

Eugene Urban Reserves Technical Memo

I. Introduction

The purpose of this document is to describe the assumptions and methodology behind the two models used for Eugene urban reserves planning work: The Land Need Model and the Land Supply Model, and how this work informs the land selected for Eugene’s urban reserves.

The work that went into developing these two models is laid out consecutively in section II. Land Need Model, and section III. Land Supply Model. However, this work in practice was intertwined in the development of the Eugene urban reserves, and each are referenced throughout this document (e.g., the land capacity analysis in the Land Supply Model is also a component of the Land Need Model). This memo cannot describe all the technical analysis involved in urban reserves planning, instead it documents the key assumptions and methodology.

This document is Appendix 4 to the Eugene urban reserves legal findings, and two documents are included as attachments to this memo: the Eugene Urban Reserves Land Need Model (Appendix 4a), and the Map Documentation of “Undevelopable” Land (Appendix 4b).

II. Land Need Model

For urban reserves planning, the City of Eugene contracted with ECONorthwest to retrofit the Envision Eugene Land Sufficiency Model developed for estimating the 20-year land demand and the development capacity of the 2012-2032 Buildable Lands Inventory (BLI) to meet that demand during the 2017 UGB analysis.¹ The result is the **Urban Reserves Land Need Model (Land Need Model), Appendix 4a – its purpose is to estimate the amount of land needed for residential, employment and other uses over the 2032-2062 urban reserves planning period.** Wherever possible, the assumptions used in the Land Need Model are carried forward from the Envision Eugene Land Sufficiency Model since they were adopted with the UGB.²

This section summarizes the assumptions used in the Land Need Model and directs readers to the tables in the Land Need Model – where the assumptions and results are located. For more detailed information

¹The 2012-2032 Buildable Lands Inventory was adopted as part of the Envision Eugene Comprehensive Plan Appendix C Residential Land Supply Study and Appendix B Employment Land Supply Study in 2017 and acknowledged by DLCD in 2018. The Envision Eugene Land Sufficiency Model was developed to allow the City and interested stakeholders to model the effects of changing key assumptions used in Envision Eugene, including assumptions regarding land demand and the capacity of the land supply, and also to show the complexity of the analysis and how all the assumptions relate to each other.

² For brevity, we are calling this work “Envision Eugene” in many cases throughout this document and in the Land Need model

on the assumptions adopted with the UGB and how they were developed, see the adopted Envision Eugene Residential and Employment Land Supply Studies (2012-2032).

A. Forecast Period

The model calculates land needed for urban reserves ranging from a 10-year to a 30-year forecast period, or any years in between, depending on the population and employment growth assumptions input in the model. These assumptions are based on review of OAR 660-021 and discussions with staff from the Department of Land Conservation and Development (DLCD). OAR 660-021-0030(1) reads: “Urban reserves shall include an amount of land estimated to be at least a 10-year supply and no more than a 30-year supply of developable land beyond the 20-year timeframe used to establish the urban growth boundary.” The model is built to allow comparing timeframes, such as 2032-2042; 2032-2052; or 2032-2062 for comparison purposes only.

The Land Need Model Forecasts Tab shows the Population Forecast for Eugene (Table F1) and the Employment Forecast for Eugene (Table F2), including annual estimates extrapolated for the urban reserves study years between 2032 and 2062. Based on Eugene City Council and Lane County Board of Commissioners direction, the model (and the following analysis) calculates the land needed for urban reserves for a 27-year period, 2032-2059. Population growth for the year selected (2059) is used in the Assumptions tab, Table 1, and Employment growth for the year selected (2059) is used in Table 8.

B. Residential Land Needs

The following section documents the assumptions about residential land needs for urban reserves.

Population Forecast & Growth Rate

A population forecast is the foundation for estimating how many new dwelling units will be needed and eventually how much land is needed to accommodate those dwellings and related development. The population forecast must be based on the official state forecast from Portland State University (PSU).³ In this case that is the “Coordinated Population Forecast, 2019 through 2069, Lane County, its Urban Growth Boundaries (UGB), and Area Outside UGBs” Final Report, **June 30, 2019**.

The 2019 population forecast is used beginning in 2032, the year the UGB planning period ends (Eugene’s adopted UGB planning period is 2012-2032). For the UGB planning period, the 2009 population forecast from PSU was used, which assumed that the Eugene UGB would grow to 214,693 by 2032.⁴ Because the 2009 forecast is no longer the official state forecast, the urban reserves planning period begins with the 2019 forecast,⁵ which shows that in 2032 the Eugene UGB will have 213,619 people and by 2062 there will be 216,412 people. The 2019 forecast shows that the Eugene UGB will have 1,074 fewer people than the 2009 forecast projected by 2032.

³ OAR 660-032-0020(1)

⁴ Eugene City Council Ordinance Number 20437, effective as of November 13, 2009. See page 2.

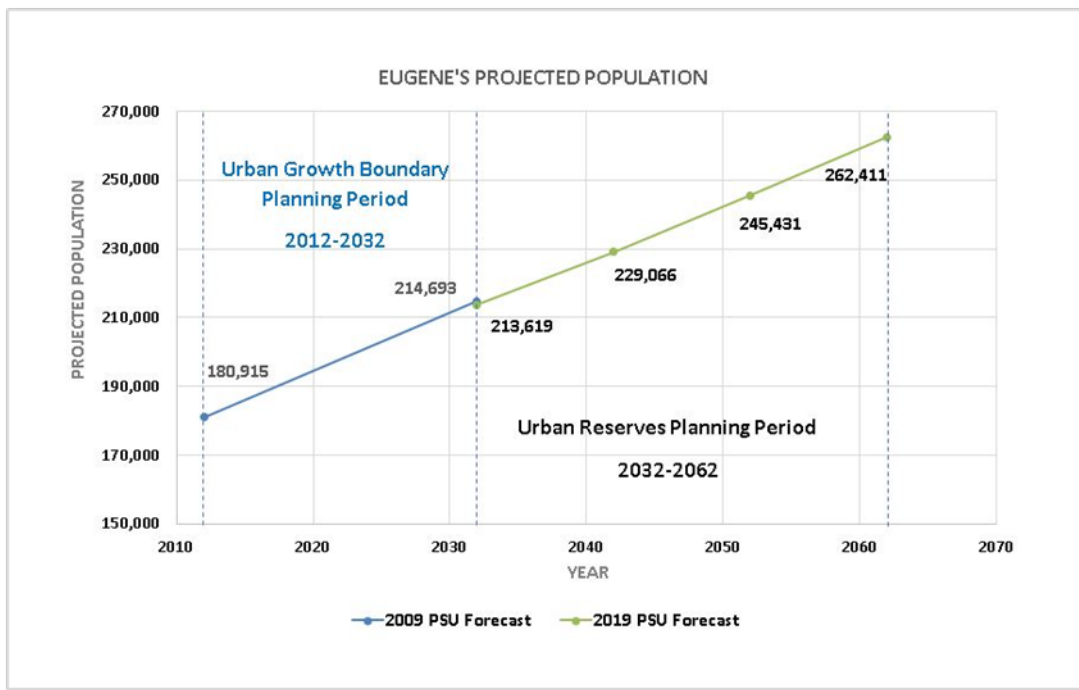
⁵ Coordinated Population Forecast, 2019 through 2069, Lane County, its Urban Growth Boundaries (UGB), and Area Outside UGBs” Final Report, June 30, 2019

The rationale to use the 2019 forecast for urban reserve planning was based on review of OAR 660-021, the fact that the population forecast must be based on the official state forecast from PSU, and discussions with staff from the Department of Land Conservation and Development (DLCD).⁶

ECONorthwest extrapolated a population forecast between 2032 and 2062 from PSU’s 2019 forecast (which is in 5-year increments) using the methodology specified by PSU as the correct way to extrapolate annual population forecasts.⁷ The Land Need Model shows the extrapolated forecast on a year-by-year basis on the Forecasts Tab, Table F1.

Figure 1 below shows the expected population growth based on PSU’s 2019 forecast for Eugene; there will be 48,792 new residents between 2032 and 2062, which is a **growth rate of approximately 0.7 percent**. Based on a 27-year urban reserve, the population growth is **43,944 new residents between 2032 and 2059** (257,563 people in Eugene’s UGB by 2059), shown in the Land Need Model on the Assumptions Tab, Table 1 and Forecasts Tab, Table F1.

Figure 1: UGB and Urban Reserves Planning Periods and Population Forecasts



Number of New Dwelling Units

The number of new dwelling units is calculated based on population growth, persons in group quarters, average household size, and vacancy rates.

⁶ PSU issued a new population forecast on June 30, 2021 for Lane County. Since the urban reserves analysis was based on the 2019 forecast, including urban reserves adoption initiation, that forecast has been used. The City submitted proposed plan amendments to DLCD on June 25, 2021, based on guidance from DLCD.

⁷ The method for extrapolation is described here:

<https://drive.google.com/file/d/1hw7qOk6LkiZsuU8rwH6heWkeLLsl6OZs/view?usp=sharing>

The assumptions about number of new units are shown in the Land Need Model on the Assumptions Tab in Table 1 and in Table 6 for group quarters. They include population growth for the 2032-2059 period, percentage of new population in group quarters, average household size, and vacancy rate. The expected population growth, excluding the percentage of new people expected to reside in group quarters (e.g., nursing homes, dormitories), is divided by the average number of people per household (household size) for all households, resulting in the initial number of new units needed. The initial number of new units is increased by a certain percentage to allow for some portion of the new housing units to be vacant, allowing for the typical movement of households between housing units. For group quarters, the expected population growth to need group quarters is divided by the average number of people per household in buildings with 5 or more units.

These calculations are shown on the Residential Tab in Table R1 and for group quarters Table R6. The assumptions for these variables, other than population growth, did not change from the adopted Envision Eugene Residential Land Supply Study. For full information see Section 3.1, Part II “Eugene Housing Needs Analysis” of the Envision Eugene Residential Land Supply Study. The Residential Land Supply Study used the best available information at the time of the UGB analysis. Since those assumptions were adopted with the UGB, they were carried forward for urban reserves planning. They are: that 4.6% of the new population (2,021 people) will live in group quarters housing, the average household size or number people per household will be 2.24 people per household, the average household size for group quarters will be 1.6 people per household, and the vacancy rate of all new housing will be 5%.

Housing Mix and Allocation of Dwelling Units to Plan Designations

The assumptions about the mix of new housing and allocation of new housing by type of housing to each of Eugene’s comprehensive plan designations did not change from the adopted Envision Eugene Residential Land Supply Study.

The assumptions about housing mix are also shown in the Land Need Model on the Assumptions Tab in Table 1. The housing types categories assumed in the Land Need Model are: single-family detached, single-family attached, buildings with two to four units, and buildings with five or more units. The assumptions about allocating housing types to residential plan designations are presented in Table 2. These calculations are shown in the Land Need Model on the Residential Tab in Tables R1 and R2.

Initially, the Land Need Model allocates housing need to each of Eugene’s existing residential plan designations, to be consistent with the analysis and assumptions used in the adopted Envision Eugene Residential Land Supply Study. Later in the Land Need Model all housing needs from each plan designation are collapsed into one category of “residential” need because land in urban reserves cannot have a specific plan designation until included in the urban growth boundary, per OAR 660-021-0040(1). When (and if) the Eugene UGB is expanded, is the point when Eugene plan designations will be assumed for specific parcels of land in a UGB expansion area and the housing needs will be allocated by specific plan designation. Because of this, the density assumptions for urban reserves land also are collapsed into a generic “residential” category, as discussed in the next subsections.

Residential Density of Land by Plan Designation

The assumptions about housing density (number of dwellings per acre) by plan designation, including net density, net to gross factor, and resulting gross density generally did not change from the Envision

Eugene Residential Land Supply Study. These assumptions are used to estimate the capacity of land to accommodate expected growth. The exception is the density assumed for the Medium Density Residential (MDR) Plan Designation. This assumption was changed from 13.4 dwelling units per net acre to 15.4 dwelling units per net acre on land less than 5 percent slope to be consistent with Eugene's adopted policy changes regarding density in MDR that were made as part of the Envision Eugene process. For more information see Section 2, Part IV "Measures to Increase Residential Development" of the Envision Eugene Residential Land Supply Study.

These assumptions about housing density by plan designation are shown in the Land Need Model on the Assumptions Tab in Tables 3 and 4. The density assumptions initially begin with a "net" density assumption. The net residential density of land⁸ shown in Table 3 is the density on land that is outside of transportation rights-of-ways (e.g., streets, alleys); it is essentially the density of tax lots that are the privately-owned portion of property. However, roads and utilities are also needed to serve residential development and they take up land that would otherwise be used for housing, therefore assuming net densities would overestimate the housing capacity of land. To ensure these needs are accounted for, the net density assumptions are reduced by a percentage (e.g., the net to gross factor) shown in Table 4, resulting in the average "gross density" assumptions by plan designation shown in Table 5. These assumptions were used as an initial step to estimate the potential capacity of urban reserves to accommodate new housing units, as described later in this document under Section III. Land Supply Model.

Residential Density of Land in Urban Reserves

As mentioned above, different from Envision Eugene, urban reserves will not result in different plan designations therefore the gross density assumptions need to be collapsed into generalized "residential" density assumptions before they can be applied to urban reserves land. The plan designation-specific gross density assumptions in Tables 3 and 4 on the Assumptions Tab, are collapsed into generalized residential density assumptions which are then applied to the actual developable land in the urban reserve area. The Residential Capacity Tab, Table UR-C1 shows the collapsed residential density assumptions which are allocated to the actual urban reserves land depending on lot size, slope and elevation to determine the capacity of urban reserves. More information of how urban reserves capacity was calculated is in Section III. Land Supply Model, D. Capacity Analysis, Weighted Residential Density Assumptions.

Other Residential Land Demand

These assumptions are about land demand for group quarters and land demand from commercial uses in residential plan designations. These assumptions did not change from the Envision Eugene Residential and Employment Land Supply Studies. The land for group quarters is from the number of new people assumed to need group quarters (discussed above under Number of New Dwelling Units). Commercial uses in residential plan designations include uses such as neighborhood markets and daycare, and is exclusive of home occupations, which occur with residences and therefore are assumed to not need additional land.

⁸ During Envision Eugene, the term "buildable" was used instead of "developable," consistent with OAR 660-024 for urban growth boundary planning.

The assumptions about land demand for group quarters are shown in the Land Need Model on the Assumptions Tab in Tables 5 and 6. This calculation is shown on the Residential Tab in Table R6. The assumptions about land demand for commercial uses in residential plan designations are shown on the Assumptions Tab in Table 9. The calculation is shown on the Employment Tab in Table E4 and reiterated on the Residential Tab in Table R7.

Residential Capacity of Surplus Land inside the UGB

There is a projected surplus of 47 acres of LDR land in 2032 after accounting for capacity in the 2012-2032 buildable lands inventory and efficiency measures, according to the adopted Envision Eugene Residential Land Supply Study. The capacity of this surplus is deducted from the overall residential land need for urban reserves. The housing capacity of the 47 acres surplus is estimated to be on average 4.0 du/gross acres (the Envision Eugene collapsed average density for all LDR land) because it was not possible to say where these 47 acres would be in Eugene (i.e., on land with slopes or flat land, above/below 900 feet in elevation, or size of lot).

The assumptions and calculations about surplus buildable residential land inside the UGB and its dwelling unit potential are shown in the Land Need Model on the Residential Tab in Table R3. The remaining dwellings needed for a 27-year urban reserves need after accounting for the 47-acre residential surplus is shown in the Land Need Model on the Residential Tab in Table R4 and the estimated amount of residential land needed in the urban reserve is on the Residential Tab in Table R5.

C. Commercial and Industrial (Employment) Land Needs

The following section documents the assumptions about employment land needs.

Employment Forecast & Growth Rate

The employment forecast begins in 2032, the year the UGB planning period ends. The decision to begin the forecast in 2032 was made to be consistent with the population forecast assumptions, as described previously in this memo (above under section B. Residential Land Needs), and as directed in OAR 660-021-0030. This assumption is shown on the Assumptions Tab in Table 7.

The growth rate assumed for employment growth is the OED forecast growth rate of **1.07% average annual growth per year from the 2017-2027 Oregon Employment Department (OED) forecast for Lane County**, the most recently available forecast when the majority of work on urban reserves was completed. The rationale to use this growth rate⁹ included that Eugene also used an (earlier) growth rate provided by OED in the Envision Eugene Land Sufficiency Model, which was adopted as part of the Employment Land Supply Study. In addition, as the regional employment center in Lane County, it is reasonable to expect that employment will continue relatively strong growth in Eugene. However, the rate of growth used in Envision Eugene (1.43%) for employment was significantly faster than the projected population growth for urban reserves, and there was concern that continuing to assume that

⁹ Two other employment growth rate options were considered for urban reserves other than the growth rate selected. They were: the same growth rate as used in Envision Eugene (1.43% AAGR—based on the Oregon Employment Department (OED) forecast for Lane County released in 2014); and the population growth rate from the 2019 PSU forecast (0.7%)

employment will grow that much faster than population growth forecast would be unrealistic and would presume increased commuting from outlying communities.

Using the 2017 OED employment growth forecast of 1.07%, the Land Need Model projects Eugene employment to be 204,468 by 2062, adding up to 56,008 new employees between 2032 and 2062. Table 1 below shows the employment and population forecasts assumed for urban reserves in 10-year increments.

Table 1: Summary of Employment and Population Forecast

Year	Employment growth	Employment change (from 2032)	Population growth	Population change (from 2032)
2032	148,460		213,619	
2042	165,177	16,716	229,067	15,448
2052	183,775	35,315	245,432	31,813
2062	204,468	56,008	262,412	48,792
2032-2062		1.07% AAGR		0.7% AAGR

Source: Oregon Employment Department (2017 Employment Forecast), Portland State University (2019 Draft Population Forecast), ECONorthwest, City of Eugene Urban Reserves Land Need Model

For a 27-year urban reserve, the employment growth is **49,567 new jobs between 2032 and 2059** (198,027 jobs in Eugene’s UGB by 2059). The employment growth rate of 1.07% is shown in the Land Need Model in the Assumptions Tab, Table 8 and in the Employment Tab, Table E1. The extrapolated employment forecast is shown on a year-by-year basis on the Forecasts Tab, Table F2. The starting and ending number of jobs is shown in Assumptions Tab Table 7 and the employment growth in number of new jobs is shown in Employment Tab, Table E1 and Forecasts Tab, Table F1.

Mix of Employment

The assumptions about the mix of employment types for new jobs did not change from the Envision Eugene Employment Land Supply Study. The employment types for new jobs assumed in the Land Need Model are: industrial, non-retail commercial, retail and government.

The assumptions about employment mix are shown in the Land Need Model on the Assumptions Tab, Table 8. The employment mix calculations are shown on the Employment Tab, Table E2.

Commercial Employment in Residential Designations

These assumptions are about land demand from commercial uses in residential plan designations. The amount of employment locating in residential plan designations did not change from the Envision Eugene Residential and Employment Land Supply Studies, as discussed previously under section B. Residential Land Needs.

These assumptions are shown in the Land Need Model on the Assumptions Tab in Table 9. These calculations are shown on the Employment Tab in Tables E3 and E4 and reiterated on the Residential Tab in Table R7.

Employment Densities and Land Need

The assumed employment capacity is derived from average employment densities (number of employees per acre). The average employment density assumptions did not change from the Envision Eugene Employment Land Supply Study.

The method for calculating the land needed for **commercial and retail** employment growth using employment densities also did not change from the Envision Eugene Employment Land Supply Study.

The employment land need for **industrial** employment is calculated differently for urban reserves than for Envision Eugene. The primary difference is that Envision Eugene based industrial land needs on site needs, considering the size of needed industrial sites (i.e., need for sites smaller than 10 acres compared to need for sites 50 acres and larger). Envision Eugene still counted capacity on buildable industrial lands smaller than 10 acres by assuming an average employment density (similar to commercial and retail capacity), for sites larger than 10 acres Envision Eugene used the average employment density to determine the number of sites needed in different size classifications.

For urban reserves, the Land Need Model calculates industrial land needs from an employees per acre assumption, the same way that commercial and retail employment land needs are calculated. The industrial employment density assumption is based on analysis that was conducted for Envision Eugene but, as previously outlined, was not used solely to estimate future industrial land needs in Envision Eugene.

These assumptions are shown in the Land Need Model on the Assumptions Tab in Table 10. These calculations are shown on the Employment Tab in Table E5.

Employment Capacity of Surplus Land inside the UGB

There is a projected surplus of 7 acres of Commercial land in 2032 after accounting for capacity in the 2012-2032 buildable lands inventory and efficiency measures, according to the adopted Envision Eugene Employment Land Supply Study. The capacity of this surplus is deducted from the overall commercial land need for urban reserves.

The assumptions and calculations about surplus buildable commercial land inside the UGB are shown in the Land Need Model on the Employment Tab in Table E6. The remaining 27-year urban reserves employment land need after accounting for the 7-acre commercial surplus is shown in the Land Need Model on the Employment Tab in Table E6.

D. Public and Semi-Public Land Needs

The following section documents assumptions about public and semi-public land needs:

Parks

The City Council adopted a Parks and Recreation System Plan by resolution in July 2018.¹⁰ From this work, the City estimates a future level of service of 3.59 acres of neighborhood and community parks per 1,000 residents in Eugene. The Urban Reserves Land Need Model uses this estimated level of service to determine the land need for future neighborhood and community parks in urban reserves. These types of parks are presumed because they would serve future neighborhoods and traditionally require urban services. This is a different approach to estimating land need for parks than used in Envision Eugene, where specific park acreage was used rather than a level of service. Part of the reason for this difference is that during Envision Eugene, the City had an adopted list of expected parkland acquisitions for the UGB planning period which is a level of detail the City does not have for urban reserves because of its distant planning period, nor is it necessary given the generic assumption of parks per 1,000 people in Eugene is readily available and derived from the City parks plan.

In addition, there are some public (non-neighborhood or community) parks already present in the Eugene urban reserves study area. As described further here, these parks are not included in the Land Model as needed for urban reserves nor accommodating the neighborhood or community park need identified above. These parks serve a different purpose and are evaluated as part of the Urban Reserves Study (Section C. Identification of Land in the Study Area That Would be “Suitable”) to determine whether these lands are suitable for urban reserves consideration – primarily whether they are necessary to be brought into the UGB in the future to aid in the efficient accommodation of identified land needs and in the orderly and economic provision of public facilities and services (Goal 14, Locational Factors 1 and 2). Some of these parks are surrounded by developable lands and others are on the edge of the urban reserves study area, including: Wild Iris Ridge, Spencer’s Butte, Suzanne Arlie Park, Armitage Park and others. As with existing utility land, discussed below, they do not need to be urbanized due to their use, nor do they have development capacity for residential or employment uses. Depending on their location and adjacency to developable land, the Eugene urban reserves either included existing parkland or dismissed that land because overall it was determined to be unsuitable for urban reserves. This analysis is documented in the Urban Reserves Study Subarea Reports (Appendix 2a of the Findings).

Educational and Other Public Facilities

City staff have had discussions with Bethel and 4J School Districts about their long-term land needs to serve students in the Eugene urban reserves. Neither school district identified a need for acquiring additional land outside of the UGB.

City staff had discussions with the University of Oregon and Lane Community College (LCC) staff about their long-term need for additional land for facilities to serve students in the Eugene urban reserves. Neither institution identified a need for acquiring additional land outside of the UGB.

City staff have had discussions about the long-term need for land for other public facilities such as major water, wastewater, or stormwater facilities in Eugene urban reserves. Conversations have been held

¹⁰ <https://www.eugene-or.gov/DocumentCenter/View/42069/2018-Final-Parks-System-Plan>

with City Public Works Department staff as well as public agencies such as the Eugene Water and Electric Board (EWEB) and the Metropolitan Wastewater Management Commission (MWWC). None of the agencies identified a need for acquiring additional land outside of the UGB for public facilities. This is a different approach to estimating land need for public facilities than used in Envision Eugene, where the acreage needed for specific facilities was used. Part of the reason for this difference is that during Envision Eugene, the City had adopted project lists of expected public facility acquisitions in adopted facilities master plans and capital improvement lists for the UGB planning period, which is a level of detail the City does not have for urban reserves and its more distant planning period. It is acknowledged that these types of public facilities will be needed if the UGB is expanded into urban reserves. The net-to-gross factor discussed in this memo under section B. Residential Land Needs accounts for the expected needs for utility (water, stormwater, wastewater) lines and transportation rights-of-way, but other public facilities discussed in this section will need to be further analyzed at the time of the next UGB analysis. Once areas of UGB expansion are identified, service providers will have more information about the amount of public land acquisition needed due to the additional amount, location and capacity of housing and jobs needed. Therefore, the Land Need Model does not include any additional land needed for public facilities, though some publicly-owned land is included in urban reserves as noted below.

While public facilities do not necessarily need to bring land into the UGB (and thus into urban reserves) to accommodate expected growth, some of these agencies already own property within the Eugene urban reserves. These include: the LCC main campus, MWWC wastewater facilities, land owned by Bethel School District, Oregon Department of Transportation, EWEB, and others. Depending on the location of the facilities and other factors evaluated in the suitability analysis, as noted above regarding parkland, the Eugene urban reserves includes some of these publicly-owned properties to aid in the efficient accommodation of identified land needs, and in the serviceability of surrounding developable land. Other publicly owned land was identified as not suitable for Eugene urban reserves due primarily to its greater isolation—for example, its location on the edge of the urban reserves study area would not allow it to aid in the service provision of developable land in the future. The evaluation of publicly owned properties is documented in the Urban Reserves Study Subarea Reports (Findings Appendix 2a).

Semi-Public Uses

The Urban Reserves Land Need Model assumes 1.3 acres of land need for semi-public (i.e., religious institutions) uses per 1,000 (new) people. This assumption did not change from the Envision Eugene Residential and Employment Land Supply Studies.

The assumptions for both public and semi-public land demands are shown in the Land Need Model on the Assumptions Tab in Table 11. These calculations are shown on the Public Tab in Table P1.

E. Summary

The **Land Need Model Summary Tab**, Table S1 summarizes the estimated need for residential, commercial, industrial, and public land uses and compares the total estimated need to the estimated supply (the actual land selected for Eugene urban reserves). The total land need for each use is carried

forward from the “Assumptions,” “Residential,” “Employment” and “Public” tabs in the City’s Land Need Model, as summarized in the sections above. These are pulled into the Summary Tab; together they result in an estimate of 5,922 total acres needed for a 27-year supply of urban reserves (Table 2). This estimate of the amount of land needed for a 27-year supply of urban reserves land is slightly less (by 21 acres) than the final amount of land selected, due to the characteristics and resulting lower capacity of the actual lots selected for urban reserves (e.g., flatter land has a higher capacity assumption resulting in less acreage needed to accommodate the need than sloped land). As documented in the following sections of this memo, and in the Eugene Urban Reserves Study (Appendix 2 of the Findings), after the capacity analysis was completed and land was selected for the Eugene urban reserves, the “land selected for 27-year urban reserves” in Table 2 shows **5,901 acres of developable land**.¹¹

Table 2. Summary of all land need for a 27-year urban reserves (2032-2059)

Land Use Type	Urban Reserve Land Needs (gross acres/developable land)
Residential	
For housing	4,021
For group quarters	59
For employment in residential areas	82
Commercial	
For employment	694
Industrial	
For employment	852
Public Land	
For public uses	158
For semi-public uses	57
Estimate of land need for 27-year urban reserves	5,922
Land selected for 27-year urban reserves	5,901

Source: City of Eugene Urban Reserves Land Need Model

¹¹ Entering the population and employment forecasts for a 26-year supply and a 28-year supply into the Urban Reserves Land Need Model, it is clear that the 5,901 developable acres selected for Eugene Urban Reserves is closest to a 27-year urban reserve. The model shows an estimate of land needed for a 26-year urban reserve is 5,689 developable acres and an estimate of land needed for a 28-year urban reserve is 6,159 developable acres.

F. Capacity of Land in Potential Urban Reserves for Residential Uses, Overall Capacity and Capacity by Subarea

These two tabs (Residential Capacity and Capacity by Subarea) show background data that informs the results of both the Land Need and Land Supply models; they show the estimated capacity of the land that was analyzed, then ultimately selected for Eugene urban reserves.

The **Residential Capacity Tab** shows the estimated capacity of urban reserve land for residential uses. It is based on the density assumptions used in Tables 3 and 4 of the Assumptions Tab, and the gross density assumptions shown in Table UR-C1 used in the Land Supply Model. These assumptions are then applied to urban reserves and presented on the Residential Capacity Tab at three scales: (1) the total study area (Tables UR-C2 and UR-C3), (2) only the land in the study area identified as suitable for urban reserves (“Suitable Land” in Tables UR-C4 and UR-C5), and (3) only the suitable land selected for a 27-year urban reserve (Tables UR-C6 and UR-C7).

This information is then summarized into Table UR-C8: Summary of developable land for residential uses, in developable acres, and Table UR-C9: Summary of residential capacity and average density. Table UR-C9 shows how the overall average residential density (estimated dwellings/developable acres) achieved changes with the differing characteristics of the land included at each scale. Although each scale uses the same density assumptions in Table UR-C1, the suitable land (row 2) has a higher average estimated density than the full study area (row 1), because land with more development constraints has been removed from the suitable lands (primarily lots with greater than five percent slope above 900 feet in elevation which has lower density and capacity assumptions). The average estimated density then drops when land for the 27-year urban reserves is selected from that suitable land (row 3), because the highest-value agricultural land is removed from urban reserves consideration (which has less than 5 percent slope and is located below 900 ft. and therefore has higher density and capacity assumptions). This methodology is fully described later in this memo, in **Section III. Land Supply Model, D. Capacity Analysis**.

The **Capacity by Subarea Tab** shows the summary of developable land (Table UR-C10) and the estimated residential capacity of urban reserves land, by subarea and at three scales, (1) the total study area (Table UR-C11), (2) only the land in the study area identified as suitable for urban reserves (“Suitable Land” in Table UR-C12), and (3) only the suitable land selected for a 27-year urban reserve (Table UR-C13). Subareas were developed for analysis purposes only as part of the suitability analysis. Results are based on the density assumptions used in Table UR-C1 in the Residential Capacity Tab and applied to developable land. As noted above, further documentation of how urban reserves capacity was calculated can be found in **Section III. Land Supply Model, D. Capacity Analysis**.

III. Land Supply Model

A geospatial Urban Reserves Land Supply Model was developed to analyze the land within the urban reserve study area. The same data sources and methodology from the Envision Eugene adopted 2012-2032 Buildable Lands Inventory (BLI)¹² were employed whenever possible. However, some data sources were no longer available or more precise updated datasets had become available. For example, the 2012-2032 BLI used the regional land use layer as one of the primary inputs to determine whether land was developed or undeveloped, but that information has not been updated since 2012. As a substitute for the regional land use layer, the Urban Reserves Land Supply Model used the Property Class Description from the Lane County Assessment and Taxation Department, which is updated annually based upon property sales.

This section describes the data, methodology and assumptions used in the Land Supply Model to develop the urban reserves land supply and land capacity estimates. The main unit of analysis within the Land Supply Model is the tax lot, and whenever possible, information is provided at the tax lot level. Therefore, tax lots were either entirely included or excluded at each stage of the analysis when determining the Eugene urban reserves, with the exception of transportation rights-of-ways because those are not individual tax lots.

A. Classifying development potential

The assessment of land supply begins by classifying each tax lot into four categories based on their development potential:

- Occupied
- Severely constrained by natural hazards or subject to natural resource protections,
- Partially vacant
- Undeveloped

Land that is occupied¹³ falls into three categories:

- Publicly owned land that is being used or that is committed to public use (including parkland, land owned for schools and utilities, airport property, and utility and transportation easements and rights-of-way)
- Cemeteries
- Privately owned land that is developed

The first step is identifying occupied lands that are committed to public or special uses. These areas are devoted to uses like parks, schools, government offices, cemeteries, and rights-of-way and therefore are assumed to have no development or redevelopment capacity for residential or employment. Occupied land committed to public or special use includes:

¹² For complete details on Eugene’s adopted 2012-2032 Buildable Lands Inventory, refer to the Envision Eugene Comprehensive Plan Appendices: the [Employment Land Supply Study](#) and the [Residential Land Supply Study](#).

¹³ Land that is occupied is further described in the Urban Reserves Study, Appendix 2 to the Eugene Urban Reserves Findings.

- Transportation rights-of-way (e.g. streets and rail)
- City Government Property
- County Government Property
- State Government Property (includes land owned by state-funded schools such as University of Oregon and Lane Community College)
- Federal Government Property (e.g. Bureau of Land Management)
- Parks (city, county, and state) and park easements
- School property (e.g. 4J and Bethel schools)
- Cemeteries
- Public utility property for water, wastewater, electric and natural gas, including Bonneville Power Administration (BPA) easements

Next, lands that are severely constrained by natural hazards or subject to natural resource protections¹⁴ are identified.¹⁵ These lands are assumed to have no potential capacity for residential or employment development or redevelopment and include:

- Federal Emergency Management (FEMA) Floodway and Special Flood Hazard areas
- Lane County's Adopted Goal 5 Riparian Corridors with applicable setbacks
- Lane County Goal 5 adopted wetlands, wetlands on the National Wetlands Inventory, and wetlands designated as protect or restore in the West Eugene Wetlands Plan
- Critical habitat (federal and state-listed threatened and endangered species) from U.S. Fish and Wildlife Service and the Oregon Biodiversity Information Center
- Historic and cultural resources, which are properties classified as eligible and listed according to the Oregon Heritage State Historic Preservation Office
- Designated Natural Areas on the Oregon State Register of Natural Heritage Resources
- Plan designations: Natural Resource (Metro Plan), Natural Resource: Conservation Area (Rural Comprehensive Plan), and Natural Resource: Wildlife (Rural Comprehensive Plan)
- Properties with active conservation easements recognized by the Lane County Assessment and Taxation Department¹⁶
- Areas with prohibitively steep slopes of 30% or greater
- Areas with a high risk of either a shallow or deep landslide according to the Oregon Department of Geology and Mineral Industries (DOGAMI) landslide susceptibility layers

¹⁴ Also identified as/synonymous with “Land that is Severely Constrained by Natural Hazards or Designated / Zoned to Protect Natural Resources” in the Urban Reserves Study, Appendix 2 to the Eugene Urban Reserves Findings.

¹⁵ Except for one, these land types are included in OAR 660-024-0065 “Establishment of Study Area to Evaluate Land for Inclusion in the UGB ... (c) the land consists of a significant scenic, natural, cultural or recreational resource described in this subsection” and “(b) the land is subject to significant development hazards...” These are lands which may be excluded from the preliminary study area when considering a UGB expansion. They were identified as “undevelopable” for the purposes of establishment of the Eugene urban reserves in part to be consistent with state rules for UGB expansion, as urban reserves will be among the first land considered when expanding the UGB in the future. The only land type included here but not in OAR 660-024-0065 are areas with prohibitively steep slopes of 30% or greater; they are included to be consistent with the analysis undertaken for the Envision Eugene adopted 2012-2032 Buildable Lands Inventory (BLI).

¹⁶ While this was a model input, there were no properties with conservation easements identified in the study area.

Other land with natural resource protections were handled differently and not classified with the above data in the land supply model. These include land with sand and gravel resources and land that was included on Lane County’s map of big game habitat prior to 1984. These land types were evaluated as part of the Goal 14 locational factor analysis in the suitability analysis, Eugene Urban Reserves Study, Section C.

Lands can be classified as occupied, severely constrained by natural hazards or subject to natural resource protections, or both (e.g., government-owned land with protected wetlands) and as such these classes are not mutually exclusive. In areas that are both occupied and severely constrained by natural hazards or subject to natural resource protections, the occupied classification takes priority, and will ultimately be assigned to the area.

For more information on these model inputs, see the the Map Documentation of “Undevelopable” Land (Attachment 4b).

With occupied lands that are committed to public or special uses and land severely constrained by natural hazards or subject to natural resource protections identified, the Urban Reserves Land Supply Model categorizes the remaining land within the study area as **occupied, partially vacant, or undeveloped**. Property classifications and improvement valuations from the Lane County Assessment and Taxation Department are used to determine the categorization of each lot. The locations of addresses and building footprints along with aerial imagery are also used to aid in the process.

Privately owned, developed tax lots are initially classified as **occupied** if these criteria are met:

- Not previously identified as fully constrained by natural hazards or subject to natural resource protections
- Has an improvement value assigned by the Lane County Assessor of greater than or equal to \$1,000 in 2018
- Has a developed property class code from the Lane County Assessor in 2018
- Contains an address point as of January 1, 2019
- Contains a building footprint as of January 1, 2019

Privately owned tax lots initially classified as occupied are reclassified as **partially vacant** if these criteria are met:

- The portion of the tax lot not occupied by a public easement, severely constrained by natural hazards, or subject to natural resource protections is greater than or equal to the partially vacant threshold size of 1 acre
- The remaining developable land on the lot is greater than 4,500 square feet¹⁷

Tax lots are initially classified as **undeveloped** if these criteria are met:

- Not previously identified as occupied or fully constrained by natural hazards or subject to natural resource protections
- Has an improvement value assigned by the Lane County Assessor of less than \$1,000 in 2018

¹⁷ The minimum lot size in Eugene’s R-1 Low Density Residential of 4,500 square feet was used as a proxy for the threshold of a buildable lot size.

- Has an undeveloped property class code from the Lane County Assessor in 2018
- Does not contain an address point as of January 1, 2019
- Does not contain a building footprint as of January 1, 2019

B. Manual review of tax lots

Whenever there is conflicting information (e.g., significant improvement value and a property classification indicating development, but no address or building footprint), staff manually reviewed the information for the property in question and all surrounding properties to categorize the development potential of the lot.

When evaluating lots that are eligible for the partially vacant development potential, the area of the existing development is quantified to determine the remaining amount of developable land. The methodology for this differs slightly from the Envision Eugene method. The 2012-2032 Adopted BLI assumed for low density residential land a standard existing development amount of 0.33 acres for lots with a predominant slope of 5 percent or less, and 0.5 acres for lots with a predominant slope of greater than 5 percent. These standard values were based on a manual review of development on partially vacant residential lots across the Eugene UGB during Envision Eugene. A review of large developments was then conducted to manually measure the existing development visible on aerial imagery and those values were applied instead of the standard existing development amounts.

Instead of this practice, the Urban Reserves Land Supply Model used an automated approach to buffer all building footprints on a lot by 30 feet, then draw a polygon completely containing all the buildings and buffers. Driveways outside of the buffer do not count as development, as they can be reconfigured. The size of the polygon containing all the buildings and their buffers was calculated and if it was greater than the standard amount (0.33 acres for lots with a predominant slope of 5 percent or less and 0.5 acres for lots with a predominant slope of greater than 5 percent), it was rounded to the nearest tenth of an acre and used for the existing development amount for the lot. If the automated calculation was less than the standard amount, then the standard existing development amount was applied based on the predominant slope of the lot.

Large lots with widespread development were manually checked, and overridden if necessary, to ensure that the automated calculation did not overestimate the existing development. Additionally, lots with developable land near the threshold amount of 4,500 square feet were manually reviewed to estimate that the configuration of the lot could accommodate additional development.

There were other cases where staff overrode the standard output of the model to reflect more recent information. Examples include land recently purchased by the City's Parks and Open Space Division that was soon to be committed to park use, land initially identified as occupied because it was owned by a public-entity but was actually surplus and could be developed, land without a building footprint in the GIS layer but with a building on it and at least one other indicator of development (e.g., improvement value greater than \$1,000, an address point, or a developed property class code).

In areas where the UGB bisects a tax lot, the development on the entire tax lot is considered when assigning a development potential, but only the amount of developable acreage outside the UGB is counted. For example, if all the existing development is on the portion of the tax lot inside the UGB, the lot will be classified as occupied or partially vacant depending upon the amount of developable acreage of the portion outside the UGB.

After manual review, classification of development potential was complete.

C. Cleaning up plan designation slivers and identifying splits to determine priority land categories and acreage

When plan designations and tax lots did not align perfectly in the geospatial model, staff manually reviewed tax lots to determine on which plan designation(s) the existing development occurred and to correctly identify the priority land category of the lot (based on the plan designation).

Staff identified all splits or gaps in plan designations to be a “sliver” if the secondary plan designation or gap in plan designation accounted for **less than 10%** of the area of a tax lot. These slivers were determined to be a misalignment/difference in spatial accuracy between the plan designation layers and the tax lot layer. Tax lots containing slivers were assigned the primary plan designation. This was done to calculate acreage and capacity by priority land categories for determination of urban reserves, as required per OAR 660-021-0030. Table 3 summarizes which plan designations were assigned to each priority land category.

Table 3: Plan designations comprising each priority land classification

Priority Land Classification	Metropolitan Plan Designations	Rural Comprehensive Plan Designations
First Priority: Exception Areas	<ul style="list-style-type: none"> • Government and Education • Rural Industrial • Rural Commercial • Rural Residential 	<ul style="list-style-type: none"> • Commercial • Industrial • Nonresource • Residential
Second Priority: Marginal Lands	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Marginal
Third Priority: Agricultural Lands	<ul style="list-style-type: none"> • Agriculture 	<ul style="list-style-type: none"> • Agriculture
Third Priority: Forest Lands	<ul style="list-style-type: none"> • Forest Land 	<ul style="list-style-type: none"> • Forest
Other Lands¹⁸	<ul style="list-style-type: none"> • All other plan designations 	<ul style="list-style-type: none"> • All other plan designations

A manual review of the alignment for tax lots with secondary plan designations or gaps in plan designations accounting for **greater than 10%** of the tax lot revealed that in certain cases there was a clear shift in the plan designation from the tax lot layer. In some cases, the plan designation layer roughly followed the tax lot lines, but was drawn at a different scale, resulting in this spatial shift or offset. In these cases, the shift was evaluated manually, and the interpreted, intended plan designation was applied to the entire tax lot. For tax lots where the secondary plan designation accounted for greater than 10% of the tax lot and there was no clear spatial shift between the tax lot layer and the plan designation layer, the tax lot was classified as split designated. Split-designated tax lots may also result in a tax lot with a split priority land classification.

All split-designated tax lots with a development potential of partially vacant were manually reviewed to determine on which plan designation(s) the existing development occurred. The existing development

¹⁸ “Other lands” include land present in the urban reserves study area with plan designations that are not included in the First, Second or Third priority land categories, such as Sand and Gravel, Airport Reserve, and Public Facility, among others.

acreage was then removed from the developable acres in the appropriate plan designation/priority land category, so that capacity could be assigned to the correct category.

Table 4: Developable land in acres by Priority Land Category in the Urban Reserve Study Area

Priority Land Classification	Partially Vacant	Undeveloped	Grand Total
First Priority: Exception Areas	1,377	321	1,698
Second Priority: Marginal Lands	342	432	774
Third Priority: Agricultural Lands	3,485	1,489	4,974
Third Priority: Forest Lands	1,833	1,633	3,466
Other Lands	190	111	301
Grand Total	7,226	3,987	11,213

D. Capacity analysis

The capacity analysis combines the urban reserves land need and land supply results to determine how many homes or jobs could be accommodated on developable land within the urban reserves study area. No uses are assigned to specific land in the study area; the analysis simply identifies whether there is enough land with specific characteristics to potentially meet different needs.

Staff and the Envision Eugene Technical Advisory Committee (EETAC) looked at capacity assumptions for two of the land needs that are potentially most significant, residential housing and industrial jobs. Capacity was analyzed for these two land use types because most of the land need is from residential housing and industrial land has certain site characteristics that are different from residential or commercial land. Commercial land is often sited with or adjacent to residential housing in mixed use neighborhoods.

Residential capacity

Residential land makes up the majority of the urban reserves land need. This section explains how residential development capacity was estimated for urban reserves, which used a similar, but more streamlined methodology to estimate residential capacity than the adopted 2012-2032 BLI. A full explanation of the residential capacity methodology for the adopted 2012-2032 BLI is available in section 4.1 of the [Envision Eugene Residential Land Supply Study](#).

The estimate of residential capacity starts with quantifying the acres of developable land, which includes undeveloped land and developable portions of partially vacant land. It uses housing density averages to convert from acres of undeveloped and partially vacant land to capacity for residential development in dwelling units. The result of the capacity analysis is an estimate of the number of dwelling units that can be accommodated on urban reserve’s undeveloped and partially vacant land. The housing density assumptions are generally the same as those used in the Envision Eugene Residential Land Supply Study, which were derived from review of previous housing development in Eugene.

Factors such as elevation, slope, and lot size can affect the capacity of the land supply to accommodate new units of housing.¹⁹ Therefore, as described below, the capacity analysis uses different density assumptions and two capacity methods for land depending on its elevation (below or at or above 900 feet), slope (less than or greater than or equal to 5%), and lot size (acres located on lots²⁰ of less than 1 acre, 1-5 acres, or 5 or more acres). Although this level of specificity makes urban reserve’s capacity analysis more complicated than is legally required, it produces more accurate results than a capacity analysis that uses a single method and density assumption to determine the capacity of all undeveloped and partially vacant land and is consistent with the Envision Eugene capacity methodology and assumptions.

- **Lot size** for undeveloped and partially vacant land. The lot size categories are lots smaller than 1 acre, lots of 1 to 5 acres in size, and lots larger than 5 acres. Lot size is considered because smaller lots require less land set aside for rights-of-way and larger lots require more land for rights-of-way. Lot size excludes the acreage of the lot occupied for public or special uses, severely constrained by natural hazards, or subject to natural resource protections. For example, if an undeveloped lot is 1.2 acres in total, with 0.5 acres of that being severely constrained by natural hazards, its lot size for capacity calculations will be classified as less than one acre (1.2 total acres minus 0.5 natural hazard acres equals 0.7 developable acres). To address the fact that there are some lots that are unlikely to develop without adding more acreage (e.g., very small “sliver” tax lots with only hundreds of square feet and lots that may be mostly non-developable because they are severely constrained by natural hazards or subject to natural resource protections), capacity was not calculated for lots below a minimum lot size.²¹
- **Slope of lot.** The slope categories are less than 5% slope and greater than or equal to 5% slope. The slope is considered because development on lands with steeper slopes generally occurs at lower densities compared to flat land (e.g., below 5% slope). To simplify slope across an entire lot into one category for the capacity analysis, all precise slope values were reclassified into 7 categories (less than 5%, 5-10%, 10-15%, 15-20%, 20-25%, 25-30%, and greater than or equal to 30%). The slope category that comprised the largest share, by area, of the lot was calculated and assigned as the predominant slope of the lot. The predominant slope of the lot was then further collapsed into two general categories: less than 5% slope or greater than or equal to 5% slope. For example, a large lot may have a predominant slope classification of less than 5%, but still contain small areas of steeper slopes. Any portions of this example lot with slopes of 30% or

¹⁹ The City imposes more regulation in areas of higher elevation and slope that contribute to lower residential densities in those areas. The areas are still developable; they simply have less capacity because portions of many sites may have steep grades or have neighborhood plan density limits.

²⁰ The capacity model results in a sub-tax lot level analysis. This means that in the geospatial model, a lot or subarea is not identical with a tax lot. Instead, it is a subarea of a tax lot that shares certain characteristics. For instance, if a lot has more than priority land classification, barring any other differing characteristics the tax lot would be split into subareas by the number of priority land classifications on the site. The term “lot” (rather than “tax lot”) as used here and throughout this section refers to the sub-tax lot acre size, excluding acreage previously identified as occupied for public or special use or fully constrained by natural hazards or subject to natural resource protections.

²¹ The minimum lot size of 4,500 square feet was used as a proxy for the threshold of a developable lot size.

more would be classified as undevelopable due to being severely constrained by natural hazards.

- **Elevation** of the land. The elevation categories are below 900 feet and at or above 900 feet. If any portion of the lot is at or above 900 feet, the entire lot is classified as at or above 900 feet. Elevation is considered because Eugene’s land use code regulates development above and below 900 feet differently in some areas.

The methods used in the capacity analysis are described below; they are the same for undeveloped and partially vacant land, which is consistent with the Envision Eugene Residential Land Supply Study:²²

- **Capacity method in dwellings per acre.** This method estimates the capacity on:
 - land of all sizes that is flat and below 900 feet,
 - lots of all sizes with a slope of greater than or equal to 5% and an elevation at or above 900 feet, and
 - lots of 1 to 5 acres and larger than 5 acres on land with a slope of greater than or equal to 5% or an elevation at or above 900 feet.

This capacity method multiplies the acres of developable land by the density assumption:

$$\text{Developable Land (ac)} * \text{Density (du/ac)} = \text{Capacity (du)}$$

For example: 100 acres of developable land * 6 dwelling units per acre = a capacity of 600 dwelling units

Developable land excludes acreage previously identified as occupied for public or special use or severely constrained by natural hazards or subject to natural resource protections. For partially vacant lots, it also excludes the amount of existing development estimated.

- **Capacity method in dwellings per lot.** This method estimates the capacity on lots smaller than 1 acre on land with any portion of the lot at an elevation above 900 feet, regardless of the slope of the lot.

This capacity method multiplies the total number of lots by an assumption about the density at which a lot will develop:

$$\text{Number of Lots} * \text{Density (du/lot)} = \text{Capacity (du)}$$

For example: 100 lots * 1 dwelling unit per lot = a capacity of 100 dwelling units

Based on actual development trends collected for the adopted 2012-2032 BLI, it is reasonably clear that, even in sloped areas and areas above 900 feet in elevation (south hills), almost every reasonably sized,

²² There is one exception to this; in the Envision Eugene Residential Land Supply Study, there was one type of land that used a different capacity method for undeveloped than for partially vacant land (LDR, 1-5 acres, sloped, less than 900'). This difference in methodology was to address an area-specific density restriction. However, for urban reserves capacity analysis, since that density restriction is not applicable in the urban reserves area, undeveloped and partially vacant land in this category were treated with the same capacity method.

undeveloped lot could develop with one home. For these smaller lots, an average density “per acre” is not as accurate as a “one dwelling unit per lot” measurement.

Density assumptions are documented in the Urban Reserves Land Need Model. As described in Section I, they are generally the same assumptions as were used in the adopted 2012-2032 Buildable Lands Inventory and based on the actual density achieved inside the UGB between 2001-2012. The density assumption begins with identifying a preliminary average residential density that would occur on those acres if all the buildable land was dedicated to housing units (net density). The method does not employ site specific density assumptions; rather it applies average densities to all developable land in a category to derive a dwelling unit estimate.

Each net density is then converted to a gross density to account for developable land that will be used for future streets, sidewalks and utility lines to serve new housing. The net density assumption was adjusted to a gross density assumption based on the amounts of land used for rights-of-way in existing housing, referred to as a net-to-gross conversion.²³ Accounting for land needed for rights-of way (e.g., streets, sidewalks, utility lines) in this way results in a density assumption that ensures the analysis is not over-estimating the housing capacity of the land supply by recognizing that some land will be needed for public uses.

Weighted residential density assumptions

Given that future residential plan designations will not be identified for urban reserve areas, an average density is needed to predict capacity across all tax lots. The analysis used the plan designation probability by site characteristics inside the UGB as a basis for predicting potential future density within the urban reserves study area.

To incorporate these density assumptions into the urban reserves capacity analysis,²⁴ the Envision Eugene density assumptions were collapsed into weighted average density factors for residential development within each lot type for urban reserves. Calculating a weighted average density involved looking at how different residential plan designations inside the UGB (low, medium, and high density residential) are distributed within each lot type category (e.g., same elevation, slope, size) then applying it to land within the urban reserves study area.

Table 5 shows the weighted residential density calculations, which were based off actual conditions within the Eugene UGB during Envision Eugene. Residential plan designation records²⁵ from the adopted BLI (2012-2032) were categorized by elevation, slope, and size (as was done for the BLI and described

²³ OAR 660-024-0010(6) provides the following definition: “*Net Buildable Acre*” consists of 43,560 square feet of residentially designated buildable land after excluding future rights-of-way for streets and roads. Thus, a gross acre is an acre that includes future rights-of-way for streets and roads. Net densities are always higher than gross densities. Sample net to gross calculation for single-family detached using a 25% net to gross factor: Gross density = net density * (1-0.25). For example: net density of 6.0 dwelling units per acre equates to a gross residential density of 4.5 dwelling units per acre (6.0 * (1-.25) = 4.5).

²⁴ Because urban reserves studies rural land outside of the UGB that does not have low density residential, medium density residential or high-density residential designations, it was not possible to overlay capacity assumptions on tax lots with these plan designations.

²⁵ The calculations included only BLI records with 4,500 square feet or more of developable land (0.103 acres) AND one of the following plan designations: high density residential, high density residential mixed use, medium density residential, medium density residential mixed use, or low density residential.

above). Then, the proportion of plan designation records in each elevation/slope/size category were calculated and multiplied by the density factor associated with each category. Those products were then summed to arrive at a weighted average residential density assumption for each category (e.g., same lot elevation, slope, and size).

For example, within the UGB, small and sloped residential lots are overwhelmingly low density residential, whereas flat and large residential lots have a mixture of low, medium, and high density residential plan designations. This means that the weighted residential density factor applied to a large and flat lot will be higher (more density assumed) than the weighted density factor applied to a small and sloped lot (less density assumed) because the slope and size of the lot affect the likelihood of more dense development occurring.

To apply numbers to that, when tallying residential lots inside the UGB that are small (less than one acre), flat (predominantly below 5% slope), and below 900 feet in elevation, about 92% are designated LDR, 6% are designated MDR, and 2% are designated HDR. Multiplying each of those probabilities by its corresponding adopted BLI 2012-2032 gross density assumption and summing the products results in an average weighted density assumption for small, flat, and below 900 feet lots, of 6.3 dwelling units per acre.

$$(Percent\ of\ lots\ in\ LDR * LDR\ density) + (Percent\ of\ lots\ in\ MDR * MDR\ density) + (Percent\ of\ lots\ in\ HDR * HDR\ density) = weighted\ residential\ density$$

For example, for flat small lots below 900 feet in elevation (first row in the table below):

$$(92.2\% * 5.2\ du/ac) + (6.1\% * 15.4\ du/ac) + (1.8\% * 32.6\ du/ac) = 6.3\ du/ac$$

Table 5: Conversion of density assumptions by residential plan designation to a weighted gross residential density assumption for all residential land, with densities in dwelling units per acre except where noted

Lot characteristics			Distribution of lots within the UGB with matching characteristics by residential plan designation			BLI gross density assumption by residential plan designation			Weighted residential density assumption
Size	Slope	Elevation	LDR	MDR	HDR	LDR	MDR	HDR	
< 1 ac	< 5%	Below 900 ft	92%	6%	2%	5.2	15.4	32.6	6.3 du per acre
< 1 ac	< 5%	At or above 900 ft	100%	0%	0%	1 per lot	15.4	32.6	1 du per lot
< 1 ac	≥ 5%	Below 900 ft	98%	1%	1%	4.1 ²⁶	12.5	32.6	4.4 du per acre
< 1 ac	≥ 5%	At or above 900 ft	100%	0%	0%	1 per lot	12.5	32.6	1 du per lot
1-5 ac	< 5%	Below 900 ft	68%	27%	5%	4.6	13.2	24.8	8.0 du per acre
1-5 ac	< 5%	At or above 900 ft	100%	0%	0%	2.7 ²⁷	13.2	24.8	2.7 du per acre
1-5 ac	≥ 5%	Below 900 ft	97%	3%	1%	2.7 ²⁷	10.7	24.8	3.1 du per acre
1-5 ac	≥ 5%	At or above 900 ft	100%	0%	0%	2.7 ²⁷	10.7	24.8	2.7 du per acre
5+ ac	< 5%	Below 900 ft	61%	26%	12%	4.0	12.3	21.5	8.4 du per acre
5+ ac	< 5%	At or above 900 ft	100%	0%	0%	2.3 ²⁷	12.3	21.5	2.3 du per acre
5+ ac	≥ 5%	Below 900 ft	94%	6%	0%	2.3 ²⁷	10.0	21.5	2.8 du per acre
5+ ac	≥ 5%	At or above 900 ft	100%	0%	0%	2.3 ²⁷	10.0	21.5	2.3 du per acre

Table 6 summarizes the urban reserves weighted residential density assumptions by lot size and type. It is also included in the Land Need Model Residential Capacity Tab, Table UR-C1.

Table 6: Urban reserves weighted gross residential density assumptions in dwellings per acre except where noted

Lot size ²⁸	Lot slope <5%		Lot slope ≥5%	
	Entire lot below 900ft	Any portion of lot at or above 900ft	Entire lot below 900ft	Any portion of lot at or above 900ft
<1 acre	6.3 per acre	1 per lot	4.4 per acre	1 per lot
1-5 acres	8.0 per acre	2.7 per acre	3.1 per acre	2.7 per acre
5+ acres	8.4 per acre	2.3 per acre	2.8 per acre	2.3 per acre

²⁶ This category of LDR used a 1 dwelling unit per lot density assumption in the [Residential Land Supply Study](#) and was converted into number of dwelling units per acre to align with the units of the density factors for MDR and HDR. The number of lots in this category and their buildable acreage was used to convert the density assumption from 1 dwelling unit per lot to an equivalent of 4.1 dwelling units per acre.

²⁷ This category of LDR used a Capacity Method 2 density assumption (2.5 dwelling units per acre applied to all land) in the [Residential Land Supply Study](#) and was converted into a Capacity Method 1 density assumption (dwelling units per developable acre) equivalent since Capacity Method 2 was not used in the urban reserves land supply and capacity analysis.

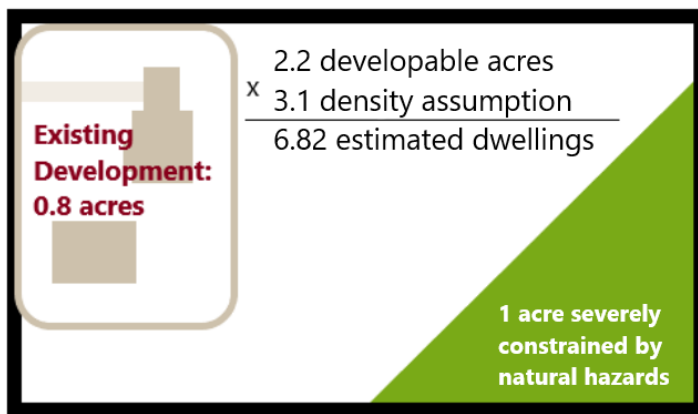
²⁸ Lot size excludes the acreage of the lot occupied for public or special uses (e.g., rights-of-way, utility easements), severely constrained by natural hazards, or subject to natural resource protections.

The weighted residential density assumption was then multiplied for each lot by the lot’s developable acres to calculate potential residential capacity for each lot in the study area.

Figure 2 displays an example to further illustrate the capacity calculations for a lot with the following characteristics:

- Lot slope: Greater than 5 percent
- Lot elevation: Below 900 feet
- Lot size: 3 acres (excludes areas occupied for public or special uses, severely constrained by natural hazards, or subject to natural resource protections)
- The slope, elevation, and size equate to a density assumption of 3.1 dwellings per acre for residential development (see Table 6)
- 4 lot acres minus 1 acre of severely constrained by natural hazards minus 0.8 existing development acres equals 2.2 developable acres
- 2.2 developable acres multiplied by 3.1 dwellings per acre results in an estimated future capacity of 6.82 dwellings on this lot.

Figure 2: Residential capacity estimate example with a 4-acre lot



It is important to keep in mind that these capacity calculations are based upon average densities seen across Eugene from 2001-2012. It is noted that some lots may develop more densely than estimated, while other lots may develop less densely. The capacity analysis does not seek to pinpoint where or exactly how much future development will happen, but to estimate on average the total amount of capacity that is available.

The developable residential acreage presented in Table 7 is also included in the Land Need Model, Residential Capacity Tab, UR-C8. It is important to note that the 5,514 acres of developable land available for residential uses in the Eugene urban reserves (row 3) is greater than the total residential land need shown in the Summary Tab, Table S1 (4,162 acres) because this land supply could be used for housing, but it could also be used for other uses, such as commercial or public uses.

Also as noted at Table UR-C8, the total acreage for all categories excludes developable acres of land in close proximity to the Eugene Airport that are only compatible with employment or industrial development, not residential use. This is further discussed in the Airport and Airport North Subarea Reports included in Appendix 2a.

Table 7: Summary of undeveloped and partially vacant land for residential uses, in developable acres^{29, 30}

	Undeveloped	Partially Vacant	Total
1. Total Study Area	3,864	6,755	10,619
2. Suitable Land	2,429	3,822	6,252
3. Urban Reserve Land (27-year)	2,252	3,263	5,514

Table 8 is a subset of results from the Land Need Model, Residential Capacity Tab, UR-C9. It shows how the estimated residential capacity changes with the land in the urban reserves study area (row 1), land that is identified as “suitable” for urban reserves (row 2) and land selected for urban reserves (row 3).

Table 8: Summary of estimated residential capacity in dwelling units²⁷

	Undeveloped	Partially Vacant	Total
1. Total Study Area	17,349	33,423	50,772
2. Suitable Land	11,577	21,286	32,864
3. Urban Reserve Land (27-year)	10,103	16,589	26,692

Industrial capacity

While residential land makes up the majority of the urban reserves land need, industrial land needs certain site characteristics that are different from some residential or commercial land. Industrial land is projected to employ 13 employees per net acre³¹. There is a projected need for 9,418 industrial employees between 2032 – 2059 (27-year planning period), which translates 852 gross acres of land.³²

The industrial capacity analysis does not assign uses to specific land in the study area; it simply identifies whether there is enough land with the characteristics to potentially meet the industrial job needs identified.

Table 9 shows the developable acres located on lots meeting all of the following industrial capacity criteria within the urban reserves study area:

- Predominant slope of less than 10 percent (OAR 660-024-0065(5)(d))
- Undeveloped or partially vacant development potential
- Developable area greater than 5 acres (OAR 660-024-0065(5)(d))

²⁹ Acreage and corresponding capacity of areas deemed incompatible with residential development due to airport proximity are excluded from tables 7 and 8.

³⁰ The acreages in Table 7 include undeveloped land that may not have estimated residential capacity because the lot size falls below the minimum threshold of 4500 square feet, therefore these values are slightly higher than those in the UR-C8 table within the Land Need Model.

³¹ 13 employees per acre is the same value found on industrially-designated land across Eugene as shown in the [Employment Land Supply Study](#).

³² These assumptions and calculations are shown in the Land Need Model on the Assumptions Tab in Table 10, and on the Employment Tab in Table E5.

- Not entirely comprised of a residential plan designation³³
- Any portion of the lot is within 1, 1.5, or 2 miles, driving distance on existing roads to a State Designated Freight Route.³⁴ Freight routes include:
 - a. I-5
 - b. I-105 west of I-5
 - c. Beltline
 - d. Hwy 99 north of Beltline
 - e. Hwy 126 west of Beltline

Table 9: Potential Industrial land capacity in developable acres

	Developable acres with potential for industrial capacity
1. Total Study Area	3,244
2. Suitable Land	2,725
3. Urban Reserve Land (27-year)	2,144

The land with industrial capacity was analyzed in the Urban Reserve Study Subarea Reports to determine whether it was suitable for urban reserves. Maps illustrating the locations of land with potential industrial capacity are shown in the Eugene Urban Reserves Study Subarea Reports (Appendix 2a to the Findings).

Table 9 shows that there is over twice as much developable and with potential industrial capacity in the Eugene urban reserves than there is need for such land. This is because developable land with industrial capacity also has potential for residential capacity, except for the land in close proximity to the Eugene Airport that is compatible only with employment uses. Further analysis related to assigning specific land uses will be undertaken during the UGB expansion analysis.

F. Suitability analysis

The results of the Land Supply Model discussed above served to inform the suitability analysis, which divided the urban reserves study area into 18 subareas to ease assessment of such a large area of land. The 18 subarea reports can be found in Appendix 2a to the Findings. The analysis from the Land Supply Model included in the subarea analysis reports, such as development potential, potential residential and industrial capacity estimates, and undevelopable land, aided staff when evaluating the Goal 14 locational factors used to determine which lands were suitable for urban reserves and which would be dismissed from consideration.

³³ The urban reserves analysis presumed that if a lot had a residential plan designation it was likely not appropriate for future industrial use due to the existing or nearby residential uses. For tax lots with split plan designations that meet the industrial criteria, potential industrial acreage and capacity estimates excluded any portion(s) with residential plan designations.

³⁴ The Freight Route designation is the criteria used in the UGB industrial expansion analysis based on the adopted Economic Opportunities Analysis in the Envision Eugene Employment Land Supply Study (1 mile was used). Rail is not included in the state’s definition of a freight route, so access to rail lines was not analyzed.

G. Determination of urban reserves land in priority order

As fully described in the Urban Reserves Study, Appendix 2, OAR 660-021-0030(3) lays out the order in which cities may include land found suitable for an urban reserve. “If land of higher priority [priority 1 and 2] are inadequate to accommodate the amount of land estimated ...third priority goes to land designated in an acknowledged comprehensive plan for agriculture or forestry, or both. Higher priority shall be given to land of lower capability as measured by the capability classification system or by cubic foot site class, whichever is appropriate for the current use.” (OAR 660-021-0030(3)(c)). This is why the Land Supply Model categorizes land in priority order and why further classification was necessary for third priority land, as described below.

Third priority agricultural and forest land classification

The predominant land capability class and forest productivity class were calculated for all suitable third priority agricultural and forest lands within the urban reserves study area. When grouped together, land capability class and forest productivity class are referred to as “land class”.

For third priority agricultural lands, the land capability class ranges from one to eight, with class one soils being the most productive for agriculture and class eight soils being least productive. The land capability class was sourced from a Lane Council of Governments (LCOG) spatial dataset, derived from the United States Department of Agriculture - Natural Resources Conservation Service (USDA - NRCS) soils database (September 10, 2019 version was used).

Land capability class definitions for agriculture land:³⁵

- Class 1 soils have slight limitations that restrict their use
- Class 2 soils have moderate limitations that reduce the choice of plants or require moderate conservation practices
- Class 3 soils have severe limitations that reduce the choice of plants or require special conservation practices, or both
- Class 4 soils have very severe limitations that restrict the choice of plants or require very careful management, or both
- Class 5 soils have little or no hazard of erosion but have other limitations, impractical to remove, that limit their use mainly to pasture, range, forestland, or wildlife food and cover
- Class 6 soils have severe limitations that make them generally unsuited to cultivation and that limit their use mainly to pasture, range, forestland, or wildlife food and cover
- Class 7 soils have very severe limitations that make them unsuited to cultivation and that restrict their use mainly to grazing, forestland, or wildlife
- Class 8 soils and miscellaneous areas have limitations that preclude their use for commercial plant production and limit their use to recreation, wildlife, or water supply or for esthetic purposes

For third priority forest lands, the productivity class is determined by the cubic feet of new growth an acre of land could produce annually when growing the dominant timber-producing tree species, which is Douglas-fir (*Pseudotsuga menziesii*) for Lane County. The Oregon Department of Forestry (ODF) groups

³⁵ Land capability class definitions are from the United States Department of Agriculture Natural Resources Conservation service: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/?cid=nrcs143_014040.

forest productivity into six classes, with class one capable of yielding the most growth and class 6 yielding the least growth.

Figure 3: Forest land productivity classes

Table 1. CUBIC FOOT PRODUCTIVITY CLASSES	
<u>CLASS</u>	<u>POTENTIAL YIELD-MEAN ANNUAL INCREMENT</u>
1	225 or more cu.ft./ac./yr.
2	165 to 224 cu.ft./ac./yr.
3	120 to 164 cu.ft./ac./yr.
4	85 to 119 cu.ft./ac./yr.
5	50 to 84 cu.ft./ac./yr.
6	20 to 49 cu.ft./ac./yr.

Source: <https://www.oregon.gov/ODF/Documents/AboutODF/LandUsePlanningNote3SiteProductivity.pdf>

The cubic feet per acre per year yield ratings were provided by the [Lane County Soil Ratings for Forestry and Agriculture report](#) (August 2011 update) from the Lane County Land Management Division. This report contains productivity ratings from NRCS and from ODF (when NRCS data are not available) by NRCS soil type. The cubic feet per acre per year yield ratings were reclassified into productivity classes based on the information listed in Figure 3.

Predominant land capability or forest productivity class

The technical analysis for urban reserves was conducted at the tax lot level, but soil types do not conform to tax lot boundaries. To evaluate agriculture land capability and forest productivity on a tax lot level, the predominant land capability or forest productivity class was calculated for each suitable third priority tax lot in the study area. In circumstances when tax lots have multiple priority land classifications, the values were only calculated for the third priority section(s) of the tax lot because land capability class and forest productivity class are only applicable when evaluating third priority land. A summary tool was run using GIS software once for land capability class on agriculture-designated land and once for forest productivity class on forest-designated land. These results produced the predominant land capability or forest productivity class (largest share by area, but not necessarily the majority because one lot could contain up to six or eight individual classes) for each tax lot comprised partially or entirely of third priority land. This method of calculating the predominant land class aligns with how slope classification was calculated for each tax lot within the study area, maintaining consistency for incorporating natural features that do not align with tax lot boundaries into the technical analysis.

Third priority (with predominant land class of 1 or 2) and first priority split tax lots

In selecting the 27-year urban reserves, as documented in the Eugene Urban Reserves Study, Sections III and IV, staff were directed by the Eugene City Council and the Lane County Board of Commissioners to not include land with the highest-value soils for urban reserves designation, which is all third priority land with predominant class 1 land and immediately adjacent predominant class 2 land (the lowest priority land based on State rules).

By not including the lowest priority land in urban reserves, five tax lots were identified with split first priority and third priority land (with a predominant land class of 1 or 2).³⁶ Since urban reserves land is selected at the tax lot level, a determination was made to select these tax lot *based on the majority priority land classification* of the tax lot. In other words, if the tax lot is majority third priority land, then that is how it is considered when designating urban reserves; if the lot is majority first priority land, then that is how it is considered when designating urban reserves. There are two cases where the tax lot is majority first priority land, and three cases where the tax lot is majority third priority land, as shown in Table 10 below:

Table 10: Third priority (with predominant land class of 1 or 2) and first priority split tax lots

Tax lot number	Percent third priority	Predominant third priority land class	Included in urban reserves?
1604280001000	88%	2	No
1604280001104	90%	1	No
1604340000900	21%	2	Yes
1604340000905	88%	1	No
1704041001200	23%	1	Yes

IV. Conclusion

This technical memo describes the methodology for estimating the land need and land supply for the Eugene urban reserves. Table 11 is from Table UR-C10 in the Land Need Model and summarizes the total developable acres available for all land uses in the urban reserves study area (row 1), in the land that is identified as “suitable” for urban reserves (row 2) and in the land selected for the Eugene urban reserves (row 3).

Table 11: Total developable acres

	Total Developable Acres ³⁷
1. Total Study Area	11,213
2. Suitable Land	6,638
3. Urban Reserve Land Selected (27-year option)	5,901

Based on the direction of the Eugene City Council and the Lane County Board of Commissioners, the Eugene urban reserves will meet the need of approximately 27-years of growth, which is a land supply

³⁶ See section III. C. of this memo, “Cleaning up plan designation slivers and identifying splits to determine priority land categories and acreage” for more information on split designations and split priority land classification within the urban reserves study area.

³⁷ These values are higher than those in Table 7 and those in the Residential Capacity section because they include developable land that is only compatible with industrial employment uses and developable land without regard to minimum lot size required for residential development.

of 5,901 developable acres. Please refer to the Eugene Urban Reserves Study (Appendix 2 to the Findings) for more information on how this technical data was used in the selection of the Eugene urban reserves.

Attachments:

- a. Eugene Urban Reserves Land Need Model (spreadsheet)
- b. Map Documentation of “Undevelopable” Land