CITY OF PHOENIX
GROWTH PROJECTIONS & LAND USE ASSUMPTIONS
2024 UPDATE

Final Report
August 21, 2024

PLANNING & DEVELOPMENT
PRESERVE
SHAPE
BUILD

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LOGANSIMPSON

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Executive Summary

This study assists the city in its planning efforts by providing various medium and long-term socioeconomic projections relating to population, employment, development by land-use, vacancy rates of existing residential and commercial space. The Growth Projections and Land Use Assumptions Update is divided into three primary project parts, the first two; (1) Growth projections and parcel sequencing information for the city's Impact Fee Growth Areas and (2) analysis of redevelopment potential and timing for Non-Impact Fee Growth Areas, will be used for impact fee calculations and updating the Infrastructure Financing Plan. The third part establishes a tool where projection results and parcel sequencing are available and data on existing land and improvements, active developments, planned and potential development.

Some of the main components and take aways from this report include:

- Control total projections for the City detail the expected total change in population and employment through year 2060 for seven major land use categories: Single-family, Multi-family, Retail, Industrial, Office, Public, and Other. City control total projections include a low-, mid-, and high-growth scenario of population and employment growth. These control totals will be used as input to guide the geospatial modeling of growth within five of Phoenix's subareas: Laveen, Estrella, Northeast, Northwest, and Balance of Phoenix.
- To facilitate the development of the socioeconomic projections, the City of Phoenix is divided into over 13,000 Development Polygons. These polygons are created using Maricopa County Assessor's Subdivisions with polygons being created for areas in the city that are not subdivided. The resulting fabric of Development Polygons (DevPolys) provides greater granularity for projection modeling than what was previously accomplished in the Land Use Assumptions update of 2018.
- The information about DevPolys is coded in DevPart records. One or more DevPart records are associated with each DevPoly, allowing for multiple land uses and development timing options to be represented. The original content in the DevPart database is created by assigning parcels from the Maricopa Association of Governments (MAG) to DevPolys. The MAG parcel data is used to create DevPart records for each unique land use MAG record. The created Devpart records receive existing development information for 2020 and 2022, which most importantly includes the number of existing units and built square feet a land parcel may have.
- The projections for the City of Phoenix are split into five periods: Base year, Current year, Estimate year, Planning Horizon, and Long-Term Projections. The Base year is 2020, it is the jump-off point where the projections start in the model. The current year is 2022, and projections for this year are based on land use data, current development figures, and other current factors that have been produced during the review process; 2022 projections are as close to actual numbers. The estimate year, 2024, is the start of the Planning Horizon timeframe and is a short-term estimate of actual numbers based on currently developing projects.
- In the case of the five growth areas, Applied Economics collected a dataset of proposed general plan amendments, proposed rezoning cases and preliminary permits from 2018 through 2022. The five-year time frame for the dataset was chosen because it would allow the team to identify projects that started building vertical in 2020 as well as identify the building order of future projects. The City of Phoenix General Plan and

Zoning maps are used as references to estimate development type and quantity for DevPolys that contain little to no information from the development pipeline dataset.

- Multiple sources were taken into account to sequence the buildout of DevPolys in each growth area. Staff knowledge, and review by the Ad Hoc Committee were key in creating the final sequence. Applied Economics completed multiple iterations to solicit feedback on the development priority of the growth regions. Sources provided by the city including preliminary permits, proposed rezonings, general plan amendments and the current general plan influenced the development priority to sequence. Taking these sources into account improved the likelihood the projected sequencing will reflect real world growth and conditions.

- Logan-Simpson developed a model to estimate the likelihood and timing of development, and redevelopment for the Balance of the city of Phoenix not in a growth area. This area includes 10 of the 15 urban villages, consisting of around 450,000 parcels. The analysis of redevelopment potential is driven by a case study of 45 actual projects Case studies are pulled from either the "Pending Major Permits" shapefile (provided by the City of Phoenix) or through the "City of Phoenix Planned Unit Development and Planned Community District Current Cases" web page. These two sources provide specific individual or collective parcels that represent current targeted areas for development, whether that be an approved site plan, rezoning case, or proposed plan.
- Utilizing Community Viz, the project team created residential and non-residential allocations by land use for each year from 2021-2060. This process was completed for a base, high and low growth scenario. After allocating dwelling units and square footage, demographic and non-residential rates are adjusted. Demographic rates take MAGs 2020 projection rates and apply them at the RAZ level. Rates are then adjusted to fit the control totals. For the high and low scenarios, the final Base scenario rates are used and then adjusted to fit the respective control totals. Nonresidential rates utilized Applied Economics LU Model sq feet per employee ratio and then adjusted the ratio to fit the control totals. Final base scenario ratios were used as the initial starting point for the high and low scenario and then adjusted to fit the control totals.
- Utilizing ESRI's Arc GIS Online Experience Builder, a tracking and reporting tool a visualization of the employment, population, square footage and housing unit results. The first component of the tracking tool is a development map that showcases the units, square feet and development timing of each Dev Poly. The second component of the tracking tool utilizes a dashboard to display projected units, square footage, employment and population.

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1.0 Introduction

The purpose of this White Paper is to document the completion of Tasks 1, 2, 3 and 4 associated with the City of Phoenix Growth Projections and Land Use Assumptions Update (City Clerk Contract Number 156366). The scope of Task 1 involves compiling the information required to develop socioeconomic projections for the City of Phoenix and its infrastructure planning areas. Task 1 also includes the collection of existing structure and parcel attributes, current development activity and future development capacity.

In Task 2, analyses were performed to generate a redevelopment sequence algorithm applied to the Balance of Phoenix (Non-Impact Fee Areas) for redevelopment potential scoring. City of Phoenix staff were continuously involved in fine tuning the redevelopment scoring algorithm for culminating in final residential and non-residential redevelopment allocations and model projections.

Task 3 allows for the creation of an internal development and land use tracking and reporting tool. This tool incorporates web-based Geographic Information Systems to present the data collected in Task 1 and the projection modeling generated in Tasks 2 and 3 through an interactive application. The Growth Projections and Land Use Assumptions Tool will also contain multiple geographic boundary references to sum projections by different geographies such as villages, council districts, and impact fee areas.

Task 4 focuses on the Impact Fee Growth Areas. Similar to Task 2, Task 4 generates parcel sequencing for all the future development potential based on city staff knowledge and City of Phoenix's Planning and Development Department data. From the parcel sequencing, projections of dwelling units, non-residential square feet, population and employment are modeled.

Projections created for each year from 2024 to 2034 are used in the calculation of development impact fees, with data for five-year projection periods extending to 2060 for longer-term planning purposes. The remainder of this introductory section provides additional information on the methodology, geographies and assumptions used in the analysis.

1.1 Background & Methodology

The goal of this study is to assist the city in its effort to prepare various medium and long-term socioeconomic projections relating to population, employment, development by land-use, vacancy rates of existing residential and commercial space, and trends in the physical characteristics. These projections are required to inform anticipated updates to the Water Resource Plan, the Water and Wastewater Master Plans, the city's Infrastructure Financing Plans (IFP), including the Water Resource Acquisition Fee, and other infrastructure and financial planning activities undertaken by the Water Services Department (WSD), the Planning and Development Department (PDD) and other city departments with major capital planning needs.

The Framework of the analysis begins with creating a county-wide forecast of total population and total employment derived from numerous state, county, and MSA projection sources. The county forecasts are then broken down into city-level forecasts. In the case of population, the share of county growth occurring in the City of Phoenix will be determined by analyzing historic growth trends and current development potential. In the case of employment, the historic share of growth occurring in Phoenix will similarly be analyzed for city-level forecasts; however, employment by industry projections will also be transformed into employment by land use. The resulting control total projections detail the change in population and employment through year 2060 for seven major land use categories: Single-family, Multi-family, Retail, Industrial, Office, Public, and Other. City control total projections will include a low-, mid-, and high-growth scenario of population and employment. These control totals will be used as input to guide the geospatial modeling of growth within five of Phoenix's subareas: Laveen, Estrella, Northeast, Northwest, and Balance of Phoenix.

The foundation of the geospatial model is the fabric of land use modeling polygons – Development Polygons, or DevPoly for short – covering the City of Phoenix. DevPolys then receive Development Part, DevPart, records that relay the type of current and future developments that exist and potentially can exist concerning the seven major land use categories. MAG and Maricopa County Assessor data with existing parcel development information will be used to fill in the DevPart records that represent existing development within a DevPoly. Data from the City of Phoenix's Planning and Development Department along with other Maricopa County ownership records will be used to fill in future potential and planned development characteristics in DevPart records that represent vacant land and redevelopable land.

A scoring system is applied to all Devpart records that contain potential for development and redevelopment to sequence the order of growth of each land use. Using the control total projections, the growth of all seven major land use categories through 2060 is allocated based on the parcel sequence system. Once all the growth allowed by the control totals is allocated to the DevPoly's, population and employment numbers are generated based on Census and MAG residential occupancy rates, population per household rates, and square feet per employee ratios. The result will be Residential and Non-Residential spatial growth models that receive mathematical control projection and then create a spatial projection based on verified development capacity.

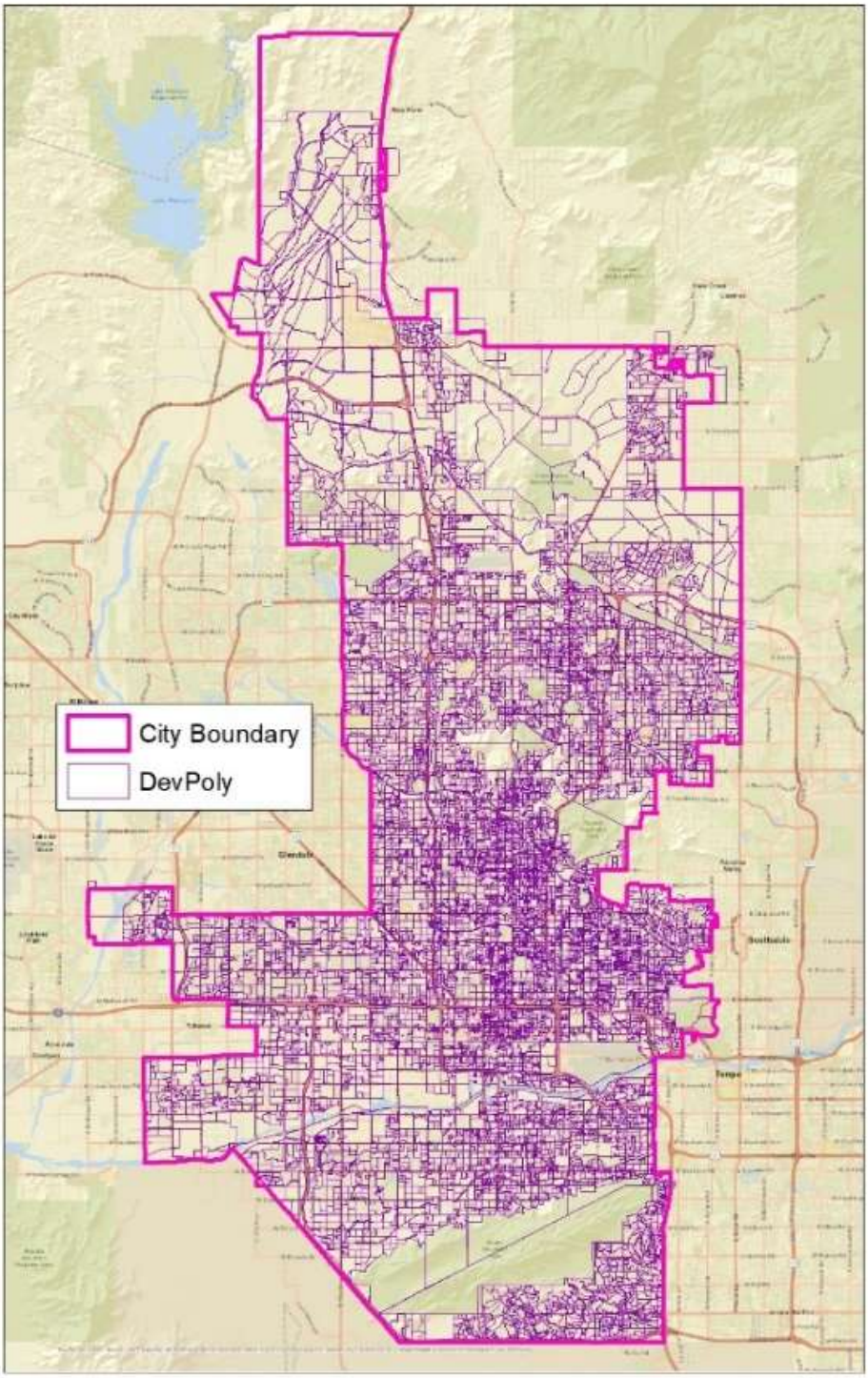
The DevPoly fabric, growth model results, model input and reference layers will all be housed in an internal City of Phoenix Arc Gis online application that can support the needs of Planning and Development and also provide valuable information to all departments in the City of Phoenix.

1.2 Spatial Modeling Areas

To facilitate the development of the socioeconomic projections, the City of Phoenix is divided into 13,469 Development Polygons (DevPolys), as show in **Map 1.1.**. These polygons are created by combining Maricopa County Assessors subdivision parcels with original Applied Economics' parcels for areas in the city where subdivision parcels did not exist. The newly synthesized polygon layer is then trimmed or merged into model-level polygons usually by way of arterials, highways and other rights of ways. The resulting fabric of DevPolys

provides greater granularity for projection modeling than what was previously accomplished in the Land Use Assumptions update of 2018.

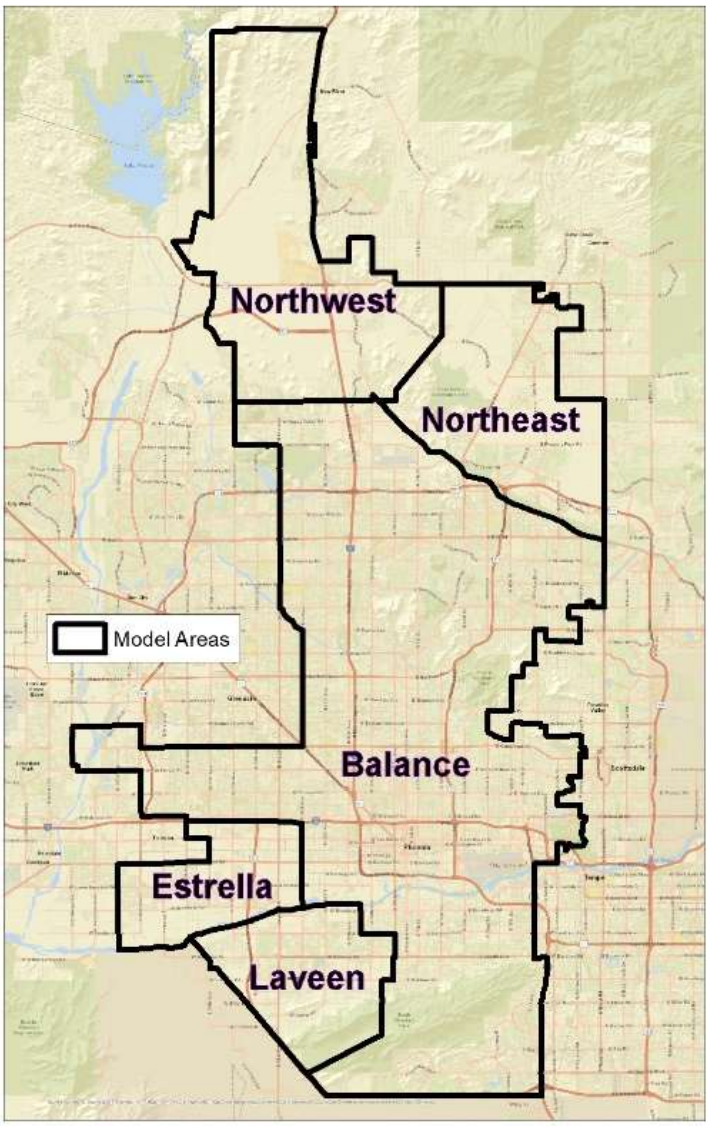
MAP 1.1
DEVPOLY LAYER



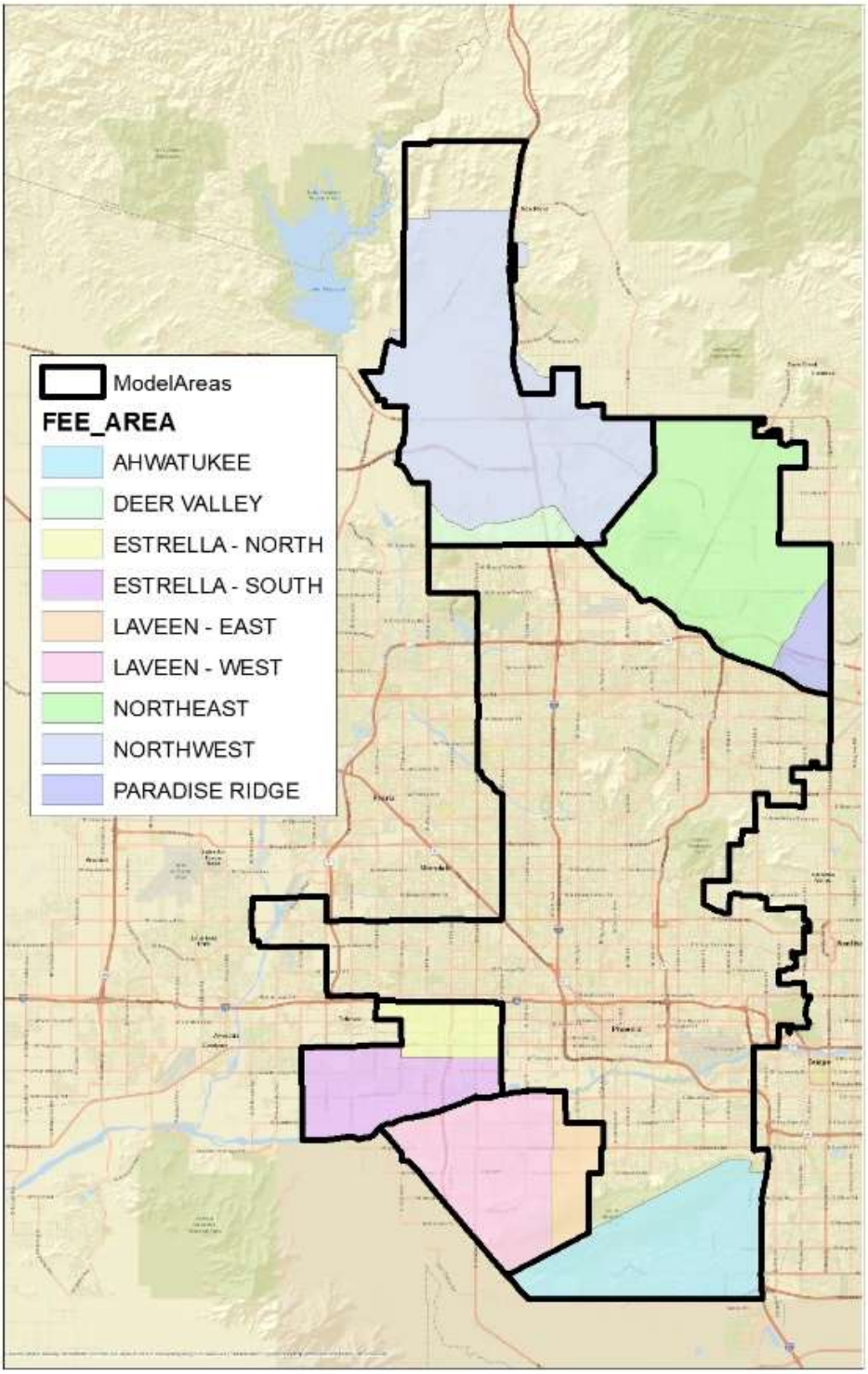
Potential development and redevelopment data collected for the DevPolys is then used to prepare sub-city allocations of projected housing units and employment by land use at the Master Plan or Modeling areas**, Map 1.2.** There are a total of five modeling areas; Four which fall under the umbrella term 'growth areas', Laveen, Estrella, Northwest, and Northeast, due to their large potential for new development growth, and one large modeling area called 'Balance of Phoenix', which represents the geography where there is little to no new development growth and mostly all development is considered redevelopment.

The five modeling areas also respect the current City of Phoenix Impact Fee boundaries, as shown in **Map 1.3**. For this analysis, the Ahwatukee Impact Fee Area was not made part of a growth area because the Ahwatukee region has largely been built out with little potential for new development, for this reason, it falls within the Balance of Phoenix modeling area.

MAP 1.2
MODEL AREAS



MAP 1.3
IMPACT FEE AREAS



1.3 Development and Redevelopment Database Structure

The DevPoly geospatial polygon framework co-exists with a DevPoly and DevPart database containing existing and future land development characteristics. **Figure 1.1** presents the current working version of two database tables, DevPoly and DevPart.

FIGURE 1.1
DEVELOPMENT AND REDEVELOPMENT DATABASE STRUCTURE

TABLE: DEVPOLY

Field	Example	Note
DevPoly	1	Master Development ID
LastUpdate	6/6/2018	Last Update of Record
PlanDevArea	SM	One of five Modeling Areas
DevName	Dobbins Point	Development Name
Developer	DR Horton	Master Developer
Jurisdiction	Phoenix	Legal Jursidiction
RedevProj	No	Is redevelopment?
RecordSource	City Records	Source of information
PolySource	MCR or DevPoly	Source of Polygon
PolySourceID	MCR or DevPoly#	Polygon source ID
LUAU	43	Land Use Analysis Unit
LUAUName	South Mountain - Laveen	Land Use Analysis Unit Name
ImpactFeeArea	Laveen East	Impact Fee Area or Infill
WaterResourceAreas	1	1 = SRP, 2 = Phoenix, etc.
Village	Laveen	COP Village Planning Area
CouncilDistrict	7	1, 2, 3, 4, 5, 6, 7, 8
TotAcres	141.492731	Total Acres in DevPoly
WaterServiceYear	2010	Availble Water Infrastructure
WWaterServiceYear	2012	Availble Wastewater Infrastructure
TransServiceYear	2008	Available Street Infrastructure
Notes		General project notes
ContactInfo		John Smith 602-888-9999

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TABLE: DEVPART

Field	Example	Note
DevPartID	119	Development Content ID
DevPolyID	1	Master Development ID
LastUpdate	6/6/2018	Last Update of Record
DevPolyLabel	SM119	PlanDevArea & DevPartID
Builder	XYZ Homes	DevPart builder
PctDevPoly	100	DevPart share of DevPoly (%)
PrimaryType	SF	SF,MF,CM,IN,OF,PF,TR or OS
LUCode	140	MAG land use code (see Table)
PolyAcres	141.492731	Master Development Acres
PartAcres	141.492731	Development Content Area
Age_Restricted	No	Is occupancy age restricted
DevPriority	0	Development priority (see Table)
StartYr	2015	Actual or Minimum*
StartBy	2020	Start project by this year
EndYr	2040	Complete project by this year
CurrentYr	2022	Current Year Built
UnitsTotal	381	Total Housing Units
UnitsBaseyear	300	Units in 2020
UnitsCurrent	365	Current Units Built
UnitsFuture	16	Remaining Units
UnitsPerAcre	2.69	Unit Density
SqFtTotal	0	Total Square Footage
SqFtBaseyear	0	Square Footage in 2020
SqFtCurrent	0	Square Footage Current
SqFtFuture	0	Square Footage Future
SqFtFAR	0	Floor-Area ratio
LandUseNotes		Notes on land use or density
TimeNotes		Notes on development timing

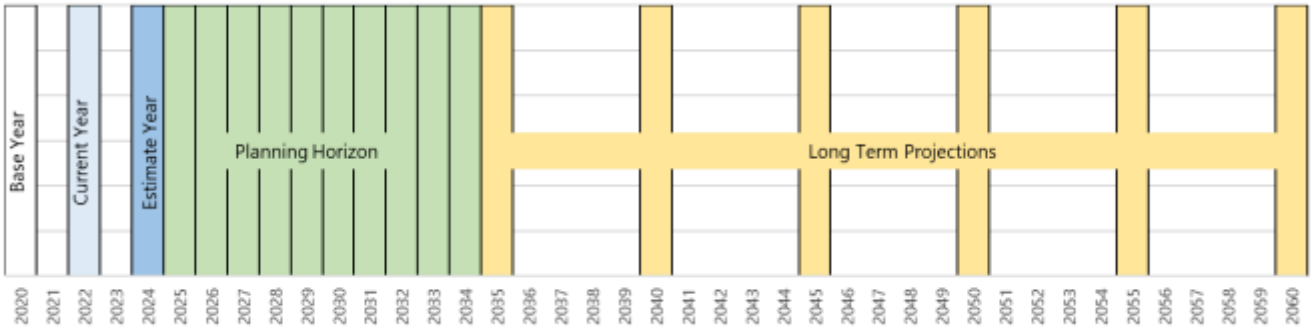
Each DevPoly record, which relates one-to-one with a GIS Development Polygons, can be associated with one or more DevPart records. The DevPoly data record contains basic information about the subdivision/model polygon such as name, jurisdiction, source of the data, number of acres and last update. The DevPoly table also includes several fields that are used in the growth modeling such as PlanDevArea, RedevProj, and IimpactFeeArea. Additional geography fields are also included to aid in reporting including LUAUName, Village, and Council District.

The DevPart records detail the specific nature of the type(s) of development that are in the DevPoly. This includes the land use, acreage, development timing and amount of development. The amount of development is measured in housing units in the case of residential development and square footage in the case of non-residential development, each with estimates for the base year (2020), the model's current year (2022) and the future. The PrimaryType field will link each record to an allocation sub-model specifically designed for that land use type. The LUCode, which is more detailed than PrimaryType, can be used to link assumptions about the amount of future development that could result from the acreage included in the DevPart.

1.4 Projection Timeline

The City of Phoenix projections are split into five periods: Base year, Current year, Estimate year, Planning Horizon, and Long-Term Projections. The Base year is 2020, it is the jump off point where the projections will start in the model. The current year is 2022, and projections for this year are based on land use data, current development figures and other current factors that have been produced during the review process; 2022 projections are as close to actual numbers. The estimate year, 2024, is the start of the Planning Horizon timeframe and is a short-term estimate of actual numbers based on currently developing projects. The Planning Horizon includes years 2024 through 2034, projections in this time frame are founded on City of Phoenix's Planning and Development data. The Planning Horizon period is what the PPD will use to analyze infrastructure needs, plan infrastructure additions and adjust impact fees. The Long-Term period is the rest of the projections, 2035 through 2060, and are projected in intervals of five: 2035, 2040, 2045, … The Long-Term projections will aid in infrastructure and finance planning.

FIGURE 1.2
PROJECTION & ALLOCATION TIME PERIODS



2.0 Data Collection

This section details the socioeconomic and development data sets that were compiled to support the new socioeconomic projections associated with Task 1 of the City of Phoenix Demographic Study.

2.1 City Population and Employment Projections

In order to provide a regional control total and guidance on projected growth rates, one of the tasks in preparing the small area projections is to compile data from various sources on projected population. In comparing the projections from various sources, there are challenges in terms of matching up data for the same geography and time horizon. At the sub-city level, Maricopa Association of Governments (MAG) is the primary source of estimates and projections for population and employment that rely on a sophisticated modeling process using a significant amount of primary local data. The projections presented here are for the county and metro area, and include data from the state demographer published by the Arizona Office of Economic Opportunity, the University of Arizona Forecasting Project, the Greater Phoenix Blue Chip Forecast and private vendor Woods & Poole

2.1.1 Comparative Population Projections

The data from state demographer includes a high, medium and low series extending to 2060. These projections were issued in March 2023 and reflect current conditions and expectations about a possible recession in the next two years. The medium series is used as the county control total by MAG. Despite looming concerns about a national recession that would reduce job growth and in-migration in the Phoenix metro area, projected annual growth rates range from 1.9 percent to 1.8 percent through 2025. Beyond 2025, there is a gradual decline in annual growth rates from 1.63 percent in 2026 to 0.52 percent by 2060 as the region approaches build out (**Table 2.1**). These result in a 2050 county population ranging from 5.7 million (low scenario) to 6.7 million (high scenario), and a 2060 county population ranging from 5.8 million (low scenario) to 7.3 million (high scenario). The state demographer's projections for the MSA are about 0.2% higher in terms of annual growth rates throughout the 2022 to 2060 projection period, due to the amount of long-term growth projected for Pinal County. Total population estimates for the metro area in 2050 range from 6.5 million to 7.9 million, and in 2060 range from 6.8 million to 8.8 million.

The University of Arizona (UA) Forecasting Project also produces long term population projections through 2050 for both the metro area and Maricopa County. The medium series for Maricopa County shows annual growth rates that are about 0.2 percent lower than the state demographer over the next three years. However, over the longer term, the UA medium series assumes a higher annual growth rate than the state demographer, particularly after 2040, but results in lower projected population through 2035 due to slower growth in the early years, and higher population projections in 2040 and beyond, due to high growth rate assumptions during that period. Total population projections for Maricopa County from in 2050 range from 6.0 million to 7.0 million, which is about 200,000 to 400,000 more people than the state demographer is projecting for 2050. The UA projections for the metro area follow a similar but more pronounced trend, with lower annual growth rates through 2029, resulting in lower projected population through 2040. However, by 2050 the UA projections for

the metro area show a total population ranging from 6.9 million (low scenario) to 8.0 million (high scenario), or about 160,000 to 350,000 people more than the state projections for 2050. For both the county and the metro area, the most significant differences between the UA and state projections are in the low scenario.

The Greater Phoenix Blue Chip Economic Forecast is compiled by the Seidman Research Institute at Arizona State University and is a consensus forecast of the projected annual rate of change based on input from 10 local organizations. These organizations include the ASU Economic Outlook Center, UA Eller College of Management, the Joint Legislative Budget Committee, and seven private economic consulting firms. This is a short term forecast through 2024 for the metro area. Annual growth rates are projected at 1.7 percent for 2023 and 2024, which is below the low series from the state demographer, but between the low and medium series from UA.

For comparative purposes, a projection set from Woods & Poole is also included for the Phoenix metro area through 2060. Woods & Poole Economics, Inc. is an experienced, independent firm in Washington DC that specializes in long-term county economic and demographic projections. They use a top-down dynamic model that allocates a U.S. control total to counties, incorporating the fact that growth in one part of the country will result in declines in other parts of the country. Employment projections are created using an export-based approach and are then used to drive population projections in the Woods & Poole model. The Woods & Poole population projections show much less variation in the growth rates over time. Annual growth rates range from 1.49 percent in 2023 to 1.31 percent in 2045, but then increasing slightly to 1.42 percent by 2060. This is significantly lower than 2022 to 2030 annual growth rates projected by the state demographer, but significantly higher than the state's projected growth rates in the 2040 to 2060 period. The 2060 projected population for the metro area from Woods & Poole is 8.5 million, or about 700,000 people greater than the state demographer medium series.

Among the projection sources shown here, there is some variation in terms of the rate of growth and the point at which longer term growth will begin to slow as the area approaches build out. Despite slower growth projections in the short-term, the UA projection ultimately result in more population by 2050 in both the county and the metro area. The over-simplified assumption of consistent growth over time reflected in the Woods & Poole projections ultimately leads to a much higher build-out population in the post 2040 period.

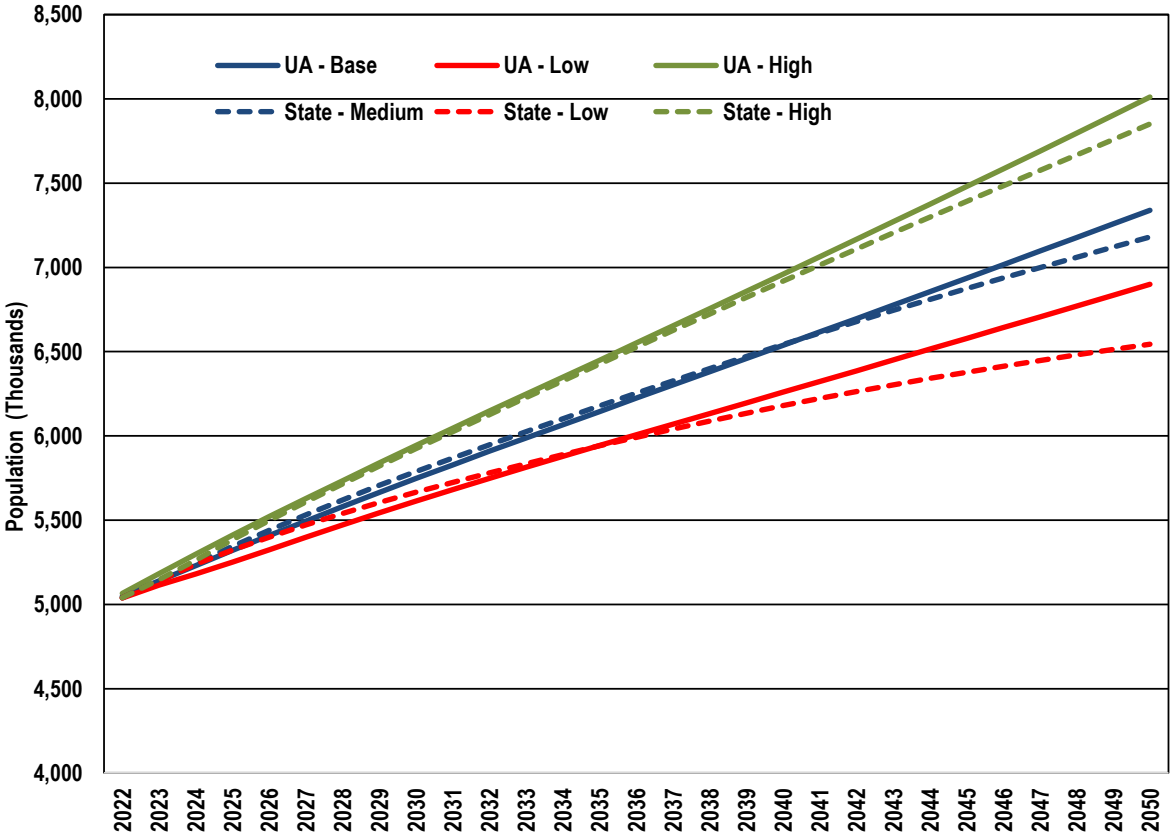
A graphic comparison of the base, low and high projection series from the state demographer and UA is shown in **Figure 2.1**. For all three series, the projections are very similar until about 2040 when the UA projections exceed the state projections. The greatest divergence is in the low series where the UA projections start to increase around 2036, and continue to increase through 2050 when the state low series projections grow at a decreasing rate. Unlike previous projection sets where the high and low series represent a uniform margin above and below the state medium series, the projections appear to capture projected differences in the underlying economic and development assumptions that may impact the rate of growth over time, particularly in the 2022 to 2030 period.

TABLE 2.1
COMPARATIVE POPULATION PROJECTIONS FOR MARICOPA COUNTY AND THE PHOENIX METRO AREA

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2040	2045	2050	2055	2060
AZ Office of Economic Opportunity																			
County Projections																			
Maricopa County-Low Series	4,586,400	4,670,800	4,753,200	4,825,800	4,890,300	4,950,900	5,007,500	5,060,000	5,108,300	5,153,300	5,197,000	5,238,900	5,279,100	5,317,700	5,485,600	5,609,900	5,696,700	5,760,600	5,808,700
Maricopa County-Medium Series	4,586,400	4,672,900	4,757,600	4,841,700	4,920,400	4,995,700	5,067,600	5,135,900	5,200,400	5,262,100	5,322,900	5,382,400	5,440,700	5,497,700	5,762,700	5,990,700	6,186,100	6,362,700	6,529,100
Maricopa County-High Series	4,586,400	4,675,900	4,770,700	4,870,300	4,962,800	5,052,300	5,138,700	5,222,100	5,302,200	5,380,100	5,457,600	5,534,300	5,610,400	5,685,700	6,050,000	6,389,000	6,706,000	7,014,700	7,325,300
County Annual Growth Rate																			
Maricopa County-Low Series	na	1.84%	1.76%	1.53%	1.34%	1.24%	1.14%	1.05%	0.95%	0.88%	0.85%	0.81%	0.77%	0.73%	0.63%	0.45%	0.31%	0.22%	0.17%
Maricopa County-Medium Series	na	1.89%	1.81%	1.77%	1.63%	1.53%	1.44%	1.35%	1.26%	1.19%	1.16%	1.12%	1.08%	1.05%	0.96%	0.79%	0.65%	0.57%	0.52%
Maricopa County-High Series	na	1.95%	2.03%	2.09%	1.90%	1.80%	1.71%	1.62%	1.53%	1.47%	1.44%	1.41%	1.38%	1.34%	1.28%	1.12%	0.99%	0.92%	0.89%
MSA Population Projections																			
Phoenix MSA-Low Series	5,040,400	5,140,400	5,238,000	5,322,800	5,398,900	5,471,300	5,540,000	5,604,800	5,665,600	5,723,400	5,780,100	5,835,200	5,888,800	5,940,800	6,179,200	6,377,900	6,544,400	6,690,300	6,820,300
Phoenix MSA-Medium Series	5,040,400	5,143,400	5,244,200	5,344,600	5,439,600	5,531,600	5,620,500	5,706,000	5,788,200	5,867,900	5,946,900	6,024,900	6,101,900	6,177,800	6,541,600	6,873,700	7,180,300	7,473,600	7,759,700
Phoenix MSA-High Series	5,040,400	5,147,600	5,262,100	5,383,200	5,496,600	5,607,600	5,715,900	5,821,500	5,924,400	6,025,400	6,126,300	6,226,900	6,327,000	6,426,700	6,918,000	7,391,000	7,851,600	8,313,100	8,784,300
MSA Annual Growth Rate																			
Phoenix MSA-Low Series	na	1.98%	1.90%	1.62%	1.43%	1.34%	1.26%	1.17%	1.08%	1.02%	0.99%	0.95%	0.92%	0.88%	0.80%	0.64%	0.52%	0.45%	0.39%
Phoenix MSA-Medium Series	na	2.04%	1.96%	1.91%	1.78%	1.69%	1.61%	1.52%	1.44%	1.38%	1.35%	1.31%	1.28%	1.24%	1.18%	1.02%	0.89%	0.82%	0.77%
Phoenix MSA-High Series	na	2.13%	2.22%	2.30%	2.11%	2.02%	1.93%	1.85%	1.77%	1.70%	1.67%	1.64%	1.61%	1.58%	1.53%	1.37%	1.25%	1.18%	1.13%
UA Economic Forecasting Project																			
County Projections																			
Maricopa County-Low Series	4,584,629	4,650,951	4,709,607	4,771,245	4,835,591	4,900,145	4,963,796	5,025,188	5,083,471	5,140,321	5,196,420	5,251,305	5,305,189	5,357,600	5,607,856	5,846,824	6,071,617	na	na
Maricopa County-Medium Series	4,592,405	4,670,811	4,745,602	4,820,110	4,893,740	4,965,670	5,036,214	5,105,394	5,172,744	5,239,144	5,304,924	5,369,254	5,432,869	5,496,080	5,805,503	6,106,863	6,400,229	na	na
Maricopa County-High Series	4,607,956	4,707,174	4,803,839	4,898,224	4,990,514	5,080,340	5,168,572	5,255,809	5,341,575	5,426,744	5,511,368	5,594,697	5,677,850	5,761,160	6,175,432	6,588,083	7,000,035	na	na
County Annual Growth Rate																			
Maricopa County-Low Series	na	1.45%	1.26%	1.31%	1.35%	1.33%	1.30%	1.24%	1.16%	1.12%	1.09%	1.06%	1.03%	0.99%	0.93%	0.85%	0.77%	na	na
Maricopa County-Medium Series	na	1.71%	1.60%	1.57%	1.53%	1.47%	1.42%	1.37%	1.32%	1.28%	1.26%	1.21%	1.18%	1.16%	1.13%	1.04%	0.96%	na	na
Maricopa County-High Series	na	2.15%	2.05%	1.96%	1.88%	1.80%	1.74%	1.69%	1.63%	1.59%	1.56%	1.51%	1.49%	1.47%	1.44%	1.34%	1.25%	na	na
MSA Population Projections																			
Phoenix MSA-Low Series	5,037,886	5,113,947	5,180,478	5,250,376	5,323,780	5,397,943	5,471,746	5,543,652	5,612,675	5,680,587	5,747,759	5,813,860	5,879,187	5,943,350	6,259,169	6,578,355	6,899,869	na	na
Phoenix MSA-Medium Series	5,047,403	5,140,702	5,230,283	5,319,629	5,408,148	5,494,841	5,580,234	5,664,406	5,746,805	5,828,244	5,908,761	5,987,787	6,066,348	6,144,928	6,538,009	6,935,859	7,339,251	na	na
Phoenix MSA-High Series	5,065,500	5,182,945	5,297,973	5,410,547	5,520,862	5,628,369	5,734,206	5,839,097	5,942,500	6,045,261	6,147,175	6,247,725	6,348,356	6,449,577	6,959,776	7,479,882	8,010,491	na	na
MSA Annual Growth Rate																			
Phoenix MSA-Low Series	na	1.51%	1.30%	1.35%	1.40%	1.39%	1.37%	1.31%	1.25%	1.21%	1.18%	1.15%	1.12%	1.09%	1.06%	1.02%	0.98%	na	na
Phoenix MSA-Medium Series	na	1.85%	1.74%	1.71%	1.66%	1.60%	1.55%	1.51%	1.45%	1.42%	1.38%	1.34%	1.31%	1.30%	1.28%	1.22%	1.16%	na	na
Phoenix MSA-High Series	na	2.32%	2.22%	2.12%	2.04%	1.95%	1.88%	1.83%	1.77%	1.73%	1.69%	1.64%	1.61%	1.59%	1.58%	1.49%	1.42%	na	na
Greater Phoenix Blue Chip Consensus																			
Phoenix MSA	4,586,431	4,664,400	4,743,695	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Phoenix MSA		1.70%	1.70%	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Woods & Poole																			
MSA Population Projections	5,075,229	5,150,725	5,226,995	5,303,928	5,381,416	5,459,381	5,537,777	5,616,652	5,696,050	5,775,949	5,856,211	5,936,909	6,017,916	6,099,164	6,509,036	6,935,562	7,393,635	7,897,650	8,458,927
MSA Annual Growth Rate	na	1.49%	1.48%	1.47%	1.46%	1.45%	1.44%	1.42%	1.41%	1.40%	1.39%	1.38%	1.36%	1.35%	1.34%	1.31%	1.32%	1.36%	1.42%

Source: Arizona Commerce Authority, Office of Economic Opportunity, March 2023; Arizona State University W.P. Carey School of Business, Seidman Research Institute, Blue Chip Economic Forecast, Q3, 2022; University of Arizona Eller School of Management, Economic and Business Research Center, Q3 2022; Woods and Poole Complete Economic and Demographic Data Source, 2022.

FIGURE 2.1
COMPARATIVE POPULATION PROJECTIONS FOR THE PHOENIX MSA



2.1.2 Growth and Development Trends

This section describes the data and methodology used to develop projections of the overall change in population and employment for the city of Phoenix. The magnitude of change is a function of both new development and redevelopment potential and the market characteristics of specific portions of the city. Information in this section details the development of population and employment projects for Maricopa County.

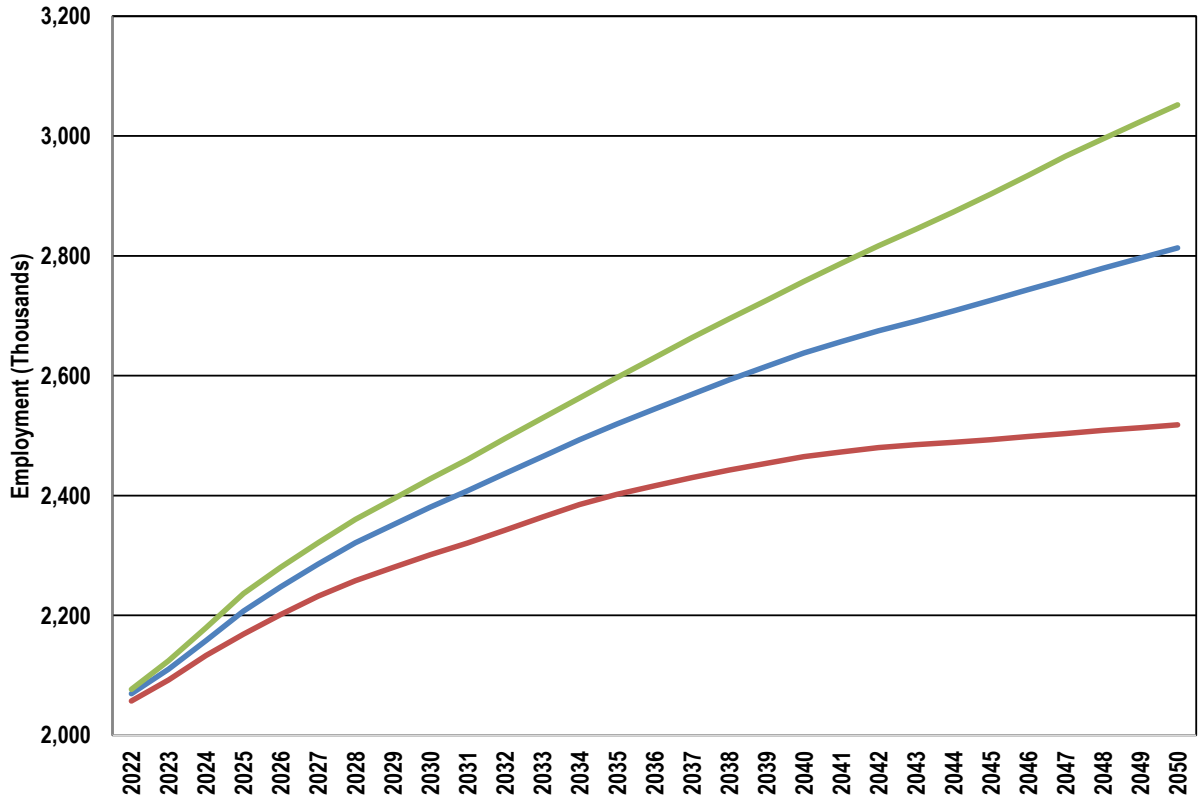
County and City Control Totals

A variety of sources are available for long-term population and employment projections for the metro area. For this analysis, the state demographer's most recent projection series, issued in March 2023, is used as the basis for population projections. However, the state does not issue long-term employment projections, therefore it was necessary to obtain county control totals from an alternate source, in this case, the University of Arizona Forecasting project. The UA data includes projections of employment by industry sector for the Phoenix metro area extending to 2052 using Bureau of Labor Statistics, Current Employment Survey (CES) data as the basis. There are also industry employment projections for Maricopa County and Pinal County, but they utilize Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW), which provides a less comprehensive

estimate of total employment. This section describes the process for using the metro area projections and employment to population ratios to create employment projections by industry for Maricopa County.

First, the annual ratio of population to total employment for the metro area is calculated for the high, medium and low scenarios using state demographer population and UA employment projections for the 2022 to 2050 period. This ratio is applied to state population projections for Maricopa County to create a projection of total employment for the county. Next, using the UA county-level projections, the annual Pinal County share of metro area employment by industry is calculated. This Pinal share is subtracted from projected metro area employment by industry to prepare employment projections for Maricopa County only. Then, the share of employment by industry for Maricopa County is applied to the total employment figure to estimate county employment by industry that align with state population projections. **Figure 2.2** shows a comparison of the high, medium and low scenarios for the county, and a trend line for each. Projected employment in 2050 ranges from 2.5 million (low scenario) to 3.1 million (high scenario). The ratio of population to employment ranges from 0.44 to 0.45 in 2040.

FIGURE 2.2
EMPLOYMENT PROJECTIONS FOR MARICOPA COUNTY
HIGH, MEDIUM AND LOW SCENARIO



Employment by Industry

In addition to looking at total employment, it is also important to understand the relationship between employment growth and land use and development, which requires looking at employment growth by industry. The impact on land use and development has implications for the geographic distribution of employment growth within the city and county. The connection between employment by industry and employment by land use is not straightforward because most industry sectors have impacts on real estate development in multiple land use categories. However, for illustrative purposes, we can assign a dominant land use to each industry sector to create a rough estimate of employment by land use as shown in **Figures 2.3 and 2.4.**

The largest increases in employment by land use are projected to be in office, followed by retail. However, as a result of the pandemic, a much larger share of office workers are able to work remotely, at least some of the time. This has resulted in less demand for office space, with a trend toward changing older office space into multi-family or retail space. Trends in work-at-home are examined in more detail later in this chapter.

FIGURE 2.3
GENERALIZED EMPLOYMENT BY LAND USE FOR MARICOPA COUNTY
MEDIUM SCENARIO

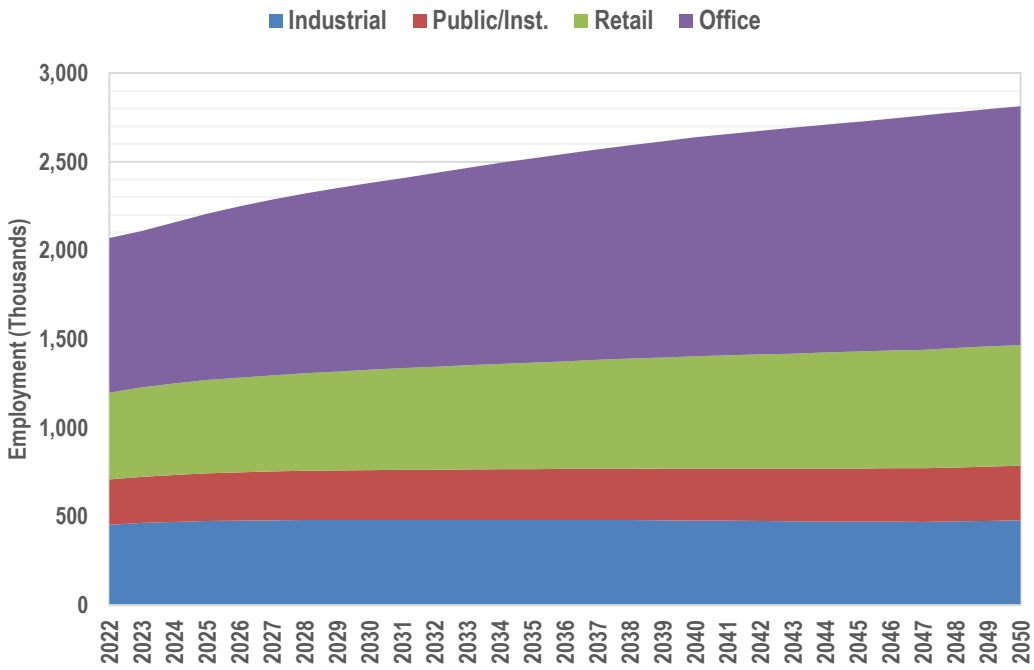


FIGURE 2.4
GENERALIZED EMPLOYMENT BY LAND USE FOR MARICOPA COUNTY
MEDIUM SCENARIO, CONTINUED

NAICS	Sector	Dominant Land Use
11	Agriculture, Forestry and Fishing	Industrial
21	Mining	Industrial
22	Utilities	Industrial
23	Construction	Industrial
31-33	Manufacturing	Industrial
42	Wholesale Trade	Industrial
44-45	Retail Trade	Retail
48-49	Transportation and Warehousing	Industrial
51	Information	Office
52	Finance and Real Estate	Office
53	Real Estate, Rental and Leasing	Office
54	Professional, Scientific and Technical Services	Office
55	Management of Companies and Enterprises	Office
56	Administrative and Support Services	Office
61	Education Services	Public/Inst.
62	Health Care and Social Assistance	Office
71	Arts, Entertainment and Recreation	Retail
72	Accomodation, Food Services	Retail
81	Other Services	Retail
92	Government	Public/Inst.

Employment by Occupation

To create at a more refined estimate of employment by land use, a two-step process is employed to translate employment by industry into employment by occupation. Occupations can then be assigned to land use to translate employment by industry into employment by land use. The correspondence between occupations and land uses is much more direct than the correlation between industries and land use.

The Bureau of Labor Statistics publishes a National Industry-Occupation Matrix that translates employment by industry into 1,112 summary-level and detailed occupational categories. The most current matrix includes estimates for 2021 and projections for 2031. The industry detail was collapsed into 24 categories that correspond to the employment by industry detail available from the UA projections series. Next, employment by occupation from the National Industry-Occupation Matrix was divided by total employment in each industry category to calculate the share of employment by occupation in the detailed categories within each industry sector. This information will be used to translate employment projections for Maricopa County into occupational projections.

The summary level breakdown of employment by industry and occupation is shown in **Table 2.2** for illustrative purposes. Most industries like transportation and warehousing, K-12 education and food services have more than 65 percent of total employment concentrated in a single occupational category. In contrast, industries like professional and business services and other services have less than 20 percent of employment in any single

occupational category, indicating a greater diversity of skills required in those industries. Industries with more broadly distributed occupational requirements are likely to have impacts across multiple land use categories.

Looking at the distribution by occupational category, instead of by industry, there are some occupations such as management, business and financial operations and transportation and material moving that are present in almost every industry section to some degree. In contrast, occupations such as education, healthcare practitioners, healthcare support and food preparation are very concentrated in specific industries.

TABLE 2.2
PROJECTED 2031 OCCUPATIONAL REQUIREMENTS BY INDUSTRY SECTOR

Occupations	Natural Resources and Mining	Utilities	Construction	Non-Durable Manufacturing	Durable Goods Manufacturing	Wholesale Trade	Motor Vehicles and Parts Retail	Building Material, Retail Garden Supply	Food and Beverage Retail	Other Retail Trade	Transportation and Warehousing	Publishing and Telecommunications	Other Information	Finance and Insurance	Real Estate, Rental, and Leasing	Professional and Business Services	K-12	Post Secondary	Health Care and Social Assistance	Arts, Entertainment, and Recreation	Accommodation	Food Svcs and Drinking Places	Other Services	Government
Management	18.2%	7.7%	7.6%	6.3%	6.3%	9.2%	5.3%	3.4%	2.0%	3.7%	3.3%	11.6%	11.6%	11.4%	16.2%	9.8%	4.6%	8.4%	4.3%	6.9%	7.0%	3.3%	6.7%	4.1%
Business and financial operations	1.3%	8.9%	5.3%	4.7%	4.7%	6.3%	2.3%	0.9%	0.6%	1.6%	2.3%	11.1%	11.1%	28.9%	6.8%	14.1%	1.0%	6.7%	2.0%	4.7%	2.3%	0.5%	6.3%	0.8%
Computer and mathematical	0.3%	3.6%	0.3%	2.6%	2.6%	3.1%	0.3%	0.1%	0.1%	0.7%	0.6%	26.0%	26.0%	8.8%	0.8%	11.9%	0.9%	3.5%	0.6%	0.5%	0.2%	0.0%	1.0%	0.8%
Architecture and engineering	1.4%	8.9%	1.3%	6.5%	6.5%	1.1%	0.0%	0.1%	0.0%	0.0%	0.4%	1.5%	1.5%	0.1%	0.2%	5.0%	0.0%	0.4%	0.0%	0.1%	0.1%	0.0%	0.2%	0.0%
Life, physical, and social science	1.9%	1.7%	0.2%	1.2%	1.2%	0.4%	0.0%	0.0%	0.0%	0.0%	0.2%	0.1%	0.1%	0.1%	0.0%	2.1%	0.6%	2.8%	0.5%	0.1%	0.0%	0.0%	0.3%	0.7%
Community and social service	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.1%	0.2%	2.9%	3.6%	5.7%	0.1%	0.0%	0.0%	8.1%	2.8%
Legal	0.1%	0.3%	0.0%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.5%	0.5%	1.3%	0.4%	4.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	0.2%	0.0%
Education, training, and library	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.7%	0.7%	0.0%	0.0%	0.2%	66.7%	45.6%	2.7%	2.6%	0.1%	0.0%	3.4%	66.9%
Arts, design, entertainment, sports, and media	0.0%	0.4%	0.1%	0.7%	0.7%	1.7%	0.1%	3.5%	0.3%	1.0%	0.1%	14.1%	14.1%	0.4%	0.8%	2.2%	0.8%	4.3%	0.2%	8.9%	0.3%	0.1%	3.4%	0.7%
Healthcare practitioners and technical	0.0%	0.0%	0.0%	0.1%	0.1%	0.5%	0.0%	0.0%	2.2%	5.7%	0.0%	0.2%	0.2%	1.2%	0.1%	2.4%	2.1%	2.5%	32.4%	0.3%	0.0%	0.0%	0.5%	2.2%
Healthcare support	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.4%	0.0%	0.0%	0.0%	0.1%	0.0%	1.3%	0.3%	0.5%	30.5%	0.2%	0.4%	0.0%	3.6%	0.3%
Protective service	0.1%	0.8%	0.1%	0.1%	0.1%	0.1%	0.0%	0.2%	0.1%	0.5%	0.7%	0.1%	0.1%	0.2%	1.0%	3.9%	1.4%	1.3%	0.3%	4.4%	2.6%	0.2%	0.7%	1.6%
Food preparation and serving related	0.0%	0.0%	0.0%	0.9%	0.9%	0.2%	0.0%	0.0%	12.6%	1.9%	0.0%	1.0%	1.0%	0.0%	0.8%	0.5%	3.7%	0.8%	2.2%	12.5%	19.3%	87.5%	1.8%	4.1%
Building and grounds cleaning and maintenance	1.2%	0.6%	0.5%	0.6%	0.6%	0.5%	0.4%	0.9%	0.9%	0.8%	0.4%	0.2%	0.2%	0.1%	5.7%	8.8%	4.1%	2.5%	1.8%	7.8%	27.2%	0.5%	7.9%	4.4%
Personal care and service	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.2%	2.2%	2.2%	0.0%	0.9%	0.4%	1.4%	1.8%	2.7%	28.7%	6.5%	0.0%	19.0%	1.2%
Sales and related	1.4%	1.5%	2.1%	3.4%	3.4%	22.9%	36.9%	57.1%	38.7%	55.7%	1.3%	10.5%	10.5%	15.8%	21.9%	4.3%	0.1%	0.6%	0.3%	6.4%	2.8%	3.5%	2.6%	0.0%
Office and administrative support	5.2%	13.6%	8.1%	7.4%	7.4%	14.9%	10.8%	8.9%	6.4%	8.2%	13.2%	10.9%	10.9%	31.1%	16.3%	15.1%	5.3%	11.6%	11.9%	9.1%	20.2%	0.7%	12.5%	5.2%
Farming, fishing, and forestry	43.3%	0.1%	0.0%	0.3%	0.3%	0.8%	0.0%	1.1%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%
Construction and extraction	11.3%	6.6%	60.4%	1.7%	1.7%	0.5%	0.0%	1.3%	0.0%	0.2%	0.5%	0.2%	0.2%	0.0%	1.4%	1.7%	0.2%	0.6%	0.1%	0.3%	0.3%	0.0%	0.3%	0.2%
Installation, maintenance, and repair	4.1%	30.7%	9.1%	5.5%	5.5%	7.6%	26.4%	2.3%	0.2%	1.9%	5.2%	7.8%	7.8%	0.2%	19.9%	1.9%	1.2%	1.6%	0.7%	4.1%	7.4%	0.3%	11.7%	1.2%
Production	2.7%	12.7%	1.5%	48.8%	48.8%	5.0%	0.6%	0.8%	7.3%	1.4%	1.3%	0.5%	0.5%	0.0%	0.5%	3.6%	0.1%	0.2%	0.3%	0.2%	2.3%	0.6%	3.5%	0.1%
Transportation and material moving	7.5%	2.0%	3.2%	9.2%	9.2%	25.1%	16.6%	19.3%	28.3%	15.0%	70.4%	0.8%	0.8%	0.0%	5.9%	6.5%	2.5%	0.6%	0.7%	1.9%	1.0%	2.8%	6.2%	2.8%

Sources: Bureau of Labor Statistics, 2021-31 National Employment Matrix; Applied Economics, 2023.

Employment by Land Use

To translate projected employment by occupation into employment by land use, each of the 1,112 occupational categories included in the National Industry-Occupation Matrix are assigned to one or more land use categories. In many cases, it is possible to assign an occupation to a single land use, but for some occupations it was necessary to split it into two or more land use categories. Where splits are necessary, they are based on the relative employment in the occupational category and the consultant team's knowledge of employment patterns by land use in the City of Phoenix. There is also some employment that is not assigned to a land use category because it is not site-based. This applies to people like construction workers who are not in buildings and not working at a fixed location. This process is consistent with the employment projection methodology used by MAG.

The matrix multiplication of employment by occupation by year, and the share of occupation by land use results in a projection of employment by land use for Maricopa County. **Table 2.3** shows projected employment for Maricopa County for the mid-range scenario. With an overall projected increase of 744,000 jobs (36 percent growth) between 2022 and 2050 for this scenario, the greatest increases in projected employment by land use in both percentage and actual terms are in office (40 percent growth) and retail (49 percent growth), which is consistent with the preliminary estimates in section 1.1.2.2. On a percentage basis, only government, warehousing and manufacturing are projected to grow more slowly than total employment, or by less than 36 percent from 2022 to 2050.

As a cross-check for this method of calculating employment, employment by land use was compared to the amount of built nonresidential space in Maricopa County using data from the Assessor's Office to verify that the implied square feet per employee by land use fell within the range of values used by MAG in their modeling process. In addition, the calculation was applied to projected employment to estimate the amount of new nonresidential space that would be required to support the expected level of employment growth. This calculation included assumptions about changes in employment density over time.

TABLE 2.3
PROJECTED EMPLOYMENT BY LAND USE FOR MARICOPA COUNTY
MID-RANGE SCENARIO
(Thousands of Jobs)

Year	Mfg/Ind	Warehouse	Office	Retail	Lodging	Institutional	Non-Site	Govt.	Total
2022	192.72	192.83	742.92	383.63	20.00	188.82	206.29	142.17	2,069.39
2023	196.95	197.25	751.99	395.65	21.22	193.54	211.61	141.98	2,110.18
2024	200.63	201.42	770.09	404.39	23.19	199.62	215.65	142.91	2,157.89
2025	203.87	205.21	790.65	412.96	23.88	205.43	220.43	144.68	2,207.11
2026	206.63	208.29	808.49	420.80	24.32	208.82	223.77	146.63	2,247.74
2027	209.22	210.99	824.43	429.49	24.50	211.76	226.92	148.43	2,285.75
2028	211.36	212.69	839.86	437.79	24.79	214.38	229.94	150.19	2,321.00
2029	212.79	213.69	852.78	445.76	25.10	216.60	232.44	151.81	2,350.96
2030	214.23	214.42	864.92	453.54	25.47	218.74	234.95	154.45	2,380.70
2031	215.96	215.19	877.27	460.85	25.70	221.00	237.82	154.30	2,408.09
2032	217.35	215.70	889.97	467.92	26.08	223.51	241.01	155.13	2,436.66
2033	218.72	216.34	902.24	474.96	26.24	225.95	244.33	155.94	2,464.72
2034	219.97	217.27	914.46	482.16	26.52	228.49	247.74	156.84	2,493.45
2035	221.28	217.88	925.55	489.06	26.82	230.68	250.73	157.62	2,519.61
2036	222.43	218.22	935.91	495.87	27.14	232.84	253.69	158.31	2,544.40
2037	223.87	218.53	946.11	502.61	27.49	234.93	256.45	158.88	2,568.87
2038	225.21	218.91	956.16	509.27	27.76	237.11	259.15	159.47	2,593.04
2039	226.21	219.13	965.57	515.62	28.00	239.32	261.60	159.99	2,615.44
2040	226.81	219.28	974.52	521.76	28.22	241.64	264.02	161.79	2,638.03
2041	227.48	219.40	982.84	527.65	28.39	243.89	266.34	160.78	2,656.78
2042	228.02	219.56	990.19	533.30	28.55	246.11	268.26	160.82	2,674.81
2043	228.21	219.55	996.73	538.76	28.68	248.62	269.78	160.95	2,691.27
2044	228.44	219.62	1,003.21	544.17	28.82	251.15	271.71	161.10	2,708.21
2045	229.13	219.78	1,009.91	549.59	28.99	253.13	273.69	161.21	2,725.43
2046	230.03	220.04	1,017.01	555.01	29.17	255.19	275.71	161.31	2,743.45
2047	230.77	220.31	1,024.26	560.38	29.35	257.15	277.70	161.50	2,761.40
2048	232.25	221.72	1,030.83	563.98	29.53	258.80	279.48	162.54	2,779.14
2049	233.70	223.10	1,037.24	567.49	29.72	260.41	281.22	163.55	2,796.42
2050	235.10	224.44	1,043.49	570.90	29.90	261.97	282.91	164.53	2,813.24
2022-50	42.38	31.61	300.56	187.28	9.89	73.15	76.62	22.36	743.85
Change	20%	15%	35%	42%	39%	34%	33%	15%	32%

Sources: Arizona Commerce Authority, Office of Economic Opportunity; University of Arizona, Economic and Business Research Center; Bureau of Labor Statistics; Applied Economics, 2023.

Base year employment in 2022 in Maricopa County is estimated at 2.07 million jobs, resulting in an overall employment density of 550 square feet of nonresidential space per job across all land use categories **(Table 2.4**). Estimated employment density ranges from a low of 245 square feet per job for office space to 1,490 square feet per job for warehouse space. The only significant variation between these rates and the employment density assumptions that MAG uses in their projections are in the lodging and manufacturing categories. The differences in manufacturing likely relate to how various types of industrial uses are classified.

TABLE 2.4
EMPLOYMENT, IMPLIED SQUARE FOOTAGE AND SQUARE FEET PER EMPLOYEE
2022-2050
MID-RANGE SCENARIO

	Mfg/Ind	Warehouse	Office	Retail	Lodging	Institutional	Non-Site	Govt.	Total
Employment (000s)									
2022	192.72	192.83	742.92	383.63	20.00	188.82	206.29	142.17	2,069.39
2050	235.10	224.44	1,043.49	570.90	29.90	261.97	282.91	164.53	2,813.24
Change	42.38	31.61	300.56	187.28	9.89	73.15	76.62	22.36	743.85
% Change	22%	16%	40%	49%	49%	39%	37%	16%	36%
Square Feet (000s)									
2022	65,636	287,849	181,936	323,008	37,756	70,658	0	169,041	1,135,884
2050	91,066	343,162	242,049	435,376	47,648	103,577	0	195,871	1,458,750
Change	25,430	55,313	60,112	112,368	9,893	32,919	0	26,831	322,866
Square Feet / Employee									
2022	341	1,493	245	842	1,887	374	0	1,189	550
2050	387	1,529	232	763	1,594	395	0	1,190	519

Applying future employment densities to the mid-range projection of 2.8 million jobs by 2050 could result in about 1.5 billion square feet of nonresidential built space in the county, or an increase of 323 million square feet over current levels. Comparing the change in square feet to the change in employment shows average density declining from 550 square feet per employee currently to 519 square feet per employee by 2050.

The increase in nonresidential built space includes the addition of more than 55 million square feet of warehouse space that is driven by the strength of this sector in terms of employment growth and the increase in e-commerce. Office square footage is projected to expand similarly to warehouse, and retail square footage is projected to expand by more than warehouse, with both retail and office square footage accommodating much greater increases in employment.

2.2 Database Structure and Parcel Attributes

2.2.1 Parcel Information

The base data on existing development for the DevPoly system is derived from the Maricopa Association of Governments small-area modeling dataset. Two potential approaches were identified to obtain existing structure and parcel information for the DevPart records, including working with data and maps directly from the Assessor's Office, or obtaining only the required information pre-processed by MAG.

The raw data from the Assessor's Office would be more robust and contains some data elements that could prove useful to the city in efforts beyond the scope of this project. However, a great deal of effort is required to process the data in its raw form to extract what is most needed for the growth projections modeling. This includes the number of existing housing units and the amount of non-residential square footage by land use for each modeling unit. This is complicated by the fact that multifamily units and non-residential space must often be calculated from many parcels and many "improvement" records for each parcel; some improvement types, like parking garages and storage rooms, should not be counted as useable space.

In the parcel data from MAG, all of the work of parsing the raw assessor's data has been done in support of their small-area modeling activities, and it is updated on a biannual basis. Because the MAG parcel data is much easier to work with, maintained regularly, and still contains all the information needed for the Growth Projections and Land Use Assumptions project, the city of Phoenix and project team agreed to use it for populating the existing development and land use characteristics in the DevPoly database. **Figure 2.5** shows the comparison of the Parcel Master, Commercial property and Residential property datasets between Maricopa County Assessor and MAG.

FIGURE 2.5
PARCEL DATA COMPARISON

Parcel Master Data				**Commercial Property Data**				**Residential Property Data**			
County Assessor (single parcel)		**MAG (single / group)**		**County Assessor (one-to-many)**		**MAG (one-to-many)**		**County Assessor (one to one)**		**MAG (one to many)**	
Secured Master: ST42073		**PIT (2022)**		**Commerical Master: ST42082**		**NRIT (2022)**		**Residential Master: ST42030**		**RIT (2022)**	
PARCEL_NUM	10125163	mpn	mc_10125163	CountyID	07	OBJECTID	37	APN	16468279	mpn	mc_16468279
O_NAME	SOLOMON CHRISTOPHER M	IMPR_FCV	138400	ParcelID		mpn	mc_0001000060	PartComp		use_	RSF
O_ADDR1	3113 S 100TH DR	LAND_FCV	34600	ParcelNum	10101011	use_	OFF	InspDate	062011	utype	SF
O_ADDR2		TOTAL_FCV	173000	ImpID	000101	model_desc	Office Building	PropClass	5	residentia	2060
O_CITY	TOLLESON			OccNum	344	sqft	18440	Stories	S	units	1
O_STATE	AZ			OccParam		ground_flo	18440	WallStruct	8	units_sour	assumed_sf
O_ZIP	85353			OccRank	2	constructi	1989	RoofComp	8	ground_flo	0
O_CNTRY				StructClass	D	stories	1	Heating	Y	constructi	1988
SITE_ADDR	3113 S 100TH DR			OccDesc	Office Building	impr_fcv	746177	AC	0	stories	1
S_SUITE				PUC	9720	story_heig	12	BathFix	10	story_heig	0
S_CITY	TOLLESON			FCV	2895348	res_bldg	0	Patio	301	res_bldg	1
S_ZIP	85353			Stories	2.0	construc_1	1989	LivSqFt	2060	mh_spaces	0
PROP_TYPE	RESIDENTIAL			StoryHeight	13	construc_2	1989	ConstYr	1988	rv_spaces	0
DEED_NUM	160129979			GFPerim	561	construc_3	1989	Garage	102	gq_capacit	0
DEED_DATE	29-FEB-2016			GFArea	16208	construc_4	1989	PoolArea	400	gq_occupan	0
DEED_TYPE	WD			TotArea	32236	repl_fcv_l	-1	SalePrice		gq_type_co	0
LAND_FCV	26100			ConstYr	2004	fcv	-1	SaleDate		gq_type_de	
LAND_ASSDV	2610			PctComplete	100	repl_fcv	-1	ImpModPct		year_built	1988
IMPR_FCV	104400			ObsPct	0			ImpModReas		year_bui_1	1988
IMPR_ASSDV	10440			ModPct	100			AddValue		year_bui_2	1988
TOTAL_FCV	130500			CondPct	100			AddAttSqFt		year_bui_3	1988
TOTAL_FCAV	13050			PctOwn	100			AddResSqFt		gq_type__1	-1
LPV	70476			SubMktAdy				AddDetSqFt		gq_type__2	-1
PUC	0131							PropUse	0151	SHAPE_X	-1
LAND_LCC	3									SHAPE_Y	-1
LAND_LCSC										SHAPE_AREA	-1
IMPR_LCC	3									SHAPE_LENG	-1
IMPR_LCSC											
RENTAL_IND											
X_CENTER	590628.9021										
Y_CENTER	879789.7274										

2.2.2 MAG Land Use Conversion to Model Land Uses

MAG parcel data is categorized into 93 unique land uses identified by a three-digit land use code, the hundredth-place digit signifies the major Land Use Sector of a MAG parcel. MAG parcel data collectively presents 11 Primary Land Uses:

SF- Single Family
MF – Multi-Family
RT – Retail
IN – Industrial
OF – Office
OT – Other
TR – Transportation
OS – Open Space
MX- Mixed Use
VA – Vacant
UK – Unknown

MAG's Land Use Code system does not contain a Public category and instead, groups government, institutional, and other employment types under the primary land use Other. The Land Use Code system also arranges certain land use types under primary use Other that can be categorized elsewhere for more uniform modeling. One example, MAG places medical offices in the primary land use other, when medical offices are more similar to other business offices than cemeteries, prisons and Mining grounds.

For these two reasons, we will rearrange the MAG's 93 different land uses types into a new Model Use system that creates a Public category and places land use types into different categories based on similar land use characteristics. The new land use code system, **Tables 2.6 and Table 2.7**, shows how the land use categories were rearranged. This new categorization is what will be used in conjunction with MAG's parcel datasets to fill in the DevPart's base year fields.

TABLE 2.6
NEW MODEL LAND USE CODE

PrimaryUse	LUCode	LUDesc	LUDisplayCode	LUDetailDesc
SF	110	Rural Residential	Single Family Low Density - Less than 1 du/ac	<= 1/5 du per acre (SF)
SF	120	Estate Residential	Single Family Low Density - Less than 1 du/ac	1/5 du per acre to 1 du per acre (SF)
SF	130	Large Lot Residential (SF)	Single Family Medium Density - 1 to 4 du/ac	1 du per acre to 2 du per acre (SF)
SF	140	Medium Lot Residential (SF)	Single Family Medium Density - 1 to 4 du/ac	2-4 du per acre (SF)
SF	150	Small Lot Residential (SF)	Single Family High Density - Greater than 4 du/ac - Includes Mobile Homes	4-6 du per acre (SF)
SF	160	Very Small Lot Residential (SF)	Single Family High Density - Greater than 4 du/ac - Includes Mobile Homes	>6 du per acre (SF)
SF	161	Very Small Lot Residential (SF-Mobile Homes	Single Family High Density - Greater than 4 du/ac - Includes Mobile Homes	Mobile home parks/RV Parks (>6 du per acre)
MF	170	Medium Density Residential (MF)	Multi Family	5-10 du per acre (MF)
MF	180	High Density Residential (MF)	Multi Family	10-15 du per acre (MF)
MF	190	Very High Density Residential (MF)	Multi Family	15-50 DU/AC Residential (MF)
MF	191	High Rise Residential	Multi Family	>50 DU/AC (MF)
RT	210	Low Density Commercial	Retail Low - Amusement/Movie Theatre/Specialty Retail/Neighborhood Retail	Movie Theatres, Skating Rinks, Amusement Facilities
RT	220	Greenhouse Commercial	Retail Low - Amusement/Movie Theatre/Specialty Retail/Neighborhood Retail	Nurseries, Greenhouses
RT	230	Specialty Commercial	Retail Low - Amusement/Movie Theatre/Specialty Retail/Neighborhood Retail	<=50,000 square feet
RT	240	Neighborhood Commercial	Retail Low - Amusement/Movie Theatre/Specialty Retail/Neighborhood Retail	50,000 to 100,000 square feet
RT	250	Community Commercial	Retail High - Community Retail/Regional Retail	100,000 to 500,000 square feet
RT	260	Regional Commercial	Retail High - Community Retail/Regional Retail	500,000 to 1,000,000 square feet
RT	270	Super-Regional Commercial	Retail High - Community Retail/Regional Retail	>= 1,000,000 square feet
IN	310	Storage Facilities	Industrial	Storage Facilities
IN	320	Warehouse	Industrial	Warehouse/Distribution Centers
IN	330	Light Industrial	Industrial	Laboratory/Back Office
IN	340	Heavy Industrial	Industrial	Manufacturing
OF	410	Office Low Rise	Office	1-4 stories
OF	420	Office Mid Rise	Office	5-12 stories
OF	430	Office High Rise	Office	13 stories or more
HT	510	Motels/Hotels	Tourist Accomodations - Motel/Hotel/Resort	Motels/Hotels
HT	511	Resorts	Tourist Accomodations - Motel/Hotel/Resort	Resorts
PB	520	Educational	Educational	Educational institutions where no detail available
PB	521	Preschool/Daycare facilities	Educational	Preschool/Daycare facilities
PB	522	Schools (K-12 grade)	Educational	Schools
OT	523	Post High School Institutions	Educational	Including public and private colleges and technical training institutions
OT	524	Arizona State University	Educational	ASU Main and Extended Campuses
OT	525	Dormitories	Educational	Dormitories associated with educational institutions
OT	530	Institutional	Institutional/Religious	Institutions where no details are available
OT	531	Religious Institutions	Institutional/Religious	Churches/Religious Institutions
OF	532	Medical Offices	Medical/Nursing Home	Medical Offices
OT	533	Hospitals/Medical Centers	Medical/Nursing Home	Hospitals/Medical Centers
OT	534	Nursing Homes/Assited Care Facilities	Medical/Nursing Home	Nursing Homes/Assited Care Facilites (Group Quarter)
OT	540	Cemeteries	Cemetery	Cemeteries, Mausoleums, Crematoriums
PB	551	Public Offices	Public/Special Event/Military	Includes city halls
PB	552	Public Services	Public/Special Event/Military	Includes community centers, libraries, police stations, and other government services
PB	553	Large Public Facilities	Public/Special Event/Military	Includes power sub-stations, cell phone towers, and well heads.
PB	554	Military	Public/Special Event/Military	Military Use
PB	555	Prisons	Public/Special Event/Military	Prisons and jails
PB	560	Special Events and Attractions	Public/Special Event/Military	Includes stadiums, sports complexes, and fairgrounds
OT	571	Landfill	Other Employment - Landfill/Proving Grounds/Sand and Gravel/etc.	Landfill
OT	572	Sand and Gravel	Other Employment - Landfill/Proving Grounds/Sand and Gravel/etc.	Sand and Gravel
OT	573	Automotive Proving Grounds	Other Employment - Landfill/Proving Grounds/Sand and Gravel/etc.	Automotive Proving Grounds
OT	574	Mining	Other Employment - Landfill/Proving Grounds/Sand and Gravel/etc.	Mining
OT	575	Solar Generating Stations	Other Employment - Landfill/Proving Grounds/Sand and Gravel/etc.	Solar generation stations not associated with other power facilities

TABLE 2.7
NEW MODEL LAND USE CODE

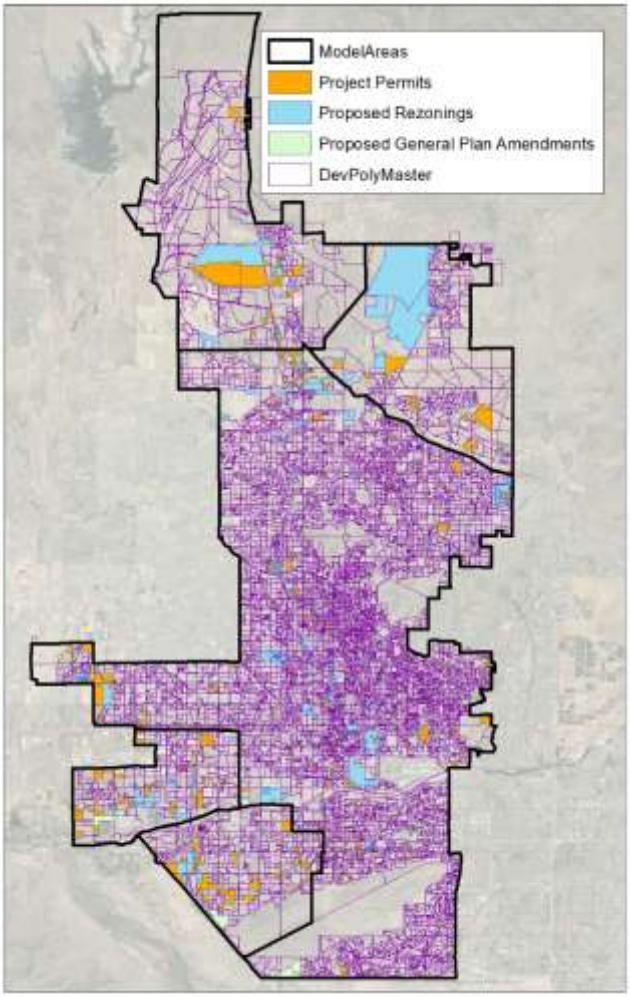
PrimaryUse	LUCode	LUDesc	LUDisplayCode	LUDetailDesc
TR	610	Transportation	Transportation	Freeways/Expressways/ Highways/ Major Roads/ Arterials/ ROWs where no detail available
TR	611	Parking Lots	Transportation	Parking Lots
TR	612	Parking Structures	Transportation	Parking Structures
TR	613	Park and Ride lots	Transportation	Park and Ride lots
TR	614	Transit Center	Transportation	Transit Center
TR	615	Freeways/Expressways/ Highways	Transportation	Freeways/Expressways/ Highways
TR	616	Major Roads, Arterials	Transportation	Major Roads, Arterials
TR	617	Neighborhood roads	Transportation	Neighborhood roads
TR	618	Railroads	Transportation	Railroads
TR	620	Airports	Airport	Public use airports
OT	621	Sky Harbor Airport	Airport	Sky Harbor Airport
OT	622	Private airport	Airport	Private use airports
OS	710	City/Regional Active Open Space	Active Open Space	Includes city/regional parks, playgrounds/fields
OS	711	Local/Neighborhood Active Open Space	Active Open Space	Includes Local/Neighborhood common areas, parks, playgrounds
OS	712	Desert Parks and Preserves	Active Open Space	Any park or mountain preserve that has a predominantly desert character
OS	720	Golf courses	Golf Course	Golf Courses
OS	730	Passive Open Space	Passive/Restricted Open Space	Includes mountain preserves and washes
OS	731	Restricted Open Space	Passive/Restricted Open Space	Restricted Open Space (Including Firing Range)
OS	732	Limited Use Public Facilities	Passive/Restricted Open Space	Very small difficult to access parcels
OS	733	Wash	Passive/Restricted Open Space	Dry water course
OS	740	Water	Water	Reservoirs/Rivers/Lakes
OS	741	Canal	Water	Canal
OS	742	Intermittant Water	Water	Intermittant Water
OS	743	Residential Lake	Water	Residential Lake
OS	750	Agriculture	Agriculture	General Agriculture
OS	751	Field Crops	Agriculture	
OS	752	Orchard	Agriculture	
OS	753	Dairy or Feedlot	Agriculture	
MX	810	Business Park	Business Park	Includes enclosed industrial, office or retail in a planned environment
MX	820	Mixed Use	Mixed Use	Jurisdiction defined
MX	821	Mixed Use/Indian Community	Mixed Use	Mixed Use/Indian Community
MX	830	Planned Community	Planned Development	Planned Community
VA	900	Vacant (existing land use database only)	Vacant	Vacant
VA	901	Abandoned Agriculture	Vacant	Agricultural lands that are no longer in production (fallow lands are classed as 750)
VA	910	Developing Residential	Developing Residential	Residential Under Construction
VA	920	Developing Commercial	Developing Employment Generating	Commercial Under Construction
VA	930	Developing Industrial	Developing Employment Generating	Industrial Under Construction
VA	940	Developing Office	Developing Employment Generating	Office Under Construction
VA	950	Developing Public/Other Employment	Developing Employment Generating	Employment Under Construction
VA	960	Developing Transportation	Transportation	Transportation Under Construction
VA	970	Developing Open Space	Active Open Space	Developing Open Space
VA	980	Developing Multiple Use	Developing Employment Generating	Multiple Use Under Construction
UK	999	Unknown	Unknown	Unknown

2.2.3 City of Phoenix Planning and Development Data

The City of Phoenix Planning and Development Department (PDD), oversees all planning, zoning and permitting processes. The department continuously maintains updated records of proposed general plan amendments, proposed rezoning cases and preliminary permits. These records, collectively, can portray where in the initial proposal-to-building vertical pipeline a project may be. These records are also the most credible sources regarding the development that will occur on undeveloped and redevelopable land.

The project team collected a dataset of proposed general plan amendments, proposed rezoning cases and preliminary permits from 2018 through 2022. The five-year time frame for the dataset was chosen because it would allow the team to identify projects that started building vertical in 2020 as well as identify the building order of future projects. The City of Phoenix General Plan and Zoning maps are used as references to estimate development type and quantity for DevPoly's that contain little to no information from the development pipeline dataset.

FIGURE 2.6
PROPOSED REZONINGS, GENERAL PLAN AMENDMENTS AND PRELIMINARY PERMITS 2018-2022



The project team maintains constant communication with the Planning and Development Department staff regarding projects that will be proposed and negotiated away from public view. The PDD staff are a vital resource in the accuracy of potential development type and quantity.

2.2.4 Populating Base Year Data

The information about DevPolys is coded in DevPart records. One or more DevPart records are associated with each DevPoly, allowing for multiple land uses and development timing options to be represented. The original content in the DevPart database is created by assigning parcel-level data from the Maricopa Association of Governments (MAG) to DevPolys. The MAG parcel data is used to create DevPart records for each unique land use MAG record. The created Devpart records receive existing development information for 2020 and 2022, which most importantly includes the number of existing units and built square feet a land parcel may have.

By using the new land use code system while populating the Base fields in the DevPoly data we create a total of twelve Primary Land Use Types: Single family (SF), Multi-family (MF), Retail (RT), Warehouse (WA), Industrial (IN), Office (OF), Other (OT), Public (PB), Open space (OS), Transportation (TR), Mixed Use (MX), and Vacant (VA). The new land use code system creates twelve Primary Land Use Types in the DevPoly database, seven of which are used for modeling. The other five major land use categories are used to account for vacant land, undevelopable land (open space and transportation), and two categories (industrial and mixed use) that require additional distinction to determine the development potential.

Vacant land uses provide information on the type of future development that will occur according to their respective MAG Land Use Code, a three-digit number. Though it is possible to model vacant land according to the assigned Land Use Code, for ease of database management, it is best to re-assign all vacant land uses to whatever land use they will develop into. To signify that the land is vacant and undeveloped, Base year data will be zero. By re-assigning vacant land to its future land use, we will be able to work with one less land use when model building and querying the database.

Open space land use represents mountain preserves, washes, canals, etc.; Though they are not included in the growth models, it is still important to track in order to show the constraints of where growth cannot occur. Transportation land uses mainly represent roads and highways, but it may include parking structures and parking lots. The project team will consider parking lots and structures as part of the land use they serve, but parking uses will not be counted in the square feet portion of the development. When updating the Transportation DevPart records, new records are not created for major roads that are not already accounted for, but instead the major roads are not included in any developable land uses. Since major roads can be left out of the DevPoly database, there can be instances where the sum of DevPart acres is less than the sum of acres in a DevPoly, the difference therefore represents roads and right of ways.

The industrial category requires additional distinction because the characteristics of warehouse space are dramatically different than manufacturing space. The differences include both the building coverage rates (floor-area-ratios), as well as employment density rates. So, while employment is modeled for the whole industrial category, the amount of potential development and employment is based on manufacturing versus warehousing uses. In city planning, warehouse use buildings are also developed in industrial zoning areas.

The second category requiring further distinction is mixed-use development. Mixed-use spaces depending on the type of zoning, can have any combination of residential, office, retail, medical, recreational, commercial, or industrial land uses. Therefore, it is possible to further break down mixed-use DevPart records into multiple records representing each land use within a mixed-use parcel. For mixed-use land that has already been developed, areal imagery and maps are used to verify the types of existing development. Vacant land that is zoned for mixed-use development is broken down into assumed land use types based on City of Phoenix development data, more on how future capacity is analyzed in Section 1.4.

2.2.5 Growth Areas - Existing Development

Table 2.8, presents the developed acreage breakdown for each land use in the base year, 2020.

TABLE 2.8
SUM OF ACRES BY LAND USE

	Total Acres						
	IN	**MF**	**OF**	**OT**	**RT**	**SF**	**Total**
Estrella	4,134.48	42.82	4.30	961.50	1,733.40	2,868.62	9,745.13
Laveen	215.52	43.89	0.71	1,500.50	866.12	6,307.82	8,934.56
Northeast	297.06	486.16	138.97	1,491.56	481.26	4,952.93	7,847.94
Northwest	72.14	265.64	28.99	2,228.91	335.17	3,849.86	6,780.71
Balance	8,143.82	11,558.53	3,826.89	6,068.96	11,529.43	66,547.06	107,674.71
Total	12,863.03	12,397.05	3,999.85	12,251.44	14,945.37	84,526.31	140,983.04

Table 2.9, shows the total existing square feet developed in the base year, 2020.

TABLE 2.9
BUILT SQUARE FEET BASE YEAR

	Built Square Feet					
	IN	**OF**	**OT**	**PB**	**RT**	**Total**
Estrella	56,023,463	16,026	176,281	1,977,943	3,102,712	61,318,739
Laveen	935,346	9,227	228,410	2,565,832	2,767,858	6,572,180
Northeast	1,292,798	2,243,411	3,406,471	1,913,334	3,602,623	12,824,556
Northwest	860,628	251,915	360,937	1,613,636	1,666,070	4,795,391
Balance	110,928,089	107,184,989	56,591,239	88,542,610	83,756,558	447,003,485
Total	170,040,324	109,705,568	60,763,338	96,613,355	94,895,821	532,514,351

Table 2.10, provides the inventory of existing dwelling units in 2020.

TABLE 2.10
RESIDENTIAL INVENTORY

Existing Dwelling Units

	SF	MF	Total
Estrella	17,348	811	18,159
Laveen	24,841	484	25,325
Northeast	17,988	8,752	26,740
Northwest	13,787	4,071	17,858
Balance	313,845	236,187	17,858
Total	387,809	250,305	105,940

2.3 Current Development Activity

A priority score of zero indicates the development is currently active. Not all active developments will be fully built out in the first projections year 2021. They will be allocated thought 2023/24 to mimic actual development growth as close as possible. **Tables 2.11 and 2.12** list the active non-residential and residential developments respectively.

TABLE 2.11
NON-RESIDENTIAL SQUARE FEET IN PROGRESS

Active Non-Residential Square Feet

	IN	OF	OT	PB	RT	Total
Estrella	8,680,261			90,564	158,797	8,929,622
Laveen	91,229	35,868	32,017	166,079	548,016	873,209
Northeast	526,265	500,000	555,086	12,892	9,200	1,603,443
Northwest	3,158,892			108,087	199,295	3,466,274
Total	12,456,647	535,868	587,103	377,622	915,308	14,872,547

TABLE 2.12
RESIDENTIAL UNITS IN PROGESS
Active Residential Units

	SF	MF	Total
Estrella	2,540	729	3,269
Laveen	3,161	657	3,818
Northeast	1,656	205	1,861
Northwest	1,157	1,054	2,211
Total	8,514	2,645	11,159

2.4 Future Development Capacity

The methodology used to determine development capacity was different in the Impact Fee (Growth) areas than it was in the balance of the City. In the growth areas, allocations were only made to vacant land and approved redevelopment projects with the total development capacity being fixed. In the balance of the city, allocations were made to vacant land, approved projects and to parcels that are now developed. This means that development capacity is not fixed, but can change over time. As a result, the allocations for 2060 were provided as estimates of the development capacity.

In all model areas, development capacity was determined for active developments and vacant land parcels based on land use and density information from several sources listed in order of importance and specificity. These include:

- Remaining portions of active projects;
- Approved specific plans and permits;
- Approved zoning changes;
- Approved general plan amendments; and
- General Plan land use.

Where General Plan land use was used, the land use categories were collapsed into the five categories being modeled including single family and multifamily residential, and retail, office, industrial, public and other non-residential uses. General plan land use categories like Business Park and Mixed Use required assignment to one or more of the five modeled use categories. These assignments were made by a set allocation formula originally, and then modified based on review. The changes from the review in the Balance of City, while isolated, involved significant changes to land use and development density, incorporating more up-to-date and detailed plans for redevelopment of a specific set of projects currently underway around the city.

In the Balance of the City, a model was developed to estimate the likelihood and timing of redevelopment, which can cause changes to land use, density or both. The analysis was driven by a case study of 45 actual projects. Case studies are pulled from either the "Pending Major Permits" shapefile (provided by the City of Phoenix) or through the "City of Phoenix Planned Unit Development and Planned Community District Current Cases" web page.

These two sources provide specific individual or collective parcels that represent current targeted areas for development, whether that be an approved site plan, rezoning case, or proposed plan.

In the southern growth areas, Laveen and Estrella, the development capacity was much less dependent on General Plan land use since the vast majority of the vacant land is the subject of one of the more actions that provide more detail. This is much less the case in the northern growth areas, particularly in the Northwest Growth Area. **Table 2.13** below detail the non-residential capacity by growth area. This includes square footage that is currently developing. This information is used as the capacity for each land use that can be allocated. In some areas, the model will flex allocations between different categories when necessary.

TABLE 2.13
NON-RESIDENTIAL CAPACITY (including currently developing)
Potential Non-residential SqFt

	IN	OF	OT	PB	RT	Total
Estrella	21,514,224	57,000		896,055	1,297,176	23,764,455
Laveen	6,413,938	2,264,816	2,166,614	426,079	3,723,164	14,994,611
Northeast	2,275,228	25,809,942	1,347,727	2,459,333	7,192,922	39,085,152
Northwest	42,124,784	16,925,187	1,145,301	2,490,523	9,993,683	72,679,479
Total	72,328,174	45,056,946	4,659,642	6,271,990	22,206,945	150,523,697

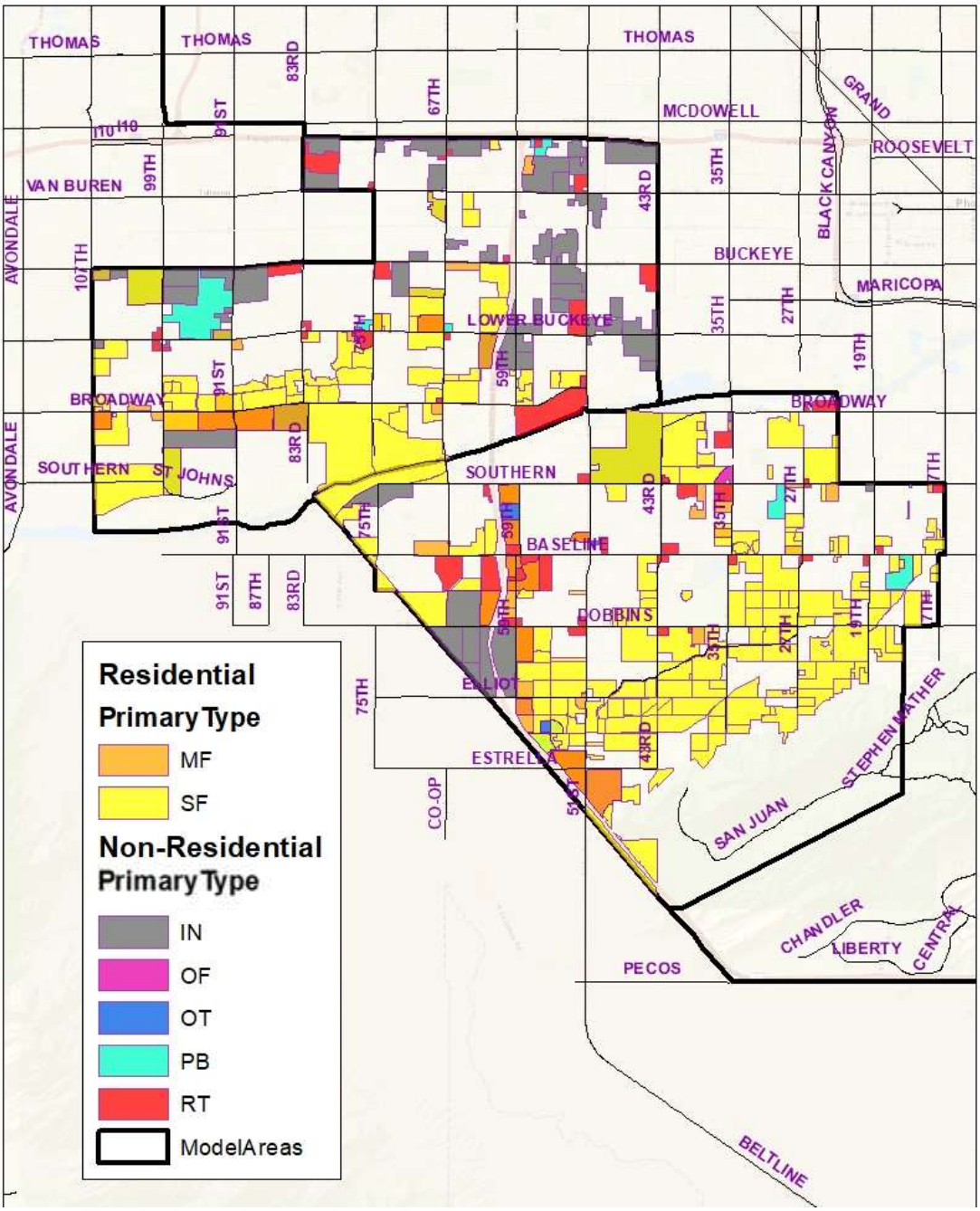
Table 2.14 shows the capacity of multifamily and single-family residential units. These are the maximum number of units each of the growth areas can reach by the end of the long-term planning horizon.

TABLE 2.14
RESIDENTIAL CAPACITY (including currently developing)
Potential Residential Units

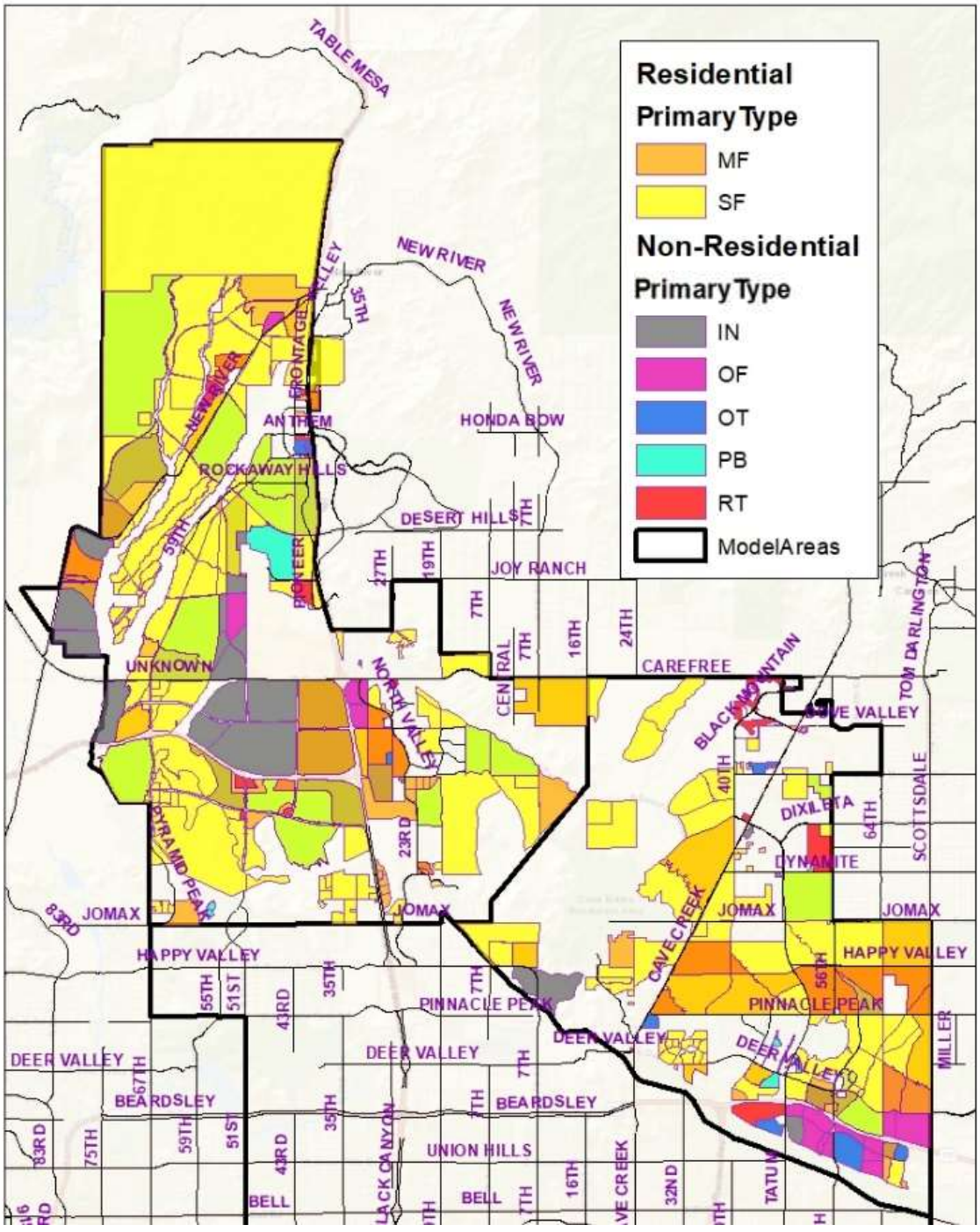
	SF	MF	Total
Estrella	8,408	3,840	12,248
Laveen	9,372	6,488	15,860
Northeast	42,722	14,906	57,628
Northwest	52,641	30,591	83,232
Total	113,143	55,825	168,968

Maps 2.1 and 2.2 show the potential land use for the South and North growth areas. The primary type use shows the main type of residential and non-residential land use to be allocated.

MAP 2.1
ESTRELLA & LAVEEN POTENTIAL LAND USE



MAP 2.2
NORTHEAST & NORTHWEST LAND USE



3.0 Growth Area Projections and Sequencing

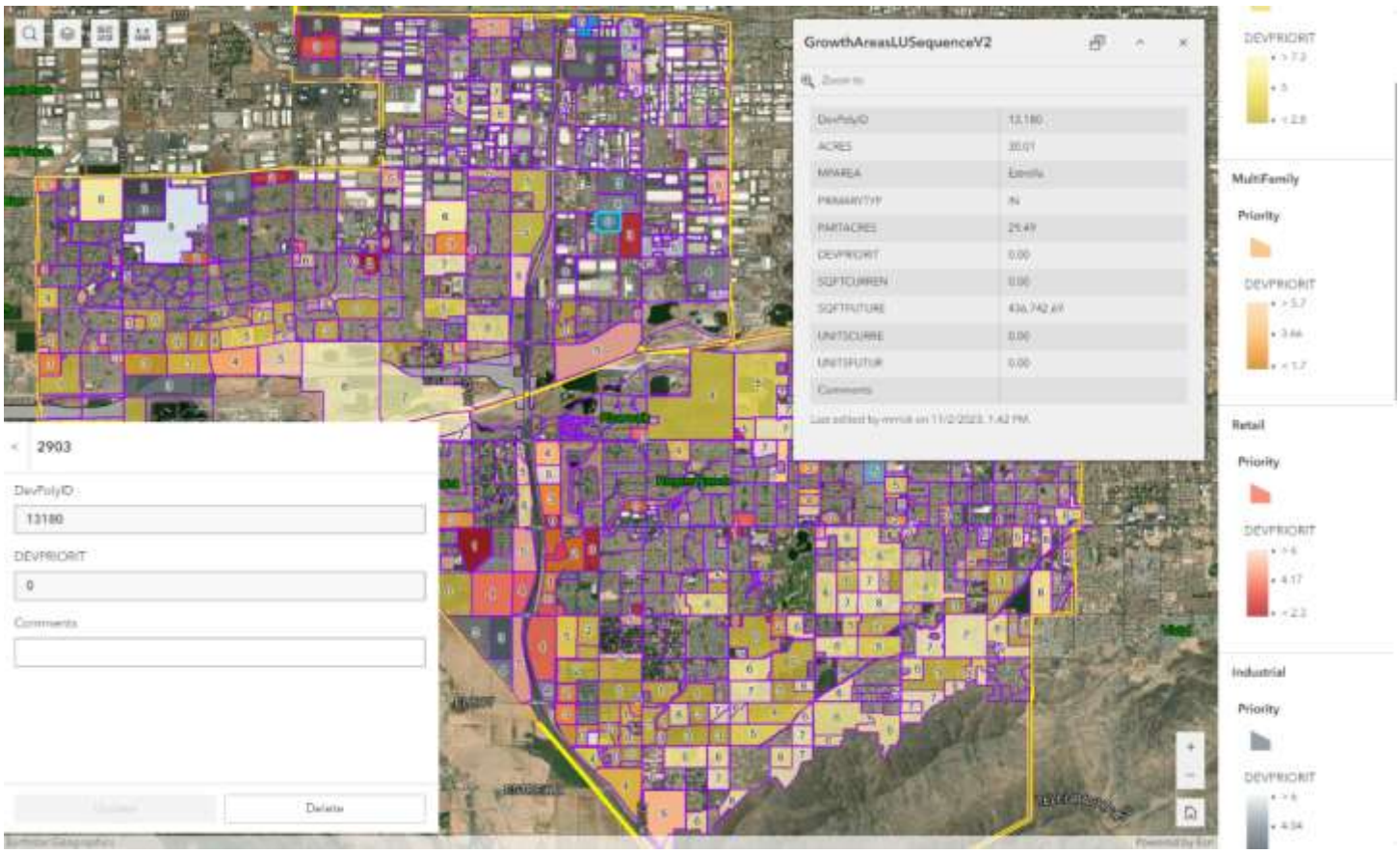
3.1 Parcel Sequencing

A system was developed by Applied Economics to direct the order in which parcels in the same land and growth area where to develop over time. While originally being based on estimate timeframes, the real use is to determine the sequence in which development will occur, with the timeframe being determined by the total amount of growth to be allocated. In the priority system, sequencing is done at the individual growth area level. For example, any sequencing done on Estrella is independent from the rest of the growth areas and has no effect on them. **Table 3.1** below depicts the parcel sequencing system used for each of the growth areas.

TABLE 3.1
PARCEL SEQUENCE SYSTEM

DevPriority	Timing
-1	Builtout
0	Active/Current Year
1	Estimate Year
2	Planning Horizon
3	
4	
5	
6	Long Term Projections
7	
8	
9	

Multiple sources were taken into account to sequence the buildout of each growth area. Staff knowledge and review were key in creating the final sequence. Applied Economics completed multiple iterations to solicit feedback on the development priority of the growth regions. To aid in this review process an interactive ArcGIS online web application was created. This gave stakeholders, including the Ad Hoc Committee the capability to leave comments on each development polygon.

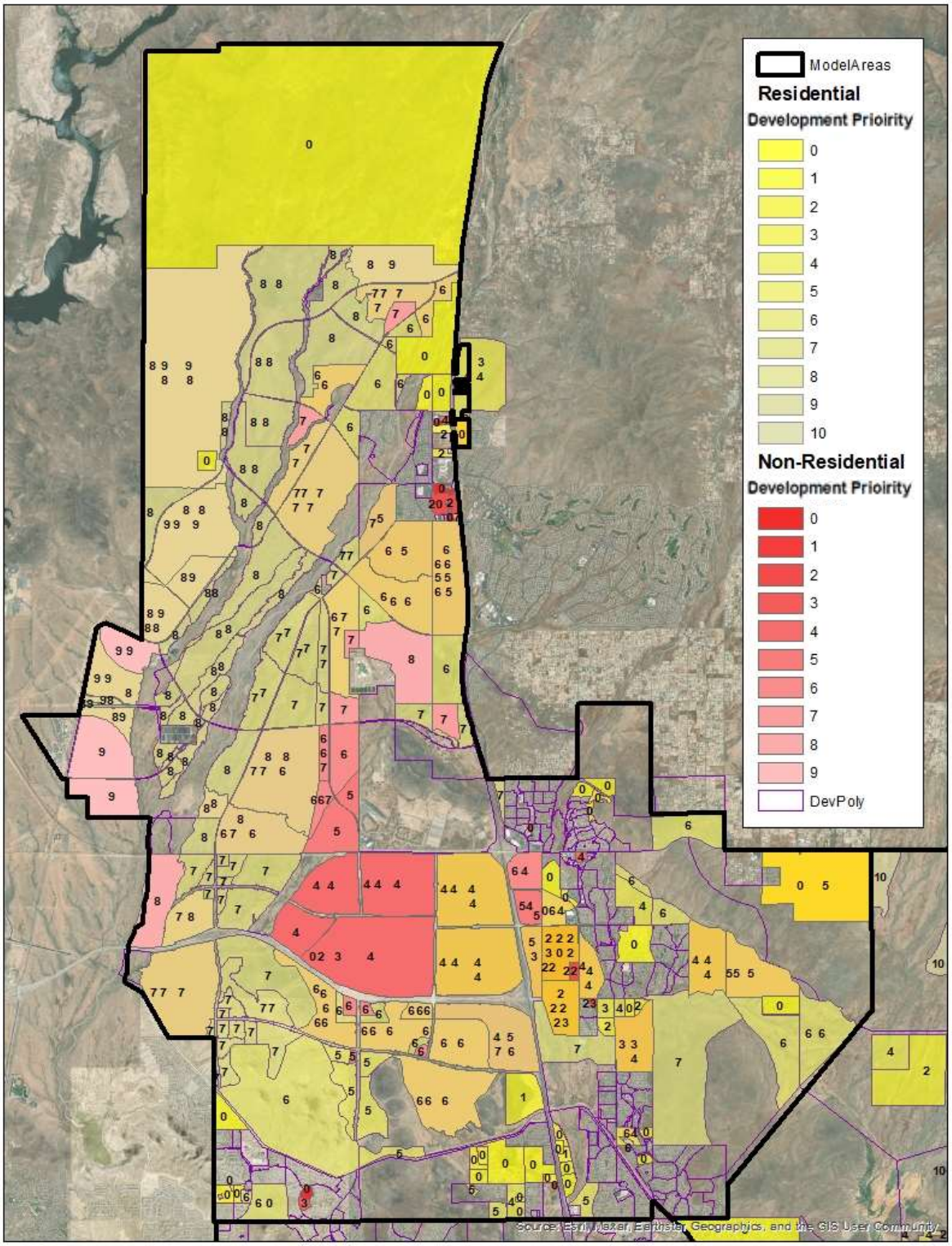


Sources provided by the city including preliminary permits, proposed rezonings, general plan amendments and the current general plan influenced the development priority to sequence. Taking these sources into account improved the likelihood the projected sequencing will reflect real world growth and conditions.

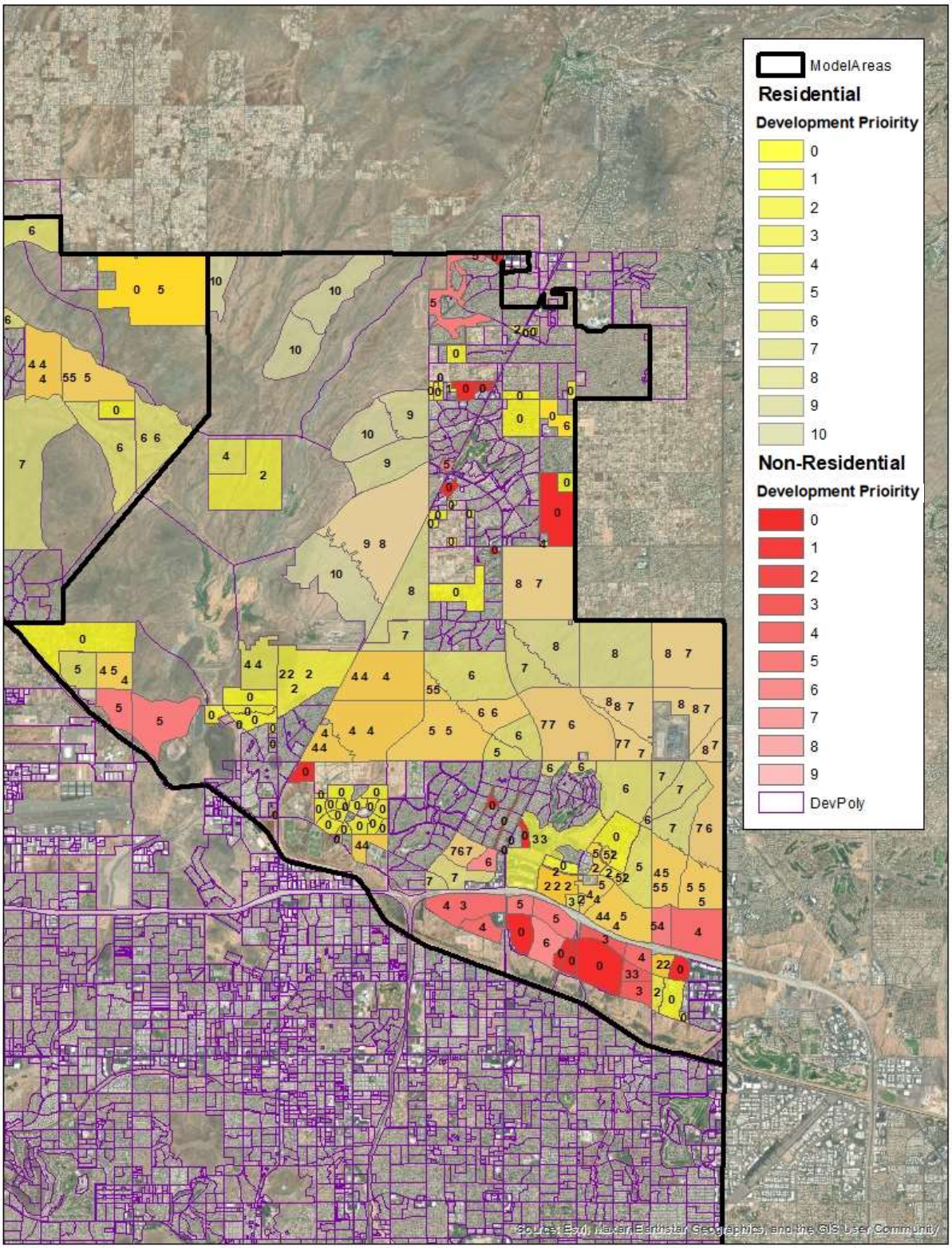
4.2 Parcel Sequencing Results

Maps **3.1,3.2,3.3 and 3.4** show the final development sequencing for residential and non-residential development in each growth area. Note that some polygons have both types of uses. The parcel sequencing was more difficult in the Northeast and Northwest growth areas due to the large amount of vacant land, and the extended timeframe that development will cover. In Laveen and Estrella, most of the vacant land is already included in documented development plans, is likely to occur over the next 10 to 20 years.

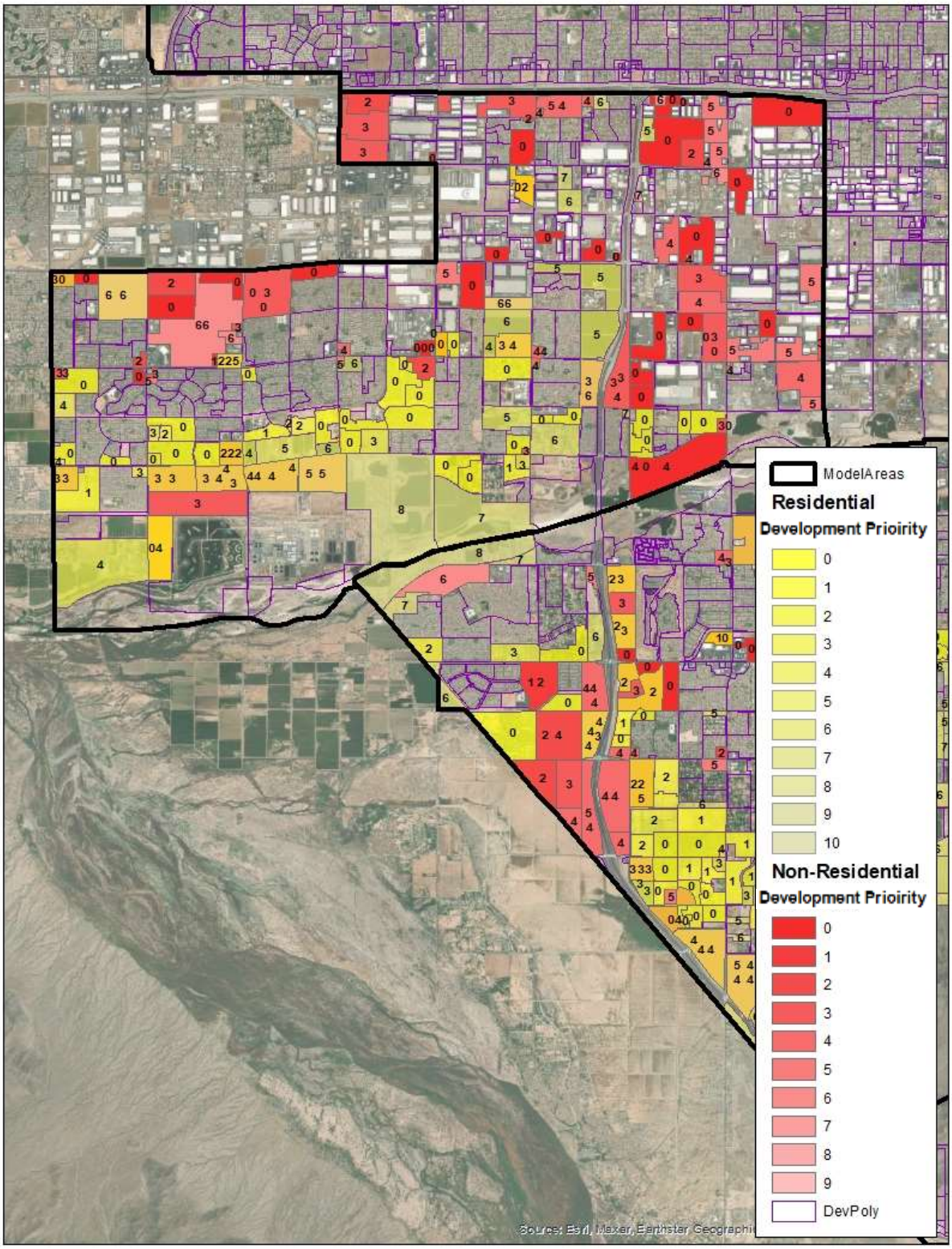
MAP 3.1
NORTHWEST PARCEL SEQUENCE



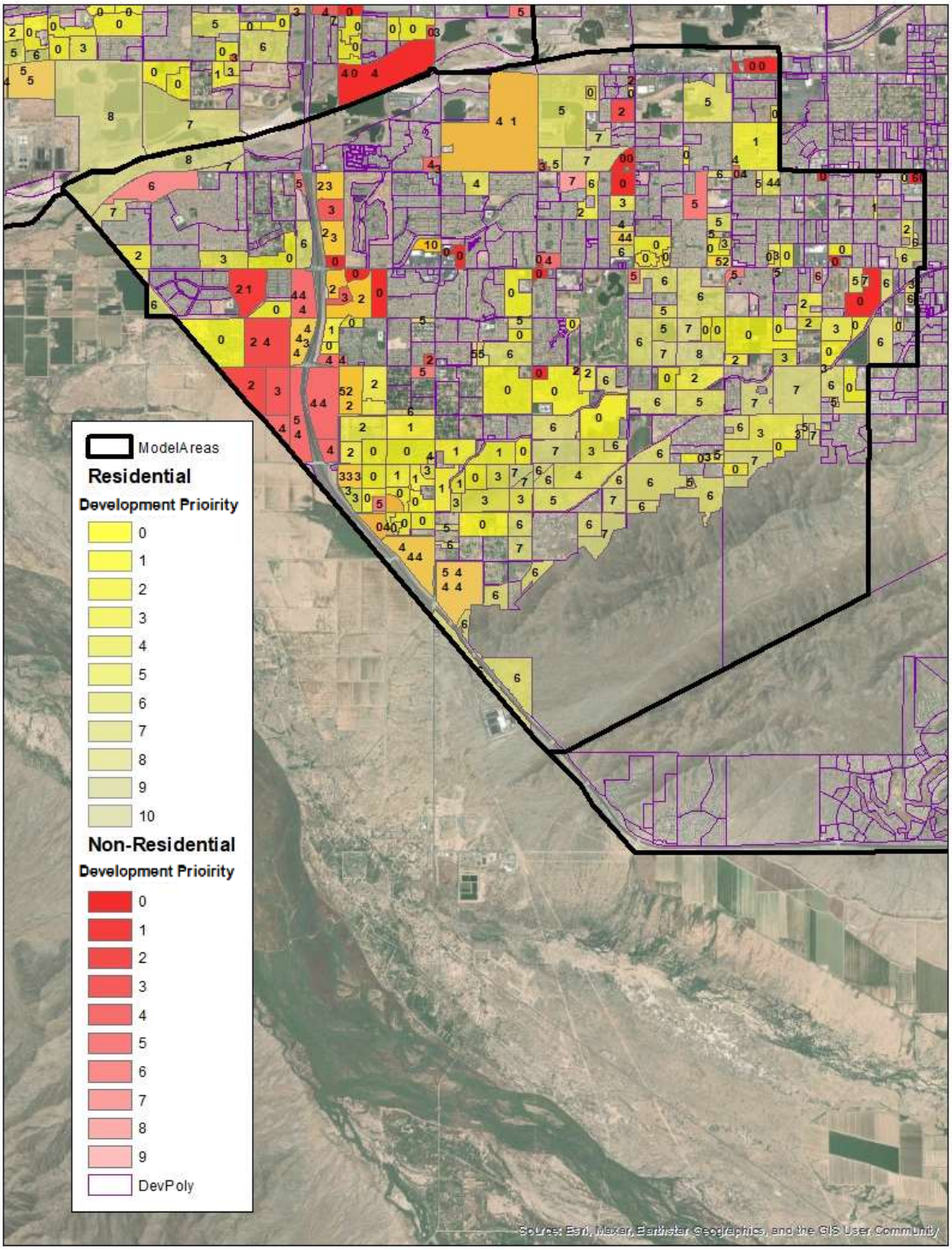
MAP 3.2
NORTHEAST PARCEL SEQUENCE



MAP 3.3
ESTRELLA PARCEL SEQUENCE



MAP 3.4
LAVEEN PARCEL SEQUENCE



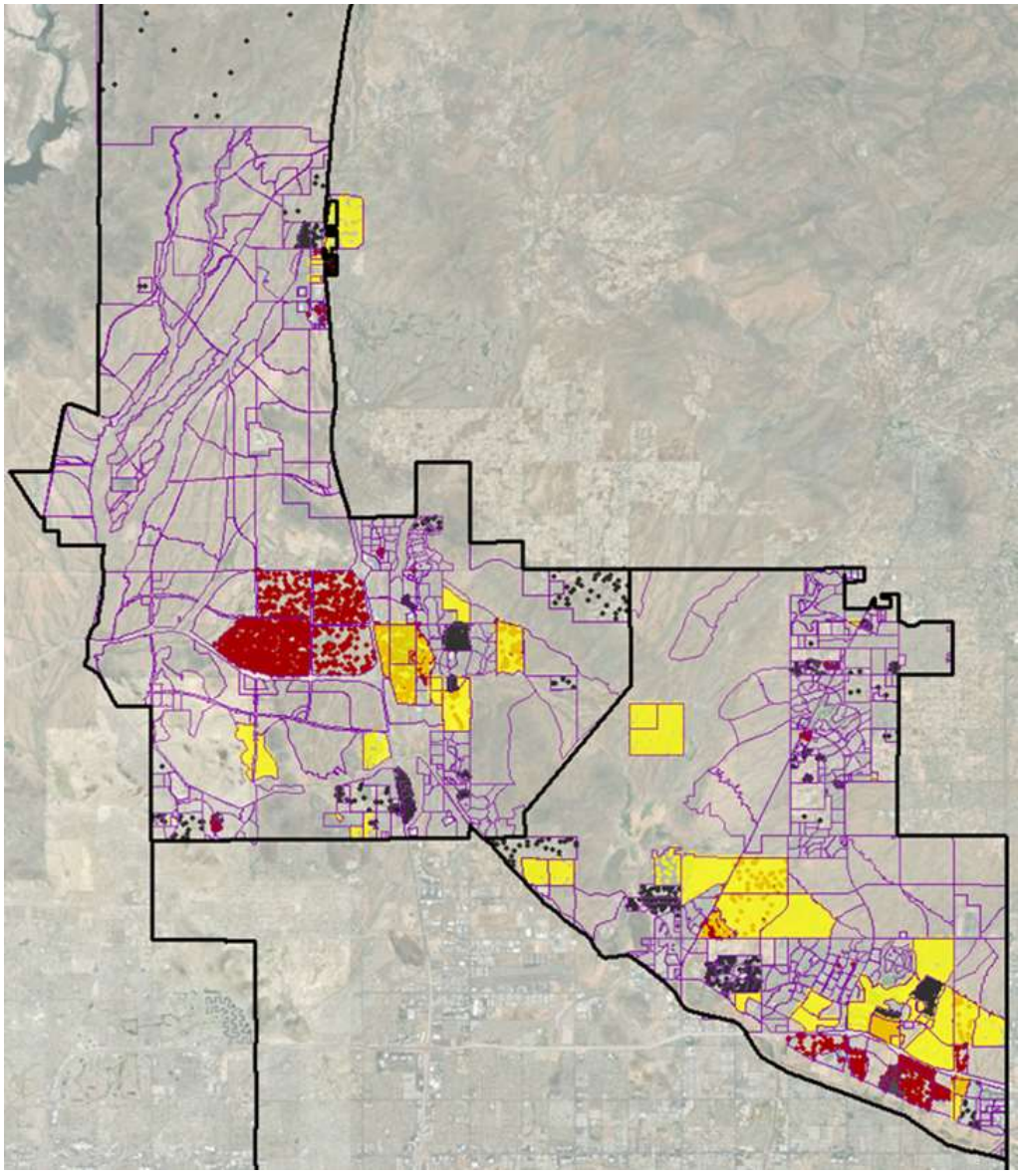
3.2 Allocations

Utilizing Community Viz, an extension of ArcGIS, residential and non-residential allocations were made for each year from 2021-2060 by growth area. The allocations were driven by control total levels of development for each growth area. This process was completed for a base, high and low growth scenarios.

3.2.1 Base Scenario Allocations

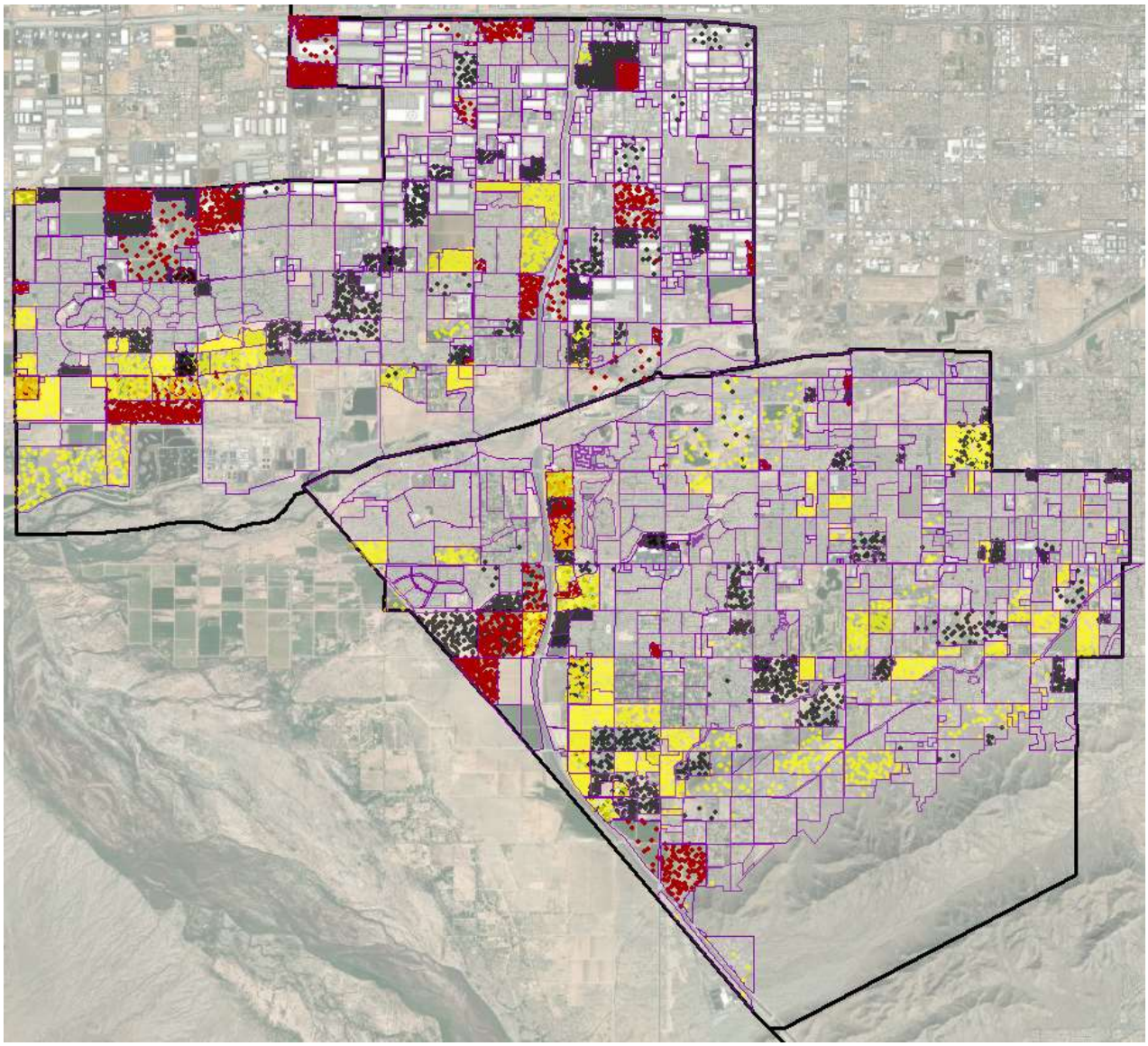
The maps below group land allocated in years 2024 to 2034. With yellow representing residential allocations, red representing non-residential allocations and grey representing land allocated between 2020-2024.

MAP 3.5
RESIDENTIAL & NON-RESIDENTIAL NORTH PHOENIX PLANNING HORIZON (2025-2034):



Yellow – Residential dwelling units, 1 Dot = 3 units Red – Non-residential square feet, 1 Dot = 5,000 square feet

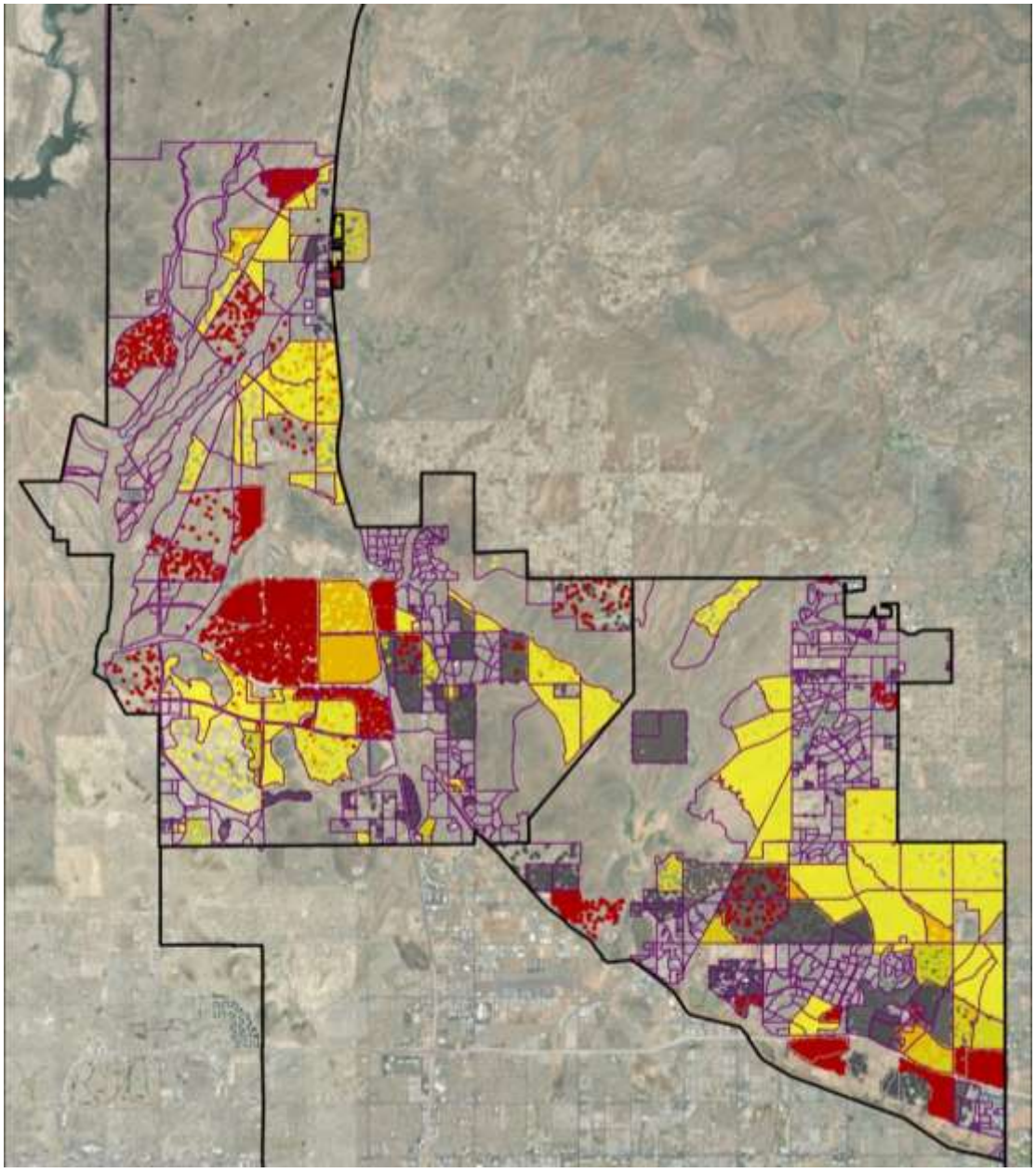
MAP 3.6
Residential & Non-Residential South Phoenix Planning Horizon (2025-2034):



Yellow – Residential dwelling units, 1 Dot = 3 units

Red – Non-residential square feet, 1 Dot = 5,000 square feet

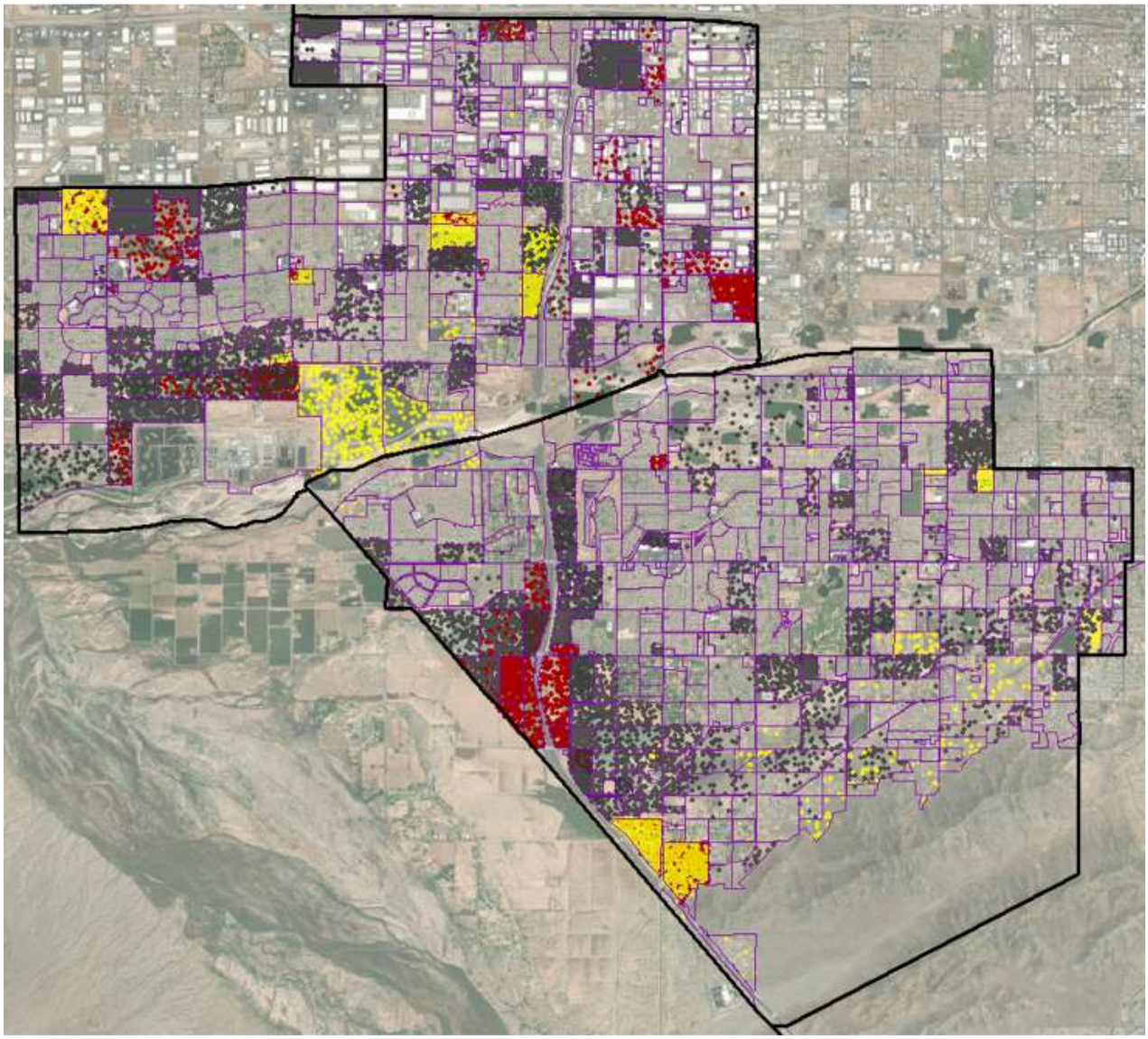
MAP 3.7
Residential & Non-Residential North Phoenix Long Term Projection (2035-2060):



Yellow – Residential dwelling units, 1 Dot = 3 units

Red – Non-residential square feet, 1 Dot = 5,000 square feet

MAP 3.8
RESIDENTIAL & NON-RESIDENTIAL SOUTH PHOENIX LONG TERM PROJECT (2035-2060):

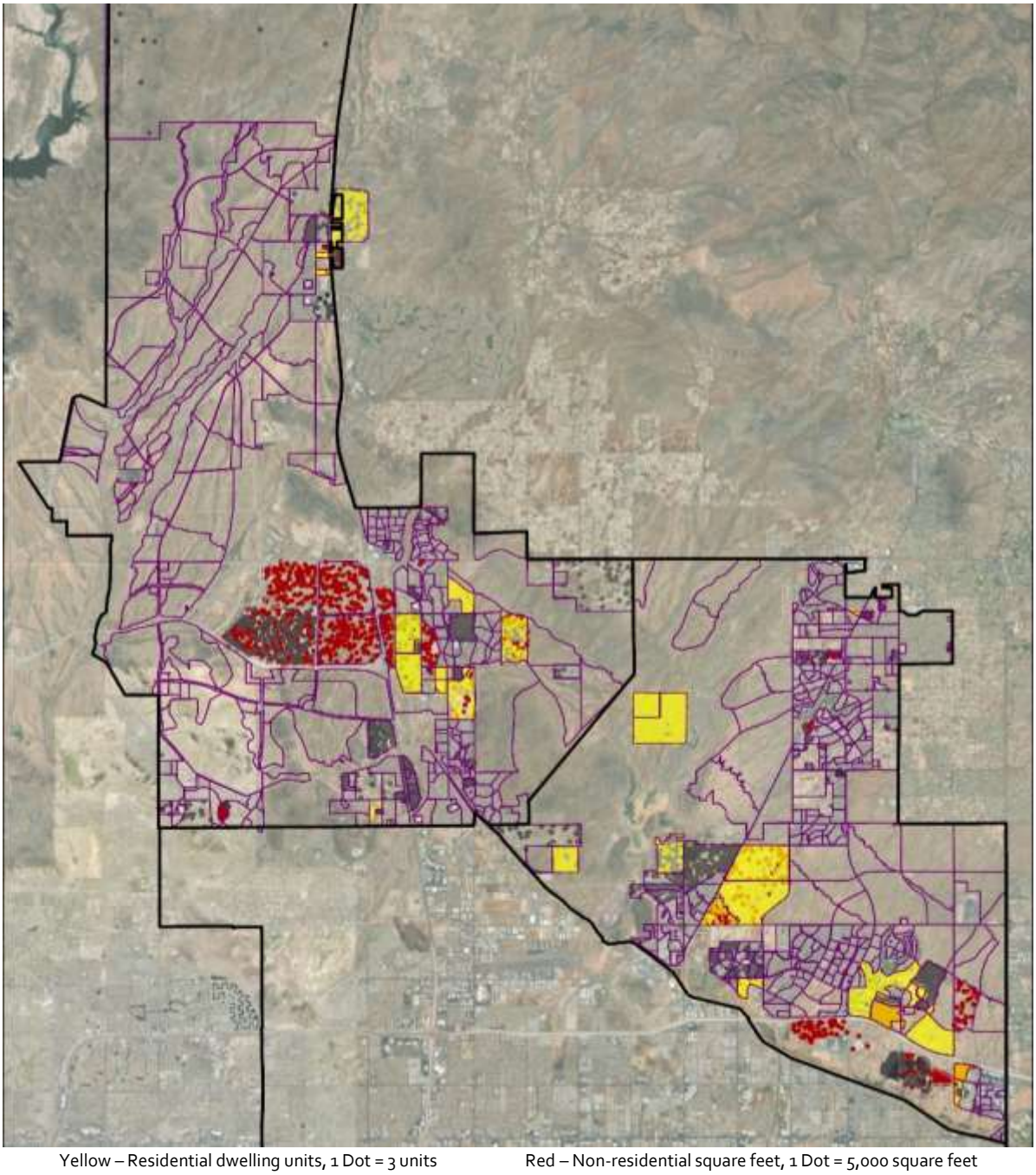


Yellow – Residential dwelling units, 1 Dot = 3 units

Red – Non-residential square feet, 1 Dot = 5,000 square feet

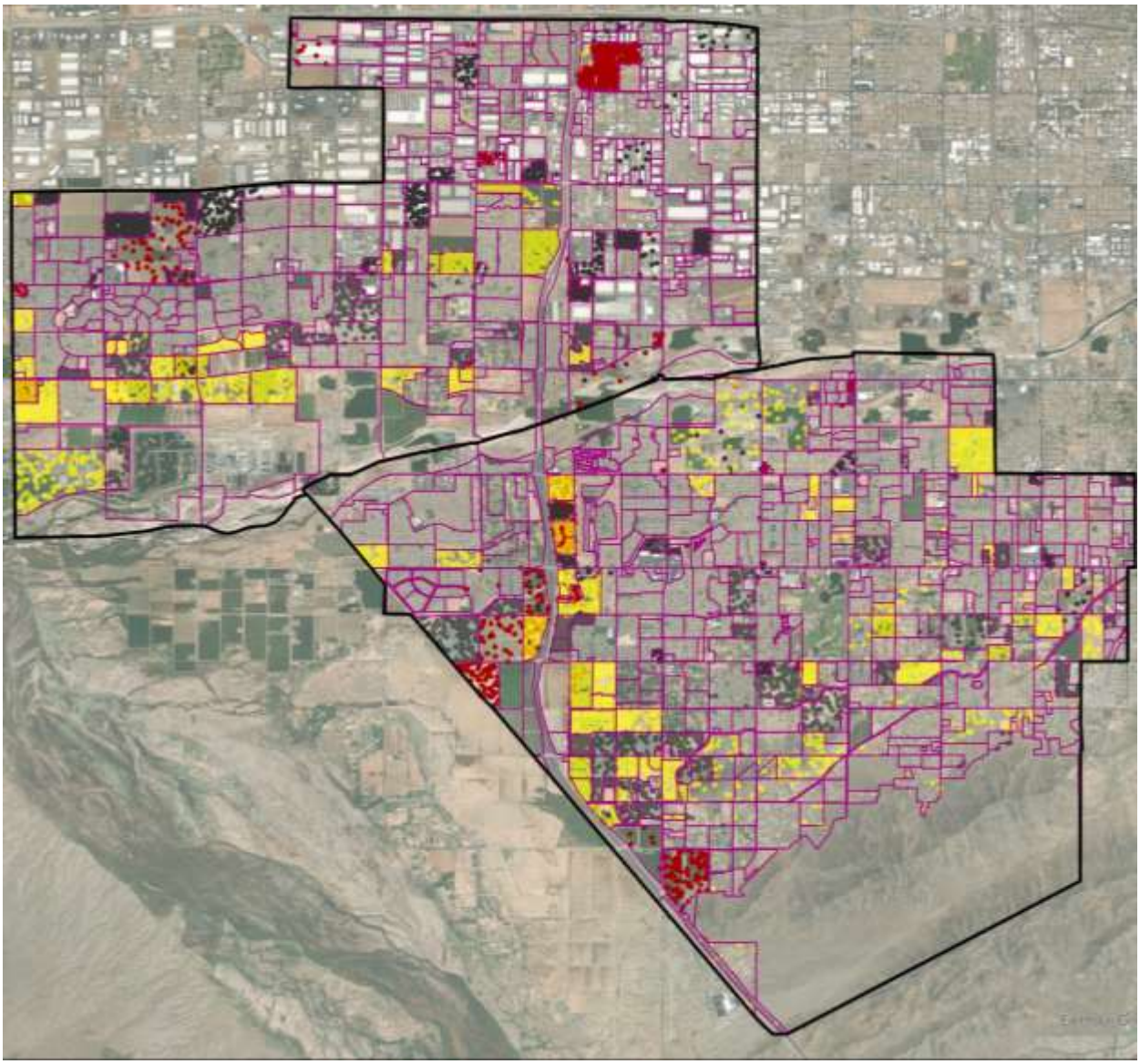
3.2.2 Low Scenario Allocations

MAP 3.9
RESIDENTIAL & NON-RESIDENTIAL NORTH PHOENIX LONG TERM PROJECTION (2035-2060):



Yellow – Residential dwelling units, 1 Dot = 3 units Red – Non-residential square feet, 1 Dot = 5,000 square feet

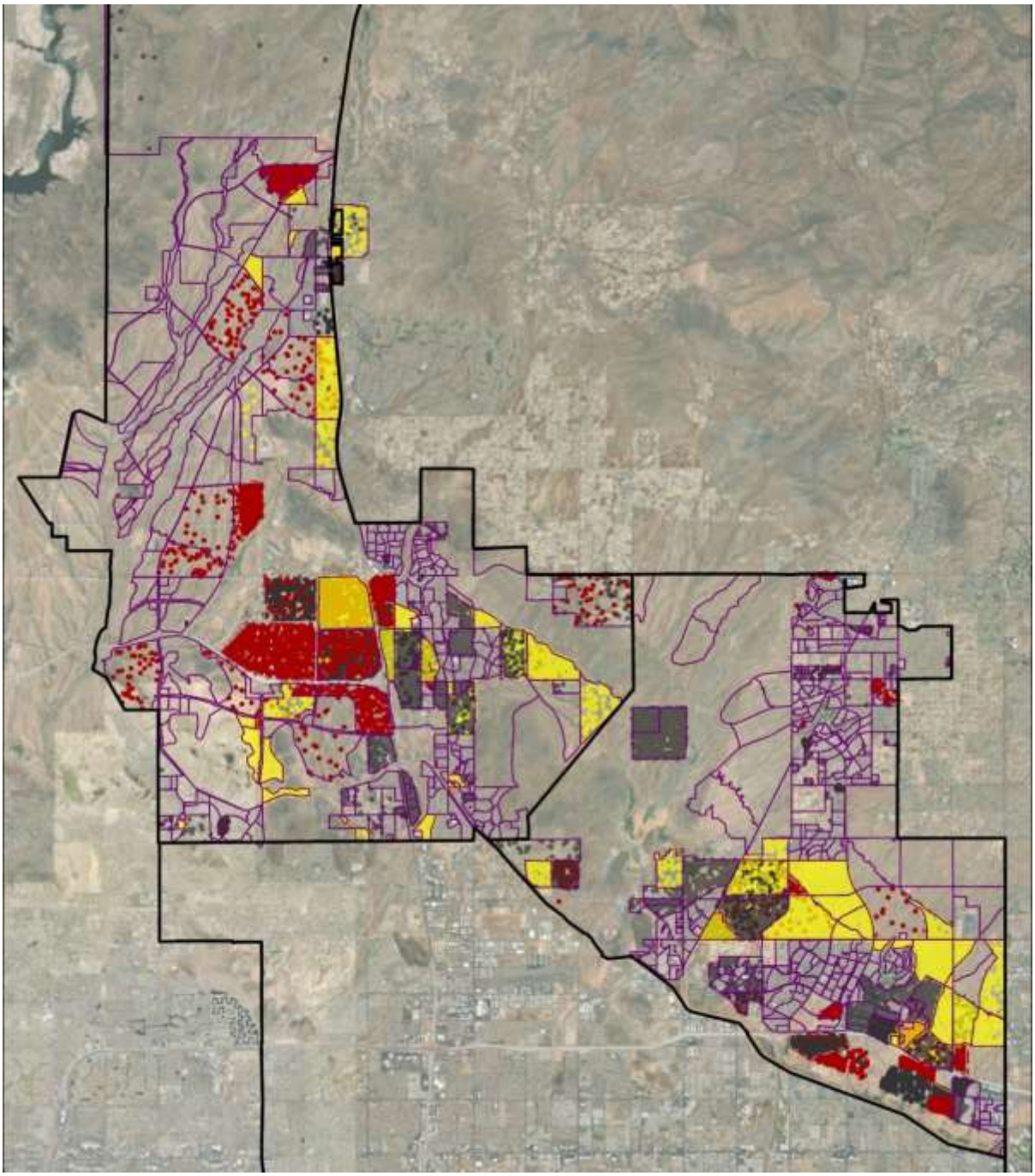
MAP 3.10
RESIDENTIAL & NON-RESIDENTIAL SOUTH PHOENIX LONG TERM PROJECT (2035-2060):



Yellow – Residential dwelling units, 1 Dot = 3 units

Red – Non-residential square feet, 1 Dot = 5,000 square feet

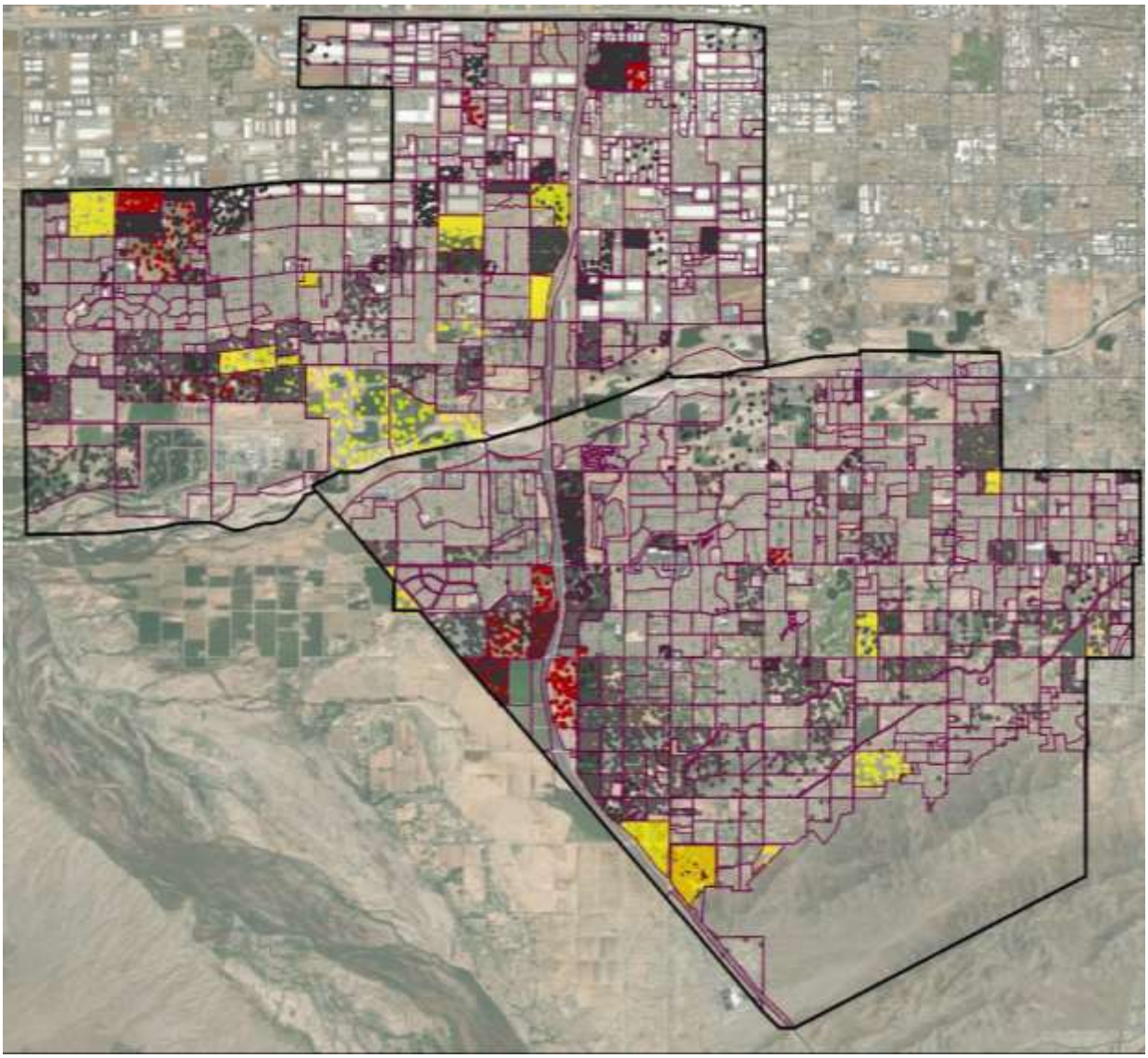
MAP 3.11
RESIDENTIAL & NON-RESIDENTIAL NORTH PHOENIX LONG TERM PROJECTION (2035-2060):



Yellow – Residential dwelling units, 1 Dot = 3 units

Red – Non-residential square feet, 1 Dot = 5,000 square feet

MAP 3.12
RESIDENTIAL & NON-RESIDENTIAL NORTH PHOENIX LONG TERM PROJECTION (2035-2060):

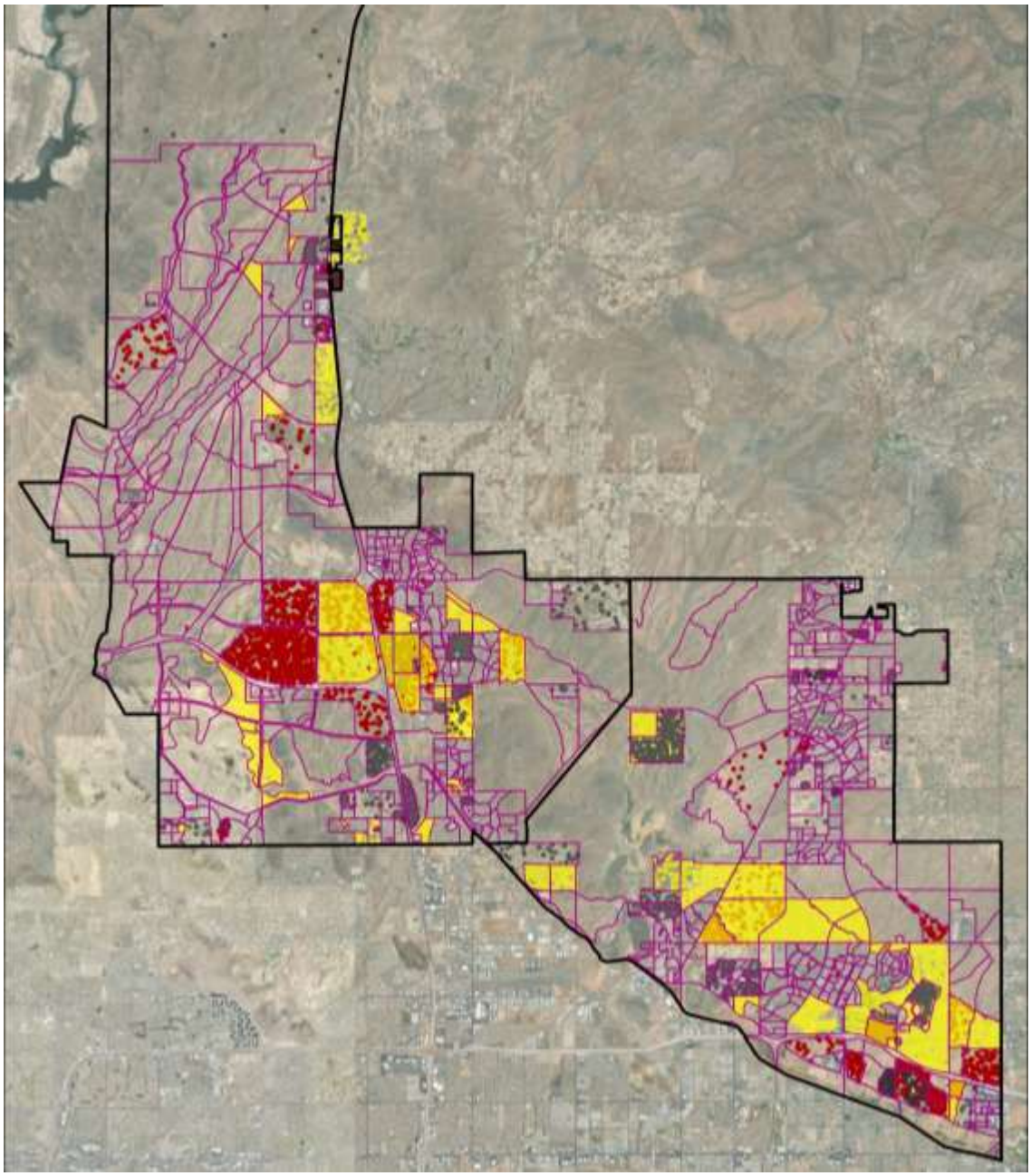


Yellow – Residential dwelling units, 1 Dot = 3 units

Red – Non-residential square feet, 1 Dot = 5,000 square feet

3.2.3 High Scenario Allocations

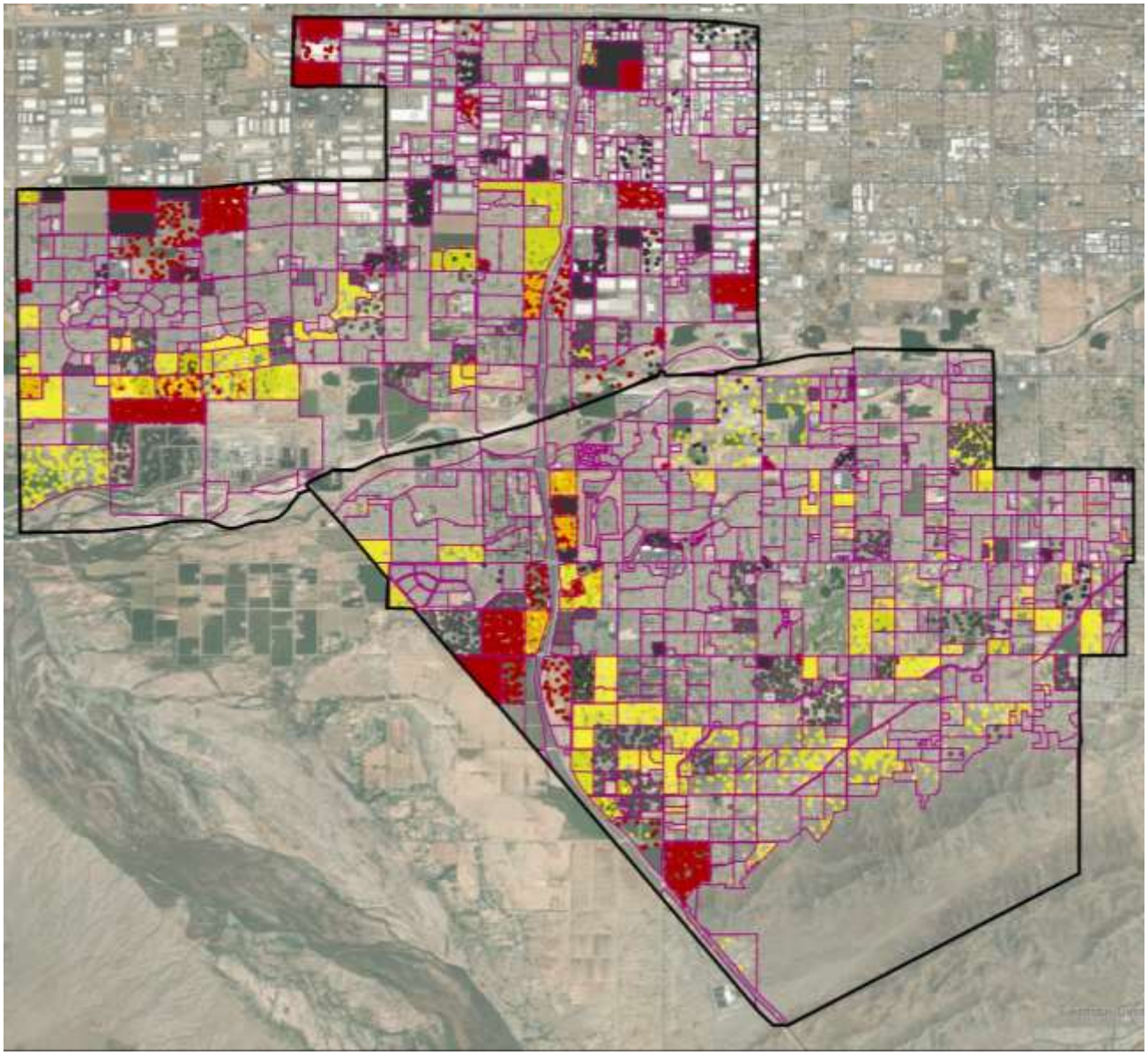
MAP 3.13
RESIDENTIAL & NON-RESIDENTIAL NORTH PHOENIX PLANNING HORIZON (2025-2034):



Yellow – Residential dwelling units, 1 Dot = 3 units

Red – Non-residential square feet, 1 Dot = 5,000 square feet

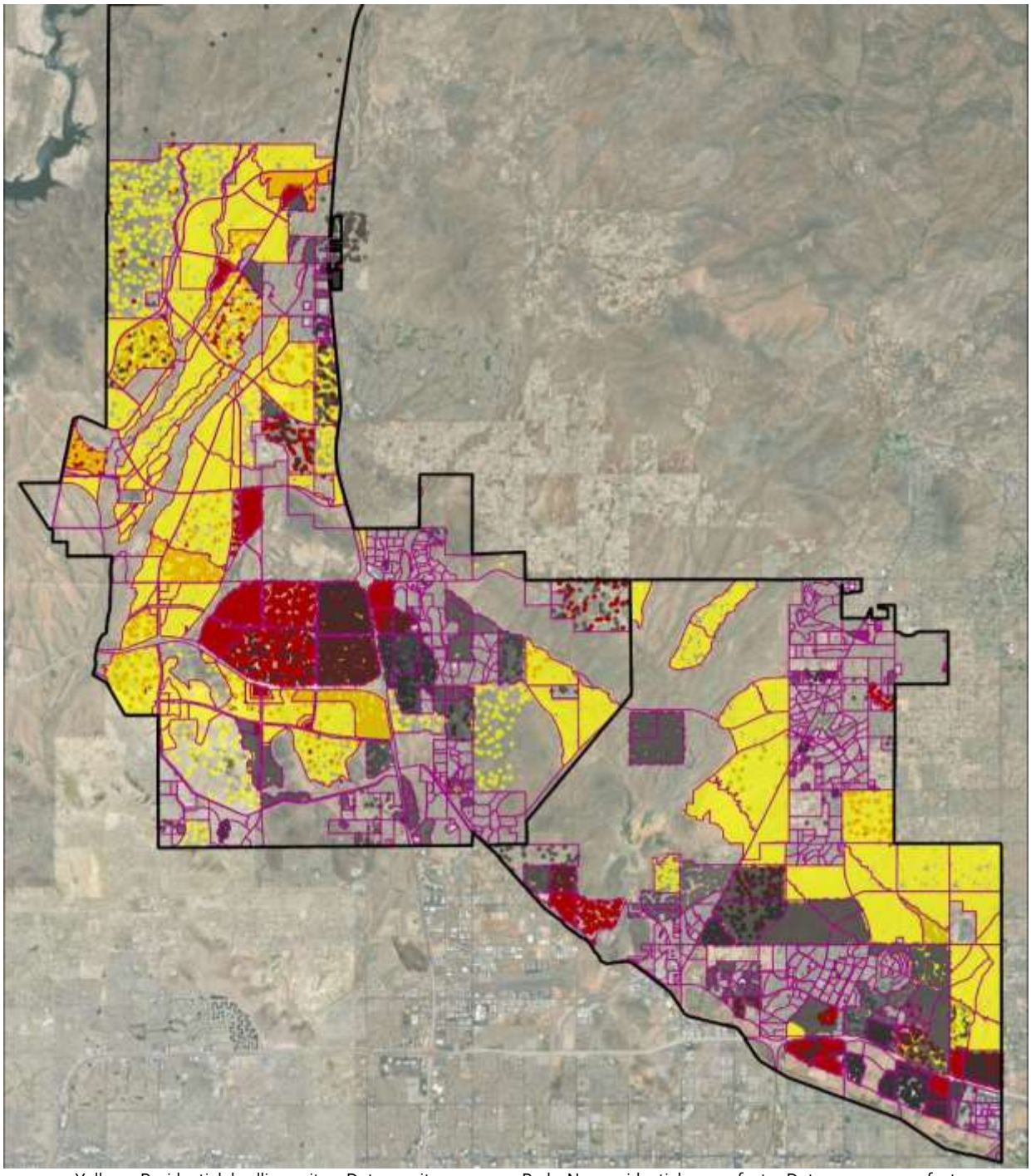
MAP 3.14
RESIDENTIAL & NON-RESIDENTIAL SOUTH PHOENIX PLANNING HORIZON (2025-2035)



Yellow – Residential dwelling units, 1 Dot = 3 units

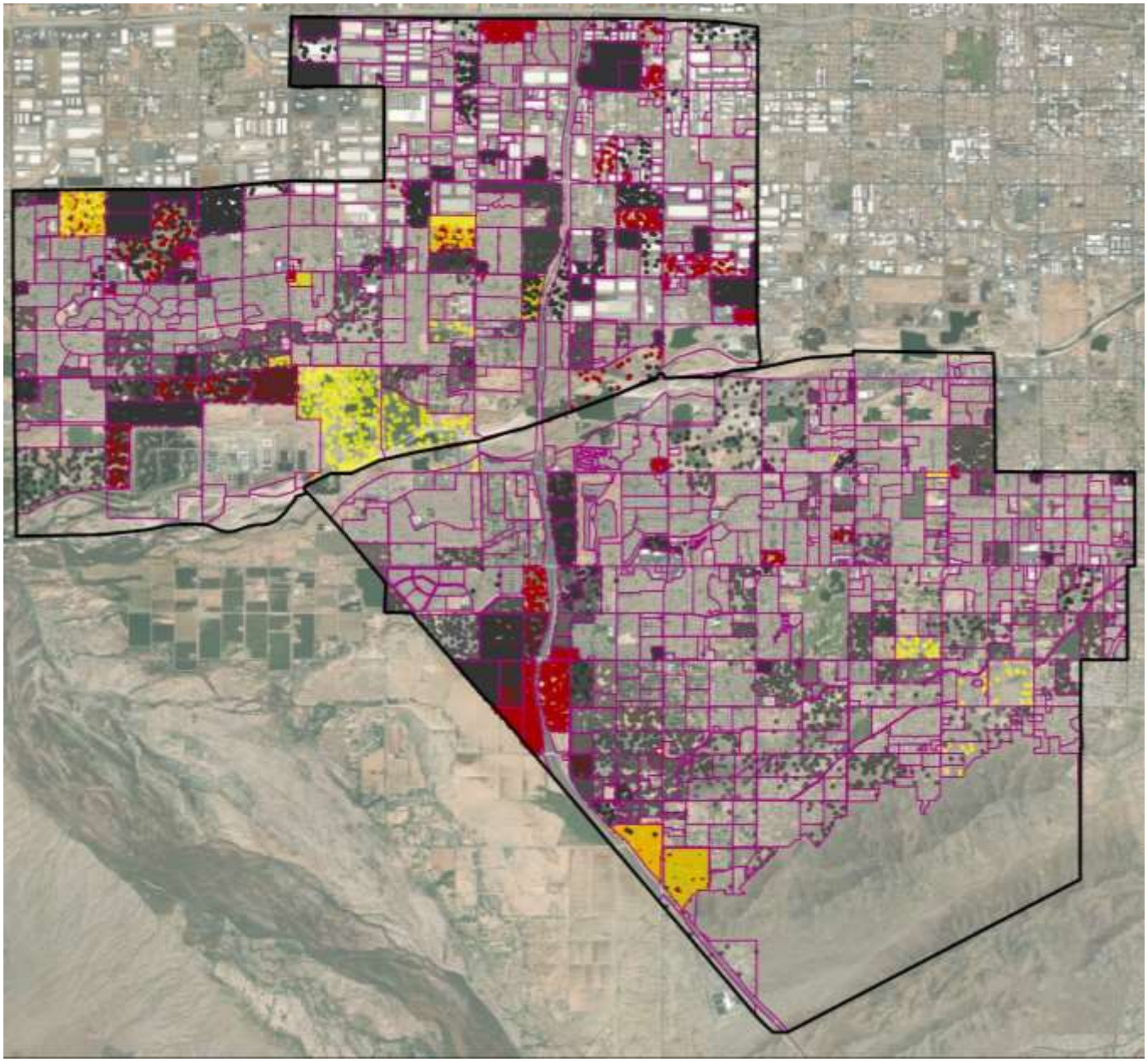
Red – Non-residential square feet, 1 Dot = 5,000 square feet

MAP 3.15
RESIDENTIAL & NON-RESIDENTIAL NORTH PHOENIX LONG TERM PROJECTION (2035-2060):



Yellow – Residential dwelling units, 1 Dot = 3 units Red – Non-residential square feet, 1 Dot = 5,000 square feet

MAP 3.16
RESIDENTIAL & NON-RESIDENTIAL SOUTH PHOENIX LONG TERM PROJECTION (2035-2060):



Yellow – Residential dwelling units, 1 Dot = 3 units

Red – Non-residential square feet, 1 Dot = 5,000 square feet

3.3 Demographic and Employment Rates

After allocating dwelling units and square footage, demographic and non-residential rates are applied and adjusted to project occupied housing units, population and employment. Demographic rates take MAGs 2020 projection rates and apply them at the RAZ level. Rates are then adjusted to fit the control totals. For the high and low scenarios, the final Base scenario rates are used and then adjusted to fit the respective control totals. Nonresidential rates utilized Applied Economics LU Model sq feet per employee ratio and then adjusted the ratio to fit the control totals. Final base scenario ratios were used as the initial starting point for the high and low scenario then adjusted to fit the control totals. The employment rates for the year 2025 are shown in **Table 2.3** below. The nonresidential rates represent employees for 1,000 square feet by land use types.

For residential land uses, the rates display persons per household. Since the MAG household size rates do not separate household populations by single family and multifamily use types, the City can use household sizes based on data from the 2022 American Community Survey (ACS) for point-in-time estimates. Population and occupied units by structure type were used to calculate the city wide average values shown in **Table 2.2** below.

TABLE 2.2
2025 AVERAGE NON RESIDENTIAL RATES

Employees/ 1,000 Square Feet				
Industrial	Office	Retail	Public	Other
1.20	2.95	1.55	0.84	1.60

TABLE 2.3
2022 AVERAGE HOUSEHOLD SIZE

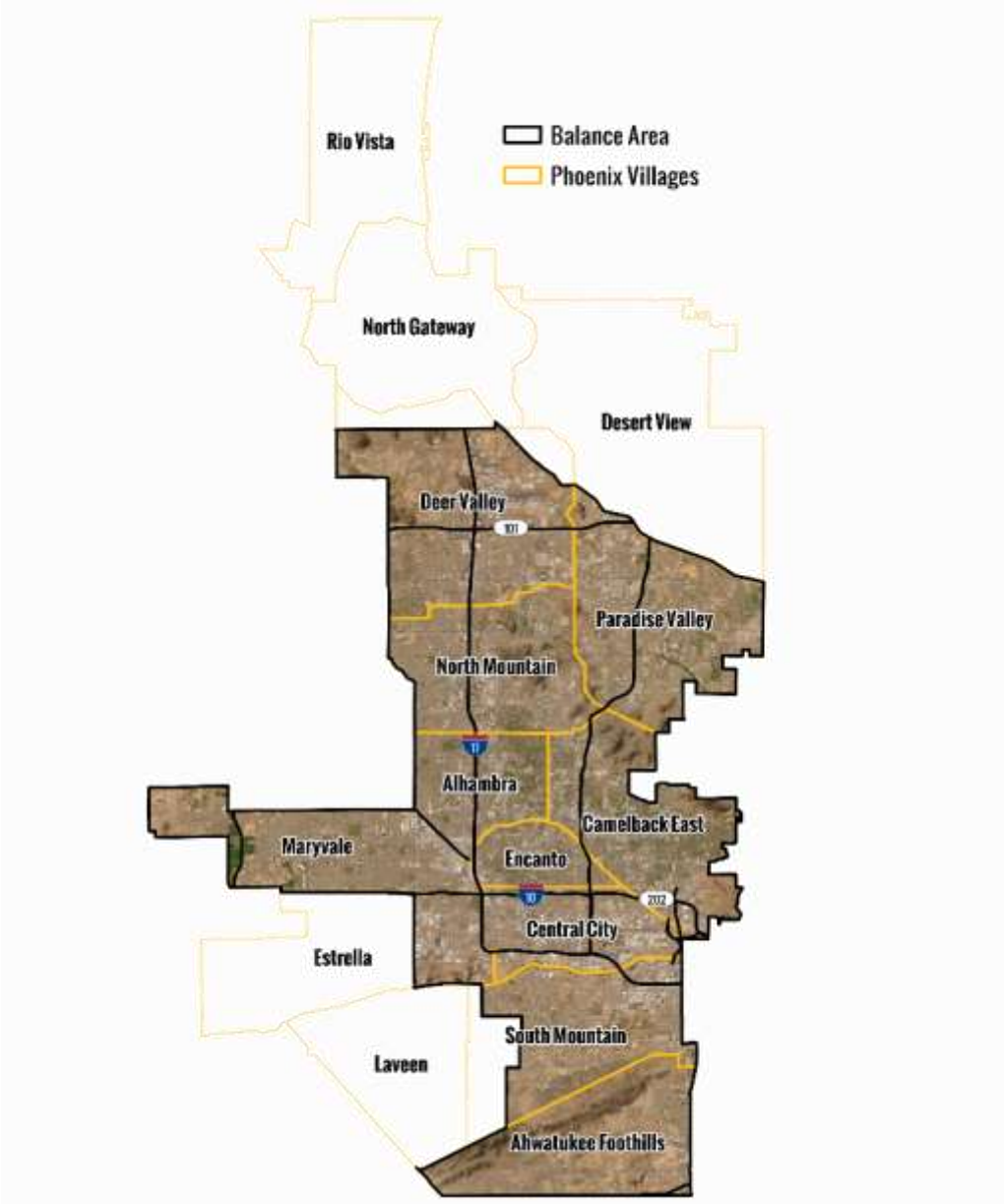
Persons/Household	
Single Family	Multifamily
3.10	2.11

4.0 Balance of Phoenix Analysis

Logan Simpson's part in the City of Phoenix Growth Projections and Land Use Assumptions Update was to develop a model to estimate the likelihood and timing of development and redevelopment for the Balance Area of the Phoenix Metropolitan Area. This area includes 10 of the 15 urban villages, consisting of around 450,000 parcels to be analyzed for infill and redevelopment potential. **Map 4.1** shows the Balance Area and villages included in the study area. Modeling utilized Maricopa Association of Governments (MAG) parcel data, as the base for the Redevelopment Database.

MAP 4.1

PHOENIX BALANCE AREA AND VILLAGES



The first phases of modeling took place in Esri's ArcGIS Pro to model Areas of Change for the Redevelopment Database and mark Case Studies that influence current market development trends. Areas of Change are existing, vacant, and redevelopment tagged parcels, which are used in the model to compute the allocation of control totals in the second phase of modeling. The Second Phase of Growth Projections modeling utilized CommunityViz, an extension of Esri's ArcMap. CommunityViz provides a specialized approach to scenario modeling, setting up fluent workflows to allocate the redevelopment database through the Base, Low, and High scenarios. The results of the Balance Area modeling are three separate redevelopment databases containing the timing and development of homes and jobs for the three scenarios over the Planning Horizon (2025-2034), and Long-Term Projection Period (2035-2060).

4.1 Case Studies

To understand innovative examples for Areas of Change, a series of Case Studies are identified within each village to provide a framework of attributes that reflect current market trends for development. Case studies are pulled from either the "Pending Major Permits" shapefile (provided by the City of Phoenix) or through the "City of Phoenix Planned Unit Development and Planned Community District Current Cases" web page. These two sources provide specific individual or collective parcels that represent current targeted areas for development, whether that be an approved site plan, rezoning case, or proposed plan. Three case studies are analyzed from each village for a total of 45 case studies.

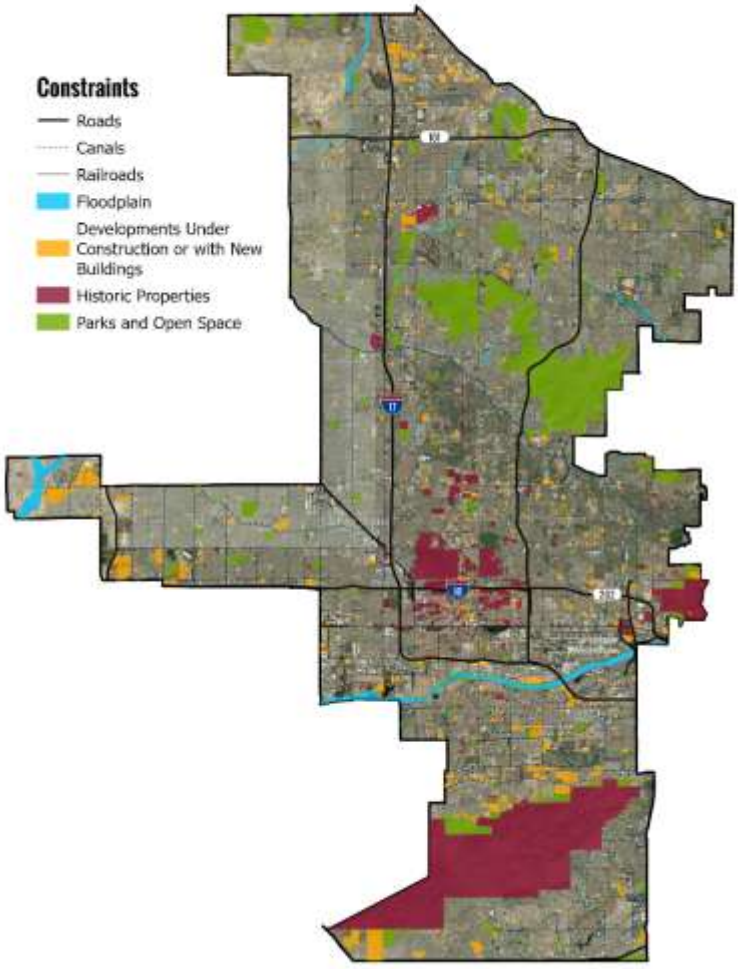
Case Studies with parcels not yet redeveloped provide better indicators for redevelopment because they reflect the current assessor attributes before the parcel is reassessed to reflect the new development. On top of the 2022 MAG parcel dataset, a 2017 MAG parcel data was analyzed as well. The 2017 MAG parcel dataset was used as collateral to backup trends and provide additional insight on how Case Study Parcels have been reassessed overtime.

The collection of case studies provided an insightful start to understanding the general development trends in each Phoenix village. However, there are some limitations with the data provided that are important to consider. The 2017 parcels contained limited assessor information compared to the 2022 MAG parcels. Information pulled from the 2017 parcels were parcel size, use, improvement value, and first-floor square footage. Improvement value in the 2017 parcel data was represented as improvement value per square foot. To get a comparable value to the 2022 improvement value, the 2017 improvement value was taken, and multiplied by the square footage of the 2017 building area based on a polygon drawn from 2017 aerial. These improvement values will not be exact but provide a close estimate of the 2017 parcels' improvement value. Many of the 2017 parcels also didn't have information for every parcel, so looking at Case Studies through 2017 parcel data had some data gaps.

4.2 First Screening: Citywide

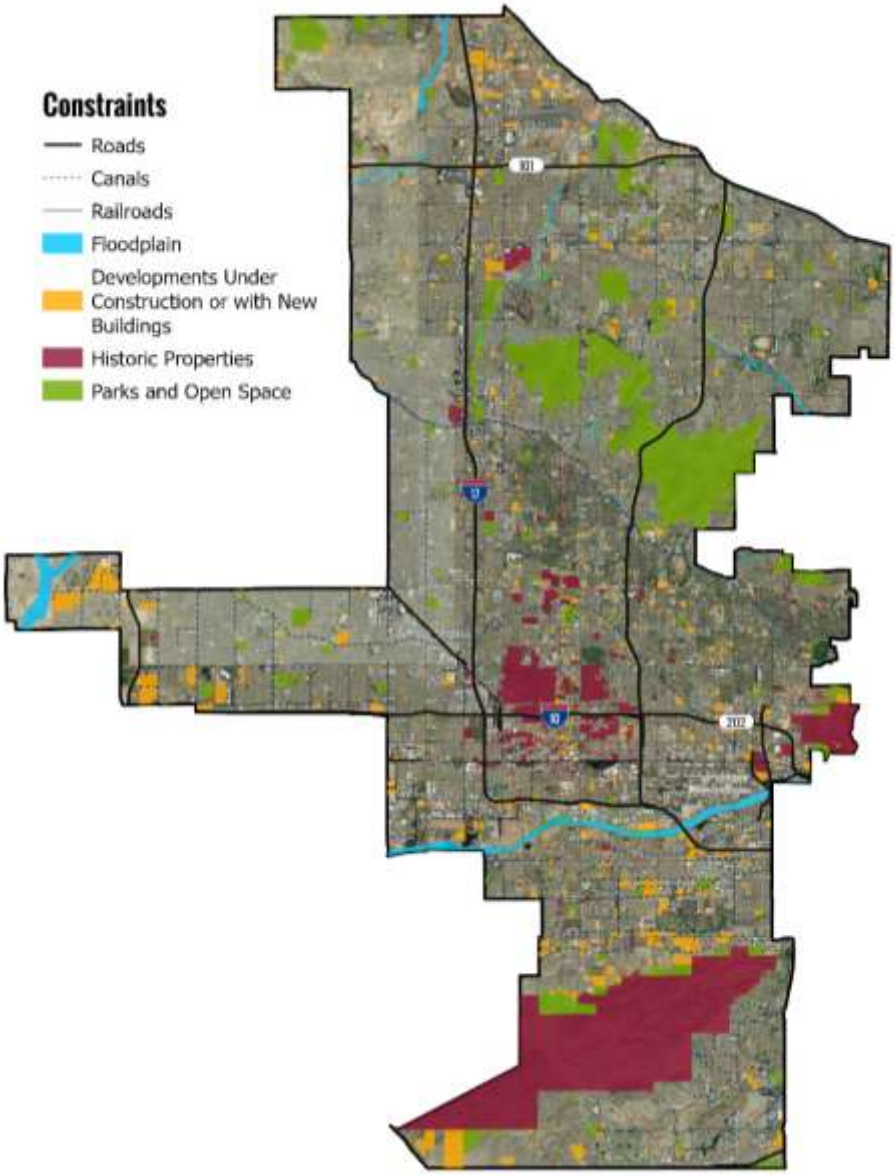
With the case studies captured, a range of indicators are now pulled to initiate the first screening process for redevelopment and vacant parcels in the Balance Area of Phoenix. The process of screening is conducted in ArcGIS Pro utilizing SQL queries (a way to search for and select a subset of records from the parcel dataset). The queries are based on the indicators pulled from the Case Studies. Queries are refined until the subset of parcels pulled from the indicators collect appropriate parcels that follow the trends for redevelopment. These parcels are labeled "Redevelopment" "Vacant", or "Existing" in the Redevelopment Database. The Balance Area of Phoenix has over 450,000 parcels. To help with the accuracy of screening and to begin filtering out unqualified parcels, we look at current factors and planning to eliminate parcels that will likely not change in the foreseeable future. These factors are our development constraints.

Constraints for the Balance Area of Phoenix included parcels intersected by ROWs (Railroads, roads, canals, etc.), Open Space, Parks, Historic Properties, 100-year floodplain, and parcels that are under construction or have newly built developments (identified by building age in the parcel dataset, and the Major Developments dataset provided by City of Phoenix), as see in Figure 3. These parcels are coded as "Existing". "Existing" parcels from development constraints are tagged by running each constraint against the parcels in a "select by location" function. Based on the constraint's data format (Polygon or Line Feature), parcels will be added to the "Existing" category. For example, railroads and canals are line features so parcels that have these features will not be picked up with the centroid selection, as the line will not run directly through the center of the parcel, hence utilizing the intersect selection instead of the centroid. On the other hand, intersect is not used for polygons. Polygon constraints (i.e., Historic Properties, Open Space, Floodplain, etc.) cast a bigger spatial net to pick up constrained parcels. Using the centroid selection for these datasets instead mitigates some margin of error that the intersect selection might create. Selecting the centroid of a parcel assumes, generally, that at least



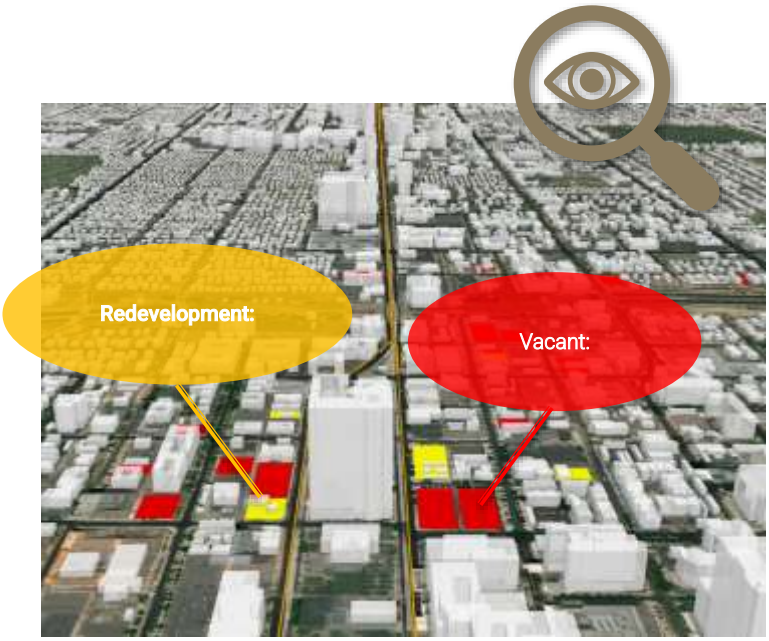
about half the parcel is under a constrained polygon, which will be coded appropriately as "Existing". In addition, after each selection we randomly select around 100 parcels to verify by aerial imagery that we are capturing constrained parcels correctly. A field column is added to the parcel dataset titled "Verified" to allow an additional coding of "Yes" or "No" to be assigned to parcels. Through the verification process, we look to verify at least 1% of the total 450,000 parcels, whether that be a coded "Existing", "Redevelopment", or a "Vacant" parcel (visually verifying around 4,500 individual parcels). In future queries we now can add "Verified = No" to ensure our queries are not accidentally re-considering already coded parcels.

MAP 4.2
CONSTRAINTS



4.3 First Screening: Citywide

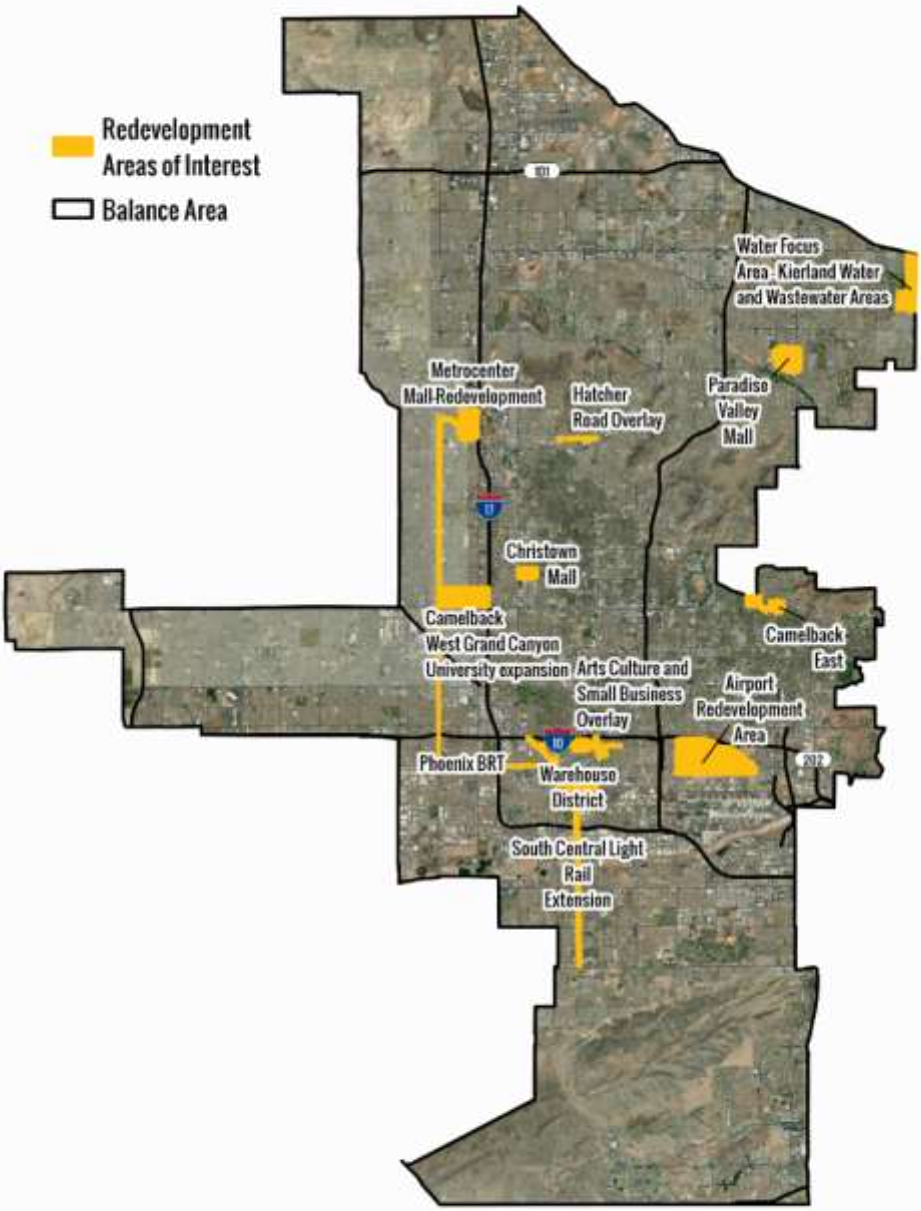
A high-level citywide screening is conducted first to add the most susceptible parcels for development to the database as a baseline. Each village is looked at separately and general queries are started based on averages of attributes from the Case Studies. Attributes from Case Studies include acreage, construction year, parcel use description, improvement value, land value, zoning, land use, and the added verified field to remove constrained and already coded parcels. After reviewing what is captured in the initial queries, more specific parameters are put in place to accurately capture change. This usually is an adjustment of the ratio of improvement value to land value and size of the parcel. An additional analysis that was conducted during the first screening was a Big Box Store Analysis. Big Box Stores have different indicators compared to other parcels given they might have larger assessed land and improvement values given their sales revenue and space they take-up that might fly under the radar on our first screening. To make sure we capture Big Box Stores that are more suitable for redevelopment we ran an Improvement Per Square Footage Ratio to see which Big Box Stores in the Balance Area fit criteria for redevelopment. This analysis was conducted by using the metrics mentioned above, but with the inclusion of the Improvement Per Square Foot Ratio (Building Footprint Square Footage divided by Improvement Value). A higher Improvement Value to Square Footage means the store is valued higher or in other words has a higher economic output than one with a lower Improvement Value to Square Footage. The ratio used based on Maricopa County's 2022 Assessor Data was Big Box Stores that are assessed at $60 per SqFt qualify for redevelopment. Example of Analysis: Burlington in Camelback East has an Improvement Value to SQFT Ratio of $15.80 Per SqFt (qualifying for potential redevelopment) and REI in Paradise Valley has an Improvement Value to SqFt Ratio of $454 per SqFt (not qualifying for redevelopment).



4.4 Second Screening: Redevelopment Areas of Interest

The second screening is a deeper look into more specific areas that are volatile to redevelopment in the Balance Area. The City of Phoenix provided 12 Redevelopment Areas of Interest for the Balance Area: Airport Redevelopment Area, Arts Culture and Small Business Overlay, Camelback East, Camelback West, Canyon University Expansion, Christown mall, Hatcher Road Overlay, Metrocenter Mall, Paradise Valley Mall, Phoenix BRT, South Central Light Rail Extension, Warehouse District, and Water Focus Area – Kierland water and Wastewater Areas (as shown in **Figure 4.3**).

MAP 4.3
DEVELOPMENT AREAS OF INTEREST



As Case Studies were used for the queries in the first screening, input from Village Planners was used for the second query screening. An ArcGIS Online Review Tool was set up that allowed Phoenix Village Planners to participate in the analysis and individually verify parcels for redevelopment in their respective village. To make the most of the Village Planners' time and knowledge, we set up the review tool to only show parcels within those focused Redevelopment Areas that correspond to their village. This participation method enhanced the accuracy of the redevelopment database and provided us with a second set of attributes to hone in on for these redevelopment areas.

The second set of queries for the redevelopment database used the same attribute fields as the first screening (acreage, construction year, parcel use description, improvement value, land value, zoning, land use, and the added verified field to remove already coded parcels) but utilized finer tuned intervals of assessed values based on Planners verification.

4.5 Modeling Jobs and Homes

The first phase of the growth projections established the Redevelopment Database to capture development potential in the Balance Area of Phoenix through vacant and redevelopment catchment analysis. The second phase is understanding the timing and capacity of the selected parcels to model Base Economic, Low Economic, and High Economic scenarios for home and job capacity in the Balance Area. The final step in setting up the Redevelopment Database for CommunityViz is querying out the coded constrained parcels (existing parcels) to not allocate homes and jobs to parcels that would likely not change in the foreseeable future.

Three tables are used to calculate and assign appropriate land uses, buildout, and allocations throughout the modeling process. The first table is the Land Use Look up table that assigns Dwelling Units and Employees per acre for each Phoenix Future Land Use type and allows the model to calculate buildout. For example, the "Residential 2 to 5 du/ acre" land use allocates a maximum of 5 dwelling units per acre. To calculate the buildout, the model takes the coded land use and multiplies it that by each parcel's acreage to get the total buildout capacity homes and jobs for that parcel. This gives us our maximum capacity for homes and jobs for each parcel, as well as our total buildout (Balance Area wide) for each land use. While the model does utilize the Phoenix's Future Land Use to specify homes and jobs per acre, each land use is simplified into 6 different land use types.

The remaining two tables help determine the split between these land use types: one table being for residential land use types and the other for employment land use types. The 6 land use types are provided from Applied Economics and are categorized as Single-family, Multi-family, Retail, Industrial, Public, Office, and Other. These land use types are used to aggregate allocations appropriately by land use. For example, Single and Multi-family land uses get a land use type of Residential, meaning it receives 100% home allocation across forecasted years and will never receive any split of jobs for that parcel. The two job allocation exceptions for residential land use types are that they also have "Work from Home" and "Non-Site Based" employment attached to them. This method was chosen because these jobs don't technically take up acreages from a land use standpoint, and that's how jobs are assigned in the model. If these jobs were attached to an employment land use type, then they'd be taking away from those acreage calculations. Conversely to residential land uses, an employment land use type (Retail, Industrial, Public, Office) receives all jobs allocations, and a Mixed-Use land use (Other) will receive a proportional split between homes and jobs throughout the modeling years.

The model generates three scenarios which utilize three control total forecasts provided by Applied Economics that represent a Base, Low, and a High scenario Each scenario has a unique set of control totals that represent projected growth throughout the Planning Horizon (2025-2034) and Long-Term Projections (2035-2060). Control totals are based off the growth of the baseline year (2022), so everything we allocate is added development from that year forward through 2060. Control Total allocations are based on the composite score assigned to each parcel, which is an individual score added together for both jobs and homes (outlined in the Modeling Process section). The model utilizes the control totals for each residential and employment land use type and allocates

down until those control totals are exhausted, through the Planning Horizon (2025-2034), and out to the Long-Term Projections (2035-2060). Examples, of the growth allocations are highlighted below between the Base (**Figure 4.1**), Low (**Figure 4.2**), and High scenario (**Figure 4.3**).

FIGURE 4.1
BASE SCENARIO

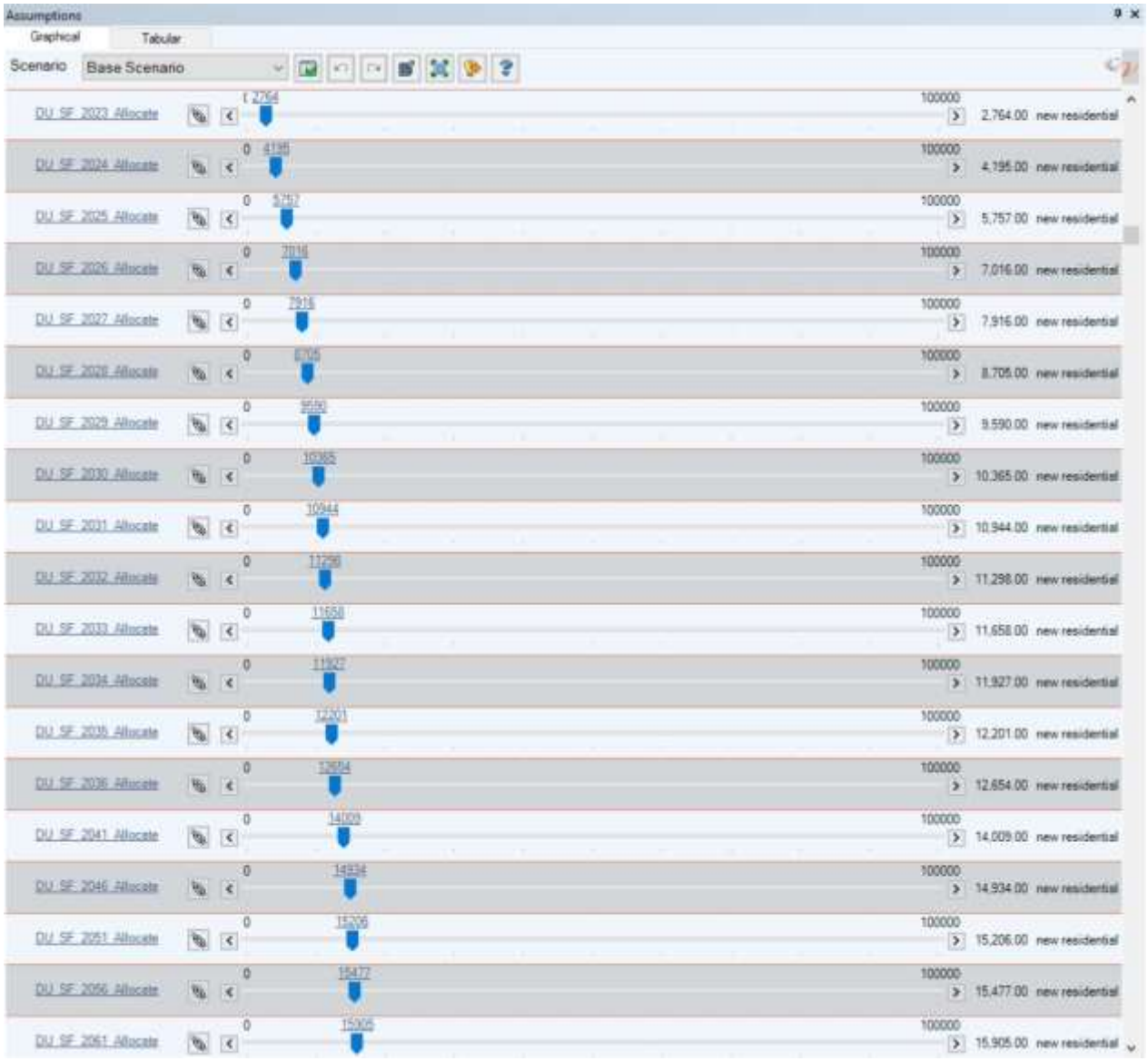


FIGURE 4.2
LOW SCENARIO

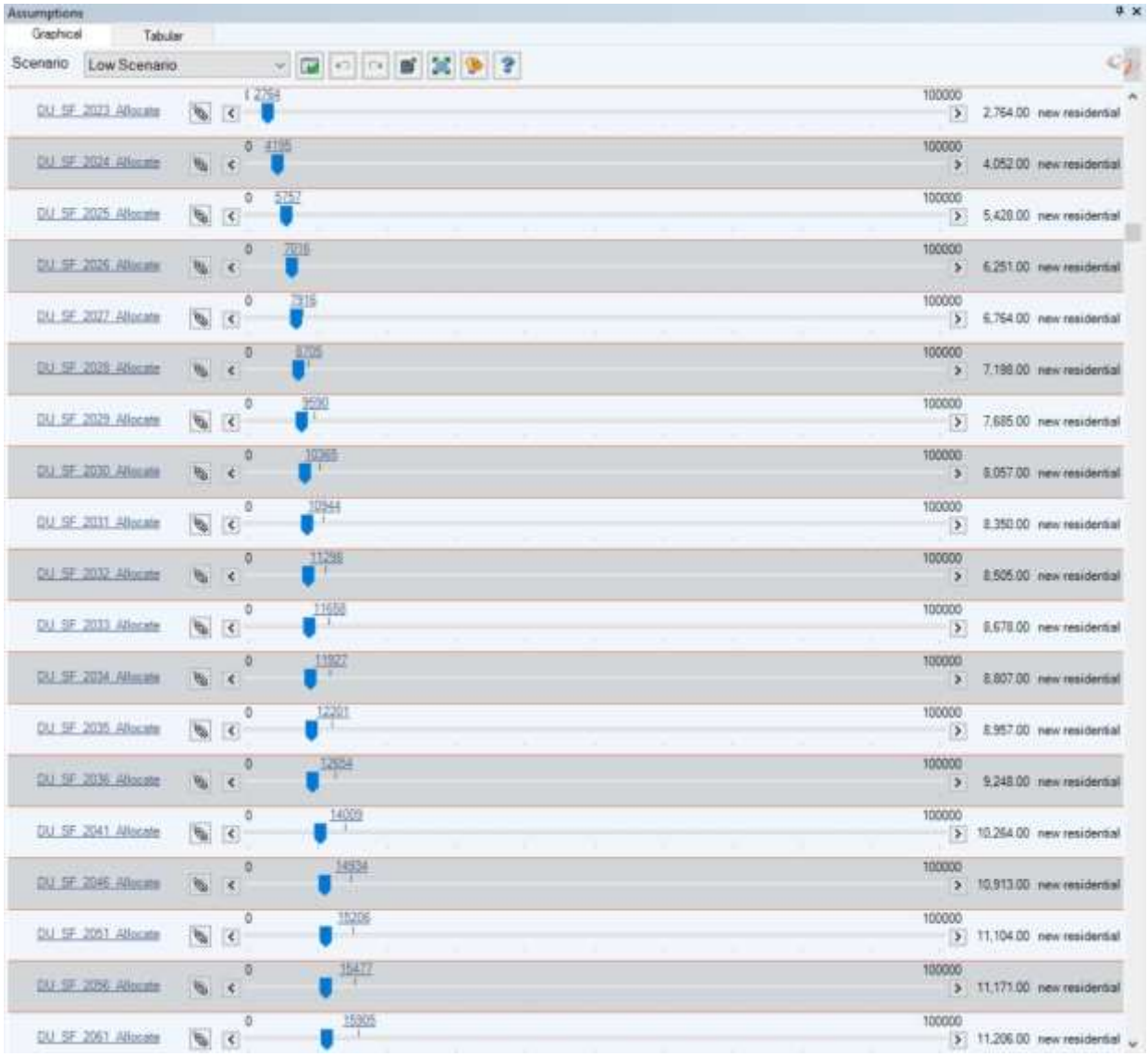
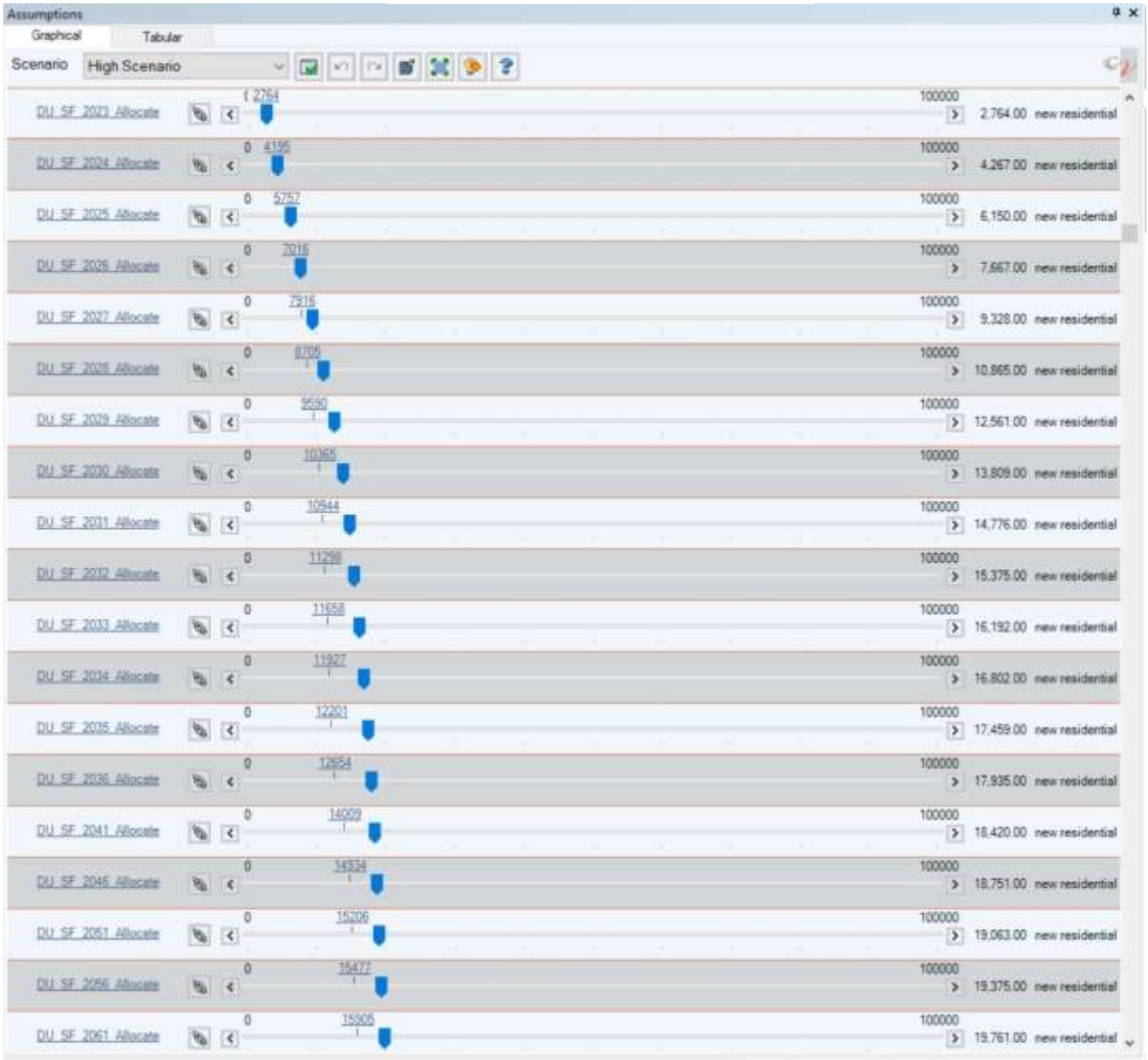


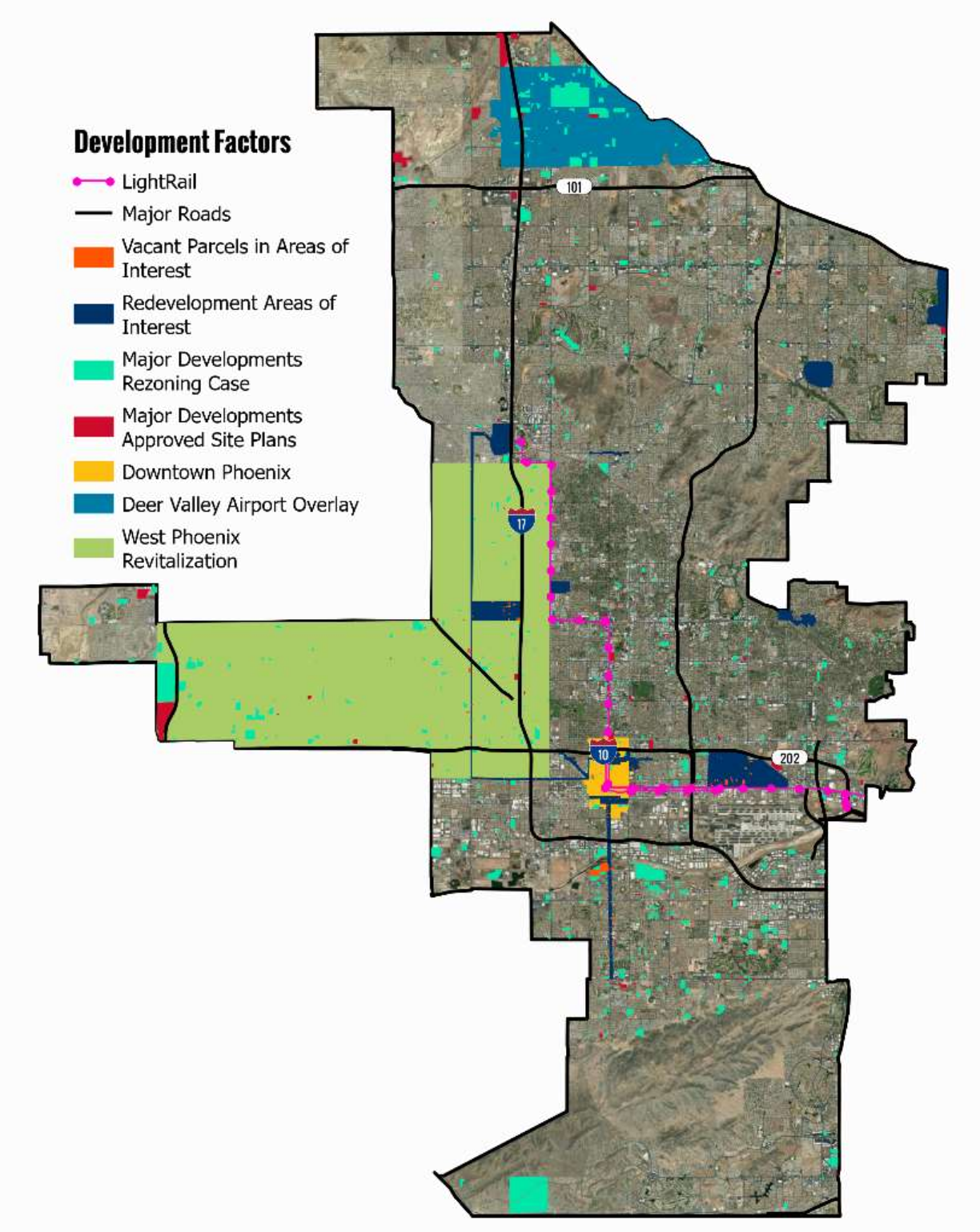
FIGURE 4.3
HIGH SCENARIO



4.6 Model Inputs and Development Factors

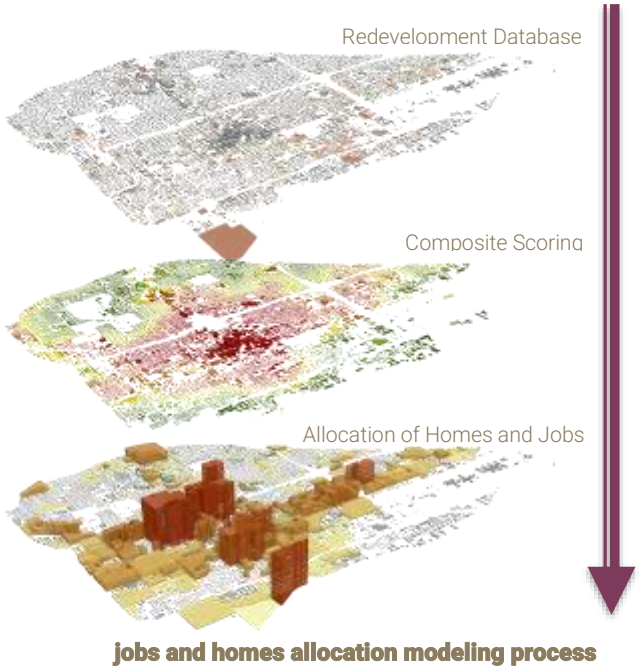
The last input for the model is development factors (or attractants), which are the determinants for what makes a parcel more likely to develop over another for redevelopment. A list of factors was developed through review and discussion with the City of Phoenix team, with the question being asked 'What drives development for homes and Jobs?". Each of the development factors contribute to the desirability of a parcel, with the relative impact of each factor varying for both jobs and homes. For example, close proximity to freeways might be more attractive for jobs compared to homes, while the Light Rail might equally encourage development for both homes and jobs. The resulting development factors are Near Freeways (303, 202, 101, 51, 17, and 10), Enterprise Zones from West Phoenix Revitalization Plan, City of Phoenix Opportunity Zones, Deer Valley Airport Overlay, Major Developments that have a Rezoning Case, Major Developments that have an Approved Site Plan, Light Rail Corridor, Phoenix Downtown, and Vacant Land within Areas of Interests (show below and in **Map 4.4**).

MAP 4.4
DEVELOPMENT FACTORS



4.7 Modeling Process

The overview of the modeling process includes the following inputs: Redevelopment Database, Land Use Look-up Table, Residential Split Table, Employment Split, and Control total Scenario Table. The model first computes Buildout for each parcel based on acreage and land use association of homes and jobs per acre. The model then takes each development factor and computes an individual proximity score to each parcel in the Balance Area for each factor, resulting in each parcel being assigned nine individual proximity scores. Values for proximity-based factors are computed for each parcel using an invert and rank procedure defined by Equation 1.



jobs and homes allocation modeling process

Where:

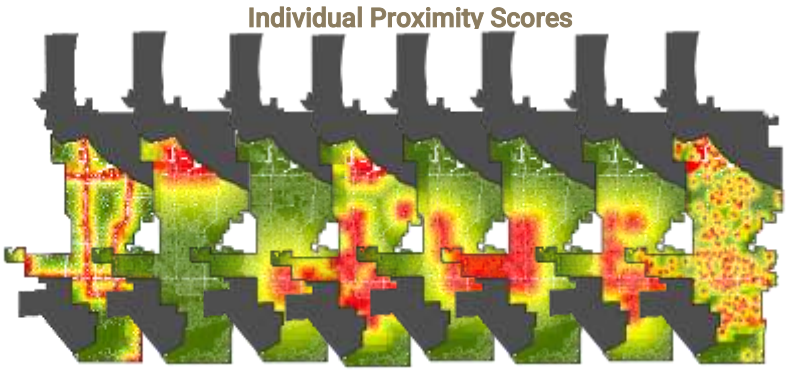
A_p = Attractants factor for parcel "p"

D_p = Distance from parcel "p" to the nearest occurrence of the relevant activity

D_{max} = Maximum distance from any parcel in the region to the nearest occurrence of the relevant activity

$$A_p = \left(1 - \frac{D_p}{D_{max}}\right) \cdot 100 \qquad \text{Equation 1}$$

The result of the proximity, invert, and rank functions are highlighted below graphically below.



Factor weights and proximity values define the order parcels will be expected to develop through the planning horizon and Long-Term projections. To aggregate the individual scores for each development factor for a parcel, a composite score is computed. This will rank every parcel on a normalized scale so the model can determine timing of development and allocate through control totals until buildout. The composite score is the sum of the factor weights of values and scores for each factor, as shown in the below Equation.

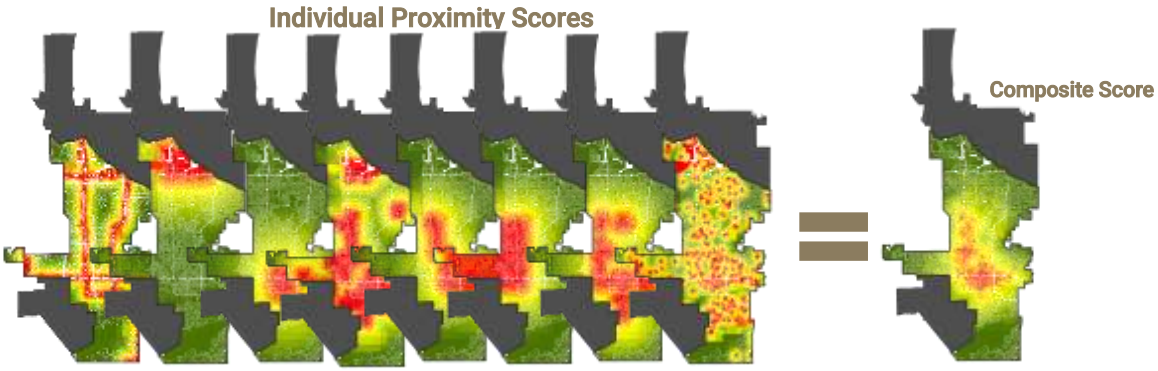
$$Score_p = \sum_{f=1}^{n} Value_{f,p} \cdot Weight_f \quad \text{Equation 2}$$

Where:

$Score_p$ = Development desirability score for parcel p

$Value_f$ = Computed value of factor f for parcel p

$Weight_f$ = Weight for factor f



With every parcel assigned a composite score, the final step is allocating homes and jobs starting with the highest composite score through the projected years (2022-2060) until control totals or buildout is met. The conclusion of the modeling process is three separate Redevelopment Databases containing the timing and development of homes and jobs for the three (Base, Low, and High) scenarios over the first years of the project (2022-2024), Planning Horizon (2025-2034), and Long-Term Projection Period (2035-2060).

5.0 Results

Results are calculated at the DevPoly level of geography for every year under the base, high and low growth scenarios. The primary results are allocations of residential dwelling units and non-residential square footage in each for year, which are presented for the base scenario in this section. Changes in the residential and nonresidential inventory are used to calculate a number of associated variables including occupied housing units, household population, employment by land use and built acres by land use. These secondary calculations are performed using demographic and development assumptions which are based on trends in the MAG forecasts at the Regional Analysis Zone (RAZ) level of geography, and current and future land use acreage. These assumptions change over time based on trends in regional demographic and development characteristics. **Figure 5.1** details all of the data elements included in the results table for each scenario. Note that the information in each record is reflective of the inventory in that year, not annual additions.

The results of the base, high and low growth allocations totaled for the city as a whole are summarized in **Table 5.1**. The data shows a total of about 202,000 new housing units being added between 2020 and 2060, with about 77,000 of those units (38 percent) being added during the infrastructure planning horizon of 2024/25 through 2034/25. The total number of units added increases by about 52,000 units (26 percent) in high scenario, and decreases by about 61,000 (30 percent) under low scenario.

In the case of nonresidential development, base scenario growth results indicate the addition of some 178.7 million square feet of space, with the largest increase occurring in the industrial category. The total amount of new space increases to 203.2 million square feet under the growth scenario, with the largest increase over the base scenario occurring in the industrial category. The amount of new space in the low scenario is 66 million square feet less than the base scenario with the largest drop occurring in the industrial category.

Figure 5.1 Results Table Structure

Field	Description
DevPolyID	DevPolyID
Year	Year
HHPOP	Household Population
HH	# of Households
TODU	Total Units
SFDU	Single Family Units
MFDU	Multi Family Units
SFAcres	Single Family Acres
MFAcres	Multi Family Acres
ResAcres	Residential Acres
TotalPop	Total Population
PopPHH	Population per Household
OccRate	Occupancy Rate
RetEmp	Retail Employment
OffEmp	Office Employment
IndEmp	Industrial Employment
PubEmp	Public Employment
OthEmp	Other Employment
HomEmp	Home Employment
NSBEmp	Non Site Based Employment
TotalEmp	Total Employment
RetailFT	Retail Feet
OfficeFT	Office Feet
IndFT	Industrial Feet
PubFT	Public Feet
OthFT	Other Feet
TotalFT	Total Feet
RetAcres	Retail Acres
OffAcres	Office Acres
IndAcres	Industrial Acres
PubAcres	Public Acres
OthAcres	Other Acres
NonResAc	Non Residential Acres
DevAcre	Developed Acres
TotAcre	Total Acres

Table 5.1
City of Phoenix Growth Allocations

Base Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**1,593,622**	**638,114**	**387,809**	**250,305**	**532,514,351**	**94,895,821**	**109,705,568**	**170,040,324**	**157,872,638**
2024/25	1,701,299	672,874	401,806	271,068	557,049,755	96,382,090	114,494,804	185,873,373	160,299,489
2034/35	1,900,668	749,962	434,622	315,340	607,022,194	103,493,350	125,939,752	211,258,927	166,318,455
2035/36	1,917,995	757,097	438,195	318,902	614,864,417	104,528,099	127,422,088	215,976,751	166,925,770
2060/61	2,122,282	839,701	479,006	360,695	711,247,174	124,121,126	159,857,449	251,219,173	176,032,182
2020/21 - 2060/61	528,660	201,587	91,197	110,390	178,732,823	29,225,305	50,151,881	81,178,849	18,159,544

Source: Applied Economics, 2024.

High Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**1,593,622**	**638,114**	**387,809**	**250,305**	**532,514,351**	**94,895,821**	**109,705,568**	**170,040,324**	**157,872,638**
2024/25	1,743,142	675,761	402,485	271,097	**560,013,644**	96,820,814	114,936,862	187,640,904	160,615,064
2034/35	1,952,951	762,552	441,103	323,851	**622,556,812**	106,796,662	128,283,978	219,352,349	168,123,823
2035/36	2,116,306	769,140	448,482	326,573	**630,769,929**	108,147,750	129,414,405	224,632,826	168,574,948
2060/61	2,205,659	891,565	517,874	374,352	**735,715,465**	131,528,798	163,805,561	261,683,225	178,697,881
2020/21 - 2060/61	456,307	253,451	130,065	124,047	203,201,114	36,632,977	54,099,993	91,642,901	20,825,243

Source: Applied Economics, 2024.

Low Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**1,593,622**	**638,114**	**387,809**	**250,305**	**532,514,351**	**94,895,821**	**109,705,568**	**170,040,324**	**157,872,638**
2024/25	1,704,742	673,137	401,583	270,847	555,229,491	95,976,452	116,828,009	179,230,534	163,194,496
2034/35	1,850,524	722,721	420,973	307,178	584,846,102	101,593,321	125,355,828	186,916,932	170,980,022
2035/36	1,862,461	727,395	423,007	310,000	588,722,447	102,432,181	126,316,128	188,331,457	171,642,682
2060/61	1,974,897	778,489	445,087	333,402	644,966,526	121,085,849	146,760,758	198,860,527	178,259,392
2020/21 - 2060/61	381,275	140,375	57,278	83,097	112,452,175	26,190,028	37,055,190	28,820,203	20,386,754

Source: Applied Economics, 2024.

The following sections summarize this information for each of the growth area and for the balance of the city.

5.1 Northeast Growth Area Allocations

The results of the base, high and low growth allocations for the Northeast growth areas are summarized in **Table 5.2**. The data shows a total of about 53,000 thousand new housing units being added between 2020 and 2060,

with about 20,000 of those units (38 percent) being added during the infrastructure planning horizon of 2024/25 through 2034/25. The total number of units added increases by 4,000 units (8 percent) in the high scenario, and decreases by about 23,000 (43 percent) under the low scenario.

In the case of nonresidential development, base scenario growth results indicate the addition of about 22 million square feet of space, with the largest increase occurring in the office category. The total amount of new space increases to 23 million square feet under the high growth scenario, with the largest increase over the base scenario occurring in the other category. The amount of new space in the low scenario is around 6 million square feet less than the base scenario with the largest drop occurring in the office category.

Table 5.2
Northeast Growth Area Allocations

Base Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	Units	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**58,086**	**26,740**	**17,988**	**8,752**	**12,824,556**	**3,602,623**	**2,243,411**	**1,292,798**	**5,685,724**
2024/25	66,597	29,740	20,356	9,384	13,536,830	3,735,195	2,769,388	1,503,306	5,528,941
2034/35	114,373	49,929	34,706	15,223	19,456,394	4,763,150	5,960,737	1,819,068	6,913,439
2035/36	121,064	52,915	36,983	15,932	20,235,500	4,865,465	6,446,906	1,819,068	7,104,061
2060/61	185,125	80,103	57,397	22,706	34,414,727	6,271,249	16,590,036	2,944,187	8,609,255
2020/21 - 2060/61	127,039	53,363	39,409	13,954	21,590,171	2,668,626	14,346,625	1,651,389	2,923,531

Source: Applied Economics, 2024.

High Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**58,086**	**26,740**	**17,988**	**8,752**	**12,824,556**	**3,602,623**	**2,243,411**	**1,292,798**	**5,685,724**
2024/25	67,344	29,908	20,482	9,426	13,565,112	3,735,195	2,785,751	1,503,306	5,540,860
2034/35	119,013	52,112	33,928	15,846	19,871,992	4,763,150	6,224,670	1,819,068	7,065,104
2035/36	126,594	55,397	38,771	16,626	20,713,387	4,865,465	6,753,010	1,819,068	7,275,844
2060/61	195,258	84,324	60,671	23,653	35,775,735	6,203,040	17,460,599	2,944,186	9,167,910
2020/21 - 2060/61	137,172	57,584	42,683	14,901	22,951,179	2,600,417	15,217,188	1,651,388	3,482,186

Source: Applied Economics, 2024.

Low Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**58,086**	**26,740**	**17,988**	**8,752**	**12,824,556**	**3,602,623**	**2,243,411**	**1,292,798**	**5,685,724**
2024/25	67,530	29,697	20,326	9,371	13,564,256	3,724,091	2,787,838	1,427,522	5,624,805
2034/35	93,866	40,689	26,863	13,826	17,572,271	4,659,524	4,705,746	1,515,932	6,691,069
2035/36	97,144	42,225	27,888	14,337	18,061,156	4,752,630	4,967,841	1,515,932	6,824,753
2060/61	133,405	57,173	39,450	17,723	28,317,240	6,944,393	11,276,272	1,830,965	8,265,610
2020/21 - 2060/61	75,319	30,433	21,462	8,971	15,492,684	3,341,770	9,032,861	538,167	2,579,886

Source: Applied Economics, 2024.

5.2 Northwest Growth Area Allocations

The results of the base, high and low growth allocations for the Northwest growth area are summarized in **Table 5.3**. With the most land available for development, the growth in this area is heavily impacted by the overall level of growth in the city. The data shows a just over 40,000 new housing units being added between 2020 and 2060, with about 8,500 of those units (21 percent) being added during the infrastructure planning horizon of 2024/25 through 2034/25. The total number of units added increases by 42,000 units (104 percent) in the high scenario, and decreases by about 20,000 units (50 percent) under low scenario.

In the case of nonresidential development, base scenario growth results indicate the addition of some 41.4 million square feet of space, with the largest increase occurring in the industrial category, followed by the office category indicative of newly emerging basic industry in the area. The total amount of new space increases to 42.3 million square feet under the growth scenario, with the largest increase over the base scenario occurring in the retail category driven by the increase in residential development compared to the base scenario. The amount of new space in the low scenario is 25.0 million square feet less than the base scenario with the largest drop occurring in the industrial category based on much smaller increases in employment in basic industries.

Table 5.3
Northwest Growth Area Allocations

Base Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**47,564**	**17,858**	**13,787**	**4,071**	**4,795,391**	**1,666,070**	**251,915**	**860,628**	**2,016,778**
2024/25	57,548	21,260	15,172	6,088	8,449,319	2,061,161	263,044	3,960,628	2,164,486
2034/35	78,499	29,835	17,882	11,953	16,154,320	2,950,265	2,063,044	8,510,628	2,630,383
2035/36	80,592	30,731	18,351	12,380	19,643,286	3,056,691	2,388,044	11,510,628	2,687,923
2060/61	146,943	58,238	32,823	25,415	46,228,435	7,002,373	12,928,873	21,260,628	5,036,561
2020/21 - 2060/61	99,379	40,380	19,036	21,344	41,433,044	5,336,303	12,676,958	20,400,000	3,019,783

Source: Applied Economics, 2024.

High Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**47,564**	**17,858**	**13,787**	**4,071**	**4,795,391**	**1,666,070**	**251,915**	**860,628**	**2,016,778**
2024/25	58,382	21,575	15,238	6,337	8,567,390	2,143,724	263,044	3,960,628	2,199,994
2034/35	97,652	37,044	20,115	15,990	17,345,267	3,750,876	2,063,044	8,535,628	2,995,719
2035/36	100,677	38,337	21,745	16,592	20,887,679	3,892,436	2,388,044	11,535,628	3,071,571
2060/61	250,858	100,271	65,115	35,156	47,058,713	10,727,666	12,851,256	17,785,628	5,694,163
2020/21 - 2060/61	203,294	82,413	51,328	31,085	42,263,322	9,061,596	12,599,341	16,925,000	3,677,385

Source: Applied Economics, 2024.

Table 5.3
Northwest Growth Area Allocations (continued)

Low Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**47,564**	**17,858**	**13,787**	**4,071**	**4,795,391**	**1,666,070**	**251,915**	**860,628**	**2,176,538**
2024/25	58,267	21,227	15,158	6,069	6,335,889	2,040,381	262,154	1,790,628	2,344,160
2034/35	71,809	26,883	16,156	10,727	10,472,188	2,562,302	1,918,154	3,180,628	2,650,257
2035/36	73,422	27,578	16,508	11,070	11,816,733	2,631,968	2,217,154	4,080,628	2,682,994
2060/61	100,946	39,344	22,433	16,911	29,801,670	6,177,083	11,914,715	7,005,628	3,003,661
2020/21 - 2060/61	53,382	21,486	8,646	12,840	25,006,279	4,511,013	11,662,800	6,145,000	827,123

Source: Applied Economics, 2024.

5.3 Estrella Growth Area Allocations

The results of the base, high and low growth allocations for the Estrella growth area are summarized in **Table 5.4**. The data shows a total of about 12,000 new housing units being added between 2020 and 2060, with about 6,000 of those units (50 percent) being added during the infrastructure planning horizon of 2024/25 through 2034/25. The total number of units added is the same in the high scenario since the area reaches buildout by 2060 under all the scenarios. The number of units added by 2060 decreases very slightly under the low scenario as the area still nearly reaches buildout.

In the case of nonresidential development, base scenario growth results indicate the addition of some 23.6 million square feet of space, with the vast majority of the increase occurring in the industrial category. The total amount of new space increases to 24.6 million square feet under the high growth scenario, with the largest increase over the base scenario occurring in the industrial and retail categories. The amount of new space in the low scenario is 12.2 million square feet less than the base scenario with the largest drop occurring in the industrial category.

Table 5.4
Estrella Growth Area Allocations

Base Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	AE	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**64,359**	**18,159**	**17,348**	**811**	**61,318,739**	**3,102,712**	**16,026**	**56,023,463**	**2,176,538**
2024/25	72,706	20,763	19,012	1,751	70,391,193	3,351,909	16,026	64,703,723	2,319,535
2034/35	92,545	26,878	23,081	3,797	80,006,359	3,825,097	73,026	73,440,613	2,667,623
2035/36	94,034	27,485	23,405	4,080	80,739,507	3,870,125	73,026	74,094,291	2,702,065
2060/61	101,493	30,406	25,755	4,651	85,001,471	4,389,567	73,026	77,490,525	3,048,353
2020/21 - 2060/61	37,134	12,247	8,407	3,840	23,682,732	1,286,855	57,000	21,467,062	871,815

Source: Applied Economics, 2024.

High Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**64,359**	**18,159**	**17,348**	**811**	**61,318,739**	**3,102,712**	**16,026**	**56,023,463**	**2,176,538**
2024/25	72,706	21,422	19,012	1,751	70,396,616	3,351,909	16,026	64,703,723	2,324,958
2034/35	92,545	26,878	23,081	3,797	80,038,520	3,825,097	73,026	73,440,613	2,699,784
2035/36	94,034	27,485	23,405	4,080	80,773,581	3,870,125	73,026	74,094,291	2,736,139
2060/61	101,493	30,406	25,755	4,651	85,886,491	4,434,596	73,026	78,265,811	3,113,058
2020/21 - 2060/61	37,134	12,247	8,407	3,840	24,567,752	1,331,884	57,000	22,242,348	936,520

Source: Applied Economics, 2024.

Low Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**64,359**	**18,159**	**17,348**	**811**	**61,318,739**	**3,102,712**	**16,026**	**56,023,463**	**2,176,538**
2024/25	73,839	20,751	19,002	1,749	67,369,592	3,343,773	16,026	61,665,633	2,344,160
2034/35	92,597	27,360	22,732	4,027	70,784,359	3,774,377	73,026	64,286,699	2,650,257
2035/36	93,960	27,817	23,049	4,167	71,054,175	3,815,353	73,026	64,482,802	2,682,994
2060/61	100,932	29,814	25,163	4,651	72,752,986	4,174,625	73,026	65,501,674	3,003,661
2020/21 - 2060/61	36,573	11,655	7,815	3,840	11,434,247	1,071,913	57,000	9,478,211	827,123

Source: Applied Economics, 2024.

5.4 Laveen Growth Area Allocations

The results of the base, high and low growth allocations for the Laveen growth area are summarized in **Table 5.5**. The data shows a total of about 16,000 new housing units being added between 2020 and 2060, with about 8,500 of those units (54 percent) being added during the infrastructure planning horizon of 2024/25 through 2034/25. The total number of units added is the same in the high scenario since the area reaches buildout by 2060. The

number of units added by 2060 decreases very slightly under the low scenario as the area still nearly reaches buildout.

In the case of nonresidential development, base scenario growth results indicate the addition of some 12.4 million square feet of space, with the largest increase occurring in the industrial category. The total amount of new space increases to 12.7 million square feet under the high growth scenario, with the largest increase over the base scenario occurring in the industrial category. The amount of new space in the low scenario is 4.5 million square feet less than the base scenario with the largest drop occurring in the industrial category.

Table 5.5
Laveen Growth Area Allocations

Base Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**86,890**	**25,325**	**24,841**	**484**	**6,572,180**	**2,767,858**	**9,227**	**935,346**	**2,859,749**
2024/25	96,186	29,894	28,207	1,687	7,874,547	3,462,090	93,611	1,208,735	3,110,111
2034/35	123,685	38,491	33,476	5,015	12,296,981	4,548,800	408,495	3,223,360	4,116,326
2035/36	124,519	38,810	33,526	5,284	12,659,728	4,640,989	439,627	3,428,934	4,150,178
2060/61	130,412	41,054	34,082	6,972	18,926,314	5,675,350	1,697,093	6,926,813	4,627,058
2020/21 - 2060/61	43,522	15,729	9,241	6,488	12,354,134	2,907,492	1,687,866	5,991,467	1,767,309

Source: Applied Economics, 2024.

High Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**86,890**	**25,325**	**24,841**	**484**	**6,572,180**	**2,767,858**	**9,227**	**935,346**	**2,859,749**
2024/25	96,589	30,011	28,295	1,716	7,886,201	3,462,090	94,890	1,208,735	3,120,486
2034/35	125,417	39,033	33,774	5,206	12,358,393	4,548,800	417,119	3,223,360	4,169,114
2035/36	126,294	39,368	33,880	5,488	12,723,016	4,640,989	448,807	3,428,934	4,204,286
2060/61	130,405	41,054	34,082	6,972	19,307,460	5,784,133	1,600,592	7,280,311	4,642,424
2020/21 - 2060/61	43,515	15,729	9,241	6,488	12,735,280	3,016,275	1,591,365	6,344,965	1,782,675

Source: Applied Economics, 2024.

Low Scenario

Fiscal		Housing Units			Land Use				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**86,890**	**25,325**	**24,841**	**484**	**6,572,180**	**2,767,858**	**9,227**	**935,346**	**2,859,749**
2024/25	97,627	29,869	28,189	1,680	7,765,054	3,438,990	94,945	1,081,222	3,149,897
2034/35	123,585	37,882	32,957	4,925	10,616,038	4,435,827	382,576	1,685,608	4,112,027
2035/36	124,490	38,194	33,006	5,188	10,824,896	4,520,392	411,481	1,747,280	4,145,743
2060/61	130,329	40,430	33,551	6,879	14,521,369	5,524,101	1,579,327	2,796,645	4,621,296
2020/21 - 2060/61	43,439	15,105	8,710	6,395	7,949,189	2,756,243	1,570,100	1,861,299	1,761,547

Source: Applied Economics, 2024.

5.5 Balance of Phoenix Allocations

The results of the base, high and low growth allocations for the balance of the city of Phoenix are summarized in **Table 5.6**. The data shows a total of about 79.9 thousand new housing units being added between 2020 and 2060, with about 33,000 of those units (42 percent) being added during the infrastructure planning horizon of 2024/25 through 2034/25. The total number of units added increases by 6,271 units (7.9 percent) in the high scenario, and decreases by about 18,000 (22.8 percent) under the low scenario.

In the case of nonresidential development, base scenario growth results indicate the addition of some 79.6 million square feet of space, with the largest increase occurring in the industrial category. The total amount of new space increases to 100.7 million square feet under the growth scenario, with the largest increase over the base scenario occurring in the industrial category. The amount of new space in the low scenario is some 27 million square feet less than the base scenario with the largest drop occurring in the industrial category.

Table 5.6
Balance of Phoenix Allocations

Base Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**1,336,723**	**550,032**	**313,845**	**236,187**	447,003,485	**83,756,558**	**107,184,989**	**110,928,089**	**145,133,849**
2024/25	1,408,263	571,217	319,059	252,158	456,797,866	83,771,735	111,352,735	114,496,981	147,176,416
2034/35	1,491,566	604,546	325,477	279,069	479,083,140	87,406,038	117,434,450	124,240,258	149,990,684
2035/36	1,497,786	607,013	325,930	281,083	481,561,396	88,094,829	118,074,485	125,098,830	150,281,543
2060/61	1,558,309	629,900	328,949	300,951	526,651,227	100,782,587	128,568,421	142,572,020	154,710,955
2020/21 - 2060/61	221,586	79,868	15,104	64,764	79,647,742	17,026,029	21,383,432	31,643,931	9,577,106

Source: Applied Economics, 2024.

High Scenario

Fiscal		Housing Units			Square Feet				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**1,336,723**	**550,032**	**313,845**	**236,187**	447,003,485	**83,756,558**	**107,184,989**	**110,928,089**	**145,133,849**
2024/25	1,408,836	572,845	319,458	251,867	459,598,325	84,127,896	111,777,151	116,264,512	147,428,766
2034/35	1,515,285	608,146	330,205	283,012	492,942,640	89,908,739	119,506,119	132,333,680	151,194,102
2035/36	1,518,512	609,214	330,681	283,787	495,672,266	90,878,735	119,751,518	133,754,905	151,287,108
2060/61	1,575,202	636,171	332,251	303,920	547,687,066	104,379,363	131,820,088	155,407,289	156,080,326
2020/21 - 2060/61	238,479	86,139	18,406	67,733	100,683,581	20,622,805	24,635,099	44,479,200	10,946,477

Source: Applied Economics, 2024.

Table 5.6
Balance of Phoenix Allocations (continued)

Low Scenario

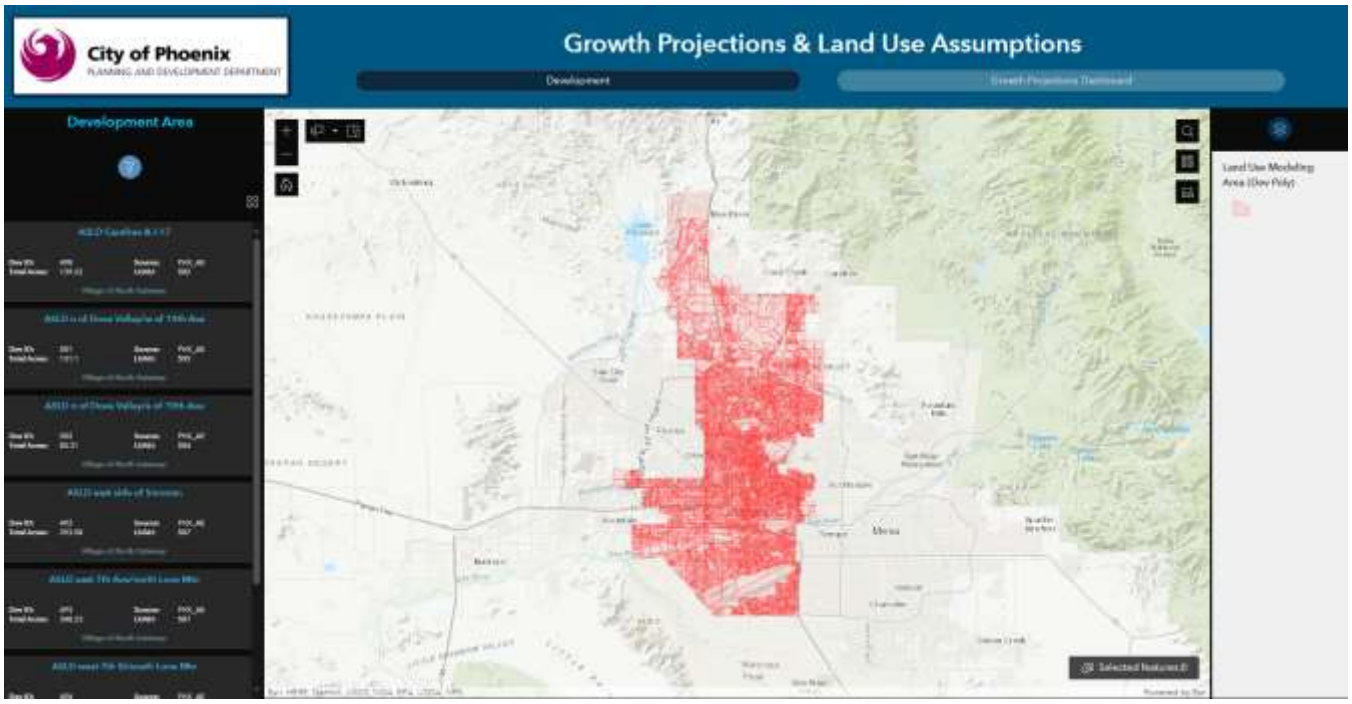
Fiscal		Housing Units				Land Use				
Year	Household Pop	Total	SF	MF	Total	Retail	Office	Industrial	Other
2020/21	**1,336,723**	**550,032**	**313,845**	**236,187**	447,003,485	**83,756,558**	**107,184,989**	**110,928,089**	**145,133,849**
2024/25	1,407,479	571,593	318,908	251,978	460,194,700	83,429,217	113,667,046	113,265,529	149,832,908
2034/35	1,468,668	589,907	322,265	273,673	475,401,246	86,161,291	118,276,326	116,248,065	154,715,565
2035/36	1,473,445	591,581	322,556	275,238	476,965,487	86,711,838	118,646,626	116,504,815	155,102,209
2060/61	1,509,285	611,728	324,490	287,238	499,573,261	98,265,647	121,917,418	121,725,615	157,664,581
2020/21 - 2060/61	172,562	61,696	10,645	51,051	52,569,776	14,509,089	14,732,429	10,797,526	12,530,732

Source: Applied Economics, 2024.

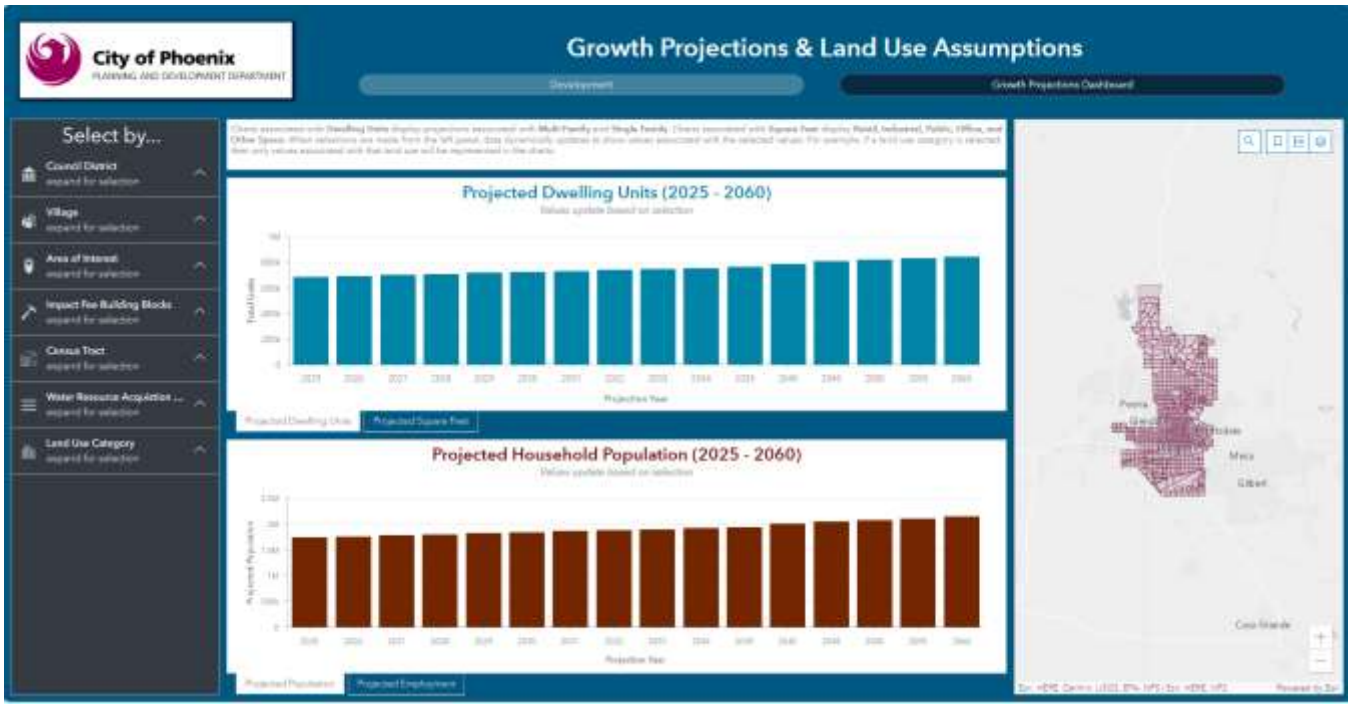
6.0 Land Use Tracking and Reporting Tool

6.1 Development and Land Use Tracking and Reporting Tool

Utilizing ESRI's Arc GIS Online Experience Builder, Geodetic Analysis and Dynamic Visions GIS developed a tracking and reporting tool provides a visualization of the employment, population, square footage and housing unit results. The first component of the tracking tool is a development map that showcases the units, square feet and development timing of each Dev Poly. Additional layers include query geographies, general plan, zoning, permits and proposed rezoning layers. A user can filter and select development areas to view further information.



The second component of the tracking tool utilizes a dashboard to display projected units, square footage, employment and population. This data is aggregated by LUAU to avoid too large of a data set. The user can select by council district, village, area of interest, Impact fee building block, census tract, or water resource acquisition area. Additionally, they can filter by land use and employment category. When selections are made from the left panel, the data in the charts will dynamically update to reflect the selected values.



6.2 Biannual Updates

Updates to the tracking tool will be completed on a biannual basis. Through the scope of the current contract, four updates will be completed. During this process, the existing general plan, existing zoning, 5-year permit project and 5-year rezoning proposed will be updated. As of June 2024, there are two additional updates left in the agreement.

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Growth and Infrastructure Team
Long Range Planning
Street Transportation Department
Water Services Department

City of Phoenix
Impact Fee Ad Hoc Committee

Maricopa Association of Governments
Information Services

Maricopa County
Assessor's Office