

City of
AVONDALE

Land Use Assumptions and Infrastructure
Improvements Plan for Parks/Recreation,
Fire, Police, Streets, Water, and Wastewater
Facilities

Final Report

November 23, 2022

TABLE OF CONTENTS

INTRODUCTION **5**
 INFRASTRUCTURE IMPROVEMENTS PLAN 5
 QUALIFIED PROFESSIONALS 6

LAND USE ASSUMPTIONS **7**
 SERVICE AREA..... 7
 Figure 1 – Service Area Map 8
 SUMMARY OF GROWTH INDICATORS 9
 Figure 2 – Chart of Projected Development 9
 SERVICE UNITS BY TYPE OF RESIDENTIAL DEVELOPMENT 9
 Figure 3 – Persons per Housing Unit by Units in Structure 10
 SERVICE UNITS BY TYPE OF NONRESIDENTIAL DEVELOPMENT 10
 Figure 4 – Nonresidential Trip Rates and Jobs by Type of Development 10
 Figure 5 – Work Area Profile..... 11
 Figure 6 – Detailed Land Use Assumptions 13

PARKS/RECREATION FACILITIES IIP **14**
 SERVICE AREA..... 14
 PROPORTIONATE SHARE 14
 Figure PR1 – Daytime Population 14
 CURRENT USE AND STANDARDS FOR PARKS/RECREATION FACILITIES 15
 Figure PR2 – Existing Park Improvements Standards and Growth Needs..... 15
 PARKS/RECREATION IMPROVEMENTS 16
 Figure PR3 – Parks/Recreation Projects Over Ten Years..... 16

FIRE FACILITIES IIP **17**
 FEE CALCULATION METHODOLOGY 17
 SERVICE AREA..... 17
 PROPORTIONATE SHARE 17
 Figure F1 – Functional Population 18
 CURRENT USE AND AVAILABLE CAPACITY 18
 Figure F2 – Existing Fire Buildings and Standards..... 19
 Figure F3 – Existing Fire Vehicles and Standards 20
 PROJECTED NEED FOR FIRE FACILITIES..... 20
 Figure F4 – Fire Facilities Needed to Accommodate Growth 21
 FIRE INFRASTRUCTURE IMPROVEMENTS 22
 Figure F5 – Ten-Year Plan for Fire Facilities 22

POLICE FACILITIES IIP **23**
 SERVICE AREA..... 23
 PROPORTIONATE SHARE 23
 CURRENT USE AND AVAILABLE CAPACITY 23
 Figure P1 – Existing Police Infrastructure Standards 24
 Figure P2 – Projected Need for Police Infrastructure..... 26
 POLICE INFRASTRUCTURE IMPROVEMENTS..... 27
 Figure P3 – Ten-Year Plan for Police Facilities 27

STREET FACILITIES IIP **28**
 EXISTING INFRASTRUCTURE 28

Figure S1 – Arterials in Avondale 29

Figure S2 – Traffic Signals in Avondale 30

FORECAST OF SERVICE UNITS 31

Figure S3 – Travel Demand Model..... 31

TRIP GENERATION RATES..... 32

ADJUSTMENTS FOR COMMUTING PATTERNS AND PASS-BY TRIPS 32

Figure S4 – Inflow/Outflow Analysis 32

TRIP LENGTH WEIGHTING FACTOR BY TYPE OF LAND USE 33

Figure S5 – Average Trip Length Weighting Factors..... 33

LANE CAPACITY..... 33

INFRASTRUCTURE IMPROVEMENTS PLAN FOR STREETS..... 33

Figure S6 – Avondale Transportation Plan..... 34

Figure S7 – Ten-Year Plan for Street Improvements 35

WATER UTILITY FEES..... **36**

FEE CALCULATION METHODOLOGY 36

SERVICE AREA..... 36

PROPORTIONATE SHARE 36

Figure W1 – 2016 Distribution of the Number of Meters and Demand by Land Use Type 37

EXISTING FACILITIES..... 37

Figure W2 – 2018 Existing Wells and Production Capacities 38

Figure W3 – Existing Booster Pump Stations and Capacities..... 38

Figure W4 – Existing Storage..... 39

Figure W5 – Existing Transmission and Distribution Lines..... 39

EXPANSION FACILITY COSTS 40

Figure W6 – Expansion Facility Project Costs..... 40

SERVICE UNITS AND DEMAND BY LAND USE..... 41

Figure W7 – Historical Average Day and Maximum Day Demands..... 41

Figure W8 – Water Demand Unit 42

Figure W9 – Average and Maximum Day Demand by Water Meter Size 42

PROJECTED SERVICE UNITS 42

Figure W10 – Projected Added Dwelling Units and Water Demand Forecast 43

FACILITY IMPROVEMENTS 43

WASTEWATER UTILITY FEES..... **44**

FEE CALCULATION METHODOLOGY 44

SERVICE AREA..... 44

PROPORTIONATE SHARE 44

Figure WW1 – 2016 Account Type Return to Sewer Factors and Contributed Volume 45

EXISTING FACILITIES..... 45

Figure WW2 – Existing Lift Stations and Firm Capacity..... 46

EXPANSION FACILITY COSTS 46

SERVICE UNITS AND DEMAND BY LAND USE..... 47

Figure WW3 – Wastewater Demand Unit 47

Figure WW4 – Meter Capacity Ratios..... 48

PROJECTED SERVICE UNITS 48

Figure WW5 – Projected Added Dwelling Units and Wastewater Flows Forecast 49

FACILITY IMPROVEMENTS 49

APPENDIX A – FORECAST OF REVENUES 50
 Figure A1 – Ten-Year Revenue Projections 51

APPENDIX B – MAG SOCIOECONOMIC DOCUMENTATION 52

APPENDIX C – IMPACT FEE REFERENCES..... 55

Introduction

Arizona Revised Statutes (ARS) §9-463.05 governs how Development Impact Fees (DIF) are calculated for municipalities in Arizona. The enabling legislation calls for three integrated products: 1) Land Use Assumptions (LUA) for at least 10 years, 2) Infrastructure Improvements Plan (IIP), and 3) Development Impact Fees (DIF). Because Arizona requires a two-phase adoption process, the LUA and IIP will be reviewed, refined, and approved before focusing on impact fees.

According to requirements of Arizona's enabling legislation, DIF may be only used for construction, acquisition or expansion of public facilities that are necessary public services. "Necessary public service" means any of the following categories of facilities that have a life expectancy of three or more years and that are owned and operated by or on behalf of the municipality.

- Water Facilities
- Wastewater Facilities
- Storm Water, Drainage, and Flood Control Facilities
- Library Facilities
- Streets Facilities
- Fire and Police Facilities
- Parks and Recreational Facilities
- Any facility that was financed before June 1, 2011 and that meets the following requirements:
 1. Impact fees were pledged to repay debt service obligations related to the construction of the facility.
 2. After August 1, 2014, any impact fees collected are used solely for the payment of principal and interest on the portion of the bonds, notes, or other debt service obligations issued before June 1, 2011 to finance construction of the facility.

Infrastructure Improvements Plan

Development fees must be calculated pursuant to an Infrastructure Improvements Plan (IIP). For each necessary public service that is the subject of a development fee, Subsection 9-463.05(E) requires the following.

- 1. A description of the existing necessary public services in the service area and the costs to upgrade, update, improve, expand, correct or replace those necessary public services to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards, which shall be prepared by qualified professionals licensed in this state, as applicable.*
- 2. An analysis of the total capacity, the level of current usage and commitments for usage of capacity of the existing necessary public services, which shall be prepared by qualified professionals licensed in this state, as applicable.*
- 3. A description of all or the parts of the necessary public services or facility expansions and their costs necessitated by and attributable to development in the service area based on the approved land use assumptions, including a forecast of the costs of infrastructure, improvements, real property, financing, engineering and architectural services, which shall be prepared by qualified professionals licensed in this state, as applicable.*
- 4. A table establishing the specific level or quantity of use, consumption, generation or discharge of a service unit for each category of necessary public services or facility*

expansions and an equivalency or conversion table establishing the ratio of a service unit to various types of land uses, including residential, commercial and industrial.

5. The total number of projected service units necessitated by and attributable to new development in the service area based on the approved land use assumptions and calculated pursuant to generally accepted engineering and planning criteria.

6. The projected demand for necessary public services or facility expansions required by new service units for a period not to exceed ten years.

7. A forecast of revenues generated by new service units other than development fees, which shall include estimated state-shared revenue, highway users revenue, federal revenue, ad valorem property taxes, construction contracting or similar excise taxes and the capital recovery portion of utility fees attributable to development based on the approved land use assumptions, and a plan to include these contributions in determining the extent of the burden imposed by the development as required in subsection B, paragraph 12 of this section.

Qualified Professionals

Qualified professionals must prepare the LUA, IIP and DIF, using generally accepted engineering, planning, and financial practices. A qualified professional is defined as “a professional engineer, surveyor, financial analyst or planner providing services within the scope of the person’s license, education, or experience.” Raftelis is a financial consulting firm specializing in impact fees, infrastructure funding, user fees, cost of service studies, capital improvement plans, and utility rate studies. Raftelis has over 100 professionals located in major urban areas across America. Avondale’s LUA and IIP were prepared by qualified professionals in Denver, CO.

Land Use Assumptions

The City of Avondale will use the same land use assumptions for all types of infrastructure. In addition to population and housing unit projections, the IIP and impact fees also require demographic data on nonresidential development, such as jobs and floor area. This document contains the land use assumptions for Avondale's 2022 DIF update. The LUA and IIP must be updated every five years, making short-range projections the critical time frame. The IIP is limited to ten years, thus a very long-range "build-out" analysis may not be used to derive impact fees in Arizona.

ARS §9-463.05(T)(7) defines land use assumptions as:

"Projections of changes in land uses, densities, intensities and population for a specified service area over a period of at least ten years and pursuant to the General Plan of the municipality."

Raftelis prepared current demographic **estimates** and future development **projections** for both residential and nonresidential development that are used in the IIP and calculation of impact fees. Current conditions in Fiscal Year (FY) 21-22 are used to document levels-of-service provided to existing development in Avondale. Although long-range projections are necessary for planning infrastructure systems, a ten-year timeframe is critical for the LUA and IIP.

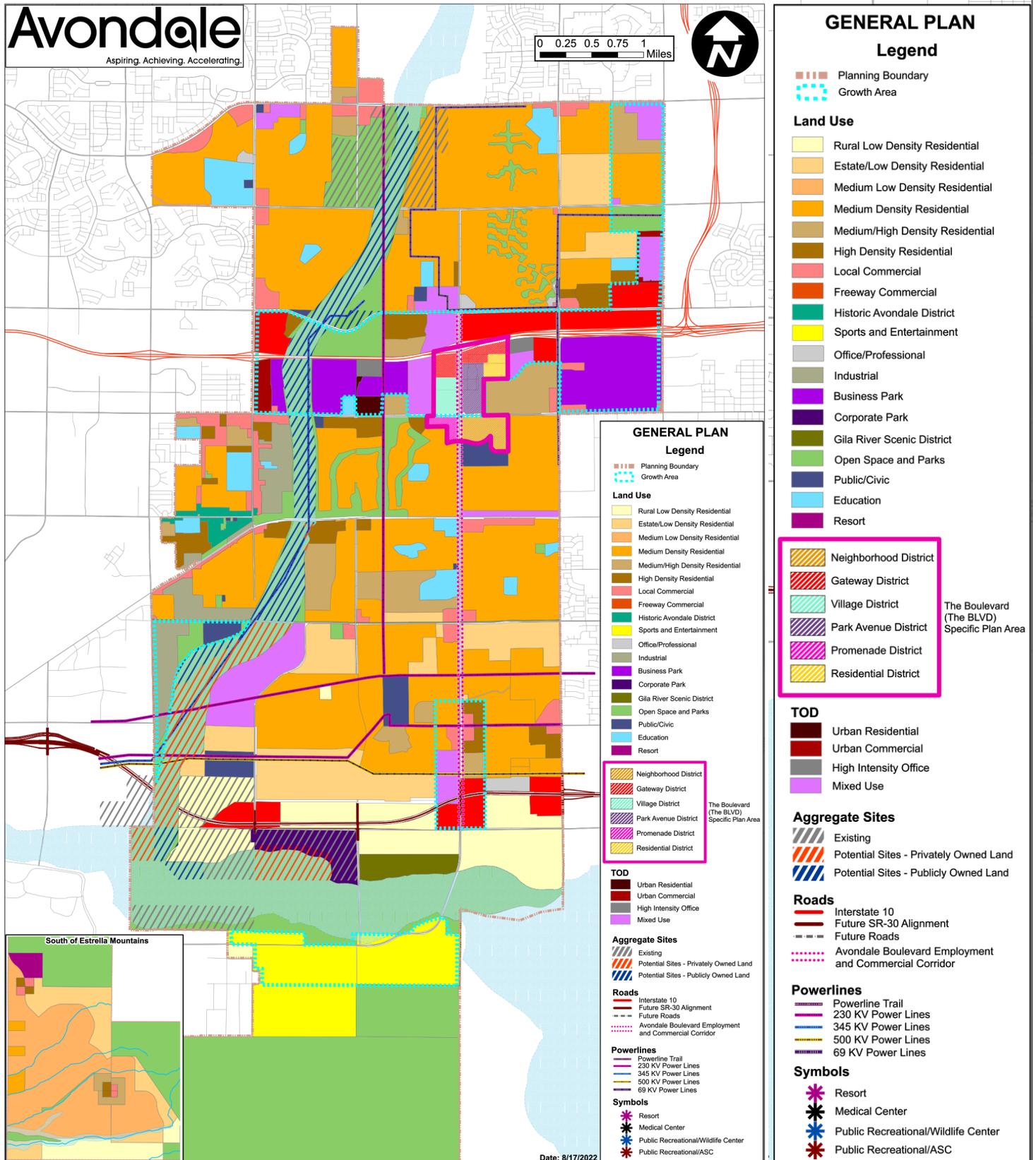
Service Area

ARS §9-463.05(T)(9) defines "service area" as:

"...Any specified area within the boundaries of a municipality in which development will be served by necessary public services or facility expansions and within which a substantial nexus exists between the necessary public services or facility expansions and the development being served as prescribed in the infrastructure improvements plan. "

The service area covered in this LUA report is north of the Estrella Mountains. Figure 1 indicates land uses, densities, and intensities of development as specified in the General Plan. The service area is defined as all land within the city limits of Avondale, as modified over time.

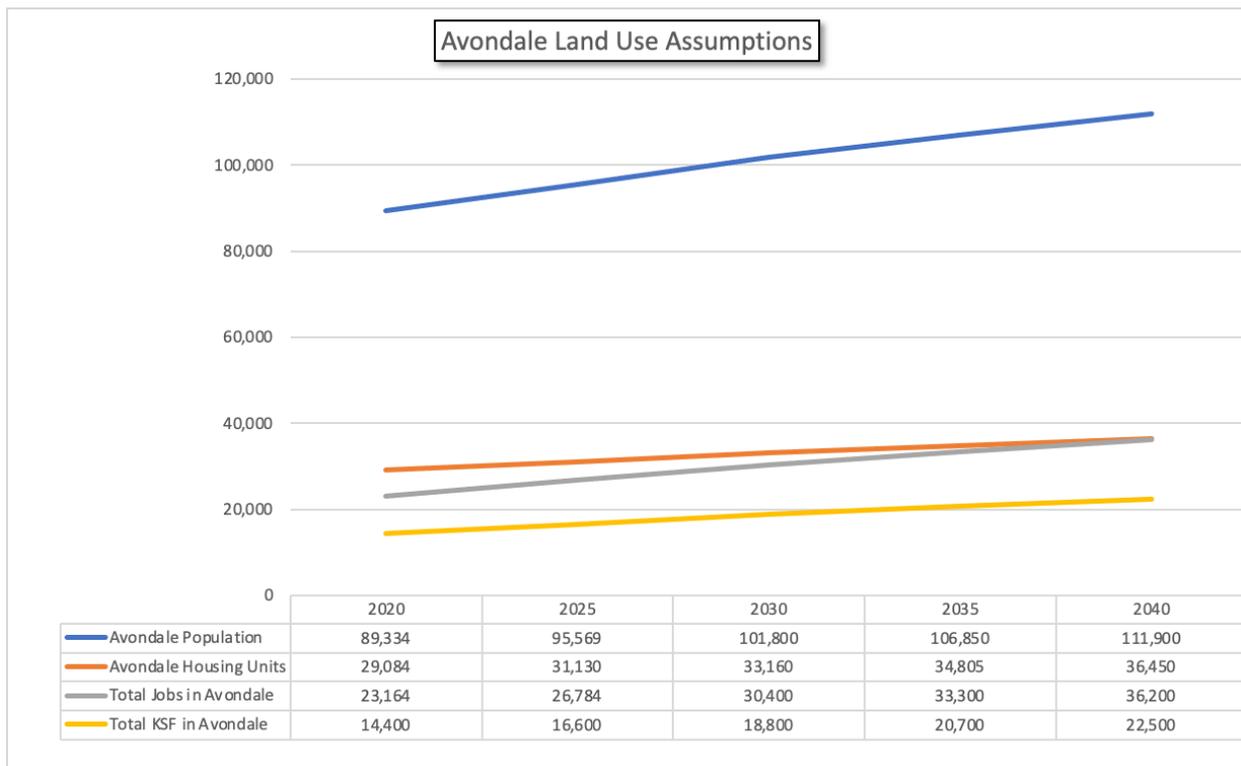
Figure 1 - Service Area Map



Summary of Growth Indicators

Service units (i.e., residents and jobs) and development units (i.e., dwellings and square feet of nonresidential floor area expressed in thousands) for 2020 through 2040 are summarized in Figure 2. These land use assumptions will be used to estimate DIF revenue and to indicate the anticipated need for growth-related infrastructure. However, DIF methodologies are designed to reduce sensitivity to accurate development projections in the determination of the proportionate-share fee amounts. If actual development is slower than projected, DIF revenues will also decline, but so will the need for growth-related infrastructure. In contrast, if development is faster than anticipated, Avondale will receive an increase in DIF revenue and will also accelerate capital improvements to keep pace with development.

Figure 2 – Chart of Projected Development



Service Units by Type of Residential Development

The U.S. Census Bureau no longer obtains detailed information using “long-form” questionnaires. Demographic data is currently collected using a continuous monthly mailing of surveys, known as the American Community Survey (ACS), which is limited by sample-size constraints. For example, data on Single Family detached housing units are now combined with attached single units (commonly known as townhouses). According to the U.S. Census Bureau, a household is a housing unit that is occupied by year-round residents. Development fees often use per capita standards and persons per housing unit, or persons per household, to derive proportionate-share fee amounts. Raftelis recommends that fees for residential development in the City of Avondale be imposed according to the number of year-round residents per housing unit. Figure 3 documents Avondale’s most recent multipliers by type of housing.

Figure 3 – Persons per Housing Unit by Units in Structure

City of Avondale

Units in Structure	Persons	Housing Units	Persons per Housing Unit	Housing Mix
Single Unit (detached and attached)	70,590	21,442	3.29	77%
2+ Unit (all other residential)	15,332	6,543	2.34	23%
Subtotal	85,922	27,985	3.07	

Source: 2016-2020 ACS Tables B25024 and B25033, U.S. Census Bureau.

Service Units by Type of Nonresidential Development

In addition to data on residential development, the calculation of impact fees requires data on nonresidential development. Raftelis uses the term “jobs” to refer to employment by place of work. In Figure 4, gold shading indicates nonresidential development prototypes that will be used to allocate costs. Nonresidential development categories represent general groups of land uses that share similar average weekday vehicle trip generation rates and employment densities (i.e., jobs per thousand square feet of floor area). The prototype for future Industrial development is Warehousing (ITE land use 150). For Office/Services, General Office (ITE 710) is the prototype for future development in Avondale. The prototype for Commercial (e.g., retail and restaurants) is a Shopping Center (ITE code 820).

Figure 4 – Nonresidential Trip Rates and Jobs by Type of Development

ITE Code	Land Use / Size	Demand Unit	Weekday Trip Ends Per Demand Unit*	Weekday Trip Ends Per Employee*	Employees Per Demand Unit	Square Feet Per Employee
110	Light Industrial	1,000 Sq Ft	4.87	3.10	1.57	637
140	Manufacturing	1,000 Sq Ft	4.75	2.51	1.89	528
150	Warehousing	1,000 Sq Ft	1.71	5.05	0.34	2,953
310	Hotel	room	7.99	14.34	0.56	N/A
320	Motel	room	3.35	25.17	0.13	N/A
520	Elementary School**	1,000 Sq Ft	19.52	21.00	0.93	1,076
530	High School**	1,000 Sq Ft	14.07	22.25	0.63	1,581
610	Hospital	1,000 Sq Ft	10.77	3.77	2.86	350
620	Nursing Home	1,000 Sq Ft	6.75	3.31	2.04	490
710	General Office	1,000 Sq Ft	10.84	3.33	3.26	307
720	Medical/Dental Office	1,000 Sq Ft	36.00	8.71	4.13	242
820	Shopping Center	1,000 Sq Ft	37.01	17.42	2.12	471
850	Grocery/Supermarket	1,000 Sq Ft	93.84	43.86	2.14	467

* *Trip Generation*, Institute of Transportation Engineers, 11th Edition (2022).

** *Trip Generation*, Institute of Transportation Engineers, 10th Edition (2017).

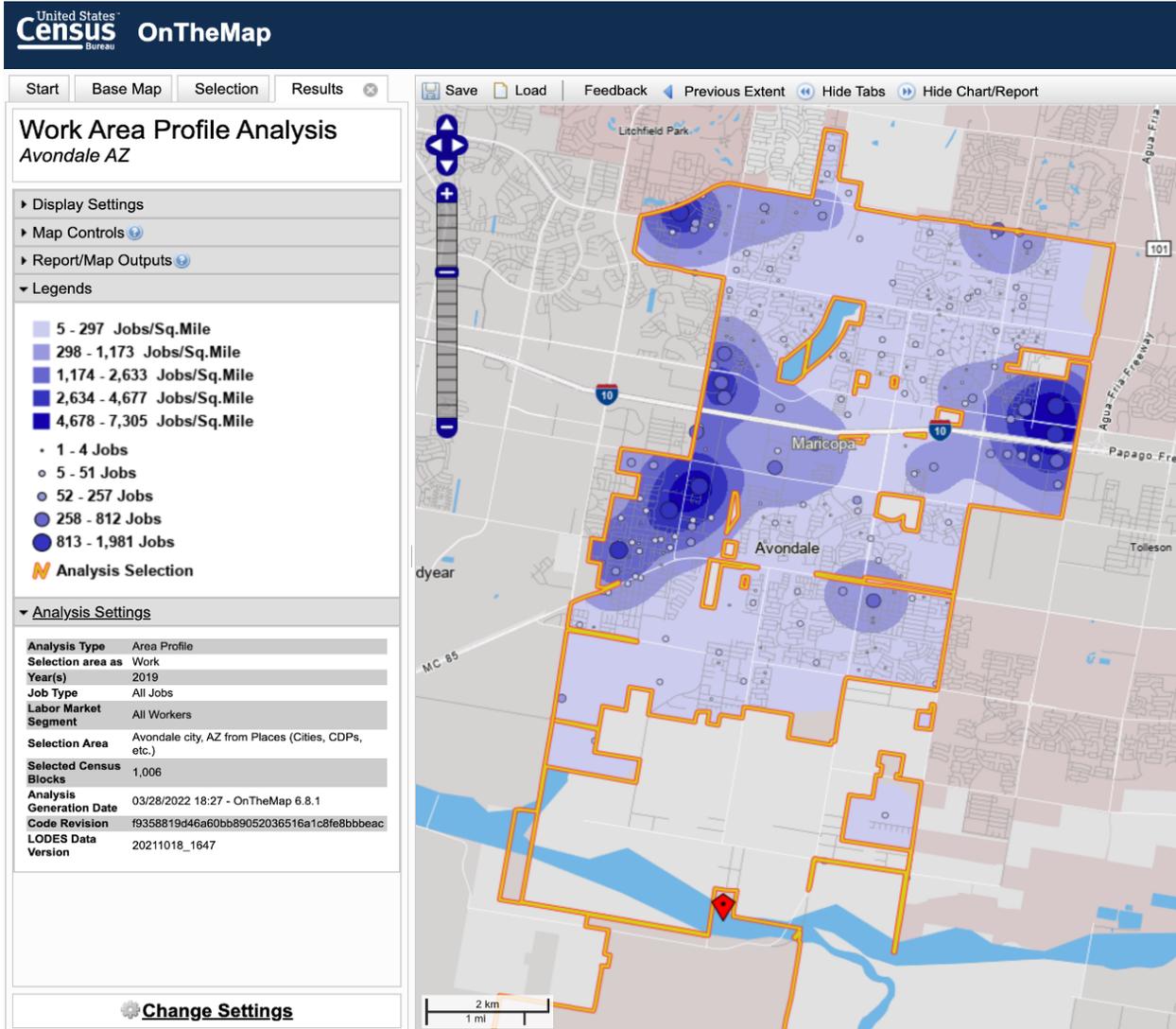
Latest data on jobs in Avondale (see Figure 5) are from the Census Bureau. Each row is an industry sector, as reported by the North American Industry Classification System. Subtotals and percentages for Avondale’s three types of nonresidential development are shown at the bottom of the figure.

Figure 5 – Work Area Profile

Avondale AZ

<i>Industry Classification</i>	<i>2019 Jobs</i>	<i>General Type</i>
Agriculture, Forestry, Fishing and Hunting	16	Industrial
Mining, Quarrying, and Oil and Gas Extraction	0	Industrial
Utilities	127	Industrial
Construction	871	Industrial
Manufacturing	68	Industrial
Wholesale Trade	460	Industrial
Retail Trade	5,440	Commercial
Transportation and Warehousing	235	Industrial
Information	380	Office / Institutional
Finance and Insurance	203	Office / Institutional
Real Estate and Rental and Leasing	208	Office / Institutional
Professional, Scientific, and Technical Services	272	Office / Institutional
Management of Companies and Enterprises	16	Office / Institutional
Administration & Support, Waste Management and Remediation Services	536	Office / Institutional
Educational Services	3,399	Office / Institutional
Health Care and Social Assistance	1,285	Office / Institutional
Arts, Entertainment, and Recreation	349	Office / Institutional
Accommodation and Food Services	2,565	Commercial
Other Services (excluding Public Administration)	173	Office / Institutional
Public Administration	1	Office / Institutional
Total Jobs	16,604	
Subtotals by Type of Nonresidential Development		
Industrial	1,777	11%
Commercial	8,005	48%
Office / Institutional	6,822	41%
Total Jobs	16,604	100%

The map below indicates the general location and concentration of jobs within Avondale (dark blue indicates more jobs per square mile).



Detailed land use assumptions are shown in Figure 6. Population and housing units in 2020 are from the U.S. Census Bureau. Projected 2030, 2040, and 2050 population in the Avondale Municipal Planning Area (MPA) are from Maricopa Association of Governments (MAG). Jobs in the Avondale MPA for 2020, 2030, 2040, and 2050 are also from MAG. Raftelis converted jobs to nonresidential floor area using average square feet per job multipliers documented in pages 23-25 of the MAG 2019 Socioeconomic Projections. Industrial average of 1,060 square feet per job is based on manufacturing and warehousing. Commercial average of 660 square feet per job is based on retail, restaurants, and hotels. Office/Services average of 459 square feet per job is based on information, finance/insurance, and real estate. See Appendix B for supporting documentation from MAG.

Figure 6 – Detailed Land Use Assumptions

2022 LUA	<i>FY21-22</i>	<i>FY22-23</i>	<i>FY23-24</i>	<i>FY24-25</i>	<i>FY25-26</i>	<i>FY26-27</i>	<i>FY31-32</i>	<i>FY41-42</i>	<i>FY49-50</i>
Avondale AZ	<i>Base Yr</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>10</i>	<i>20</i>	<i>28</i>
	2022	2023	2024	2025	2026	2027	2032	2042	2050
Population									
Avondale Population	91,828	93,075	94,322	95,569	96,816	98,063	103,820	113,320	119,000
Housing Units									
Persons per Housing Unit	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07
Avondale Housing Units	29,911	30,318	30,724	31,130	31,536	31,942	33,818	36,912	38,762
Jobs (place of work)									
Industrial Jobs	2,707	2,787	2,867	2,946	3,026	3,106	3,472	4,127	4,708
Commercial Jobs	11,814	12,161	12,509	12,856	13,204	13,551	15,149	18,010	20,544
Office/Services Jobs	10,091	10,388	10,685	10,981	11,278	11,575	12,940	15,383	17,548
Total Jobs in Avondale	24,612	25,336	26,060	26,784	27,508	28,232	31,560	37,520	42,800
Jobs-Housing Ratio	0.82	0.84	0.85	0.86	0.87	0.88	0.93	1.02	1.10
Nonresidential Floor Area (square feet in thousands = KSF)									
Industrial KSF	2,900	3,000	3,000	3,100	3,200	3,300	3,700	4,400	5,000
Commercial KSF	7,800	8,000	8,300	8,500	8,700	8,900	10,000	11,900	13,600
Office/Services KSF	4,600	4,800	4,900	5,000	5,200	5,300	5,900	7,100	8,000
Total KSF in Avondale	15,300	15,800	16,200	16,600	17,100	17,500	19,600	23,400	26,600
Average Square Feet per Job	622	624	622	620	622	620	621	624	621
Annual Increases in Avondale									
	22to23	23to24	24to25	25to26	26to27	31to32	41to42	49to50	
Population	1,247	1,247	1,247	1,247	1,247	1,010	710	710	
Housing Units	407	406	406	406	406	329	231	231	
Jobs	724	724	724	724	724	580	660	660	
Industrial KSF	100	0	100	100	100	100	100	100	
Commercial KSF	200	300	200	200	200	200	200	300	
Office/Services KSF	200	100	100	200	100	100	200	100	
Total Nonresidential KSF	500	400	400	500	400	400	500	500	

Parks/Recreation Facilities IIP

ARS § 9-463.05(T)(7)(g) defines parks and recreation facilities eligible for development fee funding.

“Neighborhood parks and recreational facilities on real property up to thirty acres in area, or parks and recreational facilities larger than thirty acres if the facilities provide a direct benefit to the development. Park and recreational facilities do not include vehicles, equipment or that portion of any facility that is used for amusement parks, aquariums, aquatic centers, auditoriums, arenas, arts and cultural facilities, bandstand and orchestra facilities, bathhouses, boathouses, clubhouses, community centers greater than three thousand square feet in floor area, environmental education centers, equestrian facilities, golf course facilities, greenhouses, lakes, museums, theme parks, water reclamation or riparian areas, wetlands, zoo facilities or similar recreational facilities, but may include swimming pools.”

In the 2022 update, the City of Avondale is using two methods to derive impact fees for park and recreation facilities. First, Avondale use a cost recovery method for a General Fund loan of \$2.5 million used to construct 5.8 acres at Alamar Park. Second, Avondale will use an incremental expansion cost method for additional park improvements. Parks/recreation development fees in Avondale exclude costs to upgrade, update, improve, expand, correct or replace necessary public services to meet existing needs/usage. Avondale fees also exclude stricter safety, efficiency, environmental or regulatory standards.

Service Area

The service area for parks/recreation development fees includes the area north of the Estrella Mountains.

Proportionate Share

ARS § 9-463.05(B)(3) states the development fee shall not exceed a proportionate share of the cost of necessary public services needed to serve new development. In Avondale, parks/recreation infrastructure standards, projected needs, and development fees are based on both residential and nonresidential development. As shown in Figure PR1, Raftelis used daytime population to allocate costs. Daytime population includes estimated residents and inflow commuters in 2019 (latest year available). Potential demand days per year assume residents might use parks every day of the year, but inflow commuters will only use parks four days per week over 48 weeks per year (i.e., two weeks of vacation and two weeks of holidays). Based on cumulative demand days, residential development accounts for 92% of the demand for parks/recreation facilities, with 8% assigned to nonresidential development.

Figure PR1 – Daytime Population

Cost Allocation Factors for Parks	<i>Residential</i>	<i>Nonresidential</i>	
2019 Daytime Population	85,595	14,888	
	Residents	Inflow Commuters	
Potential Demand Days per Year	365	192	<i>Total</i>
Cumulative Demand Days	31,242,175	2,858,496	34,100,671
Proportionate Share	92%	8%	

Source of inflow commuters is U.S. Census Bureau, Inflow/Outflow report from OnTheMap website.

Current Use and Standards for Parks/Recreation Facilities

Avondale has determined that additional parks are necessary to accommodate future development. As shown in Figure PR2, the City’s current standard is approximately 1.10 acres of improved parks per 1,000 residents and approximately 0.36 acres per 1,000 jobs. These standards exclude parks less than 1.5 acres that might not provide citywide benefit. To accommodate new development over the next ten years, Avondale will expand parks, with expenditures estimated to cost approximately \$6.72 million. According to Avondale staff, the cost factor of \$431,000 per acre for park improvements is based on recent construction of Alamar Park.

Figure PR2 – Existing Park Improvements Standards and Growth Needs

Location	Improved Acres*
Friendship Park	30.0
Festival Fields	30.0
Alamar Park**	24.2
Las Ligas Park	8.1
Donnie Hale Park	5.3
Dessie Lorenz Park	4.6
Mountain View Park	3.6
Dennis DeConcini Park	2.0
Fred Campbell Park	1.5
Total =>	109.3
Average Size (acres)	12.1

**Source: Avondale staff (excludes parks less than 1.5 acres that might not provide citywide benefit).*

*** Impact fee eligible area (30 acres) reduced to account for area constructed using loan from General Fund.*

		Residential	Nonresidential	Total
		Residents	Inflow Commuters	
2019 Daytime Population		85,595	14,888	
Potential Demand Days per Year		365	192	
Cumulative Demand Days		31,242,175	2,858,496	34,100,671
Proportionate Share		92%	8%	
2022 Service Units		91,828	24,612	
		Persons	Jobs	
Acres per 1,000 Service Units =>		1.0950	0.3553	
Projected Need for Park Improvements				
	Year	Population	Jobs	Improved Acres
Base	2022	91,828	24,612	109.3
Year 1	2023	93,075	25,336	110.9
Year 2	2024	94,322	26,060	112.5
Year 3	2025	95,569	26,784	114.2
Year 4	2026	96,816	27,508	115.8
Year 5	2027	98,063	28,232	117.4
Year 10	2032	103,820	31,560	124.9
Ten-Yr Increase		11,992	6,948	15.6
Total Project Cost per Acre =>				\$431,000
Growth Cost of Parks =>				\$6,724,000

Parks/Recreation Improvements

Figure PR3 lists planned parks/recreation improvements over the next ten years. Based on projected needs to accommodate growth, Avondale expects to spend approximately \$6.72 million on parks improvements over the next ten years. Improved acres may include expansion of existing parks or an additional park site. Also, the City used General Fund revenue to front-end recent, growth-related park improvements. Based on projects under construction in FY22, the Park impact fee fund has a negative balance of approximately \$2.5 million, to account for the General Fund loan.

Figure PR3 – Parks/Recreation Projects Over Ten Years

Planned Infrastructure Improvements

<i>Name/Description</i>	<i>Acreage</i>	<i>Estimated Cost</i>	<i>Growth Share</i>	<i>Growth Cost</i>
Future Park Expansion	9.8	\$4,224,000	100%	\$4,224,000
General Fund Loan Repayment		\$2,500,000	100%	\$2,500,000
Total	9.8	\$6,724,000		\$6,724,000

Fire Facilities IIP

ARS § 9-463.05(T)(7)(f) defines the fire facilities eligible for development fee funding.

“Fire and Police facilities, including all appurtenances, equipment and vehicles. Fire and Police facilities do not include a facility or portion of a facility that is used to replace services that were once provided elsewhere in the municipality, vehicles and equipment used to provide administrative services, helicopters or airplanes or a facility that is used for training firefighters or officers from more than one station or substation.”

Fee Calculation Methodology

In the 2022 update, the City of Avondale is using the incremental expansion cost method to derive development impact fees for fire facilities. Fire impact fees in Avondale exclude costs to upgrade, update, improve, expand, correct or replace necessary public services to meet existing needs/usage and stricter safety, efficiency, environmental or regulatory standards. Fire vehicles and equipment used to provide administrative services are also excluded.

Service Area

To hasten response times, public safety responders are typically dispatched from the closest facility, with multiple locations responding as warranted. Avondale has five existing fire stations, with a dispatch system that assigns calls to secondary responders, if needed. Therefore, all developed areas within the City of Avondale are served by an integrated public safety system. Avondale’s service area for fire impact fees includes the area North of the Estrella Mountains, as discussed previously in the section on Land Use Assumptions.

Proportionate Share

ARS § 9-463.05(B)(3) states the development fee shall not exceed a proportionate share of the cost of necessary public services needed to serve new development. In Avondale, fire infrastructure standards, projected needs, and development fees are based on both residential and nonresidential development. As stated in ARS §9.463.05(E)(4), impact fees must be proportionate to various types of land uses.

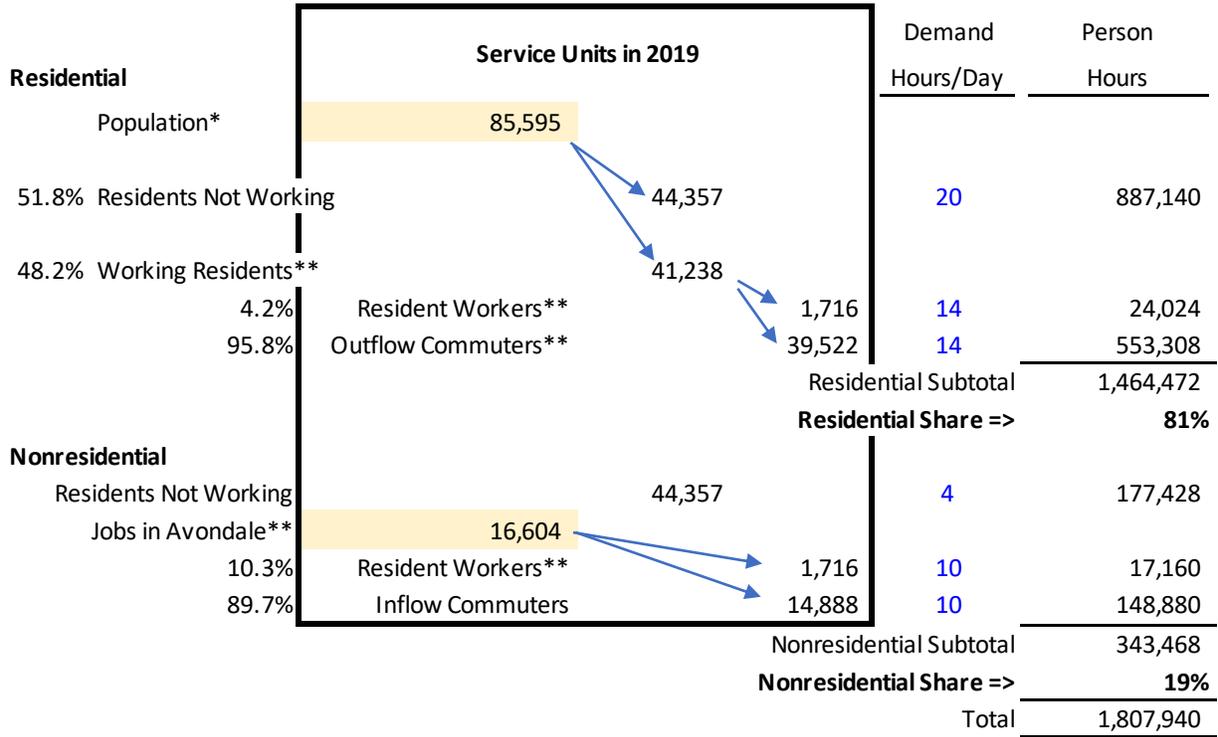
“A table establishing the specific level or quantity of use, consumption, generation or discharge of a service unit for each category of necessary public services or facility expansions and an equivalency or conversion table establishing the ratio of a service unit to various types of land uses, including residential, commercial and industrial.”

Given these requirements, Raftelis recommends using functional population to allocate capital costs of public safety facilities to residential and nonresidential development. In 2019, the U.S. Census Bureau’s commuting data indicates 1,716 persons lived and worked in Avondale, 39,522 outflow commuters went to work outside Avondale and 14,888 inflow commuters travel to jobs within Avondale. Functional population is like the U.S. Census Bureau’s definition of daytime population (based on people living and working in a jurisdiction), with the addition of journey-to-work data and weighting factors (i.e., demand hours per day) to account for time spent at residential and nonresidential locations. Residents who do not work are assigned 20 hours per day to residential development and 4 hours per day to nonresidential development (annualized averages for assumed time spent shopping, dining, obtaining personal services, going to school/church, etc.). Residents who work in Avondale are assigned 14 hours to residential development and 10 hours to nonresidential development. Residents who work outside Avondale are

assigned 14 hours to residential development. Inflow commuters are assigned 10 hours to nonresidential development. Based on 2019 population and job data for Avondale, the cost allocation for residential development is 81%, while nonresidential development accounts for 19% of the demand for infrastructure.

Figure F1 – Functional Population

Avondale AZ



* 2019 Avondale population estimate from Maricopa Association of Governments.

** 2019 Avondale Inflow/Outflow, from OnTheMap web application, U.S. Census Bureau data for all jobs.

Current Use and Available Capacity

In Avondale, fire facilities are fully utilized and there is no surplus capacity for future development. Avondale has determined that fire building space will require expansion to accommodate future development. Figure F2 inventories current fire buildings in Avondale. For residential development, population is used as the best indicator of the demand for service. For nonresidential development, Avondale will use inbound, primary vehicle trips, on an average weekday, as the service units. Figure F2 also indicates the allocation of fire building space to residential and nonresidential development. The percentages for stations 172, 174 and the Emergency Operations Center are based on approximate floor area used by fire and police personnel respectively. Current standards are 0.62 square feet of fire buildings per Avondale resident and 0.11 square feet of fire buildings per inbound, primary vehicle trip on an average weekday, to nonresidential development in Avondale.

Figure F2 – Existing Fire Buildings and Standards

<i>Building Space for Fire Functions</i>	<i>Square Feet</i>
Station 175	17,084
Station 173	16,000
Station 172 (73%)	12,391
Station 174 (60%)	10,951
Station 171	8,600
Fire Headquarters	3,000
Emergency Operations Center (50%)	2,500
Total	70,526

Data Source: Avondale Fire Department and Facilities Director.

<i>Fire Buildings Standards</i>	<i>Residential</i>	<i>Nonresidential</i>
Proportionate Share	81%	19%
Growth Indicator	<i>Population</i>	<i>Average Weekday, Inbound, Primary Vehicle Trips to Nonres Development</i>
2022 Service Units	91,828	122,675
Square Feet per Service Unit	0.62	0.11

Development fees will be used to expand the fleet of fire vehicles and purchase additional equipment that has a useful life of at least three years. Figure F3 lists fire vehicles and equipment currently used by the Avondale Fire Department that has an initial purchase price of at least \$23,500. Avondale currently has 37 fire vehicles, with a total value of approximately \$14.31 million. The weighted average cost factor is \$386,800 per fire vehicle.

Following the same methodology used for fire buildings, the total count of fire vehicles and equipment was allocated to residential and nonresidential development in Avondale. As shown at the bottom of Figure F3, every 1,000 persons will require Avondale to purchase 0.33 additional fire vehicles. Every 1,000 inbound, primary vehicle trips to nonresidential development, on an average weekday, requires 0.06 additional fire vehicles.

Figure F3 – Existing Fire Vehicles and Standards

<i>Fire Vehicle</i>	<i>Units</i>	<i>Unit Cost</i>	<i>Total Value</i>
FIRE TRUCK	12	\$950,000	\$11,400,000
LADDER	1	\$1,846,600	\$1,846,600
SEDAN / SUV	6	\$41,300	\$247,800
SAFETY TRAILER	1	\$101,500	\$101,500
LIGHT TRUCK	9	\$42,000	\$378,000
LARGE VAN	2	\$39,200	\$78,400
MEDIUM PICKUP	3	\$62,500	\$187,500
ATV	3	\$23,500	\$70,500
TOTAL	37		\$14,310,300
		Weighted Average Cost per Vehicle =>	\$386,800

Data Source: Avondale staff.

Fire Vehicle Standards

	<i>Residential</i>	<i>Nonresidential</i>
Proportionate Share	81%	19%
Growth Indicator	<i>Population</i>	<i>Average-Weekday, Inbound, Primary Vehicle Trips to Nonres Development</i>
2022 Service Units	91,828	122,675
Vehicles per thousand Service Units	0.33	0.06

Projected Need for Fire Facilities

To accommodate new development over the next ten years, Avondale will need to add 11,240 square feet of fire buildings, at an estimated cost of approximately \$7.5 million. As shown in Figure F4, the cost factor of \$668 per square foot is based on the recent total project cost of Van Buren fire station.

Also, Avondale Fire Department will need six additional vehicles to accommodate new development over the next ten years. The expected cost of additional fire vehicles is approximately \$2.3 million.

Figure F4 – Fire Facilities Needed to Accommodate Growth

Fire Building Standards and Capital Costs

Buildings - Residential	0.62	Sq Ft per person
Buildings - Nonresidential	0.11	Sq Ft per trip
Building Cost Factor	\$668	per square foot

		Infrastructure Needed		
		<i>Population</i>	<i>Vehicle Trips to Nonresidential Dev</i>	<i>Fire Buildings (sq ft)</i>
<i>Year</i>	<i>Year</i>			
Base	2022	91,828	122,675	70,526
Year 1	2023	93,075	126,287	71,697
Year 2	2024	94,322	130,493	72,932
Year 3	2025	95,569	133,564	74,043
Year 4	2026	96,816	137,176	75,213
Year 5	2027	98,063	140,246	76,324
Year 10	2032	103,820	157,275	81,766
<i>Ten-Yr Increase</i>		11,992	34,599	11,240

Growth Cost of Fire Buildings => **\$7,508,000**

Fire Vehicle Standards and Capital Costs

Vehicles - Residential	0.33	per 1,000 persons
Vehicles - Nonresidential	0.06	per 1,000 vehicle trips
Average Cost	\$386,800	per vehicle

		Infrastructure Needed		
		<i>Population</i>	<i>Vehicle Trips to Nonresidential Dev</i>	<i>Fire Vehicles</i>
<i>Year</i>	<i>Year</i>			
Base	2022	91,828	122,675	37
Year 1	2023	93,075	126,287	38
Year 2	2024	94,322	130,493	38
Year 3	2025	95,569	133,564	39
Year 4	2026	96,816	137,176	39
Year 5	2027	98,063	140,246	40
Year 10	2032	103,820	157,275	43
<i>Ten-Yr Increase</i>		11,992	34,599	6

Growth Cost of Fire Vehicles => **\$2,321,000**

Fire Infrastructure Improvements

Fire impact fees in Avondale are based on the same level of service provided to existing development. Using impact fee funding over the next ten years, Figure F5 indicates that Avondale will construct Alamar station. This public safety building will be used for fire and police functions. The total floor area of the new building will be approximately 27,000 square feet, with approximately 19,000 square feet used by the Fire Department. The planned floor area of Alamar Station is larger than the need for additional square feet to maintain existing standards. Therefore, impact fee revenue will only fund 59% of the expected cost.

Because fire vehicles require large garages, the total project cost per square foot for fire functions is less than the cost factor for police functions. Avondale will also purchase additional fire vehicles, expected to cost approximately \$2.3 million.

Figure F5 – Ten-Year Plan for Fire Facilities

<i>Infrastructure Type</i>	<i>Infrastructure Units</i>	<i>Growth Quantity Over Ten Years</i>	<i>Cost Factor per Unit</i>	<i>IIP Cost (rounded)</i>
Fire Buildings	square feet	11,240	\$668	\$7,508,000
Fire Vehicles (3+ years of useful life)	count	6	\$386,800	\$2,321,000

Planned Infrastructure Improvements

<i>Name/Description</i>	<i>Units</i>	<i>Estimated Cost</i>	<i>Growth Share</i>	<i>Growth Cost</i>
Alamar Fire Station	19,000	\$12,692,000	59%	\$7,508,000
Alamar Station Vehicle	1	\$1,000,000	100%	\$1,000,000
Additional Fire Vehicles			100%	\$1,321,000
Total		\$13,692,000		\$9,829,000

Police Facilities IIP

ARS § 9-463.05(T)(7)(f) defines the police facilities eligible for development fee funding.

“Fire and Police facilities, including all appurtenances, equipment and vehicles. Fire and Police facilities do not include a facility or portion of a facility that is used to replace services that were once provided elsewhere in the municipality, vehicles and equipment used to provide administrative services, helicopters or airplanes or a facility that is used for training firefighters or officers from more than one station or substation.”

Police development fees in Avondale exclude costs to upgrade, update, improve, expand, correct or replace necessary public services to meet existing needs/usage, and stricter safety, efficiency, environmental or regulatory standards. Also excluded from the Avondale development fees are police vehicles and equipment used to provide administrative services.

Service Area

All developed areas within the City of Avondale are served by an integrated public safety system. Avondale’s service area for police development fees includes the area north of the Estrella Mountains.

Proportionate Share

Based on the rationale discussed in the Fire section above, Raftelis recommends using functional population to allocate capital costs of police facilities to residential and nonresidential development. According to 2019 population and job data for Avondale, the cost allocation for residential development is 81%, while nonresidential development accounts for 19% of the demand for infrastructure.

Current Use and Available Capacity

The top of Figure P1 indicates police building space allocated to residential and nonresidential development, along with 2022 service units in Avondale. The percentages for stations 172, 174 and the Emergency Operations Center are based on approximate floor area used by fire and police personnel respectively. The standard in Avondale is 0.62 square feet of police building per resident. For nonresidential development, Avondale’s standard is 0.11 square feet of police building per inbound, primary vehicle trip on an average weekday, to nonresidential development.

Development fees will also be used to expand the fleet of police vehicles that have a useful life of at least three years. The bottom of Figure P1 lists the City’s current police vehicles and infrastructure standards. The current number of police vehicles were allocated to residential and nonresidential development in Avondale. Adding 1,000 residents will require Avondale to purchase 1.26 additional police vehicles. Every 1,000 inbound, primary, average weekday, vehicle trips to nonresidential development will require Avondale to purchase 0.22 additional police vehicles.

Figure P1 – Existing Police Infrastructure Standards

<i>Building Space for Police Functions</i>	<i>Square Feet</i>
Police Headquarters	41,100
Public Safety 174 (40%)	7,301
Public Safety 172 (27%)	4,583
Substation on Western	6,480
Jail	4,640
Brinker Substation	4,224
Emergency Operations Center (50%)	2,500
Total	70,828

Data Source: Avondale Police Department and Facilities Director.

Buildings Standards	<i>Residential</i>	<i>Nonresidential</i>
Proportionate Share	81%	19%
Growth Indicator	<i>Population</i>	<i>Average-Weekday, Inbound, Primary Vehicle Trips to Nonres Dev</i>
2022 Service Units	91,828	122,675
Square Feet per Service Unit	0.62	0.11

<i>Police Vehicles</i>	<i>Units</i>	<i>Unit Cost</i>	<i>Total Value</i>
PATROL UNITS	82	\$70,000	\$5,740,000
NON- PATROL	47	\$38,000	\$1,786,000
MOTORCYCLES	6	\$45,000	\$270,000
TRUCKS	2	\$55,000	\$110,000
VANS	4	\$38,000	\$152,000
ARMORED TRUCKS	2	\$350,000	\$700,000
TOTAL	143		\$8,758,000
		Weighted Average Cost per Vehicle =>	\$61,200

Data Source: Avondale Police Department.

Police Vehicle Standards	<i>Residential</i>	<i>Nonresidential</i>
Proportionate Share	81%	19%
Growth Indicator	<i>Population</i>	<i>Average-Weekday, Inbound, Primary Vehicle Trips to Nonres Development</i>
2022 Service Units	91,828	122,675
Vehicles per thousand Service Units	1.26	0.22

To maintain existing standards over the next ten years, Avondale could justify adding 11,287 square feet of police building space. However, the planned construction of the Alamar public safety building will likely complete the Police Department's need for building space to accommodate buildout of Avondale. Therefore, the 2022 update of police impact fees caps the need for building space at 8,000 square feet.

As shown in Figure P2, the cost factor of \$998 per square foot is based on the expected cost of Police Department's portion of the Alamar public safety building. The cost factor per square foot of building space is higher for police than fire functions due to lack of large garages and the extra cost for security measures.

To maintain the current infrastructure standard over the next ten years, Avondale will need to expand the police fleet by 23 vehicles, at an estimated cost of approximately \$1.41 million. The Avondale Police Department has estimated that a new fully equipped police vehicle costs approximately \$61,200, including information technology, communications, and safety equipment.

Figure P2 – Projected Need for Police Infrastructure

Police Building Standards and Capital Costs

Buildings - Residential	0.62	Sq Ft per person
Buildings - Nonresidential	0.11	Sq Ft per trip
Building Cost Factor	\$998	per square foot

		Infrastructure Needed		
		<i>Population</i>	<i>Vehicle Trips to Nonresidential Dev</i>	<i>Police Buildings (sq ft)</i>
<i>Year</i>	<i>Year</i>			
Base	2022	91,828	122,675	70,828
Year 1	2023	93,075	126,287	72,003
Year 2	2024	94,322	130,493	73,244
Year 3	2025	95,569	133,564	74,359
Year 4	2026	96,816	137,176	75,535
Year 5	2027	98,063	140,246	76,651
Year 10	2032	103,820	157,275	82,115
<i>Ten-Yr Increase</i>		11,992	34,599	11,287

Growth Cost of Police Buildings => \$11,264,000

Police Vehicle Standards and Capital Costs

Vehicles - Residential	1.26	per 1,000 persons
Vehicles - Nonresidential	0.22	per 1,000 vehicle trips
Average Cost	\$61,200	per vehicle

		Infrastructure Needed		
		<i>Population</i>	<i>Vehicle Trips to Nonresidential Dev</i>	<i>Police Vehicles</i>
<i>Year</i>	<i>Year</i>			
Base	2022	91,828	122,675	143
Year 1	2023	93,075	126,287	145
Year 2	2024	94,322	130,493	148
Year 3	2025	95,569	133,564	150
Year 4	2026	96,816	137,176	153
Year 5	2027	98,063	140,246	155
Year 10	2032	103,820	157,275	166
<i>Ten-Yr Increase</i>		11,992	34,599	23

Growth Cost of Police Vehicles => \$1,408,000

Police Infrastructure Improvements

Police impact fees in Avondale are based on the incremental expansion cost of police vehicles (i.e., maintenance of current standards) and the plan-based need for police buildings. Using impact fee funding over the next ten years, Figure P3 indicates that Avondale will expand police buildings by 8,000 square feet, which is based on the planned floor area of the combined Alamar public safety building (i.e., 27,000 total square feet) less the Fire Department’s space (i.e., 19,000 square feet). Avondale will also purchase an additional 23 police vehicles over the next ten years, expected to cost approximately \$1.4 million.

Figure P3 – Ten-Year Plan for Police Facilities

<i>Infrastructure Type</i>	<i>Infrastructure Units</i>	<i>Growth Quantity Over Ten Years</i>	<i>Cost Factor per Unit</i>	<i>IIP Cost (rounded)</i>
Police Buildings	square feet	8,000	\$998	\$7,984,000
Police Vehicles (3+ years of useful life)	count	23	\$61,200	\$1,408,000

Planned Infrastructure Improvements

<i>Name/Description</i>	<i>Units</i>	<i>Estimated Cost</i>	<i>Growth Share</i>	<i>Growth Cost</i>
Alamar Police Substation	8,000	\$7,984,000	100%	\$7,984,000
Police Vehicles & Equipment			100%	\$1,408,000
Total	8,000	\$7,984,000		\$9,392,000

Street Facilities IIP

ARS § 9-463.05(T)(7)(e) defines the facilities and assets that can be included in the Street Facilities IIP.

“Street facilities located in the service area, including arterial or collector streets or roads that have been designated on an officially adopted plan of the municipality, traffic signals and rights-of-way and improvements thereon.”

Avondale’s IIP is based on improvements to arterial streets needed to accommodate additional vehicular travel, plus the cost of preparing the LUA/IIP/DIF study required by the State of Arizona. The streets impact fee is derived from trip generation rates, trip rate adjustment factors, average trip length weighting factors, and lane capacity. Each component is described below.

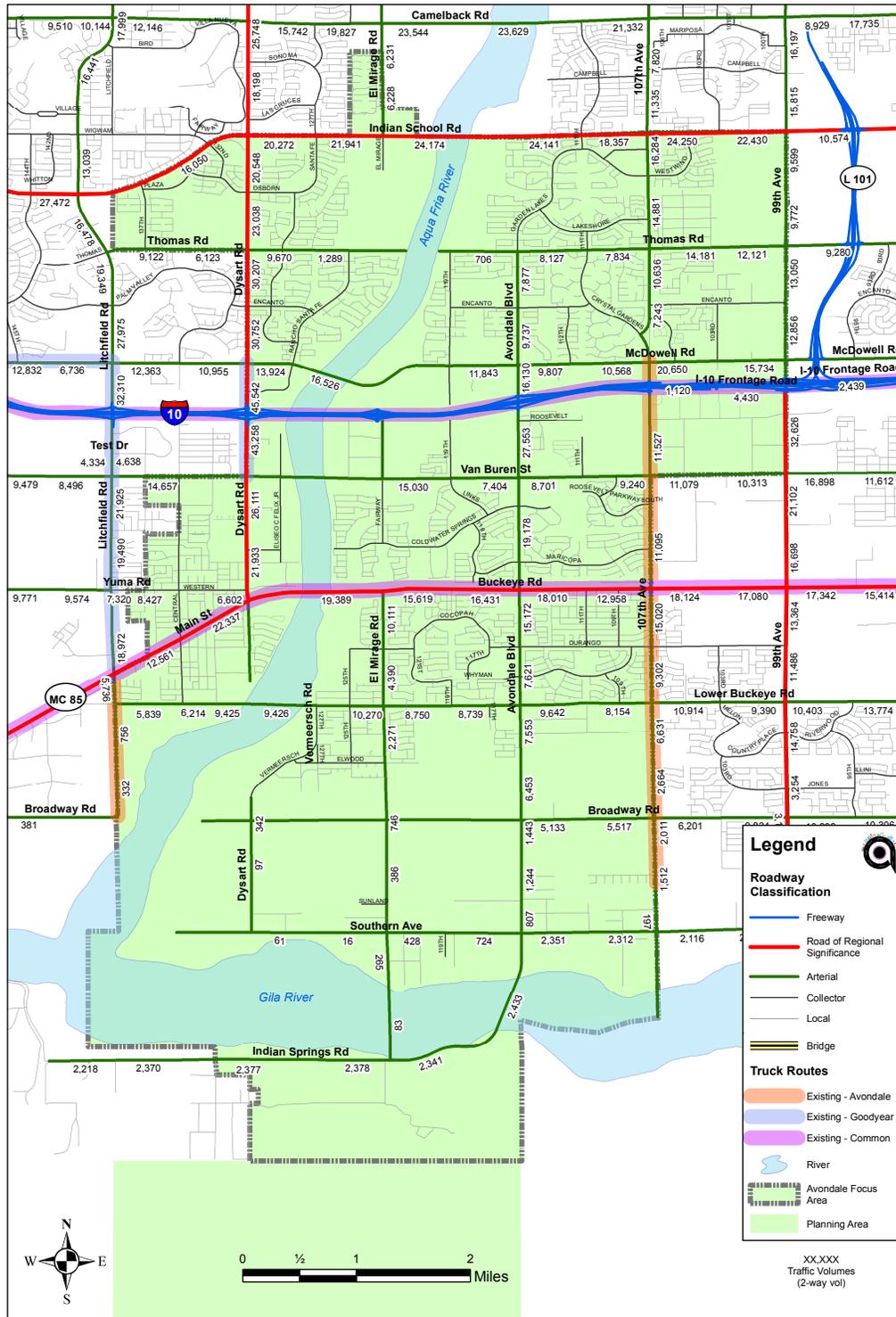
Development fees in Avondale exclude costs to upgrade, update, improve, expand, correct or replace necessary public services to meet existing needs/usage and stricter safety, efficiency, environmental or regulatory standards. The service area for streets development fees includes the area north of the Estrella Mountains.

Existing Infrastructure

Lane miles of arterials in Avondale are mapped in Figure S1. A lane mile is a rectangular area that is one travel lane wide and a mile long. According to staff, Avondale currently has 295 arterial lane miles on streets with four or more travel lanes. All local and collector streets are project-level improvements excluded from the impact fee calculations. The City will continue to require project level improvements, such as turn lanes and signals for ingress/egress, during the development review and approval process.

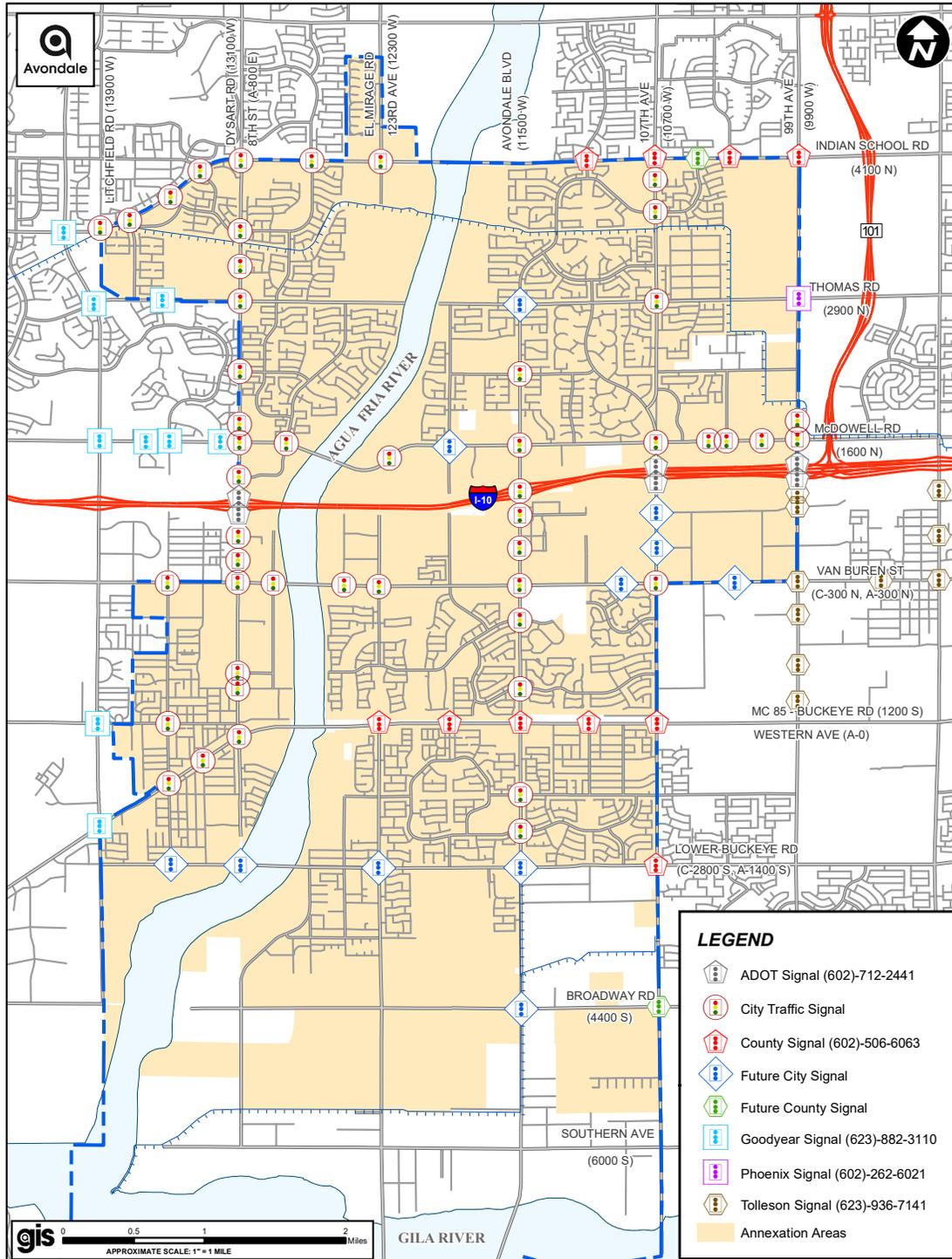
Figure S1 - Arterials in Avondale

City of Avondale
Existing Roadway Classifications & Truck Routes
Existing Traffic Volumes (MAG Model Volumes)



In addition to arterial lanes miles, transportation system improvements include City traffic signals and turn lanes at the intersection of an arterial with another arterial. As shown in Figure S2, there are currently 14 improved intersections (see City traffic signals in legend below) that meet the locational criteria for system improvements.

Figure S2 - Traffic Signals in Avondale



Forecast of Service Units

Avondale will use average weekday Vehicle Miles of Travel (VMT) as the service units for allocating the cost of future improvements. Raftelis created an aggregate travel model to convert development units within Avondale to vehicle trips and vehicle miles of travel. The top portion of Figure S3 summarizes the input variables for the travel model. Trip generation rates, expressed as average weekday Vehicle Trip Ends (VTE), are from the Institute of Transportation Engineers (ITE 2022). HU is an abbreviation for housing unit. KSF is an abbreviation for square feet of nonresidential floor area, expressed in thousands. Each input variable is described further below.

A typical vehicle trip, such as a person leaving their home and traveling to work, generally begins on a local street that connects to a collector street, which connects to an arterial and eventually to a state or interstate highway. This progression of travel up and down the functional classification chain limits the average trip length determination, for the purpose of development fees, to the following question, “What is the average vehicle trip length on system improvements (i.e., facilities funded by development fees)?”

As shown near the bottom of Figure S3, development in Avondale currently attracts 294,732 average weekday vehicle trips. According to the land use assumptions (shaded gold), new development over the next ten years is expected to account for 16% of total vehicle trips in 2032. In contrast, Avondale is only planning to expand arterial lane miles by three lane miles, which represents a conservative 1% expansion of arterial lane miles (i.e., [298/295]-1 rounded).

Figure S3 – Travel Demand Model

<i>Input Variables by Development Type</i>	<i>ITE Code</i>	<i>Weekday VTE</i>	<i>Development Unit</i>	<i>Trip Rate Adjustment</i>	<i>Trip Length Wtg Factor</i>			
Residential	210	9.43	HU	61%	1.14			
Industrial	150	1.71	KSF	50%	0.90			
Commercial	820	37.01	KSF	33%	0.75			
Office/Services	710	10.84	KSF	50%	0.90			
Average Trip Length (miles)	0.27		<= travel on system improvements to be constructed over the next ten years					
Vehicles per Lane per Day	4,600		<= existing traffic volume per lane on Avondale Blvd south of I-10					
Year->	Base	1	2	3	4	5	10	10-Year Increase
Avondale LUA	2022	2023	2024	2025	2026	2027	2032	
Residential Housing Units	29,911	30,318	30,724	31,130	31,536	31,942	33,818	3,907
Industrial KSF	2,900	3,000	3,000	3,100	3,200	3,300	3,700	800
Commercial KSF	7,800	8,000	8,300	8,500	8,700	8,900	10,000	2,200
Office/Services KSF	4,600	4,800	4,900	5,000	5,200	5,300	5,900	1,300
<i>Residential Trips</i>	172,057	174,398	176,734	179,069	181,405	183,740	194,531	
<i>Industrial Trips</i>	2,480	2,565	2,565	2,651	2,736	2,822	3,164	
<i>Commercial Trips</i>	95,264	97,706	101,370	103,813	106,256	108,698	122,133	
<i>Office/Services Trips</i>	24,932	26,016	26,558	27,100	28,184	28,726	31,978	
Total Inbound Vehicle Trips	294,732	300,686	307,227	312,633	318,580	323,986	351,806	57,073
<i>Vehicle Miles of Travel (VMT)</i>	78,911	80,411	82,003	83,369	84,867	86,233	93,148	14,237
Arterial-Arterial City Traffic Signals	14	14	15	15	15	15	17	3
Improved Intersections per 10,000 VMT	1.77	1.77	1.77	1.77	1.77	1.77	1.77	
Planned Arterial Lane Miles								3.0

Growth Share of 2032 Vehicle Trips =>	16%
Growth Cost per Lane Mile =>	\$2,500,000
Growth Cost of System Improvements Over Ten Years =>	\$7,500,000

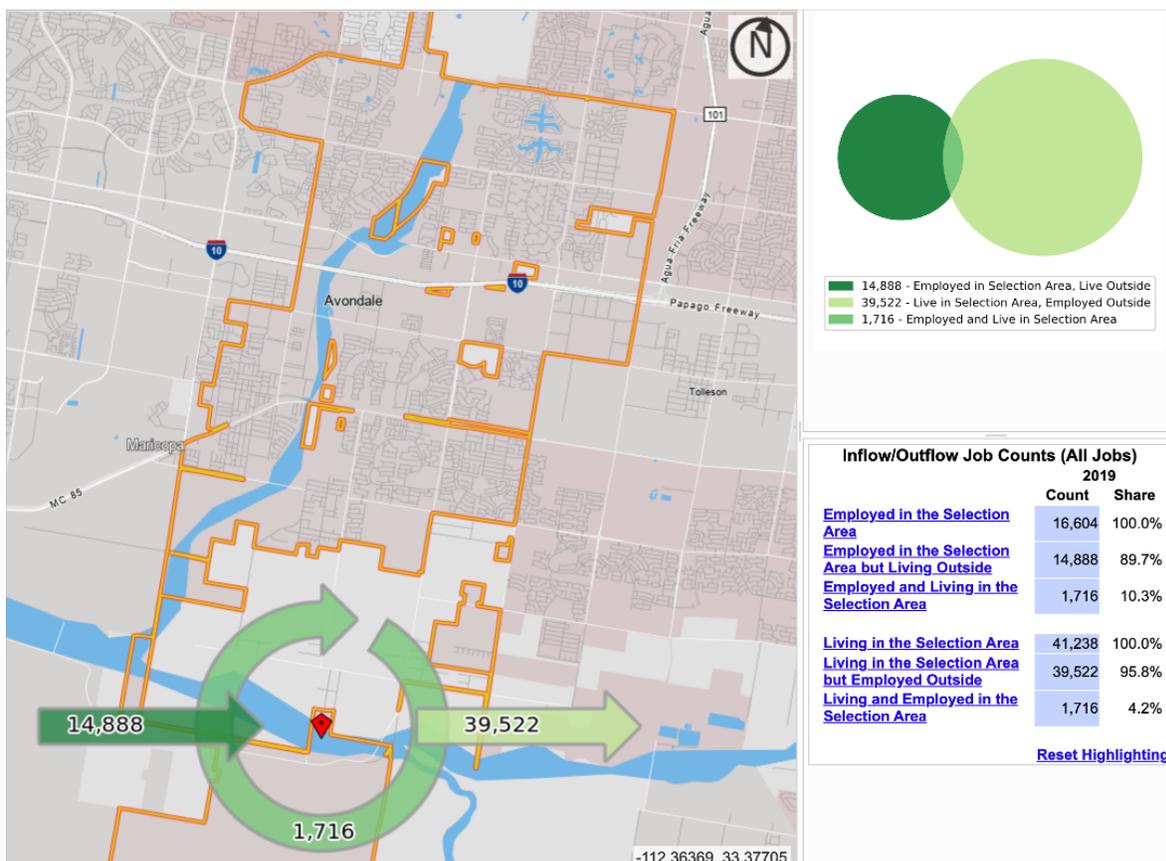
Trip Generation Rates

Avondale development fees for streets are derived using average weekday VTE. Trip generation rates are published by the Institute of Transportation Engineers (ITE 2022). A VTE represents a vehicle either entering or exiting a development (as if a traffic counter were placed across a driveway). To calculate street impact fees, trip generation rates require an adjustment factor to avoid double counting each trip at both the origin and destination points. Therefore, the basic trip adjustment factor is 50%. As discussed further below, the fee methodology includes additional adjustments to make the fees proportionate to the infrastructure demand for a particular type of development.

Adjustments for Commuting Patterns and Pass-By Trips

Residential development has a larger trip adjustment factor of 61% to account for commuters leaving Avondale for work. In other words, residential development is assigned all inbound trips plus 11% of outbound trips to account for job locations outside of Avondale. According to the National Household Travel Survey weekday work trips are typically 22.8% of production trips (i.e., all out-bound trips). As shown in Figure S4, the Census Bureau’s website (<https://onthemap.ces.census.gov/>) indicates that approximately 95.8% of resident workers traveled outside Avondale for work in 2019. In combination, these factors (0.50 x 0.228 x 0.958 = 0.11 rounded) support the additional 11% allocation of trips to residential development.

Figure S4 – Inflow/Outflow Analysis



For commercial development, the trip adjustment factor is less than 50% because retail development attracts vehicles as they pass by on arterial roads. For example, when someone stops at a convenience store on the way home from work, the convenience store is not the primary destination. For an average shopping center, ITE data indicate 34% of the vehicles that enter are passing by on their way to some other primary destination. The remaining 66% of attraction trips have the shopping center as their primary destination. Because attraction trips are half of all trips, the trip adjustment factor for an average size shopping center is 66% multiplied by 50%, or approximately 33% of the trip ends.

Trip Length Weighting Factor by Type of Land Use

The transportation impact fee methodology includes a percentage adjustment, or weighting factor, to account for trip length variation by type of land use. As shown in Figure S5, vehicle trips from residential development are approximately 114% of the average trip length. The residential trip length adjustment factor includes trips to work, social and recreational purposes, and home. Conversely, shopping trips associated with commercial development are roughly 75% of the average trip length, while other nonresidential development typically accounts for trips that are 90% of the average for all trips.

Figure S5 – Average Trip Length Weighting Factors

Trip purpose summary	Travel Day Vehicle Trip Length		Percent of Trips	Average Trip Length	Weighting Factor
	Trips	Mean Miles			
Home	205,743	9.93	Residential		
Work	92,392	11.98	Residential		
Social/Recreational	52,877	12.60	Residential		
Subtotal	351,012		Subtotal	57%	10.87
Shopping/Errands	134,048	7.08	Commercial		
Meals	43,347	7.49	Commercial		
Subtotal	177,395		Subtotal	29%	7.18
School/Daycare/Religious activity	16,288	9.11	Other		
Medical/Dental services	11,568	10.14	Other		
Transport someone	44,991	7.25	Other		
Something else	10,045	11.95	Other		
Subtotal	82,892		Subtotal	14%	8.59
All	611,299	9.55			

Source: Federal Highway Administration, 2017 National Household Travel Survey
 Tabulation created on the NHTS website at <http://nhts.oml.gov>

Lane Capacity

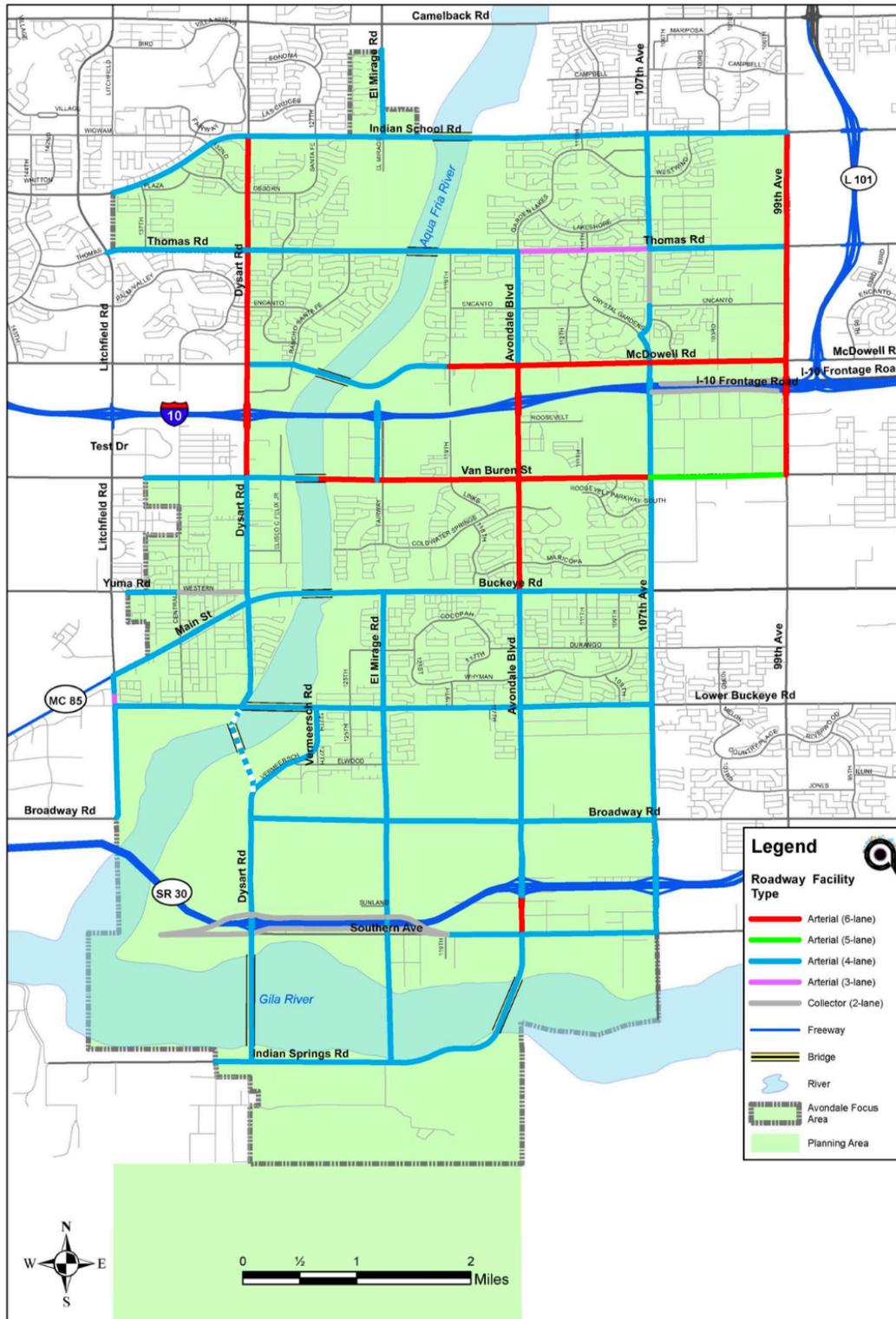
As shown in Figure S1 above, existing traffic volumes vary significantly on arterials in Avondale. For the 2022 impact fee update, the existing volume on Avondale Blvd south of I-10 (i.e., 27,553 ADT) was divided by six travel lanes to yield an average of 4,600 vehicles per lane per day (rounded).

Infrastructure Improvements Plan for Streets

The latest adopted transportation plan for Avondale is shown in Figure S6. Comparing the existing transportation network to the planned system reveals the arterial street grid is substantially complete.

Figure S6 – Avondale Transportation Plan

Figure ES-1 Recommended Street Plan



Note: Dashed Lines Indicate alternative roadway alignments subject to future studies.



Avondale staff provided the list of improvements and planning-level cost estimates in Figure S7. The ten-year plan for street improvements will benefit citywide development because vehicles flow from larger travel sheds to congested areas where improvements are planned to eliminate bottlenecks. In the area north of I-10, Avondale will improve one arterial-arterial intersection. In the area south of I-10, Avondale will improve two intersections. To accommodate new development, Avondale will add three lane miles of arterial capacity over the next ten years. The total ten-year growth cost of system improvements is approximately \$14.39 million.

Figure S7 – Ten-Year Plan for Street Improvements

<i>Transportation System Improvements</i>			
	<i>Arterial Lane Miles</i>	<i>Cost per Lane Mile</i>	<i>IIP Costs</i>
	3.0	\$2,500,000	\$7,500,000
<i>Improved Intersections</i>			
	<i>Avg Cost per Intersection</i>		
	3	\$2,295,000	\$6,885,000
<i>Planned Infrastructure Improvements</i>			
<i>Location/Description</i>	<i>Estimated Cost</i>	<i>Growth Share</i>	<i>Growth Cost</i>
Intersection Improvements @ Thomas & Avondale Blvd	\$800,000	100%	\$800,000
Intersection Improvements @ Lower Buckeye & Avondale Blvd	\$4,949,000	100%	\$4,949,000
Intersection Improvements @ Lower Buckeye & El Mirage	\$1,136,000	100%	\$1,136,000
Future Arterial Capacity Expansion	\$7,500,000	100%	\$7,500,000
Total	\$14,385,000		\$14,385,000

Water Utility Fees

ARS §9-463.05.T.7(a) defines the facilities and assets which can be included in the Water Facilities IIP:

“Water facilities, including the supply, transportation, treatment, purification and distribution of water, and any appurtenances for those facilities”

The City provides potable water with water supply consisting of a combination of ground water sources. The entire water system infrastructure includes water resources, wells, transmission, distribution, storage, administrative facilities, vehicles, and equipment including meters.

The calculation of the water facilities DIF was based on information provided by staff in addition to the City’s 2018 Integrated Utility Master Plan Report (IUMP). The findings presented in this section are based on a 10-year forecast, 2023 to 2032.

Fee Calculation Methodology

For this 2022 update, Raftelis used the plan-based approach. This approach is based on a forward-looking infrastructure improvements plan which considers the future projects needed to meet the future demands of the utility. The water development impact fee was calculated using the growth-share component of costs and the incremental capacity added from those facilities. Assumptions on included in the development of this fee were provided by Staff and the IUMP.

Service Area

The City’s water system serves the land areas north of the Estella Mountains, excluding a small area in the northwest corner of the City limits. This area is served by a private water utility. The following provides an analysis of the resource and facility costs included in the IIP and DIF calculations.

Proportionate Share

ARS §9-463.05 (B)(3) states that the development fee shall not exceed a proportionate share of the cost of necessary public services needed to provide necessary public services to the development. Page 2-8, Table 2-4 from the 2018 Integrated Utility Master Plan (IUMP) shows in 2016, the City had a total of 24,561 water meters (accounts). Of these accounts, 88% of the City’s water meters were classified as residential and made up 57% of the City’s annual average water use. The City’s landscape meters made up 2% of the total number of water meters but accounted for 23% of the City’s average annual water use. The remaining water meters and annual usage is spread across several other account types.

For the purposes of this impact fee analysis, the fees are calculated on a dwelling unit basis which is defined as a residential has a demand of 450 gallons per day. The dwelling unit demand for a ¾” meter is the total residential and nonresidential demand divided by the total residential dwelling units. Page 2-10 in the 2018 IUMP indicates the City had 27,913 dwelling units in 2016.

Figure W1 shows the distribution of residential and nonresidential account types. Please note that these are aggregated in Figure W1 (e.g. residential rural and residential urban are classified under the category of residential below). The totals shown in the *Service Units and Demand by Land Use* are projected values and vary slightly from the values in Figure W1.

Figure W1 – 2016 Distribution of the Number of Meters and Demand by Land Use Type

Account Type	Number of Meters	Percent of Total	2016 Consumption <i>mg</i>	Percent of Total
Residential	21,582	87.9%	6,444,937	56.9%
Multi-Family/Apartment/Hotel	140	0.6%	609,252	5.4%
Commercial	534	2.2%	1,180,512	10.4%
Schools	59	0.2%	182,868	1.6%
Churches	42	0.2%	12,296	0.1%
Industrial	3	0.0%	9,184	0.1%
Laundromat	3	0.0%	12,556	0.1%
Mobile Home Park	19	0.1%	155,074	1.4%
Hydrant Meter	1	0.0%	7,822	0.1%
Car Wash	9	0.0%	64,088	0.6%
Sewer Only	1	0.0%	663	0.0%
Landscape Meter	554	2.3%	2,550,748	22.5%
Unclassified	1,614	6.6%	88,819	0.8%
Total	24,561	100.0%	11,318,819	100.0%

[1] 2018 IUMP, Page 2-9, Table 2.4

Existing Facilities

ARS §9-463.05 (E)(1) requires:

“A description of the existing necessary public services in the service area and the costs to upgrade, update, improve, expand, correct or replace those necessary public services to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards, which shall be prepared by qualified professionals licensed in this state, as applicable.”

ARS §9-463.05 (E)(2) requires:

“An analysis of the total capacity, the level of current usage and commitments for usage of capacity of the existing necessary public services, which shall be prepared by qualified professionals licensed in this state, as applicable.”

The City’s integrated water system consists of major facilities to collect, treat, and distribute water to customers. Major backbone water system facilities include:

- Water production wells
- Booster pump stations
- Storage tanks
- Transmission and distribution lines

Water Production Wells (Water Sources)

Water production wells should have sufficient capacity to meet maximum day demands. In 2018, maximum day demands were be supplied by operating wells more than 18 hours per day. Figure W2

shows that the firm water supply is 17.7 mgd which is 3.2 mgd less than the 2018 maximum daily demand of 20.9 mgd.¹.

Figure W2 – 2018 Existing Wells and Production Capacities

<i>Well Water Delivery System</i>	<i>Well Supply Name</i>	<i>Production Capacity mgd</i>	<i>Firm Capacity mgd</i>
Distribution System	Wells #23	1.2	1.2
Coldwater	Wells 15, 16, 25	5.3	5.3
Garden Lakes	Well 17	1.7	1.7
Gateway	Wells 8A, 24	4.0	4.0
Northside	Wells 6, 7, 20	6.3	6.3
Rancho Santa Fe	Wells 10, 11, 12, 18 and 19	12.2	12.2
Total, gpm		30.6	30.6
Resilient Supply, mgd (18 hours/day)			23.0
Firm Supply [2]			17.7
Maximum Day Demand (2018)			20.9
Surplus/(Deficiency), mgd			(3.2)

[1] A composite of tables from the 2018 IUMP, Page 4-25, Table 4.15; Page 4-7, Table 4.6

[2] If Well #16 is out, Well #15 and Well #25 will also be out of service due to blending requirements . The firm supply represents the supply with all of the Coldwater wells out of service.

Booster Pump Stations

The City has five booster pump stations and one well that pumps directly into the distribution system as shown in Figure W3. Firm pumping capacity is the design flowrate with the largest pump out of service.

Figure W3 – Existing Booster Pump Stations and Capacities

<i>Facility</i>	<i>Number of Pumps</i>	<i>Total Pumping Capacity (gpm)</i>	<i>Firm Pumping Capacity (gpm)</i>
Well 23	1	800	800
Rancho Santa Fe	4	8,400	6,200
Coldwater Springs	4	16,000	12,000
Northside	4	7,200	5,400
Gateway	4	8,000	6,000
Del Rio	3	10,000	6,000
Garden Lakes	4	6,500	4,500
Total	24	56,900	40,900
Total, mgd		82.00	59.00

[1] 2018 IUMP, Page 4.9, Table 4.7

¹ This paragraph is summarized from 2018 IUMP text on Page 4-24. The IUMP text references a firm capacity 18.6 mgd and a deficiency of 2.3 mgd. However, Table 4.15 referenced in the text indicates a firm supply of 17.7 mgd and a deficiency of 3.2 mgd.

Storage

While water production facilities are typically designed to operate at a steady rate over an extended period of time, storage reservoirs are planned to accommodate fluctuating demands. The City’s water system has five active reservoir sites and one inactive reservoir site (Del Rio). The total capacity of the storage facilities including Del Rio is 15.5 mg.

The City’s water system operates within three pressure zones. According to the 2018 IUMP, capacity additions will be required during the study period. However, many of the facilities have available capacity to serve near term growth. The current well production capacities are the limiting factor in meeting near and long-term growth in water demands.

Figure W4 – Existing Storage

<i>Facility</i>	<i>Number of Tanks</i>	<i>Total Volume</i>	<i>Available Volume</i>
		<i>mg</i>	<i>mg</i>
Northside	2	1.2	1.1
Gateway	1	1.0	0.8
Garden Lakes	1	2.0	1.3
Rancho Santa Fe	2	2.8	2.1
Coldwater	2	5.0	3.2
Del Rio (inactive)	1	3.5	0.0
Total	9	15.5	8.5

[1] 2018 IUMP Page 4-10, Table 4.8

Distribution System

The City maintains 320 miles of transmission and distribution lines as well as 8 pressure reducing valves (PRVs). Figure W5 shows the length of mains by pipe diameter.

Figure W5 – Existing Transmission and Distribution Lines

<i>Diameter</i>	<i>Length</i>
<i>inches</i>	<i>miles</i>
6	48.2
8	170.5
10	3.3
12	57.7
16	31.5
18	0.1
20	5.1
24	2.7
30	0.1
36	1.3
48	0.1
Total	320.60

[1] 2018 IUMP Page 4-11, Table 4.10

The 2018 IUMP provides a detailed analysis of the available system capacities based on facilities and pressure zones. The 2018 IUMP also indicates the need for additional facilities over the 10-year study to accommodate new growth. New wells with a capacity of 6.92 mgd will be required over the study period to meet these demands. In addition, new transmission and distribution mains, and upsizing of existing mains will be required.

The existing water production wells, storage, pump stations, and transmission and distribution mains have an estimated value of \$734 million. Accounting for accumulated depreciation reduces this value to approximately \$410 million. In other words, the water system’s assets are about 55% depreciated in aggregate based on accounting life. This is based on the City’s most recent asset records and estimating a replacement cost of facilities using the Engineering News Record Construction Cost Index (ENR-CCI).

Expansion Facility Costs

ARS §9-463.05 (E)(3) requires:

“A description of all or the parts of the necessary public services or facility expansions and their costs necessitated by and attributable to development in the service area based on the approved land use assumptions, including a forecast of the costs of infrastructure, improvements, real property, financing, engineering and architectural services, which shall be prepared by qualified professionals licensed in this state, as applicable.”

New infrastructure-related facilities to serve growth over the study period include water production wells, transmission and distribution mains, booster pump stations, and reservoirs. The new wells will approximately 6.92 mgd of capacity. For the purposes of DIF calculations, the added well capacity represents the total increase in capacity to the system. In other words, the unit cost of expansion facilities (wells, reservoirs, pump stations, etc.) will be based on the added well capacity. The total cost of infrastructure facilities is approximately \$25.9 million. The City is also acquiring new water resources to meet the increase in demand due to growth. New water resources total 6,882 acre-feet at a cost of approximately \$10.0 million. Figure W6 details the proposed facilities needed for growth and their anticipated costs. The project listing and costs were provided by City Staff.

Figure W6 – Expansion Facility Project Costs

Description	Total Cost	Capacity Added (mgd)	Percent Growth-Related	Growth-Related Costs
Growth-Related Infrastructure Projects				
Well #33 The BLVD Well & Transmission	\$2,880,000	1.73	100.0%	\$2,880,000
Well at 107th & Encanto - SRP Shared Well Cost in Design	455,000	1.73	100.0%	455,000
McDowell Rd 16-inch Waterline - Avondale to 99th Ave	2,650,000		25%	662,500
99th Ave Waterline - Thomas to Encanto	956,000		100%	956,000
Garden Lakes Site - 2nd Reservoir & Booster Improvements	8,358,000		100.0%	8,358,000
Future Well	2,700,000	1.73	100.0%	2,700,000
Nitrate Removal System for Coldwater Booster Station	5,545,000		100.0%	5,545,000
16-inch WL Dysart Road – Illini to Roeser	1,000,000		52.0%	520,000
16-inch WL El Mirage, Elwood to Lower Buckeye	900,000		25.0%	225,000
16-inch WL 107th – Jones to Superior	500,000		25.0%	125,000
16-inch WL 107th Ave, Superior to Lower Buckeye	700,000		25.0%	175,000
Dysart Rd. Waterline - Roeser Alignment to Southern	1,000,000		63.0%	630,000
Northside Booster Well Site - Land Purchase & DCR	75,000	1.73	100.0%	75,000
NAWS Project (Impact Fee Portion, P&I) [1]	3,682,500		100.0%	3,682,500
Total Growth-Related Projects/Expansion Capacity Share	\$31,401,500			\$26,989,000
Less: FY21 Ending Fund Balance	(\$1,134,326)			(\$1,134,326)
Net Growth-Related Projects/Expansion Capacity Share	\$30,267,174	6.92		\$25,854,674
Growth-Related Resource Projects				
		Acre-Feet		
New River-Agua Fria River Underground Storage Project (NAUSP)	\$7,200,000	6,000	100.0%	7,200,000
White Mountain Apache Tribe Water Settlement	2,800,000	882	100.0%	2,800,000
Total Growth-Related Water Resource Costs	\$10,000,000	6,882.00		\$10,000,000
Total Expansion Costs				\$35,854,674

[1] Total P&I of project reimbursed from impact fees portion of \$4,419,000 multiplied by remaining 5 mgd of the 6 mgd capacity

[2] From 2018 Utility Master Plan, page 2-10. Represents metered demand from all 3/4" meters regardless of customer class.

[3] From 2018 Utility Master Plan, page 2-13.

Service Units and Demand by Land Use

ARS §9-463.05 (E)(4) requires:

“A table establishing the specific level or quantity of use, consumption, generation or discharge of a service unit for each category of necessary public services or facility expansions and an equivalency or conversion table establishing the ratio of a service unit to various types of land uses, including residential, commercial and industrial.”

The development of a dwelling unit service demand incorporates historical water production data and peak day demand data. A dwelling unit represents the smallest service capacity in the system. For the purposes of this DIF, a dwelling unit demand is equivalent to the average day and maximum day demand for the City’s 3/4” meters.²

Water production from 2012 through 2016 averaged 12.0 mgd and maximum day demands averaged 17.2 mgd. The 5-year peaking factor averaged 1.4. The 2018 IUMP recommends a peaking factor of 1.65 for planning purposes³.

Figure W7 – Historical Average Day and Maximum Day Demands

Year	(a) Average Day Demand mgd	(b) Maximum Day Demand mgd	(c)=(b)/(a) Maximum Day Peak Factor
2012	12.60	17.20	1.37
2013	12.20	17.10	1.40
2014	11.60	16.80	1.45
2015	12.10	16.20	1.34
2016	12.60	18.30	1.45
Average	12.22	17.12	1.40

[1] 2018 IUMP, Page 2-14, Table 2.9

Billed water consumption is based on data from the billing and water production records. The 2018 IUMP uses 2016 data as the baseline for developing their future demand projections.

Residential water DIFs are based on average day gallons per connection and assessed on a per dwelling unit basis. As shown on Figure W3, water production in 2016 was 12.6 MGD with 27,913 connections. This gives an existing allocated water demand of 450 gallons per day for a residential connection served by a 3/4” meter. From the 2018 IUMP, Page 2-3:

“The City’s TAZ data was used to estimate the number of dwelling units for each of the 2018 IUMP planning years. ...The 450 gpd/DU value is based on the number of dwelling units, which is calculated using the residential land use categories, and the total annual average production. However, because it is a composite unit water demand it includes both the residential and non-residential component of water use (including non-revenue water).”

² Dwelling unit and 3/4” equivalent unit or 3/4” meter are used synonymously throughout the water and wastewater section.

³ 2018 IUMP, Page 2-13

Figure W8 – Water Demand Unit

<i>Description</i>	<i>Values</i>
Total 2016 Water Demand , mgd [1]	12,600,000
Total 2016 Dwelling Units	27,913
Average Day Demand per Dwelling Unit, gpd	450
Maximum Day Peaking Factor	1.65
Maximum Day Demand per Dwelling Unit, gpd [2]	743

[1] 2018 IUMP, Page 2-10

[2] Rounded to nearest whole number

For residential and nonresidential connections, the water development fees are assessed by meter size. Development fees for meters greater than ¾” are multiplied by their corresponding meter capacity ratio. The meter capacity ratio represents the maximum safe allowable flow in gallons per minute for a given meter size as shown in Figure W9.

Figure W9 – Average and Maximum Day Demand by Water Meter Size

<i>Meter Size</i>	<i>Meter Capacity Ratio [1]</i>	<i>Average Day Demand</i>	<i>Maximum Day Demand</i>
<i>inches</i>		<i>gpd</i>	<i>gpd</i>
0.75	1.00	450	743
1.00	1.67	750	1,238
1.50	3.33	1,500	2,475
2.00	5.33	2,400	3,960
3.00	10.67	4,800	7,920
4.00	16.67	7,500	12,375
6.00	33.33	15,000	24,750

[1] American Water Works Association M1 Manual, Principles of Water Rates, Fees, and Charges. 7th Ed.

Projected Service Units

ARS §9-463.05 (E)(5) requires:

“The total number of projected service units necessitated by and attributable to new development in the service area based on the approved land use assumptions and calculated pursuant to generally accepted engineering and planning criteria.”

ARS §9-463.05 (E)(6) requires:

“The projected demand for necessary public services or facility expansions required by new service units for a period not to exceed ten years.”

It is projected that there will be an additional 3,907 dwelling units added within the City by 2032. Using the maximum day water demand per DU of 743 gpd, the projected residential peak demand will increase 2.9 mgd (743 x 3,907 = 2,902,901 gpd). It is estimated that the 6.92 mgd added capacity will serve approximately 9,314 DU (6,900,000 gpd / 743 gpd per DU = 9,314 DU).

Figure W10 shows the development of the current demand projection, projected demands and the total DU added during the study period. It also shows the DU that will be served by existing available capacity

and the capacity added by the IIP. The current system operates above the firm capacity of 17.7 mgd so there is no existing available capacity to serve growth.

Figure W10 – Projected Added Dwelling Units and Water Demand Forecast

Line No	Description	Units
Current Dwelling Units and Demand		
1	Current 2022 DU	29,911
2	Demand per EDU, gpd	450
3	Current Ave Day Demand, gpd	13,459,950
4	Maximum Day Peak Factor	1.41
5	Avg Day of Maximum Month, gpd (Line 3 x Line 4)	18,960,633
6	Current Firm Capacity, gpd	17,700,000
7	Existing Capacity Available for Growth, gpd (Line 6 - Line 5)	0
Added Capacity		
8	Added DU, 2022 - 2032	3,907
9	Average Day Demand	450
10	Planning Maximum Day Factor	1.65
11	Maximum Day Demand per DU, gpd	743
12	Added System Maximum Day Demand, gpd (Line 8 x Line 11)	2,902,901
13	Additional Capacity Needed for Growth (Line 12 - Line 7)	2,902,901
14	DU Served by Existing Available Capacity (Line 7 / Line 11)	0
15	DU Served by 10-Year IIP (Line 13 / Line 11)	3,907
16	Total Added DU	3,907
<hr style="border-top: 1px dashed black;"/>		
17	DU Served by Full 6.92 mgd Capacity Addition	9,314

Facility Improvements

The City has plans to expand the existing supply system by 6.92 mgd through the addition of wells and distribution projects meet the future demands on the service area. The City is also securing additional 6,882 acre-feet water resources to meet future demands. This includes additional storage/recharge capacity at the New River-Agua Fria River Underground Storage Project (NAUSP) operated by Salt River Project (SRP) from the City of Chandler. This provides Avondale additional recharge capability and will alleviate the need for a water surface treatment plant. The cost of water infrastructure projects totals approximately \$27.0 million. This value is reduced by the FY 21 outstanding fund balance of \$1.1 million resulting in a net cost of \$25.9 million. The cost of the water infrastructure and water resources growth-related projects is \$35.85 million.

As discussed previously, the maximum day demand per DU is 743 gpd. The \$3.74 unit cost of capacity is multiplied by 743 gpd which totals \$2,776 for the infrastructure portion of the fee. The water resource fee is equal to the annual DU demand of 164,300 gallons multiplied by \$4.46 per gallon for a total of \$732. The total water DIF is \$3,519 which also includes the cost of the study of \$11.

Wastewater Utility Fees

ARS §9-463.05.T.7(b) defines the facilities and assets which can be included in the Wastewater Facilities IIP:

“Wastewater facilities, including collection, interception, transportation, treatment and disposal of wastewater, and any appurtenances for those facilities”

The City provides central wastewater collection, treatment, and disposal service throughout the City limits. The following provides an analysis of the resource and facility costs included in the IIP and DIF calculations.

The calculation of the water facilities DIF was based on information provided by staff in addition to the City’s 2018 Integrated Utility Master Plan Update Report (IUMP).

Fee Calculation Methodology

For this 2022 update, Raftelis used the plan-based approach. This approach is based on a forward-looking infrastructure improvements plan which considers the future projects needed to meet the future wastewater demands of the utility. The wastewater development impact fee was calculated using the growth-share component of costs and the incremental capacity added from those facilities. Assumptions on included in the development of this fee were provided by Staff and the IUMP.

Service Area

The wastewater service area includes the northern municipal planning area down to the Estrella Mountains. The service area includes sections that are served by septic systems.

Proportionate Share

ARS §9-463.05 (B)(3) states that the development fee shall not exceed a proportionate share of the cost of necessary public services needed to provide necessary public services to the development. Page 2-8, Table 2.4 from the 2018 Integrated Utility Master Plan (IUMP) shows in 2016, the City had a total of 24,561 water meters (accounts).

Raftelis assumes that the number of wastewater account types are for the most part the same as water except for landscape meters and customers with septic tanks. Raftelis estimates the 2016 account type counts was approximately 24,000 (excluding irrigation and customers on septic systems) with a total contributed wastewater flow of 5.4 mgd. Based on a water demand of 12.6 mgd, the 2016 return to sewer factor was 44%. The 2018 IUMP indicates that 46% is an appropriate return to sewer factor for planning purposes. Figure WW1 shows the return to sewer percentages for each land use type and their respective contributed wastewater volume.

Figure WW1 – 2016 Account Type Return to Sewer Factors and Contributed Volume

<i>Description</i>	<i>Return to Sewer Factor</i>	<i>Average Daily WW Flow (gpd)</i>
Rural Low Density Residential	35.0%	0
Estate/Low Density Residential	35.0%	11,000
Sports & Entertainment	45.0%	0
Medium Density Residential	40.0%	1,774,000
City Center	60.0%	93,000
Historic Avondale	50.0%	163,000
Medium – High Density Residential	50.0%	165,000
High Density Residential	60.0%	1,138,000
Urban Commercial	60.0%	144,000
Mixed Use	60.0%	351,000
Urban Residential	0.0%	0
Local Commercial	60.0%	343,000
Open Space & Parks	0.0%	0
Open Space – Irrigation	0.0%	0
Freeway Commercial	75.0%	209,000
Business Park	60.0%	263,000
Education	60.0%	244,000
Industrial	60.0%	63,000
Public / Civic	60.0%	34,000
Corporate Park	60.0%	0
Gila River Scenic District	60.0%	0
High Intensity Office	60.0%	166
Office / Professional	60.0%	13,000
Total		5,008,166
Basin No. 2 Adjustment		432,000
Net Wastewater Flow (gpd)		5,440,000
2016 Actual Average Daily WastewaterFlow at WRF		5,600,000
<i>Variance (%)</i>		<i>-3.0%</i>

[1] 2018 IUMP, Page 2.18, Table 2.13; Page 2.20, Table 2.14

Existing Facilities

ARS §9-463.05 (E)(1) requires:

“A description of the existing necessary public services in the service area and the costs to upgrade, update, improve, expand, correct or replace those necessary public services to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards, which shall be prepared by qualified professionals licensed in this state, as applicable.”

ARS §9-463.05 (E)(2) requires:

“An analysis of the total capacity, the level of current usage and commitments for usage of capacity of the existing necessary public services, which shall be prepared by qualified professionals licensed in this state, as applicable.”

Water Reclamation Facility

The City’s Water Reclamation Facility (WRF) is named the Charles M. Wolf Water Resource Center and is located on Dysart Road south of Broadway Road alignment. Wastewater is conveyed to the facility

through two interceptors (36-inch and 48-inch) that enter the facility from the east. The current treatment capacity is a maximum month average daily flow (MMADF) of 9.0 million gallons per day (mgd). State regulations require the expansion of a facility when the facility reaches 80% of rated design capacity. The functional capacity under this regulation is 7.2 MGD. The 2021 average annual daily flow to the Avondale WRF was 6.5 mgd.

Lift Stations and Force Mains

The City currently has 10 lift stations. There are nearly 6.5 miles of force mains associated with the City's lift stations, which range in size from 2 to 16 inches in diameter. Figure WW2 lists the lift stations and their firm capacity.

Figure WW2 – Existing Lift Stations and Firm Capacity

Lift Station	Firm Capacity (gpd)
4th Street	3,200
10th Street	1,150
Central	200
Donatela	350
Friendship Park	350
Fulton	140
Littleton	210
PIR	30
Riley	2,200
Whyman	200

[1] 2018 IUMP Page 5-4, Table 5.1

Gravity Sewer Mains

The City's collection system contains 235 miles of mains ranging in size from 4 to 48 inches. Both the gravity sewer lines and lift stations have sufficient capacity to meet demands over the study period.

The existing wastewater treatment plant, lift stations, and gravity sewer mains have an estimated value of \$692 million. Accounting for accumulated depreciation reduces this value to approximately \$386 million. In other words, the water system's assets are about 55% depreciated in aggregate based on accounting life. This is based on the City's most recent asset records and estimating a replacement cost of facilities using the Engineering News Record Construction Cost Index (ENR-CCI).

Expansion Facility Costs

ARS §9-463.05 (E)(3) requires:

A description of all or the parts of the necessary public services or facility expansions and their costs necessitated by and attributable to development in the service area based on the approved land use assumptions, including a forecast of the costs of infrastructure, improvements, real property, financing, engineering and architectural services, which shall be prepared by qualified professionals licensed in this state, as applicable.

The City's existing treatment capacity is a maximum month average daily flow (MMADF) of 9.0 mgd. As shown on Figure WW1, the 2016 average annual daily flow to the WRF is 5.6 mgd. From 2016 to 2021, the average annual daily flow increased from 5.6 mgd to 6.5 mgd. The MMADF in 2021 was 6.75 mgd.

Under existing Arizona law, only 80% of the total capacity can be used, or 7.2 mgd. The remaining capacity of 0.45 mgd of additional capacity available for growth. The City has plans for a 3.0 mgd expansion to the Avondale Water Reclaimed Facility (WRF). Also under existing Arizona law, only 80% of the total capacity can be used, giving an additional planned capacity of 2.40 mgd.

Including both the additional capacity available from the existing facility of 0.45 mgd and the planned expansion of 2.40 mgd, the City’s wastewater treatment has 2.85 mgd of available wastewater capacity to serve growth. Of that 2.85 mgd capacity, 0.85 mgd will be required to serve growth over the 10-year period. The estimated cost of the additional capacity is approximately \$79.6 million.

Service Units and Demand by Land Use

ARS §9-463.05 (E)(4) requires:

“A table establishing the specific level or quantity of use, consumption, generation or discharge of a service unit for each category of necessary public services or facility expansions and an equivalency or conversion table establishing the ratio of a service unit to various types of land uses, including residential, commercial and industrial.”

The development of a dwelling unit wastewater service demand incorporates historical wastewater contributed flow data and system peak flow data. A dwelling unit represents the smallest service capacity in the system. For the purposes of this DIF, a dwelling unit demand is equivalent to the average daily flow and peak flow for the City’s 3/4” meters.

Residential wastewater DIFs are based on average day gallons per dwelling unit and assessed by meter size. The existing allocated water capacity is 450 gallons per day for a residential DU served by a ¾” meter. Contributed wastewater flow is estimated to be 46% of water usage based on the planning criteria in the 2018 IUMP. The product of the 450 gpd and 46% equals the average day flow per DU of 207 gpd. The MMADF factor of 1.05 is applied to account for maximum month flows which results in a MMADF of 218 gpd. Figure WW3 shows the calculation of the DU average ad MMADF flows.

Figure WW3 – Wastewater Demand Unit

<i>Description</i>	<i>Amount</i>
Avg Day Water Demand per DU, gpd	450
Return Factor	46%
MMADF Peaking Factor	105%
MMADF Flow per DU, gpd	218

For residential and nonresidential connections, the wastewater DIFs are assessed by water meter size. and are allocated the appropriate meter capacity for wastewater by multiplying the DU MMADF of 218 gpd by the corresponding capacity ratios provided in Figure WW4.

Figure WW4 – Meter Capacity Ratios

Meter Size	Meter Capacity Ratio [1]	MMADF
<i>inches</i>		<i>gpd</i>
0.75	1.00	218
1.00	1.67	363
1.50	3.33	727
2.00	5.33	1,163
3.00	10.67	2,325
4.00	16.67	3,633
6.00	33.33	7,267

[1] American Water Works Association M1 Manual, Principles of Water Rates, Fees, and Charges. 7th Ed.

Projected Service Units

ARS §9-463.05 (E)(5) requires:

“The total number of projected service units necessitated by and attributable to new development in the service area based on the approved land use assumptions and calculated pursuant to generally accepted engineering and planning criteria.”

ARS §9-463.05 (E)(6) requires:

“The projected demand for necessary public services or facility expansions required by new service units for a period not to exceed ten years.”

It is projected that there will be an additional 5,552 dwelling units built within the City by 2037. Using the MMADF per dwelling unit of 207 gpd, it is estimated that there will be an increase in projected contributed peak wastewater flow of 1.2 mgd (218 x 5,552 = 1,210,000 gpd).

Figure WW5 shows the development of the current annual average daily flow projections, projected average daily and MMADF flow, and the total DU added during the study period. It also shows the DU that will be served by existing available capacity and the capacity added by the IIP. It is estimated that the 2.4 mgd capacity addition will serve approximately 11,009 DU (2,400,000 gpd / 218 gpd).

Figure WW5 – Projected Added Dwelling Units and Wastewater Flows Forecast

Line No	Description	Units
Current Dwelling Units and Demand		
1	Current 2022 DU	29,911
2	Demand per DU, gpd	218.00
3	Current Ave Day Demand, gpd	6,520,598
4	MMADF Peak Factor	1.04
5	Avg Day of Maximum Month, gpd (Rounded) (Line 4 x Line 3)	6,751,000
6	Current Firm Capacity, gpd	7,200,000
7	Existing Capacity Available for Growth, gpd (Line 6 - Line 5)	449,000
Added Demand [1]		
8	Added DU, 2023 - 2032	3,907
9	Average Day Demand	207
10	Planning MMADF factor	1.05
11	MMADF per DU, gpd (Line 9 x Line 10)	218
12	Added MMADF, gpd	851,726
13	Additional Capacity Needed for Growth, gpd (Line 12 - Line 7)	402,726
14	DU Served by Existing Available Capacity (Line 7 / Line 11)	2,060
15	DU Served by 10-Year IIP (Line 13 / Line 11)	1,847
16	Total Added DU	3,907

17	DU Served by Full 2.4 mgd Capacity Addition	11,009

[1] The new WWTP adds a total of 2.4 mgd of capacity.

Facility Improvements

The City has plans to expand the existing wastewater treatment plant by 3.0 mgd of which 80% (2.4 mgd) can be used under Arizona law. The total cost of the wastewater treatment plant phase 2 expansion is \$79,590,000. The existing wastewater development fund has \$6,438,870 as of the end of fiscal year 2021. The total cost of the wastewater treatment plant expansion less the existing development fund balance can be recovered through wastewater DIFs. This value divided by the additional capacity added of 2.4 mgd results in a unit cost of \$30.48 per mgd.

As discussed previously, the maximum month average daily flow per demand unit is 218 for wastewater. The \$30.48 unit cost of capacity is multiplied by the MMADF per demand unit of 218 to get a wastewater DIF per 0.75-inch meter equivalent of \$6,656. This includes \$11 for the cost of this impact fee study.

The proposed wastewater DIF is the product of the dwelling unit’s maximum month average daily flow (MMADF) and the unit cost of capacity (218 gpd x \$30.48 per gpd) plus a charge of \$11 per dwelling unit for professional services. The proposed DIF totals \$6,656.

Appendix A – Forecast of Revenues

Arizona’s enabling legislation mandates a “required offset” for “excess” construction contracting excise taxes, as stated in ARS § 9-463.05(B)(12)).

The municipality shall forecast the contribution to be made in the future in cash or by taxes, fees, assessments or other sources of revenue derived from the property owner towards the capital costs of the necessary public service covered by the development fee and shall include these contributions in determining the extent of the burden imposed by the development. Beginning August 1, 2014, for purposes of calculating the required offset to development fees pursuant to this subsection, if a municipality imposes a construction contracting or similar excise tax rate in excess of the percentage amount of the transaction privilege tax rate imposed on the majority of other transaction privilege tax classifications, the entire excess portion of the construction contracting or similar excise tax shall be treated as a contribution to the capital costs of necessary public services provided to development for which development fees are assessed, unless the excess portion was already taken into account for such purpose pursuant to this subsection.

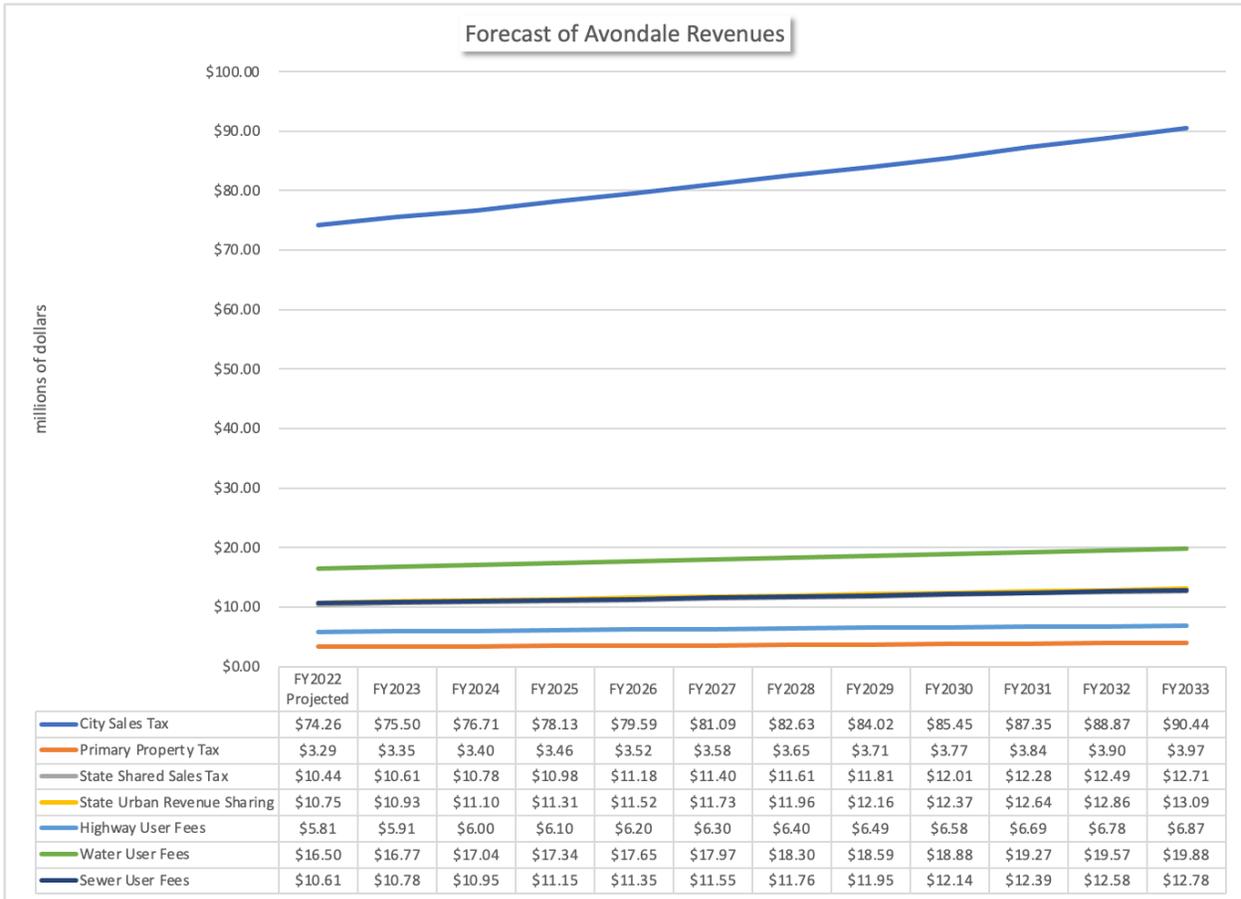
Avondale does not charge a construction excise tax at a rate higher than the rate applicable for other types of business activities. Therefore, no such offset is required.

ARS § 9-463.05(E)(7) requires:

“A forecast of revenues generated by new service units other than development fees, which shall include estimated state-shared revenue, highway users revenue, federal revenue, ad valorem property taxes, construction contracting or similar excise taxes and the capital recovery portion of utility fees attributable to development based on the approved land use assumptions, and a plan to include these contributions in determining the extent of the burden imposed by the development as required in subsection B, paragraph 12 of this section.”

The required forecast of non-development fee revenue that might be used for growth-related improvements is shown in Figure A1. The forecast of revenues was provided by staff.

Figure A1 – Ten-Year Revenue Projections



Appendix B – MAG Socioeconomic Documentation

Pages 23-25 from MAG Socioeconomic Projections 2019 Documentation are shown below.

Industrial is based on Manufacturing and Warehousing.

INDUSTRIAL EMPLOYMENT AND DEVELOPMENT BY INDUSTRY

	FAR	Sq.Ft. per Employee
Manufacturing		
311 Food Manufacturing	0.26	460
312 Beverage and Tobacco Product Manufacturing	0.37	761
314-		
323 Textiles/Wood Products/Printing	0.31	717
324-		
326 Petroleum/Pharmaceuticals/Plastics	0.28	596
327 Concrete/Concrete Products/Stone	0.08	580
331-		
332 Steel/Fabricated Metals/Machine Shops	0.30	549
333 Machinery Manufacturing	0.37	308
334 Computer and Electronic Product Manufacturing Electrical Equipment, Appliance, and Component	0.33	428
335 Manufacturing	0.35	697
336 Transportation Equipment Manufacturing	0.13	363
337 Furniture and Related Product Manufacturing	0.37	789
339 Miscellaneous Manufacturing	0.26	520
Total	0.25	495
Warehouse		
423 Merchant Wholesalers, Durable Goods	0.29	514
424 Merchant Wholesalers, Nondurable Goods	0.32	735
484 General Freight Trucking	0.11	191
493 Warehousing and Storage	0.33	1,625

Commercial is based on Retail, Restaurants, and Hotels.

RETAIL EMPLOYMENT AND DEVELOPMENT BY INDUSTRY

	FAR	Sq.Ft. per Employee
Retail		
441 Motor Vehicle and Parts Dealers	0.18	379
441 Recreational Vehicle Dealers	0.10	754
441 Automotive Parts and Accessories Stores	0.26	724
442 Furniture and Home Furnishings Stores	0.31	674
443 Electronics and Appliance Stores	0.31	532
444 Building Material and Garden Equipment and Supplies Dealers	0.24	637
445 Supermarkets and Grocery Stores	0.24	454
445 Other Food and Beverage Stores	0.26	498
446 Health and Personal Care Stores	0.28	562
447 Gasoline Stations	0.10	340
448 Clothing and Clothing Accessories Stores	0.38	615
451 Sporting Goods, Hobby, Book, and Music Stores	0.27	583
452 General Merchandise Stores	0.30	741
452 Warehouse Clubs and Supercenters	0.23	566
452 All Other General Merchandise Stores	0.18	702
453 Miscellaneous Store Retailers	0.32	548
454 Nonstore Retailers	0.22	506
Retail Total	0.25	561
Restaurants		
722 Food Service Contractors and Caterers	0.23	326
722 Drinking Places (Alcoholic Beverages)	0.27	485
722 Full-Service Restaurants	0.27	471
722 Limited-Service Restaurants	0.24	464
722 Snack and Nonalcoholic Beverage Bars	0.26	485
Restaurant Total	0.26	463
Hotels	0.37	956

Office/Institutional is based on Information, Finance/Insurance, and Real Estate.

OFFICE EMPLOYMENT AND DEVELOPMENT BY INDUSTRY

	FAR	Sq.Ft. per Employee
Information		
511 Publishing Industries (except Internet)	0.57	390
512 Motion Picture and Sound Recording Industries	0.37	574
515 Broadcasting (except Internet)	0.36	376
517 Telecommunications	0.30	500
518 Data Processing, Hosting and Related Services	0.34	349
519 Other Information Services	0.08	478
51 Total	0.29	463
Finance & Insurance		
522 Banking	0.33	429
522 Consumer Lending	0.46	441
522 Other Lending	0.25	388
523 Investments	0.53	588
524 Insurance Carriers and Related Activities	0.55	423
52 Total	0.42	445
Real Estate and Rental and Leasing		
531 Real Estate Leasing	0.25	520
531 Real Estate Agents	0.37	390
532 Car & Truck Rental	0.08	590
532 Consular Rentals	0.33	623
532 Machinery and Equipment Rental and Leasing	0.13	485
53 Total	0.19	468

Appendix C – Impact Fee References

- Been, Vicki. 2005. "Impact Fees and Housing Affordability", *Cityscape: Journal of Policy Development and Research*, Vol. 8, No. 1, 139-185.
- Bochner, Brian, Kevin Hooper, and Benjamin Sperry. 2010. "Improving Estimation of Internal Trip Capture for Mixed-Use Development" *ITE Journal* 80(8): 24–28, 33.
- Currans, Kristina and Kelly Clifton. 2015. "Using Household Travel Surveys to Adjust ITE Trip Generation Rates" *Journal of Transport and Land Use*, Vol. 8, No. 1, pp. 85-119.
- Daisa, James, M. Schmitt, P. Reinhofer, K. Hooper, B. Bochner and L. Schwartz. 2013. "Trip Generation Rates for Transportation Impact Analyses of Infill Developments" *Transportation Research Board NCHRP Report 758*.
- Ewing, Reid and Robert Cervero. 2010. "Travel and the Built Environment" *Journal of the American Planning Association*, 76:3, 265-294.
- Frank, Lawrence and Gary Pivo. 1992. "Impacts of Mixed Use and Density on Utilization of Three Modes of Travel: Single-Occupant Vehicle, Transit, and Walking" *Transportation Research Record* 1466.
- Guthrie, Dwayne and Carson Bise. 2015. "Next Generation Transportation Impact Fees" *Planning Advisory Service Memo January/February*, American Planning Association.
- Litman, Todd. 2015. *Analysis of Public Policies that Unintentionally Encourage and Subsidize Urban Sprawl*. Victoria Transportation Policy Institute.
- Moore, Terry, Paul Thorsnes and Bruce Appleyard. 2007. *The Transportation / Land Use Connection* (new edition). PAS Report 546-47. Chicago, IL: American Planning Association.
- Myers, Dowell (editor). 1990. *Housing Demography: Linking Demographic Structure and Housing Markets*. Madison, WI: University of Wisconsin Press.
- Nelson, Arthur, ed. 1988. *Development Impact Fees*. Chicago: Planners Press.
- Nelson, Arthur, Liza Bowles, Julian Juergensmeyer, and James Nicholas. 2008. *A Guide to Impact Fees and Housing Affordability*. Island Press.
- Nicholas, James, Arthur Nelson, and Julian Juergensmeyer. 1991. *A Practitioner's Guide to Development Impact Fees*. Chicago: Planners Press.
- Reid Ewing, Michael Greenwald, Ming Zhang, Jerry Walters, Mark Feldman, Robert Cervero, Lawrence Frank, and John Thomas. 2011. "Traffic Generated by Mixed-Use Developments: Six-Region Study Using Consistent Built Environmental Measures" *Journal of Urban Planning and Development* 137(3): 248–61.
- Resource Systems Group, Fehr & Peers, Robert Cervero, Kara Kockelman, and Renaissance Planning Group. 2012. *Effect of Smart Growth Policies on Travel Demand*. Strategic Highway Research Program 2 Report S2-C16-RR-1. Transportation Research Board of the National Academies.
- Schneider, Robert, Susan Handy and Kevan Shafizadeh. 2014. "Trip Generation for Smart Growth Projects" *Access 45*, University of California Transportation Center.
- Seggerman, Karen, Kristine Williams, Pei-Sung Lin, and Aldo Fabregas. 2009. *Evaluation of the Mobility Fee Concept*. Center for Urban Transportation Research, University of South Florida.
- Steiner, Ruth, and Siva Srinivasan. 2010. *VMT-Based Traffic Impact Assessment: Development of a Trip Length Model*. Center for Multimodal Solutions at the University of Florida.