Part B – Demand Estimates
Attachment B1

Selection of demand method

The application form provides for the use of the ADWR Designation Demand Worksheet or "…a detailed explanation of the assumptions used in estimating the water demand for the water service area and reference that demand spreadsheet and/or assumptions used as an attachment and complete Table B below." At the City's Pre-Application Conference on August 25, 2021, the City included information in their meeting materials and a presentation was made by Herb Dishlip, P.E. on behalf of the City on the Water Resource Management Model (WRMM). This is the tool the City has developed to analyze the City's long-term water supply and use to assess any changing conditions (increased density on a parcel, new water service requests, supply increases or decreases, and other parameters). ADWR requested additional information on the WRMM. It was provided by email to ADWR on September 14, 2021. On November 2, 2021, ADWR provided an email response as follows:

> ADWR accepts various types of evidence for use in calculating projected demands. The City should include a narrative summary of the WRMM model with its application, including the types of data that the model relies on. The model should include residential and non-residential growth. If ADWR has any questions about the WRMM model while reviewing the application, it will include those questions in a deficiency letter.

Based on the November 2, 2021 response the City is pleased to submit its information based on the WRMM that allows for the use of customer billing information (verses population projections) with a multitude of additional datasets and GIS layers to determine more accurately AWS projections (2020-2040).

City of Prescott's Water Resource Management Model (WRMM) Narrative and Assumptions

The City of Prescott has a planning model (Excel and GIS based) which it utilizes to estimate water demands for the 2009 D&O No. 86-401501.0001 and for this application for modification of its designation. The Water Resources Management Model (WRMM) tracks utility billing records for each customer and provides an analysis tool to monitor water demand patterns. Currently, the WRMM contains billing records (customer water demands) for the years 2011 through 2020. Average water demand is determined for each customer that has at least 60 months of actual use in their billing records. For customers lacking 60 months of actual use billing records, demand is estimated based on either the average of other customer uses within the same subdivision, or on the average water use within the City's overall service area. Averages are determined based on the account type i.e., single family, multi-family, or non-residential. Multi-family accounts will vary with the number of units associated with a single meter. For existing multi-family accounts the number of units on each meter has been determined. For projected new multi-family accounts, an average of 10 units per multi-family account is assumed. The city service area averages were used for demand estimates for projected new customers who are not associated with an existing final platted subdivision. For the purpose of projecting future demand, the WRMM assumes that the pattern of growth will be like the current water account type distribution. The distribution assumptions used in the modeling were:

Table 1

	Percentage of Accounts	Percentage of Demand Volume
Single-family (SF)	88.0%	55.1%
Multi-family (MF)	3.3%	10.6%
Non-residential (NR)	8.7%	34.3%

Analysis of the billing record from the 2011 through 2020 result in the following summaries by year.

Percentage of Active Accounts

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Ave
SF	87.71%	87.69%	87.74%	87.82%	87.94%	88.00%	88.16%	88.22%	88.38%	88.47%	88.01%
MF	3.47%	3.45%	3.41%	3.39%	3.32%	3.29%	3.23%	3.19%	3.21%	3.16%	3.31%
NR	8.81%	8.86%	8.84%	8.79%	8.74%	8.70%	8.61%	8.59%	8.41%	8.36%	8.67%
		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Percentage of Total Use

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Ave
SF	55.48%	55.16%	54.45%	54.22%	54.43%	54.38%	54.76%	56.19%	55.01%	57.22%	55.13%
MF	10.70%	10.86%	11.25%	10.90%	10.77%	10.67%	10.51%	10.33%	10.03%	9.54%	10.55%
NR	33.82%	33.99%	34.30%	34.88%	34.80%	34.95%	34.73%	33.48%	34.97%	33.25%	34.32%
		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Ave use for Active Account

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Ave
SF	0.183	0.177	0.170	0.171	0.163	0.163	0.166	0.166	0.161	0.179	0.170
MF	0.891	0.888	0.903	0.890	0.852	0.852	0.868	0.868	0.809	0.836	0.866
NR	1.110	1.083	1.061	1.097	1.047	1.056	1.076	1.076	1.076	1.102	1.078

Total Use by Active Account Type

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Ave
SF	3448.4	3373.8	3263.6	3315.3	3315.3	3243.8	3375.0	3658.5	3413.8	3872.0	3428.0
MF	665.1	664.1	674.2	753.0	666.3	636.2	647.6	672.9	622.2	645.3	664.7
NR	2101.7	2079.0	2055.9	2101.0	2133.0	2084.5	2140.7	2180.1	2170.0	2250.0	2129.6
										6767.3	

Number of Active Accounts

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Ave
SF	18849	19008	19216	19419	19674	19958	20369	20760	21186	21599	20004
MF	746	748	747	749	743	747	746	750	769	772	752
NR	1894	1920	1937	1944	1955	1974	1990	2021	2017	2042	1969
Total	21489	21676	21900	22112	22372	22679	23105	23531	23972	24413	22725
New Accounts	0	187	224	212	260	307	426	426	441	441	325

Wastewater Return Flow Analysis

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Delivered	6215.1	6117.0	5993.7	6114.6	5879.7	5964.5	6163.3	6511.5	6206.0	6767.3	6193.3
Returned	4102.9	3832	4059.5	4131.6	4432.8	4380.7	4764.7	4740.4	4782.9	4282.2	4351.0
% returned	66%	63%	68%	68%	75%	73%	77%	73%	77%	63%	70%

Wastewater Return Flow Analysis Including Distribution Losses of 8%

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Delivered + 8% loss	6712.3	6606.3	6473.1	6603.7	6350.1	6441.6	6656.3	7032.5	6702.5	7308.7	6688.7
Returned	4102.9	3832	4059.5	4131.6	4432.8	4380.7	4764.7	4740.4	4782.9	4282.2	4351.0
% returned	61%	58%	63%	63%	70%	68%	72%	67%	71%	59%	65%

These above summaries and the Committed Demand tables are taken directly from the WRMM. The Current Demand references are from the City's 2020 Annual Water Withdrawal and Use Report. Projected Demands are summarized as requested in the application form as "Table B" Since the WRMM contains billing records, for privacy of the City's customers, it cannot be shared in its entirety.

In addition, note that demand estimates associated with remaining lots listed in Attachment B: Subdivisions Eligible to Receive the Groundwater Allowance are based on Formula 1 set forth in ADWR Decision and Order No. 86-401501.0001, Attachment E. More information on this aspect of Committed Demand (Category 3) is located in Application Part G Consistency with Management Goal.

Current Demand

"Current demand" means the 100-year water demand for existing uses within the service area of a designation applicant or designated provider, based on the annual report for the previous calendar year." (R12-15-701.26)

The City of Prescott operates two separate water delivery systems: one for potable water and one for non-potable reclaimed water. As a baseline at the beginning of 2021, data extraction of Prescott's Calendar Year 2020 billing system resulted in records for 24,733 potable water accounts. Of those, 24,413 accounts had water demands at some time during the year. The remaining accounts were either dormant or were non-water utility customers (i.e. on the City's sewer system and/or trash service). The potable water demand for calendar year 2020 was

7,513 acre feet (see Annual Report, 2020 Summary Report, Potable Supplies (acre-feet),

Attachment B1.1. That volume was comprised of 4,565 acre-feet for residential uses, 2,262 acre-feet of non-residential uses (see Schedule F1, Part 2) **Attachment B1.2**, and an estimated value of 686 acre-feet of lost or unaccounted water (see 2020 Summary Report, 7,513 – 6,867).

Prescott's non-potable deliveries for 2020 totaled 1,815 acre-feet. This number is comprised of measured deliveries of 1,681 acre-feet (see 2020 Schedule G2 and City's Effluent Use supporting data) **Attachment B1.3**, and an estimated value of 134 acre-feet for lost and unaccounted water (8% of the measured deliveries).

The City of Prescott service area current annual demand totals 9,328.00 acre-feet which reflects water deliveries to customers of the potable and non-potable systems and associated lost and unaccounted water for the year 2020. Therefore, the 100-year current demand is equal to 932,800 acre-feet.

Committed Demand

"Committed demand" means the 100-year water demand at build-out of all recorded lots that are not yet served water within the service area of a designation applicant or a designated provider. (R12-15-701.24)

The 2009 ADWR Decision and Order No. 86-401501.0001 stated that committed demand included not just vacant lots in recorded subdivisions, but also "…the average annual volume of water that Prescott is obligated to deliver to lands within the Chino Valley Irrigation District ("CVID")." (II Findings of Fact, B. 7.) Considering the previous interpretation, Prescott believes that there are several other obligations that are of a similar nature to the CVID obligation that will need to be included in the determination of committed demand.

The City of Prescott's estimated committed demand is comprised of seven categories. See **Attachments B1.4-1.10** for further details of the dataset described below.

- Category 1. Demand associated with potable water accounts listed as Current Demand who either did not use water in 2020 or only used water for a portion of the year because they were new customers. **Attachment B1.4**
- Category 2. Demand associated with lots in recorded subdivisions within the City of Prescott's service area where there is an approved final plat, but no water account been established by December 31, 2020. **Attachment B1.5**
- Category 3. Demand associated with lots in subdivisions associated with preliminary plats approved on or before August 21, 1998, (listed in Attachment B of the 2009 Decision and Order) which remain eligible for a groundwater allowance when and if they proceed to final plat status. **Attachment B1.6**
- Category 4. Demand associated with the recorded agreement between the City of Prescott and landowners in the Chino Valley Irrigation District (City Contract No. 1998-040). Some of the demand associated with this agreement is already included in current demand or in Category 2 of committed demand because water accounts have been established or the land subject to the agreement is included within an approved final plat. The volume of committed demand in this category therefore only reflects that demand associated with additional future uses within currently non-subdivided parcels. **Attachment B1.7**

- Category 5. Demand associated with recorded intergovernmental agreements between Prescott and the Town of Chino Valley and Prescott (City Contract No. 2020-185) and the Stringfield Ranch
- Category 6. Domestic Water Improvement District obligating the City of Prescott (City Contract No. 2021-090) to provide water service. **Attachment B1.8**
- Category 7. Demand associated with the obligation by the City of Prescott to the Yavapai Prescott Indian Tribe to provide domestic water service to the reservation. Some of the demand associated with this category is reflected in current demand. Since reservation land is not subject to subdivision approval by the City, the volume of additional committed demand is based on existing on reservation land use categories. **Attachment B1.9**
- Demand associated with recorded contracts to provide reclaimed water (effluent) up to a maximum amount per year. The committed demand value reflects the difference between the maximum volume of contractual obligation and the volume of water actually reported as delivered in 2020 reported above as Current Demand. **Attachment B1.10**

The estimated volumes of water associated with these categories including potential incremental associated delivery losses of 8% is estimated to be:

Table 2

	Acre-feet	WRMM Reference Tab
Category 1	107.2	2020 Partial Year
Category 2	1,034.0	Committed Final Plats
Category 3	1,039.74	Exhibit B
Category 4	577.7	CVID Unrecorded
Category 5	137.8	IGA Committed
Category 6	65.0	YPIT
Category 7	632.1	Reclaimed Direct Delivery
Total	**3534.54**	

The 100-year volume of committed demand = 353,454 acre-feet.

Projected Demand

"Projected demand" means the 100-year water demand at build-out, not including committed or current demand, of customers reasonably projected to be added and plats reasonably projected to be approved within the designated provider's service area and reasonably anticipated expansions of the designated provider's service area. (R12-1-701.57)

The City of Prescott actively monitors areas of potential water service expansion. The number of new accounts added each year has been increasing in recent years as the housing industry in Arizona has rebounded from the national economic recession. For the purpose of estimating projected demand for this assured water supply application the City determined an additional 450 new accounts per year is a reasonable and conservative estimate of growth.

Recently there has been a surge in new master planned community proposals and corresponding annexation approvals. These include Deep Well Ranch master plan (City Contract No. 2010-086A3) and Arizona Eco Development North and South master plans (City Contract No. 2022-011). Other master plans, such as Granite Dells Estates (City Contract No. 2008-165A2 and others), have moved to preliminary plat stage with various phases proceeding to final plat and construction. Despite the increase in masterplan developments, growth will likely be constrained not only by the availability of the number of vacant lots, but rather by the general economic conditions and by the availability of construction labor.

Utilizing the WRMM, the City monitors the amount of growth associated with existing subdivisions listed above as committed demand compared to the amount of growth associated with new subdivisions which are not yet final platted. To estimate how much of the 20-year assured water supply demand planning horizon will be associated with projected demand, an estimate must first be made of the rate of development of committed demand lots. The estimates are based on observations of data from the WRMM and professional judgement of City Community Development staff. For the first two years of the estimate most of the growth will be from the inventory of existing lots. For the next 18 years, there will be a shift whereby most of the growth will occur in new subdivisions, new multi-family complexes, and on non-subdivided land. Even though the number of new customers will vary yearly, for the purposes of this estimate the average of 450 new accounts per year was held constant.

In addition to potable demand, the City estimates there will be a modest growth in demand in its non-potable system. Since the non-potable deliveries during calendar year 2020 represent the highest use in an eleven-year period the City expects only about 108 acre-feet per year of additional non-potable demand from current and committed customers. Over time the City anticipates a projected demand from new non -potable customers resulting in a build-up to an additional 270 acre-feet per year by the 20th year.

The total projected demand in the 20th year is the sum of the potable and non-potable estimated growth which is equal to 1,667 acre-feet per year which is equivalent to 166,700 acre-feet for the 100-year projection. See Table B below as required in the application.

The City proposes a designation greater than 10 years. As required in the application, Table B: Sum of Current, Committed, and Projected Demand For The Water Service Area for the Current Year Plus Each Subsequent Year is shown below.

Table B

	Population	Current Potable and Non-Potable Demand (AF)	Committed Additional Potable Demand (AF)	Committed Additional Non-Potable Demand (AF)	Cumulative Committed Demand (AF)	Projected Additional Potable Demand (AF)	Projected Additional Non-Potable Demand (AF)	Cumulative Projected Demand (AF)	Total Cumulative Demand (AF)
0		9328							9328
1	63953	9328	233	5	239	0	13.5	14	9580
2	64448	9328	134	5	378	0	13.5	27	9733
3	64943	9328	94	5	478	37	13.5	77	9883
4	65437	9328	87	5	570	43	13.5	134	10032
5	66744	9328	81	5	656	49	13.5	196	10180
6	68050	9328	74	5	735	55	13.5	265	10328
7	69356	9328	67	5	808	61	13.5	340	10475
8	70663	9328	54	5	867	74	13.5	427	10621
9	71969	9328	54	5	926	74	13.5	514	10767
10	73275	9328	40	5	972	86	13.5	613	10912
11	74582	9328	34	5	1010	92	13.5	718	11057
12	75888	9328	34	5	1049	92	13.5	824	11201
13	77194	9328	34	5	1088	92	13.5	929	11345
14	78501	9328	34	5	1127	92	13.5	1034	11490
15	79807	9328	34	5	1166	92	13.5	1140	11634
16	81114	9328	34	5	1205	92	13.5	1245	11778
17	82420	9328	34	5	1244	92	13.5	1350	11923
18	83726	9328	34	5	1283	92	13.5	1456	12067
19	85033	9328	34	5	1322	92	13.5	1561	12211
20	86339	9328	34	5	1361	92	13.5	1667	12356

Summary

Table 3

Current Demand	932,800 AF
Committed Demand	353,454 AF
Projected Demand	166,700 AF
Total	1,452,954 AF

Other Demands

In Decision and Order No. 86-401501.0001, another demand was recognized as the supplies that would meet the Town of Prescott Valley's contractual commitment from the Big Chino Sub-basin. For reference, see the previously mentioned D&O, II. Findings of Fact, B. Water Demands, 10., which state, "The 2027 projected demand does include the demand at build-out of plats reasonably projected to be approved through calendar year 2027, the volume of water that Prescott is obligated to deliver to Prescott Valley for use outside Prescott's service area, and the projected demand of the Tribe." Per the Intergovernmental Agreement between the City and Town (City Contract No. 2004-255), it states, "Prescott Valley's Water Availability shall mean forty-five and nine-tenths percent (45.9%) of all Project Water available per year." The previously mentioned D&O resulted in 8,067.4 AF/year. The Town's portion must be retained in the modification as 3,702.94 AF/year.

ADWR Designation Demand Worksheet

During the City's Pre-Application Meeting on August 25, 2021, ADWR requested the City complete the Designation Demand Worksheet, **Attachment B1.11**