Sensitivity Analysis of Member Land Housing Unit Distribution by Plan Period

Due to the large backlog of enrolled but unconstructed Member Land (ML) lots and continuous new CAGRD enrollment, CAP:SAM accounts for how many projected housing units will be associated with new MLs, versus currently enrolled MLs that have unconstructed lots.

Modeling of MLs begins with the housing unit projection and the current balance of unconstructed lots by water provider and Plan period (**see Table 1**). Then, for each undesignated provider, the model dynamically allocates annual housing units among five possible categories:

Category 1: exempt lots (e.g., pre-1995 subdivisions, non-subdivisions);
Category 2: unconstructed lots enrolled in Initial Plan;
Category 3: unconstructed lots enrolled in 2005 Plan;
Category 4: lots that will be enrolled in 2015 Plan;
Category 5: Post-2015 Plan lots.

The allocation among these five categories is based on distribution ratios that change through time. The model first allocates housing units to the "exempt lots" category. For this Plan, the allocation ratio to this category was set at 10%, based on an analysis of county assessor data and the occurrence of residential construction in older subdivisions. The remaining housing units are distributed among the other categories based on assigned ratios.

Those ratios were based on a general assumption that construction is somewhat more likely in recently platted subdivisions compared to subdivisions platted much earlier. In other words, a subdivision that was platted two years ago is more likely to construct than one that has been platted but unconstructed for 15 years. This assumption does not affect the total number of constructed units, but does strike a balance between assuming that growth will occur primarily in already enrolled subdivisions and assuming growth will be associated primarily with new enrollment.

More specifically, the beginning of the projection period assigns 80% of the new housing unit growth to lots associated with the Initial Plan and the 2005 Plan. By 2020, lots associated with those plans represent only 45% of new housing units, while new 2015 Plan enrollment accounts for 45% of new construction served by ML providers. Then, by 2030, only 20% of newly constructed lots are associated with previous plans, 30% are associated with the 2015 Plan, and 40% are associated with the post-2015 Plan.

If an individual water provider does not have any remaining unconstructed lots in one category, the model recalculates the ratios among the remaining categories for that provider. These dynamic allocation ratios add complexity to the model but provide a systematic means of analyzing assumptions about new versus existing enrollment and limit overestimation of obligation.

To test the sensitivity of the ratios selected in the Plan of Operation, CAP Staff ran several simulation scenarios holding all else constant in CAP:SAM, but testing different distribution balances among the five possible categories through time. Then, the Excess Groundwater demands generated were compared. The most prominent of these scenarios and their impact to the CAGRD obligation are detailed in the following paragraphs.

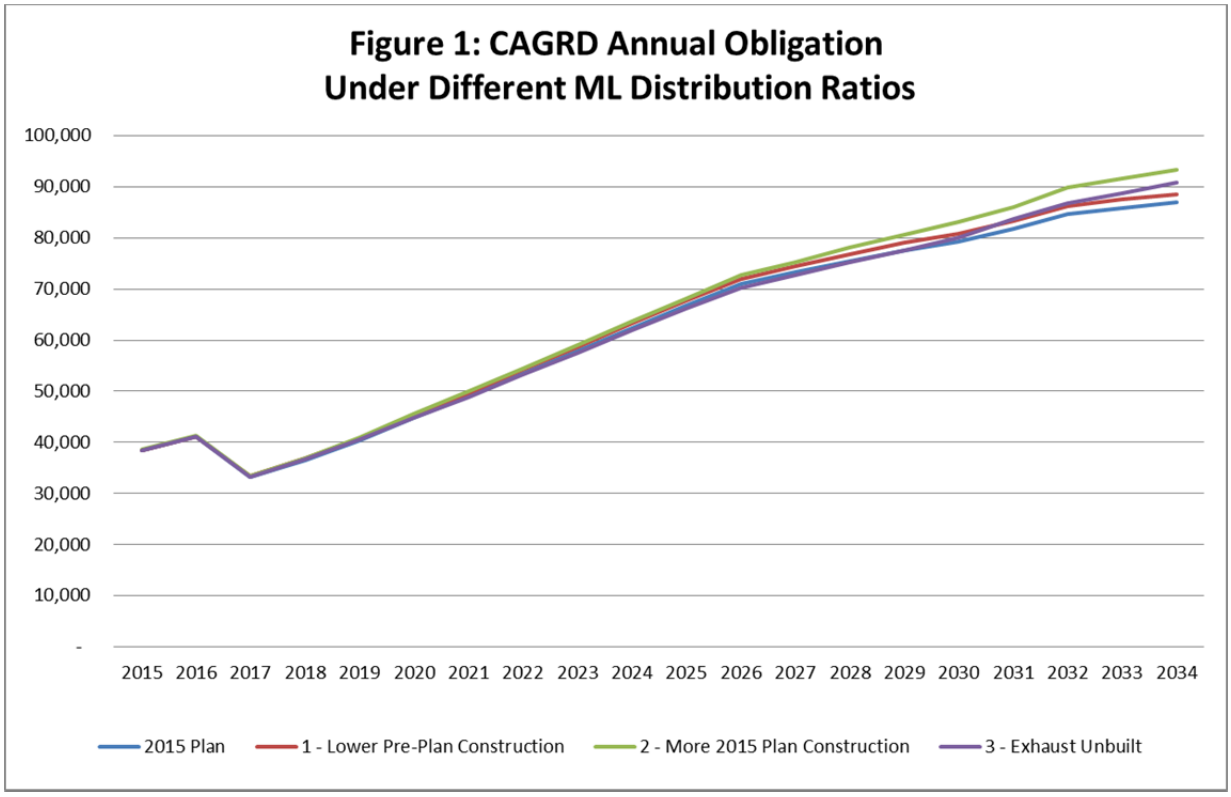
The first scenario tested a reduction in the ratio of Category 1 (exempt lots) from 10% to 5% annually, holding all other categories to the same distribution ratios as used in the 2015 Plan scenario. One stakeholder had commented during the Draft Plan comment period that, despite CAP's analysis otherwise, the 10% allocated to exempt lots seemed high. The reduction in the Category 1 distribution ratio generated a slight increase in obligation, an average of 1.3% increase per projection year (see **Figure 1** for comparison of all scenarios).

The second scenario was constructed by reducing Category 1 distribution to a constant 5% again, but also redistributing the ratios of housing units among Categories 2-5 to focus more on enrollment and construction of new housing units during the 2015 Plan of Operation (Category 4). In other words, this scenario tested the impact of more new housing units enrolling and constructing during the 2015 Plan period, rather than back-filling currently enrolled but unconstructed lots. The impact on CAGRD obligation was larger in the latter years (7.5% higher in 2034) but only increased the obligation by an average of 2.9% per year.

The third and final noteworthy scenario was constructed to prioritize build-out of the currently enrolled but unbuilt lots. This required a shift in ratios toward Categories 2 and 3 (40% each per year) and a reduction in Categories 3 (10% annually) and 4 (0% annually). This scenario resulted in a slight reduction in obligation from 2021 – 2029 (average of -0.56% per year) but a small increase in obligation in all other projection years (average of 0.51% increase in obligation over the total period).

Staff's analysis of these and other distribution scenarios found very little sensitivity in the ultimate annual CAGRD obligation based on redistribution of these ratios. This is partly explained by the fact that not all ML water providers have any, or a large number, of enrolled but unconstructed lots (**Table 1**). Since the model re-balances the ratios depending on the remaining inventory *by provider,* the variation in ratios tested in these scenarios does not express much variation in the ultimate CAGRD obligation. The ratios selected for the Plan of Operation, described above and shown in **Figure 1**, were chosen for their consistency with historic county assessor data (particularly the ratio of exempt lots) and a more balanced assumption that growth will be associated with already enrolled subdivisions in the near-term and associated primarily with new enrollment in the long-term.

Table 1: Enrolled but Unconstructed Lots by Water Provider by Plan Period

Water Provider Name	Initial Plan	2005 Plan
Avra Water Coop	185 HU	63 HU
AZ Water Co Casa Grande	11126 HU	10280 HU
AZ Water Co Coolidge	1086 HU	8339 HU
AZ Water Co Oracle	5766 HU	0.0 HU
AZ Water Co Superior	43 HU	0.0 HU
AZ Water Co Superstition	1274 HU	406 HU
AZ Water Co White Tank	3722 HU	1649 HU
Beardsley WC	615 HU	1916 HU
Buckeye	6437 HU	26215 HU
Carefree WC	28 HU	97 HU
Cave Creek	0.0 HU	193 HU
CHCID	9 HU	18 HU
Clearwater Utility Co	2 HU	178 HU
Community Water Green Valley	50 HU	447 HU
Desert Hills WC	9 HU	152 HU
Diversified Water Utilities	692 HU	1230 HU

EPCOR – Agua Fria	4866 HU	10317 HU
EPCOR – Paradise Valley	3 HU	169 HU
EPCOR – Sun City	1 HU	164 HU
Farmers WC	337 HU	766 HU
Green Valley DWID	86 HU	402 HU
H2O	1016 HU	4256 HU
Lago Del Oro	157 HU	225 HU
Las Quintas	2 HU	239 HU
Los Cerros	1 HU	16 HU
LPSCO	1998 HU	1107 HU
Marana Domestic	1 HU	219 HU
Metro - Diablo	912 HU	0.0 HU
Metro - Hub	6 HU	0.0 HU
Picacho WC	7776 HU	4388 HU
Pima Util Co	31 HU	0.0 HU
Quail Creek	1619 HU	0.0 HU
Queen Creek	1790 HU	3516 HU
Ray WC	215 HU	47 HU
Ridge View	353 HU	0.0 HU
Rio Verde Utilities	279 HU	0.0 HU
Rose Valley WC	22 HU	0.0 HU
Saguaro	371 HU	55 HU
Sunrise WC	106 HU	138 HU
Tolleson	16 HU	0.0 HU
Valencia WC	2003 HU	6910 HU
Valley Utilities WC	131 HU	209 HU
Voyager WC	16 HU	0.0 HU
WUGB	105 HU	472 HU
WUGT	183 HU	0.0 HU