Residential Consumption Volume Issue

This issue is that Aqua's data requires at least 1,303 of New Garden's 1,916 residential customers to consume zero water volume for Aqua's numbers to work. That is totally unrealistic. New Garden is not a ghost town.

So why would 1,303 customers have to use zero water?
Here is my consolidation of Aqua's residential consumption data in their 2021 rate filing:

	# Bills	Annual Gallons
Residential		
Monthly Fixed	22,992	
0 - 1667		9,580,000
1667 - 5,000		17,826,100
Over 5,000		58,758,600
Totals	22,992	86,164,700

There is some number of customers using >5,000 per billing period. We do not know what that number is, but we can make an assumption about it and test what that assumption tells us. To illustrate, assume the over 5,000 user averages 12,000 gallons/month. That means:

700 customers are needed to fill the over 5,000 rate band:

[700 = 58,758,600/(12,000 – 5,000)/12].

Those 700 customers would contribute 27,980,286 gallons to the "1667 - 5,000" rate band:

[27,980,286 = 700 x 3333 x 12].

However, 27,980,286 gallons is far greater than the actual volume for the "1667 - 5,000" rate band. Therefore, it is an impossible situation. Repeating this calculation using larger average volumes will show that this situation persists until the big user exceeds 16,000 gallons per month.

Therefore, let's consider another example where the large user averages 21,000 per month. The following table outlines this case:

Residential Customers Using Over 5,000 gallons/Month				
	Average Monthly Bill	Number Customers Required	Annual Volume	Rate Band
	21,000	306	58,758,600	>5,000
			12,241,375	1667- 5,000
			6,120,688	<1667
			77,120,663	total
	Customers Using 1667 - 5,000 gallons/Month			
Remaining 1667 - 5,000 Annual Volume	Monthly Bill 1667- 5,000	Number Customers Required	Annual Volume	Rate Band
5,584,725	5,000	140	0	>5,000
			5,584,725	1667- 5,000
			2,792,363	<1667
			8,377,088	total
	Customers Using <1667 gallons/Month			
			Annual	Rate
Remaining 0- 1667 Annual Volume	Monthly Bill 0- 1667	Number Customers Required	Volume 0	Band >5,000
666,950	333	167	0	1667- 5,000
			666,950	<1667
			666,950	total
613	Customers being billed with consumption > 0			
1,303	Customers with zero consumption			

The High Volume Rate Band:

#1 - 306 customers are needed to fill the over 5,000 rate band:

[306 = 58,758,600/(21,000 – 5,000)/12].

#2 - Those 306 customers would contribute 12,241,375 gallons to the "1667 - 5,000" rate band:

[12,241,375 = 306 x 3333 x 12].

#3 - Those 12,241,375 gallons are less than actual volume for the "1667 - 5,000" rate band, so this is a possibility.

The Middle Volume Rate Band

#1 - The big 21,000 gallon users have already consumed all but 5,584,725 gallons in this rate band. The customers using between 1,667 and 5,000 gallons must consume this amount.

#2 - Assume all these customers use the full 5,000 gallons because it will minimize the number of zero users. The math results in 140 customers using the 5,000 gallon limit:

140 customers are required [140 = 5,584,725/12/3333].

#3 - Those 140 customers also contribute 2,792,363 gallons to the "0 - 1667" rate band:

[2,792,363 = 140*12*1,667]

Low Volume Rate Band

#1 - The two other rate bands have already contributed 8,913,051 gallons to this rate band. But, that is fine because it is less than the total volume in the rate band.

#2 - There are 666,950 gallons remaining in this rate band for the low volume users. Here we assume each user consumes only 333 gallons. This is the minimum possible use, and it maximizes the number of active users. Those assumptions result in 167 customers using this volume:

[167 = 666,950/12/333].

#3 - Adding up the number of customers in each rate band you find that only 613 out of the 1,916 used any water. If any of those other 1,303 customers used any water, the total consumption allowed would be exceeded.

It is interesting to note that no matter what you assume for the >5,000 gallon customer, as long as it is greater than 16,000 gallons, it always results in 1,303 customers using zero water. Here is a table illustrating the result:

	Customer usage required for Aqua's Data			
Average Monthly Volume	# Customers >5,000/mon	# Customers 1667 - 5,000/mon	# Customers <1667/mon	# Customers @ zero
16,000	445	1	167	1,303
25,000	245	201	167	1,303
50,000	109	337	167	1,303
100,000	52	394	167	1,303
150,000	34	412	167	1,303
250,000	20	426	167	1,303