

## Memorandum

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TO: MATT ERDAHL, CITY OF MILLWOOD UTILITIES  
FROM: NECIA MAIANI, P.E.  
PRJ. #: 51046  
SUBJECT: WATER USE EFFICIENCY  
DATE: JUNE 25, 2024  
CC:

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### 1 Current Goal and Measures

The current goal (adopted in 2017) for the City of Millwood is: **to reduce water usage by 1% per connection during peak months, based on a three-year average.**

The estimated savings for this goal was 14 gallons per connection over approximately 90 days or 931,000 gallons total.

The measures implemented by the City to achieve this goal include the following:

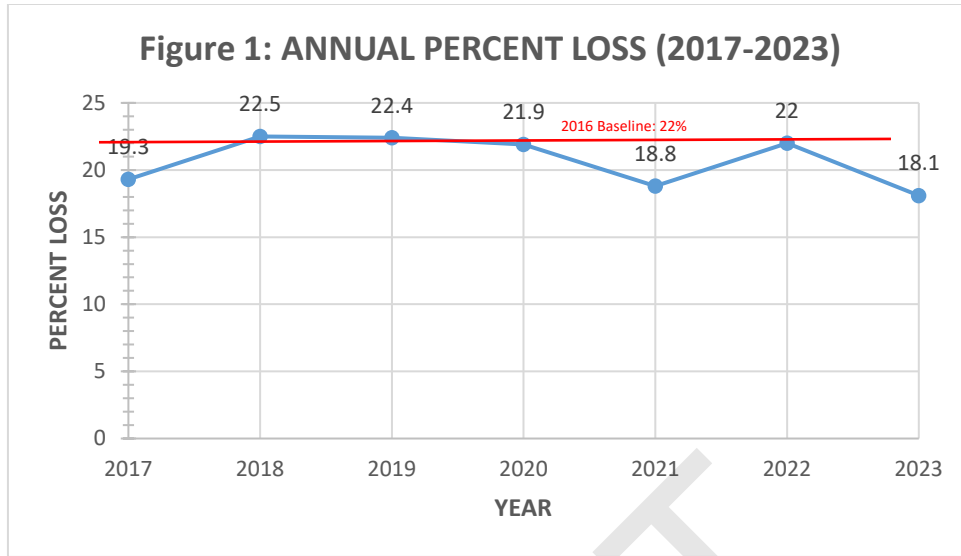
- Installation of source and consumption meters
- Meter calibration
- Implementation of Water Loss Control Action Plan
- Education of customers on water efficiency at least once per year
- Provision of rates that encourage efficiency
- Provision of irrigation conservation information kits
- Use of pump pre-lube controls
- A budget for WUE measures (\$1,000 annually)

### 2 Evaluation of Current Goal

#### 2.1 System Loss 2017-2023

The City is striving to reduce system loss to 10% or lower. Figure 1 shows that since 2016, system loss is slowly trending downward (from 22% to 18%), though it was still higher than 10%. (The City has made substantial progress in reducing loss, as in 2010, system loss was close to 40%.)

The City is working to eliminate leaking cast iron main in the water system per their capital improvement plan. As of 2017, the City had approximately 5,000 lineal feet of cast iron main. The City eliminated approximately 1,000 feet of the depreciated main between 2017 and 2024. The City is applying for funding to eliminate another 1,400 feet of cast iron main in 2025 or 2026.



## 2.2 Production 2017-2023

Table 1 below shows total annual well production for the years 2010-2023, as well as the average production of the last three years.

**Table 1: Total Annual Production**

Year	Total Annual Production (gal)
2010	251,511,000
2011	253,823,000
2012	231,272,000
2013	211,239,000
2014	225,954,000
2015	242,991,000
2016	224,262,800
2017	217,551,000
2018	226,448,000
2019	220,007,000
2020	220,125,000
2021	241,457,000
2022	206,315,000
2023	216,527,702
<b>3-Yr. Avg</b>	<b>221,433,234</b>

As shown in the table, the average annual production has trended downward since 2010. There has been a 13.91% decrease in total production from 2010 to 2023. The last three-year average (2021-2023) is approximately 2.83 million gallons less (1.26% reduction) than the 2016 baseline.

Table 2 below provides the average annual production on a per connection basis from 2010 to 2023.

**Table 2: Annual Production Per Connection**

Year	No. Connections	Total Production (gal)	Annual Production Per Connection (gal)
2010	735	251,511,000	342,192
2011	730	253,823,000	347,703
2012	733	231,272,000	315,514
2013	730	211,239,000	289,368
2014	734	225,954,000	307,839
2015	736	242,991,000	330,151
2016	736	224,262,800	304,705
2017	740	217,551,000	293,988
2018	744	226,448,000	304,366
2019	747	220,007,000	294,521
2020	751	220,125,000	293,109
2021	755	241,457,000	319,811
2022	757	206,315,000	272,543
2023	759	216,527,702	285,280
<b>3-Yr. Avg.</b>	<b>757</b>	<b>221,433,234</b>	<b>292,545</b>

As shown in the table, connections increased by 3.2% since 2010. On an annual basis, production per connection decreased 16.6% from 2010 to 2023. The last three-year average (2021-2023), annual production per connection decreased approximately 4% (12,160 gallons per year per connection).

The downward trend in annual production reflected in Tables 1 and 2 shows that the City’s efforts toward water use efficiency are working, despite an increase in connections and some very hot and dry years in this time frame.

As the City’s water use efficiency goal was focused on a reduction in use during the peak months, Table 3 shows total production per connection for the peak months, June through August, from 2010 to 2023, as well as an average total production per connection for the peak months from the last three years. Please note the peak months for 2010 and 2011 are July through September. 2012 data to current data are based on peak months June through August.

**Table 3: Peak Month Production Per Connection**

Year	No. Connections	Total Production in Peak Months (gal)	Peak Months	Production per Connection in Peak Months (gal)
2010	735	116,286,000	July, Aug, Sept	1,720
2011	730	124,845,000	July, Aug, Sept	1,859
2012	733	111,152,000	June, July, Aug	1,648
2013	730	102,645,000	June, July, Aug	1,528
2014	734	107,232,000	June, July, Aug	1,588
2015	736	121,756,000	June, July, Aug	1,798
2016	736	102,191,800	June, July, Aug	1,493
2017	740	116,121,000	June, July, Aug	1,687
2018	744	113,733,000	June, July, Aug	1,644
2019	747	110,585,000	June, July, Aug	1,592
2020	751	107,448,000	June, July, Aug	1,538
2021	755	125,234,000	June, July, Aug	1,784
2022	757	101,413,000	June, July, Aug	1,441
2023	759	114,599,923	June, July, Aug	1,624
<b>3-Yr. Avg.</b>	<b>757</b>	<b>113,748,974</b>	<b>June, July, Aug</b>	<b>1,616</b>

As shown above, production per connection during the peak months (as with the annual total production) has generally trended downward since 2010.

2023 peak month production per connection was 5.6% lower than 2010. However, the 2021-2023 production per connection average during the peak months was 123 gallons per connection more than the 2016 baseline.

We also evaluated the water use efficiency goal and progress on a consumption basis.

### 2.3 Consumption 2010-2023

Table 4 below shows the total annual consumption from 2010-2023, as well as the average consumption of the last three years.

**Table 4: Total Annual Consumption**

Year	Total Annual Consumption (gal)
2010	150,195,861
2011	151,396,973
2012	162,109,788
2013	151,311,955
2014	169,426,624
2015	187,274,656
2016	171,386,463
2017	172,158,086
2018	172,112,048
2019	167,314,466
2020	168,613,761
2021	192,224,169
2022	157,703,234
2023	173,817,483
<b>3-Yr. Avg.</b>	<b>174,581,629</b>

While the City’s annual production has trended down since 2010, Table 4 shows that total annual consumption has increased. This discrepancy is likely the result of reducing overall system loss and increasing metered connections.

2023’s total annual consumption is 15.73% higher than 2010. The 2021-2023 average is 3,195,166 gallons higher than the 2016 baseline (1.86% higher). Connections have increased by 3.2% since 2010.

Table 5 shows total annual consumption per connection from 2010-2023, as well as the average consumption per connection over the last three years.

**Table 5: Annual Consumption Per Connection**

Year	No. Connections	Total Annual Consumption (gal)	Annual Consumption Per Connection (gal)
2010	735	150,195,861	204,348
2011	730	151,396,973	207,393
2012	733	162,109,788	221,159
2013	730	151,311,955	207,277
2014	734	169,426,624	230,826
2015	736	187,274,656	254,449
2016	736	171,386,463	232,862
2017	740	172,158,086	232,646
2018	744	172,112,048	231,333
2019	747	167,314,466	223,982
2020	751	168,613,761	224,519
2021	755	192,224,169	254,602
2022	757	157,703,234	208,327
2023	759	173,817,483	229,009
<b>3-Yr. Avg.</b>	<b>757</b>	<b>174,581,629</b>	<b>230,646</b>

On a per connection basis, the total annual consumption increased 24,660 gallons from 2010 to 2023 (12%). Looking at the 2021-2023 average per connection to the 2016 baseline, there was a slight reduction, 2,216 gallons-just under 1% per connection.

Table 6 shows total consumption per connection for the peak months from 2010-2023, as well as the average consumption per connection for peak months over the last three years.

**Table 6: Peak Month Consumption Per Connection**

Year	No. Connections	Total Consumption in Peak Months (gal)	Consumption per Connection in Peak Months (gal)
2010	735	87,537,453	119,099
2011	730	92,359,293	126,520
2012	733	85,705,914	116,925
2013	730	86,349,052	118,286
2014	734	93,136,486	126,889
2015	736	107,439,332	145,977
2016	736	94,005,939	127,725
2017	740	106,810,592	144,339
2018	744	101,378,426	136,261
2019	747	97,724,696	130,823
2020	751	93,847,647	124,964
2021	755	109,257,893	144,712
2022	757	90,429,377	119,458
2023	759	104,930,921	138,249
<b>3-Yr. Avg</b>	<b>757</b>	<b>101,543,706</b>	<b>134,140</b>

- Note the peak months for 2010 and 2011 are July through September. 2012 data to current data are based on peak months June through August.

**As shown in the table above, the City did not meet their goal to reduce consumption per connection by 1% during the peak months.** Consumption per connection increased 19,000 gallons or 16% from 2010 to 2023. Consumption per connection for the 2021-2023 average was 6% higher than the 2016 baseline or 6,415 gallons.

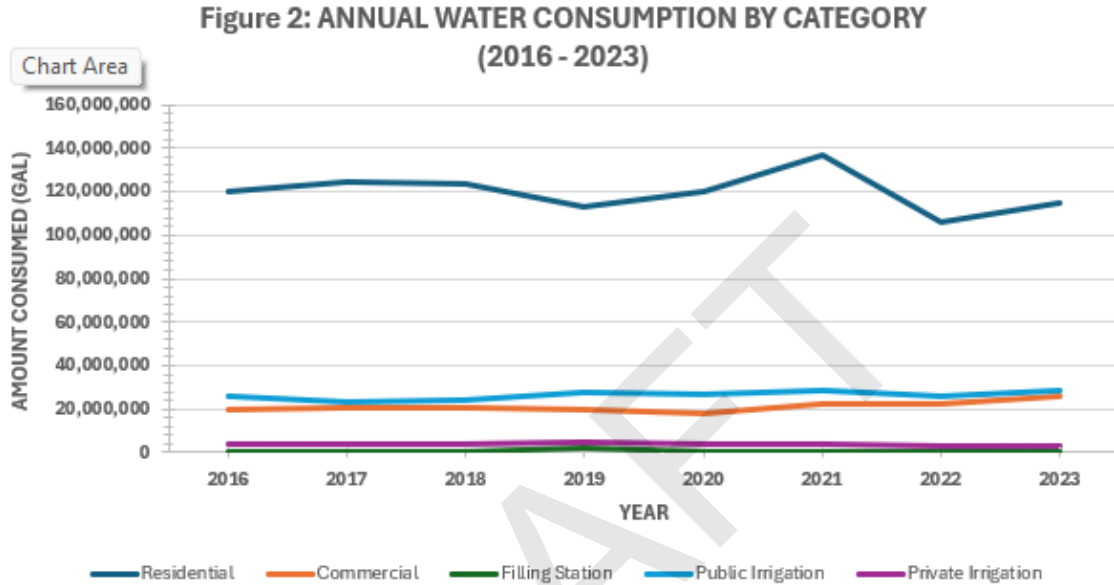
To determine trends in each user category and better understand where the increases in connections are occurring, we evaluated consumption per connection for each category between 2017 and 2023. The data is summarized in Table 7.

**Table 7: Annual Consumption Per Connection (gallons/connection) by Billing Category**

Year	Residential	Commercial	Filling Station	Public Irrigation	Private Irrigation
2017	168,382	27,392	281	31,957	4,832
2018	166,443	27,516	267	32,066	5,042
2019	151,700	26,554	2,797	37,074	5,856
2020	159,256	23,609	206	36,170	5,278
2021	181,427	29,859	261	38,072	5,243
2022	140,446	30,156	147	33,816	3,902
2023	151,584	34,598	296	38,086	4,446
<b>3-Yr. Avg.</b>	<b>157,819</b>	<b>31,538</b>	<b>235</b>	<b>36,658</b>	<b>4,530</b>
<b>Reduction (%)</b>	<b>6.27</b>	<b>-15.13</b>	<b>16.53</b>	<b>-14.71</b>	<b>6.25</b>

As shown, the annual residential consumption is trending downward. The City saw a 6% decrease (over 10,000 gallons per connection) in annual residential use since 2017 when compared to the 2021-2023 average. Private irrigation was also down 6%. Commercial and Public Irrigation rose approximately 15% each.

The relationship between the consumption of the billing categories is shown in Figure 2 below.



Because the residential category makes up approximately 2/3 of the annual total consumption, reducing consumption per connection in this category is significant to the City's overall savings. We anticipate that the City's water use efficiency measures, specifically public education and water rates that promote water conservation can be attributed to the reductions in the residential category.

#### 2.4 2017 Water Use Efficiency Program Summary

As was reflected in the prior sections, the City was unable to meet their specific 2017 goal to reduce water use during the peak months. However, the City was able to reduce both their annual consumption and production per connection since 2016. Production was reduced by over 12,000 gallons per connection or an equivalent of 2.8 million gallons. Annual consumption was reduced by 2,216 gallons per connection or an estimated 3.20 million gallons total. The reduction in annual consumption resulted in a higher savings than was estimated by the initial 2017 goal.

Based on residential trends, it appears that the City's water use efficiency measures are effective and we recommend the City continue to implement these for the next 6 years with particular emphasis on educating commercial and irrigation customers.

Based on the results seen over the last 6 years and because consumption during peak months is so volatile and tied to weather, we recommend that the City's goal for the next 6 years be based on improving efficiency (reducing consumption per connection) annually.

### 3 Proposed Goal

The new, proposed 2024, goal for the City of Millwood is: **to decrease annual water consumption from 2023 by 1% per connection, based on the three-year average of 2027-2030.**



Assuming similar growth and increase in connections (901 by 2030), this is expected to save approximately 1,049,833 gallons per year by 2030.

#### **4 Proposed Measures**

We recommend the City continue with the current measures implemented in 2017 and described within the 2017 Water System Master Plan. These measures are summarized below.

We recommend the City place particular emphasis on education for commercial and irrigation connections with respect to items 2 and 3:

1. Rates that encourage efficiency
  - a. The City will evaluate base rate and overage rates for residential and commercial users and will update the irrigation rate structure.
2. Educational newsletter or pamphlet to be mailed to water users, at least once per year
3. Discuss conservation efforts with large commercial and irrigation users
4. Budget for WUE measures
  - a. \$1,000 annually, minimum

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