

MEMORANDUM

DATE: February 26, 2021

TO: Ted Corrigan, CEO and General Manager

FROM: Michael J. McCurnin, P.E., Director of Engineering Services

SUBJECT: DMWW Long Range Plan Update and Progress Report

In 2017, DMWW Engineering staff worked closely with two engineering firms (HDR and CH2M) to compile the DMWW Long Range Plan 2017 (2017 LRP). The 2017 LRP used population, water use, and production statistics from all regional entities to project the necessary source, treatment, transmission, storage, and pumping needs for the Des Moines metropolitan region through the year 2040. While this “plan” is an excellent technical resource in regard to present-day facilities and their capabilities, it also serves as the key guide to help direct the broad and critical decision making that will be required for the region in the years ahead. It identified nearly 100 key projects, totaling more than \$600M in 2016 dollars, to be contemplated through the year 2040. All projects that were identified carry a level of importance, but the projects to provide sufficient treatment capacity are of highest importance. The 2017 LRP identified multiple ASR (aquifer storage and recovery) sites and three treatment plant expansions across the planning window, with each being done at a point in time to stay ahead of increasing maximum day consumption projections.

Early in 2021, it was decided that a comparison of recent operational data should be made against the projections that were contained in the 2017 LRP to determine if the timing of key projects could or should be altered. DMWW Engineering staff acquired HDR to use six more years of operational data (2015 through 2020) to compare against the “average day” and “maximum day” projection contained in the 2017 LRP and critique the timing of key projects. In addition to operational data, HDR was also asked to include new projected water demands for some larger water uses that were not known at the time of the 2017 effort. HDR has completed their analysis and it is summarized in the attached technical memorandum.

HDR’s DMWW Long Range Plan Update and Progress Report communicates that the key projects are effectively behind schedule and implementation dates of the treatment plant expansions need to be moved up in time. New data indicates that the order and sequencing of the treatment plant expansions may also need additional consideration to stay ahead of the projected “maximum day” consumption. Without timely corrective action, the metropolitan region may be forced to implement respective “water shortage” plans more frequently during peak times of the year to ensure consumption remains below effective treatment capacity.



Des Moines Water Works DMWW Long Range Plan Update and Progress Report

Des Moines, IA

February 25, 2021





I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa.

Mark A. Duben

2/25/2021

Mark A. Duben

Date

License number 10800

My license renewal date is December 31, 2021

Pages or sheets covered by this seal: Entire bound document.

Introduction

The purpose of this Technical Memorandum (TM) is to update elements of the Des Moines Water Works (DMWW) Long Range Plan (LRP) and report on progress of planned capital improvements of the LRP.

The Des Moines Water Works is an independently operated municipal utility providing drinking water to more than 500,000 customers in the Des Moines and surrounding metropolitan area. Over 20 central Iowa cities, rural water districts, and other entities located in Polk, Warren, Madison, and Dallas counties are served by DMWW.

DMWW owns and operates three water treatment plants (WTPs): Fleur Drive Water Treatment Plant (Fleur), L.D. McMullen Water Treatment Plant (McMullen), and Saylorville Water Treatment Plant (SWTP). The total combined treatment capacity is approximately 110 million gallons per day (mgd). The sources of supply include the Raccoon River, Des Moines River, park infiltration ponds, and the infiltration gallery at Fleur; Maffitt Reservoir, Crystal Lake, and several alluvial groundwater wells at McMullen; and alluvial wells at SWTP.

DMWW distribution system includes distribution piping that is owned and operated by the DMWW along with several consecutive customers for which the DMWW provides full service, including Windsor Heights, Pleasant Hill, Cumming, Alleman, Runnells, Berwick, Greenfield Plaza, and Woodland Lake Estates. Construction of the distribution system began in 1871 and has continued to expand over the years. The Des Moines distribution system includes approximately 900 miles of distribution piping. Consecutive systems operated by the DMWW add an additional 500 miles of piping. Piping ranges in size from 4-inch to 60-inch. System storage includes three standpipes, four elevated water storage tanks, and two ground storage tanks. Other distribution infrastructure includes 10 pumping stations and three aquifer storage and recovery wells.

In 2017, DMWW completed long range planning for water supply source, treatment, and distribution system infrastructure, resulting in the Des Moines Water Works (DMWW) Long Range Plan (LRP) dated September 19, 2017. DMWW now desires to update elements of the plan and report on the progress of planned capital improvements as follows:

- Collect average day and maximum day water production data (from water treatment and aquifer storage and recovery (ASR) facilities) for the years 2015 through 2020 from DMWW, the City of Altoona, the City of Ankeny, the City of Grimes, the City of Polk City, West Des Moines Water Works (WDMWW), and Xenia Rural Water District. These entities and facilities encompass all of the water source, treatment, and ASR capacity of the metro region. The 2017 LRP included actual population, water demand, and production data through year 2014. Years 2015 and beyond were projections for future years in the LRP.
- Collect water demand data for other major water users that have developed since the LRP was completed in 2017.
- Determine the status of high priority improvements (5-year CIP) from the LRP to indicate which improvements have been completed and which have not been completed.
- Update average day and maximum day water demands for the region using the collected actual water production for the years 2015 through 2020 and compare to those presented in the LRP.

- Update average day and maximum day water demand projections for the region for the years 2025, 2030, 2035, and 2040 and compare to those presented in the LRP. Additional water demands for other major water users that have developed since the LRP was completed in 2017 will be incorporated into the projections.
- Population data through 2020 and population projections beyond 2020 will not be updated, since 2020 census population data will not yet be available for this LRP update.
- Update production facility requirements for updated maximum day demands to indicate additional production capacity required in 2020, 2025, 2030, 2035, and 2040, with consideration of planned ASR production capacity from the LRP.
- Update the status of high priority improvements (5-year CIP) from the LRP to indicate which improvements have been completed and which have not been completed.
- Provide a Technical Memorandum (TM) summarizing the elements of the LRP update and progress report.
- Prepare a PowerPoint presentation summarizing the TM, LRP update and progress report.
- Present to the DMWW Board of Trustees.
- Present to representatives of the metro region.

Population and Demand Projections

The 2017 LRP provided historic and projected populations, water demands, and water production requirements, with historic data from years 1920 through 2015. The historic water demand data are updated from years 2016 through 2020 herein. Trend lines and projections are based on the 2017 LRP for years 1920-2015. Water demand data for DMWW are summarized in the following figures:

Figure 2-1. Historic and Projected Average Day Demand for DMWW from 1920-2020

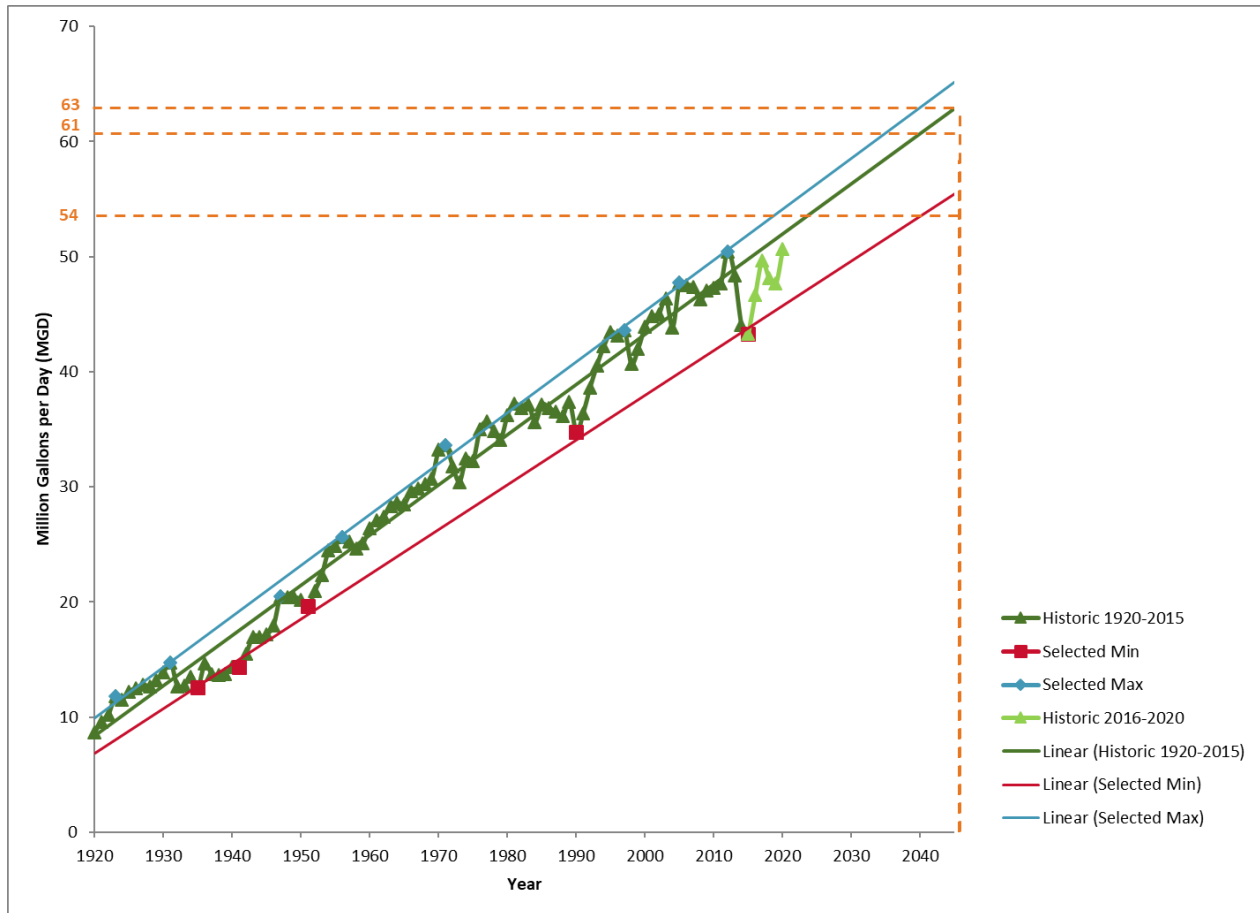
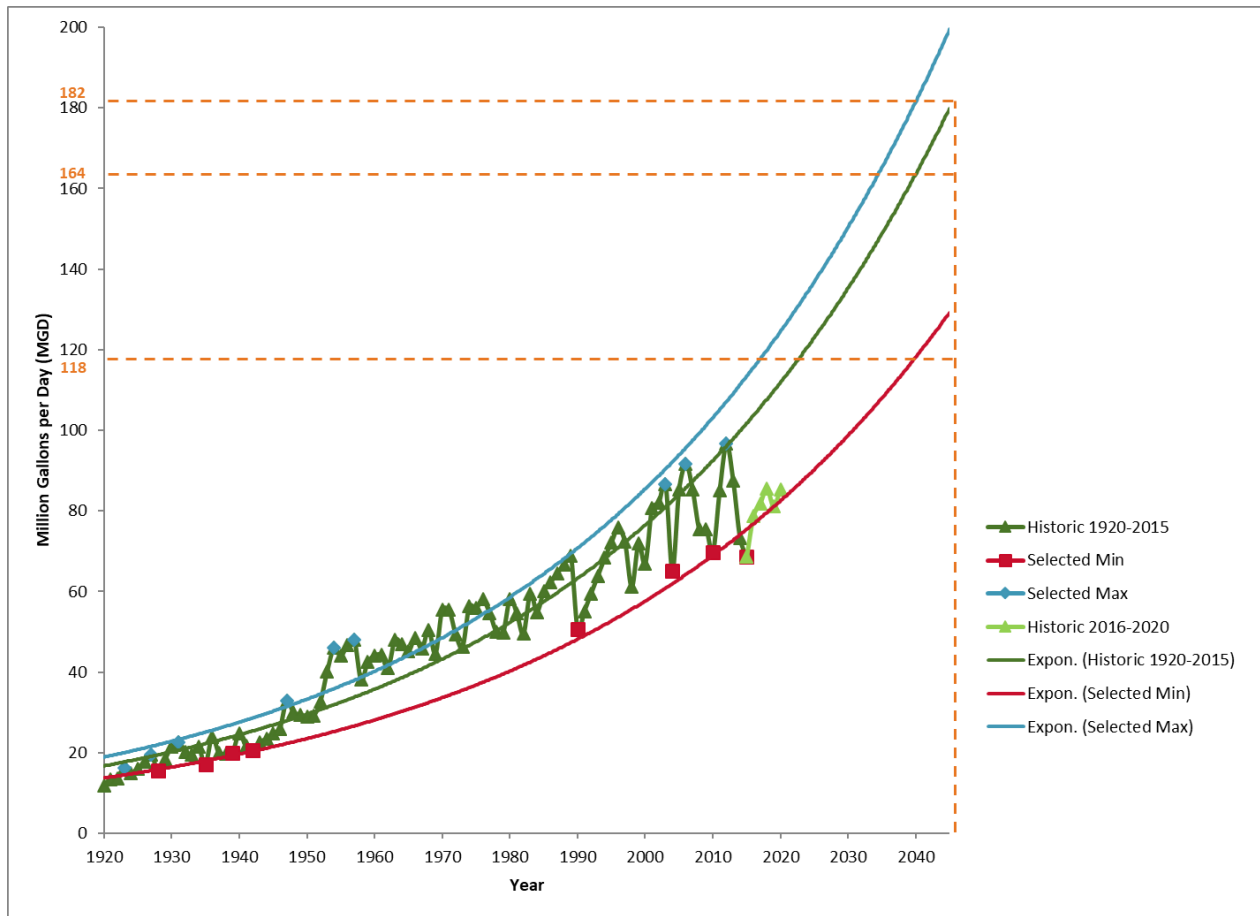


Figure 2-2. Historic and Projected Maximum Day Demand for DMWW from 1920-2020



DMWW recently contacted the entities that provide all of the water source, treatment, and ASR capacity of the metro region to collect average day and maximum day water production data (from water treatment and aquifer storage and recovery (ASR) facilities) for the years 2015 through 2020. A summary of the average day and maximum day water production data for 2015 and 2020 is provided in Table 2-1.

Table 2-1. Water Production Summary

Production	Units	DMWW 3 WTP 3 ASR	Altoona 1 WTP	Ankeny 2 ASR	Grimes 1 WTP 1 ASR	Polk City 1 WTP	WDMWW 1 WTP	Xenia 1 WTP	Total Metro
2015									
Average Day	mgd	43.28	1.82		1.22	0.11	4.57	0.27	51.27
Maximum Day	mgd	68.53	3.42	2.96	1.72	0.27	6.48	0.46	83.84
2020									
Average Day	mgd	50.65	2.37		1.49	0.30	5.18	0.25	60.22
Maximum Day	mgd	85.24	4.06	4.28	3.39	0.44	8.25	0.55	106.22

DMWW contacted the City of Altoona, the City of Waukee, and West Des Moines Water Works (WDMWW) to collect water demand data for other major water users that have developed since the LRP was completed in 2017. A summary of the major water user new demand is provided in Table 2-2.

Table 2-2. Major Water User New Demand Since 2017 LRP Summary

Entity	Units	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
City of Altoona	Major water user demand to date is 0.350 mgd, predicted to increase to 0.500 mgd by 2025.										
Maximum Day	mgd					0.15	0.15	0.15	0.15	0.15	0.15
City of Waukee	Major water user demand of 0.750 mgd developed over 20 years. Recommended 0.050 mgd in 2022 and spread remaining 0.700 mgd over 19 years from 2023 to 2041.										
Maximum Day	mgd		0.050	0.087	0.124	0.161	0.197	0.234	0.271	0.308	0.345
WDMWW	New large customer demand of 5 mgd spread across 5 years 2022 through 2026.										
Maximum Day	mgd		1.00	2.00	3.00	4.00	5.00	5.00	5.00	5.00	5.00
Total											
Maximum Day	mgd		1.05	2.09	3.12	4.31	5.35	5.38	5.42	5.46	5.50

A summary of the population and demand projections for DMWW's service area from the 2017 LRP updated with the new demand data is provided in Table 2-3. Population data through 2020 and population projections beyond 2020 are not updated, since 2020 census population data is not yet available for this LRP update. Actual 2020 Average Day Demand was 60.22 mgd versus the projection of 62.54 mgd, only 3.7% less than the projected demand. Therefore, the Average Day Demand is tracking very well with the LRP projection through 2020.

Actual 2020 Maximum Day Demand was 106.22 mgd versus the projection of 134.81 mgd, or 21% less than the projected demand. While the mid-to-late summer of 2020 was drier than normal, the overall year was not an extreme drought year where irrigation demand makes up a significant portion of the overall demand to produce the design maximum day demand. Drought conditions in 2020 were more extreme in west-central and northwest Iowa, but not as severe locally in the Des Moines metro area. Historic maximum day demands have occurred earlier in the summer season when earlier hot and dry conditions result in more extensive irrigation water use. Since the actual Average Day Demand has been very close to the projections, both Average Day Demand and Maximum Day Demand projections of the 2017 LRP will be unchanged, with the new planned major water user demands added.

Table 2-3. Population and Demand Summary

System	Units	2015	2020	2025	2030	2035	2040
Population	people	538,312	606,832	661,339	717,514	776,607	835,342
Average Day Demand¹	mgd	55.15(51.27)	62.54(60.22)	67.96	74.03	80.75	87.20
Maximum Day Demand¹	mgd	115.77(83.84)	134.81(106.22)	146.71	160.15	174.98	189.13
New Demand²	mgd			4.31	5.50	5.68	5.86
Maximum Day Demand³	mgd		115.77	134.81	151.02	165.65	180.66

¹Actual 2015 and 2020 Average Day and Maximum Day Demands are shown in parentheses in red. Original projections from 2017 LRP are shown in black.

²New Maximum Day Demand for planned new major water users since the 2017 LRP is shown in red.

³Updated Total Maximum Day Demand is shown in red.

A summary of treatment facilities is provided in Table 2-4.

Table 2-4. Treatment Facility Summary

Facility Name	Owner	Capacity
Fleur WTP	DMWW	75 mgd
McMullen WTP	DMWW	25 mgd
Saylorville WTP	DMWW	10 mgd
Altoona WTP	City of Altoona	4 mgd
Grimes WTP ¹	City of Grimes	3.5(4.5) mgd
Polk City WTP ²	City of Polk City	0.3 mgd
A.C. Ward WTP	WDMWW	10 mgd
Xenia Rural WTP ³	Xenia Rural	0.8 to 1.6 mgd

¹Grimes WTP expansion to 4.5 mgd capacity is planned for 2021.

²Anticipated be abandoned by 2035.

³Beginning production at 0.8 mgd in 2035, and increasing to 1.6 mgd in 2040.

A summary of ASR facilities is provided in Table 2-5.

Table 2-5. ASR Summary

Entity	ASR Name	Capacity					
		2015	2020	2025	2030	2035	2040
DMWW	LP Moon	3.0	3.0	3.0	3.0	3.0	3.0
	McMullen ¹	3.5 (3.1)	3.5 (3.1)	3.5 (3.1)	3.5 (3.1)	3.5 (3.1)	3.5 (3.1)
	Army Post Road	-	3.0	3.0	3.0	3.0	3.0
	Future ASR #4 ²	-	3.0	3.0	3.0	3.0	3.0
	Future ASR #5	-	-	-	-	3.0	3.0
	Future ASR #6	-	-	-	-	-	3.0
Ankeny	ASR #1 and Replacement	1.4	1.4	1.5	1.5	1.5	1.5
	ASR #2 and Replacement	2.7	2.7	2.7	2.7	2.5	2.5
Waukee	Future ASR #1 ³	-	-	2.5 (1.4)	2.5 (1.4)	2.5 (1.4)	2.5 (1.4)
WDMWW	Future ASR #1 ²	-	3.0	3.0	3.0	3.0	3.0
Total¹	Fixed Capacity (All ASRs in Service)	40.6 (10.2)	49.6 (13.2)	22.2 (20.7)	22.2 (20.7)	25.0 (23.5)	28.0 (26.5)
	Firm Capacity (1 ASR out of Service)	7.1	46.4 (10.1)	48.7 (17.6)	48.7 (17.6)	24.5 (20.4)	24.5 (23.4)
	Firm Capacity (2 ASRs out of Service)	4.1	43.4 (7.1)	45.7 (14.6)	45.7 (14.6)	48.5 (17.4)	24.5 (20.4)

¹McMullen ASR capacity is currently 3.1 mgd instead of 3.5 mgd as reported in the 2017 LRP.

²DMWW Future ASR #4 and WDMWW Future ASR #1 were not constructed and operational by 2020 per the 2017 LRP.

³Waukee Future ASR #1 is currently planned for 1.44 mgd capacity instead of 2.5 mgd as reported in the 2017 LRP.

The future production requirements for DMWW can be calculated by taking the total Maximum Day Demand (MDD) projections and subtracting the production capacity of connected systems. ASR capacity can also be used to offset MDD. Table 2-6 summarizes the existing production capacity, anticipated production requirements, and additional production capacity required over the planning period. The production requirements result in a long-term 2040 deficiency between 51.5 to 54.5 mgd depending on a 10 mgd production capacity buffer and ASR firm capacity. The maximum required production capacity for 2040 is used for the supply and treatment analyses without other major production capacity from entities other than DMWW. If other entities would provide major production capacity, then the production capacity to be provided by DMWW would decrease accordingly.

Near-term 2020 production deficiency between 6.9 to 9.9 mgd results due to the two ASR facilities not being constructed and operational by 2020, which effectively removes most or all of the desired 10 mgd production buffer. This 2020 deficiency would have been only 0.9 to 3.9 mgd if the two ASR facilities were operational by 2020, effectively maintaining most of the 10 mgd production buffer.

The 2025 projected production deficiency is between 14.6 to 17.6 mgd, even with the DMWW #4 and WDMWW #1 ASR capacity online plus a new Waukee #1 ASR facility online. Therefore, additional water source and treatment production capacity between 14.6 to 17.6 mgd must be provided by 2025, in addition to the three ASR facilities, to satisfy the projected production requirements and maintain the desired 10 mgd production buffer. If other entities would provide major production capacity, then the production capacity to be provided by DMWW would decrease accordingly.

Table 2-6. Production Facility Requirements Summary

Description	2015	2020	2025	2030	2035	2040
Total Maximum Day Demand ¹	115.8	134.8	146.7 (151.0)	160.2 (165.6)	175.0 (180.7)	189.4 (195.0)
Production Buffer	10.0	10.0	10.0	10.0	10.0	10.0
Production of Connected Wholesale Customers ^{1,3}	16.7	17.8	17.8 (18.8)	17.8 (18.8)	18.2 (19.3)	19.0 (20.1)
ASR Production Capacity ^{1,2,4}						
All ASRs In Service	40.6 (10.2)	49.6 (13.2)	22.2 (20.7)	22.2 (20.7)	25.0 (23.5)	28.0 (26.5)
1 ASR Out of Service	7.1	46.4 (10.1)	48.7 (17.6)	48.7 (17.6)	21.5 (20.4)	24.5 (23.4)
2 ASRs Out of Service	4.1	43.4 (7.1)	45.7 (14.6)	45.7 (14.6)	18.5 (17.4)	21.5 (20.4)
DMWW Production Capacity Required ¹						
All ASRs In Service	98.9	113.8	121.5	136.1	147.9	158.4
1 ASR Out of Service	102.0	440.9 (116.9)	419.7 (124.6)	433.2 (139.2)	444.8 (151.0)	455.6 (161.5)
2 ASRs Out of Service	105.0	413.9 (119.9)	422.7 (127.6)	436.2 (142.2)	447.8 (154.0)	458.6 (164.5)
Existing DMWW Production Capacity	110.0	110.0	110.0	110.0	110.0	110.0
Additional DMWW Production Capacity Required ¹						
All ASRs In Service	0.0	3.8	11.5	26.1	37.9	48.4
1 ASR Out of Service	0.0	0.9 (6.9)	10.2 (14.6)	23.7 (29.2)	35.3 (41.0)	45.6 (51.5)
2 ASRs Out of Service	0.0	3.9 (9.9)	13.2 (17.6)	26.7 (32.2)	38.3 (44.0)	48.6 (54.5)

¹Data from 2017 LRP are shown in black, updated data are shown in red.

²DMWW Future ASR #4 and WDMWW Future ASR #1 were not constructed and operational by 2020 per the 2017 LRP. Updated ASR current and planned capacities are also provided.

³Production of Connected Wholesale Customers data from Table 2-4.

⁴ASR Production Capacity data from Table 2-5.

Long Range Plan

The 2017 Long Range Plan included improvements for three major raw water supply and treatment scenarios with associated transmission and distribution, phased into 5-year increments from 2020 through 2040. The three scenarios included:

Scenario 1 – Fleur WTP Expansion

- Expand Fleur WTP from 75 to 100 mgd
- Expand Saylorville WTP from 10 to 20 mgd
- Expand McMullen WTP from 25 to 37.5 mgd
- Expand ASR Capacity as outlined in Table 2-5.

Scenario 2 – Saylorville WTP Expansion

- Rehabilitate Fleur WTP to Maintain 75 mgd
- Expand Saylorville WTP initially from 10 to 20 mgd, and ultimately to 45 mgd
- Expand McMullen WTP from 25 to 37.5 mgd
- Expand ASR Capacity as outlined in Table 2-5

Scenario 3 – 4th Water Treatment Plant

- Rehabilitate Fleur WTP to Maintain 75 mgd
- Expand Saylorville WTP from 10 to 20 mgd
- Expand McMullen WTP from 25 to 37.5 mgd
- Construct 4th WTP at 25 mgd
- Expand ASR Capacity as outlined in Table 2-5

The 2017 Long Range Plan recommended base treatment improvements for rehabilitation of the Fleur WTP at 75 mgd capacity, 10 mgd expansion of the Saylorville WTP to 20 mgd capacity, and 12.5 mgd expansion of the McMullen WTP to 37.5 mgd capacity. Corresponding source water improvements, as well as other ASR, storage, pumping, and distribution/transmission improvements would accompany these base treatment improvements. The base improvements would result in a total DMWW production capacity of 132.5 mgd. Accounting for the recommended ASR capacity, 10 mgd production buffer, production capacities of connected wholesale customers, and projected maximum day demands to year 2040, a decision must be made to implement Scenario 1, 2, or 3 before reaching DMWW production capacity of 132.5 mgd before year 2027 without other major production capacity by entities other than DMWW. At that time, another 25 mgd of production capacity would be required to reach year 2037, either by expansion of Fleur WTP (Scenario 1) or expansion of Saylorville WTP (Scenario 2) or construction of a 4th WTP (Scenario 3). The increased water demands of this current evaluation result in the final planned 25 mgd of production capacity being exceeded in year 2037 instead of year 2040. Alternately, a final production capacity increase of 30 mgd instead of 25 mgd would be necessary to reach year 2040. The most desirable final

scenario at this time is likely the ultimate expansion of future source and treatment facilities at the Saylorville WTP site.

From the recommended capital projects and costs presented in the 2017 LRP, projects were prioritized into phases by 5-year increments through water demand projections, hydraulic modeling, and system performance analysis. Planning-level opinions of probable construction cost were established through 2040. Costs for any improvements beyond 2040 were not developed. Based on the relative benefit of the projects, individual implementation years were assigned to them within their five-year planning periods.

Through the completion of the 2017 Long Range Plan process, high priority improvements consisting of the first five years of projects were developed. High priority improvements for each major improvement category for the years between 2017 and 2025, and the status relative to completion, are as follows:

High Priority Improvements (CIP through 2025)

- xxxxxxx denotes project not yet started
- xxxxxxx denotes project 100% complete
- xxxxxxx denotes project 50% complete
- xxxxxxx denotes project 10% complete

Source Water

- SU-20-01 2018 McMullen WTP Crystal Lake Improvements and Nitrate Management
- SU-20-02 2018 Fleur WTP Nitrate Removal Facility Expansion
- SU-20-06 2019 Fleur WTP Alluvial Water Supply Expansion
- SU-25-01 2023 Saylorville WTP Raw Water Supply for 10 mgd MF/RO Expansion

Water Treatment

- TR-20-01 2020 Fleur WTP Filter Rehabilitation
- TR-20-03 2018 Fleur WTP Upgrading Study
- TR-20-04 2019 Fleur WTP Chemical Feed and Storage
- TR-20-05 2019 Fleur WTP Filter Press Rehabilitation
- TR-20-06 2018 Fleur WTP Clearwell Improvements
- TR-20-07 2020 Fleur WTP Lime Softening Mixing Improvements
- TR-25-01 2024 Saylorville WTP 10 mgd MF/RO Expansion
- TR-25-02 2023 Saylorville WTP Flood Improvements
- TR-25-03 2021 Fleur WTP Electrical Supply Improvements
- TR-25-04 2021 Fleur WTP I&C Improvements
- TR-25-05 2022 McMullen WTP DBP Improvements

Aquifer Storage and Recovery

- AR-20-01 2020 DMWW ASR #4 (Joint Eastside Booster Pump Station)

Storage

- ST-20-01 2019 LP Moon Ground Storage Reservoir 2
- ST-20-02 2020 Water Storage Aeration for Disinfection Byproduct Removal
- ST-25-01 2022 Southwest Ground Storage Reservoir
- ST-25-02 2023 Joint Northside Water Tower
- ST-25-03 2025 Airport Elevated Water Tower

Pumping

- PU-20-01 2018 Joint Southwest Booster Station with VFDs and Backup Power
- PU-20-02 2018 Polk City Booster Station Replacement with VFDs and Backup Power
- PU-20-03 2018 Existing SE Polk South (Bondurant) Pump Station Chloramination
- PU-20-04 2018 LP Moon Pumping Expansion with VFDs and Backup Power

- PU-20-05 2019 Pleasant Hill Pump Station Replacement with VFDs & Backup Power
- PU-20-06 2020 Airport Booster Station Backup Power
- PU-20-07 2020 Xenia Booster Station Purchase and Upgrade
- PU-25-01 2022 SW Pump Station, Chlorine Booster Facility, VFDs & Backup Power
- PU-25-02 2023 Alleman/SE Polk Booster Pump Station with VFDs, Backup Power & Booster Chlorination

Distribution/Transmission

- DT-20-01 2022 Cumming and Norwalk Feeder Main from McMullen WTP
- DT-20-02 2018 South Feeder Main from McMullen to Supply Wholesale Customers
- DT-20-03 2018 Altoona Connection Main to Elevated Tower (Altoona Project)
- DT-20-05 2018 Army Post Road McMullen-Fleur WTP Balancing Control Valve
- DT-20-06 2018 Polk City Booster Station Suction Feeder Main
- DT-20-08 2019 Saylorville to Johnston-Tenny Feeder Main Connection
- DT-20-09 2019 Tenny to LP Moon Feeder Main Connection
- DT-20-10 2019 Purchase Remaining Capacity in Polk City Feeder Main
- DT-20-11 2020 Joint Eastside Area to Pleasant Hill Booster Station Feeder Main
- DT-25-01 2021 Feeder Main Replacement from Fleur WTP to Hazen
- DT-25-02 2021 Feeder Replacement to the South from Hazen Pump Station
- DT-25-03 2021 NW 37th St Connection Main to Complete Loop (Developer Project)
- DT-25-04 2021 Improved Transmission North and East from Fleur WTP
- DT-25-05 2022 Replacement Feeder Main North of Airport Boosted Area
- DT-25-06 2022 Improved Transmission + Fire Flow Main Replacement East in Des Moines Pressure Zone
- DT-25-09 2022 Western Transmission Feeder Main to Supply Wholesale Customers
- DT-25-10 2023 Unincorporated Polk County to Alleman/SE Polk Connection
- DT-25-11 2023 Saylorville to LP Moon Feeder Connection
- DT-25-13 2024 Alleman/SE Polk Booster Station Transmission Main Connection to Alleman
- DT-25-14 2025 Airport Water Tower Area Transmission Feeder Main Replacement

As shown above, the status of high priority projects designated to be completed through year 2020 or started ahead of schedule are summarized as follows:

- 32 Total Projects
- 6 Projects 100% Complete (19%)
- 3 Projects 50% Complete (9%)
- 4 Projects 10% Complete (13%)
- 19 Projects Not Yet Started (59%)

Therefore, the majority of the high priority improvements have not yet been started and are behind the schedule of the 2017 LRP.

The 2017 LRP high priority projects list includes several projects for rehabilitation of Fleur WTP to maintain its reliable 75 mgd capacity, as well as additional 10 mgd production capacity for raw water supply and treatment expansion of Saylorville WTP. Associated storage, pumping, and distribution/transmission improvements are also included for reliability and capacity improvements. Additional 12.5 mgd production capacity for raw water supply and treatment expansion of McMullen WTP was not scheduled until years 2029-2030.

With the updated water demands and associated additional production capacity required from this LRP update, the schedule of these two WTP capacity expansion projects must be accelerated without other major production capacity by entities other than DMWW. Furthermore, the two ASR facilities originally planned for completion by 2020 (DMWW ASR#4 and WDMWW ASR#1) must also be completed as soon as possible. The schedule for the planned WTP capacity expansion projects to be completed is provided in Table 3-1.

The total production capacity required by year is based on the midpoint of the range between one ASR out of service and two ASRs out of service. With the number of ASRs in service increasing from 8 in 2025 to 10 in 2040, it is highly likely that one ASR would be out of service at any time and reasonable to assume that two ASRs may be out of service at any time. Furthermore, these ASRs will be operated by Ankeny, Waukee, and WDMWW in addition to DMWW. Therefore, it is prudent to plan for ASR firm capacity with more than one ASR out of service, so this evaluation uses a firm capacity of the midpoint between one ASR and two ASRs out of service.

The 10 mgd raw water supply and treatment expansion of Saylorville WTP must be completed as soon as possible, since the current total production capacity required exceeds the existing total capacity. Effectively, the desired 10 mgd production capacity buffer is not available and the existing production capacity with no buffer will be exceeded in year 2021. The 10 mgd raw water supply and treatment expansion of Saylorville WTP would require 1-2 years for design and 2-3 years for construction, or overall 3-5 years for completion with capacity online by years 2023-2025 if started immediately. The DMWW ASR#4 and WDMWW ASR#1 would require a similar timeline for completion of design, construction, and filling/recovery cycles to be fully online by years 2023-2025.

By year 2025, with the Saylorville WTP expansion, DMWW ASR#4, WDMWW ASR#1, and Waukee ASR#1 online, the production capacity required (126.1 mgd) would exceed the capacity provided (120 mgd), effectively reducing the production capacity buffer to only 4 mgd. Therefore, the 12.5 mgd production capacity for raw water supply and treatment expansion of McMullen WTP should follow the Saylorville WTP expansion as soon as possible. By year 2027, the production capacity required (131.9 mgd) would approach the capacity provided by the McMullen WTP expansion (132.5 mgd) with the 10 mgd production capacity buffer provided. The 25-30 mgd final scenario production capacity expansion would be required to be online by 2028 to maintain the 10 mgd production capacity buffer.

If these ASR and source/treatment capacity improvements are not provided on this schedule, then water shortage plan implementation may be necessary much faster to ensure that maximum water demand does not exceed production capacity until the necessary capacity improvements can be implemented.

Table 3-1. Schedule for Production Capacity Expansion

Facility and Project	Units	Total Capacity	Total Production Capacity Required by Year ¹								
			2020	2021	2025	2027	2030	2035	2037	2040	
Existing Capacity	mgd	110.0	118.4								
Saylorville Expansion	mgd	120.0		119.9							
McMullen Expansion	mgd	132.5				131.9					
Final Scenario Expansion (25)	mgd	157.5							156.7		
Final Scenario Expansion (30)	mgd	162.5									163.0

¹Total Production Capacity Required by Year from Table 2-6, with values at midpoint of range between 1 ASR and 2 ASRs out of service, and values for intermediate years linearly interpolated between values for every 5 years. Includes 10 mgd production capacity buffer and planned ASR firm capacity, without other major production capacity by entities other than DMWW.

In conclusion, the timeline for high priority improvements cannot be relaxed and must be accelerated from the schedule of the 2017 LRP. Three water source/treatment expansions and three ASRs (one ASR each by DMWW, WDMWW, and Waukee) must be completed by year 2028 to keep up with the projected water demands, without other major production capacity by entities other than DMWW. DMWW staff should further evaluate the sequence, timing, and costs of the source/treatment expansions and other associated storage, pumping, and distribution/transmission high priority improvements to incorporate into the near-term CIP process.