



Des Moines
Water Works
Water You Can Trust for Life

Long Range Plan

Regional Technical Advisory Committee

June 22, 2017

10:00 am - 12:00 pm

HDR **ch2m**

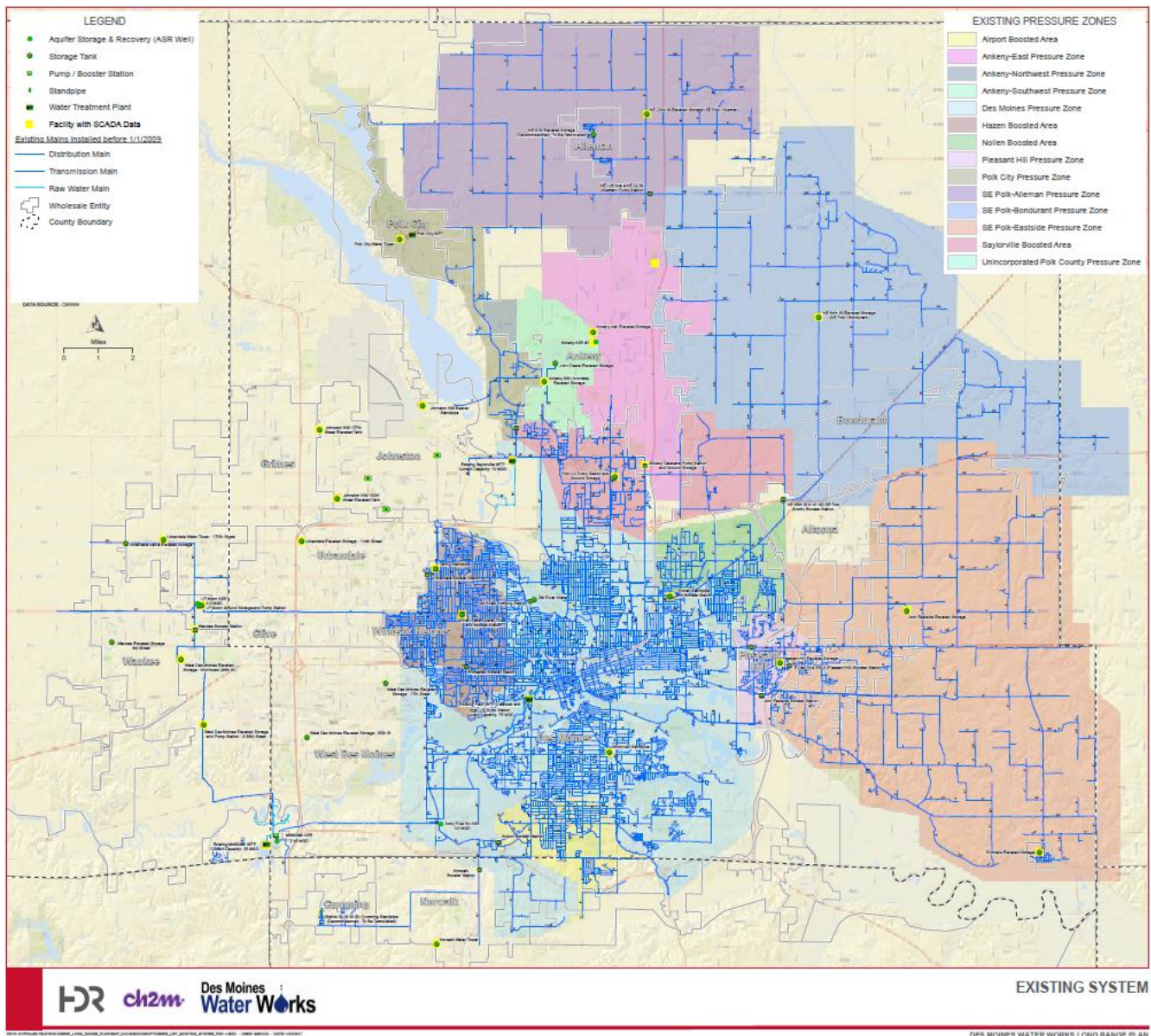
Long Range Plan Process

- Previous plan completed by DMWW in 2009
 - Basis for improvements up to year 2020
- Current plan by DMWW, HDR and CH2M in 2016-2017
 - Projected population and water demands
 - Reviewed existing DMWW facilities and wholesale customer connections
 - Evaluated source water, water treatment, and distribution infrastructure
 - Developed staged implementation plans through the year 2040
- Recommended improvements in a staged plan for the design years 2020, 2025, 2030, 2035, and 2040

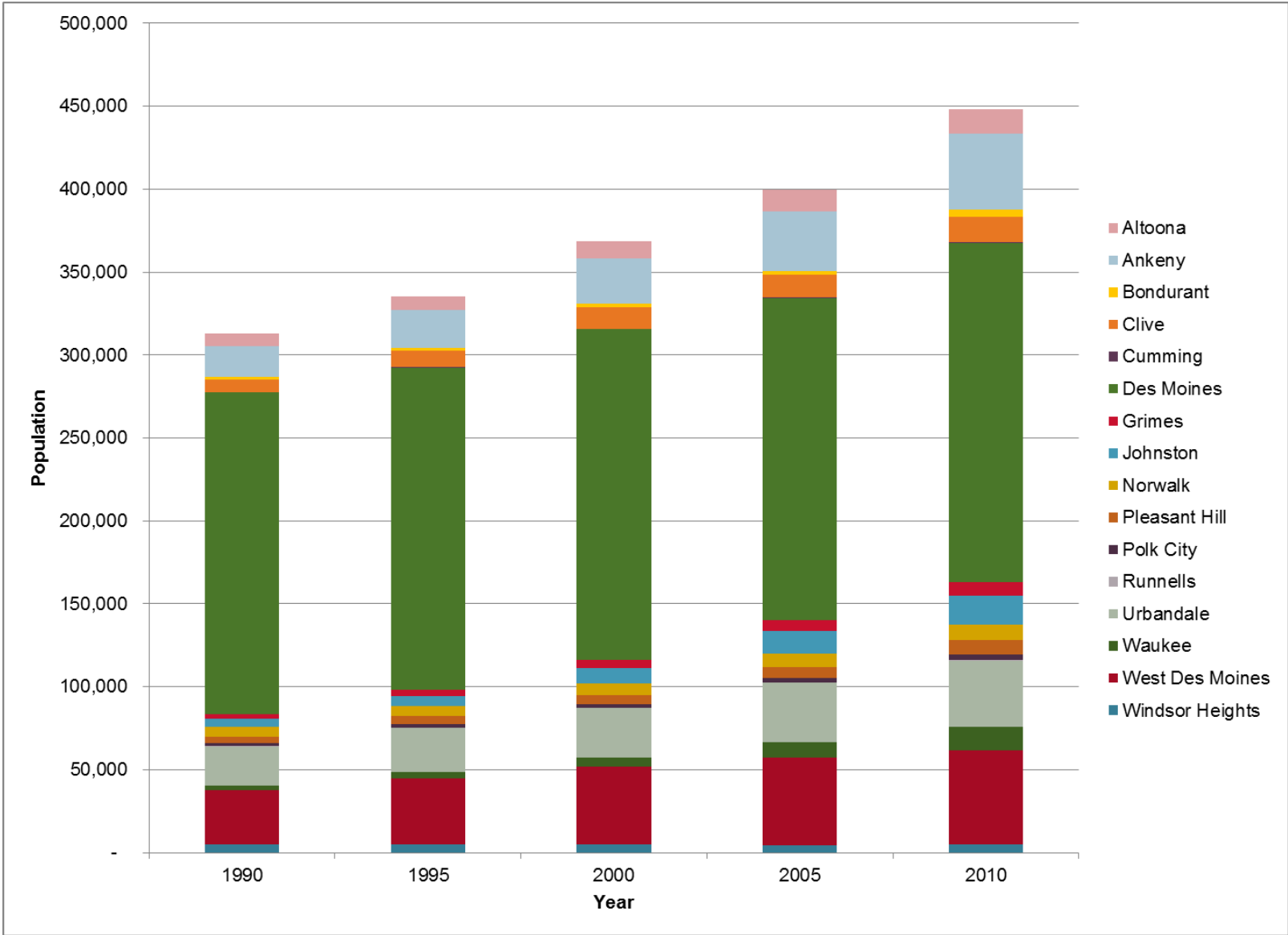
Service Areas

Community Name	Service Area Type
Altoona	Wholesale Customer
Ankeny	Wholesale Customer
Berwick	Total Service
Bondurant	Wholesale Customer
Clive	Wholesale Customer
Cumming	Total Service
Des Moines	DMWW Owned and Operated
Grimes	Wholesale Customer (Anticipated Future)
Johnston	Wholesale Customer
Norwalk	Wholesale Customer
Pleasant Hill	Total Service
Polk City	Wholesale Customer
Runnells	Total Service
Polk County / Southeast Polk Rural Water District (SE Polk)	DMWW Owned and Operated
Urbandale	Wholesale Customer
Warren County	DMWW Owned and Operated
Warren County Water District	Wholesale Customer
Waukee	Wholesale Customer
West Des Moines	Wholesale Customer
Windsor Heights	Total Service
Xenia Rural Water District	Wholesale Customer

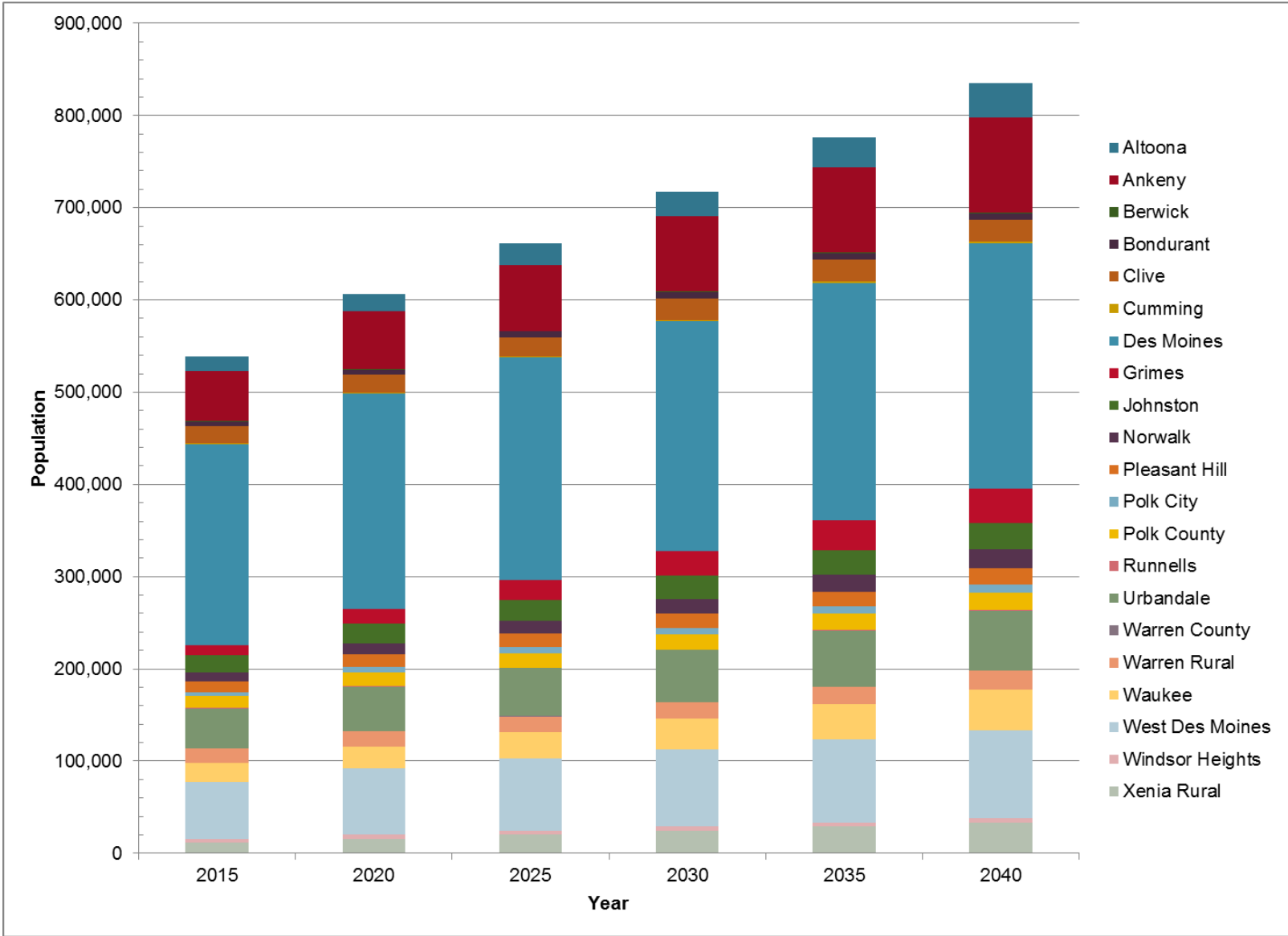
Service Areas



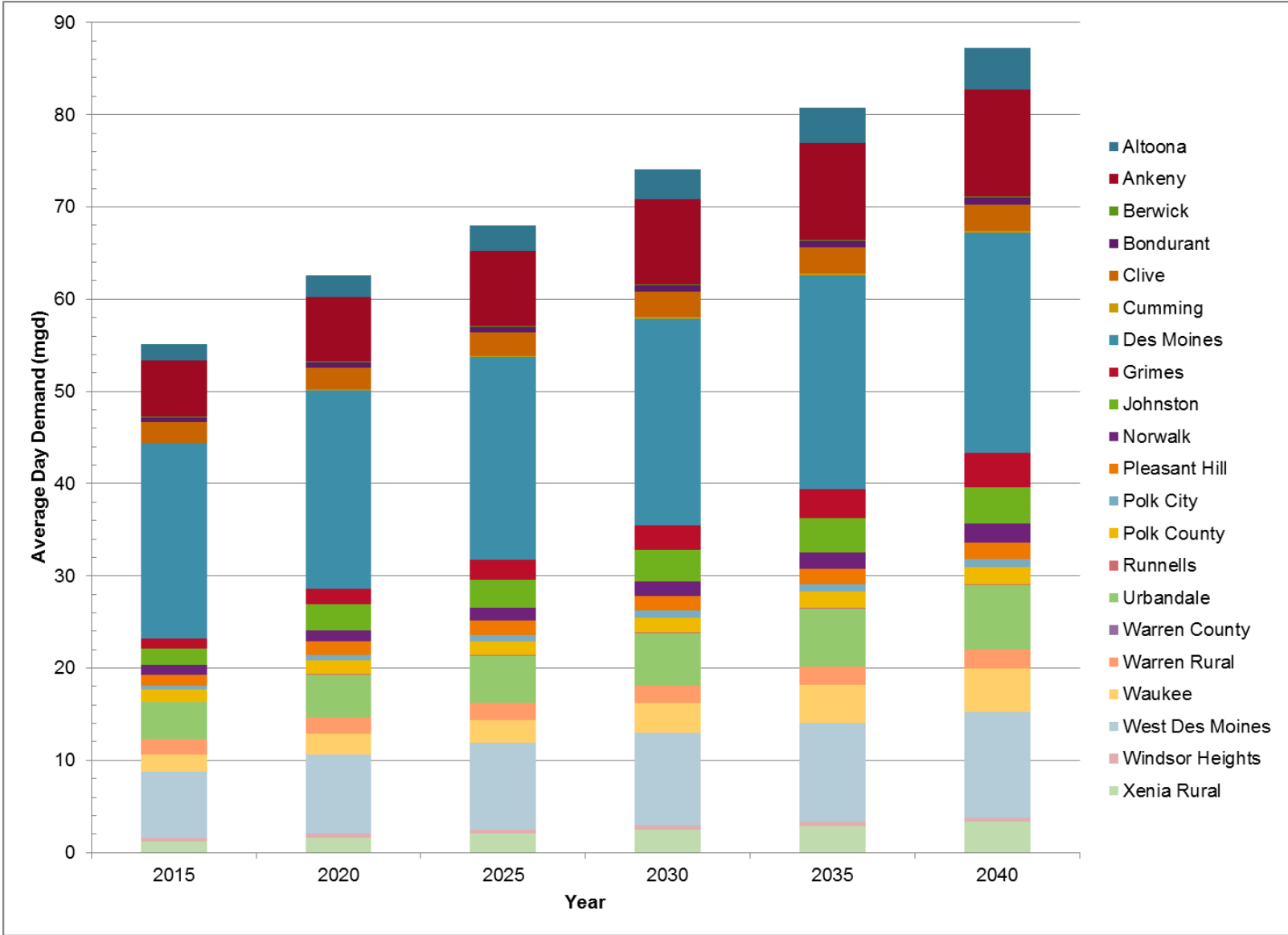
Historic Populations



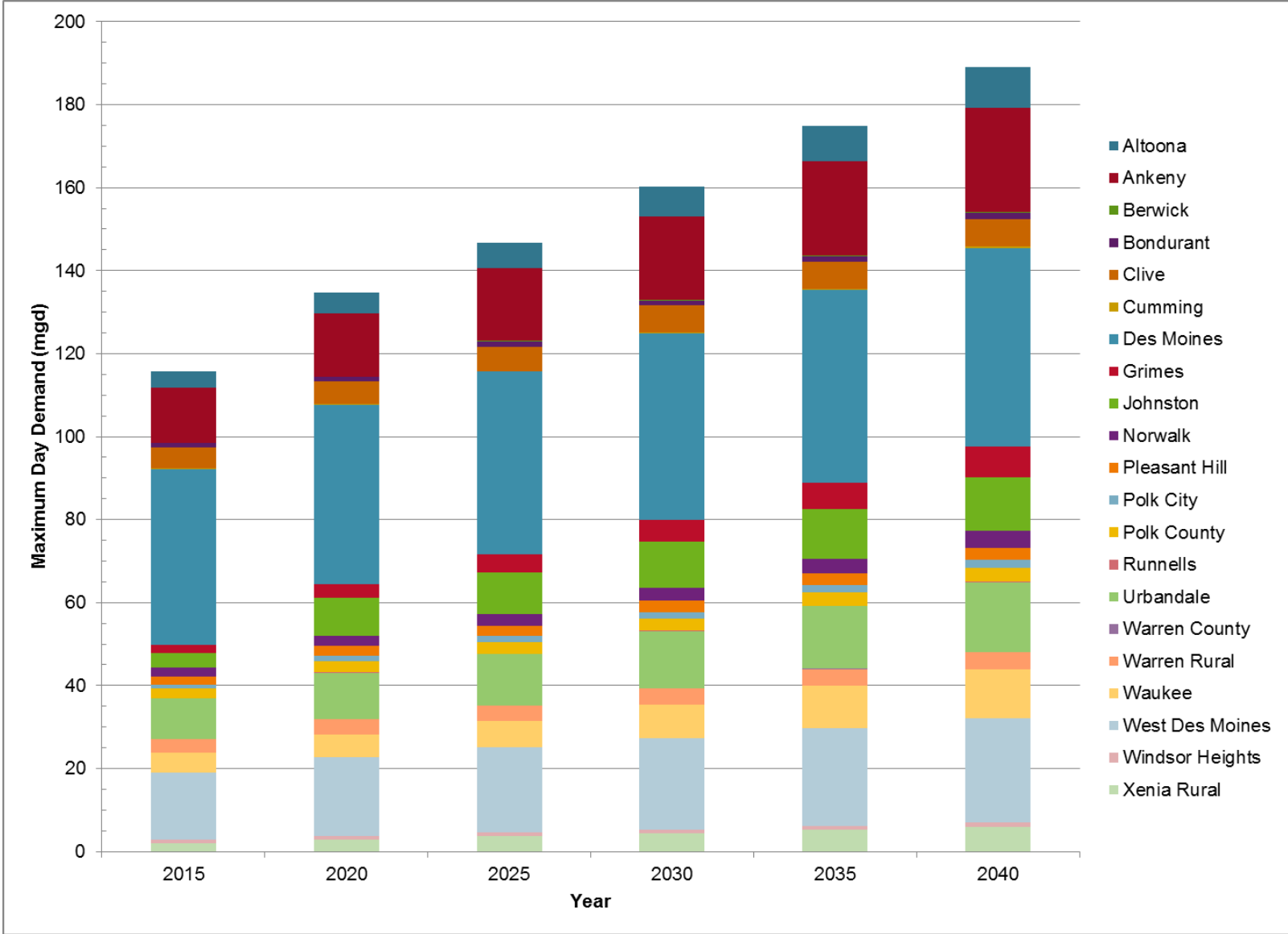
Population Growth Projections



Projected Average Day Demand



Projected Maximum Day Demand



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	City of Grimes	3.5 mgd
Polk City WTP ¹	City of Polk City	0.3 mgd
A.C. Ward WTP	West Des Moines Water Works	10 mgd
Urbandale WTP ²	Urbandale	8 mgd
Xenia Rural WTP ³	Xenia Rural	0.8 to 1.6 mgd

Notes:

¹Anticipated be abandoned by 2035

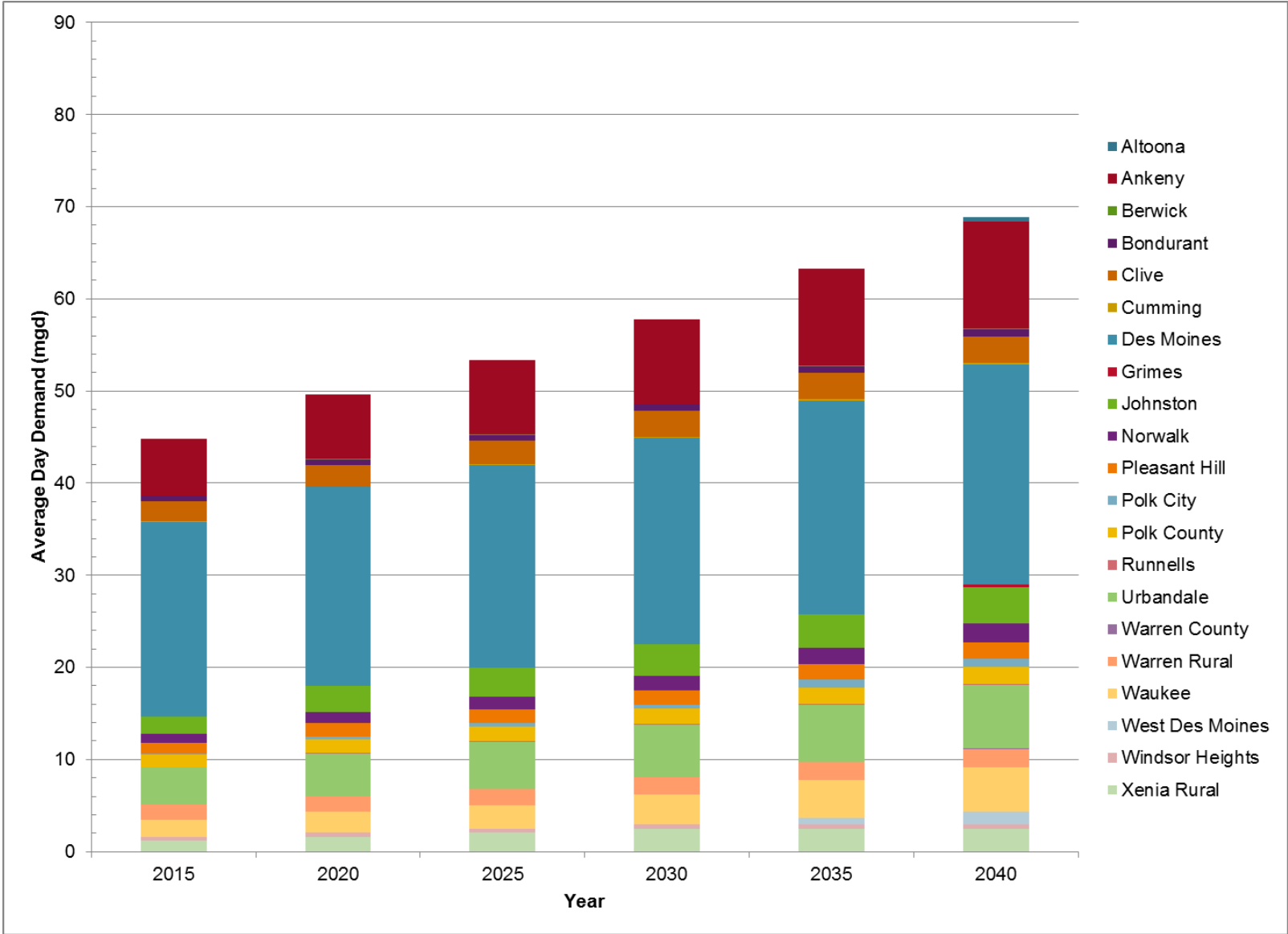
²The future of this WTP is unknown at this time, and alternatives for expanding WTP capacity with, and without the Urbandale WTP will be carried forward as part of this project

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

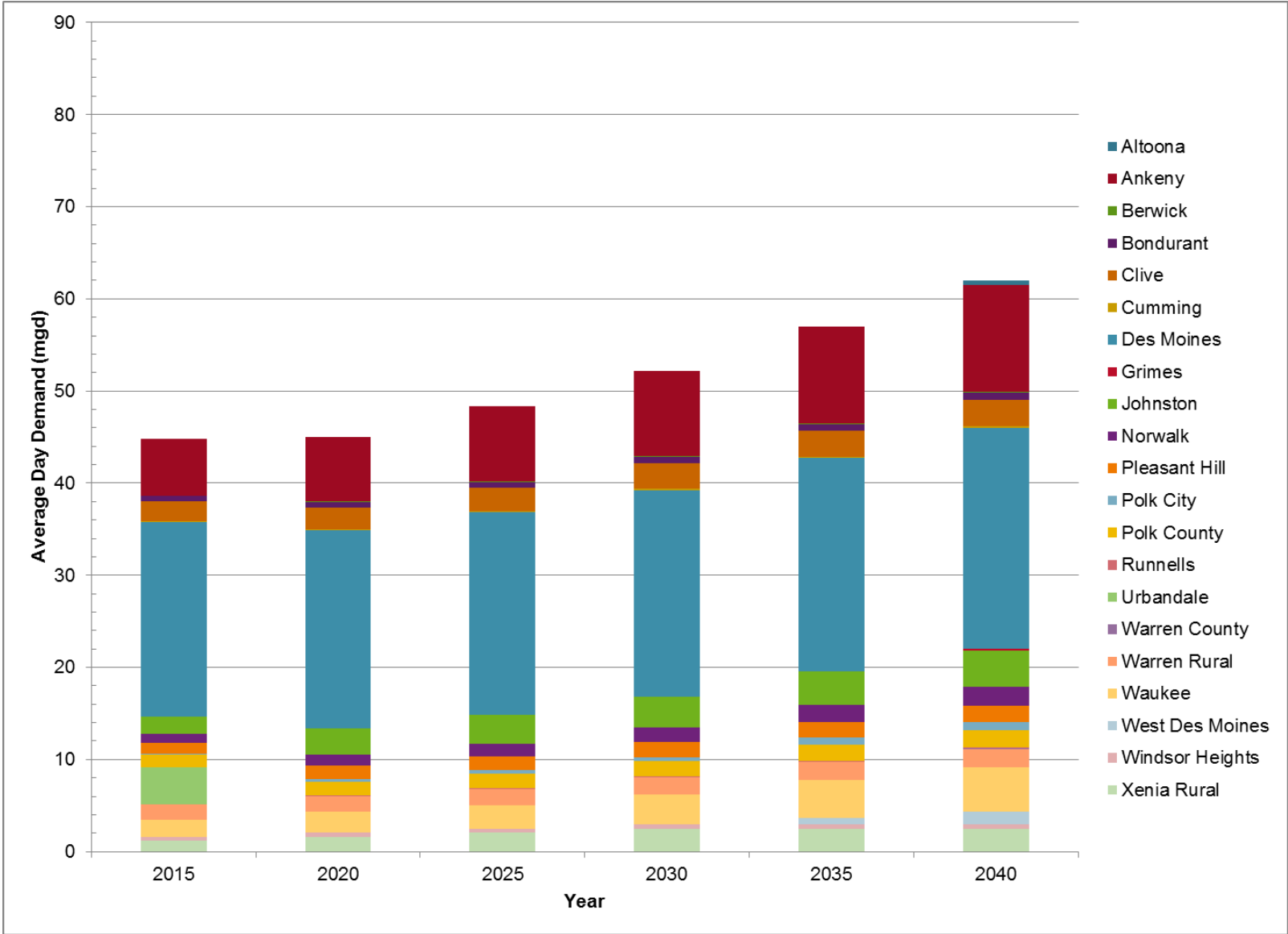
ASR Summary

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	3.5	3.5	3.5	3.5	3.5	3.5
	Army Post Road	-	3.0	3.0	3.0	3.0	3.0
	Future ASR #4	-	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	-	-	2.5	2.5	2.5	2.5
West Des Moines	Future ASR #1	-	3.0	3.0	3.0	3.0	3.0
Total	Fixed Capacity (All ASRs in Service)	10.6	19.6	22.2	22.2	25.0	28.0
	Firm Capacity (1 ASR out of Service)	7.1	16.1	18.7	18.7	21.5	24.5
	Firm Capacity (2 ASRs out of Service)	4.1	13.1	15.7	15.7	18.5	21.5

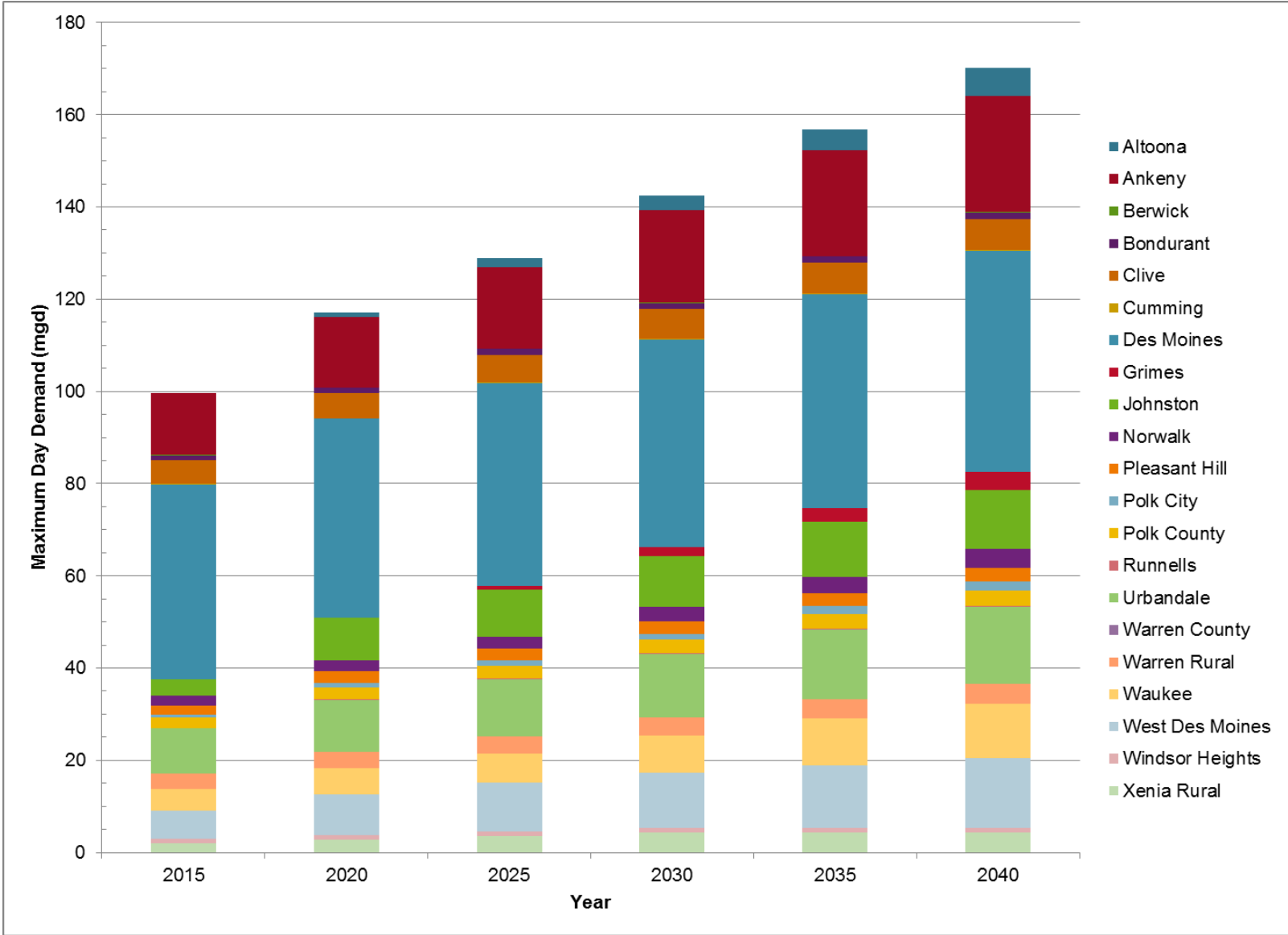
Average Day Production Requirements for DMWW without Urbandale WTP



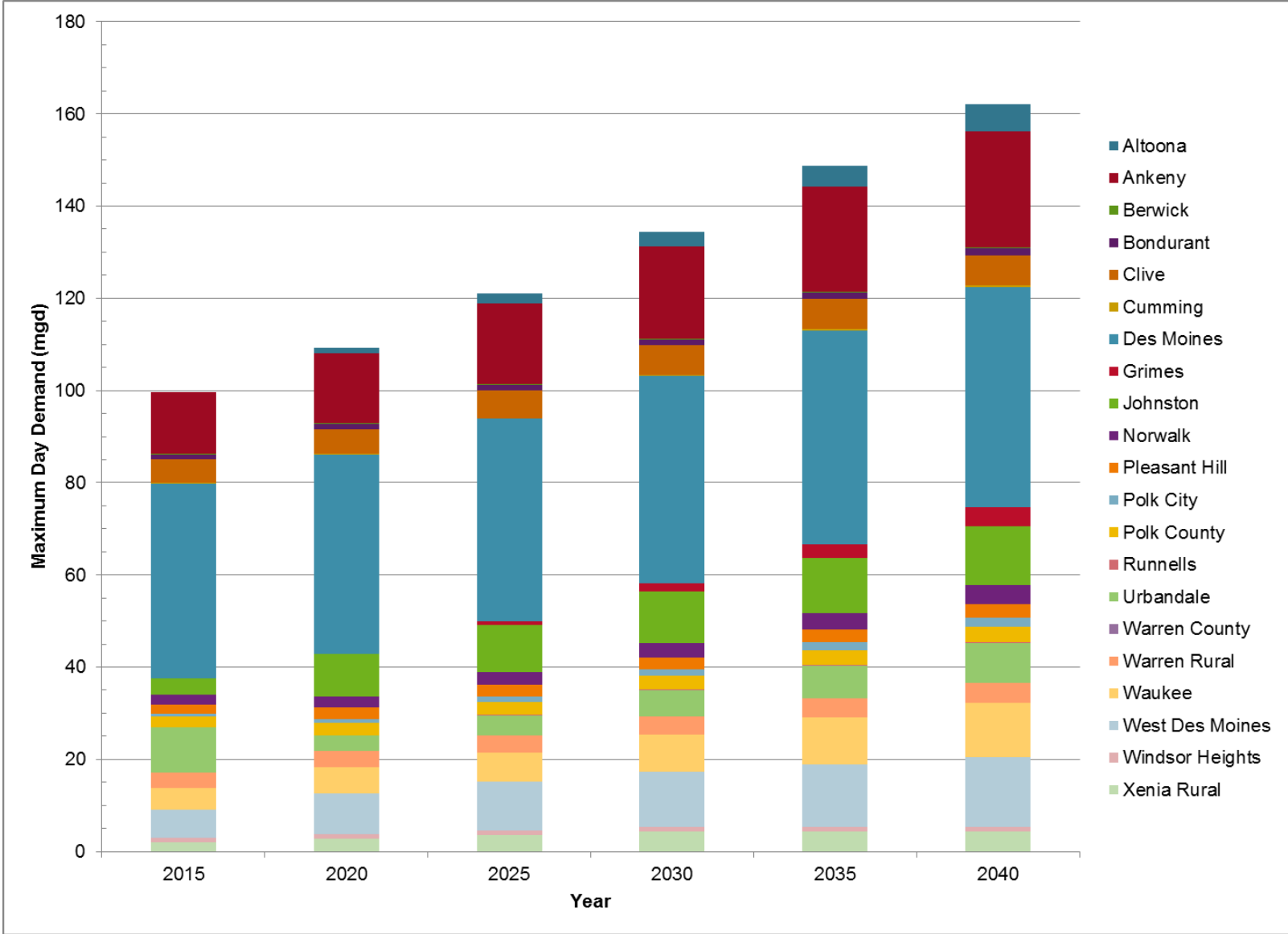
Average Day Production Requirements for DMWW with Urbandale WTP



Maximum Day Production Requirements for DMWW without Urbandale WTP



Maximum Day Production Requirements for DMWW with Urbandale WTP



Production Facility Requirements Summary for Maximum Day Demand without Urbandale WTP

<i>Description</i>	<i>2015</i>	<i>2020</i>	<i>2025</i>	<i>2030</i>	<i>2035</i>	<i>2040</i>
Total Maximum Day Demand	116.0	134.8	146.7	160.2	175.0	189.1
Production Buffer	10.0	10.0	10.0	10.0	10.0	10.0
Production of Connected Wholesale Customers	16.7	17.8	17.8	17.8	18.2	19.0
ASR Production Capacity (Firm)	4.1 to 7.1	13.1 to 16.1	15.7 to 18.7	15.7 to 18.7	18.5 to 21.5	21.5 to 24.5
DMWW Production Capacity Required	102.2 to 105.2	110.9 to 113.9	119.7 to 122.7	133.2 to 136.2	144.8 to 147.8	155.6 to 158.6
Existing DMWW Production Capacity	110.0	110.0	110.0	110.0	110.0	110.0
Additional DMWW Production Capacity Required	0.0	0.9 to 3.9	10.2 to 13.2	23.7 to 26.7	35.3 to 38.3	45.6 to 48.6

Production Facility Requirements Summary for Maximum Day Demand with Urbandale WTP

<i>Description</i>	<i>2015</i>	<i>2020</i>	<i>2025</i>	<i>2030</i>	<i>2035</i>	<i>2040</i>
Total Maximum Day Demand	116.0	134.8	146.7	160.2	175.0	189.1
Production Buffer	10.0	10.0	10.0	10.0	10.0	10.0
Production of Connected Wholesale Customers	24.69	25.76	25.76	25.76	26.24	27.03
ASR Production Capacity (Firm)	4.1 to 7.1	13.1 to 16.1	15.7 to 18.7	15.7 to 18.7	18.5 to 21.5	21.5 to 24.5
DMWW Production Capacity Required	95.2 to 97.2	102.9 to 105.9	111.7 to 114.7	125.2 to 128.2	136.8 to 139.8	147.6 to 150.6
Existing DMWW Production Capacity	110.0	110.0	110.0	110.0	110.0	110.0
Additional DMWW Production Capacity Required	0.0	0.0	2.2 to 5.2	15.7 to 18.7	27.3 to 30.3	37.6 to 40.6

Base Improvements Common to All Alternatives

- Rehabilitate Fleur WTP to Maintain 75 MGD capacity
- Expand Saylorville WTP to 20 MGD (Originally designed for this planned expansion)
- Expand McMullen WTP to 37.5 MGD (Originally designed for this planned expansion)
- Expand ASR Capacity as Outlined in Table 5-2

Alternative 1 – Fleur Expansion

- ***Expand Fleur WTP to 100 mgd***
- Expand Saylorville WTP to 20 mgd
- Expand McMullen WTP to 37.5 mgd
- Expand ASR Capacity as outlined in Table 5-2
- If the Urbandale WTP moves forward, Fleur capacity will be reduced by 8 mgd (or there will be an excess capacity of 8 mgd of production for years after 2040).

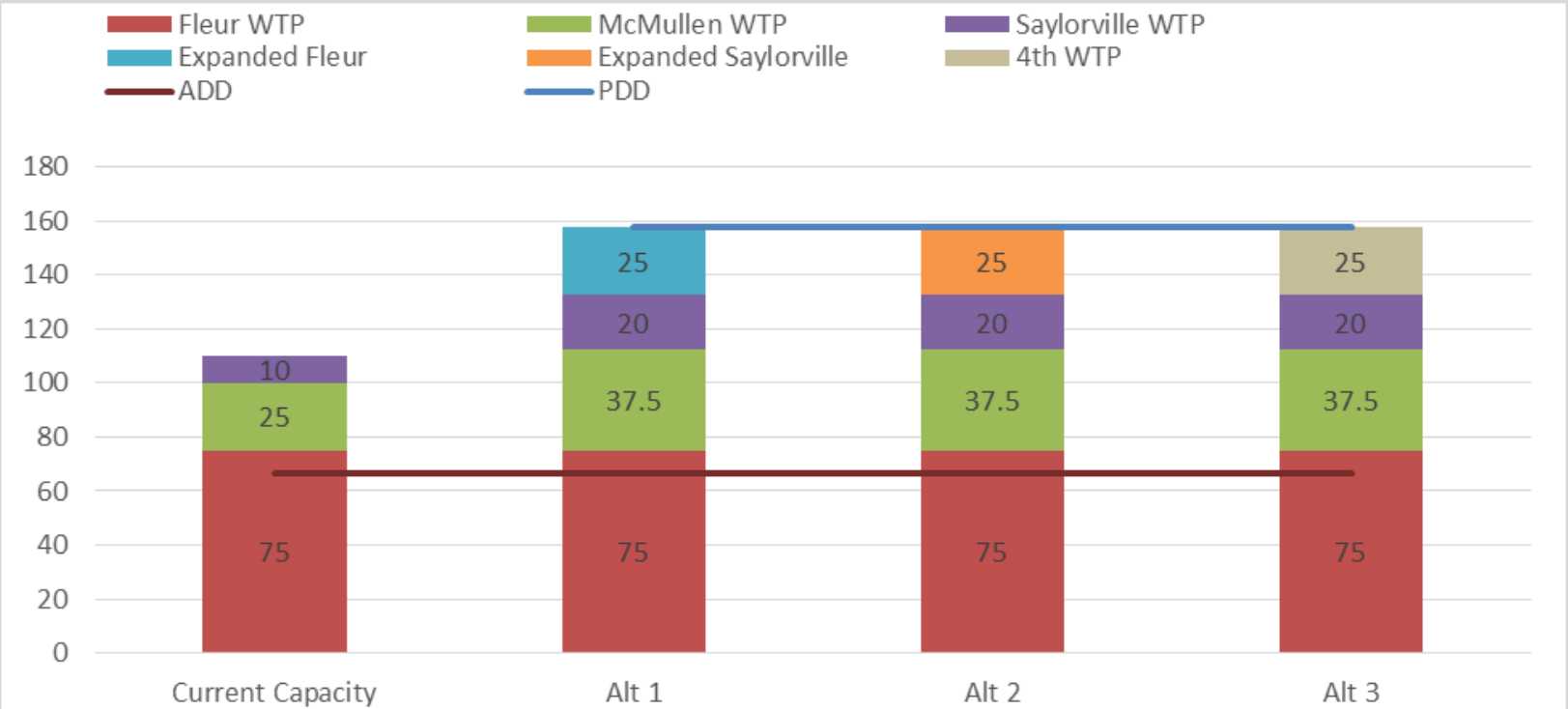
Alternative 2 – Saylorville Expansion

- Rehabilitate Fleur WTP to Maintain 75 mgd
- ***Expand Saylorville WTP to 45 mgd***
- Expand McMullen WTP to 37.5 mgd
- Expand ASR Capacity as outlined in Table 5-2
- If the Urbandale WTP moves forward, Saylorville capacity will be reduced by 8 mgd.

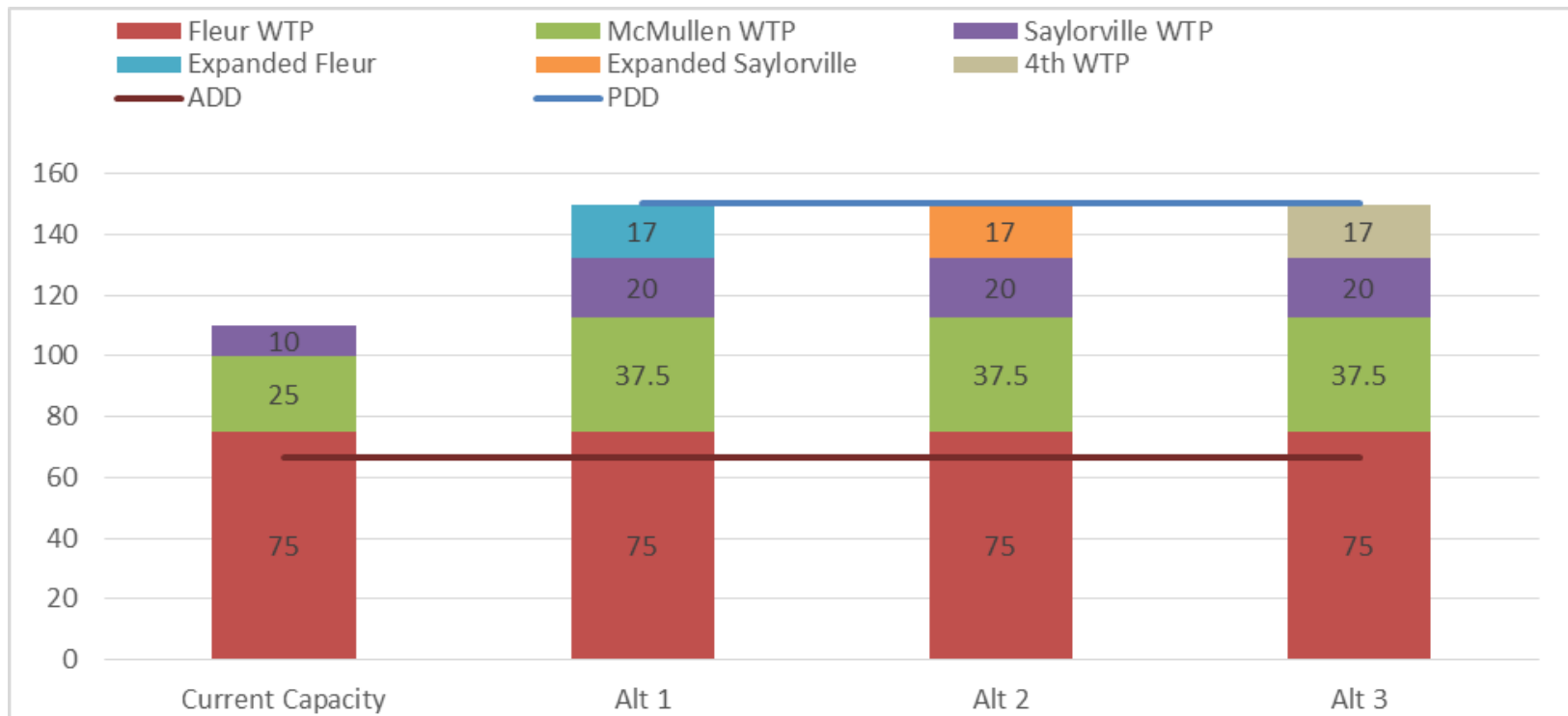
Alternative 3 – 4th Water Treatment Plant

- Rehabilitate Fleur WTP to Maintain 75 mgd
- Expand Saylorville WTP to 20 mgd
- Expand McMullen WTP to 37.5 mgd
- ***Construct 4th WTP at 25 mgd***
- Expand ASR Capacity as outlined in Table 5-2
- If the Urbandale WTP moves forward, the 4th WTP capacity will be reduced by 8 mgd.

Future Production Capacity Alternatives without Urbandale WTP



Future Production Capacity Alternatives with Urbandale WTP



Additional Sources Evaluated

- Des Moines River Alluvial Wells
- Saylorville Reservoir
- Quarry Intake
- Raccoon River Alluvial Wells
- Deep Wells
- North River and Alluvium
- Beaver Creek Alluvium
- Lake Red Rock

Source and Treatment Base Improvements

- Base improvements
 - Rehabilitate Fleur WTP to Maintain 75 MGD capacity
 - Expand Saylorville WTP to 20 MGD
 - Expand McMullen WTP to 37.5 MGD
 - Expand ASR Capacity as Outlined in Table 5-2
- Base improvements and expansions at each facility will meet projected demands
 - ***Through 2030 (without Urbandale WTP)***
 - ***Through 2035 (with Urbandale WTP)***
- Following this period, the alternative to identify for pursuit can be re-evaluated based on information gathered from revised demand projections, new regulations, and results of additional studies.
 - Alternative 1 – Expand Fleur WTP to 100 MGD (or 92 MGD)
 - Alternative 2 – Expand Saylorville WTP to 45 MGD (or 37 MGD)
 - Alternative 3 – 4th WTP at 25 MGD (or 17 MGD)

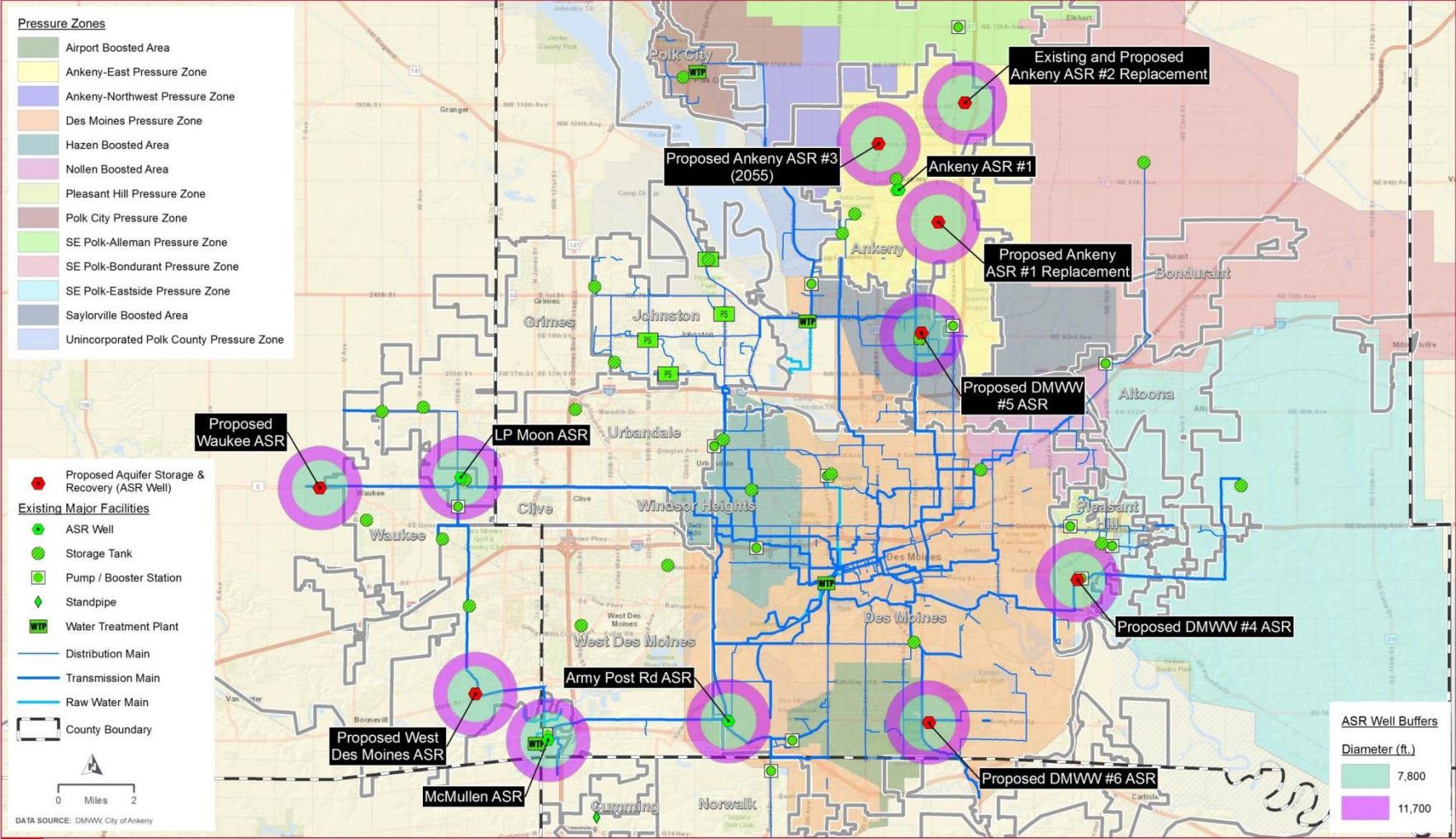
Source and Treatment Implementation Plan

1. Geotechnical and raw water study to site wells and predict long term yields from additional wells in the Des Moines River Alluvium
2. Continued evaluation of the wetland for Nitrate reduction at Fleur WTP
3. Addition of 5 alluvial wells and/or wetland and expanded ion exchange system for Nitrate management at Fleur WTP
4. Electrical and I&C condition assessments at Fleur WTP
5. Continued evaluation of the Chain of Lakes using Crystal Lake for Nitrate reduction at McMullen WTP
6. Filter rehabilitation project at Fleur WTP
7. Flood access improvements at Saylorville WTP
8. Filter press rehabilitation project at Fleur WTP
9. Clearwell improvements at Fleur WTP and McMullen WTP
10. Chemical feed system improvements at Fleur WTP
11. Chain of Lakes modifications at McMullen WTP

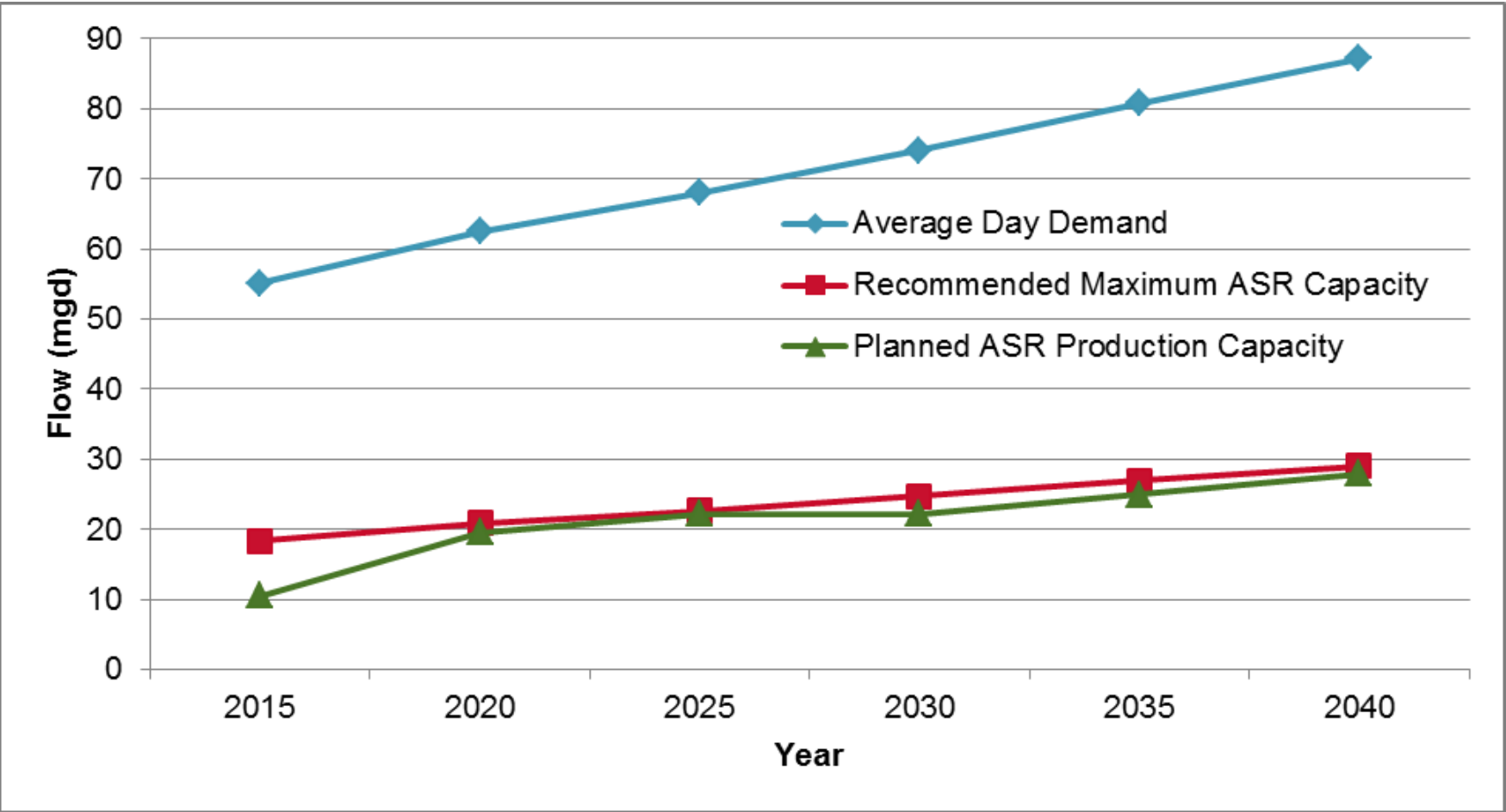
Source and Treatment Implementation Plan, Continued

12. Addition of 2 alluvial wells for Saylorville WTP expansion
13. 10 mgd expansion of Saylorville WTP
14. Upgrading study of Fleur WTP
15. Addition of 2 alluvial wells for McMullen WTP expansion
16. 12.5 mgd expansion of McMullen WTP
17. Re-evaluate future demand locations (decide between Alternative 1, 2 and 3)

Proposed ASR Well Locations with Spacing Buffers



Recommended Maximum and Planned ASR Production by Planning Year



Base Improvements for All Improvement Scenarios

▪ Fleur WTP

- Flood Study
- Rehabilitation of Fleur WTP to maintain 75 mgd
- Instrumentation and control improvements
- Disinfection byproduct (DBP) management improvements (including benefits from additional water supply)
- Addition of 15 mgd of Des Moines River alluvium supply (3 radial collector wells)
- Addition of 10 mgd of ion exchange and rehabilitation of existing 10 mgd ion exchange system for nitrate management
- Addition of 40 mgd wetland (wetland area sized for 45 mgd)
- Complete an uprating study

▪ McMullen WTP

- Expansion to 37.5 mgd
- Instrumentation and control improvements
- Disinfection byproducts (DBP) improvements
- 2 new horizontal collector wells
- Chain of Lakes modifications (including new Crystal Lake Pump Station)

Base Improvements for All Improvement Scenarios

- **Saylorville WTP**

- Flood improvements
- Expansion to 20 mgd with additional 10 mgd of UF/RO
- 3 new horizontal collector wells

- **ASR**

- New 3.0 mgd ASR Well #4 (Joint Eastside Booster Pump Station)
- New 3.0 mgd ASR Well #5 (Polk County Pump Station)
- New 3.0 mgd ASR Well #6 (Army Post Road and SE 14th Street)

Base Improvements for All Improvement Scenarios

▪ Pumping

- New Joint Southwest Booster Station
- Replace Polk City Booster Station
- Expansion of SE Polk South (Bondurant) Pump Station Rechlorination
- Expansion of LP Moon Pump Station
- Replace Pleasant Hill Pump Station
- New Alleman/SE Polk Booster Pump Station
- Airport Booster Station Backup Power
- Xenia Booster Station Purchase and Upgrade
- New Southwest Pump Station
- Decommissioning of existing Alleman Pump Station
- Install backup power and pump at Polk County Pump Station

Base Improvements for All Improvement Scenarios

- **Storage**

- New LP Moon Ground Storage Reservoir No. 2
- Aeration for DBP control
- New Southwest Ground Storage Reservoir
- New Joint Northside Tower
- New Airport Elevated Water Tower
- Replace Wilchinski Elevated Water Tower
- New Northeast Elevated Water Tower
- New Northwest Elevated Water Tower

- **Transmission and Distribution**

- Approximately 68 miles of new transmission and distribution piping

Scenario 1A – Fleur WTP Expansion without Urbandale WTP

- **Expand Fleur Drive WTP to 100 mgd**
 - Expansion of Fleur WTP from 75 mgd to 100 mgd
 - 25 mgd of Des Moines River alluvium supply (35 mgd total including base expansion)
 - 15 mgd of ion exchange (35 mgd total including base expansion/replacement)
 - Flood Protection Improvements
- **Transmission and Distribution**
 - Approximately 21 miles of additional transmission and distribution piping

Scenario 1B – Fleur WTP Expansion with Urbandale WTP

- **Expand Fleur Drive WTP to 92 mgd**
 - Expansion of Fleur WTP from 75 mgd to 92 mgd
 - 15 mgd of Des Moines River alluvium supply (30 mgd total including base expansion)
 - 13 mgd of ion exchange (33 mgd total including base expansion/replacement)
 - Flood Protection Improvements
- **Transmission and Distribution**
 - Approximately 21 miles of additional transmission and distribution piping

Scenario 2A – Saylorville WTP Expansion without Urbandale WTP

- **Expand Saylorville WTP to 45 mgd**
 - 25 mgd of conventional lime softening treatment
 - 5 new horizontal collector wells (8 total including base expansion)
- **Transmission and Distribution**
 - Approximately 24 miles of additional transmission and distribution piping

Scenario 2B – Saylorville WTP Expansion with Urbandale WTP

- **Expand Saylorville WTP to 37 mgd**
 - 17 mgd of conventional lime softening treatment
 - 4 new horizontal collector wells (7 total including base expansion)
- **Transmission and Distribution**
 - Approximately 24 miles of additional transmission and distribution piping

Scenario 3A – Construct 4th Water Treatment Plant without Urbandale WTP

- **New 4th WTP with 25 mgd Capacity**
 - 25 mgd of conventional lime softening treatment
 - 5 new alluvial wells (assumes connection to Saylorville Well Field for redundancy)
 - 7.5 mgd of ion exchange
- **Transmission and Distribution**
 - Approximately 18 miles of additional transmission and distribution piping

Scenario 3B – Construct 4th Water Treatment Plant with Urbandale WTP

- **New 4th WTP with 17 mgd Capacity**

- 17 mgd of conventional lime softening treatment
- 4 new alluvial wells (assumes connection to Saylorville Well Field for redundancy)
- 5 mgd of ion exchange

- **Transmission and Distribution**

- Approximately 18 miles of additional transmission and distribution piping

Phased Capital Improvement Plan Summary for Core Network Projects Affecting All Entities

	Scenario 1A	Scenario 1B	Scenario 2A	Scenario 2B	Scenario 3A	Scenario 3B
	Fleur Expansion without Urbandale WTP	Fleur Expansion with Urbandale WTP	Saylorville Expansion without Urbandale WTP	Saylorville Expansion with Urbandale WTP	4 th WTP without Urbandale WTP	4 th WTP with Urbandale WTP
Supply	\$133,760,000	\$125,140,000	\$134,560,000	\$126,620,000	\$143,550,000	\$134,520,000
Treatment	\$126,820,000	\$126,820,000	\$202,890,000	\$185,260,000	\$226,870,000	\$209,040,000
Distribution	\$54,290,000	\$48,140,000	\$36,790,000	\$33,730,000	\$53,910,000	\$47,690,000
Storage	\$7,380,000	\$7,380,000	\$7,380,000	\$7,380,000	\$7,380,000	\$7,380,000
Pumping	\$1,200,000	\$1,200,000	\$1,200,000	\$1,200,000	\$1,200,000	\$1,200,000
ASR	\$13,720,000	\$13,720,000	\$13,720,000	\$13,720,000	\$13,720,000	\$13,720,000
TOTAL	\$337,170,000	\$322,400,000	\$396,540,000	\$367,910,000	\$446,630,000	\$413,550,000

Phased Capital Improvement Plan Summary for Core Network Projects Affecting Some Entities

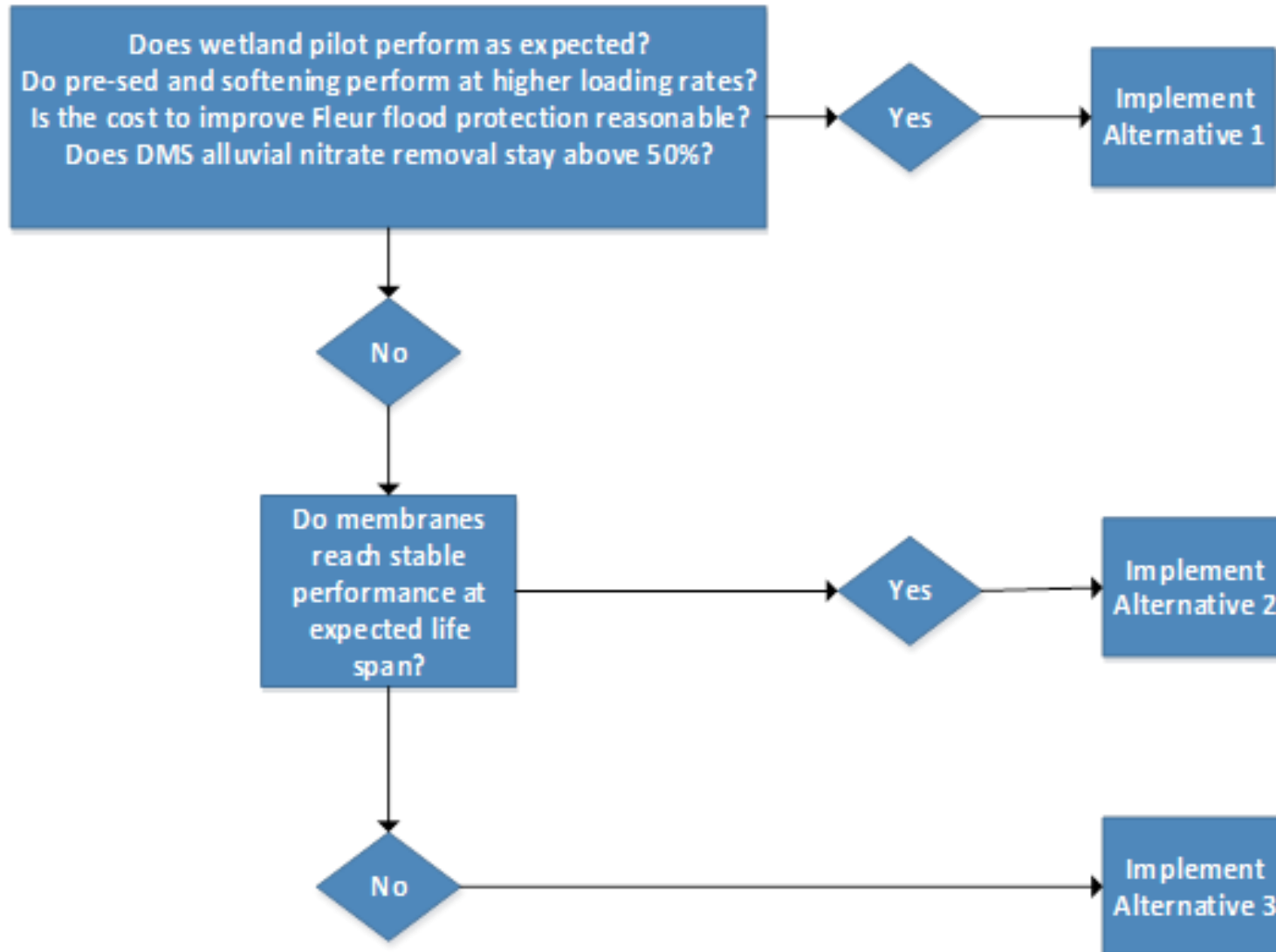
	Scenario 1A	Scenario 1B	Scenario 2A	Scenario 2B	Scenario 3A	Scenario 3B
	Fleur Expansion without Urbandale WTP	Fleur Expansion with Urbandale WTP	Saylorville Expansion without Urbandale WTP	Saylorville Expansion with Urbandale WTP	4 th WTP without Urbandale WTP	4 th WTP with Urbandale WTP
Supply	\$0	\$0	\$0	\$0	\$0	\$0
Treatment	\$0	\$0	\$0	\$0	\$0	\$0
Distribution	\$51,010,000	\$51,010,000	\$70,140,000	\$70,140,000	\$38,320,000	\$38,320,000
Storage	\$21,710,000	\$21,710,000	\$21,710,000	\$21,710,000	\$21,710,000	\$21,710,000
Pumping	\$13,940,000	\$13,940,000	\$13,940,000	\$13,940,000	\$13,940,000	\$13,940,000
ASR	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL	\$86,660,000	\$86,660,000	\$105,790,000	\$105,790,000	\$73,970,000	\$73,970,000

	Scenario 1A	Scenario 1B	Scenario 2A	Scenario 2B	Scenario 3A	Scenario 3B
	Fleur Expansion without Urbandale WTP	Fleur Expansion with Urbandale WTP	Saylorville Expansion without Urbandale WTP	Saylorville Expansion with Urbandale WTP	4 th WTP without Urbandale WTP	4 th WTP with Urbandale WTP
Supply	\$990,000	\$990,000	\$990,000	\$990,000	\$990,000	\$990,000
Treatment	\$19,750,000	\$19,750,000	\$19,750,000	\$19,750,000	\$19,750,000	\$19,750,000
Distribution	\$22,970,000	\$22,970,000	\$22,970,000	\$22,970,000	\$22,970,000	\$22,970,000
Storage	\$24,090,000	\$24,090,000	\$24,090,000	\$24,090,000	\$24,090,000	\$24,090,000
Pumping	\$2,590,000	\$2,590,000	\$2,590,000	\$2,590,000	\$2,590,000	\$2,590,000
ASR	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL	\$70,390,000	\$70,390,000	\$70,390,000	\$70,390,000	\$70,390,000	\$70,390,000

Non-Economic Evaluation

Fleur Expansion	Saylorville Expansion	4 th Plant
Least cost	Middle cost	Highest cost
Flooding potential for plant to be off line, but can maintain ADD in 2040 with plant out of service	Out of flood plain	Out of flood plain
Diverse source waters and direct surface water intakes	Only Des Moines River watershed, UF/RO limits surface intake w/o added treatment	Only Des Moines River watershed, can plan for direct surface intake
Investing in the plant with source water issues	Able to use existing RO for nitrate treatment	Similar water quality to McMullen
Site restrictions make additional treatment harder & more costly	Open site makes future changes easier to incorporate	Open site makes future changes easier to incorporate
Increased winter demand when nitrate removal in wetland is lowest	Reliance on membrane system with history of issues	Land acquisition may be problematic

Treatment Approach to Selecting a Preferred Alternative



Future Water System Improvements – Alternative 2

