WRMP 2019 Technical Document:

WRZ Summaries

December 2019

WINNER
UtilityWeek AWARDS 2018
Utility of the Year

THE QUEEN'S AWARDS FOR ENTERPRISE: SUSTAINABLE DEVELOPMENT 2015

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Lincolnshire and Nottinghamshire

1.1 Overview

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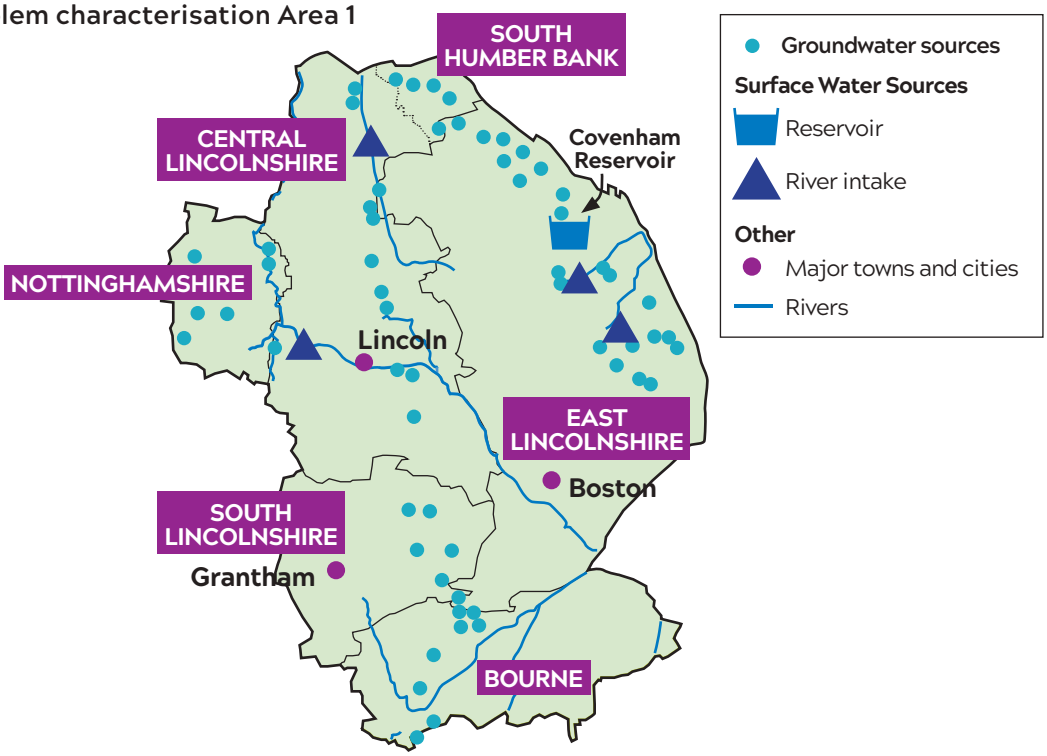


1.2 Strategic risks and issues

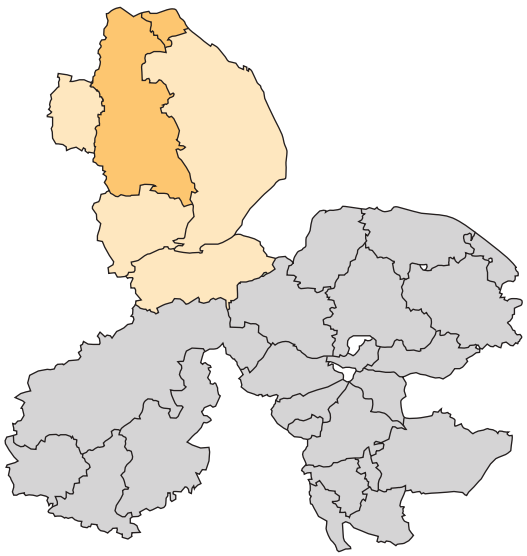
Problem Characterisation Results

- Area 1 is assessed as having low levels of concern
- Although there are significant strategic needs, the level of complexity is low

This area remains in surplus overall despite significant supply-side reductions and growth. Demand management options improve the surplus and water is exported south to Ruthamford.

1.3 Central Lincolnshire

The Central Lincolnshire WRZ covers an area of 2072km^2 and extends south from the Humber. It includes groundwater abstraction from the Lincolnshire Limestone and a surface water abstraction from the River Trent. It is based on the supply systems for Scunthorpe and Lincoln.



Supply Forecast

Table 1.3.1: Central Lincolnshire supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	137.00	137.00	137.00	137.00	137.00	137.00
Sustainability reductions (Ml/d)	0.00	-13.00	-13.00	-13.00	-13.00	-13.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	-11.00	-11.00	-11.00	-11.00
Final DO (Ml/d)	137.00	124.00	113.00	113.00	113.00	113.00
Outage Allowance†	2.49	2.49	2.49	2.49	2.49	2.49
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	134.51	121.51	110.51	110.51	110.51	110.51

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -12.0 Ml/d sustainability reduction seen in 2022
- -1.0 Ml/d sustainability reduction seen in 2024
- -11.0 Ml/d severe drought impacts seen in 2025

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately 154,000 to 199,000, and the population is forecast to increase from approximately 353,000 to 433,000[1].

[1] *Based upon Local Authority planning information*

Table 1.3.2: Central Lincolnshire Population and property totals (cumulative) per AMP

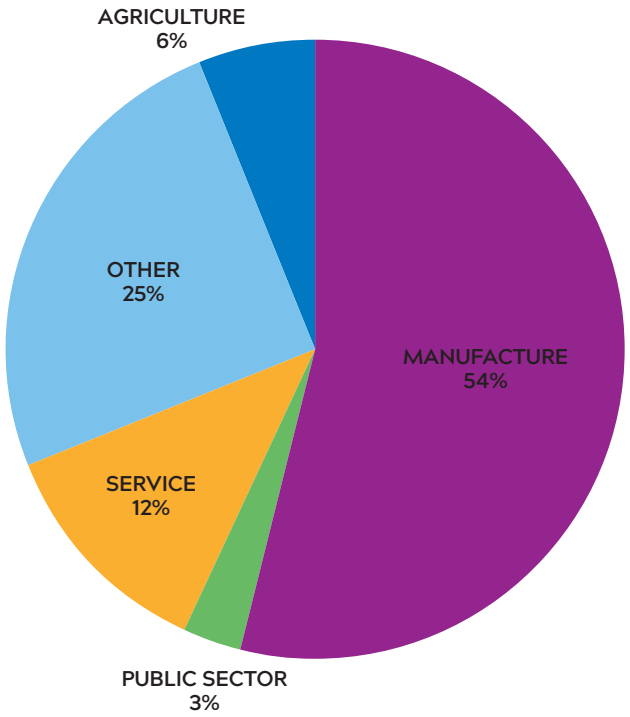
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	353,260	381,670	400,120	410,840	422,130	432,940
Total Household Properties	154,240	170,100	180,330	187,000	193,160	199,380

Property growth rates vary between **13,810** per AMP in the short-term to **6,230** per AMP in the long-term. The short- to medium-term projections are aligned with Local Authority data; the medium to long-term projections with ONS trend based data.

Table 1.3.3: Central Lincolnshire Rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	27,030	18,450	10,720	11,290	10,810
Additional Household properties per AMP	13,810	10,220	6,680	6,150	6,230

Figure 1.3.2: Central Lincolnshire Non-household sectors



Non-household demand (NHH) is predominantly from the service sector and manufacturing, which account for **66%** of total NHH demand. Non-household demand is forecast to increase over the WRMP period from **31.15 Ml/d to 37.53 Ml/d**.

For the baseline scenario WITHOUT demand management options.

Household demand (measured/unmeasured) is forecast to increase over the WRMP period from **48.64 Ml/d to 55.85 Ml/d.**

Leakage is forecast to decrease from the baseline value of **16.89Ml/d to 16.39 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to increase from **31.15 Ml/d to 37.53 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **99.64 Ml/d to 112.74 Ml/d.**

Table 1.3.4: Central Lincolnshire Baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	31.63	39.16	43.48	46.35	48.92	50.99
Household demand (Ml/d) - unmeasured	17.01	12.04	9.47	7.46	5.89	4.86
Non-household demand (Ml/d)	31.15	33.32	34.65	35.70	36.67	37.53
Leakage (Ml/d)	16.89	16.38	16.38	16.39	16.39	16.39
Distribution input (Ml/d)	99.64	103.87	106.96	108.86	110.83	112.74

Baseline supply demand balance

Figure 1.3.3: Central Lincolnshire baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

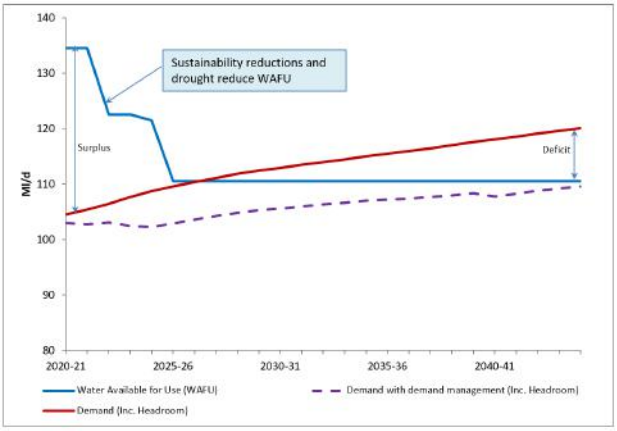


Table 1.3.5: Central Lincolnshire baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	134.51	121.51	110.51	110.51	110.51	110.51
Net transfers into Area (Ml/d)	0.0	0.0	0.0	0.0	0.0	0.0
Total DYAA Water available for Use: including transfers* (Ml/d)	134.51	121.51	110.51	110.51	110.51	110.51
Total DYAA Distribution Input (Ml/d)	100.11	103.87	106.96	108.86	110.83	112.74
Total DYAA Target Headroom (Ml/d)	4.42	4.90	5.50	6.12	6.79	7.33
DYAA supply-demand balance (Ml/d)	29.98	12.75	-1.94	-4.47	-7.11	-9.55

* bulk imports, exports and inter-zone transfers

There is a critical period deficit in this WRZ.

Figure 1.3.4: Central Lincolnshire baseline supply demand balance to 2045 for critical period (DYAA) conditions

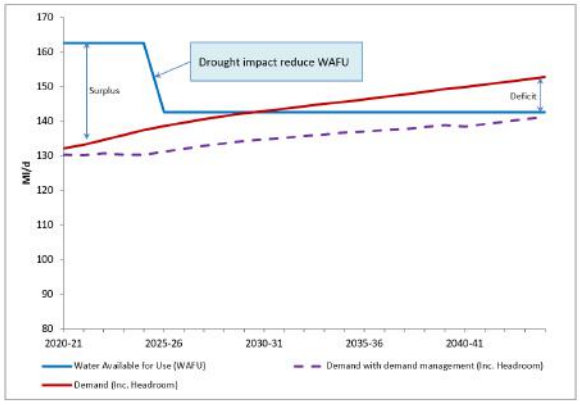


Table 1.3.6: Central Lincolnshire baseline supply-demand balance to 2045 for critical period (CP) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total CP Water available for Use: Area sources* (Ml/d)	162.57	162.57	142.57	142.57	142.57	142.57
Net transfers into Area (Ml/d)	0.0	0.0	0.0	0.0	0.0	0.0
Total CP Water available for Use: including transfers* (Ml/d)	162.57	162.57	142.57	142.57	142.57	142.57
Total CP Distribution Input (Ml/d)	126.45	131.23	135.25	137.82	140.57	143.33
Total CP Target Headroom (Ml/d)	5.59	6.19	6.95	7.75	8.62	9.32
CP supply-demand balance (Ml/d)	30.53	25.15	0.37	-3.01	-6.62	-10.08

* bulk imports, exports and inter-zone transfers

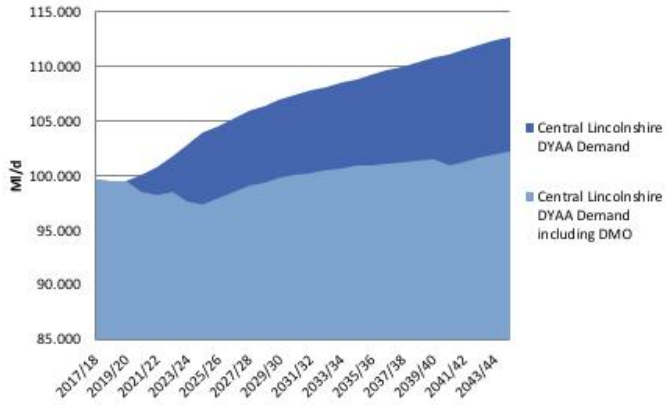
Selected demand management strategy

We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

Table 1.3.7: Central Lincolnshire Water savings (cumulative) resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.76	1.22	1.83	2.13	2.27
Smart metering (demand savings) (Ml/d) -	1.64	1.72	1.75	1.78	1.79
Leakage reduction (CSPL savings) (Ml/d)	1.41	1.53	1.60	1.67	1.73
Leakage reduction (our network) (Ml/d)	2.63	2.64	2.67	3.64	4.54
Total saving (Ml/d)	6.44	7.11	7.85	9.22	10.33

Figure 1.3.5: Central Lincolnshire DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (first year of AMP6) are: Measured PCC 128 l/h/d; Unmeasured PCC 161 l/h/d, with a weighted average value of 137.7 l/h/d. This is expected to fall to 119.3 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 1.3.8: Changes in Central Lincolnshire Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	137.7	134.2	132.4	131.0	129.9	129.0
Final demand forecast (DYAA) (includes selected demand management strategy)	137.7	127.7	124.8	122.0	120.3	119.3
Final demand forecast (DYAA) % change from baseline forecast	0.00%	4.84%	5.74%	6.87%	7.39%	7.44%

For the final plan scenario WITH demand management options

Household demand (measured/unmeasured) is forecast to increase over the WRMP period from **48.64 Ml/d to 51.67 Ml/d**, with demand management option savings.

Leakage is forecast to decrease from the baseline value of **16.89 Ml/d to 10.13 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **31.15 Ml/d to 37.53 Ml/d** over the WRMP period.

Distribution Input is predicted to increase slightly from **99.64 Ml/d to 102.29 Ml/d**, once the influence of demand management option savings has been included.

Table 1.3.9: Central Lincolnshire final demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	31.63	36.76	40.57	42.82	45.09	47.00
Household demand (Ml/d) - unmeasured	17.01	11.99	9.40	7.39	5.84	4.62
Non-household demand (Ml/d)	31.15	33.32	34.65	35.70	36.67	37.53
Leakage (Ml/d)	16.89	12.33	12.22	12.11	11.08	10.13
Distribution input (Ml/d)	99.64	97.36	99.77	100.92	101.52	102.29

Selected supply-side options

For details on the feasible options list for Central Lincolnshire WRZ please refer to the Supply-side option development technical document.

Table 1.3.10: Central Lincolnshire preferred supply side options

Opt Ref	Option Name
CLN13a	South Humber Bank WRZ to Central Lincolnshire WRZ Transfer (31 Ml/d) - Treatment only
CLN14	Central Lincolnshire locked in DO (6 Ml/d)
CLN15	East Lincolnshire WRZ to Central Lincolnshire WRZ treatment for Metaldeyhde for existing transfer
CLN16	South Humber Bank WRZ plus East Lincolnshire WRZ to Central Lincolnshire WRZ - transfer only

Final supply demand balance

Once our preferred demand management strategy has been implemented, the supply demand balance in Central Lincolnshire WRZ is maintained throughout the planning period.

Figure 1.3.6: Central Lincolnshire WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

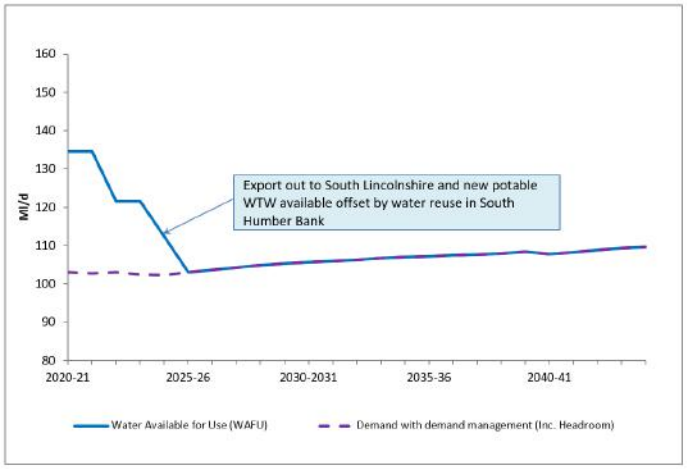


Table 1.3.11: Central Lincolnshire final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	134.51	121.51	110.51	110.51	110.51	116.51
Net transfers into Area (Ml/d)	0.00	-8.26	-5.25	-3.48	-2.20	-6.89
Total DYAA Water available for Use: including transfers* (Ml/d)	134.51	112.38	105.27	107.04	108.32	109.62
Total DYAA Distribution Input (Ml/d)	98.54	97.36	99.77	100.92	101.52	102.29
Total DYAA Target Headroom (Ml/d)	4.43	4.90	5.50	6.12	6.79	7.33
DYAA supply-demand balance (Ml/d)	31.54	10.13	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

Figure 1.3.7: Central Lincolnshire final plan supply demand balance to 2045 for critical period (CP) conditions

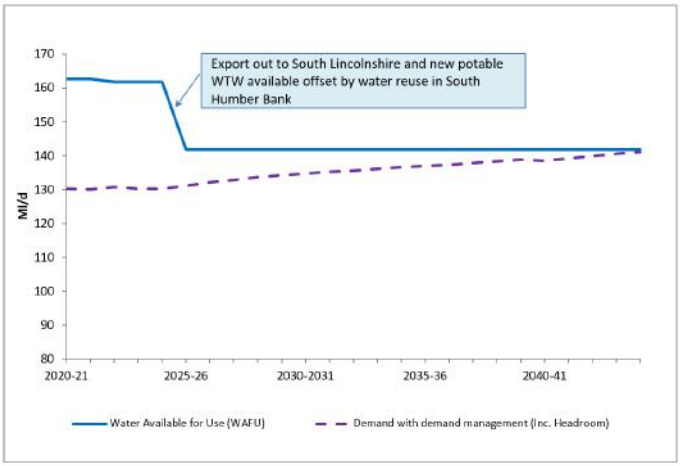


Table 1.3.12: Central Lincolnshire final plan supply-demand balance to 2045 for critical period (CP) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total CP Water available for Use: Area sources* (Ml/d)	162.57	161.8	142.57	142.57	142.57	145.57
Net transfers into Area (Ml/d)	0.00	-0.76	-0.76	-0.76	-0.76	-0.76
Total CP Water available for Use: including transfers* (Ml/d)	162.57	161.8	141.80	141.80	141.80	141.80
Total CP Distribution Input (Ml/d)	124.67	124.05	127.23	128.88	130.18	131.73
Total CP Target Headroom (Ml/d)	5.59	6.19	6.95	7.75	8.62	9.32
CP supply-demand balance (Ml/d)	32.31	31.57	7.62	5.17	3.01	0.75

* bulk imports, exports and inter-zone transfers

1.4 Bourne

The Bourne WRZ covers an area of 1087km^2 and lies to the south west of the Wash. It is based on the supply systems for Bourne, Spalding and Stamford. Water is abstracted from groundwater sources in the Lincolnshire Limestone aquifer.

Supply Forecast

Table 1.4.1: Bourne Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	56.00	56.00	56.00	56.00	56.00	56.00
Sustainability reductions (Ml/d)	0.00	-11.00	-11.00	-11.00	-11.00	-11.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	56.00	45.00	45.00	45.00	45.00	45.00
Outage Allowance†	0.92	0.74	0.74	0.74	0.74	0.74
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	-6.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	49.08	44.26	44.26	44.26	44.26	44.26

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -11.0 Ml/d sustainability reduction seen in 2022

This zone is considered to have already experienced a >1 in 200-year drought event and does not see additional severe drought impact on DO.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately 65,000 to 80,000, and the population is forecast to increase from approximately 149,000 to 175,000[2].

[2] *Based upon Local Authority planning information*

Table 1.4.2: Bourne population and property forecast per AMP

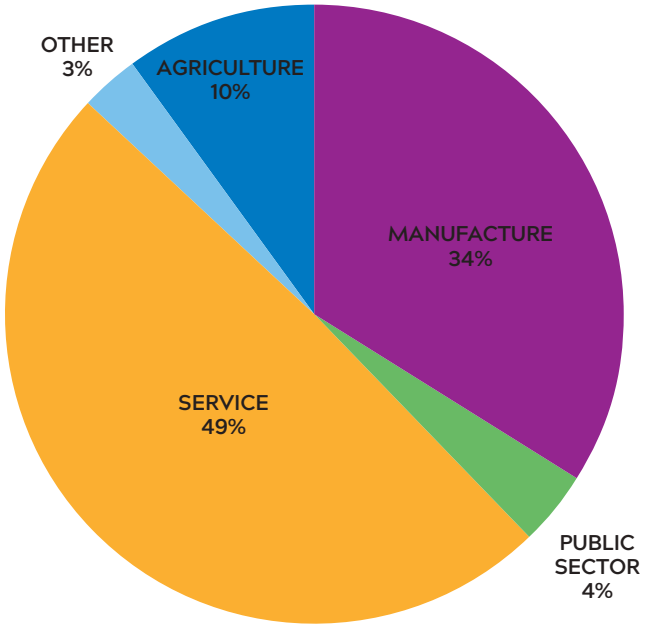
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	148,900	160,560	166,150	169,100	171,690	174,290
Total Household Properties	64,670	70,450	73,690	75,800	77,680	79,610

Property growth rates vary between **4,600** per AMP in the short-term to **1,900** per AMP in the long-term. The short- to medium-term projections are aligned with Local Authority data; the medium to long-term projections with ONS trend based data.

Table 1.4.3: Central Lincolnshire rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	9,370	5,580	2,960	2,590	2,600
Additional Household properties per AMP	4,630	3,240	2,110	1,880	1,930

Figure 1.4.1: Bourne Non-household sectors



Non-household demand is predominantly from the service sector and manufacturing, which account for 83% of total NHH demand. Non-household demand is forecast to increase over the WRMP period from **13.17 Ml/d to 14.35 Ml/d.**

For the baseline scenario WITHOUT demand management options

Household demand is forecast to increase over the WRMP period from **21.54 Ml/d to 24.09 Ml/d**.

Leakage is forecast to decline from the baseline value of **5.63 Ml/d to 5.47 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to increase from **13.17 Ml/d to 14.35 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **41.58 Ml/d to 45.15 Ml/d**.

Table 1.4.4: Bourne demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	16.37	19.12	20.47	21.33	21.71	22.00
Household demand (Ml/d) - unmeasured	5.17	3.65	2.85	2.22	2.10	2.09
Non-household demand (Ml/d)	13.17	13.41	13.65	13.92	14.15	14.35
Leakage (Ml/d)	5.63	5.46	5.46	5.47	5.47	5.47
Distribution input (Ml/d)	41.58	42.88	43.67	44.17	44.66	45.15

Baseline supply demand balance

Figure 1.4.2: Bourne baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

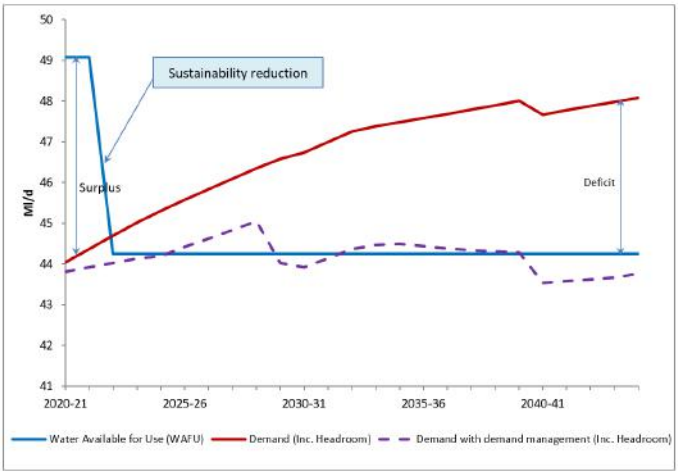


Table 1.4.5: Bourne baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	55.08	44.26	44.26	44.26	44.26	44.26
Net transfers into Area (Ml/d)	-6.00	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	49.08	44.26	44.26	44.26	44.26	44.26
Total DYAA Distribution Input (Ml/d)	41.89	42.88	43.67	44.17	44.67	45.15
Total DYAA Target Headroom (Ml/d)	2.15	2.42	2.90	3.31	3.35	2.94
DYAA supply-demand balance (Ml/d)	5.04	-1.04	-2.32	-3.23	-3.76	-3.82

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

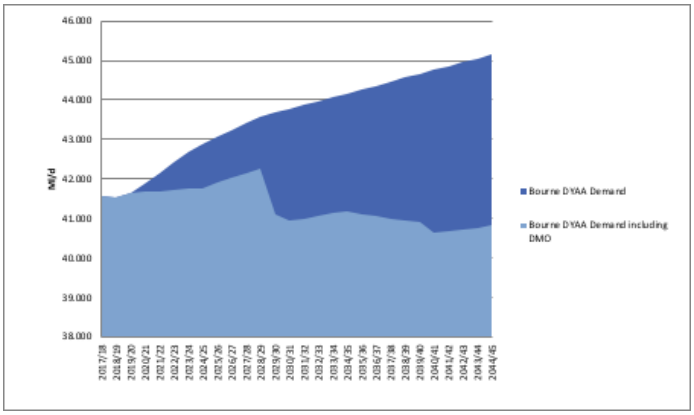
We plan to use a combined strategy of smart metering, water efficiency and leakage reduction to reduce demand.

- We plan to reduce leakage by 45% from 5.63 Ml/d in 2017/18 to 3.05 Ml/d in 2045.

Table 1.4.6: Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.35	0.55	0.70	0.95	1.15
Smart metering (demand savings) (Ml/d) -	0.00	0.62	0.65	0.67	0.69
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.60	0.63	0.66	0.68
Leakage reduction (our network) (Ml/d)	0.76	0.76	0.98	1.41	1.74
Total saving (Ml/d)	1.11	2.53	2.96	3.69	4.26

Figure 1.4.3: Bourne DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 are: Measured PCC 136 l/h/d; Unmeasured PCC 179 l/h/d, with a weighted average value of 144.7 l/h/d. This is expected to fall to 127.4 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 1.4.7: Changes in Bourne Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	144.7	141.8	140.4	139.3	138.7	138.2
Final demand forecast (DYAA) (includes selected demand management strategy)	144.7	139.6	133.2	131.1	129.0	127.4
Final demand forecast (DYAA) % change from baseline forecast	0.00%	1.55%	5.13%	5.89%	6.99%	7.81%

For the baseline scenario WITH demand management options

Household demand is forecast to increase over the WRMP period from **21.54 Ml/d to 22.19 Ml/d**.

Leakage is forecast to decrease from the baseline value of **5.63 Ml/d to 3.05 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **13.17 Ml/d to 14.35 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease slightly from **41.58 Ml/d to 40.83 Ml/d**, once the influence of demand management option savings has been included.

Table 1.4.8: Bourne demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	16.37	18.78	19.31	19.99	20.09	20.16
Household demand (Ml/d) - unmeasured	5.17	3.63	2.82	2.18	2.05	2.03
Non-household demand (Ml/d)	13.17	13.41	13.65	13.92	14.15	14.35
Leakage (Ml/d)	5.63	4.70	4.11	3.86	3.41	3.05
Distribution input (Ml/d)	41.58	41.76	41.11	41.18	40.93	40.83

Final supply demand balance

Once our preferred demand management strategy has been implemented, the supply demand balance in Bourne WRZ is maintained throughout the planning period.

Figure 1.4.4: Bourne WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

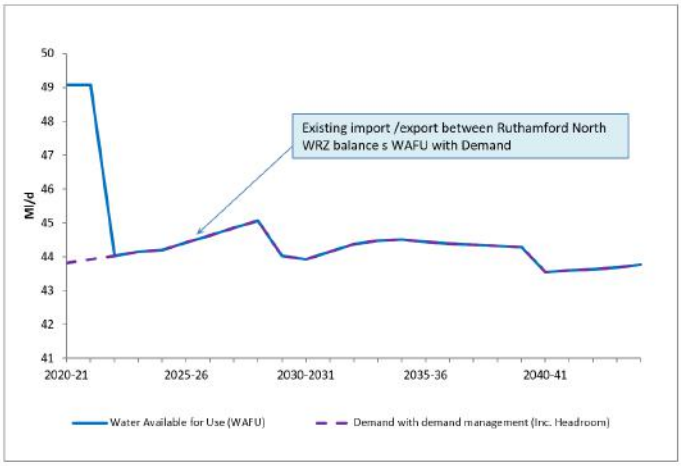


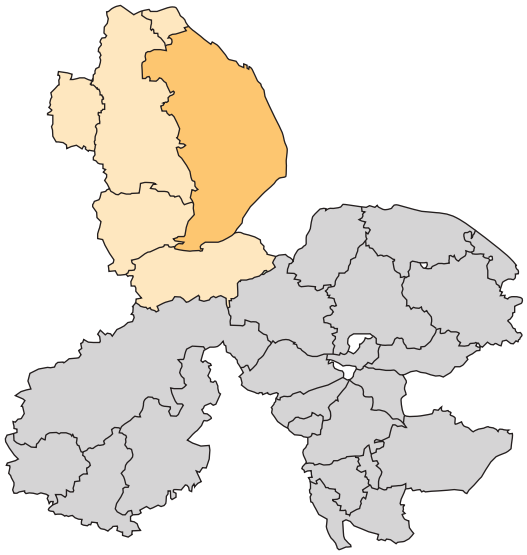
Table 1.4.9: Bourne final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	55.08	44.26	44.26	44.26	44.26	44.26
Net transfers into Area (Ml/d)	-6.00	-0.07	-0.24	0.24	0.02	-0.50
Total DYAA Water available for Use: including transfers* (Ml/d)	49.08	44.19	44.02	44.49	44.28	43.76
Total DYAA Distribution Input (Ml/d)	41.67	41.76	41.12	41.18	40.93	40.83
Total DYAA Target Headroom (Ml/d)	2.15	2.42	2.90	3.31	3.35	2.94
DYAA supply-demand balance (Ml/d)	5.27	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

1.5 East Lincolnshire

The East Lincolnshire WRZ covers an area of 2783km^2, extending from Humber to the Wash and is based on the supply systems for Grimsby, Louth, Skegness, and Boston. The supplies are primarily groundwater abstractions from the Lincolnshire Chalk, Lincolnshire Limestone and Spilsby Sandstone. There is also surface water abstraction from the Louth Canal into Covenham pumped storage reservoir.



Supply Forecast

Table 1.5.1: East Lincolnshire Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	134.00	134.00	134.00	134.00	134.00	134.00
Sustainability reductions (Ml/d)	0.00	-3.00	-3.00	-3.00	-3.00	-3.00
Climate change impacts (Ml/d)	0.00	-3.00	-3.00	-3.00	-3.00	-3.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	134.00	131.00	131.00	131.00	131.00	131.00
Outage Allowance†	2.12	2.07	2.07	2.07	2.07	2.07
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	131.88	128.93	128.93	128.93	128.93	128.93

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -3.0 Ml/d sustainability reduction seen in 2022

This zone is considered to have already experienced a >1 in 200-year drought event and does not see additional severe drought impact on DO.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately 165,000 to 207,000, and the population is forecast to increase from approximately 368,000 to 436,000[3].

[3] *Based upon Local Authority planning information*

Table 1.5.2: East Lincolnshire population and property forecast per AMP

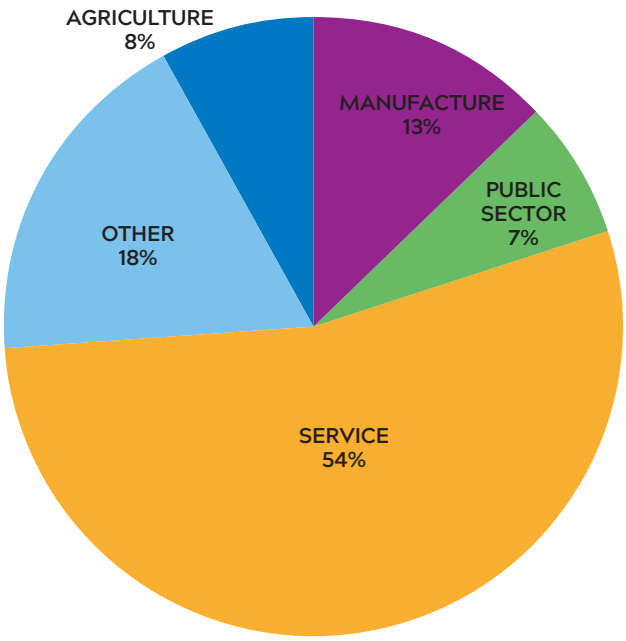
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	367,960	390,030	404,300	418,270	427,050	435,780
Total Household Properties	165,160	178,800	187,360	195,730	201,030	207,020

Property growth rates vary between 9,400 per AMP in the short-term to 6,000 per AMP in the long-term. The short- to medium-term projections are aligned with Local Authority data; the medium to long-term projections with ONS trend based data.

Table 1.5.3: East Lincolnshire rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	17,610	14,260	13,970	8,790	8,730
Additional Household properties per AMP	9,440	8,560	8,370	5,300	5,990

Figure 1.5.1: East Lincolnshire Non-household sectors



Non-household demand is predominantly from the service sector and manufacturing, which account for 67% of total NHH demand. Non-household demand is forecast to decrease over the WRMP period from **29.63Ml/d to 22.43 Ml/d**.

For the baseline scenario WITHOUT demand management options.

Household demand (measured/unmeasured) is forecast to increase over the WRMP period from **55.67 Ml/d to 61.20 Ml/d**.

Leakage is forecast to decline from the baseline value of **16.46Ml/d to 15.99 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to decrease from **29.63 Ml/d to 22.43 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease from **104.87 Ml/d to 102.74 Ml/d**.

Table 1.5.4: East Lincolnshire demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	34.31	42.10	46.49	50.29	52.98	54.58
Household demand (Ml/d) - unmeasured	21.36	15.11	11.89	9.35	7.34	6.63
Non-household demand (Ml/d)	29.63	26.60	25.02	23.83	23.01	22.43
Leakage (Ml/d)	16.46	15.95	15.97	15.98	15.99	15.99
Distribution input (Ml/d)	104.87	102.88	102.47	102.57	102.44	102.74

Baseline supply demand balance

Figure 1.5.2: East Lincolnshire baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

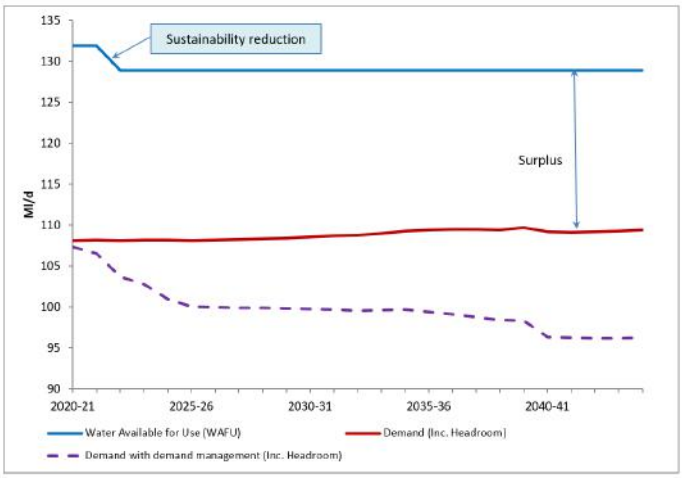


Table 1.5.5: East Lincolnshire baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	131.88	128.93	128.93	128.93	128.93	128.93
Net transfers into Area (Ml/d)	0.0	0.0	0.0	0.0	0.0	0.0
Total DYAA Water available for Use: including transfers* (Ml/d)	131.88	128.93	128.93	128.93	128.93	128.93
Total DYAA Distribution Input (Ml/d)	103.34	102.89	102.47	102.57	102.44	102.74
Total DYAA Target Headroom (Ml/d)	4.78	5.30	5.96	6.70	7.23	6.68
DYAA supply-demand balance (Ml/d)	23.76	20.75	20.49	19.66	19.26	19.51

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

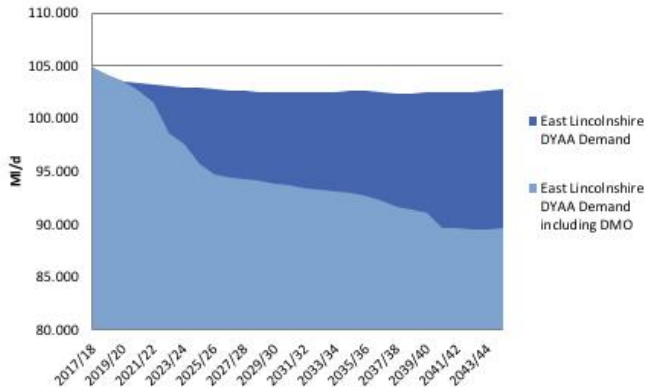
We plan to use a combined strategy of smart metering, water efficiency and leakage reduction to reduce demand.

- We plan to reduce leakage by 52% from 16.46 Ml/d in 2017/18 to 7.84 Ml/d in 2045.

Table 1.5.6: East Lincolnshire Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.94	1.27	1.90	2.30	2.44
Smart metering (demand savings) (Ml/d) -	1.89	2.14	2.24	2.30	2.34
Leakage reduction (CSPL savings) (Ml/d)	1.47	1.62	1.72	1.78	1.85
Leakage reduction (our network) (Ml/d)	2.84	3.48	3.58	4.83	6.30
Total saving (Ml/d)	7.14	8.51	9.44	11.21	12.93

Figure 1.5.3: East Lincolnshire DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (first year of AMP6) are: Measured PCC 129 l/h/d; Unmeasured PCC 211 l/h/d, with a weighted average value of 151.3 l/h/d. This is expected to fall to 129.0 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 1.5.7: Changes in East Lincolnshire Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	151.3	146.7	144.4	142.6	141.2	140.4
Final demand forecast (DYAA) (includes selected demand management strategy)	151.3	139.2	135.7	132.4	130.2	129.0
Final demand forecast (DYAA) % change from baseline forecast	0.00%	5.11%	6.02%	7.15%	7.79%	8.12%

For the final plan scenario WITH demand management options.

Household demand (measured/unmeasured) is forecast to increase over the WRMP period from **55.67 Ml/d to 56.19 Ml/d**, with demand management option savings.

Leakage is forecast to decline from the baseline value of **16.46Ml/d to 7.84 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to decrease from **29.63 Ml/d to 22.43 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease from **104.87 Ml/d to 89.58 Ml/d**, once the influence of demand management option savings has been included.

Table 1.5.8: East Lincolnshire demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	34.31	39.26	43.10	46.19	48.45	49.76
Household demand (Ml/d) - unmeasured	21.36	15.04	11.78	9.20	7.17	6.44
Non-household demand (Ml/d)	29.63	26.60	25.02	23.83	23.01	22.43
Leakage (Ml/d)	16.46	11.63	10.87	10.68	9.37	7.84
Distribution input (Ml/d)	104.87	95.65	93.86	93.03	91.12	89.58

Final supply demand balance

Once our preferred demand management strategy has been implemented, the supply demand balance in East Lincolnshire WRZ is maintained throughout the planning period.

Figure 1.5.4: East Lincolnshire WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

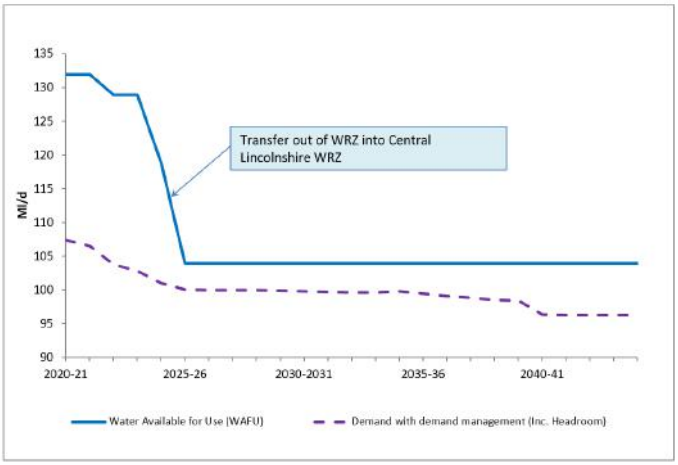


Table 1.5.9: East Lincolnshire final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	131.88	128.93	128.93	128.93	128.93	128.93
Net transfers into Area (Ml/d)	0.00	-10.17	-25.00	-25.00	-25.00	-25.00
Total DYAA Water available for Use: including transfers* (Ml/d)	131.88	118.76	103.93	103.93	103.93	103.93
Total DYAA Distribution Input (Ml/d)	102.57	95.65	93.86	93.03	91.12	89.58
Total DYAA Target Headroom (Ml/d)	4.78	5.30	5.96	6.70	7.23	6.68
DYAA supply-demand balance (Ml/d)	24.53	17.81	4.10	4.20	5.57	7.67

* bulk imports, exports and inter-zone transfers

1.6 Nottinghamshire

The Nottinghamshire WRZ covers an area of 672km^2 and lies to the west of the River Trent. The zone is based on the supply systems for Gainsborough and Retford. Customers in the zone receive groundwater abstracted from the Sherwood Sandstone aquifer.

Supply Forecast

Table 1.6.1: Nottinghamshire Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	22.00	22.00	22.00	22.00	22.00	22.00
Sustainability reductions (Ml/d)	0.00	-2.00	-2.00	-2.00	-2.00	-2.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	22.00	20.00	20.00	20.00	20.00	20.00
Outage Allowance†	0.54	0.49	0.49	0.49	0.49	0.49
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	21.46	19.51	19.51	19.51	19.51	19.51

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to

- -2.0 Ml/d sustainability reduction seen in 2022

This zone is considered to have already experienced a 1 in 200 year drought event and does not see additional severe drought impact on DO.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately 32,000 to 39,000, and the population is forecast to increase from approximately 72,000 to 82,000[4].

[4] *Based upon Local Authority planning information*

Table 1.6.2: Nottinghamshire population and property forecast per AMP

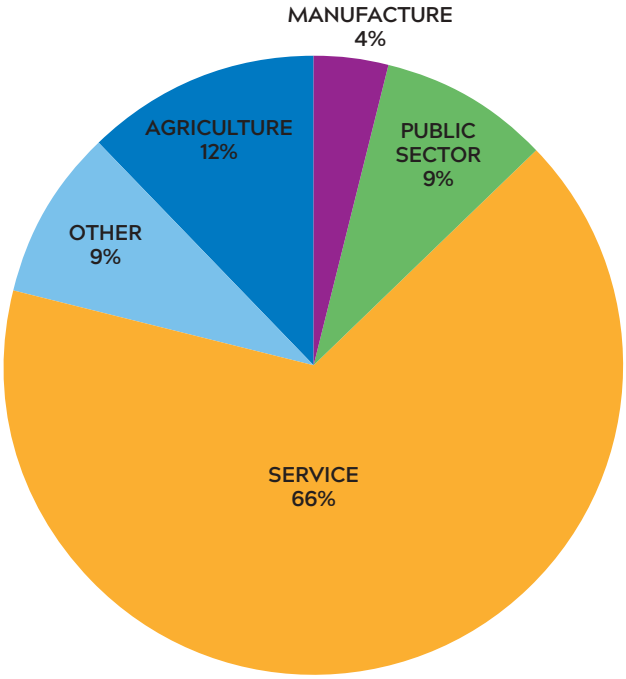
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	71,980	76,350	77,600	78,580	80,320	81,920
Total Household Properties	31,770	35, 120	36, 070	36,890	37,920	38,940

Property growth rates vary between **2,250** per AMP in the short-term to **1,010** per AMP in the long-term. The short- to medium-term projections are aligned with Local Authority data; the medium to long-term projections with ONS trend based data.

Table 1.6.3: Nottinghamshire rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	4,060	1,250	980	1,740	1,600
Additional Household properties per AMP	2,250	950	820	1,040	1,010

Figure 1.6.1: Nottinghamshire Non-household sectors



Non-household demand is predominantly from the service sector and agriculture, which account for 78% of total NHH demand. Non-household demand is forecast to increase over the WRMP period from 4.**21 Ml/d to 5.73 Ml/d.**

For the baseline scenario WITHOUT demand management options.

Household demand is forecast to increase over the WRMP period from **9.81 Ml/d to 10.42 Ml/d**.

Leakage is forecast to decrease from the baseline value of **5.01 Ml/d to 4.90 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to increase from **4.21 Ml/d to 5.73 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **19.61 Ml/d to 21.62Ml/d**.

Table 1.6.4: Nottinghamshire demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	5.57	7.12	7.73	8.20	8.68	9.08
Household demand (Ml/d) - unmeasured	4.24	3.01	2.42	1.97	1.62	1.34
Non-household demand (Ml/d)	4.21	4.49	4.68	4.96	5.32	5.73
Leakage (Ml/d)	5.01	4.89	4.90	4.90	4.90	4.90
Distribution input (Ml/d)	19.61	20.09	20.32	20.61	21.10	21.62

Baseline supply demand balance

Figure 1.6.2: Nottinghamshire baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

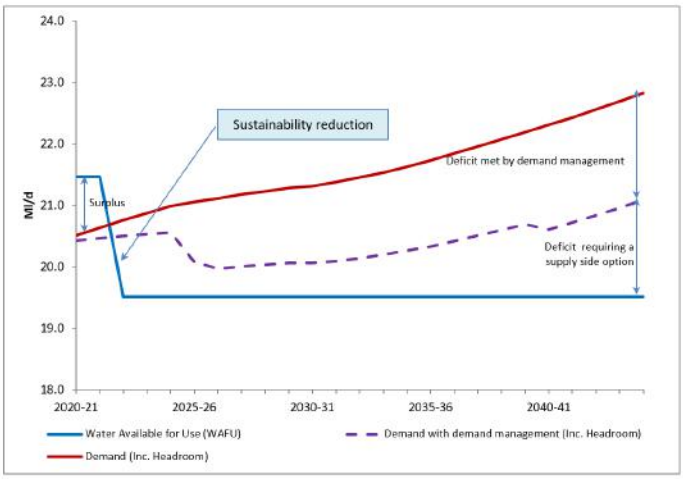


Table 1.6.5: Nottinghamshire baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	21.46	19.51	19.51	19.51	19.51	19.51
Net transfers into Area (Ml/d)	0.0	0.0	0.0	0.0	0.0	0.0
Total DYAA Water available for Use: including transfers* (Ml/d)	21.46	19.51	19.51	19.51	19.51	19.51
Total DYAA Distribution Input (Ml/d)	19.65	20.1	20.32	20.61	21.10	21.62
Total DYAA Target Headroom (Ml/d)	0.86	0.89	0.96	1.01	1.09	1.21
DYAA supply-demand balance (Ml/d)	0.95	-1.48	-1.77	-2.12	-2.68	-3.32

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

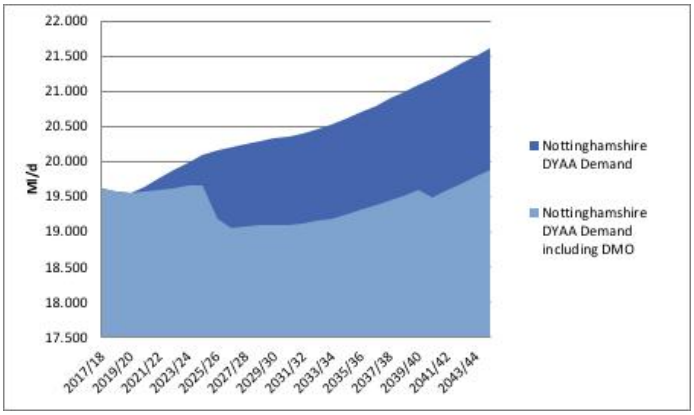
We plan to use a combined strategy of smart metering, water efficiency and leakage reduction to reduce demand.

- We plan to reduce leakage by 20% from 5.01 Ml/d in 2017/18 to 3.99 Ml/d in 2045.

Table 1.6.6: Nottinghamshire Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.16	0.22	0.34	0.45	0.48
Smart metering (demand savings) (Ml/d) -	0.00	0.31	0.32	0.33	0.33
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.29	0.30	0.32	0.33
Leakage reduction (our network) (Ml/d)	0.26	0.39	0.39	0.39	0.58
Total saving (Ml/d)	0.42	1.22	1.35	1.49	1.72

Figure 1.6.3: Nottinghamshire DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2015/16 (first year of AMP6) are: Measured PCC 129 l/h/d; Unmeasured PCC 147 l/h/d, with a weighted average value of 136.3 l/h/d. This is expected to fall to 117.0 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 1.6.7: Changes in Nottinghamshire Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	136.3	132.6	130.9	129.4	128.2	127.2
Final demand forecast (DYAA) (includes selected demand management strategy)	136.3	130.4	123.9	120.8	118.2	117.0
Final demand forecast (DYAA) % change from baseline forecast	0.00%	1.66%	5.35%	6.65%	7.80%	8.02%

For the final plan scenario WITH demand management options.

Household demand is forecast to decrease over the WRMP period from **9.81 Ml/d to 9.59 Ml/d**.

Leakage is forecast to decline from the baseline value of **5.01 Ml/d to 3.99 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **4.20 Ml/d to 5.72 Ml/d** over the WRMP period.

Distribution Input is predicted to increase slightly from **19.61 Ml/d to 19.89 Ml/d**, once the influence of demand management option savings has been included.

Table 1.6.8: Nottinghamshire demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	5.57	6.97	7.23	7.57	7.94	8.31
Household demand (Ml/d) - unmeasured	4.24	2.99	2.39	1.92	1.56	1.28
Non-household demand (Ml/d)	4.21	4.49	4.68	4.96	5.32	5.72
Leakage (Ml/d)	5.01	4.64	4.22	4.21	4.19	3.99
Distribution input (Ml/d)	19.61	19.67	19.10	19.25	19.60	19.89

Selected supply-side options

For details on the feasible options list for Nottinghamshire WRZ please refer to the supply-side option development technical document.

Table 1.6.9: Nottinghamshire preferred supply side options

Opt Ref	Option Name
NTM1	Central Lincolnshire WRZ to Nottinghamshire WRZ transfer

Final supply demand balance

Once our preferred demand management strategy has been implemented, the supply demand balance in Nottinghamshire WRZ is maintained throughout the planning period.

Figure 1.6.4: Nottinghamshire WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

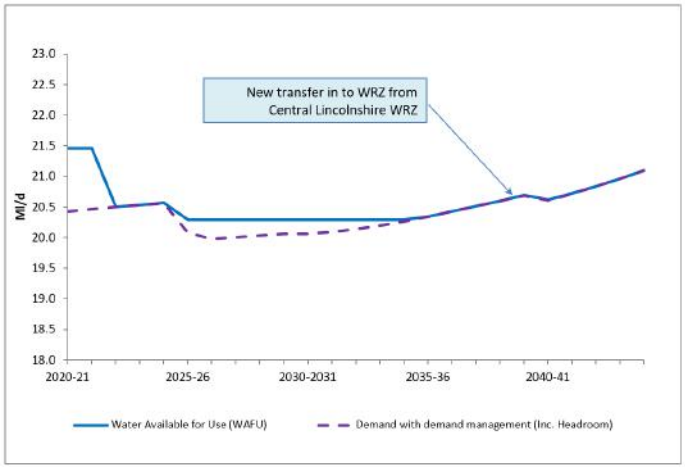


Table 1.6.10: Nottinghamshire final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	21.46	19.51	19.51	19.51	19.51	19.51
Net transfers into Area (Ml/d)	0.00	1.05	0.78	0.78	1.18	1.58
Total DYAA Water available for Use: including transfers* (Ml/d)	21.46	20.56	20.29	20.29	20.69	21.09
Total DYAA Distribution Input (Ml/d)	19.56	19.67	19.10	19.25	19.60	19.89
Total DYAA Target Headroom (Ml/d)	0.86	0.89	0.96	1.01	1.09	1.21
DYAA supply-demand balance (Ml/d)	1.04	0.00	0.23	0.03	0.00	0.00

* bulk imports, exports and inter-zone transfers

1.7 South Lincolnshire

The South Lincolnshire WRZ covers an area of 888km^2 and is based on the supply systems for Grantham and Sleaford. The zone comprises of groundwater abstractions from the Lincolnshire Limestone aquifer.

Supply Forecast

Table 1.7.1: South Lincolnshire Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	34.00	34.00	34.00	34.00	34.00	34.00
Sustainability reductions (Ml/d)	0.00	-2.00	-2.00	-2.00	-2.00	-2.00
Climate change impacts (Ml/d)	-1.23	-1.34	-1.47	-1.61	-1.75	-1.88
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	32.77	30.66	30.53	30.39	30.25	30.12
Outage Allowance†	0.44	0.41	0.41	0.41	0.41	0.41
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	32.33	30.25	30.12	29.98	29.85	29.71

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -2.0 Ml/d sustainability reduction seen in 2022
- Climate change impact of -1.23 Ml/d in 2020 increasing to -1.88 Ml/d in 2045

This zone is considered to have already experienced a >1 in 200-year drought event and does not see additional severe drought impact on DO.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately 46,000 to 62,000, and the population is forecast to increase from approximately 105,000 to 134,000[5].

[5] *Based upon Local Authority planning information*

Table 1.7.2: South Lincolnshire population and property forecast per AMP

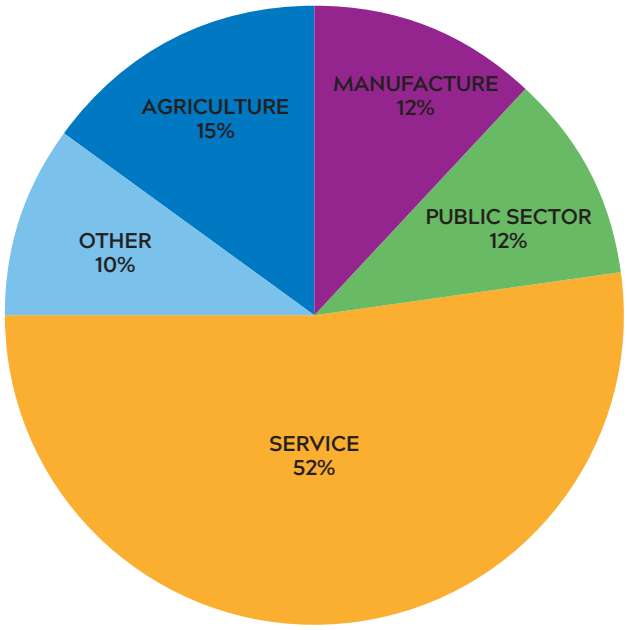
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	105,130	116,150	121,060	125,640	129,980	134,360
Total Household Properties	46,280	52,120	54,840	57,440	59,880	62,350

Property growth rates vary between 4,300 per AMP in the short-term to 2,500 per AMP in the long-term. The short- to medium-term projections are aligned with Local Authority data; the medium to long-term projections with ONS trend based data.

Table 1.7.3: South Lincolnshire rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	8,700	4,910	4,580	4,330	4,370
Additional Household properties per AMP	4,320	2,730	2,600	2,430	2,470

Figure 1.7.1: South Lincolnshire Non-household sectors



Non-household demand is predominantly from the service sector and agriculture, which account for 67% of total NHH demand. Non-household demand is forecast to decrease over the WRMP period from **7.46 Ml/d to 4.01 Ml/d.**

For the Baseline scenario WITHOUT demand management options.

Household demand is forecast to increase over the WRMP period from **14.04 Ml/d to 17.34 Ml/d**.

Leakage is forecast to decrease from the baseline value of **4.40 Ml/d to 4.28 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to decrease from **7.46 Ml/d to 4.01 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease from **26.69 Ml/d to 26.41 Ml/d**.

Table 1.7.4: South Lincolnshire demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	11.51	13.53	14.45	15.24	15.75	16.27
Household demand (Ml/d) - unmeasured	2.53	1.77	1.39	1.08	1.07	1.07
Non-household demand (Ml/d)	7.46	6.06	5.34	4.78	4.34	4.01
Leakage (Ml/d)	4.40	4.28	4.28	4.28	4.28	4.28
Distribution input (Ml/d)	26.69	26.44	26.25	26.18	26.25	26.41

Baseline supply demand balance

Figure 1.7.2: South Lincolnshire baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

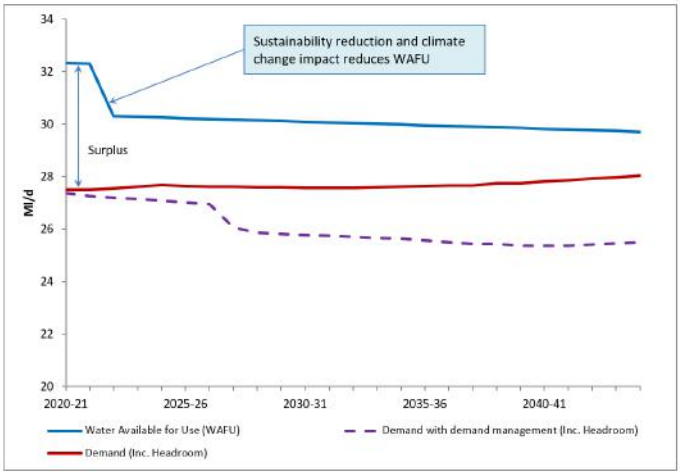


Table 1.7.5: South Lincolnshire baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	32.33	30.25	30.12	29.98	29.85	29.71
Net transfers into Area (Ml/d)	0.0	0.0	0.0	0.0	0.0	0.0
Total DYAA Water available for Use: including transfers* (Ml/d)	32.33	30.25	30.12	29.98	29.85	29.71
Total DYAA Distribution Input (Ml/d)	26.32	26.44	26.25	26.18	26.25	26.41
Total DYAA Target Headroom (Ml/d)	1.18	1.24	1.33	1.43	1.51	1.63
DYAA supply-demand balance (Ml/d)	4.84	2.56	2.54	2.37	2.09	1.67

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

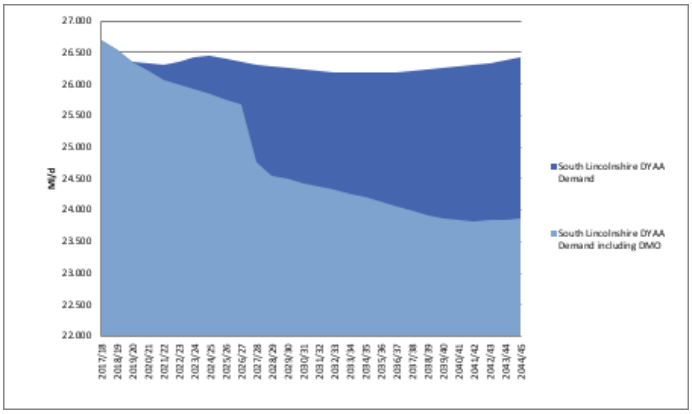
We plan to use a combined strategy of smart metering, water efficiency and leakage reduction to reduce demand.

- We plan to reduce leakage by 30% from 4.40 Ml/d in 2017/18 to 3.09 Ml/d in 2045.

Table 1.7.6: South Lincolnshire Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.27	0.38	0.53	0.71	0.81
Smart metering (demand savings) (Ml/d) -	0.00	0.42	0.45	0.47	0.49
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.45	0.48	0.50	0.53
Leakage reduction (our network) (Ml/d)	0.33	0.49	0.49	0.66	0.66
Total saving (Ml/d)	0.60	1.74	1.95	2.34	2.49

Figure 1.7.3: South Lincolnshire DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2015/16 are: Measured PCC 135 l/h/d; Unmeasured PCC 128 l/h/d, with a weighted average value of 133.5 l/h/d. This is expected to fall to 119.1 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 1.7.7: Changes in South Lincolnshire Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	133.5	131.8	130.8	129.9	129.5	129.0
Final demand forecast (DYAA) (includes selected demand management strategy)	133.5	129.4	124.0	121.9	120.1	119.0
Final demand forecast (DYAA) % change from baseline forecast	0.00%	1.82%	5.20%	6.16%	7.26%	7.67%

For the final plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **14.04 Ml/d to 15.99 Ml/d.**

Leakage is forecast to decrease from the baseline value of **4.40 Ml/d to 3.09 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to decrease from **7.46 Ml/d to 4.01 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease from **26.69 Ml/d to 23.88 Ml/d**, once the influence of demand management option savings has been included.

Table 1.7.8: South Lincolnshire demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	11.51	13.27	13.65	14.27	14.57	14.97
Household demand (Ml/d) - unmeasured	2.53	1.76	1.36	1.05	1.04	1.03
Non-household demand (Ml/d)	7.46	4.49	4.68	4.96	5.32	5.72
Leakage (Ml/d)	4.40	3.95	3.35	3.32	3.12	3.09
Distribution input (Ml/d)	26.69	25.84	24.49	24.21	23.86	23.88

Selected supply-side options

For details on the feasible options list for South Lincolnshire WRZ please refer to the Supply-side option development technical document.

Table 1.7.9: South Lincolnshire preferred supply side options

Opt Ref	Option Name
SLN6	Central Lincolnshire WRZ to South Lincolnshire WRZ Transfer (63 Ml/d)

Final supply demand balance

Once our preferred demand management strategy has been implemented, the supply demand balance in South Lincolnshire WRZ is maintained throughout the planning period.

Figure 1.7.4: South Lincolnshire WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

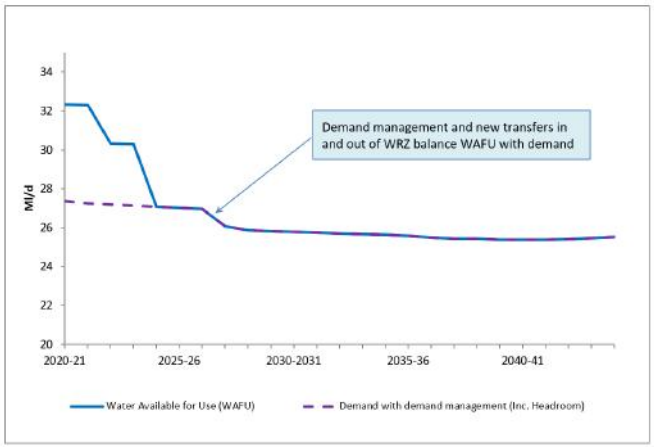


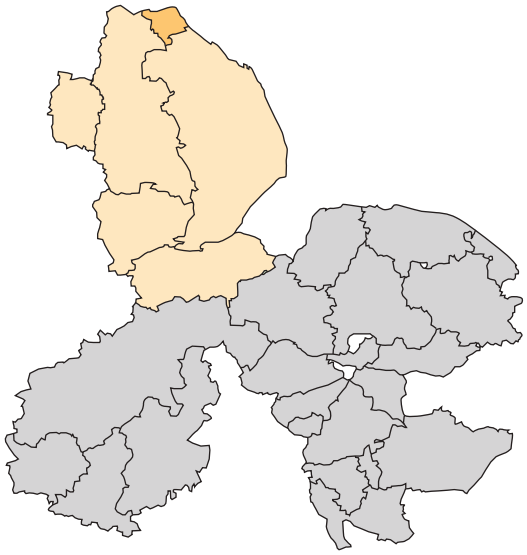
Table 1.7.10: South Lincolnshire final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	32.33	30.25	30.12	29.98	29.85	29.71
Net transfers into Area (Ml/d)	0.00	-3.17	-4.29	-4.34	-4.48	-4.20
Total DYAA Water available for Use: including transfers* (Ml/d)	32.33	27.08	25.82	25.64	25.37	25.51
Total DYAA Distribution Input (Ml/d)	26.20	25.84	24.49	24.21	23.86	23.88
Total DYAA Target Headroom (Ml/d)	1.18	1.24	1.33	1.43	1.51	1.63
DYAA supply-demand balance (Ml/d)	4.96	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

1.8 South Humber Bank

The South Humber Bank is a non-potable system which is supplied with resources abstracted from the River Ancolme.



Supply Forecast

Table 1.8.1: South Humber Bank Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	57.00	57.00	57.00	57.00	57.00	57.00
Sustainability reductions (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	57.00	57.00	57.00	57.00	57.00	57.00
Outage Allowance	N/A	N/A	N/A	N/A	N/A	N/A
Transfers In (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	57.00	57.00	57.00	57.00	57.00	57.00

This zone is non-potable and does not experience any changes to baseline DO or WAFU over the planning period. The DO accounts for outage related effects and so these are not reported separately.

Baseline Demand Forecast

Demand has been modelled as a constant for this zone.

Baseline supply demand balance

Figure 1.8.1: South Humber Bank baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

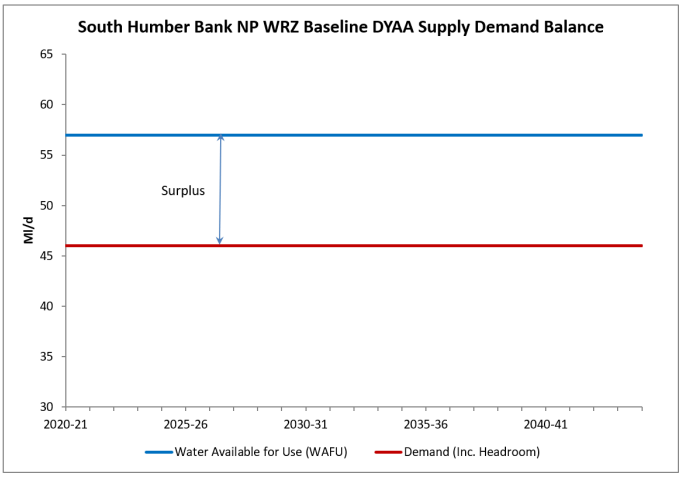


Table 1.8.2: South Humber Bank baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

Water Balance Components (Ml/d)	2020-21	End of AMP7 2024-25	End of AMP8 2029-30	End of AMP9 2034-35	End of AMP10 2039-40	End of AMP11 2044-45
Total DYAA Water available for Use: Area sources* (Ml/d)	57.00	57.00	57.00	57.00	57.00	57.00
Net transfers into Area (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	57.00	57.00	57.00	57.00	57.00	57.00
Total DYAA Distribution Input (Ml/d)	46.00	46.00	46.00	46.00	46.00	46.00
Total DYAA Target Headroom (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
DYAA supply-demand balance (Ml/d)	11.00	11.00	11.00	11.00	11.00	11.00

* bulk imports, exports and inter-zone transfers

Selected supply-side options

Table 1.8.3: South Humber Bank preferred supply side options

Opt Ref	Option Name
SHB2	Pyewipe Water Reuse for non-potable use

Final planning solution (principle planning scenario)

Figure 1.8.2: South Humber Bank final plan supply demand balance to 2045 for dry year annual average (DYAA) conditions

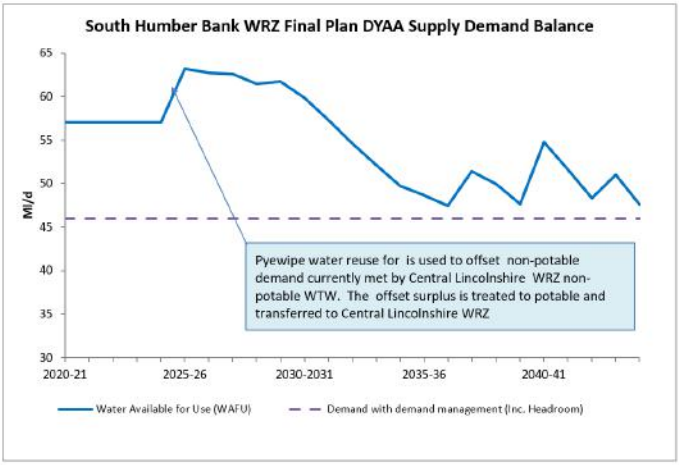


Table 1.8.4: South Humber Bank baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

Water Balance Components (Ml/d)	2020-21	End of AMP7 2024-25	End of AMP8 2029-30	End of AMP9 2034-35	End of AMP10 2039-40	End of AMP11 2044-45
Total DYAA Water available for Use: Area sources* (Ml/d)	57.00	57.00	77.40	77.40	77.40	77.40
Net transfers into Area (Ml/d)	0.00	0.00	-18.72	-22.93	-29.75	-29.85
Total DYAA Water available for Use: including transfers* (Ml/d)	57.00	57.00	58.68	54.47	47.65	47.55
Total DYAA Distribution Input (Ml/d)	46.00	46.00	46.00	46.00	46.00	46.00
Total DYAA Target Headroom (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
DYAA supply-demand balance (Ml/d)	11.00	11.00	12.68	8.47	1.65	1.55

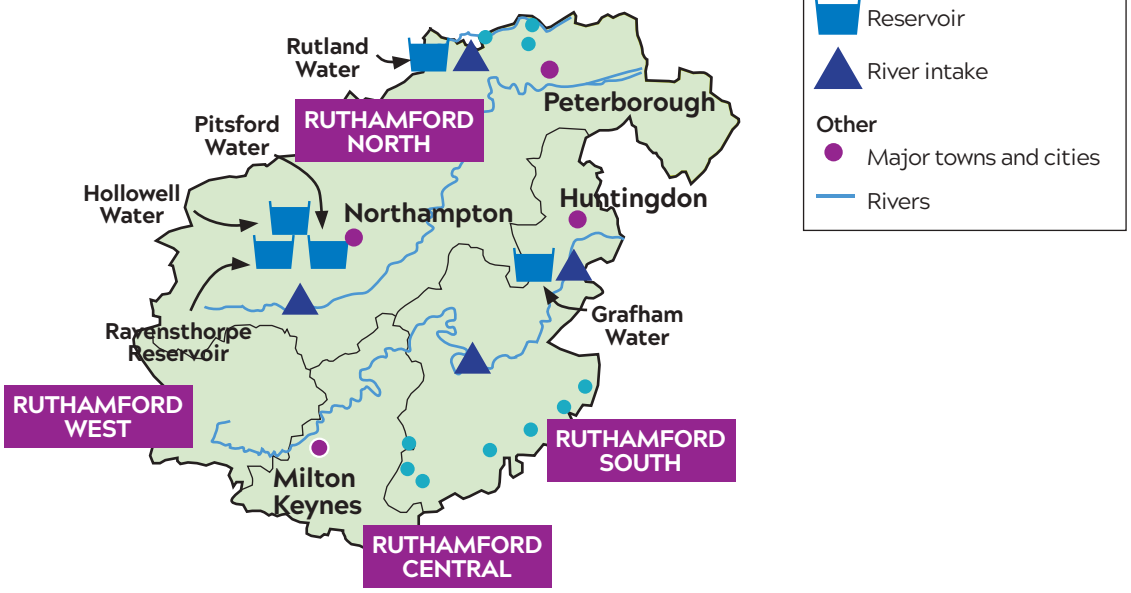
* bulk imports, exports and inter-zone transfers

2. Area 2:

Ruthamford

2.1 Overview

Figure 2.1.1: Problem characterisation Area 2



2.2 Strategic risks and issues

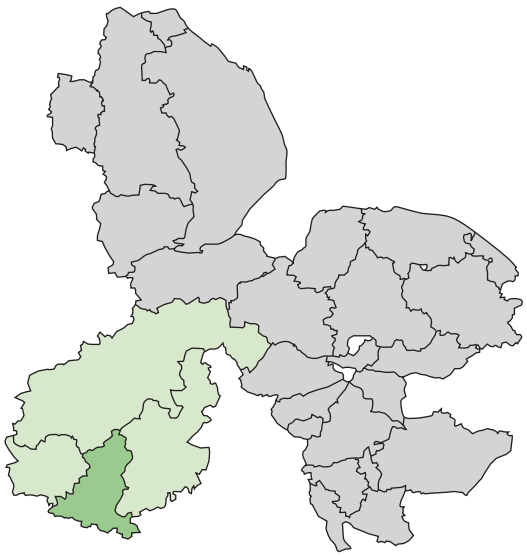
Problem Characterisation Results

- Area 2 is assessed as having moderate levels of concern
- There are very significant strategic needs, although the level of complexity is low

This area experiences significant pressures, especially from climate change and growth, resulting in major baseline deficits. These are resolved through demand management options and especially imports from Lincolnshire, although a residual deficit remains before 2024-25 which will be managed via preparation for a Drought Permit application.

2.3 Ruthamford Central

The Ruthamford Central WRZ covers an area of 719km^2 and includes the supply system for Milton Keynes.



Supply Forecast

Table 2.3.1: Ruthamford Central Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Sustainability reductions (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Outage Allowance†	0.00	0.00	0.00	0.00	0.00	0.00
Transfers In (Ml/d)*	70.39	73.54	75.24	77.14	78.68	80.54
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	70.39	73.54	75.24	77.14	78.68	80.54

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

This zone does not supply its own DO. It receives transfers from Ruthamford South and West from the start of the planning period, which are represented in the baseline WAFU.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **119,000 to 168,000**, and the population is forecast to increase from approximately **294,000 to 391,000**[1].

Table 2.3.2: Ruthamford Central population and property forecast per AMP

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	293,750	337,190	351,970	367,220	378,720	390,810
Total Household Properties	118,860	138,090	146,420	154,790	161,140	167,840

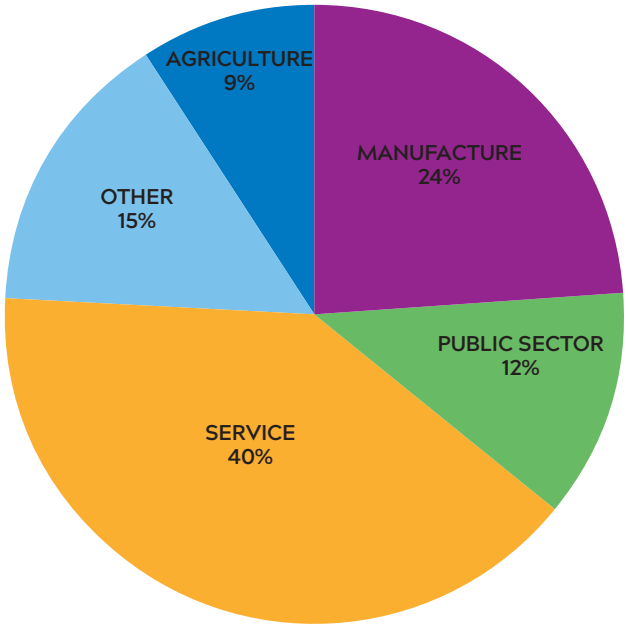
Property growth rates vary between **14,600** per AMP in the short-term to **6,700** per AMP in the long-term. The short- to medium-term projections are aligned with Local Authority data; the medium to long-term projections with ONS trend based data.

[1] *Based upon Local Authority planning information*

Table 2.3.3: Ruthamford Central rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	32,140	14,790	15,250	11,500	12,090
Additional Household properties per AMP	14,570	8,330	8,370	6,350	6,700

Figure 2.3.1: Ruthamford Central Non-household sectors



Non-household demand is predominantly from the service sector and manufacturing, which account for **64%** of total NHH demand. Non-household demand is forecast to decrease over the WRMP period from **16.05 Ml/d to 14.61Ml/d.**

For the baseline scenario WITHOUT demand management options

Household demand is forecast to increase over the WRMP period from **41.53 Ml/d to 53.53 Ml/d.**

Leakage is forecast to decrease from the baseline value of **6.26 Ml/d to 6.04 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to decrease from **16.05 Ml/d to 14.61 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from 6**5.80 Ml/d to 76.13 Ml/d.**

Table 2.3.4: Ruthamford Central demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	34.21	41.90	44.73	47.14	48.59	50.13
Household demand (Ml/d) - unmeasured	7.32	5.12	4.01	3.46	3.43	3.40
Non-household demand (Ml/d)	16.05	15.39	15.09	14.83	14.67	14.61
Leakage (Ml/d)	6.27	6.04	6.04	6.04	6.04	6.04
Distribution input (Ml/d)	65.80	70.39	71.81	73.41	74.67	76.13

Baseline supply demand balance

Figure 2.3.2: Ruthamford Central baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

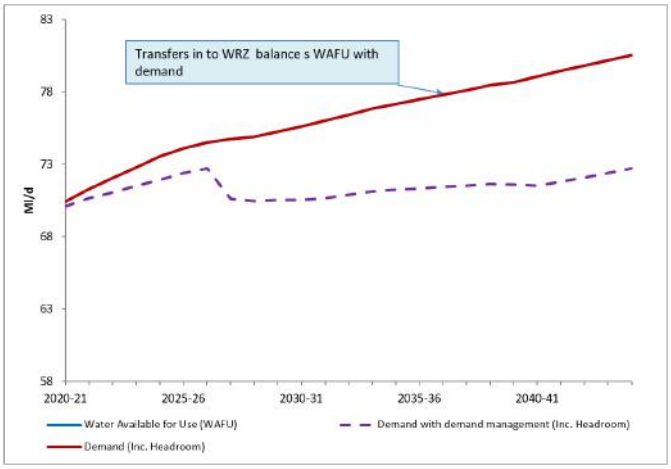


Table 2.3.5: Ruthamford Central baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Net transfers into Area (Ml/d)	70.39	73.54	75.24	77.14	78.68	80.54
Total DYAA Water available for Use: including transfers* (Ml/d)	70.39	73.54	75.24	77.14	78.68	80.54
Total DYAA Distribution Input (Ml/d)	67.46	70.40	71.81	73.41	74.67	76.13
Total DYAA Target Headroom (Ml/d)	2.93	3.15	3.43	3.74	4.01	4.42
DYAA supply-demand balance (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

There is a critical period deficit in this WRZ.

Figure 2.3.3: Ruthamford Central baseline supply demand balance to 2045 for critical period (CP) conditions

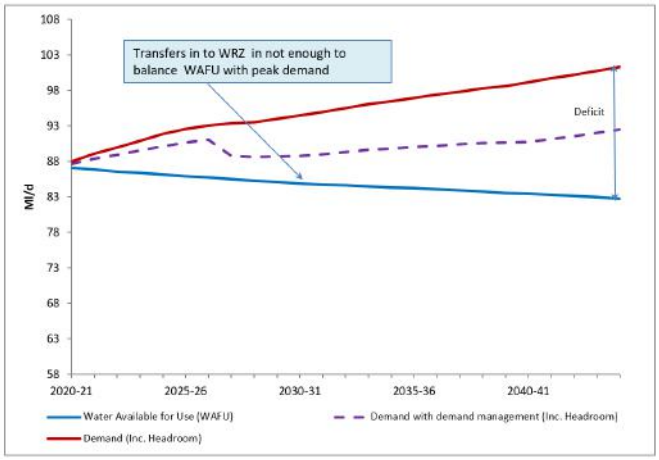


Table 2.3.6: Ruthamford Central baseline supply-demand balance to 2045 for critical period (CP) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total CP Water available for Use: Area sources* (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Net transfers into Area (Ml/d)	87.07	86.15	85.10	84.34	83.56	82.76
Total CP Water available for Use: including transfers* (Ml/d)	87.07	86.15	85.10	84.34	83.56	82.76
Total CP Distribution Input (Ml/d)	84.32	87.92	89.70	91.80	93.60	95.72
Total CP Target Headroom (Ml/d)	3.66	3.93	4.28	4.67	5.03	5.55
CP supply-demand balance (Ml/d)	-0.91	-5.70	-8.88	-12.14	-15.07	-18.51

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

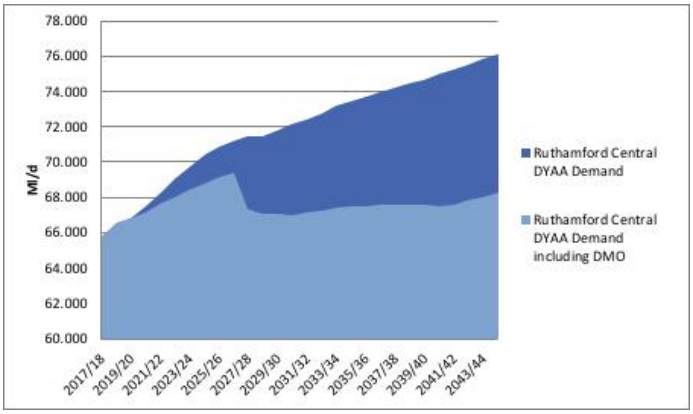
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 66% from 6.26 Ml/d in 2020 to 2.08 Ml/d in 2045, through a combination of leakage reduction and smart metering.

Table 2.3.7: Ruthamford Central Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.44	0.97	1.47	1.96	2.24
Smart metering (demand savings) (Ml/d) -	0.00	1.32	1.40	1.46	1.52
Leakage reduction (CSPL savings) (Ml/d)	0.00	1.21	1.30	1.37	1.44
Leakage reduction (our network) (Ml/d)	1.18	1.18	1.66	2.19	2.52
Total saving (Ml/d)	1.62	4.68	5.83	6.98	7.72

Figure 2.3.4: Ruthamford Central DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 140.2 l/h/d; Unmeasured PCC 146.9 l/h/d, with a weighted average value of 141.4 l/h/d. This is expected to fall to 127.1 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 2.3.8: Changes in Ruthamford Central Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	141.37	139.45	138.46	137.77	137.35	136.97
Final demand forecast (DYAA) (includes selected demand management strategy)	141.37	138.12	131.72	129.74	128.39	127.07
Final demand forecast (DYAA) % change from baseline forecast	0.00%	0.95%	4.87%	5.83%	6.52%	7.23%

For the final plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **41.53 Ml/d to 49.66 Ml/d**.

Leakage is forecast to decrease from the baseline value of **6.26 Ml/d to 2.08 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to decrease from **16.05 Ml/d to 14.61 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **65.80 Ml/d to 68.30 Ml/d,** once the influence of demand management option savings has been included.

Table 2.3.9: Ruthamford Central demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	34.21	41.48	42.42	44.26	45.15	46.36
Household demand (Ml/d) - unmeasured	7.32	5.09	3.96	3.39	3.34	3.30
Non-household demand (Ml/d)	16.05	15.39	15.09	14.83	14.67	14.61
Leakage (Ml/d)	6.26	4.86	3.66	3.08	2.48	2.08
Distribution input (Ml/d)	65.80	68.77	67.08	67.50	67.59	68.30

Selected supply-side options

For details on the feasible options list for Ruthamford Central WRZ please refer to the Supply-side option development technical document.

Table 2.3.10: Ruthamford Central preferred supply side options

Opt Ref	Option Name
RTC2	Ruthamford South WRZ to Ruthamford Central WRZ Transfer

Final supply demand balance

Once our preferred strategy has been implemented, the supply demand balance in Ruthamford Central WRZ is maintained throughout the planning period.

Figure 2.3.5: Ruthamford Central WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

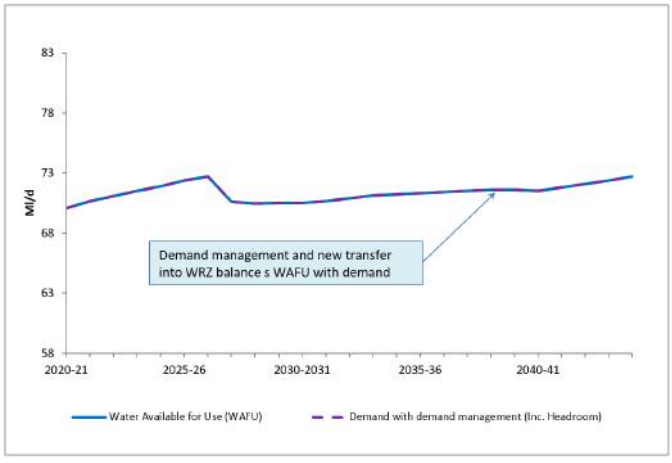


Table 2.3.11: Ruthamford Central final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Net transfers into Area (Ml/d)	70.07	71.92	70.51	71.23	71.60	72.72
Total DYAA Water available for Use: including transfers* (Ml/d)	70.07	71.92	70.51	71.23	71.60	72.72
Total DYAA Distribution Input (Ml/d)	67.14	68.77	67.08	67.50	67.59	68.30
Total DYAA Target Headroom (Ml/d)	2.93	3.15	3.43	3.74	4.01	4.42
DYAA supply-demand balance (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

Figure 2.3.6: Ruthamford Central final plan supply demand balance to 2045 for critical period (CP) conditions

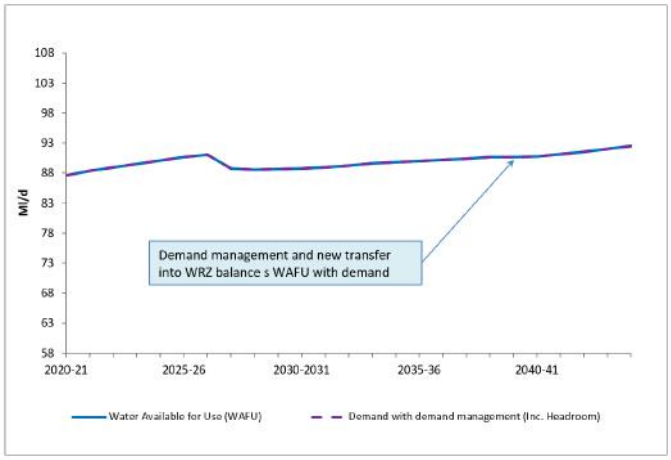


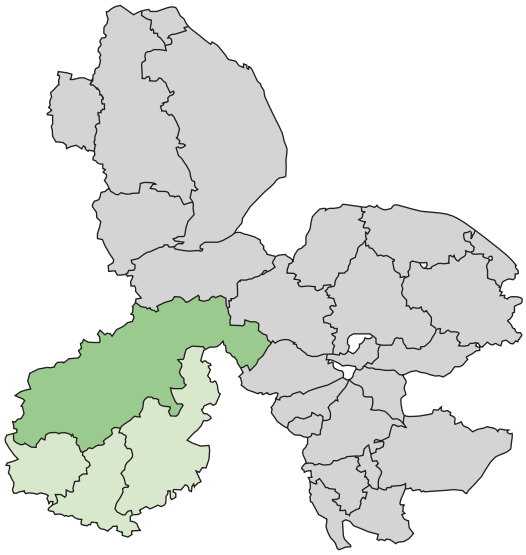
Table 2.3.12: Ruthamford Central final plan supply-demand balance to 2045 for critical period (CP) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total CP Water available for Use: Area sources* (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Net transfers into Area (Ml/d)	87.64	90.11	88.67	89.84	90.68	92.49
Total CP Water available for Use: including transfers* (Ml/d)	87.70	90.11	88.67	89.84	90.68	92.49
Total CP Distribution Input (Ml/d)	83.98	86.18	84.38	85.16	85.65	86.93
Total CP Target Headroom (Ml/d)	3.66	3.93	4.28	4.67	5.03	5.55
CP supply-demand balance (Ml/d)	0.06	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

2.4 Ruthamford North

The Ruthamford North WRZ covers an area of 2894km^2 and is based on the supply systems for Peterborough, Northampton, Wellingborough, Corby, Daventry and Kettering. This zone is supplied solely from surface water, with abstractions in the Rivers Nene and Welland filling Pitsford Water and Rutland Water reservoirs respectively. Two smaller naturally filled reservoirs, Hollowell and Ravensthorpe, also provide some resource for the zone.



Supply Forecast

Table 2.4.1: Ruthamford North Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	308.00	308.00	308.00	308.00	308.00	308.00
Sustainability reductions (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Climate change impacts (Ml/d)	-18.11	-19.72	-21.74	-23.75	-25.76	-27.78
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	289.89	288.28	286.26	284.25	282.24	280.22
Outage Allowance†	4.48	4.45	4.42	4.39	4.36	4.32
Transfers In (Ml/d)*	46.00	40.00	40.00	40.00	40.00	40.00
Transfers Out (Ml/d)*	85.60	86.34	87.16	87.74	88.30	88.86
Total Water Available for Use (Ml/d)	245.80	237.48	234.68	232.12	229.58	227.04

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- Climate change impact of -18.11 Ml/d in 2020 increasing to -27.78 Ml/d in 2045

This zone is considered to have already experienced a 1 in 200 year drought event and does not see additional severe drought impact on DO.

The zone supplies a bulk export to Severn Trent Water of 18 Ml/d throughout the planning period.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **385,000 to 524,000**, and the population is forecast to increase from approximately **908,840 to 1,170,000**[2].

[2] *Based upon Local Authority planning information*

Table 2.4.2: Ruthamford North population and property forecast per AMP

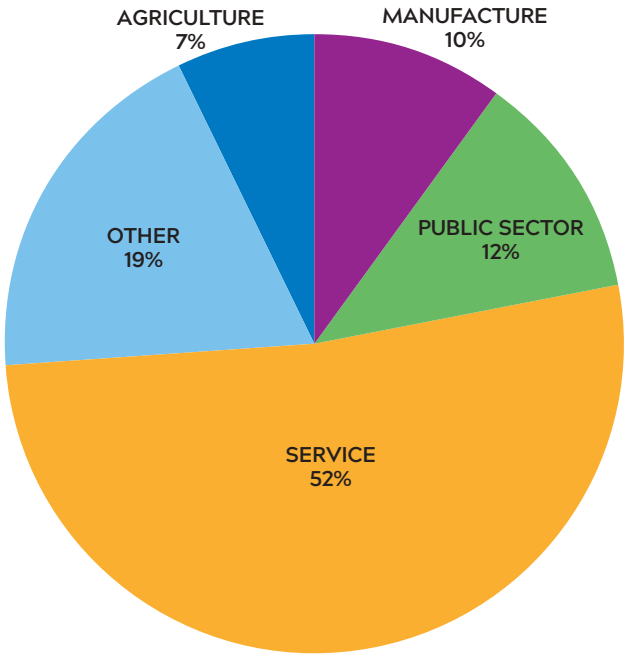
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	908,840	1,015,350	1,061,880	1,097,740	1,135,020	1,168,970
Total Household Properties	385,520	436,360	462,740	484,670	504,220	524,190

Property growth rates vary between **40,000** per AMP in the short-term to **20,000** per AMP in the long-term. The short- to medium-term projections are aligned with Local Authority data; the medium to long-term projections with ONS trend based data.

Table 2.4.3: Ruthamford North rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	83,050	46,520	35,860	37,280	33,950
Additional Household properties per AMP	40,360	26,380	21,930	19,550	19,980

Figure 2.4.1: Ruthamford North Non-household sectors



Non-household demand is predominantly from the service and public sectors which account for **64%** of total NHH demand. Non-household demand is forecast to increase over the WRMP period from **50.27 Ml/d to 50.84 Ml/d.**

For the baseline scenario WITHOUT demand management options

Household demand is forecast to increase over the WRMP period from **125.47 Ml/d to 155.02 Ml/d.**

Leakage is forecast to decrease from the baseline value of **37.11 Ml/d to 35.92 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to increase from **50.27 Ml/d to 50.84 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **219.36 Ml/d to 248.30 Ml/d.**

Table 2.4.4: Ruthamford North demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	98.47	118.58	127.70	134.62	139.55	143.64
Household demand (Ml/d) - unmeasured	27.01	19.27	15.20	12.05	11.47	11.38
Non-household demand (Ml/d)	50.27	50.72	50.83	50.76	50.75	50.84
Leakage (Ml/d)	37.11	35.94	35.94	35.94	35.93	35.92
Distribution input (Ml/d)	219.36	231.02	236.18	239.88	244.21	248.30

Baseline supply demand balance

Figure 2.4.2: Ruthamford North baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

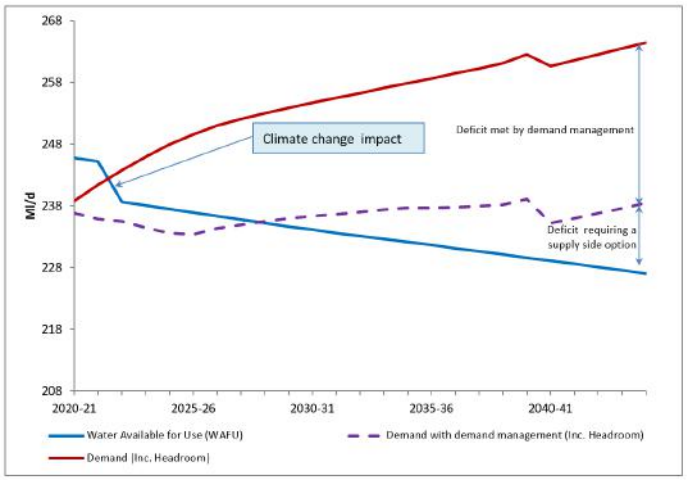


Table 2.4.5: Ruthamford North baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	285.40	283.82	281.84	279.86	277.88	275.90
Net transfers into Area (Ml/d)	-39.60	-46.34	-47.16	-47.74	-48.30	-48.86
Total DYAA Water available for Use: including transfers* (Ml/d)	245.80	237.48	234.68	232.12	229.58	227.04
Total DYAA Distribution Input (Ml/d)	223.21	231.02	236.18	239.88	244.21	248.30
Total DYAA Target Headroom (Ml/d)	15.63	16.90	17.72	18.00	18.32	16.14
DYAA supply-demand balance (Ml/d)	6.97	-10.45	-19.23	-25.75	-32.95	-37.40

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

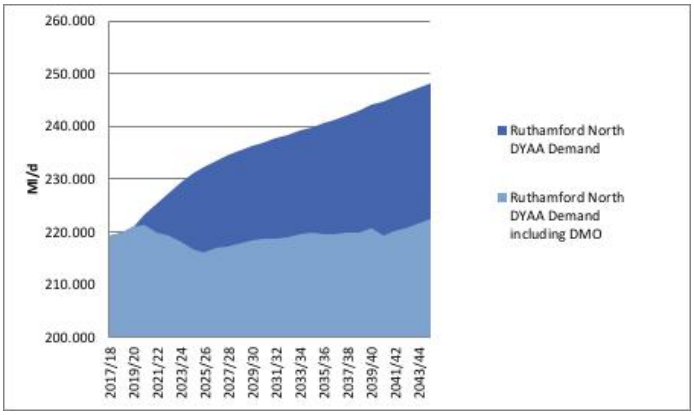
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 42% from 37.11 Ml/d in 2020 to 21.47 Ml/d in 2045.

Table 2.4.6: Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	2.36	3.75	5.33	6.19	6.54
Smart metering (demand savings) (Ml/d) -	3.73	4.13	4.34	4.50	4.64
Leakage reduction (CSPL savings) (Ml/d)	3.53	3.87	4.12	4.33	4.54
Leakage reduction (our network) (Ml/d)	4.60	5.94	6.11	8.05	9.91
Total saving (Ml/d)	14.22	17.69	19.9	23.07	25.63

Figure 2.4.3: Ruthamford North DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 134.9 l/h/d; Unmeasured PCC 151.1 l/h/d, with a weighted average value of 138.1 l/h/d. This is expected to fall to 122.7 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 2.4.7: Changes in Ruthamford North Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	138.10	135.76	134.58	133.61	133.10	132.61
Final demand forecast (DYAA) (includes selected demand management strategy)	138.10	129.60	126.94	124.57	123.32	122.74
Final demand forecast (DYAA) % change from baseline forecast	0.00%	4.54%	5.68%	6.77%	7.35%	7.44%

For the final plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **125.47 Ml/d to 143.48 Ml/d.**

Leakage is forecast to decline from the baseline value of **37.11 Ml/d to 21.47 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **50.27 Ml/d to 50.84 Ml/d** over the WRMP period.

Distribution Input is predicted to increase slightly from **219.36 Ml/d to 222.30 Ml/d,** once the influence of demand management option savings has been included.

Table 2.4.8: Ruthamford North demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	98.47	112.44	119.80	124.97	128.82	132.46
Household demand (Ml/d) - unmeasured	27.01	19.15	15.00	11.78	11.14	11.02
Non-household demand (Ml/d)	50.27	50.72	50.83	50.76	50.75	50.84
Leakage (Ml/d)	37.11	27.82	26.13	25.71	23.54	21.47
Distribution input (Ml/d)	219.36	216.64	218.27	219.72	220.77	222.30

Selected supply-side options

For details on the feasible options list for Ruthamford North WRZ please refer to the Supply-side option development technical document.

Table 2.4.9: Ruthamford North preferred supply side options

Opt Ref	Option Name
RTN27	South Lincolnshire WRZ to Ruthamford North WRZ transfer (67 Ml/d)

Final supply demand balance

Once our preferred demand management strategy has been implemented, the supply demand balance in Ruthamford North WRZ is maintained throughout the planning period.

Figure 2.4.4: Ruthamford North WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

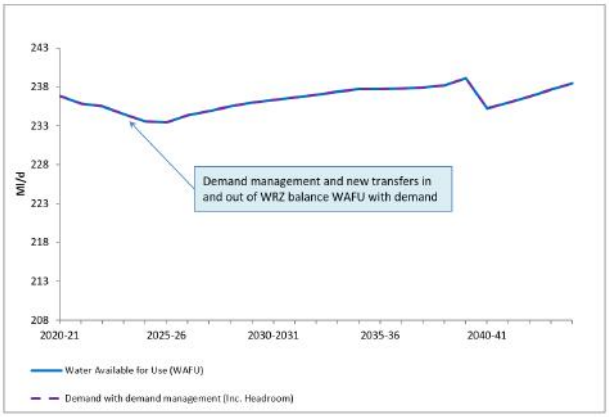


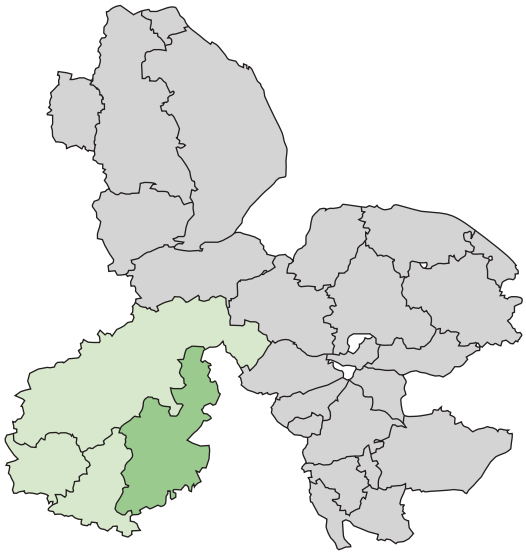
Table 2.4.10: Ruthamford North final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	285.40	283.82	281.84	279.86	277.88	275.90
Net transfers into Area (Ml/d)	-48.57	-50.28	-45.85	-42.14	-38.79	-37.46
Total DYAA Water available for Use: including transfers* (Ml/d)	236.83	233.54	235.99	237.72	239.09	238.44
Total DYAA Distribution Input (Ml/d)	221.20	216.64	218.27	219.72	220.77	222.30
Total DYAA Target Headroom (Ml/d)	15.63	16.90	17.72	18.00	18.32	16.14
DYAA supply-demand balance (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

2.5 Ruthamford South

The Ruthamford South WRZ covers an area of 1419km^2 and is based on the supply systems for Bedford and Huntingdon. This zone is supplied from surface water, with a direct abstraction on the River Great Ouse going to Grafham Water reservoir. There is also a small groundwater contribution from the abstraction in the Woburn Sands aquifer.



Supply Forecast

Table 2.5.1: Ruthamford South Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	263.00	263.00	263.00	263.00	263.00	263.00
Sustainability reductions (Ml/d)	0.00	-3.00	-3.00	-3.00	-3.00	-3.00
Climate change impacts (Ml/d)	-15.43	-16.8	-18.52	-20.23	-21.95	-23.66
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	247.57	243.20	241.48	239.77	238.05	236.34
Outage Allowance†	4.25	4.32	4.29	4.26	4.24	4.21
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	151.05	153.63	154.63	155.82	156.65	157.81
Total Water Available for Use (Ml/d)	92.27	85.24	82.56	79.68	77.16	74.32

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -2.0 Ml/d sustainability reduction seen in 2022 and -1.0 Ml/d seen in 2024
- Climate change impact of -15.43 Ml/d in 2020 increasing to -23.66 Ml/d in 2045

This zone is considered to have already experienced a 1 in 200-year drought event and does not see additional severe drought impact on DO.

The zone also supplies a bulk export to Affinity Water from Grafham Water of 84.6 Ml/d in 2020, reducing to 81.3 Ml/d in 2045 to reflect climate change impact on Grafham yield.

Baseline Demand Forecast

Over the WRMP period household properties are expected to increase from approximately **188,000 to 256,000**, based upon Local Authority planning information and population is expected to increase from approximately **448,000 to 573,000**.

Table 2.5.2: Ruthamford South population and property forecast per AMP

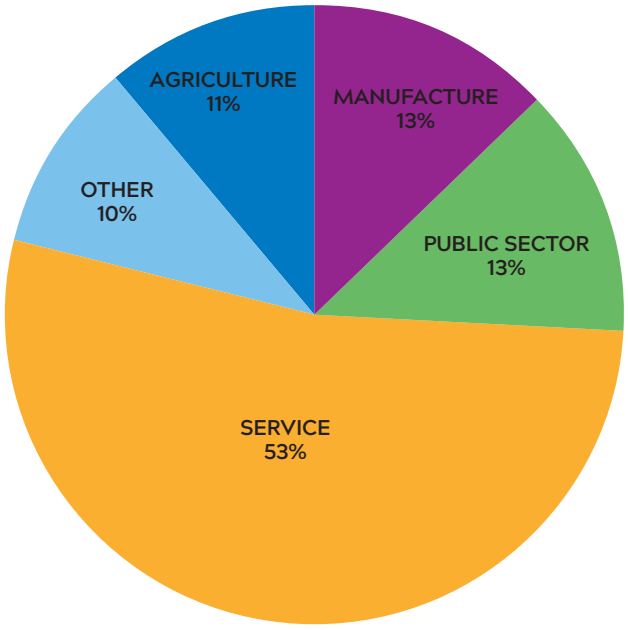
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	447,570	488,610	513,410	531,230	552,160	572,590
Total Household Properties	187,860	209,000	222,230	232,680	244,460	256,070

Rates of household population and property growth per AMP are given below. Property growth rates vary between **16,700** per AMP in the short term to **11,600** per AMP in the long-term. The short to medium term projections are aligned with Local Authority data; the medium to long-term projections with ONS trend based data.

Table 2.5.3: Ruthamford South rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	33,900	24,800	17,820	20,930	20,430
Additional Household properties per AMP	16,690	13,230	10,490	11,780	11,610

Figure 2.5.1: Ruthamford South Non-household sectors



Non-household demand is predominantly from the service sector and manufacturing, which account for **66%** of total NHH demand. Non-household demand is forecast to increase over the WRMP period from **19.84 Ml/d to 21.35 Ml/d.**

For the baseline scenario WITHOUT demand management options.

Household demand is forecast to increase over the WRMP period from **69.99 Ml/d to 83.22 Ml/d.**

Leakage is forecast to decrease from the baseline value of **11.16 Ml/d to 10.94 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to increase from **19.84 Ml/d to 21.35 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **104.07 Ml/d to 118.59 Ml/d.**

Table 2.5.4: Ruthamford South demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	46.36	56.59	62.28	66.48	70.42	73.04
Household demand (Ml/d) - unmeasured	23.63	17.37	14.24	11.80	10.25	10.18
Non-household demand (Ml/d)	19.84	20.10	20.36	20.65	20.97	21.35
Leakage (Ml/d)	11.16	10.82	10.83	10.86	10.89	10.94
Distribution input (Ml/d)	104.07	107.96	110.78	112.87	115.61	118.59

Baseline supply demand balance

Figure 2.5.2: Ruthamford South baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

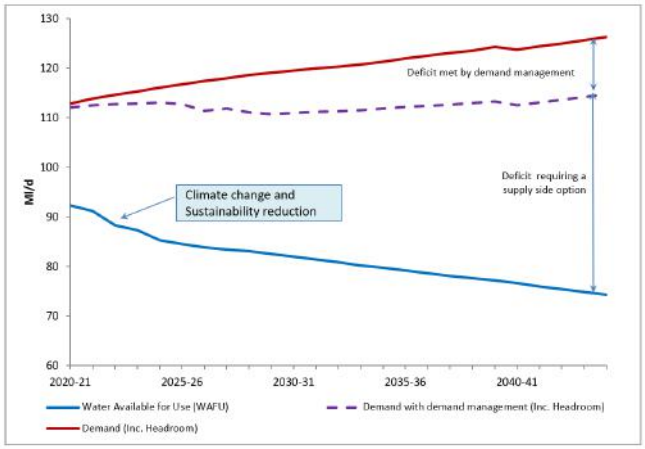


Table 2.5.5: Ruthamford South baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	243.32	238.88	237.19	235.50	233.82	232.13
Net transfers into Area (Ml/d)	-151.05	-153.63	-154.63	-155.82	-156.65	-157.81
Total DYAA Water available for Use: including transfers* (Ml/d)	92.27	85.24	82.56	79.68	77.16	74.32
Total DYAA Distribution Input (Ml/d)	105.00	107.96	110.78	112.87	115.61	118.59
Total DYAA Target Headroom (Ml/d)	7.88	8.10	8.31	8.47	8.67	7.71
DYAA supply-demand balance (Ml/d)	-20.60	-30.82	-36.54	-41.66	-47.11	-51.99

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

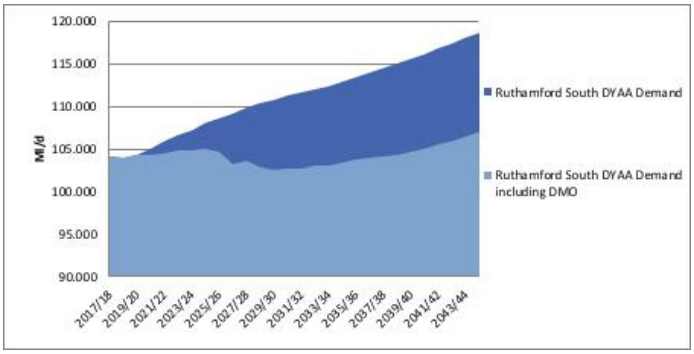
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 48% from 11.16 Ml/d in 2020 to 5.76 Ml/d in 2045.

Table 2.5.6: Ruthamford South Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.72	1.49	2.20	2.95	3.29
Smart metering (demand savings) (Ml/d) -	0.28	2.35	2.57	2.77	2.91
Leakage reduction (CSPL savings) (Ml/d)	0.04	1.86	1.99	2.12	2.24
Leakage reduction (our network) (Ml/d)	1.91	5.94	6.11	8.05	9.91
Total saving (Ml/d)	2.95	8.23	9.32	10.79	11.38

Figure 2.5.3: Ruthamford South DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 128.9 l/h/d; Unmeasured PCC 268.5 l/h/d, with a weighted average value of 156.4 l/h/d. This is expected to fall to 134.1 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 2.5.7: Changes in Ruthamford South Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	156.38	151.37	149.03	147.37	146.09	145.34
Final demand forecast (DYAA) (includes selected demand management strategy)	156.38	149.26	141.34	138.14	135.35	134.14
Final demand forecast (DYAA) % change from baseline forecast	0.00%	1.39%	5.16%	6.26%	7.35%	7.71%

For the final plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **69.99 Ml/d to 76.81 Ml/d**.

Leakage is forecast to decrease from the baseline value of **11.16 Ml/d to 5.76 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **19.84 Ml/d to 21.35 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **104.07 Ml/d to 107.00 Ml/d**, once the influence of demand management option savings has been included.

Table 2.5.8: Ruthamford South demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	46.36	55.61	58.43	61.71	64.65	66.81
Household demand (Ml/d) - unmeasured	23.63	17.32	14.14	11.67	10.09	10.00
Non-household demand (Ml/d)	19.84	20.10	20.36	20.65	20.97	21.35
Leakage (Ml/d)	11.16	8.86	6.44	6.31	5.83	5.76
Distribution input (Ml/d)	104.07	104.97	102.45	103.42	104.61	107.00

Selected supply-side options

Due to the capping of time limited licences we have found that there are now deficits in discrete parts of some WRZs (see Figure 2.5.4 and 2.5.5). These local deficits are not seen at WRZ level and as such would not appear within the WRZ supply demand balances in the WRP Tables. We have completed smaller scale supply demand balances for discrete Planning Zones (PZs) and developed intra-WRZ transfer options to resolve these deficits.

Figure 2.5.4: Meppershall PZ baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

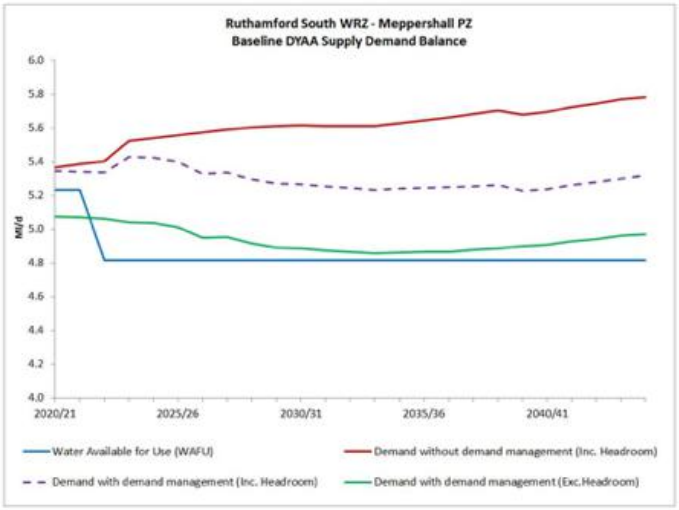
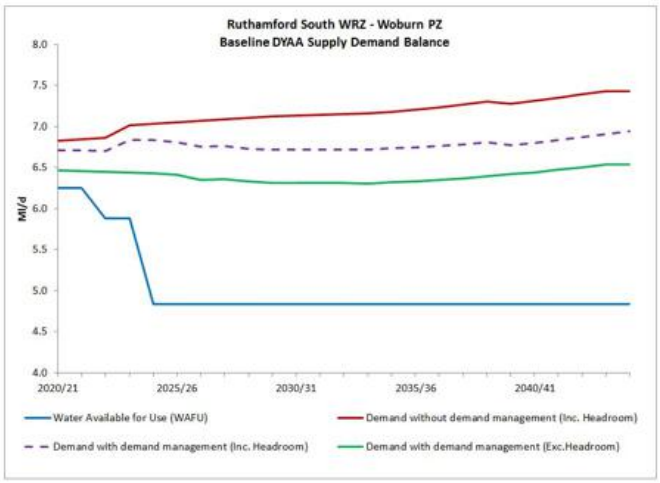


Figure 2.5.5: Woburn PZ baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions



Final supply demand balance

Once our preferred demand management strategy has been implemented, the supply demand balance in Ruthamford South WRZ is maintained throughout the planning period.

Figure 2.5.6: Ruthamford South WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions)

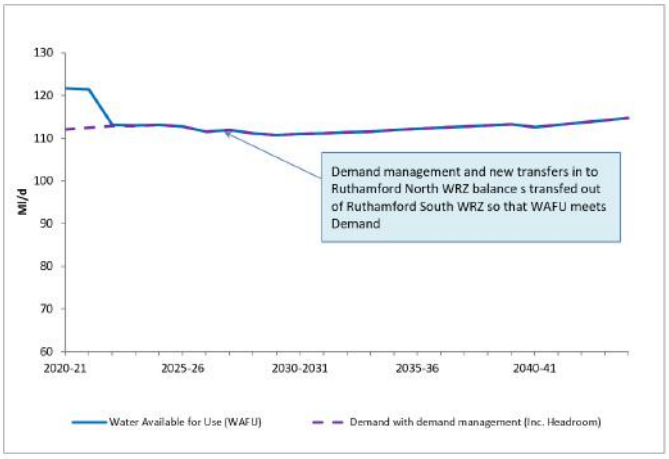


Table 2.5.9: Ruthamford South final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	243.32	238.88	237.19	235.50	233.82	232.13
Net transfers into Area (Ml/d)	-141.60	-125.80	-126.43	-123.61	-120.53	-117.42
Total DYAA Water available for Use: including transfers* (Ml/d)	121.72	113.07	110.76	111.89	113.28	114.71
Total DYAA Distribution Input (Ml/d)	104.23	104.97	102.45	103.42	104.62	107.00
Total DYAA Target Headroom (Ml/d)	7.88	8.10	8.31	8.47	8.67	7.71
DYAA supply-demand balance (Ml/d)	9.62	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

2.6 Ruthamford West

The Ruthamford West WRZ covers and area of 618km^2 and is based on the supply systems for Buckingham and Brackley.

Supply Forecast

Table 2.6.1: Ruthamford West Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Sustainability reductions (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Outage Allowance†	0.00	0.00	0.00	0.00	0.00	0.00
Transfers In (Ml/d)*	67.60	68.34	69.16	69.74	70.30	70.86
Transfers Out (Ml/d)*	-44.00	-44.00	-44.00	-44.00	-44.00	-44.00
Total Water Available for Use (Ml/d)	23.60	24.34	25.16	25.74	26.30	26.86

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

This zone does not supply its own DO. It receives a transfer from Ruthamford South from the start of the planning period, which is represented in the baseline WAFU. It also transfers water out to Ruthamford Central.

Baseline Demand Forecast

Over the WRMP period household properties are expected to increase from approximately **33,000 to 45,000**, based upon Local Authority planning information and population is expected to increase from approximately **80,000 to 101,000**.

Table 2.6.2: Ruthamford West population and property forecast per AMP

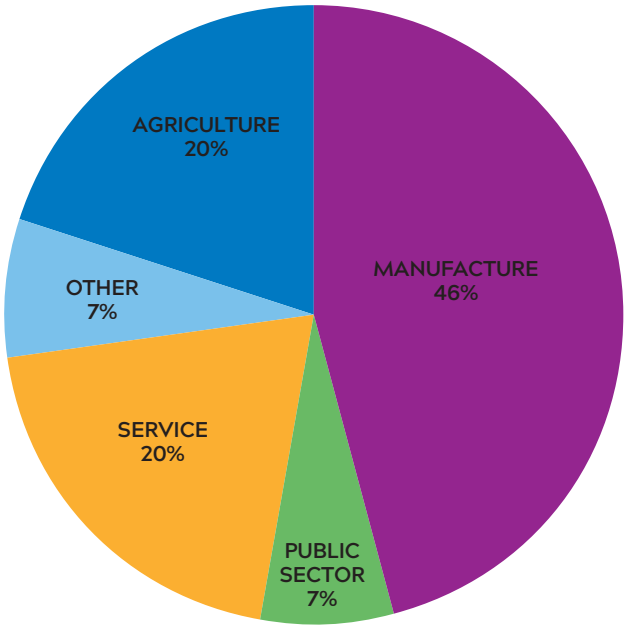
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	79,690	87,320	93,000	96,190	99,000	101,360
Total Household Properties	33,040	36,870	39,840	41,710	43,190	44,690

Rates of household population and property growth per AMP are given below. Property growth rates vary between **3,400** per AMP in the short term to **1,500** per AMP in the long-term. The short to medium term projections are aligned with Local Authority data; the medium to long-term projections with ONS trend based data.

Table 2.6.3: Ruthamford West rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	7,020	5,690	3,190	2,810	2,360
Additional Household properties per AMP	3,410	2,980	1,870	1,480	1,490

Figure 2.6.1: Ruthamford West Non-household sectors



Non-household demand is predominantly from the service sector and manufacturing, which account for **66%** of total NHH demand. Non-household demand is forecast to increase over the WRMP period from **5.96 Ml/d to 6.60 Ml/d.**

For the baseline scenario WITHOUT demand management options.

Household demand is forecast to increase over the WRMP period from **10.29 Ml/d to 12.72 Ml/d**.

Leakage is forecast to decrease from the baseline value of **5.61 Ml/d to 5.46 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to increase from **5.96 Ml/d to 6.60 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **22.53 Ml/d to 25.46 Ml/d.**

Table 2.6.4: Ruthamford West demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	8.66	10.04	10.95	11.45	11.77	12.04
Household demand (Ml/d) - unmeasured	1.63	1.11	0.86	0.70	0.69	0.69
Non-household demand (Ml/d)	5.96	6.03	6.12	6.25	6.41	6.60
Leakage (Ml/d)	5.61	5.46	5.46	5.46	5.46	5.46
Distribution input (Ml/d)	22.53	23.31	24.06	24.53	25.01	25.46

Baseline supply demand balance

Figure 2.6.2: Ruthamford West baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

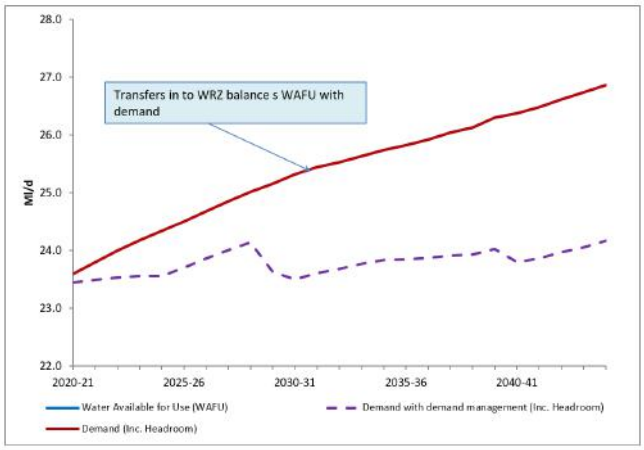


Table 2.6.5: Ruthamford West baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Net transfers into Area (Ml/d)	23.60	24.34	25.16	25.74	26.30	26.86
Total DYAA Water available for Use: including transfers* (Ml/d)	23.60	24.34	25.16	25.74	26.30	26.86
Total DYAA Distribution Input (Ml/d)	22.62	23.31	24.06	24.53	25.01	25.46
Total DYAA Target Headroom (Ml/d)	0.98	1.03	1.10	1.21	1.29	1.40
DYAA supply-demand balance (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

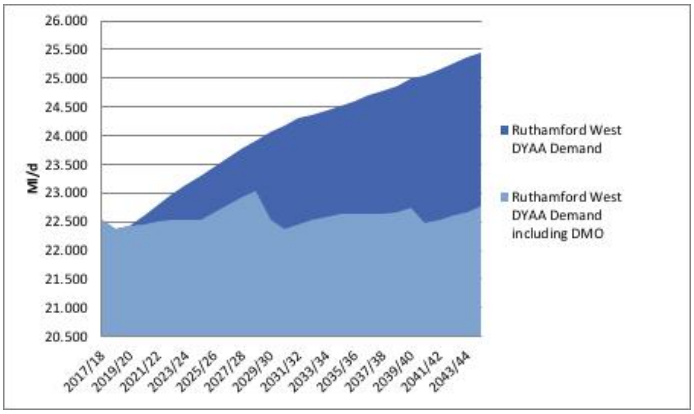
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 32% from 5.61 Ml/d in 2020 to 3.77 Ml/d in 2045.

Table 2.6.6: Ruthamford West Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.19	0.30	0.37	0.51	0.62
Smart metering (demand savings) (Ml/d) -	0.00	0.32	0.33	0.34	0.36
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.33	0.35	0.36	0.38
Leakage reduction (our network) (Ml/d)	0.59	0.59	0.83	1.03	1.31
Total saving (Ml/d)	0.78	1.54	1.88	2.24	2.67

Figure 2.6.3: Ruthamford West DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 133.2 l/h/d; Unmeasured PCC 110.8 l/h/d, with a weighted average value of 129.1 l/h/d. This is expected to fall to 115.6 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 2.6.7: Changes in Ruthamford West Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	129.11	127.73	126.95	126.29	125.88	125.52
Final demand forecast (DYAA) (includes selected demand management strategy)	129.11	125.50	120.19	118.75	117.01	115.59
Final demand forecast (DYAA) % change from baseline forecast	0.00%	1.75%	5.32%	5.97%	7.05%	7.91%

For the final plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **10.29 Ml/d to 11.72 Ml/d**.

Leakage is forecast to decrease from the baseline value of **5.61 Ml/d to 3.77 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **5.96 Ml/d to 6.60 Ml/d** over the WRMP period.

Distribution Input is predicted to increase slightly from **22.53 Ml/d to 22.76 Ml/d**, once the influence of demand management option savings has been included.

Table 2.6.8: Ruthamford West demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	8.66	9.86	10.34	10.74	10.92	11.06
Household demand (Ml/d) - unmeasured	1.63	1.10	0.84	0.68	0.67	0.66
Non-household demand (Ml/d)	5.96	20.10	20.36	20.65	20.97	21.35
Leakage (Ml/d)	5.61	4.88	4.55	4.28	4.07	3.77
Distribution input (Ml/d)	22.53	22.53	22.52	22.62	22.74	22.76

Final supply demand balance

Once our preferred demand management strategy has been implemented, the supply demand balance in Ruthamford West WRZ is maintained throughout the planning period.

Figure 2.6.4: Ruthamford West WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

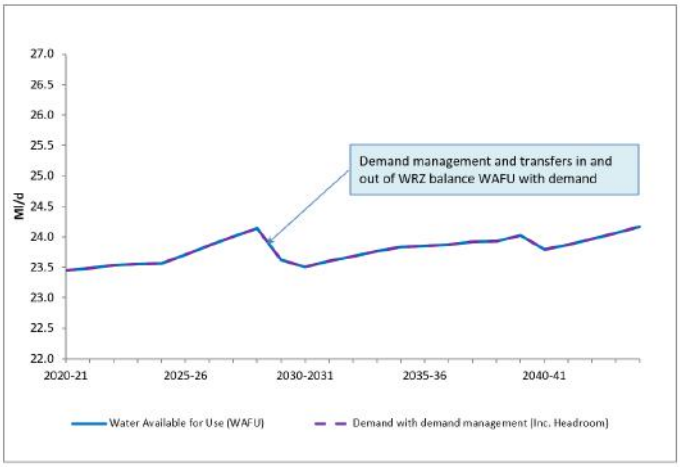


Table 2.6.9: Ruthamford West final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Net transfers into Area (Ml/d)	23.44	23.56	23.62	23.83	24.03	24.17
Total DYAA Water available for Use: including transfers* (Ml/d)	23.44	23.56	23.62	23.83	24.03	24.17
Total DYAA Distribution Input (Ml/d)	22.46	22.53	22.52	22.62	22.74	22.76
Total DYAA Target Headroom (Ml/d)	0.98	1.03	1.10	1.21	1.29	1.40
DYAA supply-demand balance (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00

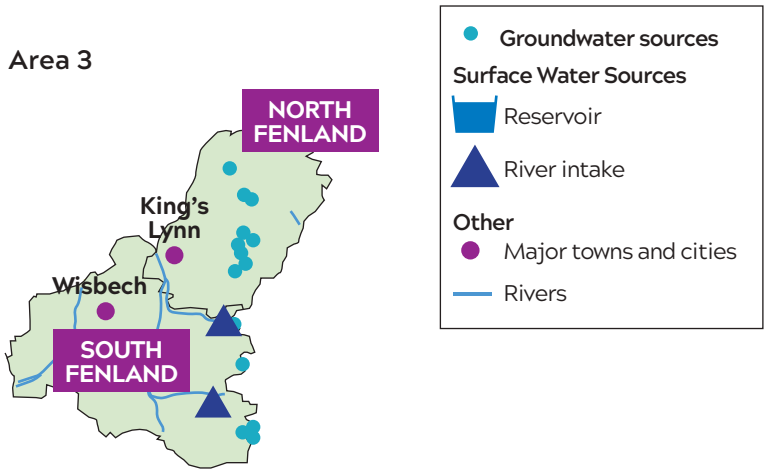
* bulk imports, exports and inter-zone transfers

3. Area 3:

Fenland

3.1 Overview

Figure 3.1.1 Problem characterisation Area 3



3.2 Strategic risks and issues

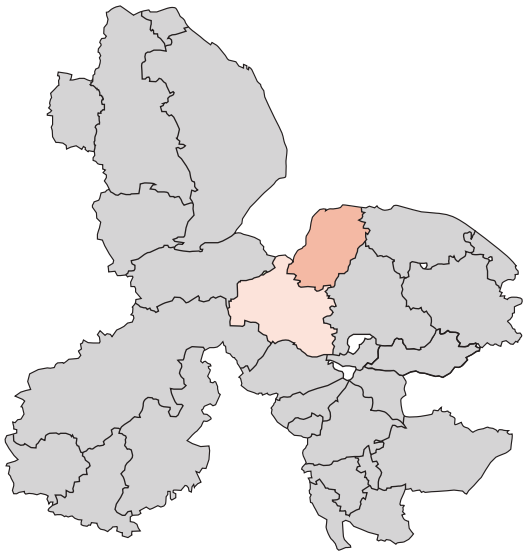
Problem Characterisation Results

- Area 3 is assessed as having low levels of concern
- Although there are some very significant strategic needs, especially regarding supply-side impacts, the level of complexity is low

This area experiences significant pressures, especially from sustainability reduction and drought resilience, resulting in a baseline deficit. This is resolved through demand management options and imports from Ruthamford.

3.3 North Fenland

The North Fenland WRZ covers an area of 672 km^2 and is based on the supply systems for King's Lynn. Water is supplied from groundwater abstractions in the Norfolk Chalk and Sandringham Sands aquifers, and a surface water abstraction from the River Wissey.



Supply Forecast

Table 3.3.1: North Fenland Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	37.00	37.00	37.00	37.00	37.00	37.00
Sustainability reductions (Ml/d)	0.00	-3.00	-3.00	-3.00	-3.00	-3.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	37.00	34.00	34.00	34.00	34.00	34.00
Outage Allowance†	0.66	0.61	0.61	0.61	0.61	0.61
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	-3.30	-3.30	-3.30	-3.30	-3.30	-3.30
Total Water Available for Use (Ml/d)	33.04	30.09	30.09	30.09	30.09	30.09

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -3.0 Ml/d sustainability reduction seen in 2022

This zone does not see additional severe drought impact on DO and is not considered vulnerable to a 1 in 200 year event.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **41,000 to 54,000**, and the population is forecast to increase from approximately **94,000 to 118,000**[1].

Table 3.3.2: North Fenland population and property forecast per AMP

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	93,990	105,730	111,280	113,650	115,880	117,930
Total Household Properties	41,110	46,930	49,900	51,340	52,530	53,750

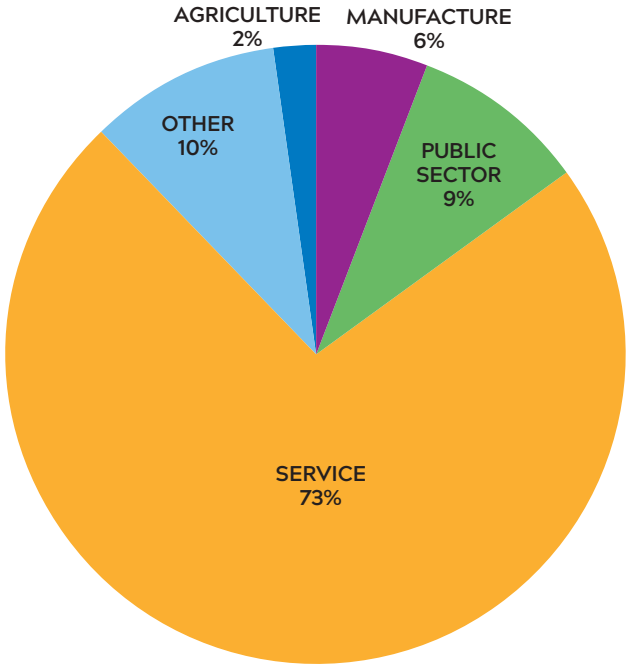
Property growth rates vary between **4,600** per AMP in the short-term to **1,200** per AMP in the long-term. The short- to medium-term projections are aligned with Local Authority data; the medium to long-term projections with ONS trend based data.

[1] *Based upon Local Authority planning information*

Table 3.3.3: North Fenland rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	9,390	5,540	2,370	2,230	2,050
Additional Household properties per AMP	4,570	2,970	1,440	1,200	1,210

Figure 3.3.1: North Fenland Non-household sectors



Non-household demand is predominantly from the service sector and manufacturing, which account for **79%** of total NHH demand. Non-household demand is forecast to decrease over the WRMP period from **8.73 Ml/d to 7.08 Ml/d**.

For the baseline scenario WITHOUT demand management options

Household demand is forecast to increase over the WRMP period from **13.4 Ml/d to 15.62 Ml/d.**

Leakage is forecast to decrease from the baseline value of **3.16 Ml/d to 3.02 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to decrease from **8.73 Ml/d to 7.09 Ml/d** over the WRMP period.

Distribution Input is predicted to increase slightly from **26.06 Ml/d to 26.50 Ml/d.**

Table 3.3.4: North Fenland baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	8.72	11.27	12.43	13.08	13.63	13.85
Household demand (Ml/d) - unmeasured	4.68	3.27	2.64	2.15	1.77	1.77
Non-household demand (Ml/d)	8.73	8.02	7.67	7.41	7.22	7.09
Leakage (Ml/d)	3.16	3.04	3.03	3.03	3.03	3.02
Distribution input (Ml/d)	26.06	26.37	26.55	26.45	26.43	26.50

Baseline supply demand balance

Figure 3.3.2: North Fenland baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

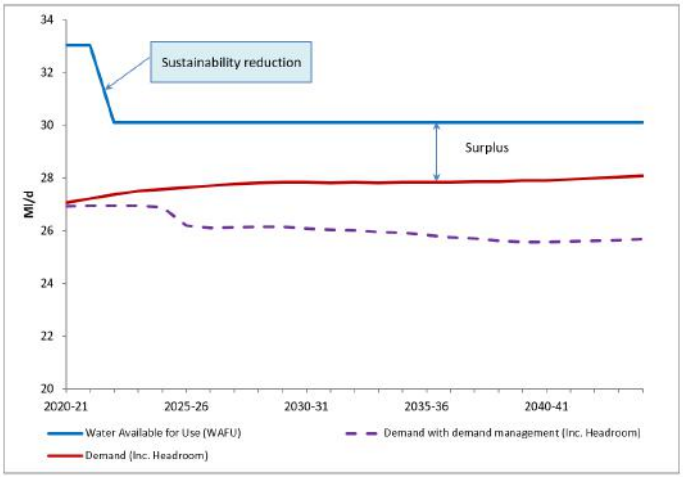


Table 3.3.5: North Fenland baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	36.34	33.39	33.39	33.39	33.39	33.39
Net transfers into Area (Ml/d)	-3.30	-3.30	-3.30	-3.30	-3.30	-3.30
Total DYAA Water available for Use: including transfers* (Ml/d)	33.04	30.09	30.09	30.09	30.09	30.09
Total DYAA Distribution Input (Ml/d)	25.93	26.37	26.55	26.45	26.43	26.50
Total DYAA Target Headroom (Ml/d)	1.13	1.21	1.28	1.38	1.46	1.58
DYAA supply-demand balance (Ml/d)	5.99	2.52	2.26	2.26	2.20	2.01

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

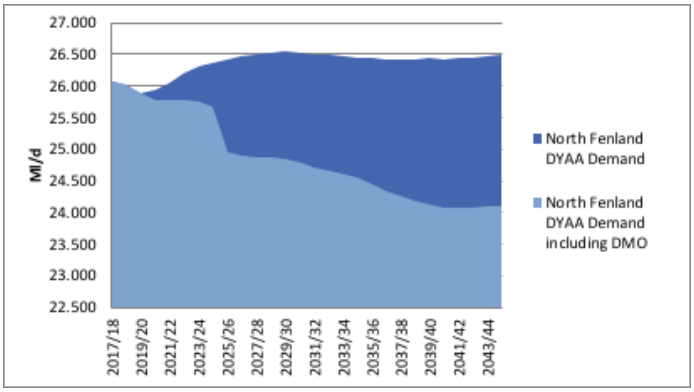
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 42% from 3.16 Ml/d in 2020 to 1.81 Ml/d in 2045.

Table 3.3.6: North Fenland Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.22	0.31	0.49	0.64	0.68
Smart metering (demand savings) (Ml/d) -	0.00	0.41	0.43	0.45	0.46
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.40	0.42	0.43	0.45
Leakage reduction (our network) (Ml/d)	0.47	0.56	0.56	0.77	0.77
Total saving (Ml/d)	0.69	1.68	1.9	2.29	2.36

Figure 3.3.3: North Fenland DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 are: Measured PCC 121 l/h/d; Unmeasured PCC 214 l/h/d, with a weighted average value of 142.6 l/h/d. This is expected to fall to 122.5 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 3.3.7: Changes in North Fenland Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	142.6	137.5	135.4	134.1	133.0	132.4
Final demand forecast (DYAA) (includes selected demand management strategy)	142.6	135.3	128.8	125.8	123.3	122.5
Final demand forecast (DYAA) % change from baseline forecast	0.00%	1.60%	4.87%	6.19%	7.29%	7.48%

For the final plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **13.4 Ml/d to 14.43Ml/d**.

Leakage is forecast to decline from the baseline value of **3.16 Ml/d to 1.81 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to decrease from **8.73 Ml/d to 7.09 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease from **26.06 Ml/d to 24.10 Ml/d**, once the influence of demand management option savings has been included.

Table 3.3.8: North Fenland final plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	8.72	11.06	11.73	12.19	12.57	12.73
Household demand (Ml/d) - unmeasured	4.68	3.25	2.61	2.11	1.72	1.71
Non-household demand (Ml/d)	8.73	8.02	7.67	7.41	7.22	7.09
Leakage (Ml/d)	3.16	2.57	2.08	2.06	1.83	1.81
Distribution input (Ml/d)	26.06	25.67	24.86	24.54	24.12	24.10

Selected supply-side options

For details on the feasible options list for North Fenland WRZ please refer to the Supply-side option development technical document.

Table 3.3.9: North Fenland preferred supply side options

Opt Ref	Option Name
NFN4	South Fenland WRZ to North Fenland WRZ Transfer (20 Ml/d)

Final supply demand balance

Once our preferred demand management strategy has been implemented, the supply demand balance in North Fenland WRZ is maintained throughout the planning period.

Figure 3.3.4: North Fenland WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

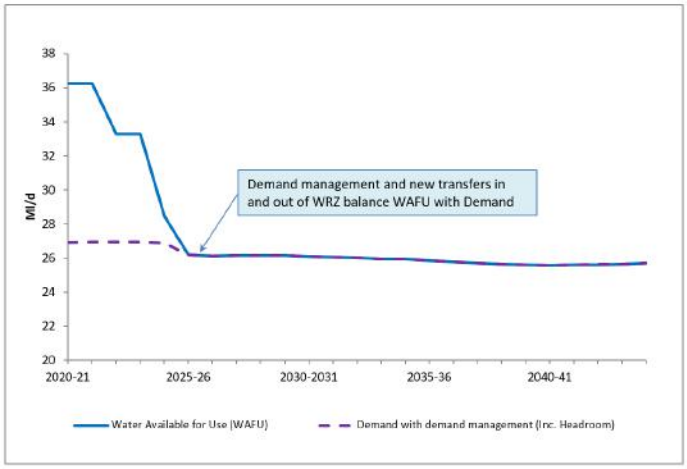


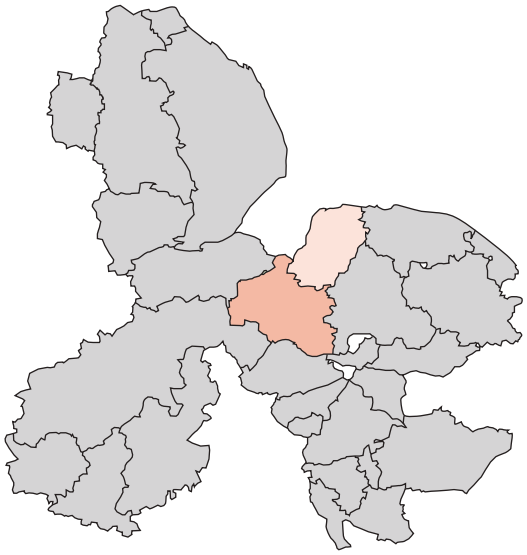
Table 3.3.10: North Fenland final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	36.34	33.39	33.39	33.39	33.39	33.39
Net transfers into Area (Ml/d)	-0.10	-4.94	-7.25	-7.47	-7.81	-7.71
Total DYAA Water available for Use: including transfers* (Ml/d)	36.24	28.45	26.14	25.92	25.58	25.68
Total DYAA Distribution Input (Ml/d)	25.79	25.67	24.86	24.54	24.12	24.10
Total DYAA Target Headroom (Ml/d)	1.13	1.21	1.28	1.38	1.46	1.58
DYAA supply-demand balance (Ml/d)	9.33	1.58	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

3.4 South Fenland

The South Fenland WRZ covers an area of 984 km^2 and lies to the south of the Wash. It is based on the supply systems of Wisbech. Water is supplied from a combination of groundwater abstractions in the Norfolk Chalk and a surface water abstraction from the River Nar.



Supply Forecast

Table 3.4.1: South Fenland Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	33.00	33.00	33.00	33.00	33.00	33.00
Sustainability reductions (Ml/d)	0.00	0.00	-13.00	-13.00	-13.00	-13.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	-9.00	-9.00	-9.00	-9.00
Final DO (Ml/d)	33.00	33.00	11.00	11.00	11.00	11.00
Outage Allowance†	0.62	0.45	0.21	0.21	0.21	0.21
Transfers In (Ml/d)*	3.30	3.30	3.30	3.30	3.30	3.30
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	35.68	35.85	14.09	14.09	14.09	14.09

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -9.0 Ml/d severe drought impacts seen in 2025
- -13.0 Ml/d sustainability reduction in 2025

There is no climate change impact because the vulnerable sources are lost to either sustainability reduction or severe drought impact.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **42,000 to 54,000**, and the population is forecast to increase from approximately **96,000 to 118,000**[2].

[2] *Based upon Local Authority planning information*

Table 3.4.2: South Fenland population and property forecast per AMP

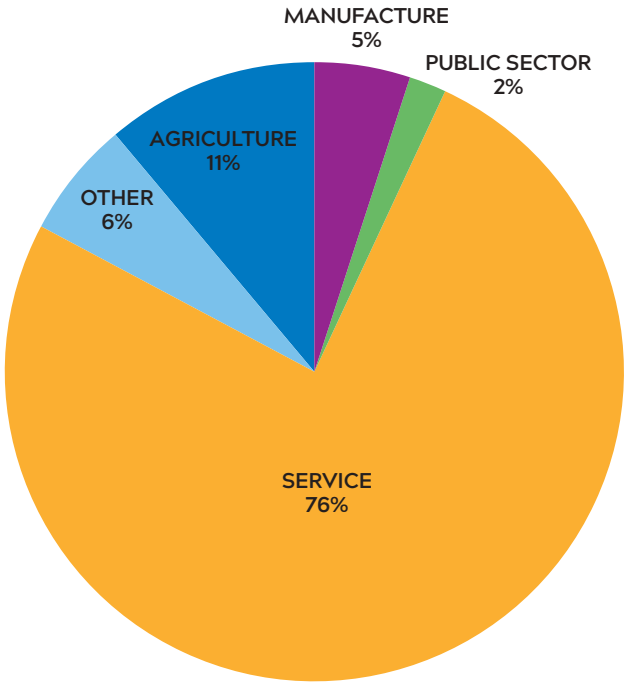
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	95,070	104,420	109,490	112,520	115,310	117,690
Total Household Properties	41,640	46,350	49,210	51,090	52,540	54,060

Property growth rates vary between **4,370** per AMP in the short-term to **1,500** per AMP in the long-term. The short- to medium-term projections are aligned with Local Authority data; the medium to long-term projections with ONS trend based data.

Table 3.4.3: South Fenland rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	8,690	5,080	3,030	2,790	2,380
Additional Household properties per AMP	4,370	2,860	1,870	1,460	1,510

Figure 3.4.1: South Fenland Non-household sectors



Non-household demand is predominantly from the service sector and manufacturing, which account for **82%** of total NHH demand. Non-household demand is forecast to decrease over the WRMP period from **8.64 Ml/d to 7.09Ml/d.**

For the baseline scenario WITHOUT demand management options

Household demand is forecast to increase over the WRMP period from **14.92 Ml/d to 17.04 Ml/d.**

Leakage is forecast to decrease from the baseline value of **6.76 Ml/d to 6.51 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to decrease from **8.64 Ml/d to 7.09 Ml/d** over the WRMP period.

Distribution Input is predicted to increase slightly from **31.25 Ml/d to 31.57 Ml/d.**

Table 3.4.4: South Fenland baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	8.72	11.39	12.73	13.64	14.40	15.03
Household demand (Ml/d) - unmeasured	6.20	4.41	3.58	2.92	2.42	2.01
Non-household demand (Ml/d)	8.64	7.98	7.68	7.44	7.25	7.09
Leakage (Ml/d)	6.76	6.53	6.53	6.53	6.52	6.51
Distribution input (Ml/d)	31.25	31.25	31.44	31.46	31.52	31.57

Baseline supply demand balance

Figure 3.4.2: South Fenland baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

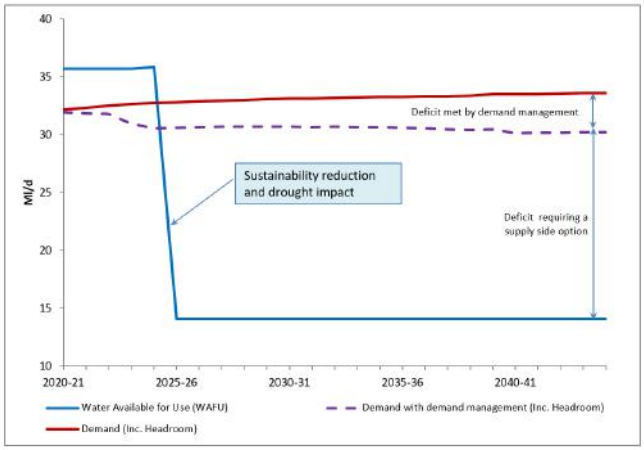


Table 3.4.5: South Fenland baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	32.38	32.55	10.79	10.79	10.79	10.79
Net transfers into Area (Ml/d)	3.30	3.30	3.30	3.30	3.30	3.30
Total DYAA Water available for Use: including transfers* (Ml/d)	35.68	35.85	14.09	14.09	14.09	14.09
Total DYAA Distribution Input (Ml/d)	30.80	31.25	31.44	31.46	31.52	31.57
Total DYAA Target Headroom (Ml/d)	1.37	1.48	1.61	1.79	1.96	2.05
DYAA supply-demand balance (Ml/d)	3.50	3.12	-18.96	-19.15	-19.39	-19.53

* bulk imports, exports and inter-zone transfers

There is a critical period deficit in this WRZ.

Figure 3.4.3: South Fenland baseline supply demand balance to 2045 for critical period (CP) conditions

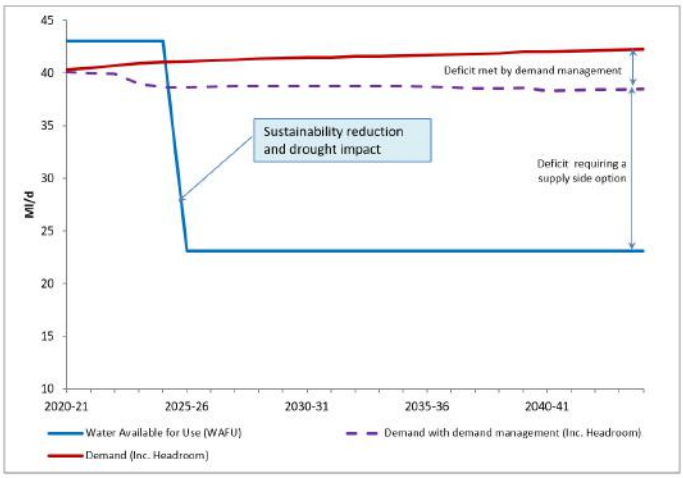


Table 3.4.6: South Fenland baseline supply-demand balance to 2045 for critical period (CP) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total CP Water available for Use: Area sources* (Ml/d)	42.95	42.95	19.81	19.81	19.81	19.81
Net transfers into Area (Ml/d)	0.10	0.10	3.30	3.30	3.30	3.30
Total CP Water available for Use: including transfers* (Ml/d)	43.05	43.05	23.11	23.11	23.11	23.11
Total CP Distribution Input (Ml/d)	38.61	39.17	39.40	39.44	39.56	39.69
Total CP Target Headroom (Ml/d)	1.72	1.85	2.02	2.24	2.47	2.58
CP supply-demand balance (Ml/d)	2.71	2.03	-18.31	-18.56	-18.91	-19.16

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

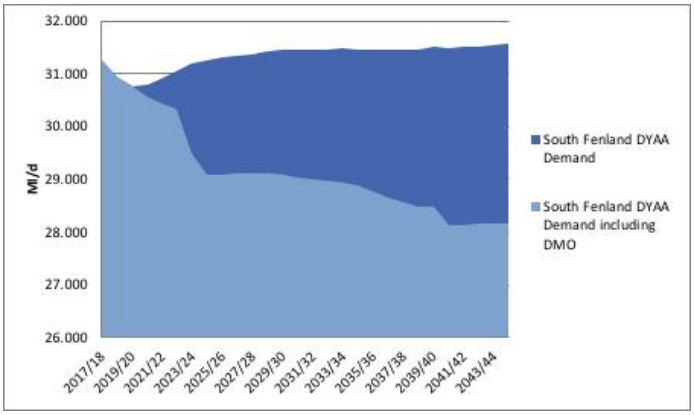
We plan to use a combined strategy of smart metering, water efficiency and leakage reduction to reduce demand.

- We plan to reduce leakage by 35% from 6.76 Ml/d in 2020 to 4.36 Ml/d in 2045.

Table 3.4.7: Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.24	0.33	0.50	0.61	0.65
Smart metering (demand savings) (Ml/d) -	0.46	0.53	0.55	0.56	0.58
Leakage reduction (CSPL savings) (Ml/d)	0.36	0.41	0.43	0.45	0.46
Leakage reduction (our network) (Ml/d)	1.07	1.07	1.08	1.40	1.69
Total saving (Ml/d)	2.14	2.34	2.56	3.02	3.38

Figure 3.4.4: South Fenland DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 are: Measured PCC 131 l/h/d; Unmeasured PCC 219 l/h/d, with a weighted average value of 156.9 l/h/d. This is expected to fall to 134.1 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 3.4.8: Changes in South Fenland Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	156.9	151.4	148.9	147.2	145.9	144.8
Final demand forecast (DYAA) (includes selected demand management strategy)	156.9	144.5	140.8	137.6	135.4	134.1
Final demand forecast (DYAA) % change from baseline forecast	0.00%	4.56%	5.44%	6.52%	7.20%	7.39%

For the Final Plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **14.92 Ml/d to 15.79 Ml/d.**

Leakage is forecast to decrease from the baseline value of **6.76 Ml/d to 4.36 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to decrease from **8.64 Ml/d to 7.09 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease slightly from **31.25 Ml/d to 28.17 Ml/d**, once the influence of demand management option savings has been included.

Table 3.4.9: South Fenland final plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	8.72	10.69	11.88	12.61	13.25	13.84
Household demand (Ml/d) - unmeasured	6.20	4.39	3.54	2.88	2.36	1.95
Non-household demand (Ml/d)	8.64	7.98	7.68	7.44	7.25	7.09
Leakage (Ml/d)	6.76	5.09	5.05	5.02	4.68	4.36
Distribution input (Ml/d)	31.25	29.09	29.08	28.88	28.47	28.17

Selected supply-side options

For details on the feasible options list for South Fenland WRZ please refer to the Supply-side option development technical document.

Table 3.4.10: South Fenland preferred supply side options

Opt Ref	Option Name
SFN4	Ruthamford North WRZ to South Fenland WRZ Transfer (40 Ml/d)

Final supply demand balance

Once our preferred demand management strategy has been implemented, the supply demand balance in South Fenland WRZ is maintained throughout the planning period.

Figure 3.4.5: South Fenland WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

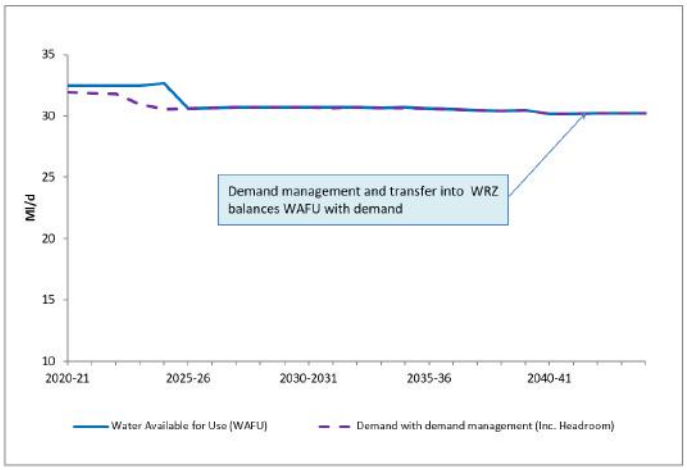


Table 3.4.11: South Fenland final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use* (Ml/d)	32.48	32.65	30.69	30.67	30.44	30.22
Total DYAA Distribution Input (Ml/d)	30.56	29.09	29.08	28.88	28.47	28.17
Total DYAA Target Headroom (Ml/d)	1.37	1.48	1.61	1.79	1.96	2.05
DYAA supply-demand balance (Ml/d)	0.54	2.08	0.00	0.00	0.00	0.00

Figure 3.4.6: South Fenland final plan supply demand balance to 2045 for critical period (CP) conditions

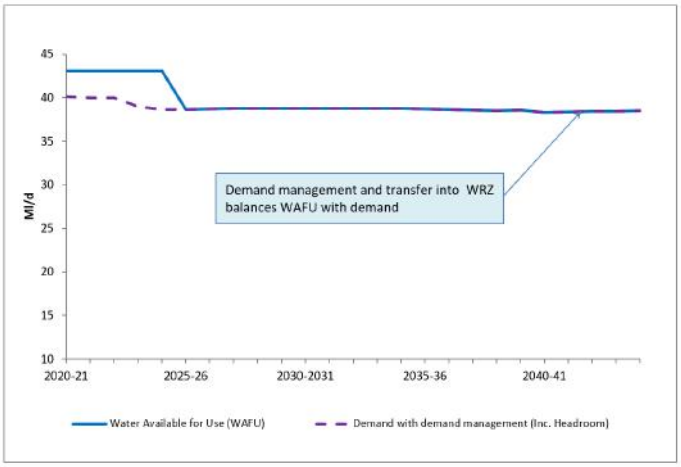


Table 1.3.12: South Fenland final plan supply-demand balance to 2045 for critical period (CP) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total CP Water available for Use: Area sources* (Ml/d)	42.95	45.53	19.81	19.81	19.81	19.81
Net transfers into Area (Ml/d)	0.10	0.1	20.01	19.98	19.82	19.70
Total CP Water available for Use: including transfers* (Ml/d)	43.05	43.05	38.78	38.76	38.60	38.48
Total CP Distribution Input (Ml/d)	38.35	36.78	36.76	36.52	36.13	35.89
Total CP Target Headroom (Ml/d)	1.72	1.85	2.02	2.24	2.47	2.58
CP supply-demand balance (Ml/d)	2.97	4.42	0.00	0.00	0.00	0.00

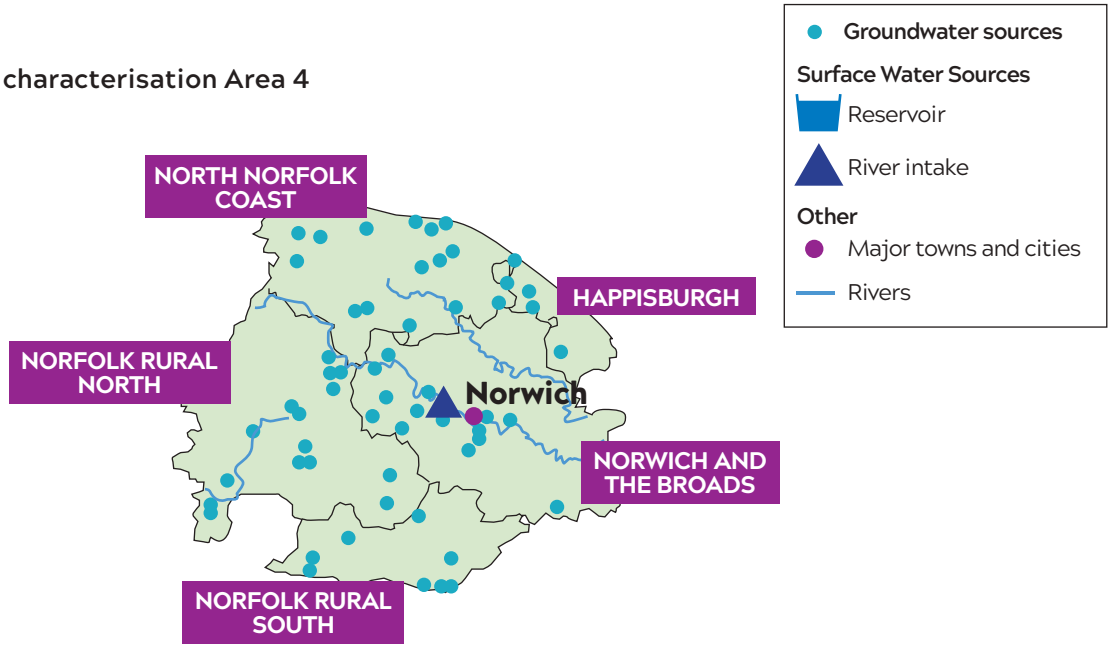
* bulk imports, exports and inter-zone transfers

4. Area 4:

Norfolk

4.1 Overview

Figure 4.1.1 Problem characterisation Area 4



4.2 Strategic risks and issues

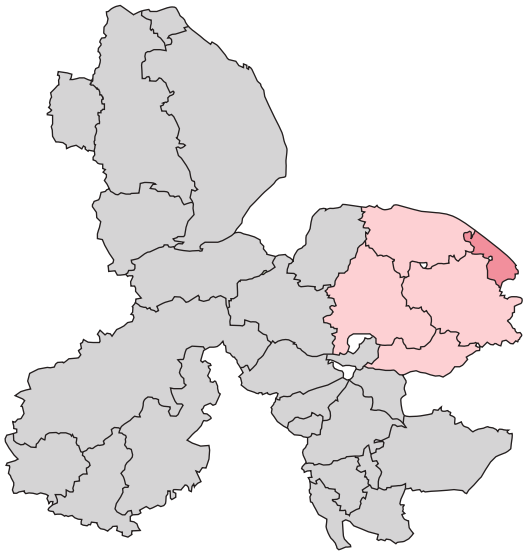
Problem Characterisation Results

- Area 4 is assessed as having low levels of concern
- Although there are some significant strategic needs, especially regarding supply-side impacts, the level of complexity is low

This area experiences significant pressures from sustainability reduction and growth, resulting in baseline deficits. This is resolved through demand management options and local inter-WRZ transfers.

4.3 Happisburgh

The Happisburgh WRZ covers an area of 190 km^2 and sits along the Norfolk coastline. It is primarily supplied by abstraction from the Norfolk Chalk.



Supply Forecast

Table 4.3.1: Happisburgh Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	5.20	5.20	5.20	5.20	5.20	5.20
Sustainability reductions (Ml/d)	0.00	-3.10	-3.10	-3.10	-3.10	-3.10
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	5.20	2.10	2.10	2.10	2.10	2.10
Outage Allowance†	0.10	0.08	0.08	0.08	0.08	0.08
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30
Total Water Available for Use (Ml/d)	4.80	1.72	1.72	1.72	1.72	1.72

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -1.3 Ml/d sustainability reduction seen in 2021
- Further -1.8 Ml/d sustainability reduction in 2024

This zone does not see additional severe drought impact on DO and is therefore not considered vulnerable to a 1 in 200 year event.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **7,900 to 10,000**, and the population is forecast to increase from approximately **17,000 to 20,000**[1].

Table 4.3.2: Happisburgh population and property forecast per AMP

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	16,810	18,080	18,650	89,300	19,730	20,250
Total Household Properties	7,880	8,760	9,150	9,520	9,860	10,200

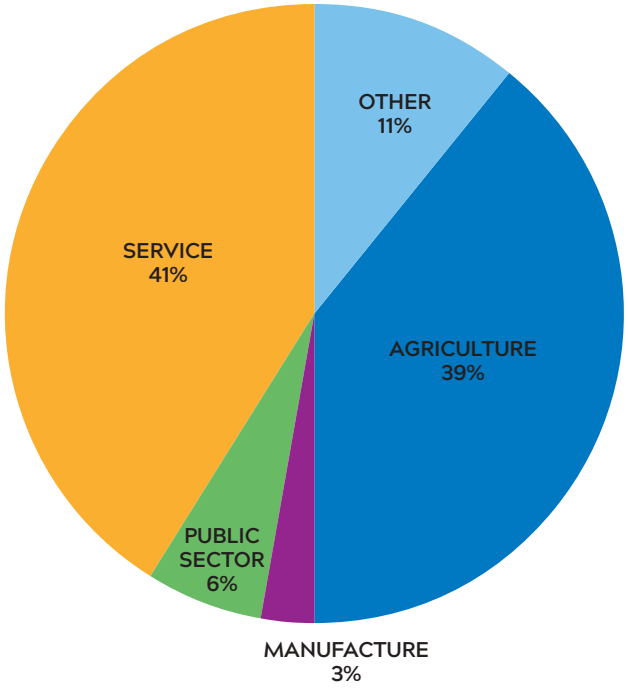
Property growth rates vary between **530** per AMP in the short-term to **340** per AMP in the long-term. The short-to-medium term projections are aligned with Local Authority data; the medium to long term projections with ONS based data.

[1] *Based upon Local Authority planning information*

Table 4.3.3: Happisburgh rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	880	560	560	530	520
Additional Household properties per AMP	530	390	370	340	340

Figure 4.3.1: Happisburgh Non-household sectors



Non-household demand is predominantly from the service sector and agriculture, which account for **80%** of total NHH demand. Non-household demand is forecast to decrease over the WRMP period from **0.75 Ml/d to 0.59 Ml/d.**

For the baseline scenario WITHOUT demand management options.

Household demand is forecast to increase over the WRMP period from **2.43 Ml/d to 2.73 Ml/d.**

Leakage is forecast to decrease from the baseline value of **0.65 Ml/d to 0.63 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to decrease from **0.75 Ml/d to 0.59 Ml/d** over the WRMP period.

Distribution Input is predicted to increase slightly from **3.98 Ml/d to 4.06 Ml/d.**

Table 4.3.4: Happisburgh baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	1.48	1.88	2.05	2.19	2.32	2.42
Household demand (Ml/d) - unmeasured	0.98	0.67	0.54	0.44	0.36	0.31
Non-household demand (Ml/d)	0.75	0.70	0.67	0.64	0.61	0.59
Leakage (Ml/d)	0.65	0.63	0.63	0.63	0.63	0.63
Distribution input (Ml/d)	3.98	4.00	4.00	4.02	4.04	4.06

Baseline supply demand balance

Figure 4.3.2: Happisburgh baseline supply demand balance to 2045 to dry year annual average (DYAA) condition

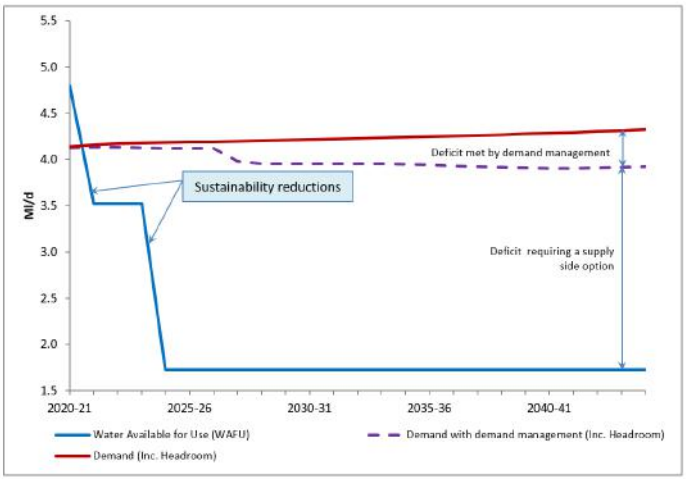


Table 4.3.5: Happisburgh baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	5.10	2.02	2.02	2.02	2.02	2.02
Net transfers into Area (Ml/d)	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30
Total DYAA Water available for Use: including transfers* (Ml/d)	4.80	1.72	1.72	1.72	1.72	1.72
Total DYAA Distribution Input (Ml/d)	3.97	4.00	4.00	4.02	4.04	4.06
Total DYAA Target Headroom (Ml/d)	0.17	0.19	0.20	0.22	0.24	0.26
DYAA supply-demand balance (Ml/d)	0.66	-2.46	-2.48	-2.52	-2.55	-2.60

* bulk imports, exports and inter-zone transfers

There is a critical period deficit in this WRZ.

Figure 4.3.3: Happisburgh baseline supply demand balance to 2045 for critical period (CP) conditions

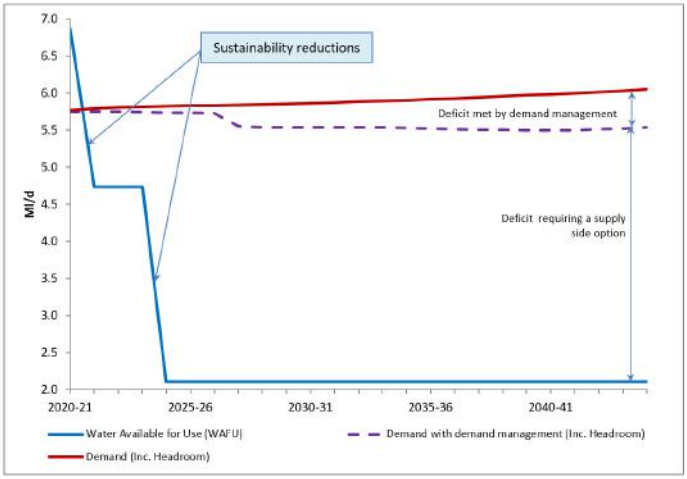


Table 4.3.6: Happisburgh baseline supply-demand balance to 2045 for critical period (CP) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total CP Water available for Use: Area sources* (Ml/d)	7.17	2.41	2.41	2.41	2.41	2.41
Net transfers into Area (Ml/d)	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30
Total CP Water available for Use: including transfers* (Ml/d)	6.87	2.11	2.11	2.11	2.11	2.11
Total CP Distribution Input (Ml/d)	5.52	5.56	5.57	5.60	5.63	5.69
Total CP Target Headroom (Ml/d)	0.24	0.26	0.29	0.31	0.34	0.37
CP supply-demand balance (Ml/d)	1.10	-3.71	-3.74	-3.79	-3.86	-3.94

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

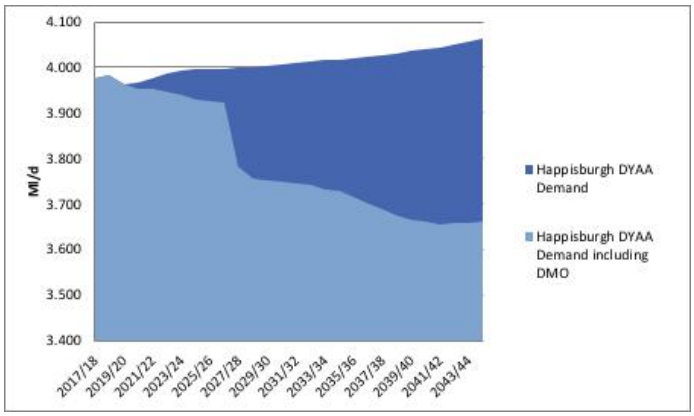
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 30% from 0.65 Ml/d in 2020 to 0.45 Ml/d in 2045.

Table 4.3.7: Happisburgh Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.05	0.06	0.09	0.12	0.13
Smart metering (demand savings) (Ml/d) -	0.00	0.07	0.08	0.09	0.10
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.00	0.07	0.08	0.08
Leakage reduction (our network) (Ml/d)	0.01	0.04	0.04	0.07	0.07
Total saving (Ml/d)	0.06	0.17	0.28	0.36	0.39

Figure 4.3.4: Happisburgh DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (baseline) are: Measured PCC 121.9l/h/d; Unmeasured PCC 209.7 l/h/d, with a weighted average value of 146.3 l/h/d. This is expected to fall to 122.8 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 4.3.8: Changes in Happisburgh Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	146.3	140.9	138.8	137.1	135.7	134.7
Final demand forecast (DYAA) (includes selected demand management strategy)	146.3	138	131.2	128	124.9	122.8
Final demand forecast (DYAA) % change from baseline forecast	0.00%	2.06%	5.48%	6.64%	7.96%	8.83%

For the Final Plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **2.43 Ml/d to 2.48 Ml/d.**

Leakage is forecast to decrease from the baseline value of **0.65 Ml/d to 0.47 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to decrease from **0.75 Ml/d to 0.59 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease slightly from **3.98 Ml/d to 3.66 Ml/d**, once the influence of demand management option savings has been included.

Table 4.3.9: Happisburgh Final Plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	1.48	1.83	1.91	2.02	2.11	2.19
Household demand (Ml/d) - unmeasured	0.95	0.65	0.52	0.43	0.35	0.29
Non-household demand (Ml/d)	0.75	0.70	0.67	0.64	0.61	0.59
Leakage (Ml/d)	0.65	0.62	0.52	0.51	0.47	0.47
Distribution input (Ml/d)	3.98	3.93	3.75	3.73	3.67	3.66

Selected supply-side options

For details on the feasible options list for Happisburgh WRZ please refer to the Supply-side option development technical document.

Table 4.3.10: Happisburgh preferred supply side options

Opt Ref	Option Name
HPB1	Norwich and the Broads WRZ to Happisburgh WRZ Transfer
HPB2	Norwich and the Broads WRZ to Happisburgh Transfer (East Ruston/Witton)

Final supply demand balance

Figure 4.3.5: Happisburgh Final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

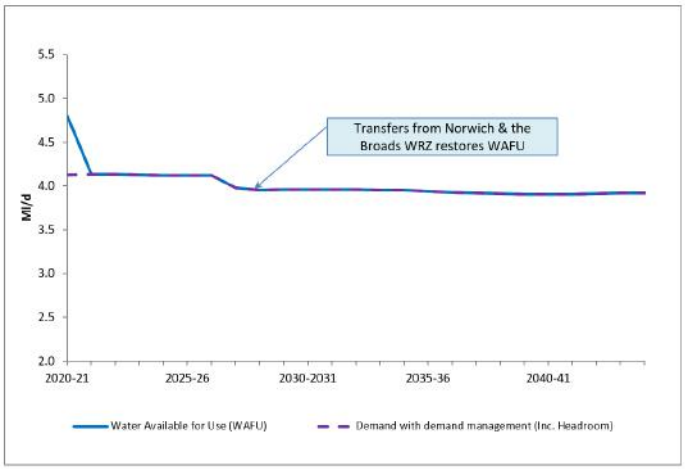


Table 4.3.11: Happisburgh final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	5.10	2.02	2.02	2.02	2.02	2.02
Net transfers into Area (Ml/d)	-0.30	2.09	1.93	1.93	1.88	1.90
Total DYAA Water available for Use: including transfers* (Ml/d)	4.80	4.12	3.96	3.95	3.91	3.92
Total DYAA Distribution Input (Ml/d)	3.95	3.93	3.75	3.73	3.67	3.66
Total DYAA Target Headroom (Ml/d)	0.17	0.19	0.20	0.22	0.24	0.26
DYAA supply-demand balance (Ml/d)	0.67	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

There is a critical period deficit in this WRZ.

Figure 1.3.6: Happisburgh final plan supply demand balance to 2045 for critical period (CP) conditions

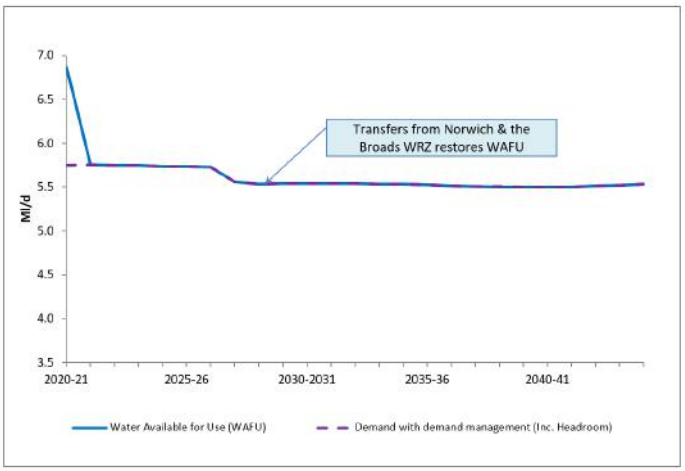


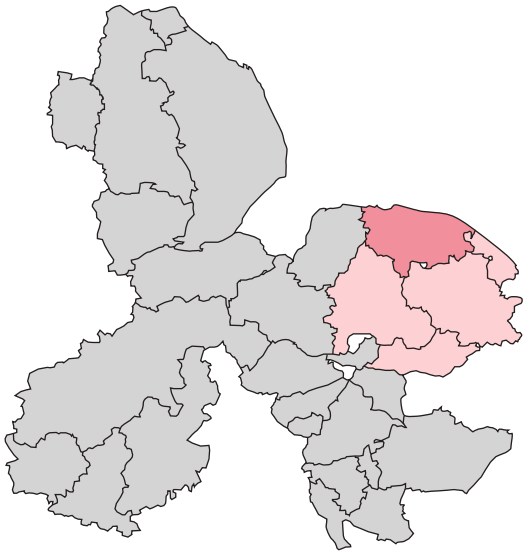
Table 1.3.12: Happisburgh final plan supply-demand balance to 2045 for critical period (CP) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total CP Water available for Use: Area sources* (Ml/d)	7.17	2.41	2.41	2.41	2.41	2.41
Net transfers into Area (Ml/d)	-0.30	3.32	3.12	3.12	3.09	3.12
Total CP Water available for Use: including transfers* (Ml/d)	6.87	5.73	5.54	5.53	5.50	5.53
Total CP Distribution Input (Ml/d)	5.51	5.47	5.25	5.22	5.16	5.17
Total CP Target Headroom (Ml/d)	0.24	0.26	0.29	0.31	0.34	0.37
CP supply-demand balance (Ml/d)	1.12	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

4.4 North Norfolk Coast

The North Norfolk Coast WRZ covers an area of 823 km² and lies along the North Norfolk coastline. It is supplied from groundwater abstractions in the Norfolk Chalk aquifer.



Supply Forecast

Table 4.4.1: North Norfolk Coast Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	26.00	26.00	26.00	26.00	26.00	26.00
Sustainability reductions (Ml/d)	0.00	-4.00	-4.00	-4.00	-4.00	-4.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	26.00	22.00	22.00	22.00	22.00	22.00
Outage Allowance†	0.35	0.30	0.30	0.30	0.30	0.30
Transfers In (Ml/d)*	0.30	0.30	0.30	0.30	0.30	0.30
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	25.95	22.00	22.00	22.00	22.00	22.00

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -4.0 Ml/d sustainability reduction seen in 2022

This zone does not see additional severe drought impact on DO and is therefore not considered vulnerable to a 1 in 200 year event.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **43,000 to 56,000**, and the population is forecast to increase from approximately **92,000 to 112,000**[2].

[2] *Based upon Local Authority planning information*

Table 4.4.2: North Norfolk Coast population and property forecast per AMP

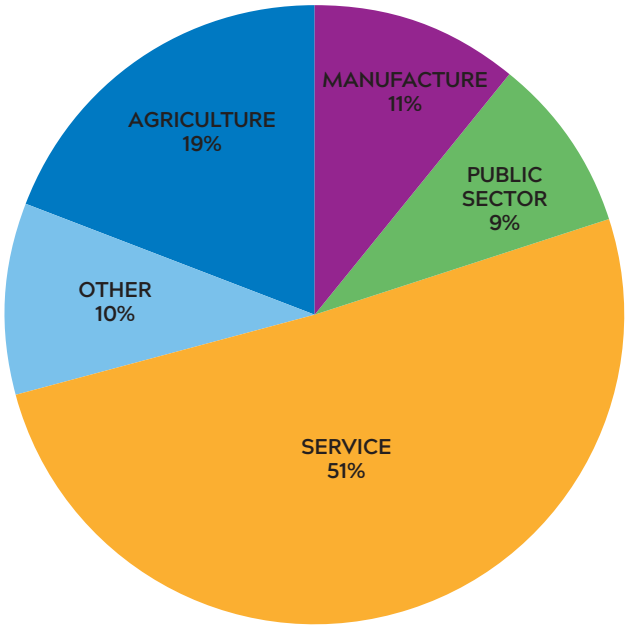
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	91,470	99,500	102,850	105,730	108,770	111,790
Total Household Properties	43,060	47,870	50,060	51,950	53,820	55,710

Property growth rates vary between **3,400** per AMP in the short-term to **1,900** per AMP in the long-term. The short-to-medium term projections are aligned with Local Authority data; the medium to long term projections with ONS based data.

Table 4.4.3: North Norfolk Coast rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	6,100	3,350	2,880	3,040	3,020
Additional Household properties per AMP	3,440	2,190	1,890	1,870	1,880

Figure 4.4.1: North Norfolk Coast Non-household sectors



Non-household demand is predominantly from the service sector and manufacturing, which account for **62%** of total NHH demand. Non-household demand is forecast to decrease over the WRMP period from **4.43 Ml/d to 3.87 Ml/d.**

For the baseline scenario WITHOUT demand management options

Household demand is forecast to increase over the WRMP period from **12.99 Ml/d to 14.85 Ml/d**.

Leakage is forecast to decrease from the baseline value of **3.40 Ml/d to 3.31 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to decrease from **4.43 Ml/d to 3.87 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **21.59 Ml/d to 22.67 Ml/d**.

Table 4.4.4: North Norfolk Coast baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	8.43	10.41	11.36	12.14	12.85	13.18
Household demand (Ml/d) - unmeasured	4.69	3.39	2.69	2.13	1.68	1.67
Non-household demand (Ml/d)	4.43	4.21	4.06	3.97	3.91	3.87
Leakage (Ml/d)	3.40	3.30	3.31	3.31	3.31	3.31
Distribution input (Ml/d)	21.59	21.95	22.05	22.18	22.38	22.67

Baseline supply demand balance

Figure 4.4.2: North Norfolk Coast baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

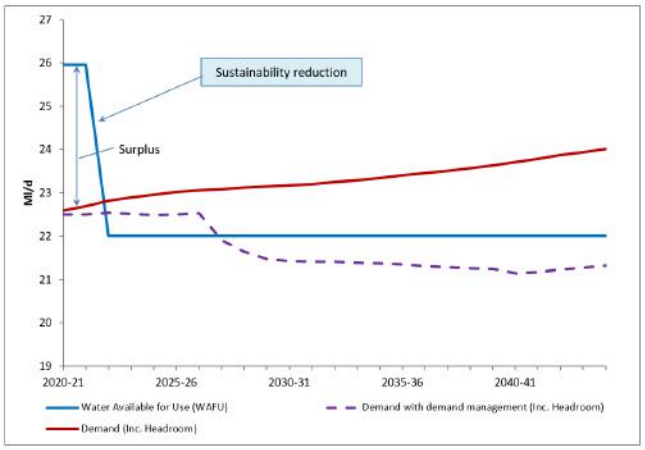


Table 4.4.5: North Norfolk Coast baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	26.00	22.00	22.00	22.00	22.00	22.00
Net transfers into Area (Ml/d)	0.30	0.30	0.30	0.30	0.30	0.30
Total DYAA Water available for Use: including transfers* (Ml/d)	25.95	22.00	22.00	22.00	22.00	22.00
Total DYAA Distribution Input (Ml/d)	21.63	21.95	22.05	22.18	22.38	22.67
Total DYAA Target Headroom (Ml/d)	0.97	1.01	1.09	1.16	1.25	1.34
DYAA supply-demand balance (Ml/d)	3.36	-0.96	-1.14	-1.33	-1.63	-2.00

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

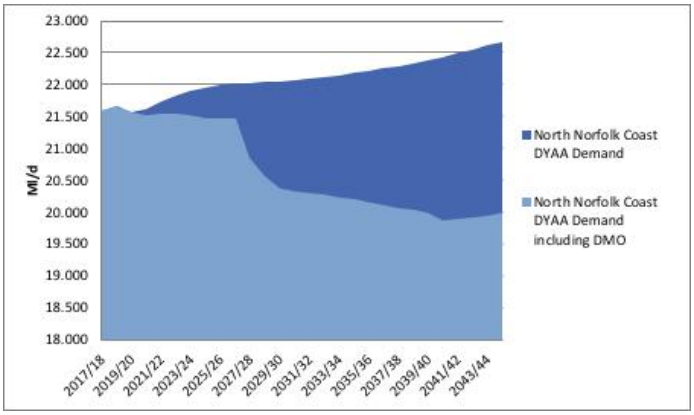
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 35% from 3.40 Ml/d in 2020 to 2.21 Ml/d in 2045.

Table 4.4.6: Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.25	0.37	0.48	0.64	0.74
Smart metering (demand savings) (Ml/d) -	0.00	0.51	0.64	0.74	0.80
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.00	0.43	0.48	0.51
Leakage reduction (our network) (Ml/d)	0.22	0.35	0.35	0.47	0.56
Total saving (Ml/d)	0.47	1.23	1.89	2.33	2.61

Figure 4.4.3: North Norfolk Coast DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 120.9 l/h/d; Unmeasured PCC 215.7 l/h/d, with a weighted average value of 143.4 l/h/d. This is expected to fall to 118.7 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 4.4.7: Changes in North Norfolk Coast Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	143.4	138.7	136.6	134.9	133.5	132.8
Final demand forecast (DYAA) (includes selected demand management strategy)	143.4	136.1	127.8	124	120.5	118.7
Final demand forecast (DYAA) % change from baseline forecast	0.00%	1.87%	6.44%	8.08%	9.74%	10.62%

For the Final Plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **12.99 Ml/d to 13.22 Ml/d**.

Leakage is forecast to decrease from the baseline value of **3.40 Ml/d to 2.21 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to decrease from **4.43 Ml/d to 3.87 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease slightly from **21.59 Ml/d to 19.98 Ml/d**, once the influence of demand management option savings has been included.

Table 4.4.8: North Norfolk Coast final plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	8.43	10.17	10.48	11.01	11.45	11.69
Household demand (Ml/d) - unmeasured	4.56	3.28	2.59	2.05	1.62	1.53
Non-household demand (Ml/d)	4.43	4.21	4.06	3.97	3.91	3.87
Leakage (Ml/d)	3.40	3.08	2.53	2.48	2.33	2.21
Distribution input (Ml/d)	21.59	21.47	20.38	20.21	19.99	19.98

Final supply demand balance

Figure 4.4.4: North Norfolk Coast Final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

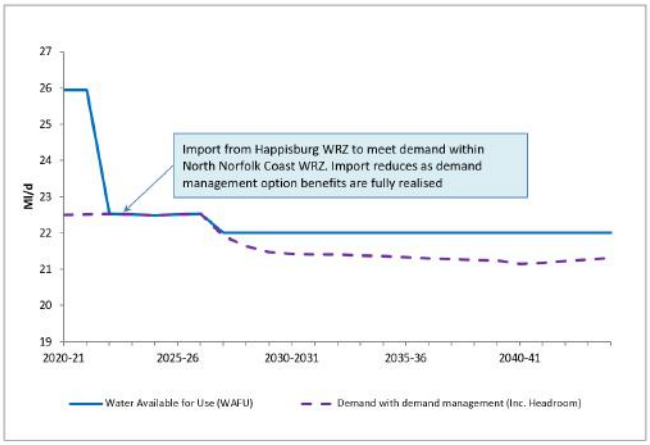


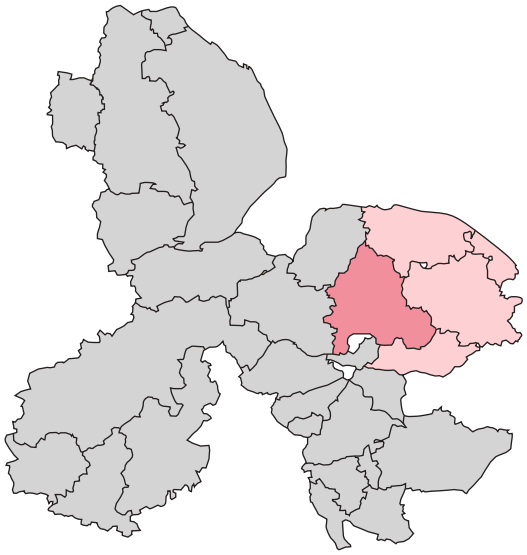
Table 4.4.9: North Norfolk Coast final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	25.65	21.70	21.70	21.70	21.70	21.70
Net transfers into Area (Ml/d)	0.30	0.78	0.30	0.30	0.30	0.30
Total DYAA Water available for Use: including transfers* (Ml/d)	25.95	22.48	22.00	22.00	22.00	22.00
Total DYAA Distribution Input (Ml/d)	21.53	21.47	20.38	20.21	19.99	19.98
Total DYAA Target Headroom (Ml/d)	0.97	1.01	1.09	1.16	1.25	1.34
DYAA supply-demand balance (Ml/d)	3.45	0.00	0.53	0.64	0.77	0.69

* bulk imports, exports and inter-zone transfers

4.5 North Norfolk Rural

The North Norfolk Rural WRZ covers an area of 1092km^2 and it sits in the centre of East Anglia. Water is supplied from groundwater abstractions from the Norfolk Chalk aquifer.



Supply Forecast

Table 4.5.1: North Norfolk Rural Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	27.00	27.00	27.00	27.00	27.00	27.00
Sustainability reductions (Ml/d)	0.00	-4.00	-4.00	-4.00	-4.00	-4.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	27.00	23.00	23.00	23.00	23.00	23.00
Outage Allowance†	0.56	0.47	0.47	0.47	0.47	0.47
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	26.45	22.53	22.53	22.53	22.53	22.53

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -2.0 Ml/d sustainability reduction seen in 2022, with a further -2.0 Ml/d sustainability reduction seen in 2024

This zone does not see additional severe drought impact on DO and is not considered vulnerable to a 1 in 200 year event.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **48,000 to 62,000**, and the population is forecast to increase from approximately **111,000 to 138,000**[3].

[3] *Based upon Local Authority planning information*

Table 4.5.2: North Norfolk Rural population and property forecast per AMP

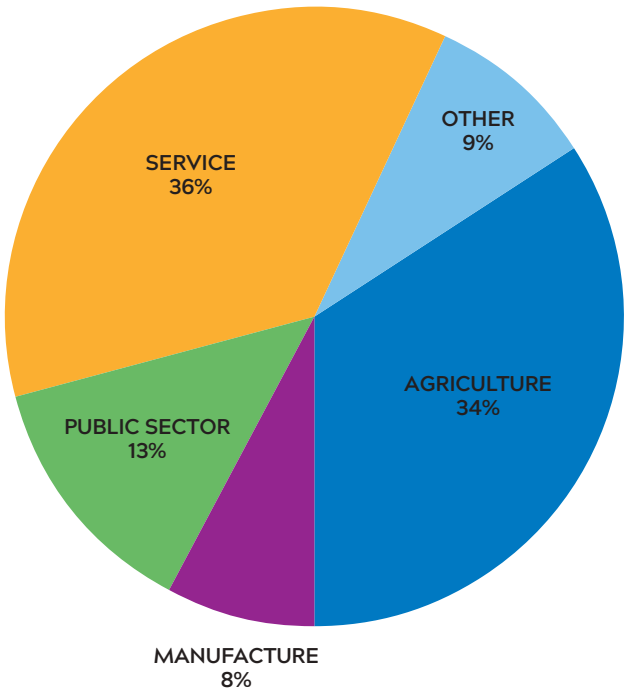
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	110,890	124,850	128,960	131,800	135,020	137,860
Total Household Properties	48,120	54,450	56,840	58,640	60,300	61,970

Property growth rates vary between **5,680** per AMP in the short-term to **1,680** per AMP in the long-term. The short-to-medium term projections are aligned with Local Authority data; the medium to long term projections with ONS based data.

Table 4.5.3: North Norfolk Rural rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	11,890	4,110	2,840	3,220	2,840
Additional Household properties per AMP	5,680	2,390	1,790	1,660	1,680

Figure 4.5.1: North Norfolk Rural Non-household sectors



Non-household demand is predominantly from the service sector and agriculture, which account for **70%** of total NHH demand. Non-household demand is forecast to increase over the WRMP period from **5.05 Ml/d to 5.71 Ml/d.**

For the baseline scenario WITHOUT demand management options.

Household demand is forecast to increase over the WRMP period from **12.93 Ml/d to 15.83 Ml/d**.

Leakage is forecast to decrease from the baseline value of **4.86 Ml/d to 4.65 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to increase from **5.05 Ml/d to 5.71 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **25.58 Ml/d to 26.89 Ml/d**.

Table 4.5.4: North Norfolk Rural baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	11.47	13.49	14.12	14.55	14.92	15.21
Household demand (Ml/d) - unmeasured	1.50	1.09	0.86	0.69	0.63	0.62
Non-household demand (Ml/d)	5.05	5.18	5.30	5.42	5.56	5.71
Leakage (Ml/d)	4.86	4.67	4.67	4.66	4.66	4.65
Distribution input (Ml/d)	23.58	25.13	25.65	26.02	26.47	26.89

Baseline supply demand balance

Figure 4.5.2: North Norfolk Rural baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

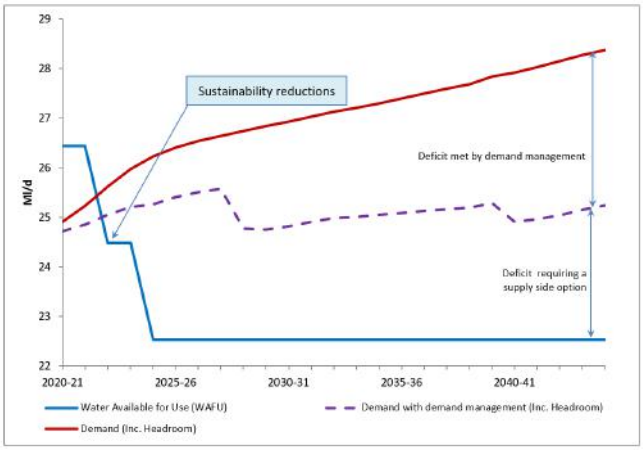


Table 4.5.5: North Norfolk Rural baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	26.44	22.53	22.53	22.53	22.53	22.53
Net transfers into Area (Ml/d)	0.0	0.0	0.0	0.0	0.0	0.0
Total DYAA Water available for Use: including transfers* (Ml/d)	26.44	22.53	22.53	22.53	22.53	22.53
Total DYAA Distribution Input (Ml/d)	23.88	25.13	25.65	26.02	26.47	26.89
Total DYAA Target Headroom (Ml/d)	1.03	1.10	1.19	1.27	1.38	1.48
DYAA supply-demand balance (Ml/d)	1.53	-3.70	-4.31	-4.77	-5.31	-5.85

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

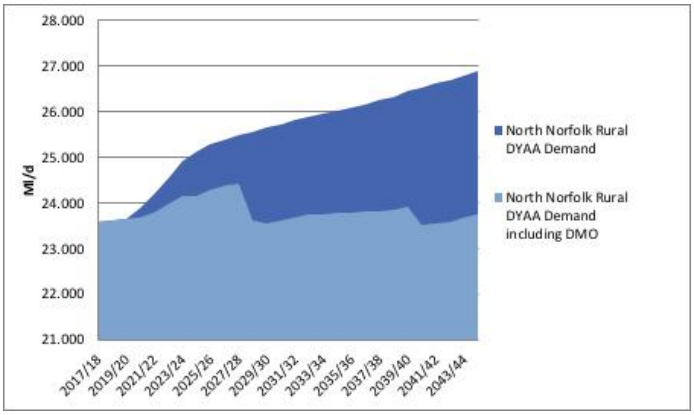
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 41% from 4.86 Ml/d in 2020 to 2.86 Ml/d in 2045.

Table 4.5.6: North Norfolk Rural Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.31	0.43	0.55	0.73	0.86
Smart metering (demand savings) (Ml/d) -	0.00	0.41	0.43	0.44	0.45
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.00	0.47	0.50	0.52
Leakage reduction (our network) (Ml/d)	0.65	0.75	0.75	0.84	1.25
Total saving (Ml/d)	0.96	1.59	2.20	2.51	3.07

Figure 4.5.3: North Norfolk Rural DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 128 l/h/d; Unmeasured PCC 70 l/h/d, with a weighted average value of 117.0 l/h/d. This is expected to fall to 105.1 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 4.5.7: Changes in North Norfolk Rural Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	117.0	116.7	116.2	115.6	115.2	114.8
Final demand forecast (DYAA) (includes selected demand management strategy)	117.0	114.2	109.5	108.0	106.3	105.1
Final demand forecast (DYAA) % change from baseline forecast	0.00%	2.14%	5.77%	6.57%	7.73%	8.45%

For the Final Plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **12.98 Ml/d to 14.48 Ml/d**.

Leakage is forecast to decline from the baseline value of **4.86 Ml/d to 2.86 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **5.05 Ml/d to 5.71 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **23.69 Ml/d to 23.76 Ml/d**, once the influence of demand management option savings has been included.

Table 4.5.8: North Norfolk Rural Final Plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	11.47	13.19	13.28	13.59	13.76	13.91
Household demand (Ml/d) - unmeasured	1.50	1.07	0.84	0.65	0.59	0.58
Non-household demand (Ml/d)	5.05	5.18	5.30	5.42	5.56	5.71
Leakage (Ml/d)	4.86	4.02	3.44	3.42	3.30	2.86
Distribution input (Ml/d)	23.69	24.16	23.56	23.78	23.91	23.76

Selected supply-side options

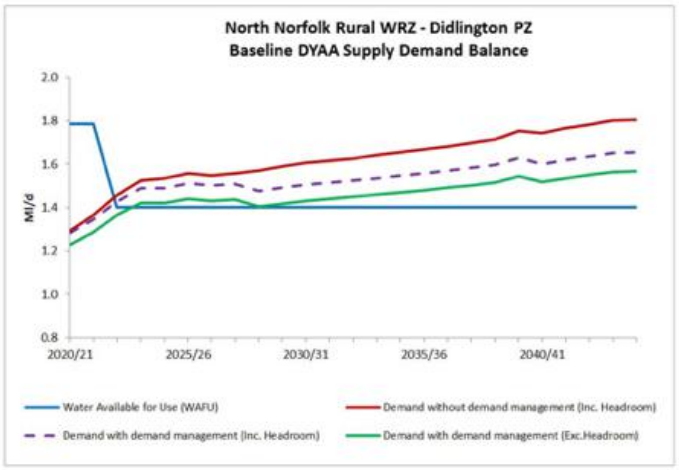
For details on the feasible options list for North Norfolk Rural WRZ please refer to the Supply-side option development technical document.

Table 4.5.9: North Norfolk Rural preferred supply side options

Opt Ref	Option Name
NNR8	Norwich and the Boards WRZ to Norfolk Rural North WRZ Transfer (5Ml/d)

Due to the capping of time limited licences we have found that there are now deficits in discrete parts of some WRZs (see Figure 4.5.4). These local deficits are not seen at WRZ level and as such would not appear within the WRZ supply demand balances in the WRP Tables. We have completed smaller scale supply demand balances for discrete Planning Zones (PZs) and developed intra-WRZ transfer options to resolve these deficits.

Figure 4.5.4: Didlington PZ baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions



Final supply demand balance

Figure 4.5.5: North Norfolk Rural WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

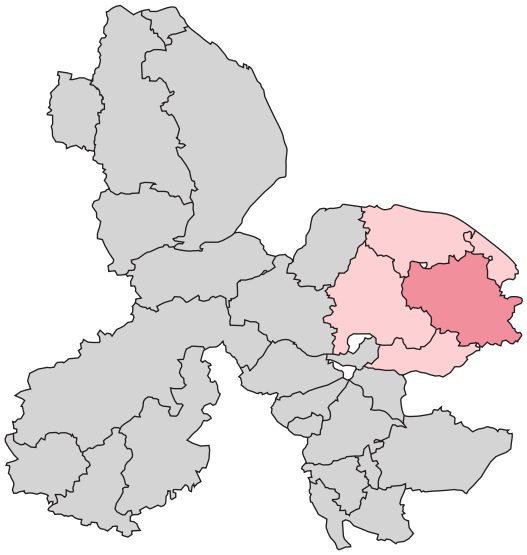
Table 4.5.10: North Norfolk Rural final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	26.44	22.53	22.53	22.53	22.53	22.53
Net transfers into Area (Ml/d)	0.00	2.74	2.23	2.52	2.76	2.71
Total DYAA Water available for Use: including transfers* (Ml/d)	26.44	25.26	24.75	25.05	25.29	25.24
Total DYAA Distribution Input (Ml/d)	23.69	24.16	23.56	23.78	23.91	23.76
Total DYAA Target Headroom (Ml/d)	1.03	1.10	1.19	1.27	1.38	1.48
DYAA supply-demand balance (Ml/d)	1.73	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

4.6 Norwich and the Broads

The Norwich and the Broads WRZ covers an area of 1123 km^2. Water is supplied from groundwater abstractions in the Norfolk Chalk aquifer and a surface water abstraction from the River Wensum.



Supply Forecast

Table 4.6.1: Norwich and the Broads Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	82.00	82.00	82.00	82.00	82.00	82.00
Sustainability reductions (Ml/d)	0.00	-5.00	-5.00	-5.00	-5.00	-5.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	82.00	77.00	77.00	77.00	77.00	77.00
Outage Allowance†	1.35	1.27	1.27	1.27	1.27	1.27
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	80.65	75.73	75.73	75.73	75.73	75.73

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -5.0 Ml/d sustainability reduction seen in 2022

This zone does not see additional severe drought impact on DO and is not considered vulnerable to a 1 in 200 year event.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **146,000 to 190,000**, and the population is forecast to increase from approximately **325,000 to 403,000**[4].

[4] *Based upon Local Authority planning information*

Table 4.6.2: Norwich and the Broads population and property forecast per AMP

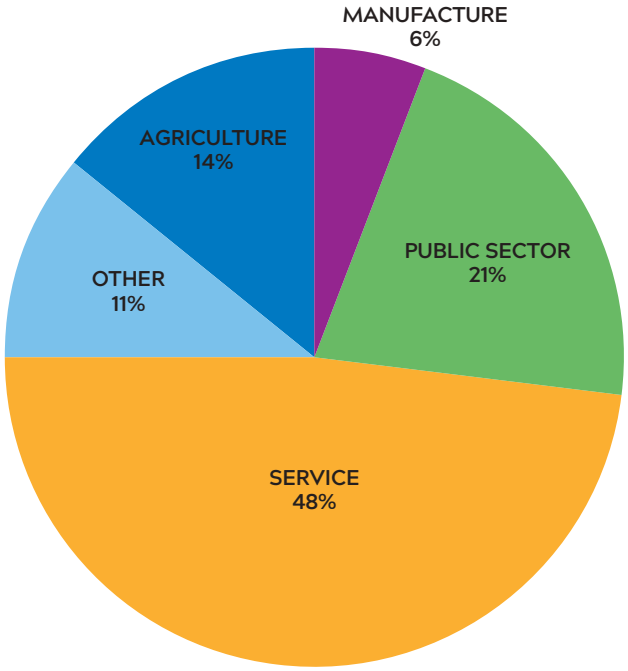
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	324,590	356,440	375,890	385,350	394,430	403,410
Total Household Properties	146,460	163,780	174,100	179,800	184,980	190,240

Property growth rates vary between **15,000** per AMP in the short-term to **5,300** per AMP in the long-term. The short-to-medium term projections are aligned with Local Authority data; the medium to long term projections with ONS based data.

Table 4.6.3: Norwich and the Broads rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	30,700	19,450	9,460	9,080	8,980
Additional Household properties per AMP	15,300	10,320	5,690	5,190	5,260

Figure 4.6.1: Norwich and the Broads Non-household sectors



Non-household demand is predominantly from the service sector which accounts for **69%** of total NHH demand. Non-household demand is forecast to decrease over the WRMP period from **11.54 Ml/d to 9.31 Ml/d.**

For the baseline scenario WITHOUT demand management options

Household demand is forecast to increase over the WRMP period from **48.39 Ml/d to 56.28 Ml/d**.

Leakage is forecast to decrease from the baseline value of **4.42 Ml/d to 4.06 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to decrease from **11.54 Ml/d to 9.31 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **66.09 Ml/d to 71.60 Ml/d**.

Table 4.6.4: Norwich and the Broads baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	30.72	38.53	42.54	44.87	46.92	48.77
Household demand (Ml/d) - unmeasured	17.67	13.11	11.19	9.70	8.49	7.51
Non-household demand (Ml/d)	11.54	11.00	10.64	10.37	9.86	9.31
Leakage (Ml/d)	4.33	4.13	4.09	4.06	4.04	4.06
Distribution input (Ml/d)	66.31	68.74	70.42	70.95	71.27	71.60

Baseline supply demand balance

Figure 4.6.2: Norwich and the Broads baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

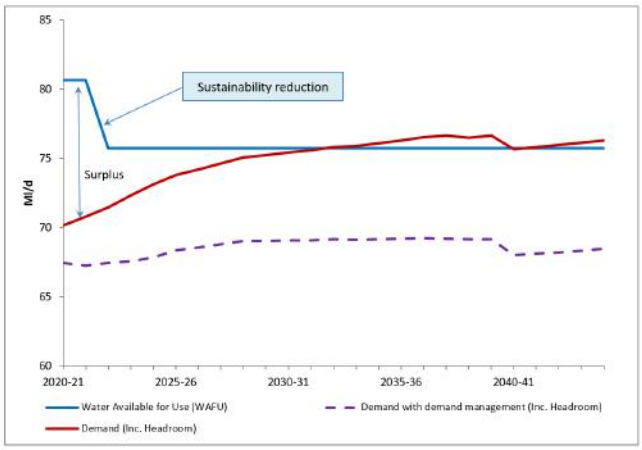


Table 4.6.5: Norwich and the Broads baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	80.65	75.73	75.73	75.73	75.73	75.73
Net transfers into Area (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	80.65	75.73	75.73	75.73	75.73	75.73
Total DYAA Distribution Input (Ml/d)	66.09	68.74	70.42	70.95	71.27	71.60
Total DYAA Target Headroom (Ml/d)	4.06	4.37	4.78	5.15	5.37	4.70
DYAA supply-demand balance (Ml/d)	10.50	2.62	0.53	-0.37	-0.91	-0.57

* bulk imports, exports and inter-zone transfers

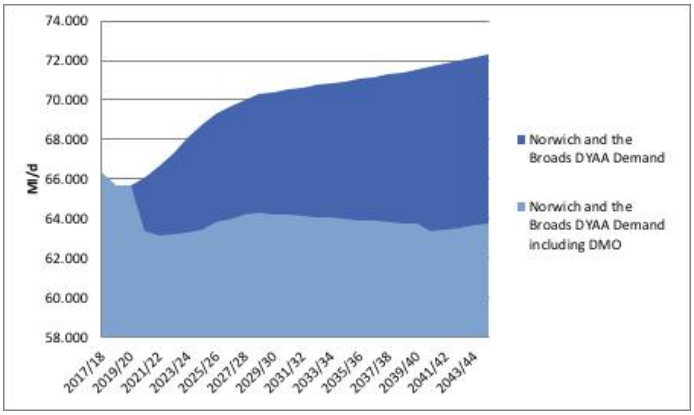
Selected demand management strategy

We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

Table 4.6.6: Norwich and the Broads Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.60	1.21	1.79	1.95	2.07
Smart metering (demand savings) (Ml/d) -	1.62	1.77	1.86	1.93	1.99
Leakage reduction (CSPL savings) (Ml/d)	1.05	1.35	1.48	1.56	1.63
Leakage reduction (our network) (Ml/d)	1.63	1.63	1.63	2.19	2.70
Total saving (Ml/d)	4.90	5.96	6.76	7.63	8.39

Figure 4.6.3: Norwich and the Broads DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 135.2 /h/d; Unmeasured PCC 182.5 l/h/d, with a weighted average value of 149.4 l/h/d. This is expected to fall to 129.2 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 4.6.7: Changes in Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	149.4	144.9	142.9	141.6	140.5	139.5
Final demand forecast (DYAA) (includes selected demand management strategy)	149.4	138.5	134.8	131.9	130.4	129.2
Final demand forecast (DYAA) % change from baseline forecast	0.00%	4.42%	5.67%	6.85%	7.19%	7.38%

For the Final Plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **48.39 Ml/d to 52.12 Ml/d**.

Leakage is forecast to decrease from the baseline value of **4.33 Ml/d to 0.38 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to decrease from **11.54 Ml/d to 9.31 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease from **66.31 Ml/d to 63.76 Ml/d**, once the influence of demand management option savings has been included.

Table 4.6.8: Norwich and the Broads final plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	30.72	36.31	39.58	41.26	43.10	44.79
Household demand (Ml/d) - unmeasured	17.67	13.05	11.09	9.56	8.33	7.33
Non-household demand (Ml/d)	11.54	11.00	10.64	10.37	9.86	9.24
Leakage (Ml/d)	4.33	1.15	0.97	0.86	0.53	0.38
Distribution input (Ml/d)	66.31	63.47	64.25	64.01	63.78	63.76

Final supply demand balance

Figure 4.6.4: Norwich and the Broads WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

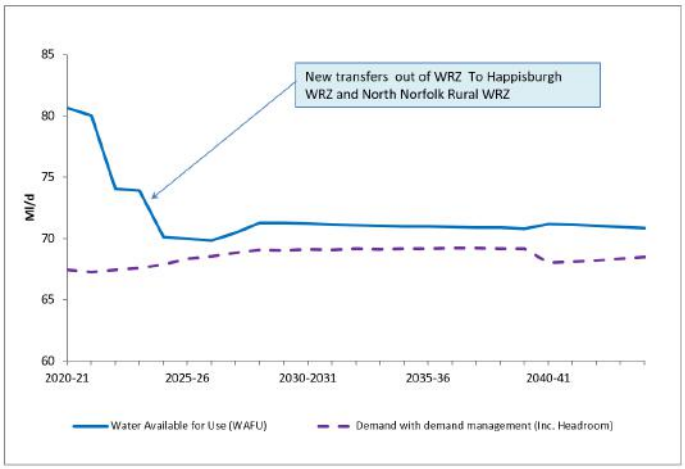


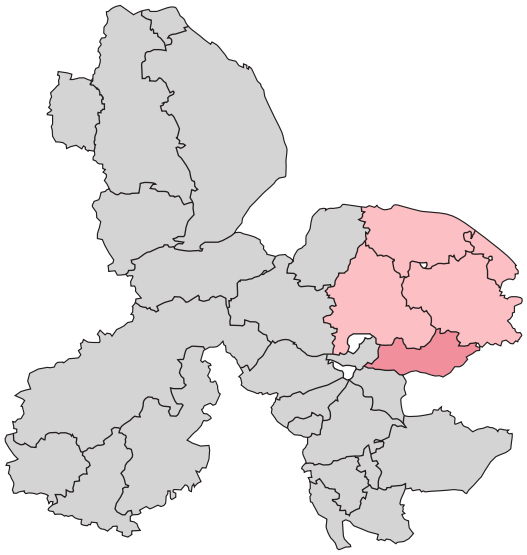
Table 4.6.9: Norwich and the Broads Final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	80.65	75.73	75.73	75.73	75.73	75.73
Net transfers into Area (Ml/d)	0.00	-5.61	-4.56	-4.75	-4.92	-4.91
Total DYAA Water available for Use: including transfers* (Ml/d)	80.65	71.92	73.08	72.79	72.59	72.62
Total DYAA Distribution Input (Ml/d)	63.37	63.47	64.25	64.01	63.78	63.76
Total DYAA Target Headroom (Ml/d)	4.06	4.37	4.78	5.15	5.37	4.70
DYAA supply-demand balance (Ml/d)	13.22	2.28	2.25	1.82	1.64	2.36

* bulk imports, exports and inter-zone transfers

4.7 South Norfolk Rural

The South Norfolk Rural WRZ covers and area of 458 km^2 and lies in the centre of East Anglia. The zone is supplied by groundwater abstractions from the Suffolk Chalk aquifer.



Supply Forecast

Table 4.7.1: South Norfolk Rural Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	15.00	15.00	15.00	15.00	15.00	15.00
Sustainability reductions (Ml/d)	0.00	-1.00	-1.00	-1.00	-1.00	-1.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	15.00	14.00	14.00	14.00	14.00	14.00
Outage Allowance†	0.28	0.26	0.26	0.26	0.26	0.26
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	14.70	13.70	13.70	13.70	13.70	13.70

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -1.0 Ml/d sustainability reduction seen in 2022

This zone does not see additional severe drought impact on DO and is not considered vulnerable to a 1 in 200 year event.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **19,000 to 27,000**, and the population is forecast to increase from approximately **44,000 to 58,000**[5] .

[5] *Based upon Local Authority planning information*

Table 4.7.2: Population and property forecast

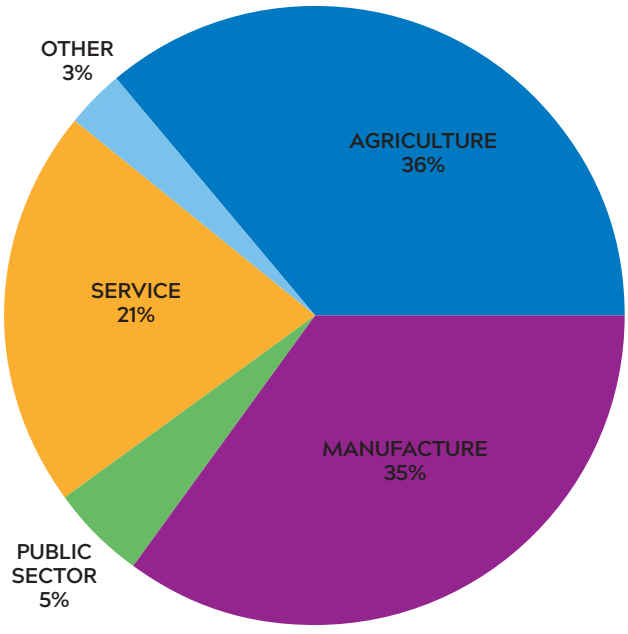
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	44,150	51,270	53,710	55,300	56,850	58,300
Total Household Properties	19,180	22,870	24,190	25,140	25,990	26,850

Property growth rates vary between **2,600** per AMP in the short-term to **870** per AMP in the long-term. The short-to-medium term projections are aligned with Local Authority data; the medium to long term projections with ONS based data.

Table 4.7.3: Rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	5,470	2,450	1,590	1,550	1,450
Additional Household properties per AMP	2,570	1,330	940	850	870

Figure 4.7.1: South Norfolk Rural Non-household sectors



Non-household demand is predominantly from the agriculture and manufacturing, which account for **71%** of total NHH demand. Non-household demand is forecast to increase over the WRMP period from **3.33 Ml/d to 3.76 Ml/d.**

For the baseline scenario WITHOUT demand management options.

Household demand is forecast to increase over the WRMP period from **5.64 Ml/d to 7.09 Ml/d**.

Leakage is forecast to increase from the baseline value of **1.79 Ml/d to 1.80 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to increase from **3.33 Ml/d to 3.76 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **11.10 Ml/d to 12.98 Ml/d**.

Table 4.7.4: South Norfolk Rural baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	4.10	5.50	6.03	6.29	6.45	6.60
Household demand (Ml/d) - unmeasured	1.54	0.90	0.60	0.49	0.49	0.49
Non-household demand (Ml/d)	3.33	3.40	3.48	3.57	3.66	3.76
Leakage (Ml/d)	1.79	1.77	1.78	1.79	1.80	1.80
Distribution input (Ml/d)	11.10	11.90	12.23	12.47	12.73	12.98

Baseline supply demand balance

Figure 4.7.2: South Norfolk Rural baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

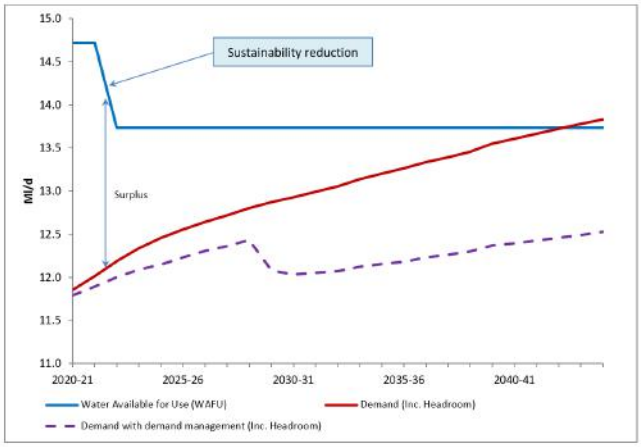


Table 4.7.5: South Norfolk Rural baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	14.72	13.74	13.74	13.74	13.74	13.74
Net transfers into Area (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	14.72	13.74	13.74	13.74	13.74	13.74
Total DYAA Distribution Input (Ml/d)	11.35	11.90	12.23	12.47	12.73	12.98
Total DYAA Target Headroom (Ml/d)	0.50	0.56	0.64	0.73	0.82	0.84
DYAA supply-demand balance (Ml/d)	2.86	1.28	0.87	0.54	0.18	-0.09

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

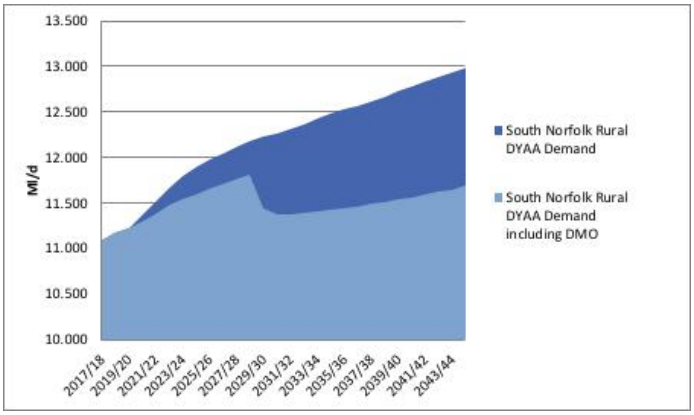
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 27% from 1.79 Ml/d in 2020 to 1.31 Ml/d in 2045.

Table 4.7.6: South Norfolk Rural Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.13	0.20	0.30	0.38	0.45
Smart metering (demand savings) (Ml/d) -	0.00	0.20	0.27	0.30	0.33
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.00	0.20	0.23	0.25
Leakage reduction (our network) (Ml/d)	0.18	0.18	0.23	0.23	0.23
Total saving (Ml/d)	0.31	0.58	0.99	1.14	1.26

Figure 4.7.3: South Norfolk Rural DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 126.6l/h/d; Unmeasured PCC 131.2 l/h/d, with a weighted average value of 127.8 l/h/d. This is expected to fall to 107.9 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 4.7.7: Changes in Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	127.8	124.9	123.4	122.6	122.1	121.7
Final demand forecast (DYAA) (includes selected demand management strategy)	127.8	122.3	115.7	111.9	109.7	107.9
Final demand forecast (DYAA) % change from baseline forecast	0.00%	2.08%	6.24%	8.73%	10.16%	11.34%

For the final plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **5.64 Ml/d to 6.29 Ml/d**.

Leakage is forecast to decrease from the baseline value of **1.79 Ml/d to 1.31 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **3.33 Ml/d to 3.76 Ml/d** over the WRMP period.

Distribution Input is predicted to increase slightly from **11.29 Ml/d to 11.69 Ml/**d, once the influence of demand management option savings has been included.

Table 4.7.8: South Norfolk Rural final plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	4.10	5.38	5.62	5.71	5.76	5.81
Household demand (Ml/d) - unmeasured	1.54	0.89	0.59	0.48	0.48	0.48
Non-household demand (Ml/d)	3.33	3.40	3.48	3.57	3.66	3.76
Leakage (Ml/d)	1.79	1.59	1.41	1.33	1.32	1.31
Distribution input (Ml/d)	11.29	11.59	11.43	11.42	11.55	11.69

Final supply demand balance

Figure 4.6.4: South Norfolk Rural WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

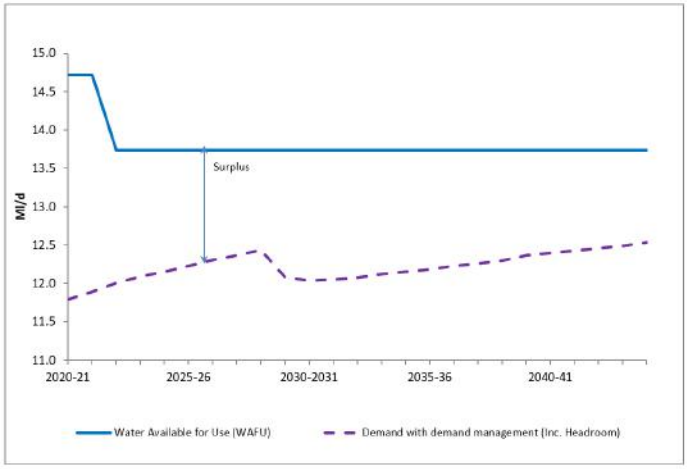


Table 4.7.9: South Norfolk Rural Final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	14.72	13.74	13.74	13.74	13.74	13.74
Net transfers into Area (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	14.72	13.74	13.74	13.74	13.74	13.74
Total DYAA Distribution Input (Ml/d)	11.29	11.59	11.43	11.42	11.55	11.69
Total DYAA Target Headroom (Ml/d)	0.50	0.56	0.64	0.73	0.82	0.84
DYAA supply-demand balance (Ml/d)	2.92	1.59	1.66	1.59	1.37	1.21

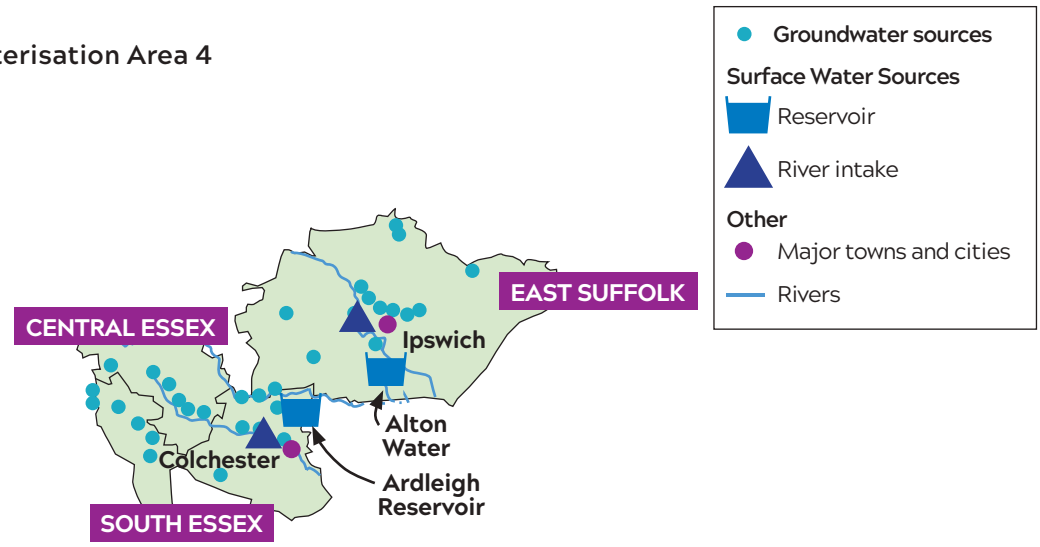
* bulk imports, exports and inter-zone transfers

5. Area 5:

East Suffolk and Essex

5.1 Overview

Figure 5.1.1: Problem characterisation Area 4



5.2 Strategic risks and issues

Problem Characterisation Results

- Area 5 is assessed as having low levels of concern
- There are very significant strategic needs, but the level of complexity is low

This area experiences significant pressures, from climate change, sustainability reductions and especially growth, resulting in baseline deficits. This is resolved through demand management options, a transfer from the west, and future resource development.

5.3 Central Essex

The Central Essex WRZ coves and area of 314km^2 and is based on the supply systems for Halstead. The water resource for this WRZ is entirely dependent on abstraction from the Suffolk Chalk aquifer.

Supply Forecast

Table 5.3.1: Central Essex Baseline supply forecast including impacts on Deployable Output

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	9.60	9.60	9.60	9.60	9.60	9.60
Sustainability reductions (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	9.60	9.60	9.60	9.60	9.60	9.60
Outage Allowance†	0.16	0.16	0.16	0.16	0.16	0.16
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	9.43	9.43	9.43	9.43	9.43	9.43

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

This zone is not forecast to experience any changes to baseline DO or WAFU over the planning period. This zone does not see additional severe drought impact on DO and is therefore not considered vulnerable to a 1 in 200 year event.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **14,000 to 20,000**, and the population is forecast to increase from approximately **34,000 to 43,000**[1].

Table 5.3.2: Central Essex Population and property totals (cumulative) per AMP

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	33,700	36,680	38,660	40,410	41,640	42,920
Total Household Properties	14,430	16,160	17,230	18,180	18,880	19,640

Property growth rates vary between **1,300** per AMP in the short-term to **760** per AMP in the long-term. The short- to medium-term projections are aligned with Local Authority data; the medium to long-term projections with ONS trend based data.

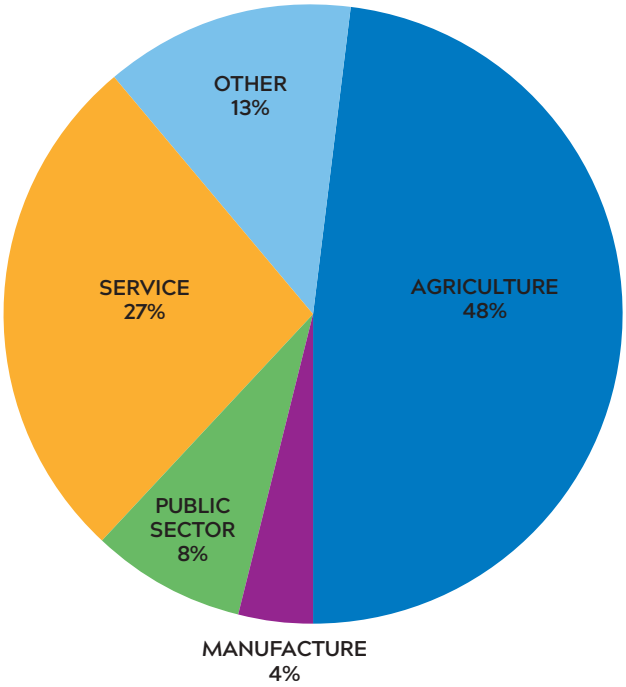
[1] *Based upon Local Authority planning information*

Table 5.3.3:Central Essex Rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	2,610	1,980	1,740	1,230	1,290
Additional Household properties per AMP	1,340	1,070	940	700	760

Household demand is forecast to increase over the WRMP period from **3.88 Ml/d to 4.54 Ml/d**.

Figure 5.3.1: Central Essex Non-household sectors



Non-household demand is predominantly from agriculture which accounts for **48%** of total NHH demand. Non-household demand is forecast to increase over the WRMP period from **1.18 Ml/d to 1.34 Ml/d.**

For the baseline scenario WITHOUT demand management options.

Household demand is forecast to increase over the WRMP period from **3.88 Ml/d to 4.93 Ml/d**.

Leakage is forecast to decrease from the baseline value of **3.26 Ml/d to 3.19 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to increase from **1.18 Ml/d to 1.34 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **8.57 Ml/d to 9.71 Ml/d**.

Table 5.3.4: Central Essex baseline demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	3.25	3.83	4.16	4.43	4.61	4.77
Household demand (Ml/d) - unmeasured	0.63	0.43	0.33	0.25	0.18	0.16
Non-household demand (Ml/d)	1.18	1.21	1.25	1.27	1.30	1.34
Leakage (Ml/d)	3.26	3.18	3.18	3.18	3.19	3.19
Distribution input (Ml/d)	8.57	8.90	9.17	9.39	9.54	9.71

Baseline supply demand balance

Figure 5.3.2: Central Essex baseline supply demand balance to 2045 to dry year annual average (DYAA) condition

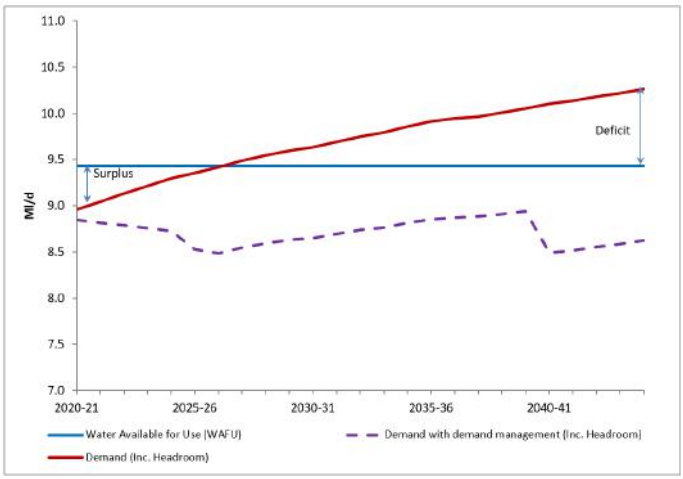


Table 5.3.5: baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	9.43	9.43	9.43	9.43	9.43	9.43
Net transfers into Area (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	9.43	9.43	9.43	9.43	9.43	9.43
Total DYAA Distribution Input (Ml/d)	8.59	8.90	9.17	9.39	9.54	9.71
Total DYAA Target Headroom (Ml/d)	0.37	0.39	0.42	0.47	0.51	0.55
DYAA supply-demand balance (Ml/d)	0.47	0.14	-0.16	-0.43	-0.62	-0.83

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

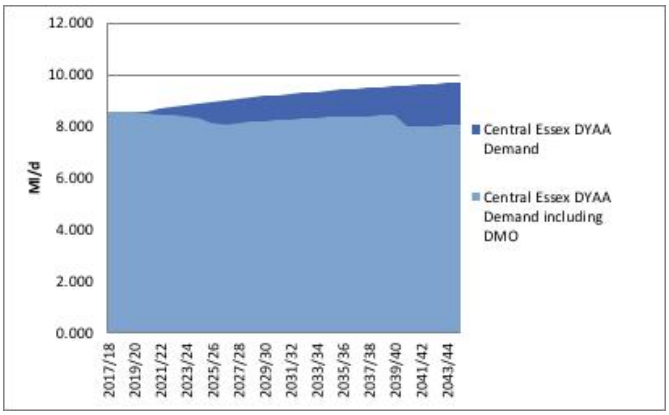
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 40% from 3.26 Ml/d in 2020 to 1.94 Ml/d in 2045.

Table 5.3.6: Central Essex water savings (cumulative) resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.09	0.11	0.17	0.22	0.24
Smart metering (demand savings) (Ml/d) -	0.00	0.13	0.13	0.14	0.14
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.15	0.16	0.17	0.17
Leakage reduction (our network) (Ml/d)	0.48	0.57	0.57	0.57	1.07
Total saving (Ml/d)	0.57	0.95	1.03	1.10	1.63

Figure 5.3.4: Central Essex DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 146.0 l/h/d; Unmeasured PCC 55.1 l/h/d, with a weighted average value of 115.2 l/h/d. This is expected to fall to 105.8 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 5.3.7: Changes in Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	115.20	116.00	116.00	115.70	115.20	114.90
Final demand forecast (DYAA) (includes selected demand management strategy)	115.20	113.50	109.80	108.00	106.40	105.80
Final demand forecast (DYAA) % change from baseline forecast	0.00%	2.16%	5.34%	6.66%	7.64%	7.92%

For the Final Plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **3.88 Ml/d to 4.54 Ml/d**.

Leakage is forecast to decrease from the baseline value of **3.26 Ml/d to 1.94 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **1.18 Ml/d to 1.34 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease from **8.57 Ml/d to 8.07 Ml/d**, once the influence of demand management option savings has been included.

Table 5.3.8: Central Essex Final Plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	3.25	3.74	3.93	4.13	4.26	4.40
Household demand (Ml/d) - unmeasured	0.63	0.42	0.31	0.23	0.17	0.14
Non-household demand (Ml/d)	1.18	1.22	1.25	1.28	1.31	1.34
Leakage (Ml/d)	3.26	2.70	2.46	2.45	2.45	1.94
Distribution input (Ml/d)	8.57	8.33	8.21	8.35	8.43	8.07

Final supply demand balance

Figure 5.3.5: Central Essex Final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

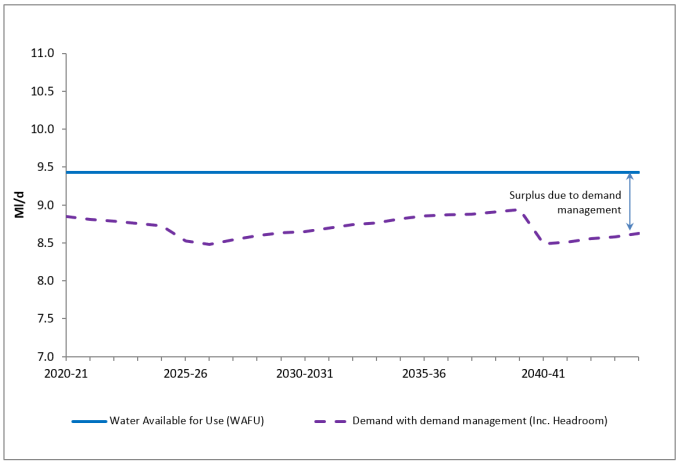


Table 5.3.9: Central Essex final supply-demand balance to 2045 for dry year annual average (DYAA) (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	9.43	9.43	9.43	9.43	9.43	9.43
Net transfers into Area (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	9.43	9.43	9.43	9.43	9.43	9.43
Total DYAA Distribution Input (Ml/d)	8.48	8.33	8.21	8.35	8.43	8.07
Total DYAA Target Headroom (Ml/d)	0.37	0.39	0.42	0.47	0.51	0.55
DYAA supply-demand balance (Ml/d)	0.58	0.71	0.80	0.62	0.49	0.81

* bulk imports, exports and inter-zone transfers

5.4 East Suffolk

The East Suffolk WRZ covers an area of 1241 km^2. The East Suffolk WRZ extends inland from Stour, Orwell and Deben estuaries and includes the supply systems for Ipswich, Felixstowe, Hadleigh, Stowmarket and Woodbridge. Supplies in the WRZ are obtained from a combination of sources that include groundwater abstracted from the Suffolk and Essex Chalk aquifers and surface water which is pumped from the River Gibbing into Alton Water reservoir.

Supply Forecast

Table 5.4.1: East Suffolk supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	78.25	78.25	78.25	78.25	78.25	78.25
Sustainability reductions (Ml/d)	0.00	-5.00	-5.00	-5.00	-5.00	-5.00
Climate change impacts (Ml/d)	-0.82	-0.89	-0.98	-1.07	-1.16	-1.25
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	77.43	72.36	72.27	72.18	72.09	72.00
Outage Allowance†	1.34	1.26	1.25	1.25	1.25	1.25
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	76.09	71.11	71.02	70.93	70.84	70.75

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -5.00 Ml/d sustainability reductions are seen in 2024; and
- Climate change impact of -0.82 Ml/d in 2020 increasing to -1.25 Ml/d in 2045.

This zone does not see additional severe drought impact on DO and is therefore not considered vulnerable to a 1 in 200 year event.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **134,000 to 164,000**, and the population is forecast to increase from approximately **303,000 to 348,000**[2].

[2] *Based upon Local Authority planning information*

Table 5.4.2: East Suffolk population and property forecast per AMP

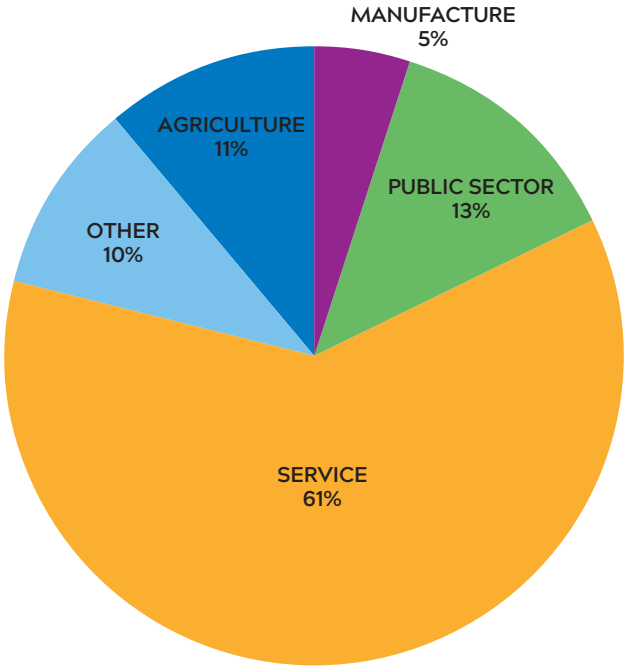
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	302,500	320,790	330,420	336,950	342,760	348,430
Total Household Properties	134,260	144,780	151,330	156,110	160,130	164,300

Property growth rates vary between **8,600** per AMP in the short-term to **4,200** per AMP in the long-term. The short- to medium-term projections are aligned with Local Authority data; the medium to long-term projections with ONS trend based data.

Table 5.4.3: East Suffolk rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	14,630	9,620	6,540	5,800	5,680
Additional Household properties per AMP	8,590	6,540	4,790	4,020	4,170

Figure 5.4.1: East Suffolk Non-household sectors



Non-household demand is predominantly from the service sector and manufacturing, which account for **66%** of total NHH demand. Non-household demand is forecast to increase over the WRMP period from **14.80 Ml/d to 15.20 Ml/d.**

For the baseline scenario WITHOUT demand management options.

Household demand is forecast to increase over the WRMP period from **39.54 Ml/d to 44.95 Ml/d**.

Leakage is forecast to decrease from the baseline value of **12.28 Ml/d to 11.80 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to increase from **14.80 Ml/d to 15.20 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **68.85 Ml/d to 73.99 Ml/d**.

Table 5.4.4: East Suffolk baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	36.28	39.52	41.13	42.19	43.02	43.67
Household demand (Ml/d) - unmeasured	3.26	2.35	1.88	1.53	1.30	1.28
Non-household demand (Ml/d)	14.80	14.62	14.56	14.64	14.86	15.20
Leakage (Ml/d)	12.28	11.85	11.84	11.83	11.82	11.80
Distribution input (Ml/d)	68.65	70.38	71.45	72.22	73.04	73.99

Baseline supply demand balance

Figure 5.4.2: East Suffolk baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

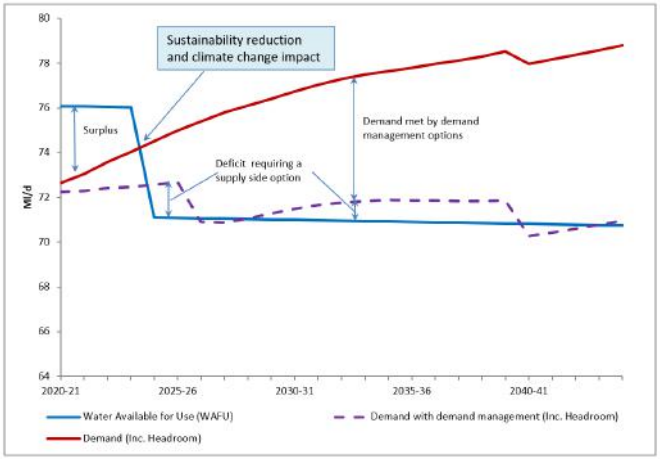


Table 5.4.5: East Suffolk baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	76.09	71.10	71.01	70.92	70.84	70.75
Net transfers into Area (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	76.09	71.10	71.01	70.92	70.84	70.75
Total DYAA Distribution Input (Ml/d)	68.97	70.38	71.45	72.22	73.04	73.99
Total DYAA Target Headroom (Ml/d)	3.67	4.15	4.95	5.42	5.48	4.81
DYAA supply-demand balance (Ml/d)	3.45	-3.42	-5.39	-6.72	-7.68	-8.05

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

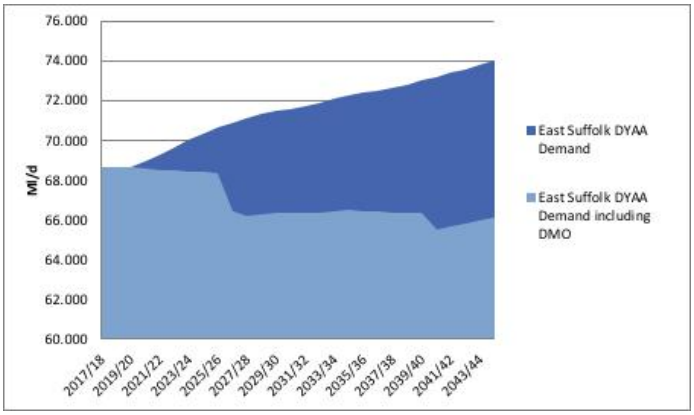
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand. **12.28 Ml/d to 7.44 Ml/d.**

- We plan to reduce leakage by 39% from 12.28 Ml/d in 2020 to 7.44 Ml/d in 2045.

Table 5.4.6: Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.55	0.99	1.51	1.99	2.15
Smart metering (demand savings) (Ml/d) -	0.00	1.16	1.18	1.20	1.23
Leakage reduction (CSPL savings) (Ml/d)	0.00	1.23	1.29	1.34	1.39
Leakage reduction (our network) (Ml/d)	1.38	1.69	1.69	2.01	2.96
Total saving (Ml/d)	1.93	5.07	5.67	6.55	7.74

Figure 5.4.3: East Suffolk DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 149.3 l/h/d; Unmeasured PCC 54.7 l/h/d, with a weighted average value of 130.7 l/h/d. This is expected to fall to 119.0 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 5.4.7: Changes in Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	130.70	130.50	130.20	129.70	129.30	129.00
Final demand forecast (DYAA) (includes selected demand management strategy)	130.70	128.80	123.50	121.50	119.70	119.00
Final demand forecast (DYAA) % change from baseline forecast	0.00%	1.30%	5.15%	6.32%	7.42%	7.75%

For the Final Plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **39.54 Ml/d to 41.48 Ml/d**.

Leakage is forecast to decrease from the baseline value of **12.28 Ml/d to 7.44 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **14.80 Ml/d to 15.20 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease from **68.65 Ml/d to 66.16 Ml/d**, once the influence of demand management option savings has been included.

Table 5.4.8: East Suffolk final plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	36.28	38.99	39.00	39.52	39.86	40.33
Household demand (Ml/d) - unmeasured	3.26	2.31	1.81	1.43	1.18	1.15
Non-household demand (Ml/d)	14.80	14.62	14.56	14.64	14.86	15.20
Leakage (Ml/d)	12.28	10.47	8.92	8.85	8.46	7.44
Distribution input (Ml/d)	68.65	68.44	66.32	66.47	66.39	66.16

Selected supply-side options

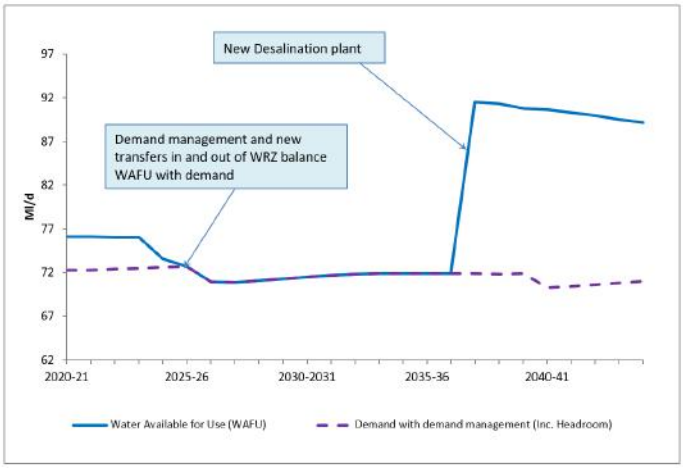
For details on the feasible options list for East Suffolk WRZ please refer to the Supply-side option development technical document.

Table 5.4.9: East Suffolk preferred supply side options

Opt Ref	Option Name
ESU1	Felixstowe Desalination
ESU8	Bury Haverhill WRZ to East Suffolk WRZ transfer (20Ml/d)

Final supply demand balance

Figure 5.4.2: East Suffolk Final supply-demand balance to 2045 for dry year annual average (DYAA)



5.4.10: East Suffolk final supply demand balance to 2045 for dry year annual average (DYAA) conditions

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	76.09	71.10	71.01	70.92	95.84	95.75
Net transfers into Area (Ml/d)	0.00	1.48	0.26	0.97	-5.10	-6.61
Total DYAA Water available for Use: including transfers* (Ml/d)	76.09	72.58	71.27	71.89	90.74	89.14
Total DYAA Distribution Input (Ml/d)	68.58	68.44	66.32	66.47	66.39	66.16
Total DYAA Target Headroom (Ml/d)	3.67	4.15	4.95	5.42	5.48	4.81
DYAA supply-demand balance (Ml/d)	3.84	0.00	0.00	0.00	18.86	18.17

* bulk imports, exports and inter-zone transfers

5.5 South Essex

The South Essex WRZ covers an area of 591km^2 and is based on the supply systems for Colchester and Braintree. Water is supplied from a combination of groundwater abstractions in the Essex Chalk Aquifer.

Supply Forecast

Table 5.5.1: South Essex Rural Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	70.00	70.00	70.00	70.00	70.00	70.00
Sustainability reductions (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Climate change impacts (Ml/d)	-2.05	-2.23	-2.45	-2.68	-2.91	-3.14
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	67.95	67.77	67.55	67.32	67.09	66.86
Outage Allowance†	1.16	1.16	1.06	1.06	1.06	1.06
Transfers In (Ml/d)*	3.00	3.00	3.00	3.00	3.00	3.00
Transfers Out (Ml/d)*	-7.80	-7.80	-13.10	-13.10	-13.10	-13.10
Total Water Available for Use (Ml/d)	61.99	61.81	56.39	56.16	55.93	55.71

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

This zone is forecast to experience changes to baseline DO over the planning period due to:

- Climate change impact of -2.05 Ml/d in 2020 increasing to -3.14Ml/d in 2045.

This zone is not forecast to experience any changes to baseline DO over the planning period. This zone does not see additional severe drought impact on DO and is not considered vulnerable to a 1 in 200 year event.

Total WAFU includes a sharing agreement with Affinity Water through the Ardleigh Agreement of 7.8 Ml/d, which has been agreed to increase to 13.1Ml/d in 2025-26.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **100,000 to 135,000**, and the population is forecast to increase from approximately **234,000 to 301,000**[6].

[6] *Based upon Local Authority planning information*

Table 5.5.2: South Essex population and property forecast per AMP

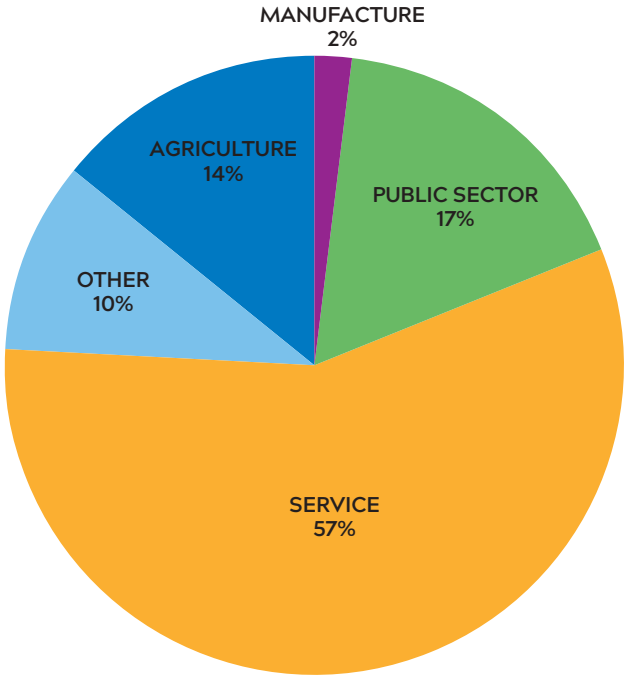
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	234,220	254,330	267,870	282,230	292,370	301,200
Total Household Properties	99,990	111,000	117,890	125,400	130,040	135,220

Property growth rates vary between **7,300** per AMP in the short-term to **5,200** per AMP in the long-term. The short- to medium-term projections are aligned with Local Authority data; the medium to long-term projections with ONS trend based data.

Table 5.5.3: Rates of household population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	14,620	13,540	14,360	10,140	8,830
Additional Household properties per AMP	7,290	6,890	7,520	4,630	5,180

Figure 5.5.1: South Essex Non-household sectors



Non-household demand is predominantly from the service sector which accounts for **57%** of total NHH demand. Non-household demand is forecast to increase over the WRMP period from **10.45 Ml/d to 11.26 Ml/d**.

For the baseline scenario WITHOUT demand management options.

Household demand is forecast to increase over the WRMP period from **34.15 Ml/d to 41.88 Ml/d**.

Leakage is forecast to decrease from the baseline value of **11.96 Ml/d to 11.70 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to increase from **10.45 Ml/d to 11.26 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **58.29 Ml/d to 66.57 Ml/d**, once the influence of demand management option savings has been included.

Table 5.5.4: South Essex baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	25.67	30.44	33.28	36.01	37.43	38.55
Household demand (Ml/d) - unmeasured	8.48	5.89	4.58	3.54	3.36	3.33
Non-household demand (Ml/d)	10.45	10.48	10.63	10.79	11.00	11.26
Leakage (Ml/d)	11.96	11.67	11.68	11.69	11.69	11.70
Distribution input (Ml/d)	58.29	60.21	61.90	63.75	65.21	66.57

Baseline supply demand balance

Figure 5.5.2: South Essex baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

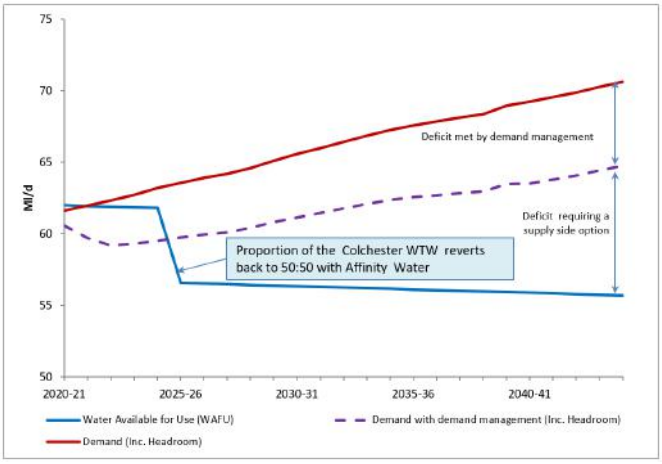


Table 5.5.5: South Essex baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	66.79	66.61	66.49	66.26	66.03	65.81
Net transfers into Area (Ml/d)	-4.80	-4.80	-10.10	-10.10	-10.10	-10.10
Total DYAA Water available for Use: including transfers* (Ml/d)	61.99	61.81	56.39	56.16	55.93	55.71
Total DYAA Distribution Input (Ml/d)	58.79	60.21	61.90	63.75	65.21	66.57
Total DYAA Target Headroom (Ml/d)	2.84	2.98	3.21	3.51	3.75	4.05
DYAA supply-demand balance (Ml/d)	0.37	-1.38	-8.73	11.10	-13.03	-14.91

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

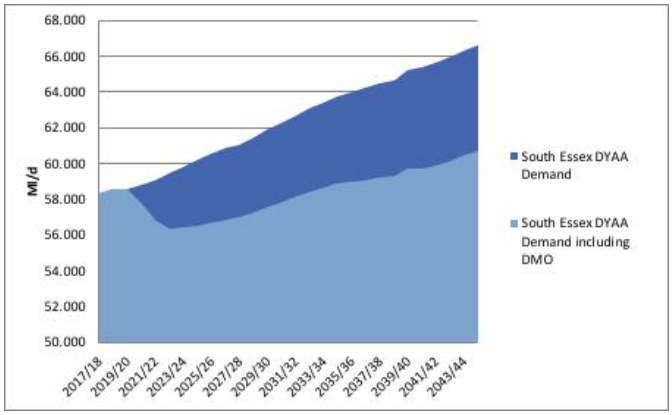
We plan to use a combined strategy of smart metering, water efficiency and leakage reduction to reduce demand.

- We plan to reduce leakage by 41% from 11.96 Ml/d in 2020 to 8.67 Ml/d in 2045.

Table 5.5.6: South Essex Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.41	0.84	1.24	1.39	1.48
Smart metering (demand savings) (Ml/d) -	1.04	1.13	1.21	1.25	1.28
Leakage reduction (CSPL savings) (Ml/d)	0.91	0.99	1.07	1.12	1.17
Leakage reduction (our network) (Ml/d)	1.30	1.30	1.29	1.67	1.86
Total saving (Ml/d)	3.65	4.25	4.81	5.42	5.79

Figure 5.5.3: South Essex DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 138.2 l/h/d; Unmeasured PCC 175.0 l/h/d, with a weighted average value of 145.8l/h/d. This is expected to fall to 129.6 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 5.5.7: Changes in Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	145.80	142.90	141.30	140.10	139.50	139.00
Final demand forecast (DYAA) (includes selected demand management strategy)	145.80	137.00	133.80	131.20	130.30	129.60
Final demand forecast (DYAA) % change from baseline forecast	0.00%	4.13%	5.31%	6.35%	6.59%	6.76%

For the final plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **34.15 Ml/d to 39.04 Ml/d**.

Leakage is forecast to decrease from the baseline value of **11.96 Ml/d to 8.67 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **10.45 Ml/d to 11.26 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **58.29 Ml/d to 60.71 Ml/d**, once the influence of demand management option savings has been included.

Table 5.5.8: South Essex Final Plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	25.67	28.97	31.31	33.56	34.80	35.79
Household demand (Ml/d) - unmeasured	8.48	5.87	4.53	3.47	3.28	3.25
Non-household demand (Ml/d)	10.45	10.48	10.63	10.79	11.00	11.26
Leakage (Ml/d)	11.96	9.47	9.40	9.33	8.91	8.67
Distribution input (Ml/d)	58.29	56.52	57.60	58.87	59.72	60.71

Selected supply-side options

For details on the feasible options list for South Essex WRZ please refer to the Supply-side option development technical document.

Table 5.5.9: South Essex preferred supply side options

Opt Ref	Option Name
SEX4	East Suffolk WRZ to South Essex WRZ transfer (15Ml/d)

Final supply demand balance

Figure 5.5.4: South Essex WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

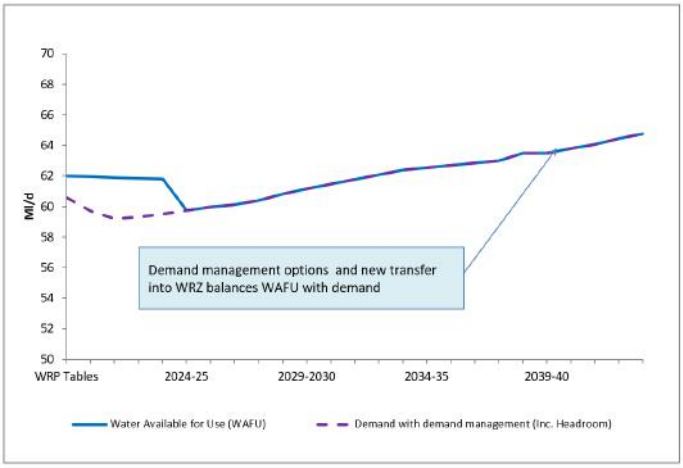


Table 5.5.10: South Essex final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	66.79	66.61	66.49	66.26	66.03	65.81
Net transfers into Area (Ml/d)	-4.80	-4.80	-5.68	-3.88	-2.56	-1.05
Total DYAA Water available for Use: including transfers* (Ml/d)	61.99	61.81	60.81	62.38	63.47	64.76
Total DYAA Distribution Input (Ml/d)	57.73	56.52	57.60	58.87	59.72	60.71
Total DYAA Target Headroom (Ml/d)	2.84	2.98	3.21	3.51	3.75	4.05
DYAA supply-demand balance (Ml/d)	1.43	2.32	0.00	0.00	0.00	0.00

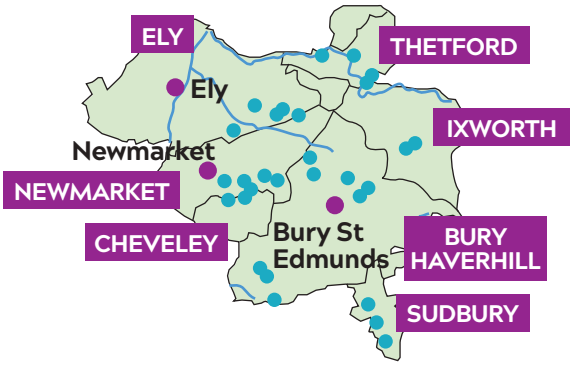
* bulk imports, exports and inter-zone transfers

6. Area 6:

Cambridgeshire and West Suffolk

6.1 Overview

Figure 6.1.1 Problem characterisation Area 6



6.2 Strategic risks and issues

Problem Characterisation Results

- Area 6 is assessed as having low levels of concern
- There are significant strategic needs, but the level of complexity is low

This area experiences significant pressures, from climate change, sustainability reductions and growth, resulting in baseline deficits. This is resolved through demand management options and transfers from the north-west.

6.3 Bury Haverhill

The Bury Haverhill WRZ covers an area of 689 km^2 and lies in the centre of East Anglia. The zone abstracts from the Suffolk and Essex Chalk aquifers and is based on the supply systems for Bury St Edmunds and Haverhill.

Supply Forecast

Table 6.3.1: Bury Haverhill supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	28.00	28.00	28.00	28.00	28.00	28.00
Sustainability reductions (Ml/d)	0.00	-3.00	-3.00	-3.00	-3.00	-3.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	-3.00	-3.00	-3.00	-3.00
Final DO (Ml/d)	28.00	25.00	22.00	22.00	22.00	22.00
Outage Allowance†	0.63	0.50	0.50	0.50	0.50	0.50
Transfers In (Ml/d)*	2.84	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	30.21	24.50	21.50	21.50	21.50	21.50

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

Baseline DO is forecast to change over the planning period due to:

- -3.0 Ml/d sustainability reductions in 2024
- -3.0 Ml/d severe drought impacts in 2025

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **48,000 to 61,000** and the population is forecast to increase from approximately **110,000 to 134,000.**

Table 6.3.2: Bury Haverhill Population and property totals (cumulative) per AMP

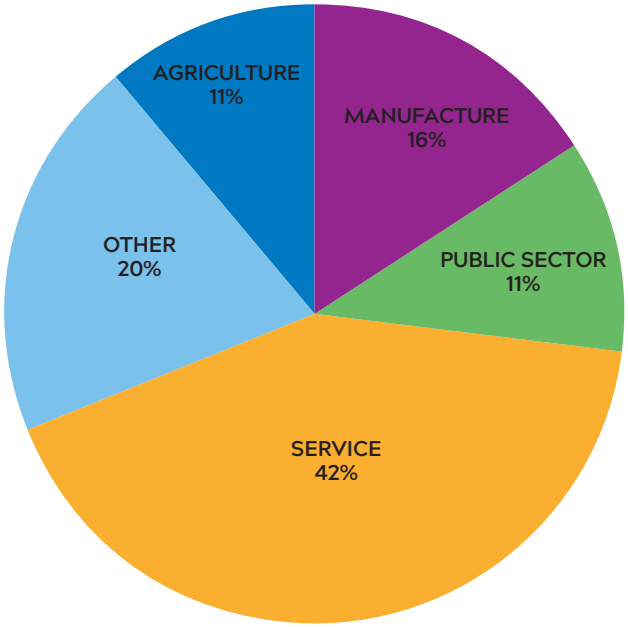
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	110,400	121,780	127,470	130,030	132,230	134,400
Total Household Properties	47,990	53,550	56,900	58,650	60,060	61,490

Property growth rates vary between **4,800** per AMP in the short-term to **1,400** per AMP in the long-term. The short-to-medium term projections are aligned with Local Authority data; the medium to long term projections with ONS based data.

Table 6.3.3: Bury Haverhill Rates of population and property totals (cumulative) per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	9,400	5,690	2,570	2,190	2,170
Additional Household properties per AMP	4,840	3,350	1,760	1,400	1,440

Figure 6.3.1: Bury Haverhill Non-household sectors



Non-household demand is predominantly from the service sector and manufacturing, which account for **58%** of total NHH demand. Non-household demand is forecast to decrease over the WRMP period from **7.44 Ml/d to 6.85 Ml/d.**

For the baseline scenario WITHOUT demand management options.

Household demand is forecast to increase over the WRMP period from **13.94 Ml/d to 16.52 Ml/d.**

Leakage is forecast to decrease from the baseline value of **5.94 Ml/d to 5.61 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to decrease from **7.44 Ml/d to 6.85 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **28.15 Ml/d to 29.81 Ml/d.**

Table 6.3.4: Bury Haverhill baseline demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	11.85	13.60	14.46	14.87	15.20	15.51
Household demand (Ml/d) - unmeasured	2.09	1.66	1.43	1.25	1.11	1.01
Non-household demand (Ml/d)	7.44	7.24	7.14	7.01	6.91	6.85
Leakage (Ml/d)	5.94	5.69	5.66	5.64	5.63	5.61
Distribution input (Ml/d)	28.15	29.03	29.52	29.61	29.69	29.81

Baseline supply demand balance

Figure 6.3.2: Bury Haverhill baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

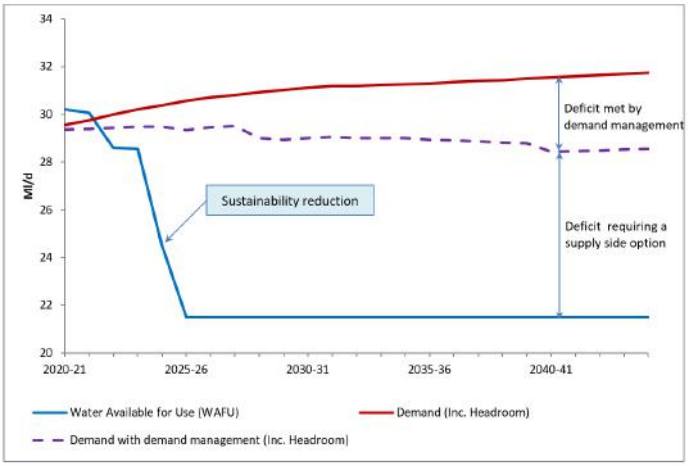


Table 6.3.5: Bury Haverhill baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	27.37	24.50	21.50	21.50	21.50	21.50
Net transfers into Area (Ml/d)	2.84	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	30.21	24.50	21.50	21.50	21.50	21.50
Total DYAA Distribution Input (Ml/d)	28.29	29.03	29.52	29.61	29.69	29.81
Total DYAA Target Headroom (Ml/d)	1.26	1.35	1.50	1.66	1.81	1.94
DYAA supply-demand balance (Ml/d)	0.66	-5.88	-9.51	-9.76	-10.00	-10.24

* bulk imports, exports and inter-zone transfers

There is a critical period deficit in this WRZ.

Figure 6.3.3: Bury Haverhill baseline supply demand balance to 2045 for critical period (CP) conditions

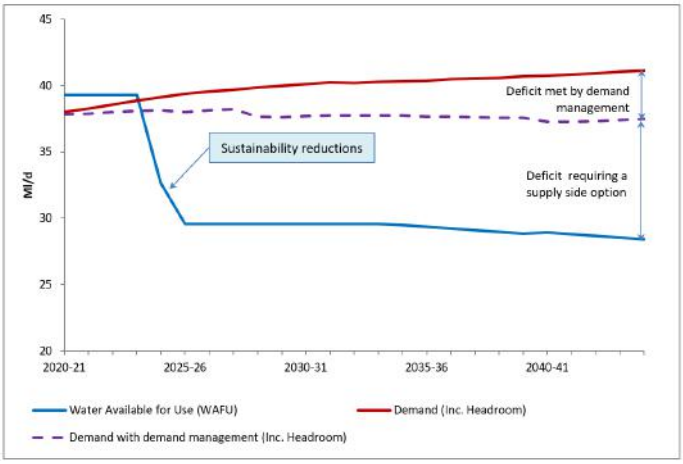


Table 6.3.6: Bury Haverhill baseline supply-demand balance to 2045 for critical period (CP) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total CP Water available for Use: Area sources* (Ml/d)	37.51	30.84	27.75	27.75	27.75	27.75
Net transfers into Area (Ml/d)	1.80	1.80	1.80	1.72	1.08	0.65
Total CP Water available for Use: including transfers* (Ml/d)	39.31	32.64	29.55	29.47	28.83	28.40
Total CP Distribution Input (Ml/d)	36.39	37.36	38.04	38.20	38.36	38.61
Total CP Target Headroom (Ml/d)	1.61	1.74	1.93	2.13	2.34	2.51
CP supply-demand balance (Ml/d)	1.30	-6.47	-10.42	-10.86	-11.88	-12.71

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

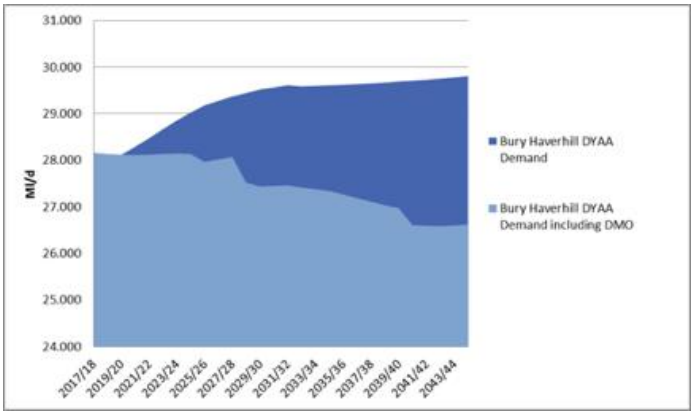
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 37% from 5.94 Ml/d in 2020 to 3.74 Ml/d in 2045.

Table 6.3.7: Bury Haverhill Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.24	0.40	0.55	0.73	0.83
Smart metering (demand savings) (Ml/d) -	0.00	0.43	0.44	0.45	0.46
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.46	0.48	0.50	0.52
Leakage reduction (our network) (Ml/d)	0.64	0.76	0.76	1.00	1.35
Total saving (Ml/d)	0.88	2.05	2.23	2.68	3.16

Figure 6.3.4: Bury Haverhill DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 130.4 l/h/d; Unmeasured PCC 106.7 l/h/d, with a weighted average value of 126.2 l/h/d. This is expected to fall to 113.1 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 6.3.8: Changes in Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	126.20	125.30	124.60	124.00	123.40	122.90
Final demand forecast (DYAA) (includes selected demand management strategy)	126.20	123.30	117.90	116.20	114.20	113.10
Final demand forecast (DYAA) % change from baseline forecast	0.00%	1.60%	5.38%	6.29%	7.46%	7.97%

For the Final Plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **13.94 Ml/d to 15.20 Ml/d**.

Leakage is forecast to decrease from the baseline value of **5.94 Ml/d to 3.74 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **7.44 Ml/d to 6.85 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease from **28.16 Ml/d to 26.62 Ml/d**, once the influence of demand management option savings has been included.

Table 6.3.9: Bury Haverhill Final Plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	11.85	13.36	13.63	13.89	14.03	14.25
Household demand (Ml/d) - unmeasured	2.09	1.65	1.40	1.22	1.07	0.95
Non-household demand (Ml/d)	7.44	7.24	7.14	7.01	6.91	6.85
Leakage (Ml/d)	5.94	5.04	4.43	4.39	4.12	3.74
Distribution input (Ml/d)	28.16	28.14	27.44	27.34	26.97	26.62

Selected supply-side options

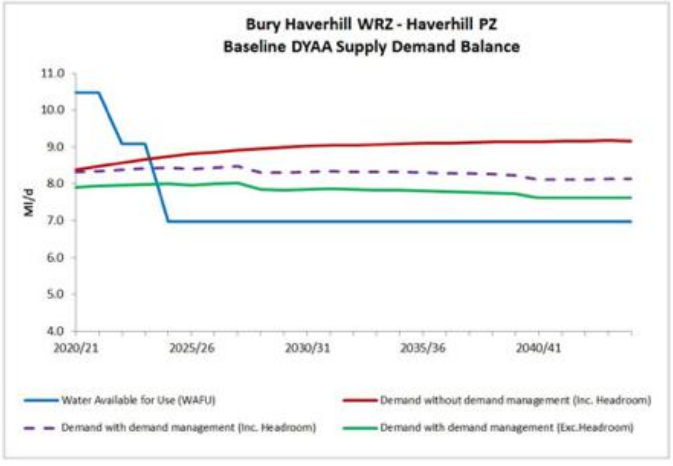
For details on the feasible options list Bury Haverhill WRZ please refer to the Supply-side option development technical document.

Table 6.3.10: Bury Haverhill preferred supply side options

Opt Ref	Option Name
BHV5	Newmarket WRZ to Bury Haverhill WRZ Transfer (20 Ml/d)

Due to the capping of time limited licences we have found that there are now deficits in discrete parts of some WRZs (see Figure 6.3.5). These local deficits are not seen at WRZ level and as such would not appear within the WRZ supply demand balances in the WRP Tables. We have completed smaller scale supply demand balances for discrete Planning Zones (PZs) and developed intra-WRZ transfer options to resolve these deficits.

Figure 6.3.5: Haverhill PZ baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions



Final supply demand

Figure 6.3.6: Bury Haverhill Final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

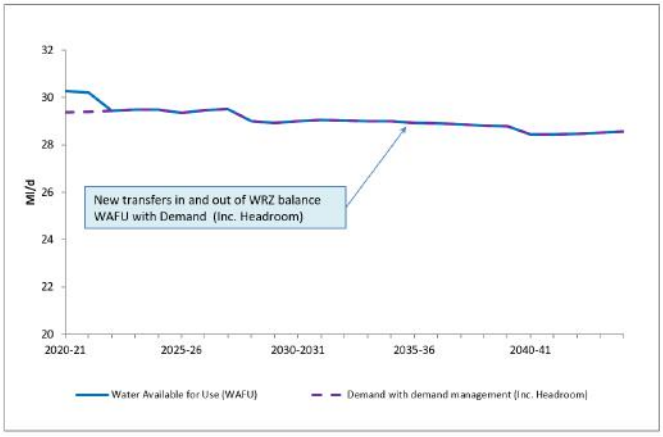


Table 6.3.11: Bury Haverhill final supply demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	27.37	24.50	21.50	21.50	21.50	21.50
Net transfers into Area (Ml/d)	2.91	4.99	7.43	7.50	7.28	7.05
Total DYAA Water available for Use: including transfers* (Ml/d)	30.28	29.49	28.94	29.00	28.78	28.56
Total DYAA Distribution Input (Ml/d)	28.12	28.14	27.44	27.34	26.97	26.62
Total DYAA Target Headroom (Ml/d)	1.26	1.35	1.50	1.66	1.81	1.94
DYAA supply-demand balance (Ml/d)	0.91	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

There is a critical period deficit in this WRZ.

Figure 6.3.7: Bury Haverhill final plan supply demand balance to 2045 for critical period (CP) conditions

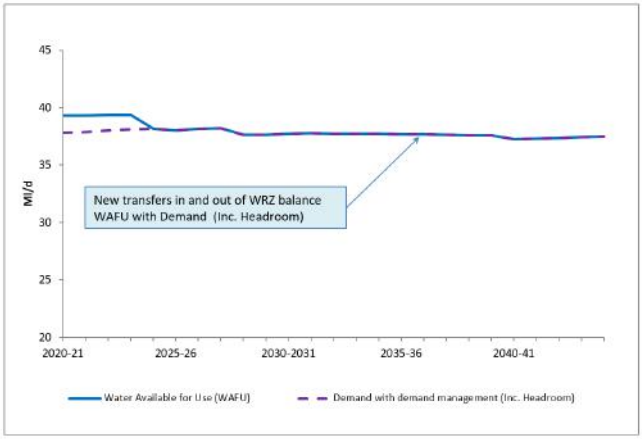


Table 6.3.12: Bury Haverhill final plan supply-demand balance to 2045 for critical period (CP) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total CP Water available for Use: Area sources* (Ml/d)	37.51	30.84	27.75	27.75	27.75	27.75
Net transfers into Area (Ml/d)	1.80	7.29	9.86	9.98	9.84	9.75
Total CP Water available for Use: including transfers* (Ml/d)	39.31	38.13	37.61	37.73	37.59	37.50
Total CP Distribution Input (Ml/d)	36.20	36.40	35.68	35.60	35.25	34.99
Total CP Target Headroom (Ml/d)	1.61	1.74	1.93	2.13	2.34	2.51
CP supply-demand balance (Ml/d)	1.49	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

6.4 Cheveley

Cheveley WRZ is a small discrete WRZ covering an area of 93km^2 with only one source works. This is supplied by groundwater abstraction from the Suffolk Chalk.

Supply Forecast

Table 6.4.1: Cheveley supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	1.70	1.70	1.70	1.70	1.70	1.70
Sustainability reductions (Ml/d)	0.00	-0.10	-0.10	-0.10	-0.10	-0.10
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	-0.30	-0.30	-0.30	-0.30
Final DO (Ml/d)	1.70	1.60	1.30	1.30	1.30	1.30
Outage Allowance†	0.06	0.05	0.05	0.05	0.05	0.05
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	1.64	1.55	1.25	1.25	1.25	1.25

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -0.10 Ml/d sustainability reductions in 2022
- -0.30 Ml/d severe drought impact in 2025

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **2,000 to 2,600** and the population is forecast to increase from approximately **4,700 to 6,100**.

Table 6.4.2: Cheveley population and property forecast per AMP

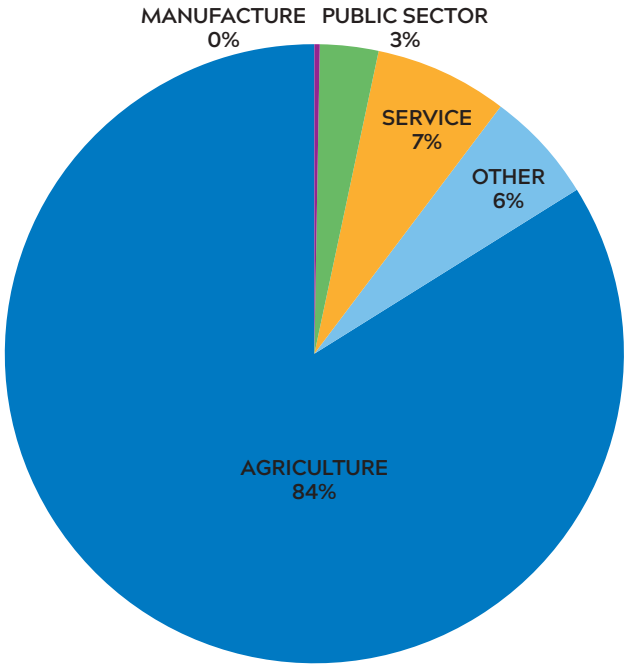
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	4,670	5,320	5,570	5,790	5,920	6,070
Total Household Properties	1,960	2,170	2,310	2,440	2,540	2,640

Property growth rates vary between **230** per AMP in the short-term to **100** per AMP in the long-term. The short-to-medium term projections are aligned with Local Authority data; the medium to long term projections with ONS based data.

Table 6.4.3: Cheveley rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	520	250	220	130	150
Additional Household properties per AMP	230	140	130	100	100

Figure 6.4.1: Cheveley Non-household sectors



Non-household demand is predominantly from the agriculture, which account for **84%** of total NHH demand. Non-household demand is forecast to decrease over the WRMP period from **0.41 Ml/d to 0.15 Ml/d.**

For the baseline scenario WITHOUT demand management options.

Household demand is forecast to increase over the WRMP period from **0.57 Ml/d to 0.73 Ml/d**.

Leakage is forecast to decrease from the baseline value of **0.42 Ml/d to 0.40 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to decrease from **0.41 Ml/d to 0.15 Ml/d** over the WRMP period.

Distribution Input is predicted to increase slightly from **1.44 Ml/d to 1.33 Ml/d**.

Table 6.4.4: Cheveley baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	0.45	0.56	0.61	0.65	0.67	0.70
Household demand (Ml/d) - unmeasured	0.12	0.09	0.07	0.05	0.04	0.03
Non-household demand (Ml/d)	0.41	0.31	0.25	0.21	0.17	0.15
Leakage (Ml/d)	0.42	0.40	0.40	0.40	0.40	0.40
Distribution input (Ml/d)	1.44	1.41	1.38	1.36	1.34	1.33

Baseline supply demand balance

Figure 6.4.2: Cheveley baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

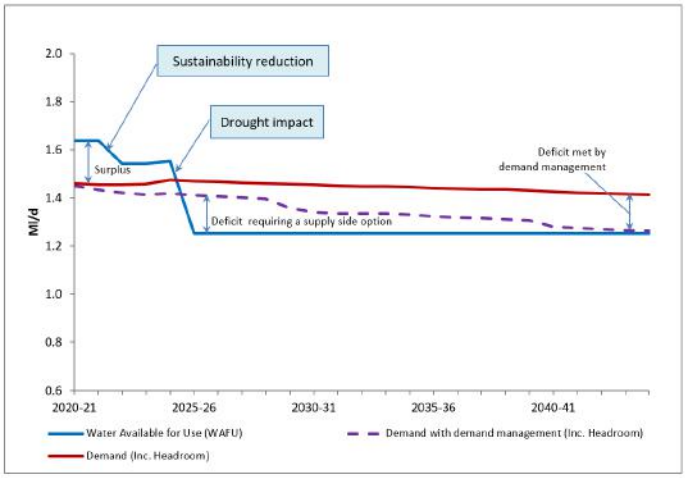


Table 6.4.5: Cheveley baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	1.64	1.55	1.25	1.25	1.25	1.25
Net transfers into Area (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	1.64	1.55	1.25	1.25	1.25	1.25
Total DYAA Distribution Input (Ml/d)	1.40	1.41	1.38	1.36	1.34	1.33
Total DYAA Target Headroom (Ml/d)	0.06	0.07	0.08	0.08	0.09	0.09
DYAA supply-demand balance (Ml/d)	0.18	0.08	-0.20	-0.19	-0.18	-0.16

* bulk imports, exports and inter-zone transfers

There is a critical period deficit in this WRZ.

Figure 6.4.3: Cheveley baseline supply demand balance to 2045 for critical period (CP) conditions

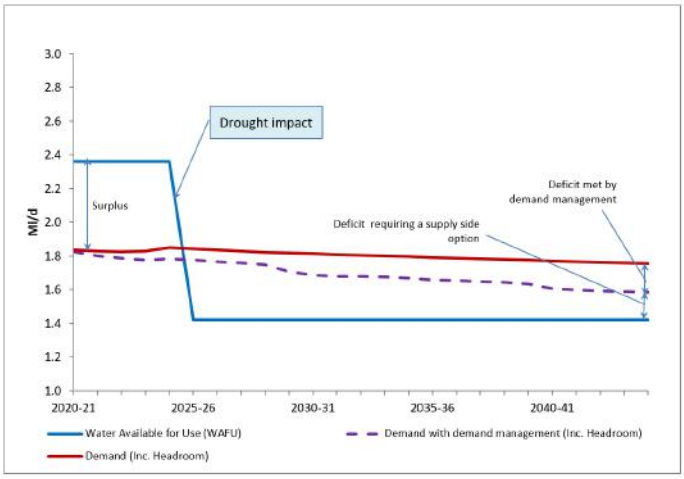


Table 6.4.6: Cheveley baseline supply-demand balance to 2045 for critical period (CP) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total CP Water available for Use: Area sources* (Ml/d)	2.36	2.36	1.42	1.42	1.42	1.42
Net transfers into Area (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total CP Water available for Use: including transfers* (Ml/d)	2.36	2.36	1.42	1.42	1.42	1.42
Total CP Distribution Input (Ml/d)	1.76	1.76	1.72	1.69	1.66	1.65
Total CP Target Headroom (Ml/d)	0.08	0.09	0.10	0.10	0.11	0.11
CP supply-demand balance (Ml/d)	0.52	0.51	-0.40	-0.38	-0.35	-0.33

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

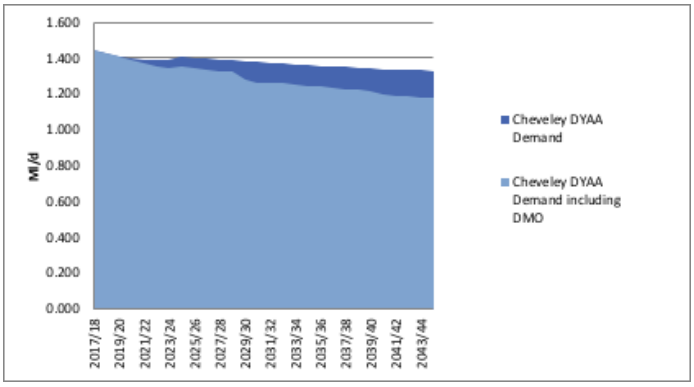
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 26% from 0.42 Ml/d in 2017/18 to 0.31 Ml/d in 2045.

Table 6.4.7: Cheveley Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.02	0.03	0.02	0.03	0.04
Smart metering (demand savings) (Ml/d) -	0.02	0.02	0.02	0.02	0.02
Leakage reduction (CSPL savings) (Ml/d)	0.02	0.02	0.02	0.02	0.02
Leakage reduction (our network) (Ml/d)	0.04	0.04	0.06	0.06	0.07
Total saving (Ml/d)	0.06	0.11	0.12	0.13	0.15

Figure 6.4.4: Cheveley DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 148.1 l/h/d; Unmeasured PCC 72.4 l/h/d, with a weighted average value of 122.0 l/h/d. This is expected to fall to 111.1 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 6.4.8: Changes in Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	122.00	122.20	122.00	121.60	121.10	120.80
Final demand forecast (DYAA) (includes selected demand management strategy)	122.00	118.20	114.00	114.40	112.60	111.10
Final demand forecast (DYAA) % change from baseline forecast	0.00%	3.27%	6.56%	5.92%	7.02%	8.03%

For the Final Plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **0.57 Ml/d to 0.67 Ml/d**.

Leakage is forecast to decline from the baseline value of **0.42 Ml/d to 0.31 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to decrease from **0.41 Ml/d to 0.15 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease slightly from **1.44 Ml/d to 1.18 Ml/d**, once the influence of demand management option savings has been included.

Table 6.4.9: Cheveley Final Plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	0.45	0.54	0.57	0.61	0.63	0.64
Household demand (Ml/d) - unmeasured	0.12	0.08	0.07	0.05	0.04	0.03
Non-household demand (Ml/d)	0.41	0.31	0.25	0.21	0.17	0.15
Leakage (Ml/d)	0.42	0.37	0.35	0.33	0.33	0.31
Distribution input (Ml/d)	1.44	1.35	1.28	1.25	1.21	1.18

Selected supply-side options

For details on the feasible options list for Cheveley WRZ please refer to the Supply-side option development technical document.

Table 6.4.10: Cheveley preferred supply side options

Opt Ref	Option Name
CVY1	Newmarket WRZ to Cheveley WRZ Transfer

Final supply demand balance

Figure 6.4.5: Cheveley Final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

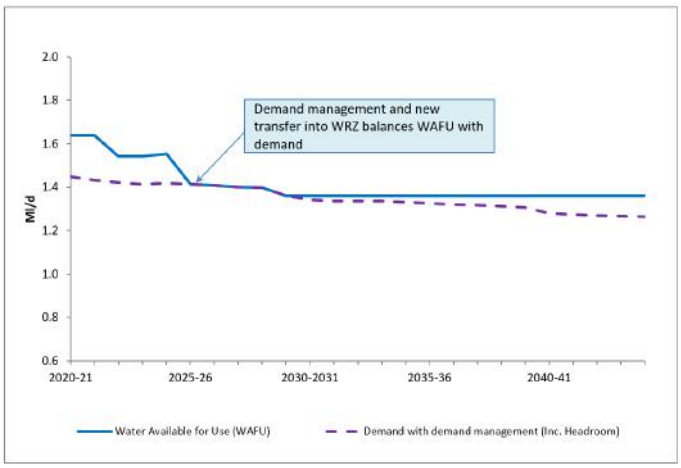


Table 6.4.11: Cheveley final supply demand balance to 2045 for dry year annual average (DYAA) conditions

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	1.64	1.64	1.25	1.25	1.25	1.25
Net transfers into Area (Ml/d)	0.00	0.00	0.11	0.11	0.11	0.11
Total DYAA Water available for Use: including transfers* (Ml/d)	1.64	1.55	1.36	1.36	1.36	1.36
Total DYAA Distribution Input (Ml/d)	1.39	1.35	1.28	1.25	1.21	1.18
Total DYAA Target Headroom (Ml/d)	0.06	0.07	0.08	0.08	0.09	0.09
DYAA supply-demand balance (Ml/d)	0.19	0.14	0.00	0.03	0.05	0.10

* bulk imports, exports and inter-zone transfers

There is a critical period deficit in this WRZ.

Figure 6.4.6: Cheveley final plan supply demand balance to 2045 for critical period (CP) conditions

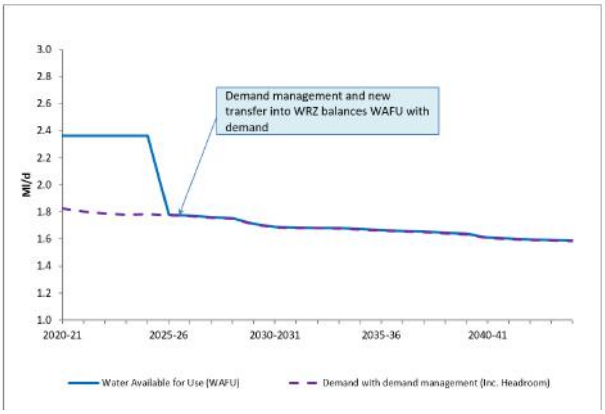


Table 6.4.11: Cheveley final supply demand balance to 2045 for dry year annual average (DYAA) conditions

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total CP Water available for Use: Area sources* (Ml/d)	2.36	2.36	1.42	1.42	1.42	1.42
Net transfers into Area (Ml/d)	0.00	0.00	0.29	0.25	0.22	0.17
Total CP Water available for Use: including transfers* (Ml/d)	2.36	2.36	1.71	1.67	1.64	1.59
Total CP Distribution Input (Ml/d)	1.75	1.70	1.61	1.56	1.52	1.48
Total CP Target Headroom (Ml/d)	0.08	0.09	0.10	0.10	0.11	0.11
CP supply-demand balance (Ml/d)	0.54	0.58	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

6.5 Ely

The Ely WRZ covers an area of 578km^2. The Ely WRZ is located in the centre of East Anglia and is based on the supply systems for Ely. The water resource for this WRZ is entirely dependent on abstraction from the Suffolk Chalk aquifer.

Supply Forecast

Table 6.5.1: Ely Supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	24.00	24.00	24.00	24.00	24.00	24.00
Sustainability reductions (Ml/d)	0.00	-3.00	-3.00	-3.00	-3.00	-3.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	24.00	21.00	21.00	21.00	21.00	21.00
Outage Allowance†	0.33	0.29	0.29	0.29	0.29	0.29
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	23.67	20.71	20.71	20.71	20.71	20.71

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -1.00 Ml/d sustainability reduction in 2022, with a further -2.00 Ml/d sustainability reduction in 2024

This zone does not see additional severe drought impact on DO and is therefore not considered vulnerable to a 1 in 200 year event.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **35,000 to 48,000** and the population is forecast to increase from approximately **83,000 to 106,000**.

Table 6.5.2: Ely population and property forecast per AMP

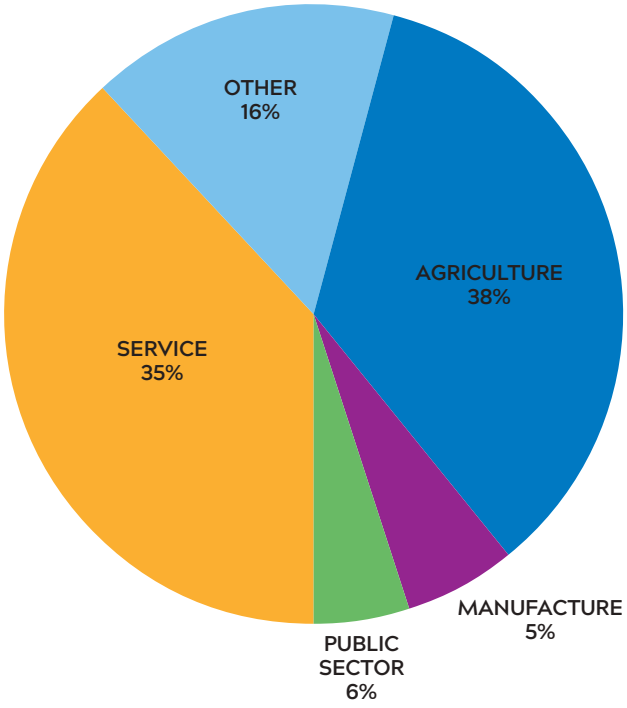
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	83,210	93,050	97,520	101,130	103,630	106,410
Total Household Properties	35,020	40,030	42,520	44,730	46,480	48,310

Property growth rates vary between **4,100** per AMP in the short-term to **1,800** per AMP in the long-term. The short-to-medium term projections are aligned with Local Authority data; the medium to long term projections with ONS based data.

Table 6.5.3: Rates of household population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	8,710	4,470	3,610	2,510	2,770
Additional Household properties per AMP	4,080	2,490	2,200	1,750	1,820

Figure 6.5.1: Ely Non-household sectors



Non-household demand is predominantly from the agriculture with 38% and the service sector which accounts for another **35%** of total NHH demand. Non-household demand is forecast to increase over the WRMP period from **3.23Ml/d to 3.27 Ml/d.**

For the baseline scenario WITHOUT demand management options.

Household demand is forecast to increase over the WRMP period from **11.58 Ml/d to 13.86 Ml/d**.

Leakage is forecast to decrease from the baseline value of **4.75 Ml/d to 4.73 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to decrease from **3.23 Ml/d to 3.27 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **20.16 Ml/d to 22.46 Ml/d**.

Table 6.5.4: Ely baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	7.91	10.48	11.63	12.05	12.33	12.64
Household demand (Ml/d) - unmeasured	3.68	1.99	1.25	1.24	1.22	1.21
Non-household demand (Ml/d)	3.23	3.04	3.02	3.05	3.14	3.27
Leakage (Ml/d)	4.75	4.67	4.69	4.71	4.72	4.73
Distribution input (Ml/d)	20.16	20.78	21.19	21.64	22.01	22.46

Baseline supply demand balance

Figure 6.5.2: Ely baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

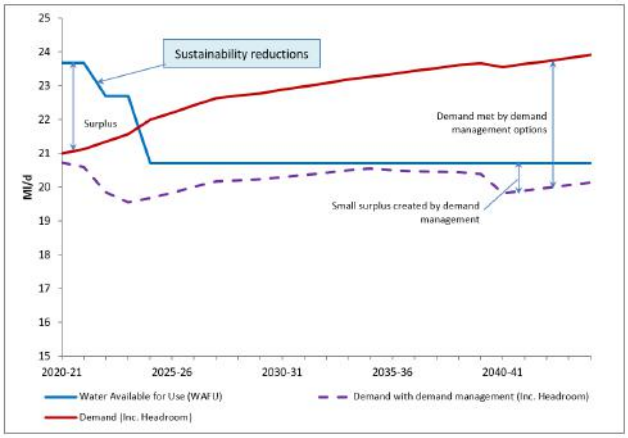


Table 6.5.5: Ely baseline supply-demand balance to 2045 for dry year annual average (DYAA) (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	23.67	20.71	20.71	20.71	20.71	20.71
Net transfers into Area (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	23.67	20.71	20.71	20.71	20.71	20.71
Total DYAA Distribution Input (Ml/d)	20.03	20.78	21.19	21.64	22.01	22.46
Total DYAA Target Headroom (Ml/d)	0.96	1.21	1.59	1.62	1.65	1.46
DYAA supply-demand balance (Ml/d)	2.68	-1.28	-2.07	-2.55	-2.95	-3.20

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

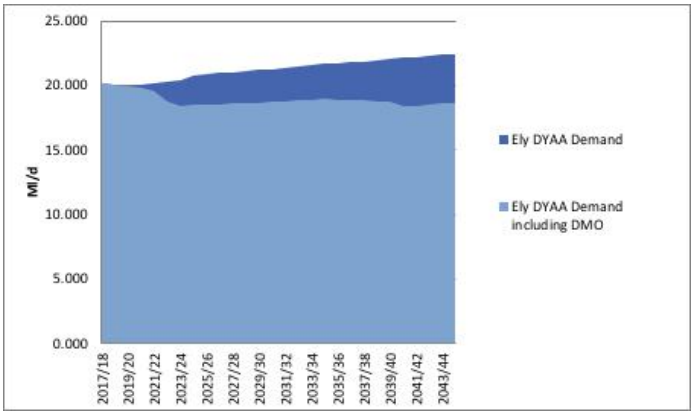
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 56% from 4.75 Ml/d in 2020 to 2.06 Ml/d in 2045.

Table 6.5.6: Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.17	0.29	0.44	0.52	0.55
Smart metering (demand savings) (Ml/d) -	0.46	0.52	0.52	0.52	0.53
Leakage reduction (CSPL savings) (Ml/d)	0.35	0.39	0.41	0.43	0.45
Leakage reduction (our network) (Ml/d)	1.32	1.32	1.32	1.77	2.23
Total saving (Ml/d)	2.30	2.52	2.69	3.24	3.76

Figure 6.5.3: Ely DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 122.2 l/h/d; Unmeasured PCC 198.6 l/h/d, with a weighted average value of 139.2 l/h/d. This is expected to fall to 119.8 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 6.5.7: Changes in Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	139.2	134.1	132.1	131.1	130.8	130.2
Final demand forecast (DYAA) (includes selected demand management strategy)	139.2	127.1	123.5	121.6	120.4	119.8
Final demand forecast (DYAA) % change from baseline forecast	0.00%	5.22%	6.51%	7.25%	7.95%	7.99%

For the Final Plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **11.58 Ml/d to 12.75 Ml/d**.

Leakage is forecast to decrease from the baseline value of **4.75 Ml/d to 2.06 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **3.23 Ml/d to 3.27 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease from **20.16 Ml/d to 18.68 Ml/d**, once the influence of demand management option savings has been included.

Table 6.5.8: Ely final plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	7.91	9.84	10.80	11.07	11.27	11.55
Household demand (Ml/d) - unmeasured	3.68	1.99	1.24	1.22	1.21	1.20
Non-household demand (Ml/d)	3.23	3.04	3.02	3.05	3.14	3.27
Leakage (Ml/d)	4.75	3.00	2.99	2.98	2.52	2.06
Distribution input (Ml/d)	20.16	18.46	18.65	18.93	18.74	18.68

Selected supply-side options

For details on the feasible options list Ely WRZ please refer to the Supply-side option development technical document.

Table 6.5.9: Ely preferred supply side options

Opt Ref	Option Name
ELY9	North Fenland WRZ to Ely WRZ Transfer (20Ml/d)

Final supply demand balance

Figure 6.5.4: Ely Final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

Table 6.5.10: Ely final supply demand balance to 2045 for dry year annual average (DYAA) conditions

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	23.67	20.71	20.71	20.71	20.71	20.71
Net transfers into Area (Ml/d)	0.00	-1.04	-0.47	-0.16	-0.32	-0.57
Total DYAA Water available for Use: including transfers* (Ml/d)	23.67	19.68	20.24	20.55	20.39	20.15
Total DYAA Distribution Input (Ml/d)	19.77	18.46	18.65	18.93	18.74	18.68
Total DYAA Target Headroom (Ml/d)	0.96	1.21	1.59	1.62	1.65	1.46
DYAA supply-demand balance (Ml/d)	2.95	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

6.6 Ixworth

The Ixworth WRZ covers an area of 265km^2. It is supplied by a single source works which abstracts from Suffolk chalk aquifer.

Supply Forecast

Table 6.6.1: Ixworth supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	6.20	6.20	6.20	6.20	6.20	6.20
Sustainability reductions (Ml/d)	0.00	-3.00	-3.00	-3.00	-3.00	-3.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	6.20	3.20	3.20	3.20	3.20	3.20
Outage Allowance†	0.11	0.06	0.06	0.06	0.06	0.06
Transfers In (Ml/d)*	1.53	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	-2.84	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	4.78	3.14	3.14	3.14	3.14	3.14

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -3.00 Ml/d sustainability reduction in 2024

This zone does not see additional severe drought impact on DO and is therefore not considered vulnerable to a 1 in 200 year event

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **9,200 to 12,000** and the population is forecast to increase from approximately **21,000 to 25,000**.

Table 6.6.2: Ixworth population and property forecast per AMP

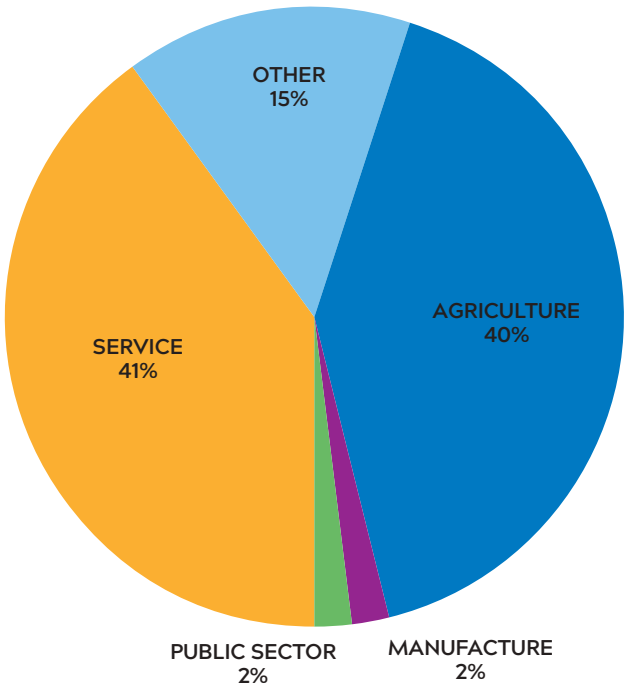
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	21,280	23,120	24,000	24,450	24,870	25,310
Total Household Properties	9,240	10,140	10,690	11,010	11,300	11,590

Property growth rates vary between **800** per AMP in the short-term to **290** per AMP in the long-term. The short-to-medium term projections are aligned with Local Authority data; the medium to long term projections with ONS based data.

Table 6.6.3: Ixworth rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	1,500	880	450	420	430
Additional Household properties per AMP	800	550	320	290	290

Figure 6.6.1: Ixworth Non-household sectors



Non-household demand is predominantly from the service sector and agriculture, which account for **81%** of total NHH demand. Non-household demand is forecast to decrease over the WRMP period from **0.82 Ml/d to 0.68Ml/d.**

For the baseline scenario WITHOUT demand management options.

Household demand is forecast to increase over the WRMP period from **2.78 Ml/d to 3.29 Ml/**d.

Leakage is forecast to decrease from the baseline value of **0.81 Ml/d to 0.77 Ml/**d at the end of the WRMP plan period.

Non-household demand is expected to decrease from **0.82 Ml/d to 0.68 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **4.54 Ml/d to 4.88 Ml/d.**

Table 6.6.4: Ixworth baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	2.55	2.86	3.00	3.07	3.13	3.20
Household demand (Ml/d) - unmeasured	0.23	0.17	0.14	0.12	0.10	0.09
Non-household demand (Ml/d)	0.82	0.77	0.75	0.72	0.70	0.68
Leakage (Ml/d)	0.81	0.78	0.78	0.78	0.77	0.77
Distribution input (Ml/d)	4.54	4.72	4.80	4.82	4.85	4.88

Baseline supply demand balance

Figure 6.6.2: Ixworth baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

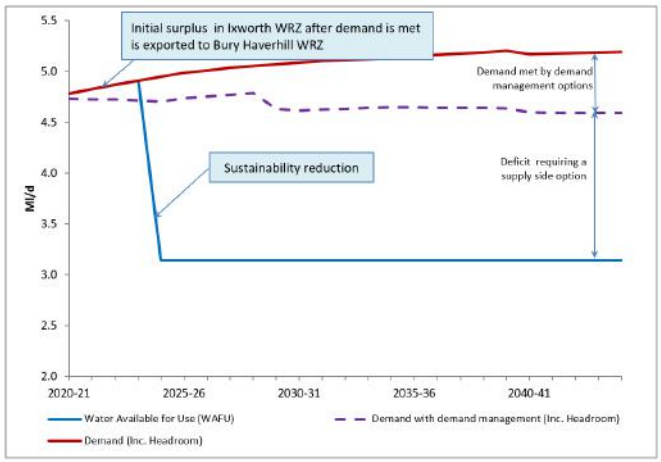


Table 6.6.5: Ixworth baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	6.09	3.14	3.14	3.14	3.14	3.14
Net transfers into Area (Ml/d)	-1.31	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	4.78	3.14	3.14	3.14	3.14	3.14
Total DYAA Distribution Input (Ml/d)	4.58	4.72	4.80	4.82	4.85	4.88
Total DYAA Target Headroom (Ml/d)	0.21	0.23	0.27	0.31	0.35	0.32
DYAA supply-demand balance (Ml/d)	0.00	-1.80	-1.93	-1.99	-2.06	-2.05

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

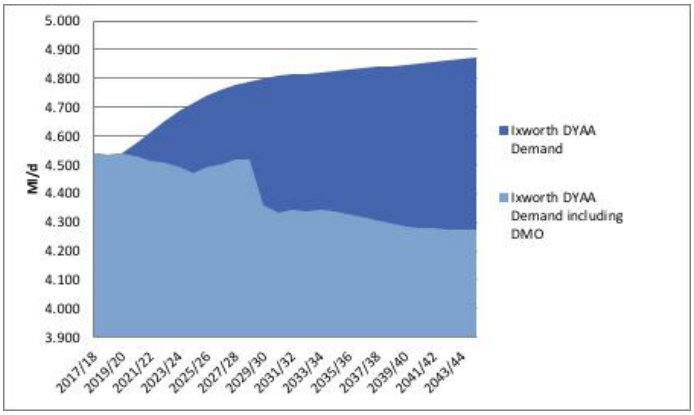
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 45% from 0.81 Ml/d in 2020 to 0.44 Ml/d in 2045.

Table 6.6.6: Ixworth Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.07	0.09	0.10	0.14	0.17
Smart metering (demand savings) (Ml/d) -	0.00	0.08	0.09	0.09	0.09
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.09	0.09	0.09	0.10
Leakage reduction (our network) (Ml/d)	0.17	0.17	0.2	0.24	0.24
Total saving (Ml/d)	0.24	0.43	0.48	0.56	0.60

Figure 6.6.3: Ixworth DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 152.2l/h/d; Unmeasured PCC 50.2 l/h/d, with a weighted average value of 130.6l/h/d. This is expected to fall to 119.5 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 6.6.7: Changes in Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	130.60	131.00	130.90	130.60	130.20	129.90
Final demand forecast (DYAA) (includes selected demand management strategy)	130.60	127.90	123.20	122.70	120.90	119.50
Final demand forecast (DYAA) % change from baseline forecast	0.00%	2.37%	5.88%	6.05%	7.14%	8.01%

For the Final Plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **2.78 Ml/d to 3.03 Ml/d**.

Leakage is forecast to decrease from the baseline value of **0.81 Ml/d to 0.44 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to decrease from **0.82 Ml/d to 0.68 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease from **4.54 Ml/d to 4.28 Ml/d**, once the influence of demand management option savings has been included.

Table 6.6.8: Ixworth Final Plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	2.55	2.79	2.82	2.89	2.91	2.95
Household demand (Ml/d) - unmeasured	0.23	0.17	0.14	0.11	0.09	0.08
Non-household demand (Ml/d)	0.82	0.77	0.75	0.72	0.70	0.68
Leakage (Ml/d)	0.81	0.60	0.52	0.48	0.44	0.44
Distribution input (Ml/d)	4.54	4.47	4.36	4.34	4.28	4.28

Selected supply-side options

For details on the feasible options list for Ixworth WRZ please refer to the Supply-side option development technical document.

Table 6.6.9: Ixworth preferred supply side options

Opt Ref	Option Name
THT1b	Bury Haverhill WRZ to Ixworth WRZ Transfer via existing infrastructure

Final supply demand balance

Figure 6.6.4: Ixworth final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

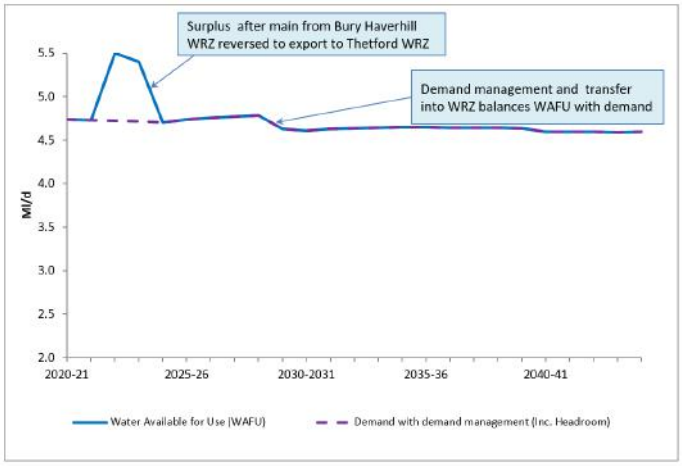


Table 6.6.10: Ixworth final supply demand balance to 2045 for dry year annual average (DYAA) conditions

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	6.09	3.14	3.14	3.14	3.14	3.14
Net transfers into Area (Ml/d)	-1.36	1.56	1.49	1.50	1.49	1.45
Total DYAA Water available for Use: including transfers* (Ml/d)	4.73	4.70	4.63	4.65	4.64	4.59
Total DYAA Distribution Input (Ml/d)	4.53	4.47	4.36	4.34	4.28	4.28
Total DYAA Target Headroom (Ml/d)	0.21	0.23	0.27	0.31	0.35	0.32
DYAA supply-demand balance (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

6.7 Newmarket

The Newmarket WRZ covers an area of 271km² and is based on the supply systems for Newmarket. Customers in the WRZ are supplied with groundwater pumped from the Suffolk Chalk aquifer.

Supply Forecast

Table 6.7.1: Newmarket supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	16.00	16.00	16.00	16.00	16.00	16.00
Sustainability reductions (Ml/d)	0.00	-1.00	-1.00	-1.00	-1.00	-1.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	-3.00	-3.00	-3.00	-3.00
Final DO (Ml/d)	16.00	15.00	12.00	12.00	12.00	12.00
Outage Allowance†	0.22	0.16	0.16	0.16	0.16	0.16
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	15.78	14.84	11.84	11.84	11.84	11.84

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -1.00 Ml/d sustainability reductions in 2022
- -3.00 Ml/d severe drought in 2024

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **19,000 to 26,000** and the population is forecast to increase from approximately **83,000 to 106,000**.

Table 6.7.2: Newmarket population and property forecast per AMP

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	45,010	50,580	53,100	54,880	56,400	58,000
Total Household Properties	19,000	21,520	22,840	23,890	24,810	25,750

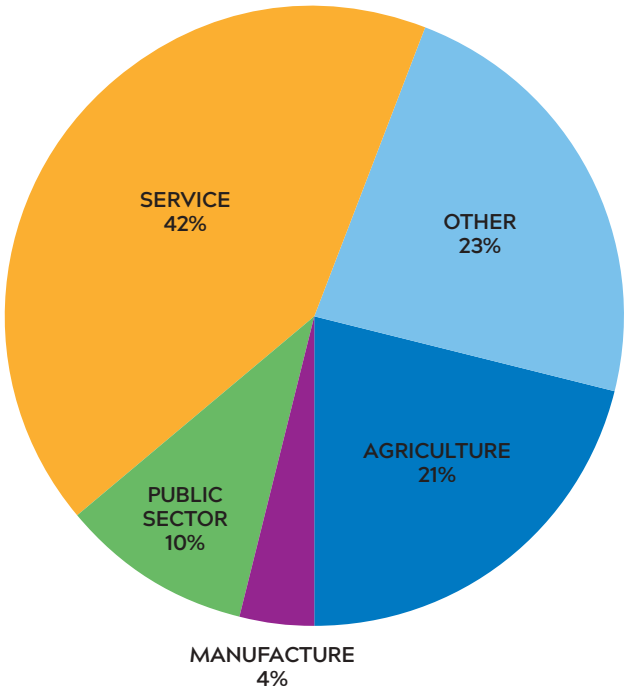
Property growth rates vary between **2,000** per AMP in the short-term to **940** per AMP in the long-term. The short-to-medium term projections are aligned with Local Authority data; the medium to long term projections with ONS based data.

Table 6.7.3: Newmarket Rates of household population and property growth per AMP are given below

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	4,520	2,520	1,780	1,520	1,600
Additional Household properties per AMP	2,040	1,320	1,050	920	940

Household demand is forecast to increase over the WRMP period from 5.60 Ml/d to 6.35 Ml/d.

Figure 6.7.1: Newmarket Non-household sectors



Non-household demand is predominantly from the service sector and manufacturing, which account for **46%** of total NHH demand. Non-household demand is forecast to increase over the WRMP period from **2.56 Ml/d to 2.70 Ml/d.**

For the baseline scenario WITHOUT demand management options

Household demand is forecast to increase over the WRMP period from **5.61 Ml/d to 6.92 Ml/d**.

Leakage is forecast to decrease from the baseline value of **2.38 Ml/d to 2.30 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to increase from **2.56 Ml/d to 2.70 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **10.88 Ml/d to 12.24 Ml/d.**

Table 6.7.4: Newmarket baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	4.33	5.28	5.72	6.04	6.24	6.41
Household demand (Ml/d) - unmeasured	1.27	0.91	0.72	0.57	0.51	0.51
Non-household demand (Ml/d)	2.56	2.52	2.52	2.54	2.60	2.70
Leakage (Ml/d)	2.38	2.31	2.31	2.31	2.30	2.30
Distribution input (Ml/d)	10.88	11.35	11.59	11.78	11.98	12.24

Baseline supply demand balance

Figure 6.7.2: Newmarket baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

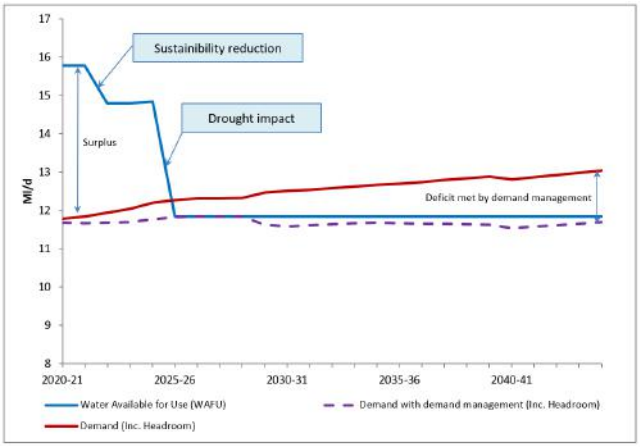


Table 6.7.5: Newmarket baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	15.78	14.84	11.84	11.84	11.84	11.84
Net transfers into Area (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	15.78	14.84	11.84	11.84	11.84	11.84
Total DYAA Distribution Input (Ml/d)	10.95	11.35	11.59	11.78	11.98	12.24
Total DYAA Target Headroom (Ml/d)	0.82	0.85	0.87	0.88	0.90	0.80
DYAA supply-demand balance (Ml/d)	4.01	2.64	-0.63	-0.82	-1.04	-1.20

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

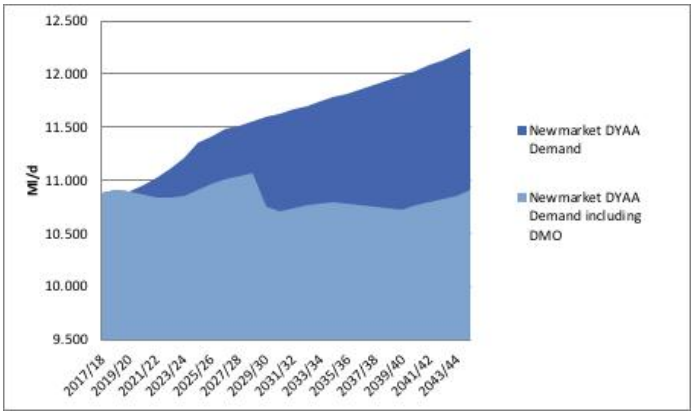
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 36% from 2.38 Ml/d in 2017/18 to 1.53 Ml/d in 2045.

Table 6.7.6: Newmarket Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.12	0.17	0.21	0.29	0.35
Smart metering (demand savings) (Ml/d) -	0.00	0.17	0.18	0.19	0.19
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.18	0.20	0.21	0.22
Leakage reduction (our network) (Ml/d)	0.31	0.00	0.31	0.31	0.07
Total saving (Ml/d)	0.43	0.52	0.90	1.00	0.83

Figure 6.7.3: Newmarket DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 122.5 l/h/d; Unmeasured PCC 132.1l/h/d, with a weighted average value of 124.6 l/h/d. This is expected to fall to 109.5 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 6.7.7: Changes in Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	124.60	122.40	121.30	120.30	119.70	119.30
Final demand forecast (DYAA) (includes selected demand management strategy)	124.60	119.90	114.70	113.00	110.90	109.50
Final demand forecast (DYAA) % change from baseline forecast	0.00%	2.04%	5.44%	6.07%	7.35%	8.21%

For the Final Plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **5.61 Ml/d to 6.35 Ml/d**.

Leakage is forecast to decrease from the baseline value of **2.38 Ml/d to 1.53 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **2.56 Ml/d to 2.70 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **10.88 Ml/d to 10.90 Ml/d**, once the influence of demand management option savings has been included.

Table 6.7.8: Newmarket final plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	4.33	5.16	5.39	5.65	5.76	5.86
Household demand (Ml/d) - unmeasured	1.27	0.90	0.71	0.55	0.49	0.49
Non-household demand (Ml/d)	2.56	2.52	2.52	2.54	2.60	2.70
Leakage (Ml/d)	2.38	2.00	1.81	1.73	1.55	1.53
Distribution input (Ml/d)	10.88	10.91	10.75	10.80	10.73	10.90

Selected supply-side options

For details on the feasible options list for Newmarket WRZ please refer to the Supply-side option development technical document.

Table 6.7.9: Newmarket preferred supply side options

Opt Ref	Option Name
NWM6	Ely WRZ to Newmarket WRZ Transfer (20Ml/d)

Final supply demand balance

Figure 6.7.4: Newmarket WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

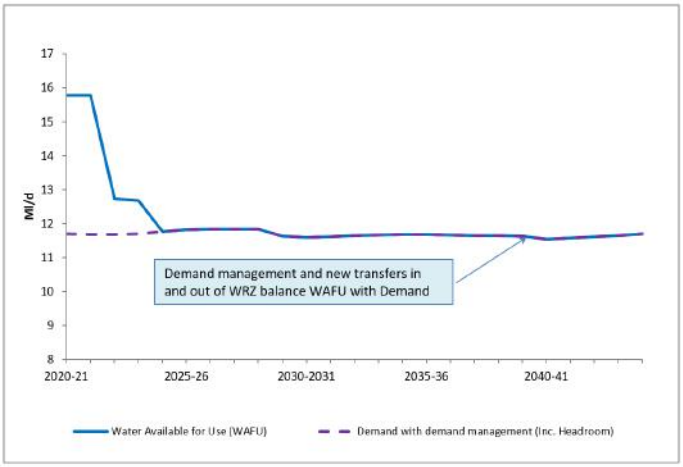


Table 6.7.10: Newmarket final supply demand balance to 2045 for dry year annual average (DYAA) conditions

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	15.78	14.84	11.84	11.84	11.84	11.84
Net transfers into Area (Ml/d)	0.00	-3.08	-0.22	-0.15	-0.21	-0.14
Total DYAA Water available for Use: including transfers* (Ml/d)	15.78	11.76	11.62	11.68	11.63	11.70
Total DYAA Distribution Input (Ml/d)	10.86	10.91	10.75	10.80	10.73	10.90
Total DYAA Target Headroom (Ml/d)	0.82	0.85	0.87	0.88	0.90	0.80
DYAA supply-demand balance (Ml/d)	4.09	0.00	0.00	0.00	0.00	0.00

* bulk imports, exports and inter-zone transfers

6.8 Sudbury

The Sudbury WRZ covers an area of 85km^2. This zone is supplied by abstractions from the Essex Chalk aquifer.

Supply Forecast

Table 6.8.1: Sudbury supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	10.50	10.50	10.50	10.50	10.50	10.50
Sustainability reductions (Ml/d)	0.00	-1.10	-1.10	-1.10	-1.10	-1.10
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	10.50	9.40	9.40	9.40	9.40	9.40
Outage Allowance†	0.16	0.14	0.14	0.14	0.14	0.14
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	10.34	9.26	9.26	9.26	9.26	9.26

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The baseline DO is forecast to change over the planning period due to:

- -1.10 Ml/d sustainability reductions in 2022

This zone does not see additional severe drought impact on DO and is not considered vulnerable to a 1 in 200 year event.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **14,000 to 16,000** and the population is forecast to increase from approximately **31,000 to 35,000**.

Table 6.8.2: Total household population and property per AMP

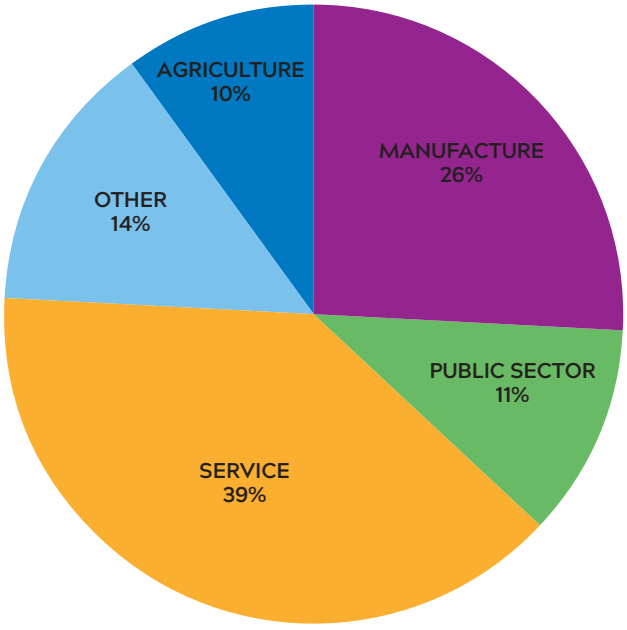
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	30,530	32,270	33,110	33,920	34,630	35,260
Total Household Properties	13,630	14,230	14,800	15,290	15,670	16,060

Property growth rates vary between **760** per AMP in the short-term to **390** per AMP in the long-term. The short-to-medium term projections are aligned with Local Authority data; the medium to long term projections with ONS based data.

Table 6.8.3: Rates of household population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	1,240	840	810	710	620
Additional Household properties per AMP	760	570	490	370	390

Figure 6.8.1: Sudbury Non-household sectors



Non-household demand is predominantly from the service sector and manufacturing, which account for **65%** of total NHH demand. Non-household demand is forecast to decrease over the WRMP period from **1.25Ml/d to 1.29 Ml/d.**

For the baseline scenario WITHOUT demand management options

Household demand is forecast to increase over the WRMP period from **4.10 Ml/d to 4.55 Ml/d**.

Leakage is forecast to decrease from the baseline value of **1.40 Ml/d to 1.34 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to increase from **1.25 Ml/d to 1.29 Ml/d** over the WRMP period.

Distribution Input is predicted to increase from **6.95 Ml/d to 7.39 Ml/d**.

Table 6.8.4: Sudbury baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	3.23	3.65	3.86	4.04	4.17	4.24
Household demand (Ml/d) - unmeasured	0.87	0.62	0.48	0.38	0.31	0.31
Non-household demand (Ml/d)	1.25	1.23	1.24	1.25	1.27	1.29
Leakage (Ml/d)	1.40	1.34	1.34	1.34	1.34	1.34
Distribution input (Ml/d)	6.95	7.05	7.13	7.22	7.30	7.39

Baseline supply demand balance

Figure 6.8.2: Sudbury baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

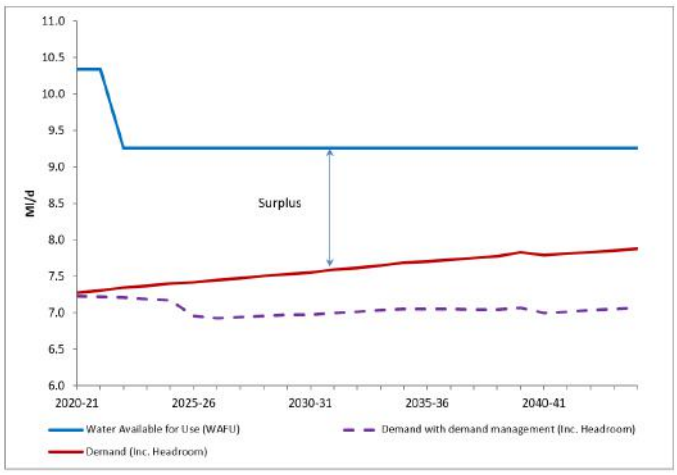


Table 6.8.5: Sudbury baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	10.34	9.26	9.26	9.26	9.26	9.26
Net transfers into Area (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	10.34	9.26	9.26	9.26	9.26	9.26
Total DYAA Distribution Input (Ml/d)	6.96	7.05	7.13	7.22	7.30	7.39
Total DYAA Target Headroom (Ml/d)	0.31	0.35	0.40	0.47	0.53	0.48
DYAA supply-demand balance (Ml/d)	3.07	1.86	1.73	1.57	1.42	1.38

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

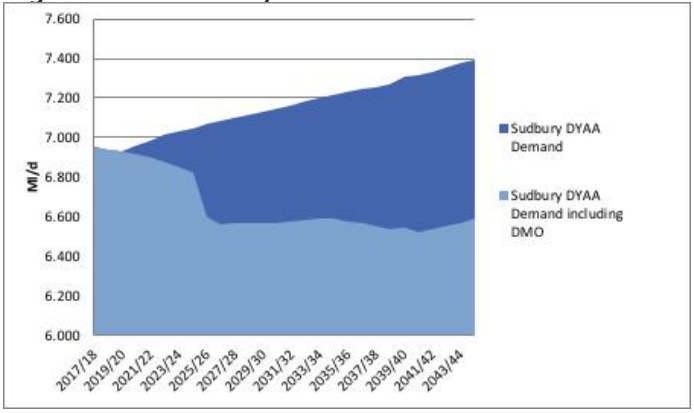
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 36% from 1.40 Ml/d in 2017/18 to 0.89 Ml/d in 2045.

Table 6.8.6: Sudbury Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.05	0.10	0.15	0.20	0.21
Smart metering (demand savings) (Ml/d) -	0.00	0.12	0.12	0.13	0.13
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.12	0.13	0.13	0.14
Leakage reduction (our network) (Ml/d)	0.17	0.21	0.21	0.29	0.32
Total saving (Ml/d)	0.22	0.55	0.61	0.75	0.79

Figure 6.8.3: Sudbury DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 136.1 l/h/d; Unmeasured PCC 127.5 l/h/d, with a weighted average value of 134.2 l/h/d. This is forecast;[to fall to 118.9 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 6.8.7: Changes in Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	134.20	132.20	131.00	130.10	129.40	129.00
Final demand forecast (DYAA) (includes selected demand management strategy)	134.20	130.60	124.40	121.80	119.60	118.90
Final demand forecast (DYAA) % change from baseline forecast	0.00%	1.21%	5.04%	6.38%	7.57%	7.83%

For the Final Plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **4.10 Ml/d to 4.19 Ml/**d.

Leakage is forecast to decrease from the baseline value of **1.40 Ml/d to 0.89 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **1.25 Ml/d to 1.29 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease from **6.95 Ml/d to 6.59 Ml/d**, once the influence of demand management option savings has been included.

Table 6.5.8: Sudbury final plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	3.23	3.60	3.65	3.76	3.84	3.90
Household demand (Ml/d) - unmeasured	0.87	0.61	0.47	0.37	0.30	0.29
Non-household demand (Ml/d)	1.25	1.23	1.24	1.25	1.27	1.29
Leakage (Ml/d)	1.40	1.17	1.00	1.00	0.92	0.89
Distribution input (Ml/d)	6.95	6.83	6.57	6.59	6.54	6.59

Final supply demand balance

Figure 6.8.4: Sudbury Final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

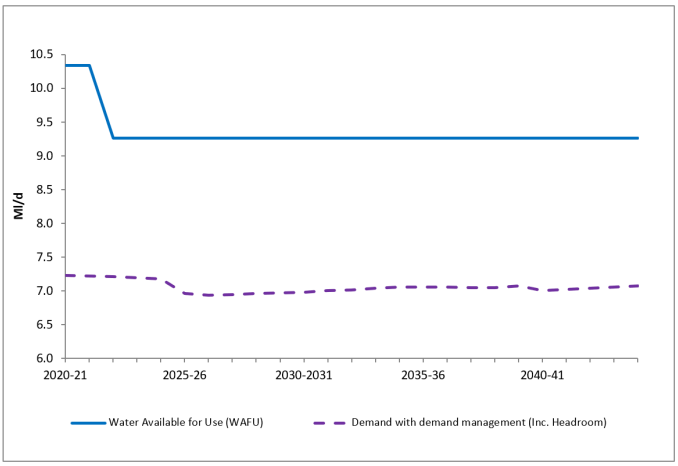


Table 6.5.9: Sudbury final supply demand balance to 2045 for dry year annual average (DYAA) conditions

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	10.34	9.26	9.26	9.26	9.26	9.26
Net transfers into Area (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	10.34	9.26	9.26	9.26	9.26	9.26
Total DYAA Distribution Input (Ml/d)	6.92	6.83	6.57	6.59	6.54	6.59
Total DYAA Target Headroom (Ml/d)	0.31	0.35	0.40	0.47	0.53	0.48
DYAA supply-demand balance (Ml/d)	3.11	2.08	2.29	2.20	2.19	2.19

* bulk imports, exports and inter-zone transfers

6.9 Thetford

The Thetford WRZ covers an area of 129km^2 and lies in the centre of East Anglia. Water is primarily supplied from abstractions in the Suffolk Chalk aquifer.

Supply Forecast

Table 6.9.1: Thetford supply characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	12.50	12.50	12.50	12.50	12.50	12.50
Sustainability reductions (Ml/d)	0.00	-2.00	-2.00	-2.00	-2.00	-2.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	12.50	10.50	10.50	10.50	10.50	10.50
Outage Allowance†	0.18	0.15	0.15	0.15	0.15	0.15
Transfers In (Ml/d)*	0.25	0.25	0.25	0.25	0.25	0.25
Transfers Out (Ml/d)*	-1.53	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	11.12	10.60	10.60	10.60	10.60	10.60

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

This zone forecast to experience changes to baseline DO over the planning period due to:

- -2.00 Ml/d sustainability reductions in 2022

It does not see additional severe drought impact on DO and is not considered vulnerable to a 1 in 200 year event.

Baseline WAFU includes a fixed bulk import from Cambridge Water of 0.25 Ml/d throughout the planning period.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **15,000 to 19,000** and the population is forecast to increase from approximately **34,000 to 42,000**.

Table 6.9.2: Thetford population and property forecast per AMP

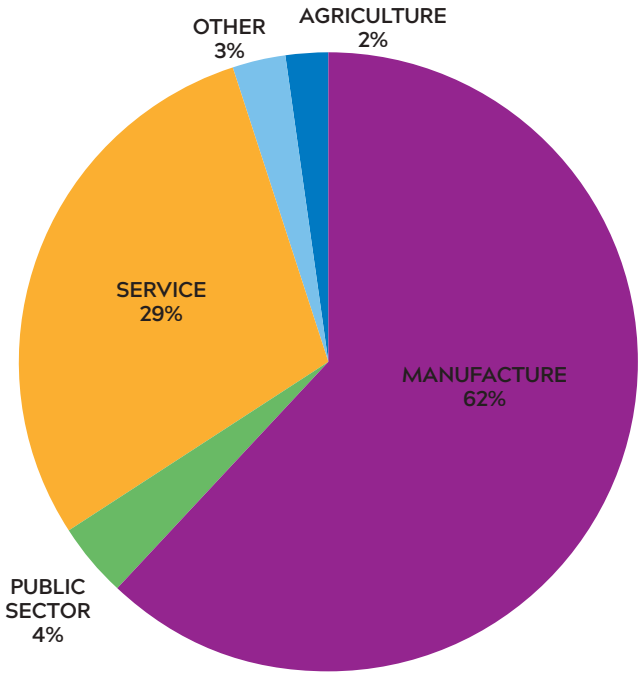
	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	33,650	38,040	39,370	40,260	41,280	42,220
Total Household Properties	14,490	16,470	17,200	17,750	18,270	18,800

Property growth rates vary between **1,600** per AMP in the short-term to **520** per AMP in the long-term. The short-to-medium term projections are aligned with Local Authority data; the medium to long term projections with ONS based data.

Table 6.9.3: Rates of household population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	3,420	1,320	890	1,020	940
Additional Household properties per AMP	1,600	730	550	520	520

Figure 6.9.1: Thetford Non-household sectors



Non-household demand is predominantly from the service sector and manufacturing, which account for **66%** of total NHH demand. Non-household demand is forecast to increase over the WRMP period from **2.57 Ml/d to 4.74 Ml/d.**

For the baseline scenario WITHOUT demand management options

Household demand is forecast to increase over the WRMP period from **4.57 Ml/d to 5.52 Ml/d**.

Leakage is forecast to decrease from the baseline value of **1.66 Ml/d to 1.61 Ml/d** at the end of the WRMP plan period.

Non-household demand is expected to increase from **2.57 Ml/d to 4.74 Ml/**d over the WRMP period.

Distribution Input is predicted to increase from **9.06 Ml/d to 12.14 Ml/d**.

Table 6.9.4: Thetford baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	3.61	4.40	4.68	4.88	5.03	5.14
Household demand (Ml/d) - unmeasured	0.95	0.68	0.54	0.42	0.39	0.38
Non-household demand (Ml/d)	2.57	3.99	4.08	4.25	4.48	4.74
Leakage (Ml/d)	1.66	1.61	1.61	1.61	1.61	1.61
Distribution input (Ml/d)	9.06	10.97	11.18	11.43	11.78	12.14

Baseline supply demand balance

Figure 6.9.2: Thetford baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

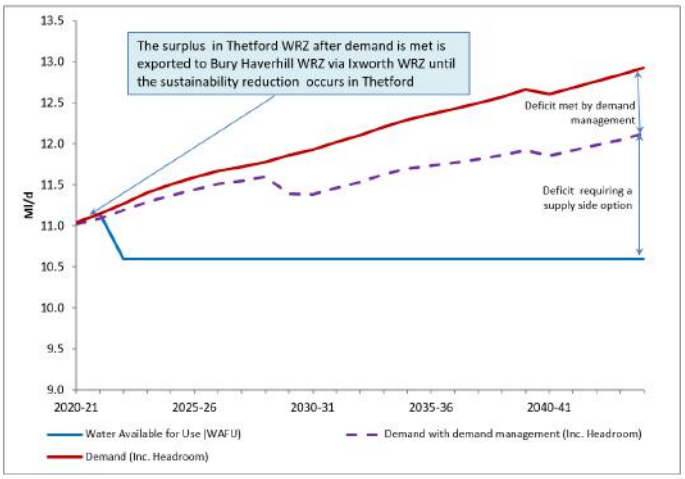


Table 6.9.5: Thetford baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	12.32	10.35	10.35	10.35	10.35	10.35
Net transfers into Area (Ml/d)	-1.28	0.25	0.25	0.25	0.25	0.25
Total DYAA Water available for Use: including transfers* (Ml/d)	11.04	10.60	10.60	10.60	10.60	10.60
Total DYAA Distribution Input (Ml/d)	10.59	10.97	11.18	11.43	11.78	12.14
Total DYAA Target Headroom (Ml/d)	0.46	0.54	0.68	0.86	0.88	0.79
DYAA supply-demand balance (Ml/d)	0.00	-0.90	-1.26	-1.69	-2.06	-2.33

* bulk imports, exports and inter-zone transfers

Selected demand management strategy

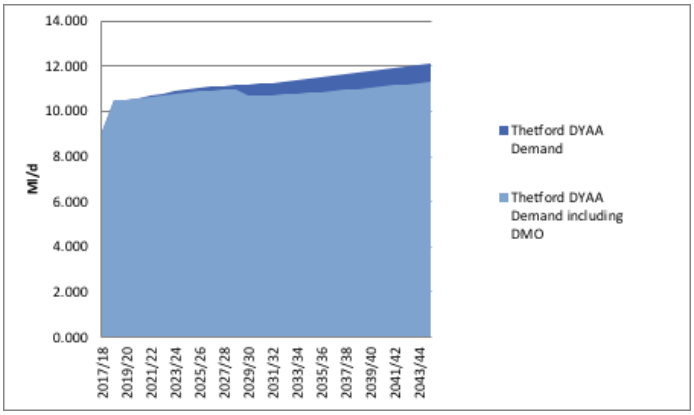
We plan to use a combined strategy of the introduction of smart metering, water efficiency measures and leakage reduction to reduce demand.

- We plan to reduce leakage by 25% from 1.66 Ml/d in 2017/18 to 1.25 Ml/d in 2045.

Table 6.9.6: Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.06	0.11	0.16	0.22	0.27
Smart metering (demand savings) (Ml/d) -	0.00	0.14	0.15	0.15	0.16
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.14	0.15	0.16	0.16
Leakage reduction (our network) (Ml/d)	0.08	0.08	0.14	0.2	0.20
Total saving (Ml/d)	0.14	0.47	0.60	0.73	0.79

Figure 6.9.3: Thetford DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/18 (base year) are: Measured PCC 135.6 l/h/d; Unmeasured PCC 136.1 l/h/d, with a weighted average value of 135.7 l/h/d. This is forecast;[to fall to 120.4 l/h/d in the Final plan forecast, as demand management option savings are realised and customers switch from unmeasured to measured status.

Table 6.9.7: Changes in Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	135.70	133.80	132.70	131.80	131.20	130.80
Final demand forecast (DYAA) (includes selected demand management strategy)	135.70	132.20	126.10	123.90	121.80	120.40
Final demand forecast (DYAA) % change from baseline forecast	0.00%	1.19%	4.97%	5.99%	7.16%	7.95%

For the Final Plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **4.57 Ml/d to 5.08 Ml/**d.

Leakage is forecast to decrease from the baseline value of **1.66 Ml/d to 1.25 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand is expected to increase from **2.57 Ml/d to 4.74 Ml/**d over the WRMP period.

Distribution Input is predicted to increase from **9.06 Ml/d to 11.34 Ml/d**, once the influence of demand management option savings has been included.

Table 6.9.8: Thetford Final Plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	3.61	4.35	4.43	4.57	4.66	4.71
Household demand (Ml/d) - unmeasured	0.95	0.68	0.53	0.41	0.37	0.37
Non-household demand (Ml/d)	2.57	3.99	4.08	4.25	4.48	4.74
Leakage (Ml/d)	1.66	1.53	1.39	1.33	1.26	1.25
Distribution input (Ml/d)	9.06	10.83	10.71	10.84	11.04	11.34

Selected supply-side options

For details on the feasible options list for Thetford WRZ please refer to the Supply-side option development technical document.

Table 6.9.9: Thetford preferred supply side options

Opt Ref	Option Name
THT1a	Ixworth WRZ to Thetford WRZ Transfer via existing infrastructure

Final supply demand balance

Figure 6.9.4: Thetford final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

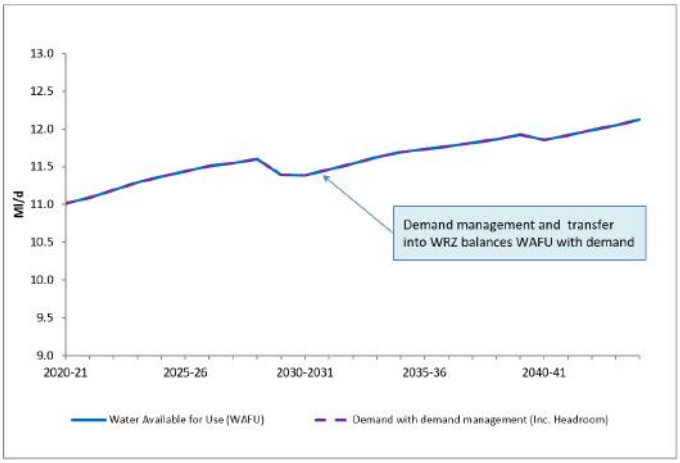


Table 6.9.10: Thetford final supply demand balance to 2045 for dry year annual average (DYAA) conditions

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	12.32	10.35	10.35	10.35	10.35	10.35
Net transfers into Area (Ml/d)	-1.31	1.02	1.04	1.34	1.57	1.78
Total DYAA Water available for Use: including transfers* (Ml/d)	11.02	11.37	11.39	11.70	11.92	12.13
Total DYAA Distribution Input (Ml/d)	10.56	10.83	10.71	10.84	11.04	11.34
Total DYAA Target Headroom (Ml/d)	0.46	0.54	0.68	0.86	0.88	0.79
DYAA supply-demand balance (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00

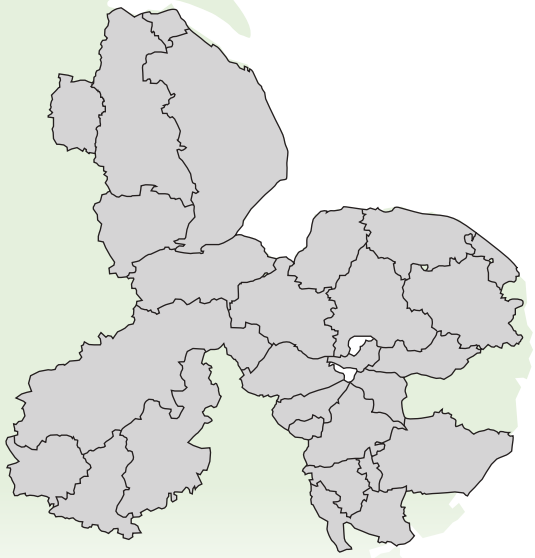
* bulk imports, exports and inter-zone transfers

7. Area 7:

Hartlepool

7.1 Overview

Figure 7.1.1: Problem characterisation Area 7



7.2 Strategic risks and issues

Problem Characterisation Results

- Area 7 is assessed as having low levels of concern
- There are low strategic needs and the level of complexity is low

This area remains in surplus with little change to the supply-demand balance.

Supply Forecast

Table 7.2.1: Hartlepool Supply-Demand characteristics

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline DO (Ml/d)	36.84	36.84	36.84	36.84	36.84	36.84
Sustainability reductions (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Climate change impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Severe drought impacts (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Final DO (Ml/d)	36.84	36.84	36.84	36.84	36.84	36.84
Outage Allowance†	0.00	0.00	0.00	0.00	0.00	0.00
Transfers In (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Transfers Out (Ml/d)*	0.00	0.00	0.00	0.00	0.00	0.00
Total Water Available for Use (Ml/d)	36.84	36.84	36.84	36.84	36.84	36.84

* bulk imports, exports and inter-zone transfers identified for the baseline scenario
† represented as a positive integer but taken off DO in the WAFU calculation

The zone is not forecast to experience any changes to baseline DO or transfers over the planning period. This zone does not see additional severe drought impact on DO and is therefore not considered vulnerable to a 1 in 200-year event.

Baseline Demand Forecast

Over the WRMP period, household properties are forecast to increase from approximately **41,000 to 49,000**, and the population is forecast to increase from approximately **89,000 to 90,000**[1].

Table 7.2.2: Hartlepool Population and property forecast per AMP

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total Household Population	89,270	88,040	88,680	89,300	89,670	90,050
Total Household Properties	41,310	44,520	46,230	47,530	48,500	49,000

Property growth rates vary between **2,700** per AMP in the short-term to **463** per AMP in the long-term. The short-to-medium term projections are aligned with Local Authority data; the medium to long term projections with ONS based data.

[1] *Based upon Local Authority planning information*

Table 7.2.3: Hartlepool rates of population and property growth per AMP

	AMP7	AMP8	AMP9	AMP10	AMP11
Additional Household population per AMP	1,170	630	620	390	370
Additional Household properties per AMP	2,720	1,700	1,300	980	463

For the baseline scenario WITHOUT demand management options.

Household demand is forecast to decrease over the WRMP period from **11.57 Ml/d to 11.25 Ml/d**.

Leakage is forecast to decrease from the baseline value of **4.32 Ml/d to 4.16 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand will remain at **8.65 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease slightly from **25.78 Ml/d to 25.30 Ml/d**, once the influence of demand management option savings has been included.

Table 7.2.4: Hartlepool baseline demand forecast (without preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	4.13	5.13	5.35	5.51	5.61	5.65
Household demand (Ml/d) - unmeasured	7.44	6.08	5.89	5.75	5.64	5.59
Non-household demand (Ml/d)	8.65	8.65	8.65	8.65	8.65	8.65
Leakage (Ml/d)	4.32	4.19	4.19	4.18	4.17	4.16
Distribution input (Ml/d)	25.78	25.30	25.32	25.33	25.32	25.30

Baseline supply demand balance

Figure 7.2.3: Hartlepool baseline supply demand balance to 2045 for dry year annual average (DYAA) conditions

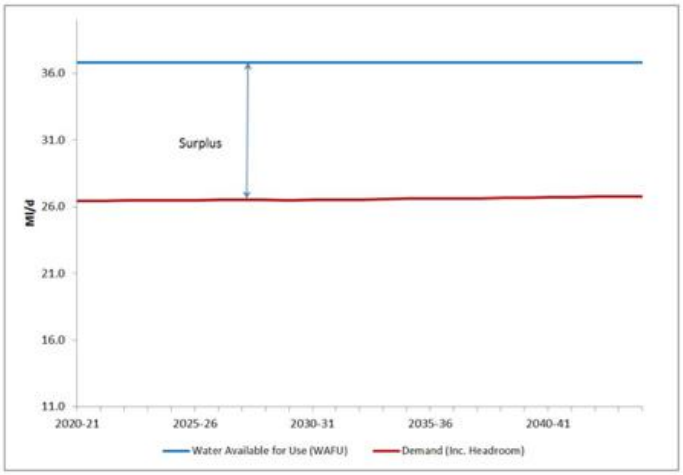


Table 7.2.5: Hartlepool baseline supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	36.84	36.84	36.84	36.84	36.84	36.84
Net transfers into Area (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	36.84	36.84	36.84	36.84	36.84	36.84
Total DYAA Distribution Input (Ml/d)	25.30	25.30	25.32	25.33	25.32	25.30
Total DYAA Target Headroom (Ml/d)	1.13	1.19	1.26	1.36	1.45	1.57
DYAA supply-demand balance (Ml/d)	10.41	10.34	10.26	10.15	10.08	9.97

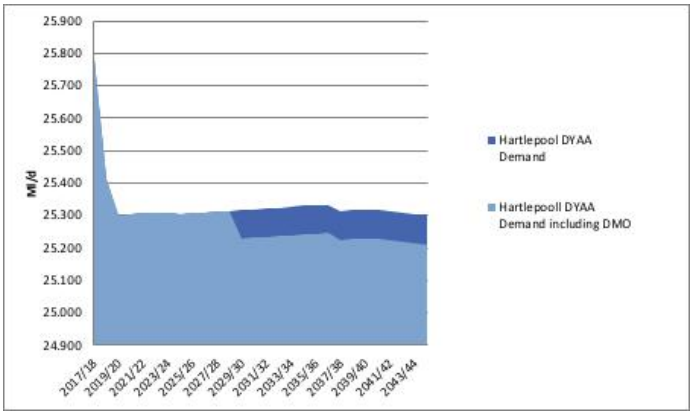
* bulk imports, exports and inter-zone transfers

Selected demand management strategy

Table 7.2.6: Hartlepool Water savings resulting from selected demand management strategy

	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Water efficiency initiatives (Ml/d)	0.00	0.00	0.00	0.00	0.00
Smart metering (demand savings) (Ml/d)	0.00	0.00	0.09	0.09	0.09
Leakage reduction (CSPL savings) (Ml/d)	0.00	0.00	0.00	0.00	0.00
Leakage reduction (our network) (Ml/d)	0.00	0.00	0.00	0.00	0.00
Total saving (Ml/d)	0.00	0.00	0.00	0.00	0.00

Figure 7.24: Hartlepool DYAA DI with and without selected demand management strategy



Per capita consumption (PCC) values in 2017/2018 (base year) are: Measured PCC 131 l/h/d; Unmeasured PCC 128.6 l/h/d, with a weighted average value of 129.6 l/h/d. This is expected to fall to 123.9 l/h/d in the final plan forecast, as demand management option savings are realised, and customers switch from unmeasured to measured status.

Table 7.2.7: Changes in Hartlepool Per Capita Consumption (PCC) resulting from selected demand management strategy

PCC (l/h/d)	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Baseline demand forecast (DYAA)	129.60	127.40	126.70	126.10	125.50	124.90
Final demand forecast (DYAA) (includes selected demand management strategy)	129.60	127.40	125.70	125.10	124.60	123.90
Final demand forecast (DYAA) % change from baseline forecast	0.00%	0.00%	0.79%	0.79%	0.72%	0.80%

For the Final Plan scenario WITH demand management options.

Household demand is forecast to increase over the WRMP period from **11.57 Ml/d to 11.16 Ml/d**.

Leakage is forecast to decrease from the baseline value of **4.32 Ml/d to 4.16 Ml/d** at the end of the WRMP plan period, with demand management option savings.

Non-household demand will remain at **8.65 Ml/d** over the WRMP period.

Distribution Input is predicted to decrease slightly from **25.78 Ml/d to 25.21 Ml/d**, once the influence of demand management option savings has been included.

Table 7.2.8: Hartlepool final plan demand forecast (with preferred demand management option)

	Base-year (2017-18)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Household demand (Ml/d) - measured	4.13	5.13	5.26	5.42	5.52	5.56
Household demand (Ml/d) - unmeasured	7.44	6.08	5.89	5.75	5.64	5.59
Non-household demand (Ml/d)	8.65	8.65	8.65	8.65	8.65	8.65
Leakage (Ml/d)	4.32	4.19	4.19	4.18	4.17	4.16
Distribution input (Ml/d)	25.78	25.30	25.31	25.24	25.23	25.21

Final supply demand balance

Figure 7.2.5: Hartlepool WRZ final supply-demand balance to 2045 for dry year annual average (DYAA) conditions

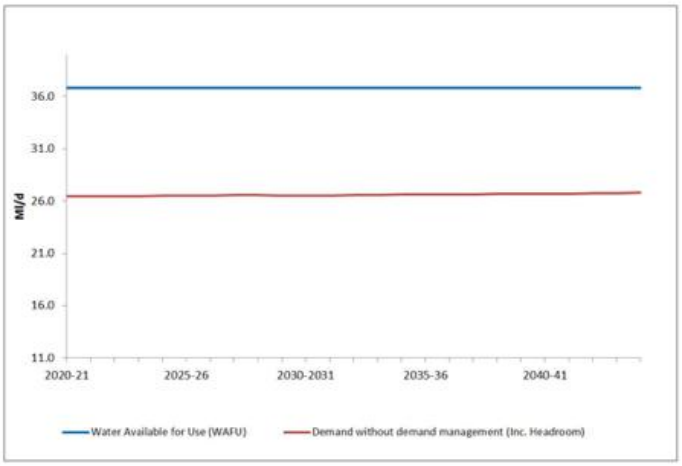


Table 7.2.9: Hartlepool final supply-demand balance to 2045 for dry year annual average (DYAA) conditions (with deficits highlighted in red)

	2020-21 (start of AMP7)	2024-25 (end of AMP7)	2029-30 (end of AMP8)	2034-35 (end of AMP9)	2039-40 (end of AMP10)	2044-45 (end of AMP11)
Total DYAA Water available for Use: Area sources* (Ml/d)	36.84	36.84	36.84	36.84	36.84	36.84
Net transfers into Area (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Total DYAA Water available for Use: including transfers* (Ml/d)	36.84	36.84	36.84	36.84	36.84	36.84
Total DYAA Distribution Input (Ml/d)	25.30	25.30	25.31	25.24	25.23	25.21
Total DYAA Target Headroom (Ml/d)	1.13	1.19	1.18	1.36	1.45	1.57
DYAA supply-demand balance (Ml/d)	10.41	10.34	10.35	10.23	10.16	10.06

* bulk imports, exports and inter-zone transfers

Cover photo shows Rutland Water

Rutland Water is a reservoir in Rutland, England, east of the county town, Oakham. It is filled by pumping from the River Nene and River Welland and provides water to the East Midlands. It is one of the largest artificial lakes in Europe.

Anglian Water Services Limited
Lancaster House
Lancaster Way
Ermine Business Park
Huntingdon
Cambridgeshire
PE29 6XU

www.anglianwater.co.uk