Independent Water Networks

Final Water Resource Management Plan 2019

Independent Water Networks Ltd.

April 2019

Contents

Document Control Sheet

TITLE: **Final Water Resource Management Plan 2019**	VERSION: **Final for Submission v3** **10th April 2019**
Document Business Owner:	 **Paula Agutter,** **Water Compliance Manager, IWNL**
Authorised:	 **John Marsh,** **Director, IWNL**

1 Introduction

1.1 This Water Resource Management Plan

This final version of the 2019 Water Resource Management Plan (WRMP) has been prepared through consultation with a variety of stakeholders (as detailed in Section 2.3).

IWNL confirms that we have adequate provision on all development sites to cater for long-term planning horizons.

1.2 Independent Water Networks Limited (IWNL)

Independent Water Networks (IWNL) is a subsidiary company within the BUUK Infrastructure group of companies. We refer to these companies in the document as the "Group".

The Group is involved in project acquisition, management, design, construction, ownership, operation and maintenance of utility networks and associated site infrastructure, serving new developments throughout the UK mainland.

The Group focuses primarily on the new build market and is the leading independent utility and infrastructure provider in the UK.

The Group has broadly divided its activities between the regulated ownership of utility network assets and the unregulated provision of utility infrastructure and asset management services. The Group owns assets at over 7,000 sites across England, Scotland and Wales which include gas, electric, water, waste water, district heating and fibre networks.

1.3 Inset Appointments

With the introduction of competition within the water industry, and following amendments to the Water Act 2003, the opportunity was created for the independent provision of water and sewerage services by new independent licence holders.

New Appointments and Variations (NAVs) allow companies to offer water and/or sewerage services within a specified geographic area instead of the existing appointee. As a result, developers and large non-household customers can choose their supplier for these services and enjoy the benefits of a more competitive market.

NAV licences are granted by OFWAT following a period of consultation and subject to the applicant satisfying certain criteria to ensure the interests of the customers are protected.

IWNL notes that, as part of consulting on the plan for 2024 WRMPs, The Environment Agency are addressing concerns raised by stakeholders that proportionate requirements should be imposed on the NAV licensees for their 2024 WRMP submission, with an approach that strikes the correct balance between detail and scale of significance. IWNL welcome such an approach and will work with The Environment Agency to simplify reporting requirements.

IWNL have been granted operating license/appointments to provide water and waste water services in place of the existing appointed Water Companies. Since 2007, operating licences have been granted in areas previously supplied by Anglian Water Services Limited (AWS),

Thames Water Utilities Ltd (TWUL), Severn Trent Water Limited (STW), Southern Water (SW) Affinity Water (AFW) and South East Water (SEW). In this report, these areas are referred to as "inset areas". Where the contract length is not "indefinite", the process, timing and triggers for renewal are shown in the table notes. IWNL do not anticipate that there is a risk to the security of supply for customers in these zones since negotiations will be concluded in a timely manner.

Note that the figures detailed in Tables 1.1 - 1.6 are taken directly from the bulk supply agreements signed by both companies.

IWNL continues to grow and will acquire new inset licences following publication of this plan. As further licences are obtained, IWNL will undertake a WRMP for each of these zones and include these as part of our Annual Reports, which will be available on our website.

Table 1.1 IWNL appointments within the AWS Company area

IWNL ref. no.	Site	Location	Incumbent WRZ	Service(s)	Date granted	Date commenc-ed	Contract Length
38861	Priors Hall	Corby, Northants	Ruthamford North	Water and sewerage	30/01/2008	04/02/2008	22 Years
40806	Long Croft Rd.	Corby, Northants	Ruthamford North	Water and sewerage	12/10/2007	15/10/2007	23 Years
42017	Great Billing Way	Northamp-ton	Ruthamford Central	Water only	03/09/2008	04/09/2008	22 Years
43414	Brooklands	Milton Keynes	Ruthamford Central	Water and sewerage	16/12/2009	17/12/2009	Indefinite

Notes:
1. *Long Croft Road was a "New Appointment" while the other three were granted by "Appointment Variation"*
2. *All inset areas were previously 'Unserved'*
3. *For Priors Hall, Long Croft Rd. and Great Billing Way, IWNL will give notice 12-18 months before the end of the agreement that we wish for it to be renewed for a further 10 years.*

Table 1.2 IWNL appointments within the TWUL Company area

IWNL ref. no.	Site	Location	Incumbent WRZ	Services	Date granted	Date commenc-ed	Contract Length
39088	Berryfields	Aylesbury	Slough, Wycombe and Aylesbury	Water and sewerage	09/07/2010	22/06/2010	Indefinite
42433	King's Cross Central	London	London	Water and sewerage	24/06/2010	25/06/2010	Indefinite
45422	The Bridge	Dartford, Kent	London	Water and sewerage	24/02/2010	25/02/2010	Indefinite
55153	GMV	Greenwich , London	London	Water and sewerage	13/11/2013	14/11/2013	Indefinite
52713	Ebbsfleet	Swanscom be, Kent	London	Water and sewerage	03/08/2016	04/08/2016	Indefinite

Notes:
1. *Water and sewerage services are provided in all 5 areas*
2. *All insets were granted by 'Appointment Variation'.*

Table 1.3 IWNL appointments within the STW Company area

IWNL ref. no.	Site	Location	Incumbent WRZ	Service(s)	Date granted	Date commenc-ed	Contract Length
40328	Oakham North	Rutland	Ruthamford North (Anglian Water)	Water only	13/08/2012	14/08/2012	23 Years

Notes:
1. *The inset is located immediately to the north west of Rutland Water within Severn Trent Water's "Rutland" WRZ*
2. *Oakham North inset was granted by "Appointment Variation"*
3. *The inset area was previously 'Unserved'.*
4. *The agreement will continue indefinitely, with no renewal action needed, unless 2 years notice is given by either party to end the agreement.*

Table 1.4 IWNL appointments within the SW Company area

IWNL ref. no.	Site	Location	Incumbent WRZ	Service(s)	Date granted	Date commenc-ed	Contract Length
53244	NES Crawley	Crawley	Sussex North	Water and Sewerage	21/08/2014	22/08/2014	Indefinite

Notes:
1. *The inset was granted by "Appointment Variation"*
2. *The inset area was previously 'Unserved'.*

Table 1.5 IWNL appointments within the AFW Company area

IWNL ref. no.	Site	Location	Incumbent WRZ	Service(s)	Date granted	Date commenc-ed	Contract Length
36948	Martello Lakes	Hythe	Dour	Water and Sewerage	22/10/2015	23/10/2015	Indefinite
55030	Bishop's Stortford	Hertford-shire	Stort	Water and Sewerage	25/04/2018	21/05/2018	Indefinite

Notes:
1. *The inset area was previously 'Unserved'.*

Table 1.6 IWNL appointments within the SEW Company area

IWNL ref. no.	Site	Location	Incumbent WRZ	Service(s)	Date granted	Date commenc-ed	Contract Length
71641	Chilmington Green	Ashford, Kent	Ashford	Water and Sewerage	20/03/2018	21/12/2017	Indefinite

Notes:
2. *The inset area was previously 'Unserved'.*

1.4 IWNL's Approach to Water Resources

IWNL does not currently own or operate water sources. All our supplies are through bulk connections from the local incumbent water company. IWNL have negotiated bulk supply agreements with the incumbent water companies for each of the inset areas. These agreements are designed to secure adequate supplies for our customers throughout the 25-year planning period, including sufficient headroom to allow for uncertainties in demand forecasts.

IWNL are committed to achieving high levels of water-use efficiency. This involves formulating a long-term strategy with developers to reduce water consumption on new domestic and commercial developments. This strategy will involve innovation and the development of strategic policies to:

a. Promoting efficient water use in domestic properties;
b. Reduction in per capita consumption from the industry average of 150 l/p/d to the new Government standard of 125 l/p/d for new homes;
c. Developing customer communication and an awareness of IWNL codes of practice to deliver reliable and sustainable supplies of water and waste water services;
d. Implementing the latest AMR metering technology for all domestic and commercial supplies;
e. Manage leakage to maintain low levels at inset appointed sites;
f. Consider environmental solutions and water recycling strategies to meet specific water demand requirements for each inset licence appointed development.

1.5 Security Considerations

As an inset supplier is reliant on supplies from incumbent suppliers we have liaised with them all about security considerations. As a consequence, we are confident that they have robust security arrangements in place for their own infrastructure. Our considerations cover the infrastructure in our ownership or over which we have control.

All but one of our sites, Ebbsfleet, are housing developments with no features that are likely to expose the supply infrastructure to sabotage. Similarly, we do not own or operate any water treatment works or service reservoirs which might represent entry points for contaminants. The Ebbsfleet site has a Waste Water Treatment Plant (WWTP) that is secured with authorised access only.

On sites that are still under development, site access is strictly controlled by the developer with all visitors being required to sign in and wear visible ID tags. These arrangements secure our operations against any deliberate attempts to sabotage water supplies.

2 The Requirement for and Background to Water Resources Management Plans

2.1 The Role of a WRMP

A water resources management plan sets out how a water company intends to maintain the balance between the supply and demand for water over a 25-year period. It shows how the company expects the demand for water to grow over the planning period and how it plans to meet those forecast demands.

2.2 Time Scales

Water companies in England and Wales have a statutory requirement to prepare a WRMP every five years; this final plan will be submitted for approval to the Secretary of State in late 2018 or 2019.

2.3 Consultation

The statutory process for the preparation of water resources management plans sets out defined stages for consultation. This final version of the 2019 WRMP has been prepared through consultation with the following:

- All our customers (approx. 22,600),
- The Environment Agency (EA),
- The Drinking Water Inspectorate (DWI),
- The Water Services Regulation Authority (OFWAT),
- The Consumer Council for Water (CC Water),
- Natural England,
- Anglian Water Services Limited (AWS),
- Thames Water Utilities Ltd (TWUL),
- Severn Trent Water Limited (STW),
- Southern Water (SW),
- Affinity Water (AFW),
- South East Water (SEW),
- Wessex Water,
- Yorkshire Water,
- Bristol Water,
- Cambridge Water,
- Northumbrian Water,
- Portsmouth Water,
- South West Water,
- United Utilities,
- Dwy Cymru.

A total of 4 written representations were received from DEFRA, The Environment Agency, OFWAT and Natural England and this report has taken these representations into account. All material amendments made to the draft WRMP as a result of these responses are summarised in our “Statement of Response, Draft Water Resource Management Plan 2019 v2” document, which is available on our website.

2.4 IWNL's Strategy

IWNL has negotiated bulk-supply agreements with incumbent water companies with the intention of ensuring that no supply-demand balance is in deficit under baseline demand conditions. IWNL's Drought Plans set out the short-term operational steps IWNL will take to maintain supplies in the event of a severe drought.

IWNL's Strategy for maintaining a positive supply-demand balance can be summarised as follows:

- Monitor actual demand as sites are developed to their full potential and develop a database of historic demand data to aid future demand planning.
- Implement a targeted programme of leakage monitoring and control (based on metering data) in order to maintain levels of leakage at or close to the economic level
- Implement efficiency measures to reduce per capita consumption to target levels consistent with the aims and objectives set out in the CFSH
- Monitor available headroom to ensure that this does not fall below target headroom objectives
- Although not forecast to happen, if available headroom falls were to fall below target headroom, consider options to eliminate the supply-demand deficit. This will entail one or more of the followings:
    - increase the quantities specified in bulk supply agreements
    - implement demand management measures if these have not yet reached their optimum level of performance

2.5 Levels of Service

A water company's target level of service is the standard of service (effectively the reliability of supply) that a customer can expect to receive. It is a form of contract between a water company and its customers. IWNL's levels of service are aligned to those of the incumbent water companies. A water company's success in delivering its stated levels of service over a period of time depends on the combined effectiveness of its WRMP and Drought Plan.

It is accepted within the water industry that it would not be economically justified, or environmentally sustainable, to develop long-term plans that removed completely the need to periodically introduce restrictions on customer's non-essential use during more extreme drought events. The target level of service is therefore the average frequency with which restrictions on water use is expected to be applied to customers. This frequency should be considered appropriate both in terms of customer expectation, impact on the environment and cost implications.

The quantity of water to be supplied under the bulk supply agreements allow for unconstrained demand in each WRZ to be supplied both now and in the future. However, the agreements also allow for reductions in bulk supply to be applied during times of drought.

IWNL's levels of service are therefore effectively aligned to those of the incumbent water companies and the annual risk is unchanged throughout the planning period. These are the restrictions on water use that IWNL will apply as drought severity increases (categorised according to incumbent supplier):

Table 2.1 IWNL's Levels of Service for AWS area

Level	Action	Frequency of implementation (drought severity)	Annual Risk of Restriction
1	Temporary use ban (includes hosepipe ban)	Not more than once in 10 years	10%
2	Non-essential use ban	Not more than once in 40 years	3%
3	Rota-cuts and standpipes	Not more than once in 100 years	1%

Note: If extreme measures (such as standpipes and rota cuts) are required, their implementation would require an Emergency Drought Order

Table 2.2 IWNL's Levels of Service for TW area

Level	Action	Frequency of implementation (drought severity)	Annual Risk of Restriction
1	Intensive water saving media campaign	Once in 5 years	20%
2	Sprinkler/unattended hosepipe ban, enhanced media campaign	Once in 10 years	10%
3	Temporary Use Ban (formerly hosepipe ban), Drought Direction 2011 (formerly non-essential use bans) requiring the granting of an Ordinary Drought Order. N.B. Drought Permits are also part of Level 3 measures, but do not impinge directly on customers and so are not strictly relevant to customer service levels	Once in 20 years	5%
4	Extreme restrictions such as standpipes and rota cuts in supply. If such measures were necessary, their implementation would require the granting of an Emergency Drought Order	Once in 125 years	0.8%

Table 2.3 IWNL's Levels of Service for STW area

Level	Action	Frequency of implementation (drought severity)	Annual Risk of Restriction
1	Temporary use bans (TUBs) and non-essential use bans (NEUBs).	Not more than 3 times every 100 years	3%
2	Imposition of the use of rota cuts/ standpipes	Never – considered unacceptable as a response to drought	0%

Table 2.4 IWNL's Levels of Service for SW area

Level	Action	Frequency of implementation (drought severity)	Annual Risk of Restriction
1	Advertising to influence water use	Once in 5 years	20%
2	Temporary Use Ban on different categories of water use	Once in 10 years	10%
3	Apply for Drought Order to restrict water use (non- essential use ban)	Once in 20 years	5%
4	Apply for Drought Order to restrict	Once in 500 years	0.2%

Table 2.5 IWNL's Levels of Service for AFW area

Level	Action	Frequency of implementation (drought severity)	Annual Risk of Restriction
1	Domestic Temporary Use Restrictions	Once in 10 years	10%
2	Drought Orders for non-essential use	1 in 40 years	3%
3	Domestic Temporary Use Restrictions and Drought Orders for non-essential use	1 in 60/80 years	1.3 – 1.7%
4	Domestic Temporary Use Restrictions, Drought Orders for non-essential use and drought permits/drought orders for additional abstraction and may require emergency drought orders for restriction on essential use	Once in 200 years	0.5%

Table 2.6 IWNL's Levels of Service for SEW area

Level	Action	Frequency of implementation (drought severity)	Annual Risk of Restriction
1	Temporary water use restrictions	no more than one year in 10	10%
2	non-essential water use restrictions	no more than one year in 40	3%

2.6 Non-Drought Hazards Considered

IWNL's supplies are derived from bulk supply contracts and IWNL does not own any above-ground infrastructure on it's clean water network. Having reviewed potential hazards (UKWIR 2013a) on IWNL's network, the following were identified as presenting a very low risk to IWNL's supply resilience and have been factored into our calculations.

- Freeze-Thaw
- Landslip/Subsidence
- Third Party - emptying inappropriate material into manholes
- Geological Processes
- SEMD Hazards

Note that these are risks to IWNL's assets and infrastructure, not to the incumbent suppliers who will have included these risks in their own plans.

2.7 Greenhouse Gas Emissions

IWNL obtains water from bulk supplies and does not abstract, treat or store water. Neither do we have any pumping stations on our clean water networks.

Although IWNL install polyethylene pipes, the production of greenhouse gases resulting from the manufacture and transport of these products is assessed by the manufacturer rather than the end-use to prevent double counting.

IWNL do not run many vehicles and consider our vehicle emissions to be negligible; this will be evaluated on an ongoing basis as the business grows.

Consequently, IWNL assess our contribution of Carbon Dioxide equivalent emissions to be effectively zero tonnes.

2.8 Current Situation Regarding Development of Supply Areas

Table 2.6 below shows the expected number of connections at full development together with the actual numbers of connected customers at the end of March 2018 for all IWNL inset areas.

Table 2.7 Current and final levels of development at IWNL sites

IWNL ref. no.	Site	Number of connections				Current development (%)
		Domestic		Non-household		
		Current	Final	Current	Final	
38861	Priors Hall	974	5140	3	12	19
40806	Long Croft Road	826	975	5	13	84
42017	Great Billing Way	162	162	4	4	100
43414	Brooklands	1335	2597	14	14	52
39088	Berryfields	2458	3600	25	42	68
42433	King's Cross Central	1008	2500	99	167	42
45422	The Bridge	771	892	51	51	87
40328	Oakham North	653	1100	0	0	59
53244	NES Crawley	454	1833	3	3	25
55153	GMV	428	1746	6	6	25
36948	Martello Lakes	73	1050	0	0	7
52713	Ebbsfleet	414	1350	2	2	31
55030	Bishop's Stortford	0	2450	0	6	0
71641	Chilmington Green	0	5750	0	14	0

Notes:
1. *'Current' refers to the actual numbers of connected customers at the end of March 2017*
2. *'Ultimate' refers to the expected no. of connections at full build-out*
3. *Numbers exclude temporary builders' supplies to compounds etc.*

At present company records show that IWNL is also supplying water to nine schools. Also, the University of Arts, London Complex at Kings Cross.

1. Corby Business Academy, Corby;
2. Brooklands Farm Primary School, Milton Keynes;
3. Little Stanion Primary School, Corby;
4. Berryfields Academy, Aylesbury;
5. Berryfields Primary School, Aylesbury;
6. Kings Cross Academy, London;
7. Forgewood Primary School, Crawley;
8. Cherry Orchard Primary Academy, Ebbsfleet
9. Walton High School, Milton Keynes

All IWNL customers are being supplied via new infrastructure constructed to industry standards; therefore, IWNL view these assets as at low risk of failure.

2.9 The Scope of the Plan

The main components of a water resources management plan are as follows:

- A baseline forecast of demand for the 25-year planning period, assuming current demand policies
- A baseline forecast of the available water supplies over the same period making assumptions about current resources and future known changes

- From these forecasts, prepare a baseline supply-demand balance by computing whether there is a water surplus or deficit in each year of the planning period
- If there is a deficit, devise and select water management solutions to make up the deficit
- Assess the cost and benefits of a range of supply and demand options and provide justification for the proposed preferred solutions
- Prepare a final-supply demand balance, taking the preferred water management solutions into account

As mentioned in section 1.4, all the company supplies are bulk transfers therefore there is no requirement to carry out a deployable output assessment, nor the associated assessment of how sustainability reductions or the impact of climate change might affect supplies. These risks are born by the donor company, although in times of drought IWNL customers will have to share the impact of any supply restrictions on an equitable basis.

3 The Supply-Demand Balance

3.1 Introduction

This section describes the general methodology used to compute the supply-demand balance, the data available and the assumptions made. Detailed balances for each of the WRZs covered by this plan are presented and discussed in section 4. These will need to be revisited as data on actual consumption and water delivery become available. Assumed or estimated values can then be substituted with actual data. The opportunity to do this arises with each annual review of the plan with a new and revised plan due after five years.

3.1.1 Deployable Output

IWNL does not own or operate water supply sources of its own. All supplies are bulk transfers from the incumbent water companies. There are no exports out of IWNL supply areas.

In general, the quantity of water to be made available in each WRZ has been negotiated with the incumbent water company such that no supply-demand deficit is envisaged within the 25-year planning horizon. Quantities are based on estimates of the total water requirement (baseline demand and operating losses) in each inset area at projected final development; i.e. after all the currently proposed development is complete.

Quantities are defined in terms of an annual maximum volume in m^3/year, a maximum daily volume in m^3/day and a maximum instantaneous flow in l/s. Values are set out in separate bulk supply agreements between IWNL and incumbent water companies.

Table 3.1.1 Agreed limits to the bulk supply within the AWS

IWNL Ref.	Site	Maximum instantaneous flow l/s	Maximum daily volume m^3/day	Maximum annual volume m^3/year
38861	Priors Hall	120	2,979.77	1,087,603
40806	Long Croft Road	16.23	600	186,000
42017	Great Billing Way	1.71	53.65	19,580
43414	Brooklands	48.49	1,828	556,050

Notes: 1. *Maximum quantities at other sites are based on estimates of total water requirements at projected final development.*

Table 3.1.2 Agreed limits to the bulk supply within the TWUL

IWNL Ref.	Site	Maximum instantaneous flow l/s	Maximum daily volume m^3/day	Maximum annual volume m^3/year
39088	Berryfields	115	1,800	657,000
42433	King's Cross Central	151	3,560	1,300,000
45422	The Bridge, Dartford	24	367	134,000
52713	Ebbsfleet	25.48	636.05	232,160
55153	GMV	23.46	662.43	249,088

Table 3.1.3 Agreed limits to the bulk supply within the STW

IWNL Ref.	Site	Maximum instantaneous flow l/s	Maximum daily volume m^3/day	Maximum annual volume m^3/year
40328	Oakham	14.4	440.64	160,834

Table 3.1.4 Agreed limits to the bulk supply within the SW

IWNL Ref.	Site	Maximum instantaneous flow l/s	Maximum daily volume m^3/day	Maximum annual volume m^3/year
53244	Crawley	44.3	690	135,086

Table 3.1.5 Agreed limits to the bulk supply within the AFW

IWNL Ref.	Site	Maximum instantaneous flow l/s	Maximum daily volume m^3/day	Maximum annual volume m^3/year
36948	Martello Lakes	18.06	525.2	191,729
55030	Bishop 's Stortford	23.58	1,111	405,397

Table 3.1.6 Agreed limits to the bulk supply within the SEW

IWNL Ref.	Site	Maximum instantaneous flow l/s	Maximum daily volume m^3/day	Maximum annual volume m^3/year
71641	Chilmington Green	32.08	2,772	1,012,346

When expressed as a daily rate, the maximum annual volume represents the average rate of transfer that can be maintained over the year. There are peaks of demand within this, normally in summer months and/or dry years when high temperatures lead to temporary highs in consumption. The maximum allowable daily transfer is at a higher rate than the annual volume to take these peaks into account.

The maximum daily and annual volumes will be supplied by incumbent water companies save in exceptional circumstances when supplies could be reduced. The incumbent water companies are entitled to reduce bulk supplies in cases of Emergency or 'Force Majeure'. Droughts are considered an emergency.

3.1.2 Outage

Outage is a temporary, short-term loss in deployable output caused by unforeseen or unavoidable events affecting any part of the water supply system. The supply failure would normally last at least 24 hours before being considered a legitimate outage event. However, interruptions longer than 3 months would be considered reductions in deployable output rather than outage.

As IWNL do not operate any sources or treatment works, any outage events upstream of the point of connection for the bulk supply will therefore be considered in incumbent company's assessment of WAFU, but not IWNL's. Any issues relating to the reliability of the bulk transfer are allowed for under Headroom.

3.2 Demand

In line with Government policy, all new properties will be metered using the latest AMR metering technology for domestic and commercial supplies. Table 2.6 shows the number of properties that have been built to date.

Existing data on water consumption is heavily influenced by the significant volumes of water used during construction at each site for building supplies, batching plants, water mains testing, commissioning of waste water networks, road sweeping, and gully cleaning.

A reasonable period of 'normal' consumption is needed, free from construction activities, before usable data on actual consumption can be obtained. In the meantime, demand must be estimated using industry-standard or average rates for the water industry as a whole, or typical values recorded elsewhere in the region, particularly in neighbouring areas.

Nevertheless, it is important to take account of key differences between inset areas and the surrounding region. For example, all properties in the inset areas are new and built to modern standards of water efficiency. The majority will be built after the latest amendments to Building Regulations came into force in October 2009. Metering is generally believed to lower per capita consumption and so the fact that all properties in the insets will be metered is an important consideration.

3.2.1 Domestic Demand

Domestic demand is estimated as the product of the number of properties times their occupancy (number of people per property) times the rate of per capita consumption (pcc – expressed in litres/person/day or l/p/d).

The Government's water strategy for England sets out a vision for the year 2030 which

includes,

"*Reduced per capita consumption of water through cost effective measures, to an average of 130 litres per person per day by 2030, or possibly even 120 litres per person per day depending on new technological developments and innovation."* (Defra 2008)

New housing (which forms the whole of IWNL's asset base) should be built to the 125 l/p/d/standard. It might be expected that over time, and with IWNL's commitment to aim for the highest levels of water efficiency, it will be possible to achieve lower pcc rates. However, for initial planning purposes we have assumed a constant pcc of 120-147 l/p/d for domestic demand throughout the planning period. This has been calculated based on measured metered consumption in each zone.

The number of domestic connections at full development in each inset area has been defined by the developers (Table 2.6) although there is uncertainty about the rate of development and when full build-out will be achieved. This will depend on the rate of house sales which in turn will depend to a large extent on the 'economic recovery' and the state of the national and local economy. For the purpose of demand forecasts, it has been assumed that domestic properties will be built at a rate not exceeding 350 properties per year depending on the size of the overall development. This rate will undoubtedly vary from year to year but as it is thought that the development of new sources of supply within the planning period will not be necessary, the rate of house building is not critical unless more than one bulk supply connection needs to be made.

With the number of domestic and commercial properties at full development already known, the only uncertainty in numbers of population served is in the rate of occupancy. With smaller families and a tendency for more people to live alone, occupancy rates across the country are falling. Occupancy rates within the inset areas are not known. For planning purposes, we have used the UK average household size 2.3 people per household (Ons.gov.uk, 2017).

3.2.2 Non-Domestic Demand

The number of non-domestic connections at full development in each inset area has been defined by the developers (Table 2.6) the developments include a mix of both commercial and educational establishments.

Water demand in commercial developments is related to internal floor area and the number of people working or living there. The property mix can vary enormously, as can water consumption expressed per person or per square metre. Commercial demand therefore has been calculated separately for each WRZ using metered consumption data.

3.2.3 Water efficiency

Water efficiency is an integral part of resource planning and IWNL has a statutory duty to promote the efficient use of water. Key to this is support for customer behavioural change. We believe that it is important to support and assist customers with these changes and this will be the key strand of our work during the period along with promoting our environmental policy objectives. All new buildings will be designed with water efficiency in mind.

All IWNL's properties are metered. Customer consumption from meter reads is monitored to either investigate for leakage or issue letters to customers advising that they are high users

along with tips on being water wise.

IWNL's company publication entitled "*Using water wisely at home*" sets out a programme of water efficiency initiatives that focus on education, advice and raising awareness. This publication is provided free to every new customer and is available to view on the IWNL web site.

IWNL issues Summer and Winter newsletters to all our domestic customers which include details on detecting leaks and water wise tips.

All bills include a table to show customers where their water consumption compares to industry averages for number of occupants, this additional information will enable customers to control their own usage.

Call centre agents are trained on how to discuss / direct customers to our water wise sections of the website and how to talk customers through leak detection techniques.

During the next 5 years, IWNL will monitor and utilise site-specific consumption data to target the delivery of water-efficiency messages to our customers in specific zones and use metering data to evaluate the efficacy of these messages".

3.3 Leakage

Some degree of leakage from the distribution network is unavoidable. It may occur from storage facilities, transmission mains and distribution mains (often called 'distribution' or 'company-side' losses) or from service connections up to the customers' meter (sometimes called USPL or 'Underground Supply Pipe Leakage'). The latter are also referred to as 'customer-side losses'.

Leakage is normally the largest component of losses from a water supply system, but it is not the only component. Illegal connections may constitute real losses from the system while meter inaccuracies may give rise to 'apparent' losses. Together with leakage, these 'real' and 'apparent' losses make up the 'unaccounted-for water' component (UFW).

Leakage performance can be expressed in several ways. Customer-side leakage is often expressed in litres/property/day while distribution leakage may be more appropriately expressed in m^3/kilometre/day. The former allows for different densities of housing while the latter takes account of the length of distribution main from source works to customer. Leakage is also often expressed in terms of % of water put into distribution. All of these indicators can be useful for comparing the performance of similar systems although care must be taken when comparing values from different systems or areas with widely varying characteristics.

In our inset application IWNL has agreed target rates for "unaccounted-for-water" of 5% of distribution input. Most of this will be leakage and the terms 'leakage' and unaccounted-for water' are taken as synonymous in the context of our supply-demand balance.

On the basis that that IWNL is constructing and operating only brand new all welded plastic systems and all supplied properties are new, water efficient and metered, UFW rates of around 4.5% are expected to be achievable.

However, as the network ages, leakage rates are likely to rise but the rate of increase is difficult to predict. IWNL is developing systems to more accurately assess UFW and will use this data in future WRMPs once we are confident of its robustness.

IWNL have assumed that we will be able to maintain distribution losses at approximately 4.5% of distribution input towards the end of the planning period. The 4.5% is a target for losses which includes potential 2% for meter inaccuracies as the meters age and 2.5% for pure distribution losses. IWNL does not own or operate any pipeline systems older than 11 years; as IWNL mostly deploy pipes made from MDPE or HDPE, with quality controlled welded joints to connect pipes, we believe that we can achieve very low levels of leakage. To maintain this IWNL regularly send teams out to visually inspect our region identifying area areas of wet ground for potential leaks. IWNL are also in the unique position of having boundary meters and all properties within the inset metered. This enables IWNL to actively monitor our level of losses with real data rather than models of assumption. Any anomalies can be investigated and rectified. IWNL will also look to adopt a leakage maintenance strategy as our network ages where we will use acoustic technics to help identify and rectify leaks.

As stated previously, almost all the sites are at an early stage of development and the take up of connected properties is low due to the down turn in housing markets. Meaningful assessments of unaccounted-for supply pipe background leakage and operational usage will therefore be difficult to make until several years of operational metering data are available. In the meantime, regular monitoring of demands and trends in readings from bulk meters will continue.

The AMR 3G metering technology employed will provide for close management of night flows through the meters enabling the rapid identification of changes in patterns of use or potential bursts in the system. Domestic leakage can be detected by leakage alarms triggered during meter reading downloads on routine drive-bys.

When development on each site becomes significant, an assessment of the company's Sustainable Environmental Level of Leakage (SELL) will be undertaken. An active programme of leakage monitoring and repair will then be instigated to maintain SELL.

3.4 Target Headroom

Headroom is a planning allowance that is used to provide a buffer in the forecast supply-demand balance. Target Headroom is defined as follows (UKWIR 1998),

"The minimum buffer that a prudent water company should allow between supply (including raw-water imports and excluding raw-water exports) and demand to cater for specified uncertainties (except those due to outages) in the overall supply-demand balance. Introducing this into the overall supply-demand balance will help to ensure that the water company's chosen level of service can be achieved."

Available headroom is the difference between demand and WAFU (the water available for use) at any given time. It will vary with time as demand increases, new supplies are brought on-line to meet increasing demand and uncertainty increases the further into the future you go.

If Available Headroom is greater than or equal to Target Headroom, then the desired level of service should be achieved. If Available Headroom falls below the target value, the water

company will face the risk of not achieving its stated level of service.

IWNL have used a method developed by UKWIR in 1998 (UKWIR 1998) to estimate target headroom for the current WRMP. Target headroom is calculated to rise from 6.5% in 2017/18 to 7.7% in 2044/45 for all the IWNL's WRZ.

3.4.1 Effect of Climate Change

3.4.1.1 Effect on Supply

An increase in target headroom resulting from climate change has not been added to IWNL's supply model, since our water is supplied by a point of connection to an incumbent water supply. The agreed bulk supply agreements will not change as a result of climate change and the contracted quantities are not restricted by a change in demand which is a consequence of climate change.

3.4.1.2 Effect on Demand

Each zone has been assessed for its vulnerability to climate change using UKCP09 predictions and after liaison with incumbent water companies (see Table 3.4.1). The vulnerability levels allocated to each site show clear regional patterns. The sites allocated as medium risk are located primarily in the South of England and the sites estimated to be at lower risk are in other parts of the UK. These results correspond with the estimates of the impact of climate change on household water demand found by UKWIR in 2013 (UKWIR 2013b)

Factors found to be statistically significant in determining household water consumption (UKWIR 2013b) are:

- sunshine hours
- maximum temperature
- rainfall
- property type
- month

IWNL have used UKCP09 climate projections to consider how these factors influence domestic demand. Weather-demand relationships have been formed and these have been used to derive the estimates of climate change on household water demand. The increase in target headroom for each zone has been evaluated to ensure consistency with the incumbent water companies. In our next WRMP, IWNL will utilise UKCP18 predictions. For each zone, the predicted increase in demand due to climate change in 2044/45 is shown in Table 3.4.1 below.

Table 3.4.1 IWNL Assessment of Site Vulnerability to Climate Change

IWNL Ref.	Site	Vulnerability to Climate Change	Increased Demand due to Climate Change in 2044/45 (Ml/d)
38861	Priors Hall	Low Risk	0.016
40806	Long Croft Road	Low Risk	0.003
42017	Great Billing Way	Low Risk	0.0004
43414	Brooklands	Low Risk	0.007
39088	Berryfields	Medium Risk	0.028
42433	King's Cross Central	Medium Risk	0.054
45422	The Bridge	Medium Risk	0.007
40328	Oakham North	Low Risk	0.003
53244	NES Crawley	Medium Risk	0.014
55153	GMV	Medium Risk	0.013
36948	Martello Lakes	Low Risk	0.003
52713	Ebbsfleet	Medium Risk	0.010
55030	Bishop's Stortford	Low Risk	0.007
71641	Chilmington Green	Medium Risk	0.037

4 Details of the Water Resources Zones

4.1 Introduction

The methodology and assumptions used to construct the supply-demand balance are described in section 3. However, the balance itself is different for each WRZ and some of the values used to estimate demand also vary. The detailed supply-demand balance for each WRZ is discussed in the following sub-sections. For the purposes of this report, each of IWNL's inset areas is currently treated as a separate WRZ, as discussed in section 1.4

4.2 Anglian Water

4.2.1 Priors Hall (38861)

Priors Hall Park lies to the north of the A43 at Weldon, about 3 miles north east of Corby town centre. The site location is shown on Figure 1.

Figure 1 Location of Priors Hall WRZ

4.2.1.1 Current Water Supply Arrangements

IWNL have negotiated an initial bulk supply agreement to supply 5140 dwellings and an Academy secondary school. The maximum quantities to be supplied under this agreement are listed in Table 3.1. The agreement makes no provision for higher peak daily rates although the maximum allowed instantaneous rate of flow is 120 l/s (10.3 Ml/d).

4.2.1.2 Current Demands

734 (14%) out of a projected final total of 5140 domestic units had been completed by the end of March 2017. Current water demand on the site is 0.22 Ml/d, and highly influenced by construction activities.

4.2.1.3 Demand Forecasts and Projections –Priors Hall WRZ

There will be an estimated 5140 domestic properties, an Academy school and 12 commercial units of varying type at full build-out. The precise rate of development is not known as it will

depend on many factors, not least the country's economic recovery from recession. For the purpose of resource planning, we have assumed that an average of 180 units will be built each year. At this rate of development, the site will be completed at or around the end of the 2040/41.

4.2.1.4 The Supply-Demand Balance

Total demand in the zone increases steadily until the projected full build-out is achieved in 2040/41. Headroom increases very slightly as uncertainty increases into the future and leakage increases as the distribution network ages although remains low. Total demand in 2044/45 (including leakage) is estimated to be 1.79 Ml/d with an additional 0.15 Ml/d headroom allowance.

The supply-demand balance is projected to remain in surplus throughout the planning period with an available headroom of 1.19 Ml/d in 2044/45. It is therefore concluded that no measures additional to routine leakage control and normal regard for the efficient use of water will be required to maintain a positive supply-demand balance within the planning period. The projected balance is illustrated in Figure 2.

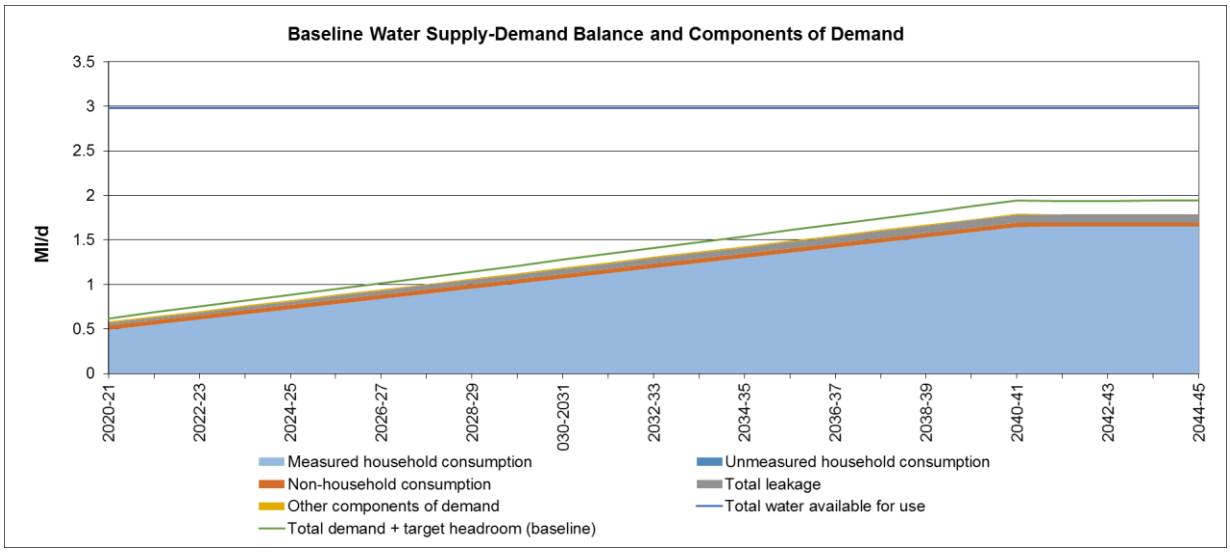

Figure 2 Priors Hall projected supply-demand balance

4.2.2 Long Croft Road (40806)

Long Croft Road is a development of 975 residential homes at Little Stanion, to the south of Corby town centre. The site location is shown on Figure 3.

Figure 3 Location of Long Croft Road WRZ

4.2.2.1 Current Water Supply Arrangements

The bulk supply agreement includes for two metered connections, marked A and B in the plan in Figure 3. The maximum quantities to be supplied under this agreement are listed in Table 3.1. The agreement makes no provision for higher peak daily rates although the maximum allowed instantaneous rate of flow is 16.23 l/s (1.4 Ml/d).

4.2.2.2 Current Demands

794 (81%) out of a projected final total of 975 domestic units had been completed by the end of March 2017. Current water demand on the site is 0.31Ml/d.

4.2.2.3 Demand Forecasts and Projections – Long Croft Road WRZ

There will be an estimated 975 domestic properties and 13 commercial buildings at full build-out. The site is expected to be completed at or around the end of the 2018/19. Demand forecasts have been derived using data obtained from bulk supply and customer meters data and assumed values for property occupancy in section 3.

4.2.2.4 The Supply-Demand Balance

Total demand in the zone increases steadily until the projected full build-out is achieved in 2018/19. Headroom increases very slightly as uncertainty increases into the future and leakage increases as the distribution network ages although remains low. Total demand in 2044/45 (including leakage) is estimated to be 0.34 Ml/d with an additional 0.03 Ml/d headroom allowance.

The supply-demand balance is projected to remain in surplus throughout the planning period with an available headroom of 0.26 Ml/d in 2044/45 compared to a target headroom of 0.03 Ml/d. It is therefore concluded that no measures additional to routine leakage control and normal regard for the efficient use of water will be required to maintain a positive supply-demand balance within the planning period. The projected balance is illustrated in Figure 4.

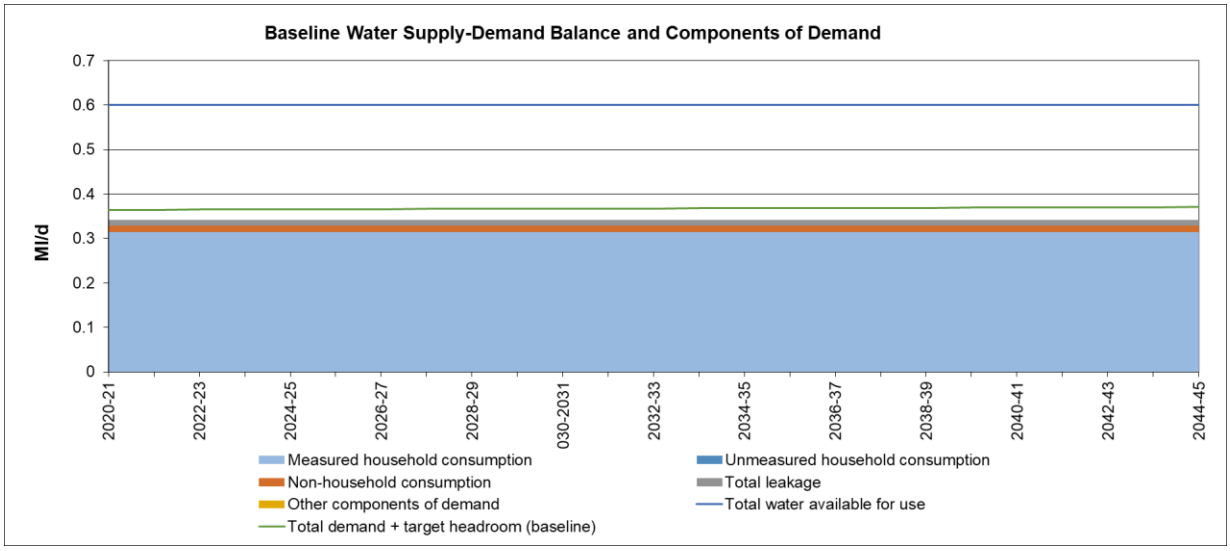

Figure 4 Long Croft projected supply-demand balance

4.2.3 Great Billing Way, Northampton (42017)

Great Billing Way is a development of 162 residential dwellings at Blackthorn Wood on the north-eastern side of Northampton. The site location is shown on Figure 5.

Figure 5 Location of Great Billing Way WRZ

4.2.3.1 Current Water Supply Arrangements

The site plan in the bulk supply agreement shows a single connection to AWS distribution system in the south west corner of the site. The maximum quantities to be supplied under this agreement are listed in Table 3.1. The agreement makes no provision for higher peak daily rates although the maximum allowed instantaneous rate of flow is 1.71 l/s (0.147 Ml/d).

4.2.3.2 Current Demands

Development of the site was completed in April 2011. Current water demand on the site is 0.05Ml/d.

4.2.3.3 Demand forecasts and projections

There are 162 domestic properties and 4 commercial buildings. The site was completed in April 2011. Demand forecasts have been derived using data obtained from bulk supply and customer meters data and assumed values for property occupancy in section 3.

4.2.3.4 The Supply-Demand Balance

Total demand in the zone is at its maximum at full build-out in 2011/12. Headroom increases very slightly as uncertainty increases into the future and leakage increases as the distribution network ages although remains low. Total demand in 2044/45 (including leakage) is estimated to be 0.05 Ml/d with an additional 0.004 Ml/d headroom allowance.

The supply-demand balance is projected to remain in surplus throughout the planning period with an available headroom of 0.01 Ml/d in 2044/45 compared to a target headroom of 0.004 Ml/d. There could be difficulties meeting peak demand without breaching the daily limits in the current bulk supply agreement although judging by the maximum instantaneous allowable flow, the connection to AWS's network has the necessary capacity.

It is concluded that no measures additional to routine leakage control and normal regard for the efficient use of water will be required to maintain a positive supply-demand balance within the planning period. Consideration will be given to increasing the daily limit quoted in the bulk supply agreement. The projected balance is illustrated in Figure 6.

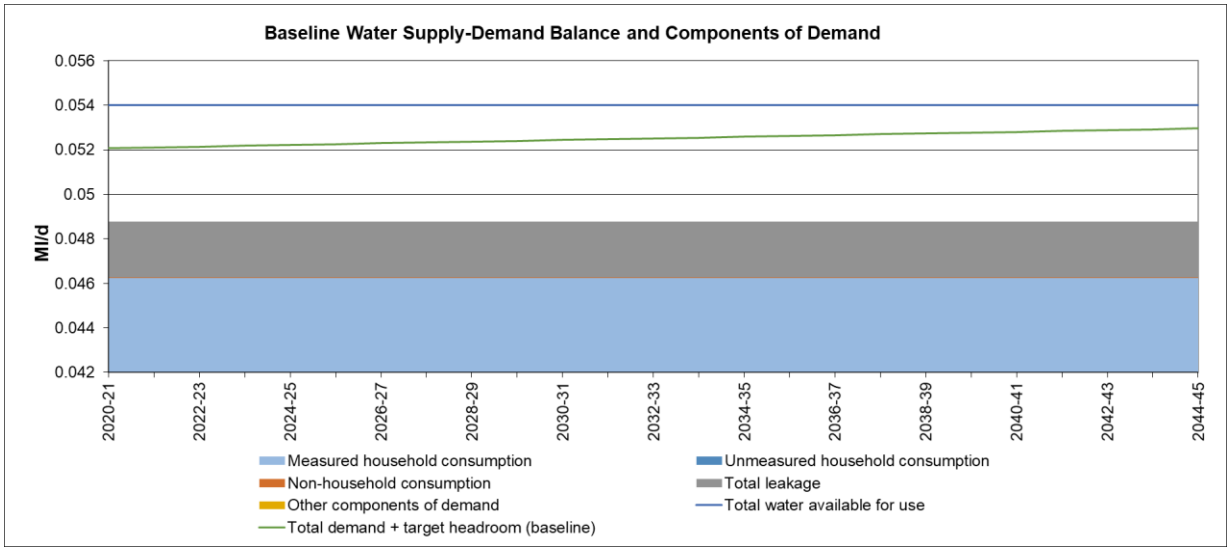

Figure 6 Great Billing Way projected supply-demand balance

4.2.4 Brooklands, Milton Keynes (43414)

The Brooklands development lies on the eastern side of Milton Keynes in Bedfordshire. It is flanked by the A4146 to the west and the A5130 to the north and east. The site location is shown on Figure 7.

Figure 7 Location of Brooklands WRZ

4.2.4.1 Current Water Supply Arrangements

Provision for a single point of connection and bulk metered supply arrangement to AWS distribution system has been agreed to the north-east corner of the site. The maximum quantities to be supplied under this agreement are listed in Table 3.1. The agreement makes no provision for higher peak daily rates although the maximum allowed instantaneous rate of flow is 48.49 l/s (4.18 Ml/d).

4.2.4.2 Current Demands

1041 (40%) out of a projected final total of 2597 domestic unit had been completed by the end of March 2017. Current water demand on the site is 0.30 Ml/d, and highly influenced by construction activities.

4.2.4.3 Demand forecasts and projections

There will be an estimated 2597 domestic properties and 14 commercial properties at full build-out. A primary school is already open although it is not known what type of commercial development will comprise the remainder. A mix of developments has therefore been assumed to estimate commercial demand. The precise rate of development is not known but if one assumes that an average of 250 units will be built each year, full build-out will be achieved in 2022/23.Demand forecasts have been derived using data obtained from bulk supply and customer meters data and assumed values for property occupancy in section 3.

4.2.4.4 The Supply-Demand Balance

Total demand in the zone increases steadily until the projected full build-out is achieved in 2022/23. Headroom increases very slightly as uncertainty increases into the future and leakage increases as the distribution network ages although remains low. Total demand in 2044/45 (including leakage) is estimated to be 0.89 Ml/d with an additional 0.08 Ml/d headroom allowance.

The supply-demand balance is projected to remain in surplus throughout the planning period

with an available headroom of 0.63 Ml/d in 2044/45 compared to a target headroom of 0.08 Ml/d. It is therefore concluded that no measures additional to routine leakage control and normal regard for the efficient use of water will be required to maintain a positive supply-demand balance within the planning period. The projected balance is illustrated in Figure 8.

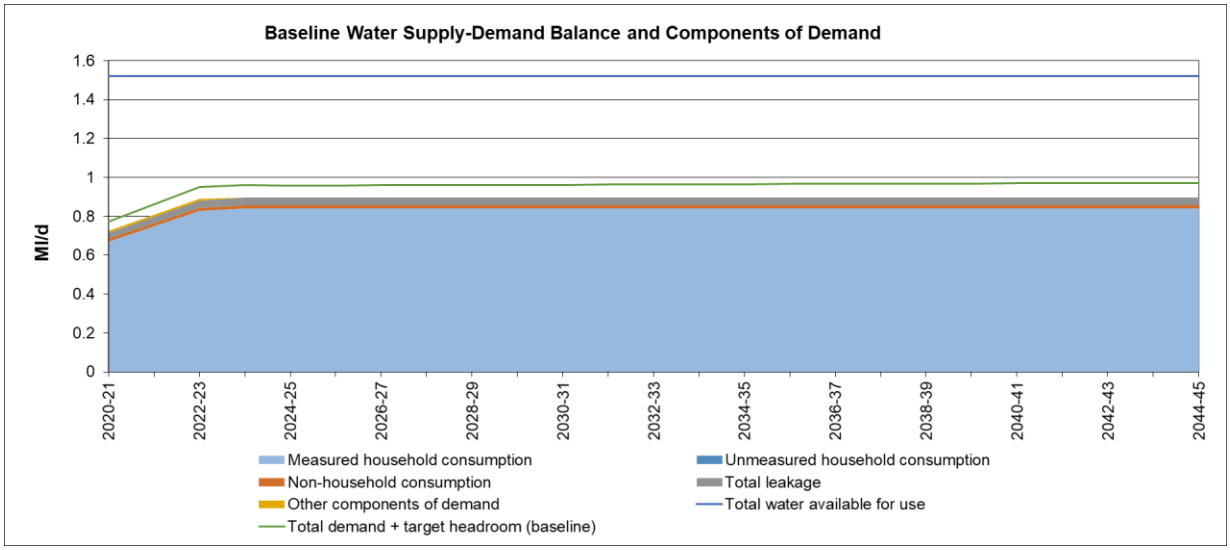

Figure 8 Brooklands projected supply-demand balance

4.3 Thames Water

4.3.1 Berryfields (39088)

The Berryfields development lies beside the A41 immediately to the north-west of Aylesbury in Buckinghamshire. It lies within TWUL's SWA (Slough/Wycombe/ Aylesbury) Water Resource Zone. The site location is shown on Figure 9.

Figure 9 Location of the Berryfields WRZ

4.3.1.1 Current Water Supply Arrangements

Schedule 2 of the bulk supply agreement indicates that the site will have a single permanent 250mm connection to TWUL's ring main in the south-east corner of the development. However, the site will initially operate with a temporary 90mm connection at the A41 roundabout close to Aylesbury Vale Parkway railway station. This will remain in place as a backup to the permanent connection. The maximum quantities to be supplied under this agreement are listed in Table 3.1. The agreement makes no provision for higher peak daily rates although the maximum allowed instantaneous rate of flow is 115 l/s (9.93 Ml/d).

4.3.1.2 Current Demands

2118 (59%) out of a projected final total of 3600 domestic unit had been completed by the end of March 2017. Current water demand on the site is 0.63 Ml/d, and highly influenced by construction activities.

4.3.1.3 Demand forecasts and projections

There will be an estimated 3600 domestic properties and 42 commercial properties at full build-out. It is not known what type of commercial development will comprise, therefore a mix of developments has been assumed to estimate commercial demand. The precise rate of development is not known but if one assumes that an average of 350 units will be built each year, full build-out will be achieved in 2022/23. Demand forecasts have been derived using data obtained from bulk supply and customer meters data and assumed values for property occupancy in section 3.

4.3.1.4 The Supply-Demand Balance

Total demand in the zone increases steadily until the projected full build-out is achieved in 2021/22. Headroom increases very slightly as uncertainty increases into the future and leakage increases as the distribution network ages although remains low. Total demand in 2044/45 (including leakage) is estimated to be 1.24 Ml/d with an additional 0.12 Ml/d headroom allowance.

The supply-demand balance is projected to remain in surplus throughout the planning period with an available headroom of 0.56 Ml/d in 2044/45 compared to a target headroom of 0.10 Ml/d. It is therefore concluded that no measures additional to routine leakage control and normal regard for the efficient use of water will be required to maintain a positive supply-demand balance within the planning period. The projected balance is illustrated in Figure 10.

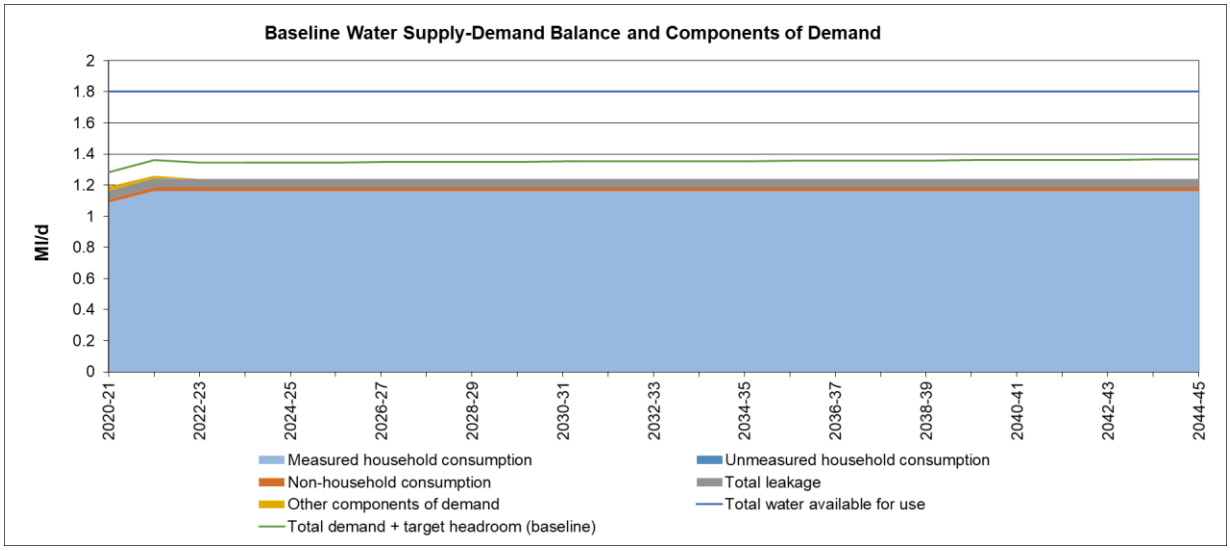

Figure 10 Berryfields projected supply-demand balance

4.3.2 Kings Cross Central (42433)

King's Cross Central is a large, 67-acre mixed development on derelict land between King's Cross and St. Pancras railway stations in central London. The site is to the west of York Way and is traversed by the Regent's Canal. It will contain offices, shops, homes, serviced apartments and a university annex. The site location is shown on Figure 11.

Figure 11 Location of the Kings Cross Central WRZ

4.3.2.1 Current Water Supply Arrangements

The bulk supply agreement confirms that the development will be supplied by two 450 mm connections fed from TWUL's distribution network at York Way and Pancras Road. Each of these connections has a transfer limit specified in the bulk supply agreement. However, there

is also an overall combined limit (equal to the limit of each 450mm connection). The maximum quantities to be supplied under this agreement are listed in Table 3.1. The agreement makes no provision for higher peak daily rates although the maximum allowed instantaneous rate of flow is 151 l/s (13.04 Ml/d).

4.3.2.2 Current Demands

784 (33%) out of a projected final total of 2500 domestic unit had been completed by the end of March 2017. Current water demand on the site is 1.60 Ml/d, and highly influenced by construction activities.

4.3.2.3 Demand forecasts and projections

There will be an estimated 2500 domestic properties and 167 commercial properties at full build-out. It is not known what type of commercial development will comprise, therefore a mix of developments has been assumed to estimate commercial demand. The precise rate of development is not known but if one assumes that an average of 130 units will be built each year, full build-out will be achieved in 2032/33. Demand forecasts have been derived using data obtained from bulk supply and customer meters data and assumed values for property occupancy in section 3.

4.3.2.4 The Supply-Demand Balance

Total demand in the zone increases steadily until the projected full build-out is achieved in 2031/32. Headroom increases very slightly as uncertainty increases into the future and leakage increases as the distribution network ages although remains low. Total demand in 2044/45 (including leakage) is estimated to be 2.39 Ml/d with an additional 0.24 Ml/d headroom allowance.

The supply-demand balance is projected to remain in surplus throughout the planning period with an available headroom of 1.17 Ml/d in 2044/45 compared to a target headroom of 0.18 Ml/d. It is therefore concluded that no measures additional to routine leakage control and normal regard for the efficient use of water will be required to maintain a positive supply-demand balance within the planning period. The projected balance is illustrated in Figure 12.

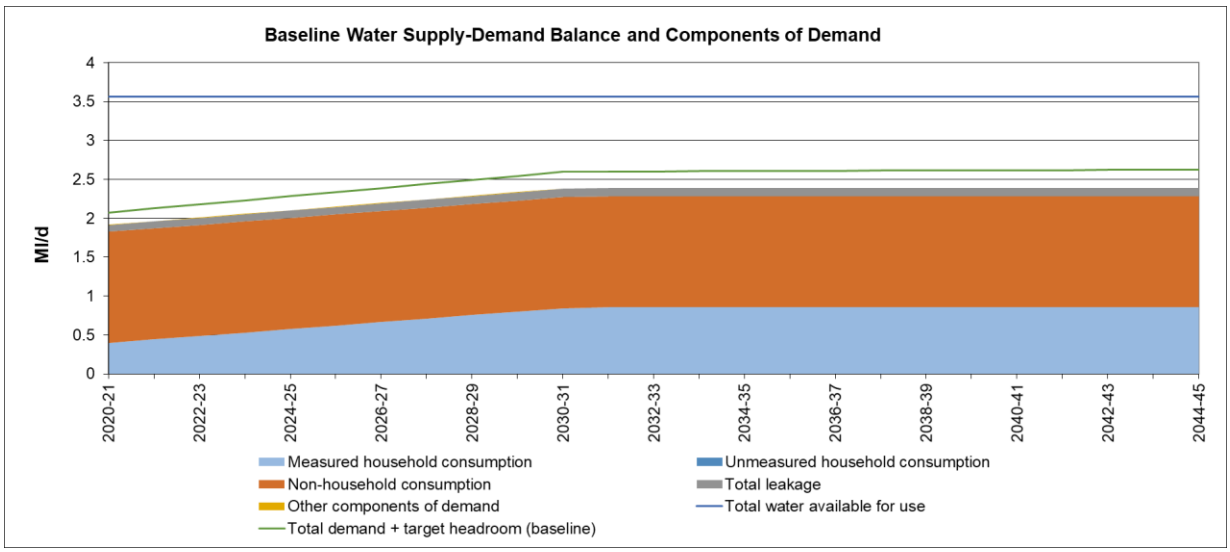

Figure 12 Kings Cross projected supply-demand balance

4.3.3 The Bridge, Dartford (45422)

The Bridge is a science and business park incorporating 1500 new homes and up to 1.8 million sq. feet of commercial space. It is situated on the south bank of the Thames next to Littlebrook Power Station and immediately to the west of the Dartford Crossing. The site location is shown on Figure 13.

Figure 13 Location of The Bridge WRZ

4.3.3.1 Current Water Supply Arrangements

The bulk supply agreement indicates that the site will have two 150 mm connections to TWUL's ring main, one to the north and one to the south. The limit on each connection is 17.7 l/s although the limit on the two connections combined is 24 l/s. It is assumed that the first figure represents a physical limit while the second figure represents a restriction on the amount of take specified in the bulk supply agreement. Limits on the bulk supply are defined in the Agreement, as shown in Table 3.1.

4.3.3.2 Current Demands

685 (78%) out of a projected final total of 892 domestic unit had been completed by the end of March 2017. Current water demand on the site is 0.29 Ml/d, and highly influenced by construction activities.

4.3.3.3 Demand forecasts and projections

There will be an estimated 892 domestic properties and 44 commercial properties at full build-out. It is not known what type of commercial development will comprise, therefore a mix of developments has been assumed to estimate commercial demand. The precise rate of development is not known but if one assumes that an average of 120 units will be built each year, full build-out will be achieved in 2019/20. Demand forecasts have been derived using data obtained from bulk supply and customer meters data and assumed values for property occupancy in section 3.

4.3.3.4 The Supply-Demand Balance

Total demand in the zone increases steadily until the projected full build-out is achieved in 2019/20. Headroom increases very slightly as uncertainty increases into the future and leakage increases as the distribution network ages although remains low. Total demand in 2044/45 (including leakage) is estimated to be 0.37 Ml/d with an additional 0.03 Ml/d headroom allowance.

The supply-demand balance is projected to remain in surplus throughout the planning period with an available headroom of 0.06 Ml/d in 2044/45 compared to a target headroom of 0.02 Ml/d. It is therefore concluded that no measures additional to routine leakage control and normal regard for the efficient use of water will be required to maintain a positive supply-demand balance within the planning period. The projected balance is illustrated in Figure 14.

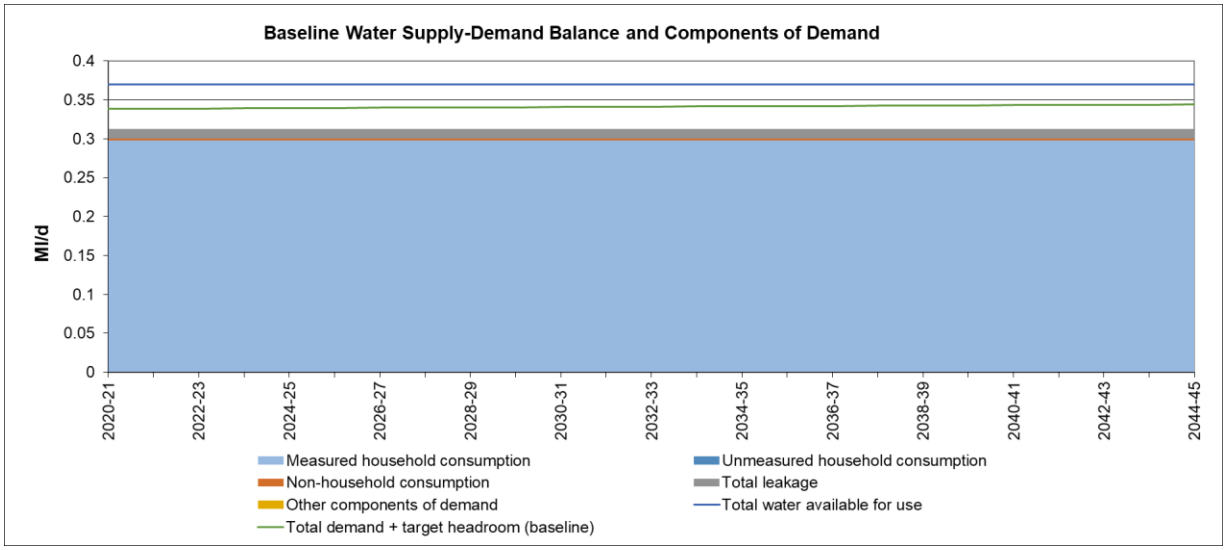

Figure 14 The Bridge projected supply-demand balance

4.3.4 Ebbsfleet (52713)

The Ebbsfleet development lies to the north of the A2 in Swanscombe, Kent. The development falls within Thames Water's 'London WRZ.' This is reliant on groundwater abstraction and river abstractions from the River Medway for supply. The site location is shown on Figure 15.

Figure 15 Location of the Ebbsfleet WRZ

4.3.4.1 Current Water Supply Arrangements

IWNL have negotiated an initial bulk supply agreement to supply 1350 dwellings. The maximum quantities to be supplied under this agreement are listed in Table 3.1. The agreement makes no provision for higher peak daily rates although the maximum allowed instantaneous rate of flow is 44.3 l/s (2.20 Ml/d).

4.3.4.2 Current Demands

184 (14%) out of a projected final total of 1350 domestic unit had been completed by the end of March 2017. Current water demand on the site is 0.11 Ml/d, and highly influenced by construction activities.

4.3.4.3 Demand forecasts and projections

There will be an estimated 1350 domestic properties build-out. The precise rate of development is not known but if one assumes that an average of 140 units will be built each year, full build-out will be achieved in 2026/27. In the absence of any meaningful measured data from the site itself, forecasts of domestic demand have been derived using assumed values for property occupancy, and pcc as described in section 3.

4.3.4.4 The Supply-Demand Balance

Total demand in the zone increases steadily until the projected full build-out is achieved in 2026/27. Headroom increases very slightly as uncertainty increases into the future and leakage increases as the distribution network ages although remains low. Total demand in 2044/45 (including leakage) is estimated to be 0.46 Ml/d with an additional 0.05 Ml/d headroom allowance.

The supply-demand balance is projected to remain in surplus throughout the planning period with an available headroom of 0.18 Ml/d in 2044/45 compared to a target headroom of 0.04 Ml/d. It is therefore concluded that no measures additional to routine leakage control and normal regard for the efficient use of water will be required to maintain a positive supply-

demand balance within the planning period. The projected balance is illustrated in Figure 16.

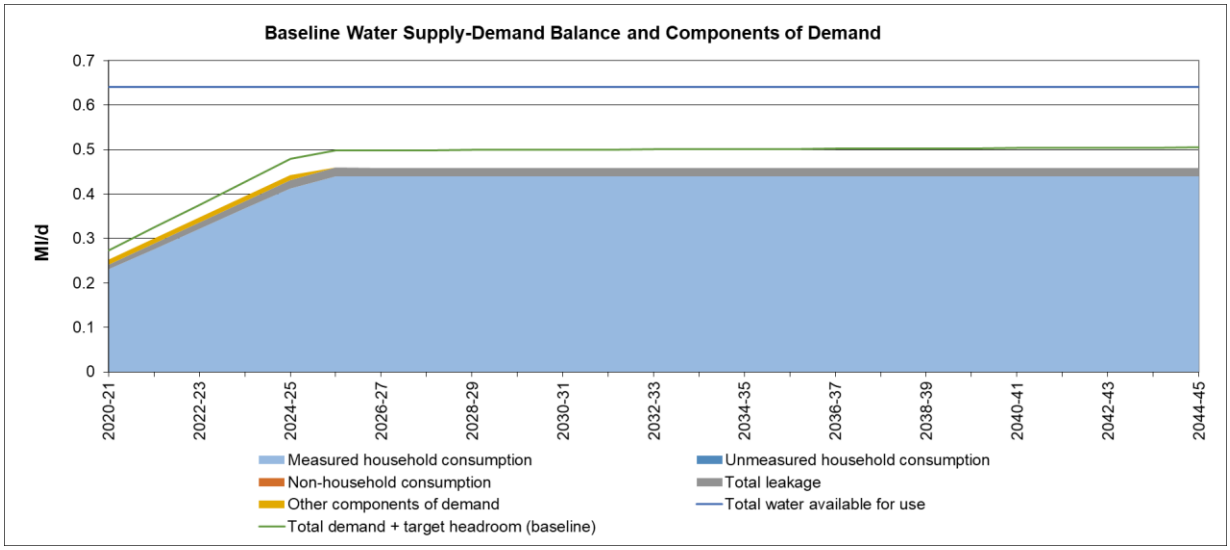

Figure 16 Ebbsfleet projected supply-demand balance

4.3.5 GMV (55153)

The Greenwich Millennium Village development is located in Greenwich, East London. It lies within TWUL's London Water Resource Zone which is reliant on a number of water abstraction and transfer methods for supply. The site location is shown on Figure 17.

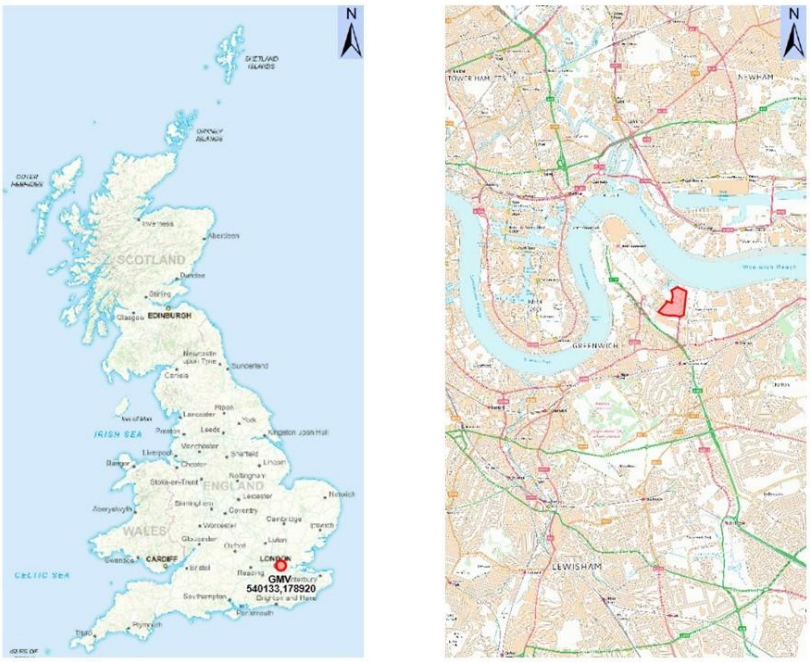

Figure 17 Location of the GMV WRZ

4.3.5.1 Current Water Supply Arrangements

IWNL have negotiated an initial bulk supply agreement to supply 1746 dwellings. The

maximum quantities to be supplied under this agreement are listed in Table 3.1. The agreement makes no provision for higher peak daily rates although the maximum allowed instantaneous rate of flow is 23.46 l/s (2.02 Ml/d).

4.3.5.2 Current Demands

288 (16%) out of a projected final total of 1746 domestic unit had been completed by the end of March 2017. Current water demand on the site is 0.14 Ml/d, and highly influenced by construction activities.

4.3.5.3 Demand forecasts and projections

There will be an estimated 1350 domestic properties and 1 commercial buildings at full build-out. The precise rate of development is not known but if one assumes that an average of 130 units will be built each year, full build-out will be achieved in 2029/30. In the absence of any meaningful measured data from the site itself, forecasts of domestic demand have been derived using assumed values for property occupancy, and pcc as described in section 3.

4.3.5.4 The Supply-Demand Balance

Total demand in the zone increases steadily until the projected full build-out is achieved in 2028/29. Headroom increases very slightly as uncertainty increases into the future and leakage increases as the distribution network ages although remains low. Total demand in 2044/45 (including leakage) is estimated to be 0.59 Ml/d with an additional 0.06 Ml/d headroom allowance.

The supply-demand balance is projected to remain in surplus throughout the planning period with an available headroom of 0.09 Ml/d in 2028/29 compared to a target headroom of 0.05 Ml/d. It is therefore concluded that no measures additional to routine leakage control and normal regard for the efficient use of water will be required to maintain a positive supply-demand balance within the planning period. The projected balance is illustrated in Figure 18.

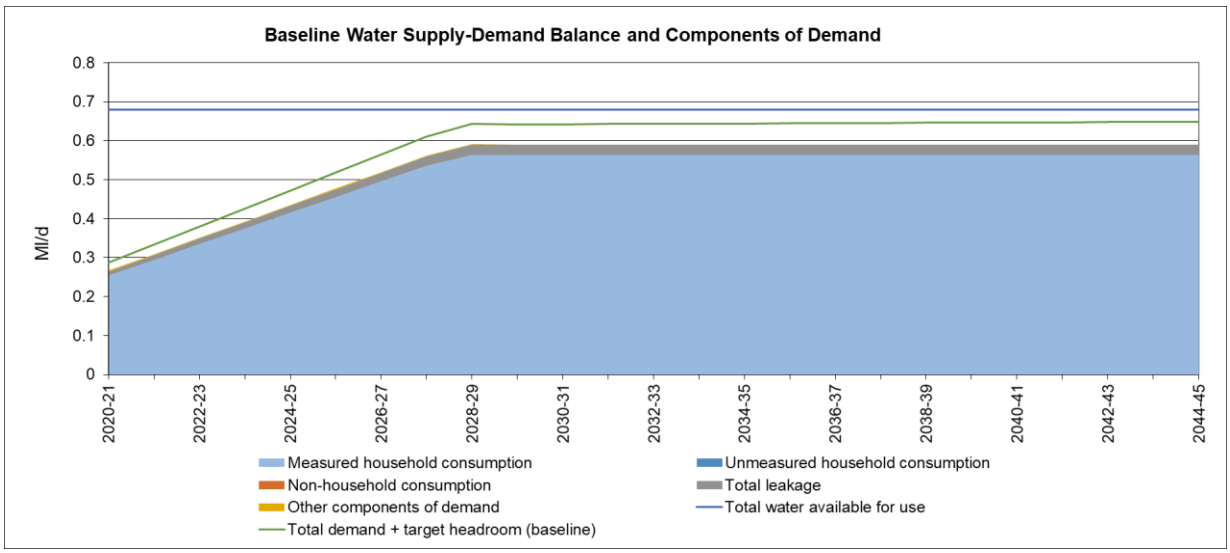

Figure 18 GMV projected supply-demand balance

4.4 Severn Trent

4.4.1 Oakham (40328)

Oakham North lies to the south of the A606 at Oakham, about 3 miles west of Rutland Water. Its location is shown on Figure 19.

Figure 19 Location of Oakham WRZ

4.4.1.1 Current Water Supply Arrangements

IWNL have negotiated an initial bulk supply agreement to supply 1100 dwellings. The maximum quantities to be supplied under this agreement are listed in Table 3.1. The agreement makes no provision for higher peak daily rates although the maximum allowed instantaneous rate of flow is 14.4 l/s (1.24 Ml/d).

4.4.1.2 Current Demands

579 (53%) out of a projected final total of 1100 domestic unit had been completed by the end of March 2017. Current water demand on the site is 0.23 Ml/d, and highly influenced by construction activities.

4.4.1.3 Demand forecasts and projections

There will be an estimated 1100 domestic properties at full build-out. The precise rate of development is not known but if one assumes that an average of 150 units will be built each year, full build-out will be achieved in 2021/22. Demand forecasts have been derived using data obtained from bulk supply and customer meters data and assumed values for property occupancy in section 3.

4.4.1.4 The Supply-Demand Balance

Total demand in the zone increases steadily until the projected full build-out is achieved in 2021/2022. Headroom increases very slightly as uncertainty increases into the future and

leakage increases as the distribution network ages although remains low. Total demand in 2044/45 (including leakage) is estimated to be 0.38 Ml/d with an additional 0.03 Ml/d headroom allowance.

The supply-demand balance is projected to remain in surplus throughout the planning period with an available headroom of 0.06 Ml/d in 2044/45 compared to a target headroom of 0.03 Ml/d. It is therefore concluded that no measures additional to routine leakage control and normal regard for the efficient use of water will be required to maintain a positive supply-demand balance within the planning period. The projected balance is illustrated in Figure 20.

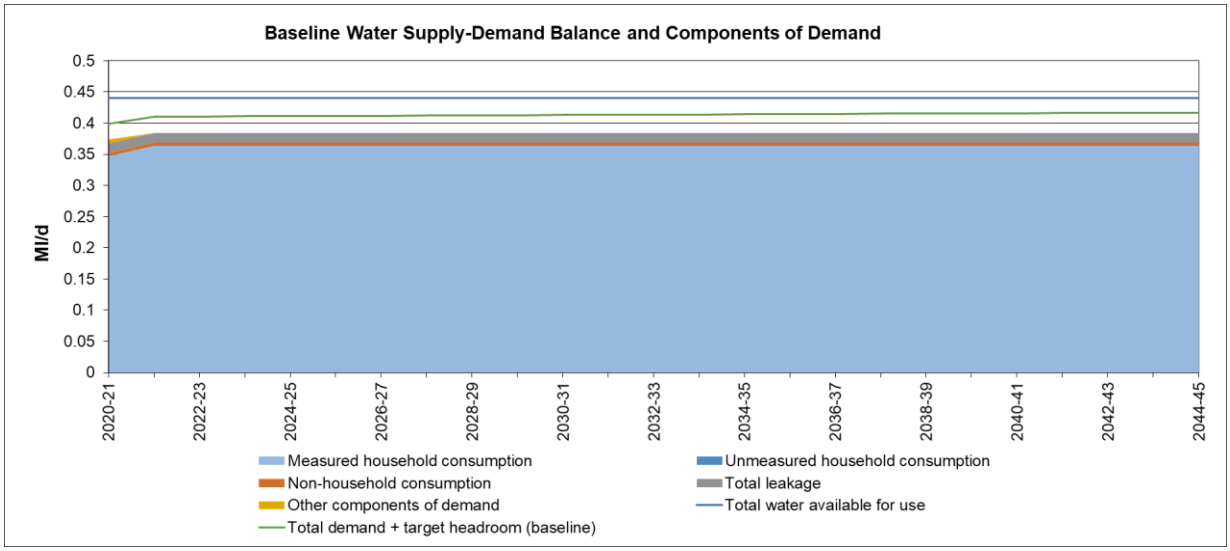

Figure 20 Oakham projected supply-demand balance

4.5 Southern Water

4.5.1 NES Crawley (53244)

The NES Crawley development is located close to Gatwick airport to the North West of Crawley. It lies within Southern Water's 'Sussex North WRZ'. The site is reliant on mainly River Abstraction and Groundwater for supply. The site location is shown on Figure 21.

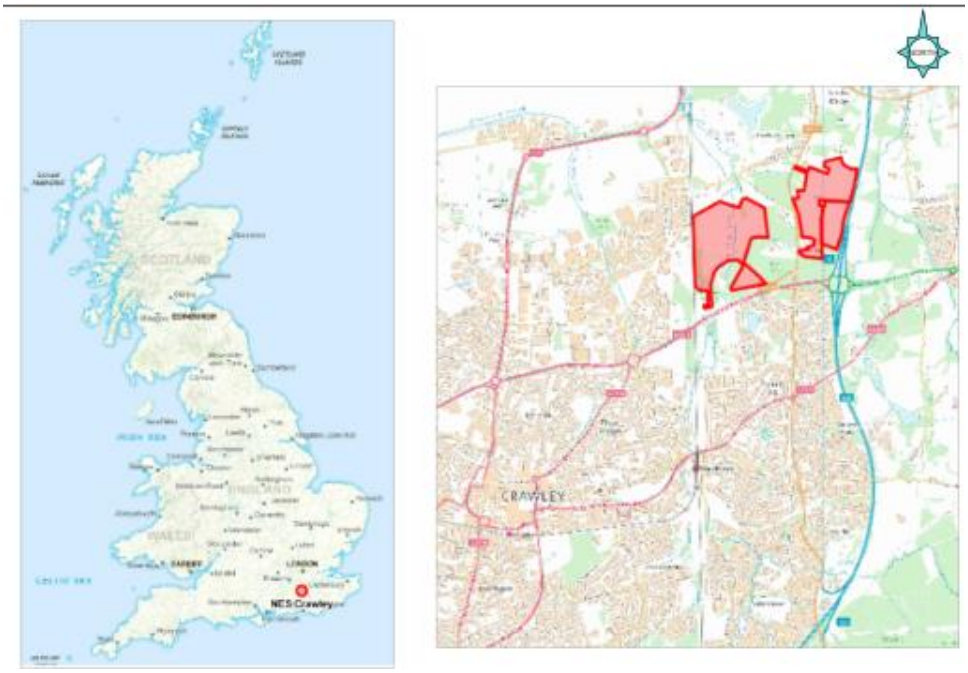

Figure 21 Location of Crawley WRZ

4.5.1.1 Current Water Supply Arrangements

IWNL have negotiated an initial bulk supply agreement to supply 1833 dwellings. The maximum quantities to be supplied under this agreement are listed in Table 3.1. The agreement makes no provision for higher peak daily rates although the maximum allowed instantaneous rate of flow is 44.3 l/s (3.82 Ml/d).

4.5.1.2 Current Demands

265 (14%) out of a projected final total of 1833 domestic unit had been completed by the end of March 2017. Current water demand on the site is 0.12 Ml/d, and highly influenced by construction activities.

4.5.1.3 Demand forecasts and projections

There will be an estimated 1833 domestic properties at full build-out. The precise rate of development is not known but if one assumes that an average of 110 units will be built each year, full build-out will be achieved in 2031/32. In the absence of any meaningful measured data from the site itself, forecasts of domestic demand have been derived using assumed values for property occupancy, and pcc as described in section 3.

4.5.1.4 The Supply-Demand Balance

Total demand in the zone increases steadily until the projected full build-out is achieved in 2031/32. Headroom increases very slightly as uncertainty increases into the future and leakage increases as the distribution network ages although remains low. Total demand in 2044/45 (including leakage) is estimated to be 0.62 Ml/d with an additional 0.06 Ml/d headroom allowance.

The supply-demand balance is projected to remain in surplus throughout the planning period with an available headroom of 0.07 Ml/d in 2044/45 compared to a target headroom of 0.05 Ml/d. It is therefore concluded that no measures additional to routine leakage control and normal regard for the efficient use of water will be required to maintain a positive supply-

demand balance within the planning period. The projected balance is illustrated in Figure 22.

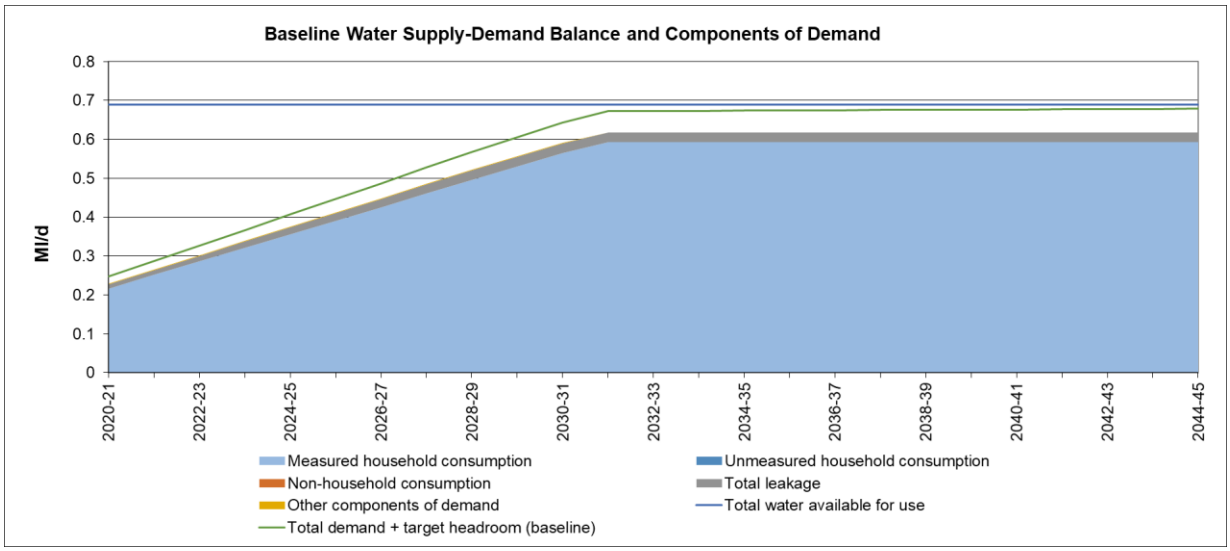

Figure 22 Crawley projected supply-demand balance

4.6 Affinity Water

4.6.1 Martello Lakes (36928)

The Martello Lakes development is located to the north of the A259 (Dymchurch Road), in the east of Hythe, Kent. The development lies within the Southeast region and abstracts 90% of its water from chalk and greensand groundwater. The site location is shown on Figure 23.

Figure 23 Location of Martello Lakes WRZ

4.6.1.1 Current Water Supply Arrangements

IWNL have negotiated an initial bulk supply agreement to supply 1050 dwellings. The maximum quantities to be supplied under this agreement are listed in Table 3.1. The agreement makes no provision for higher peak daily rates although the maximum allowed instantaneous rate of flow is 18.06 l/s (1.56 Ml/d).

4.6.1.2 Current Demands

25 (2%) out of a projected final total of 1050 domestic unit had been completed by the end of March 2017. Current water demand on the site is 0.02 Ml/d, and highly influenced by construction activities.

4.6.1.3 Demand forecasts and projection

There will be an estimated 1050 domestic properties at full build-out. The precise rate of development is not known but if one assumes that an average of 40 units will be built each year, full build-out will be achieved in 2042/43. In the absence of any meaningful measured data from the site itself, forecasts of domestic demand have been derived using assumed values for property occupancy, and pcc as described in section 3.

4.6.1.4 The Supply-Demand Balance

Total demand in the zone increases steadily until the projected full build-out is achieved in 2042/2043. Headroom increases very slightly as uncertainty increases into the future and leakage increases as the distribution network ages although remains low. Total demand in 2044/45 (including leakage) is estimated to be 0.36 Ml/d with an additional 0.03 Ml/d headroom allowance.

The supply-demand balance is projected to remain in surplus throughout the planning period with an available headroom of 0.17 Ml/d in 2044/45 compared to a target headroom of 0.03 Ml/d. It is therefore concluded that no measures additional to routine leakage control and normal regard for the efficient use of water will be required to maintain a positive supply-demand balance within the planning period. The projected balance is illustrated in Figure 24.

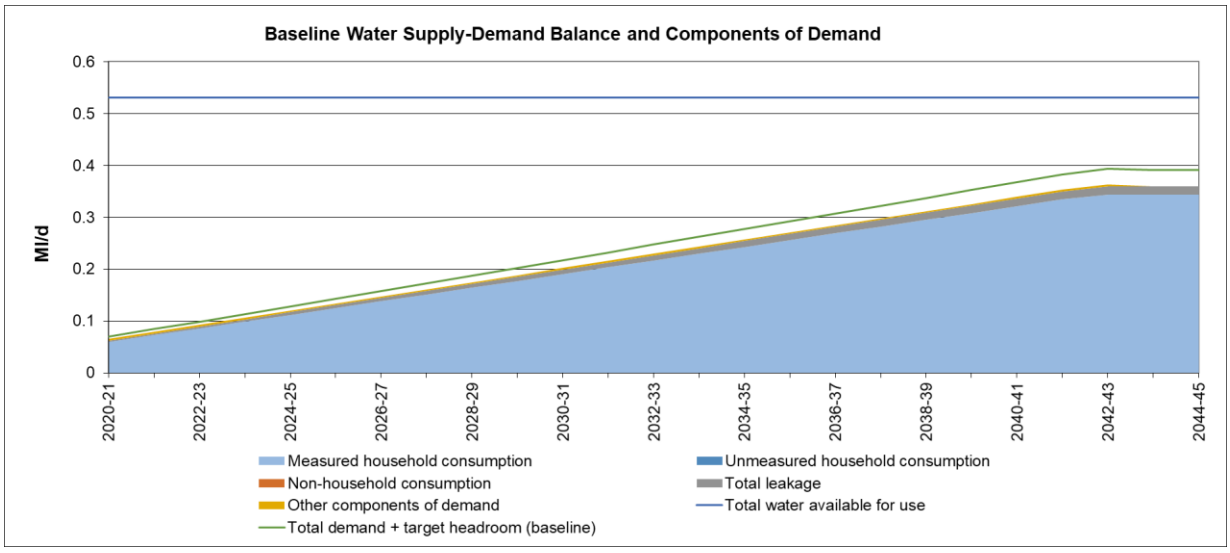

Figure 24 Martello Lakes projected supply-demand balance

4.6.2 Bishop's Stortford (55030)

IWNL have negotiated an initial bulk supply agreement to supply 2450 dwellings. The maximum quantities to be supplied under this agreement are listed in Table 3.1. The agreement makes no provision for higher peak daily rates although the maximum allowed instantaneous rate of flow is 23.58 l/s (1.11 Ml/d). The site location is shown on Figure 25.

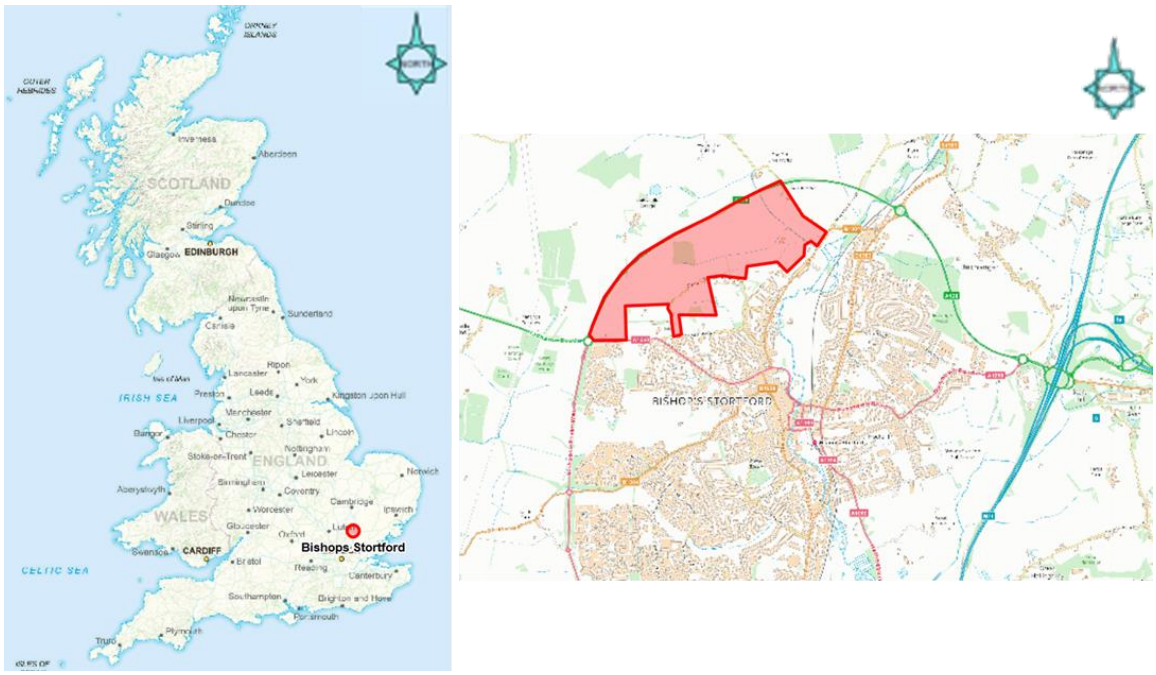

Figure 25 Location of Bishop's Stortford WRZ

4.6.2.1 Current Demands

4.6.2.2 Demand forecasts and projection

There will be an estimated 2450 domestic properties at full build-out. The precise rate of development is not known but if one assumes that an average of 200 units will be built each year, full build-out will be achieved in 2031/32. In the absence of any meaningful measured data from the site itself, forecasts of domestic demand have been derived using assumed values for property occupancy, and pcc as described in section 3.

4.6.2.3 The Supply-Demand Balance

Total demand in the zone increases steadily until the projected full build-out is achieved in 2031/32. Headroom increases very slightly as uncertainty increases into the future and leakage increases as the distribution network ages although remains low. Total demand in 2044/45 (including leakage) is estimated to be 0.74 Ml/d with an additional 0.06 Ml/d headroom allowance.

The supply-demand balance is projected to remain in surplus throughout the planning period with an available headroom of 0.37 Ml/d in 2044/45 compared to a target headroom of 0.06 Ml/d. It is therefore concluded that no measures additional to routine leakage control and normal regard for the efficient use of water will be required to maintain a positive supply-demand balance within the planning period. The projected balance is illustrated in Figure 26.

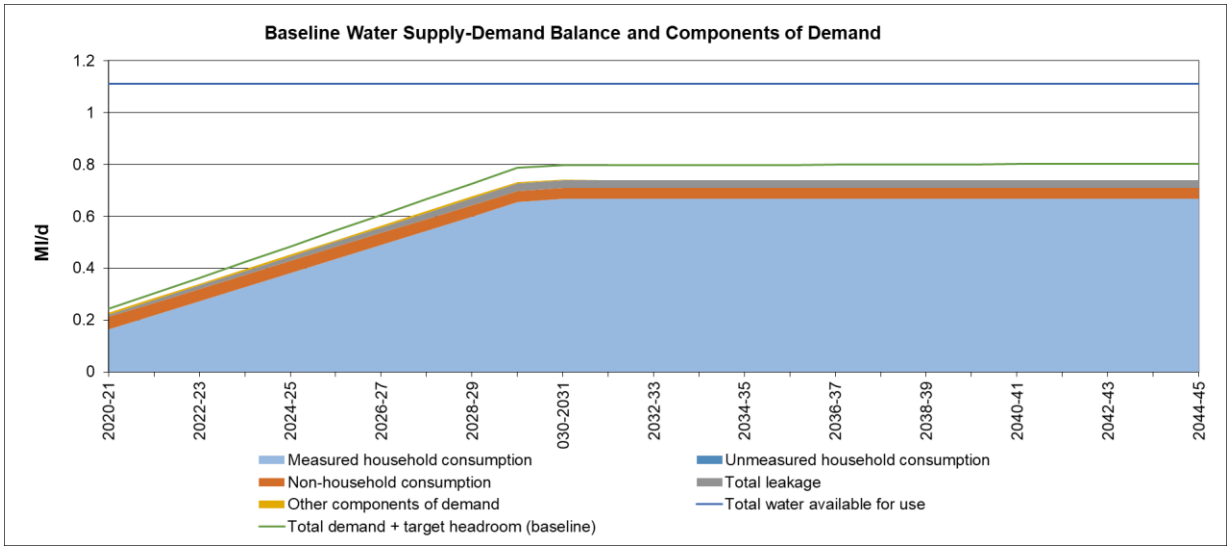

Figure 26 Bishop's Stortford projected supply-demand balance

4.7 South East Water

4.7.1 Chilmington Green (71641)

IWNL have negotiated an initial bulk supply agreement to supply 5750 dwellings. The maximum quantities to be supplied under this agreement are listed in Table 3.1. The agreement makes no provision for higher peak daily rates although the maximum allowed instantaneous rate of flow is 32.08 l/s (2.77 Ml/d). The site location is shown on Figure 27.

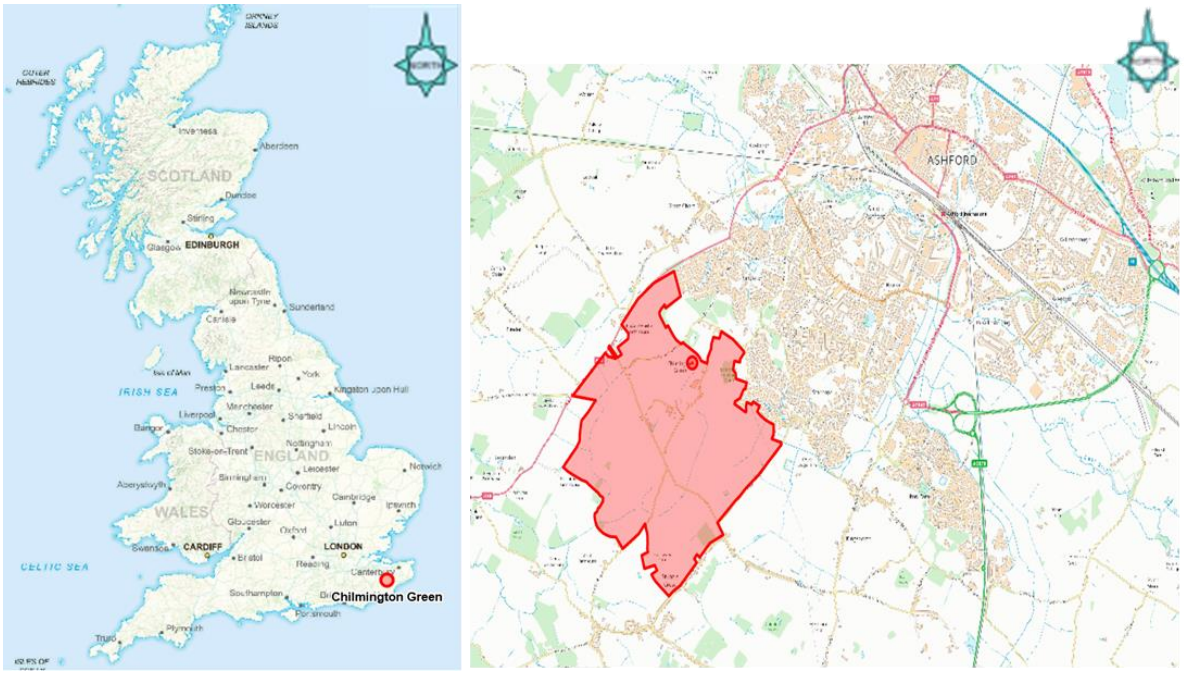

Figure 27 Location of Chilmington Green WRZ

4.7.1.1 Current Demands

4.7.1.2 Demand forecasts and projection

There will be an estimated 5750 domestic properties at full build-out. The precise rate of

development is not known but if one assumes that an average of 300 units will be built each year, full build-out will be achieved in 2038/39. In the absence of any meaningful measured data from the site itself, forecasts of domestic demand have been derived using assumed values for property occupancy, and pcc as described in section 3.

4.7.1.3 The Supply-Demand Balance

Total demand in the zone increases steadily until the projected full build-out is achieved in 2038/39. Headroom increases very slightly as uncertainty increases into the future and leakage increases as the distribution network ages although remains low. Total demand in 2044/45 (including leakage) is estimated to be 1.72 Ml/d with an additional 0.17 Ml/d headroom allowance.

The supply-demand balance is projected to remain in surplus throughout the planning period with an available headroom of 1.05 Ml/d in 2044/45 compared to a target headroom of 0.13 Ml/d. It is therefore concluded that no measures additional to routine leakage control and normal regard for the efficient use of water will be required to maintain a positive supply-demand balance within the planning period. The projected balance is illustrated in Figure 28.

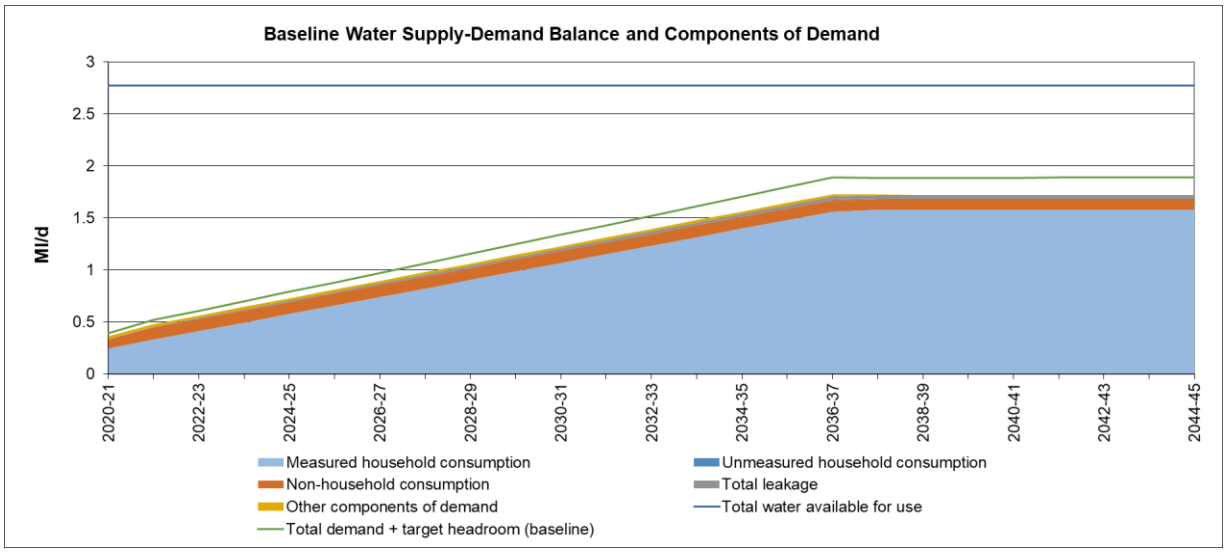

Figure 28 Chilmington Green projected supply-demand balance

5 National Environment Programmes and Water Framework Directive

IWNL will work closely with the incumbent water company as required in assessing the potential impact of licensed abstraction in designated or environmentally sensitive areas under the terms of: the Habitats Directive; the Environment Agency's Restoring Sustainable Abstractions (RSA) programme, local environment programme sustainability investigations; biodiversity action plans; Catchments Abstraction Management Strategies (CAMS).

However, given that IWNL will not be operating any of its own sources in this initial WRMP. It is not considered to be a major issue requiring significant addressing within the plan.

6 Strategic Environmental Assessment

The SEA process enables all options considered by IWNL during the formulation of the preferred strategy, to be appraised against IWNL's own environmental objectives. This process thereby allows IWNL to demonstrate how it has considered the most environmentally favourable solutions within its overall strategy.

However, while the company will work closely with the incumbent water company as appropriate, given that it will not be operating any abstraction sources it is not considered necessary to consider environmental mitigation specifically within this Drought Plan.

Appendix 1 Glossary

AMP6	Asset Management Plan 6 The 6th 5-year planning period for which, following a price review, an investment programme will guide improvements to infrastructure over the period 2015 – 2020.
AMR	Automatic Meter Reading The technology of automatically collecting consumption and diagnostic data from water or energy meters and transferring it to a central database for billing, troubleshooting and analysis.
AWS	Anglian Water Services Limited The name under which the privatised water company known as 'Anglian Water' operates.
CAMS	Catchment Abstraction Management Strategies Strategies to help safeguard water resources despite the increasing pressure on water availability from climate change and population growth; involves assessments of how much water is reliably available on a catchment by catchment basis
CFSH	The Code for Sustainable Homes The national standard for the sustainable design and construction of new homes
CLG	Dept. for Communities and Local Government Responsible for local government, regeneration, neighbourhoods, planning, housing and the built environment.
Defra	Dept. for Environment Food and Rural Affairs The UK government department responsible for policy and regulations on the environment, food and rural affairs.
Headroom	A planning allowance that is used to provide a buffer in the forecast supply-demand balance
Available headroom	The difference between demand and WAFU at any given time.
Target headroom	The minimum buffer that a prudent water company should allow between supply and demand to cater for specified uncertainties.
Inset appointment	the appointment by Ofwat of an independent limited company to replace the incumbent as the appointed water and/or sewerage company for a specified area
IWNL	Independent Water Network Limited Owned by parent company BUUK Utilities UK
LoS	Levels of Service The standard of service (effectively the reliability of supply) that a customer can expect to receive and the average frequency with which restrictions on water use are likely to be applied.
l/h/d	Litres per head per day A unit used to quantify per capita consumption of water; usually domestic consumption.
l/p/d	Litres per person per day The same as l/h/d (see above).
l/prop/d	Litres per property per day A unit of demand or consumption which is often used to describe rates of leakage from the distribution network; not to be confused with l/p/d.
l/s	Litres per second A rate of flow

NEP	National Environment Programme A list of environmental improvement schemes drawn up by EA, in consultation with others, to ensure that water companies help to meet European and national water-related targets.
Ofwat	The Water Services Regulation Authority (formerly the 'Office of Water Services') The economic regulator of the water and sewerage sectors in England and Wales
Pcc	per capita consumption The rate of water consumption expressed as an average per head of population
Poc	point of connection The point at which the bulk supply from the donor company's network enters the IWNL network
RSA	Restoring Sustainable Abstractions An Environment Agency programme to assess all licences that permit abstractions from rivers or groundwater against the level of environmental impact they cause or potentially could cause to ensure they can be sustained without damaging the environment.
SEA	Strategic Environmental Assessment An assessment, called for under the European SEA Directive, to identify and consider the significant environmental issues likely to arise from the content of strategic documents such as plans, programmes and strategies including WRMPs.
STW	Severn Trent Water Limited The name under which the privatised water company known as 'Severn Trent' operates.
TWUL	Thames Water Utilities Limited The name under which the privatised water company known as 'Thames Water' operates.
UKWIR	UK Water Industry Research An organisation set up by the UK water industry in 1993 to facilitate collaborative research for UK water operators.
USPL	Underground Supply Pipe Leakage Leakage occurring from the supply pipe that connects a customer's property to the water company's main.
WAFU	Water Available for Use The amount of water available to meet expected demand. It is calculated by deducting allowable outages and planning allowances (such as sustainability reductions) from deployable output.
WRMP	Water Resources Management Plan A statement of how a water company intends to maintain the balance between the supply and demand for water over a 25-year period, together with economic, social and environmental justification for its preferred set of options for meeting projected demand.
WRPG	Water Resources Planning Guidelines Regularly updated documents issued by the Environment Agency in collaboration with Defra, Ofwat and the Welsh Government to guide water companies in the development and presentation of their WRMPs.
WRZ	Water Resource Zone A discrete area in which resources can be shared so that all customers experience the same risk of supply failure from a resource shortfall

Appendix 2 References

AFW (2018), *Draft Water Resources Management Plan*, 2020-2080, Affinity Water, March 2018.

AWS (2018), *Draft Water Resources Management Plan 2019*, Anglian Water 2018

Defra (2008), Future Water *The Governments' water strategy for England*, February 2008.

Environment Agency (2018), *Water Resources Planning Guideline: Interim update*, July 2018

Environment Agency (2013), *Climate change approaches in water resources planning –Overview of new methods*.

IWNL (2017). *Environment - Using Water Wisely at Home - Independent Water Networks*. [online] iwnl.co.uk. Available at: https://www.iwnl.co.uk/environment/using-water-wisely-at-home [Accessed 17 Nov. 2017].

Ons.gov.uk. (2017). *2011 Census - Office for National Statistics-Office for National Statistics,* March 2011

SEW (2018), *Draft Water Resources Management Plan 2020 to 2080*, February 2018

STW (2017), *Draft Water Resources Management Plan 2018*, Severn Trent Water, December 2017

TWUL (2018), *Draft Water Resources Management Plan 2019*, February 2018.

UKWIR (1995a), *Outage allowances for water resource planning*, Report Ref. No. 95/WRP/0001/B, Sir William Halcrow & Partners for UK Water Industry Research Limited, 1995.

UKWIR (1995b), *Outage allowances for water resource planning – user guide*, Report Ref. No. 95/WR/01/3

UKWIR/EA (1998), *A practical method for converting uncertainty into headroom*, Report Ref. No. 98/WR/13/1

UKWIR (2013a), *Resilience Planning: Good Practice Guide - Summary Report*, Report Ref. No 13/RG/06/2

UKWIR (2013b), Impact of Climate Change on Demand, Report Ref. No. 13/CL/04/12

UKWIR (2016) *WRMP19 Methods – Household Consumption Forecasting*, Report Ref. 15/WR/02/9

UKWIR (2016) *Population, household property and occupancy forecasting*, Report Ref 15/WR/02/8