

ICOSA WATER SERVICES LIMITED

WATER RESOURCES MANAGEMENT PLAN
May 2019



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1 Introduction

1.1 Background

This is the final Water Resources Management Plan (WRMP), 2019, for Icosa Water Services Limited (“Icosa Water”). It covers all areas supplied with water services by Icosa Water at the time of publication of its draft WRMP in March 2018.

A twelve-week period of public consultation followed publication of the draft WRMP. Representations on the draft WRMP were received by Icosa from the Environment Agency and Ofwat. A Statement of Response to those representations was submitted to the Secretary of State on 15 September 2018.

The Statement of Response summarised the comments Icosa Water received on its draft WRMP and set out how it intended to change its WRMP as a result. This final WRMP includes those changes, and, following consideration by the Secretary of State, has been approved for publication.

1.2 Icosa Water company identity

Icosa Water is a regulated water and wastewater undertaker appointed by Ofwat under its new appointments and variations process. As a new appointee Icosa Water has been granted appointments to provide water and wastewater services for certain new housing developments across the United Kingdom. Under the new appointments and variations process, Icosa Water effectively replaces the relevant incumbent undertakers and monopoly provider for each development site. Icosa Water was granted its licence and Instrument of Appointments by Ofwat on 1 June 2017.

Icosa Water has no plans at this stage to own or operate water resources or treatment assets. Water service provision and operation will be secured with bulk supply services from the incumbent supplier and retailing direct to its customers.



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 existing water and sewerage companies to be replaced by independent licence holders.

New appointments and variations allow companies to offer water, sewerage or water and 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.

Inset appointments 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.

At the time of publication of its draft Water Resources Management Plan (WRMP), Icosa Water had been granted operating licences to provide water and wastewater services in two inset areas, one in Norfolk in place of the appointed incumbent Anglian Water Services (AWS), and the second in East Sussex in place of the appointed incumbent South East Water (SEW).

This document comprises the final WRMP covering both of these inset areas.

Inset areas are discrete areas in which resources can be shared so that all customers experience the same risk of supply failure from a resource shortfall.

This is effectively the same as the definition of a Water Resource Zone (WRZ) and so the terms 'inset area' and 'WRZ' are interchangeable in the context of this report.

Details of the inset appointments currently approved for water supply are summarised in Table 1.1. Icosa Water's WRMP and Drought Plan will be reviewed annually as part of the Annual Review process and will be updated to include additional development area as the Icosa Water portfolio expands. Details of new inset areas will be published on Icosa Water's website.



Table 1.1 Icosa Water NAV appointments as at 15 March 2018

Icosa WRZ	Site	Location	Services	Date Granted	Date Commenced
001	West Raynham	Fakenham, Norfolk	Water and Wastewater	1 April 2017	1 June 2017
002	Rosewood Park	Bexhill-on-Sea, East Sussex	Water and Wastewater	3 Feb 2018	3 Feb 2018

Please note that Rosewood Park is the developer’s name for the inset area formerly called Barnhorn Green. Going forward, this inset area will be known as Rosewood Park.

1.4 Icosa Water’s approach to water resources

Icosa Water does not currently own or operate water supply sources. All the demand areas will be serviced and supplied via bulk transfers from the water companies in whose area the inset will be located.

It is not currently within Icosa Water’s strategic plans to develop its own water supply sources hence no planning options to develop company sources have been included in the WRMP.

Icosa Water has negotiated terms and conditions for individual bulk supply agreements with the incumbent water company for each inset area. These agreements are designed to secure adequate supplies for its customers throughout the 25-year planning period, including sufficient headroom to allow for uncertainties in demand forecasts. However, if planning permission is granted for additional development within the existing inset areas, then it may be necessary to negotiate new, or additional bulk supply agreements. This is discussed further in the section on the West Raynham inset area.

Icosa Water is committed to achieving high levels of water-use efficiency. This will involve formulating a long-term strategy with developers to achieve the targets on new domestic and commercial developments. This strategy will involve innovation and the development of strategic policies to:

- Promote efficient water use in domestic properties.



- Reduce per capita consumption from the industry average of 141 l/h/d to the new Government standard of 125 l/h/d for new homes.
- Develop customer communication and awareness of Icosa Water codes of practice to deliver reliable and sustainable supplies of water and wastewater services.
- Implement the latest Automated Meter Reading (AMR) metering technology for all domestic and commercial supplies.
- Manage leakage to maintain low levels at inset appointed sites.
- Consider environmental solutions and water recycling strategies to meet specific water demand requirements for each inset development.

Further discussion on water efficiency can be found in section 3.3.5.

1.5 Summary of Icosa Water’s final WRMP

1.5.1 West Raynham WRZ

The baseline supply-demand forecast shows that Icosa Water has sufficient supplies (via the bulk supply from AWS) to meet demands at peak and average until the end of the planning period. The forecasts take all existing and planned new households and non-households into account. Should a further phase of planning be approved (earliest likely date 2028), then an additional bulk supply and network upgrade will be required.

1.5.2 Rosewood Park WRZ

The baseline supply-demand forecast shows that Icosa Water has sufficient supplies (via the bulk supply from SEW) to meet demands at peak and average until the end of the planning period. The forecasts take all existing and planned new households and non-households into account.

1.6 Annual reviews

Icosa Water will review this final WRMP annually as part of the Annual Review process. The plan will be updated to include additional development areas as Icosa Water’s portfolio expands.



2 The requirement for and background to the WRMP

2.1 Legal requirements

Under the Water Industry Act 1991 (as amended), water undertakers have a statutory duty to prepare and maintain a water resources plan (also known as water resources management plans - WRMP). Defra and the Welsh Assembly Government expect the water companies of England and Wales to follow sections 37A-D of the Water Industry Act 1991, the Water Resource Management Plan Regulations 2007 and the directions given by government.

The WRMP is not to be confused with the company's Statutory Drought Plans. Although these plans complement each other, the drought plan sets out the short-term operational steps Icosa Water will take as a severe drought progresses, i.e. the point at which the 'Dry Year' scenario it uses for long-term planning is exceeded due to extreme dry weather events.

The statutory process for the preparation of water resources management plans sets out defined stages for consultation. The three principal consultation stages are:

- Pre-draft consultation with statutory consultees and licenced water suppliers.
- Consultation with the Environment Agency's regional planners, and with the Water Services Regulation Authority (Ofwat) Reporter during the preparation of the draft WRMP.
- Consultation following publication of the draft WRMP with specified organisations (including its Regulators and local authorities), with Icosa Water's customers, and with anyone else who is likely to be affected by the plan.

Stakeholders' comments (Representations) on the draft WRMP are submitted to the Secretary of State who forwards them to the company. The Company is required to produce a "Statement of Response" to those representations setting out:

- a. The consideration that have given to those representations;
- b. Any changes that have made to the Draft WRMP as a result of consideration of those representations and the reasons for doing so; and
- c. An explanation where changes have not been made as a result of representation.
- d. Subject to review of the Statement of Response, the Secretary of State may direct the Company to make further changes to the draft Plan, to publish the Final WRMP, or may direct the Plan to public inquiry. Assuming no direction is required, Icosa Water anticipates publishing its Final WRMP in January 2019.



2.2 Background

This is Icosa Water's first WRMP as it is a recent entrant into the market having been awarded its first NAV appointment in June 2017. As part of the process, Icosa Water produced a pre-draft consultation document for circulation to DEFRA, Ofwat, the Environment Agency and donor water companies.

Following pre-consultation, Icosa Water prepared a draft WRMP that was submitted to the Secretary of State in December 2017. With the agreement of the Secretary of State, this draft Plan was published for public consultation in March 2018.

As part of the public consultation, copies of Icosa Water's draft WRMP were sent to Defra, Ofwat, the Environment Agency, the Drinking Water Inspectorate, Natural England and the relevant local authority. The draft Plan was also published on Icosa Water's website.

It should be noted that at the time of publication, the draft WRMP only covered the West Raynham inset area. Inclusion of the Rosewood Park inset area has been included in this final WRMP at the request of the Environment Agency.

Representations (comments) on the draft WRMP were received from the Environment Agency and Ofwat via the Secretary of State. As required by the Water Industry Act, Icosa Water prepared a "Statement of Response" to the representations received which was submitted to the Secretary of State on 15 September 2018.

As required by the Act, the Statement of Response sets out:

- The consideration that Icosa Water gave to those representations; and
- any changes that would be made to the Draft WRMP as a result of consideration of those representations and the reasons for doing so.

This final WRMP includes the changes set out in the Statement of Response, or explains why no change has been made.

Icosa Water's Statement of Response is included as Appendix A to this final WRMP.



2.3 Commercial confidentiality and security

As part of the formal statutory process Icosa Water is required to undertake a review of commercial confidentiality and security considerations. Prior to the publication of its draft Water Resources Management Plan, Icosa Water wrote formerly to the Secretary of State to confirm that at the time of submitting its draft plan under s37B (1)(a) of the Water Industry Act 1991, revised by the Water Act 2003:

- i. Icosa Water would not be submitting a statement in accordance with s.37B (1) (b) of the Act.
- ii. Icosa Water provided a statement of compliance to the Secretary of State confirming that the draft water resource management plan had been prepared in accordance with requirements of The Control of Sensitive Water Company Information – Advice Note 11 Edition 1 DEFRA Nov. 06 and EKP Document Designation Handling and Storage Advice Note 2 DEFRA Nov. 06.

2.4 Water Resource Management Plan (WRMP)

A WRMP 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 a company expects the demand for water to vary over the planning period and how it plans to meet those forecast demands. A water company is expected to describe its present position, how it got there and provide evidence to support its proposed plan. It must provide economic, social and environmental justification for its preferred set of options for water management to meet forecast demand.

Given that the future company business plan is for expansion of new development sites across all regional water company areas, Icosa Water will review the published version of the WRMP on a yearly basis in accordance with the Annual Review guidance.

2.5 Icosa Water's strategy

Icosa Water negotiates bulk-supply agreements with incumbent water companies with the intention of ensuring there will be a surplus across the whole of the planning period.

Icosa Water'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.



- Implement a programme of active leakage monitoring and control 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 as agreed with developers.
- Monitor available headroom to ensure that this does not fall below target headroom objectives.
- If available headroom falls below target headroom, consider options to eliminate the supply-demand deficit. This will entail one or more of the following:
 - increase the quantities specified in bulk supply agreements.
 - implement demand management measures if these have not yet reached their optimum level of performance.
- In the event of a drought, Icosa Water will follow the steps set out in its Drought Plan.

2.6 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. Icosa Water has published the company Levels of Service on its website and to date has had no adverse comments from its customers.

Guaranteed Standards of Service have been agreed with Ofwat.

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 is not economical or environmentally sustainable to develop long-term plans which completely remove 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. It might be



considered unreasonable if supplies to Icosa Water customers remained unconstrained while the incumbent’s customers who rely on the same supply source were subject to drought restrictions. Icosa Water’s levels of service will therefore be effectively aligned to those of each incumbent as set out within their WRMPs and as shown in Tables 2.1 and 2.2 below. These are the restrictions on water use that Icosa Water will apply as drought severity increases:

Table 2.1 Levels of Service for Security of Supply for West Raynham

Level	Action	Frequency of Implementation (Drought Severity)
1	Introduction of Temporary Use Ban; i.e. restrictions on the use of hose pipes	10% risk (Not more than one in 10 years)
2	Use of Drought Orders to enforce restrictions on non-essential uses and secure raw water resources	2.5% risk (Not more than one in 40 years)
3	Imposition of the use of standpipes and rota cuts	1% risk until 2024/25 (Not more than one in 100 years) 0.5% risk from 2025/26 (Not more than one in 200 years)
	<i>Note: If extreme measures (such as standpipes and rota cuts) are required, their implementation would require an Emergency Drought Order</i>	



Table 2.2 Levels of Service for Security of Supply for Rosewood Park

Level	Action	Frequency of Implementation (Drought Severity)
1	Introduction of Temporary Use Ban; i.e. restrictions on the use of hose pipes	10% risk (Not more than one in 10 years)
2	Use of Drought Orders to enforce restrictions on non-essential uses and secure raw water resources	2.5% risk (Not more than one in 40 years)
3	Imposition of the use of standpipes and rota cuts	0.5% risk (Not more than one in 200 years)
<p><i>Note: If extreme measures (such as standpipes and rota cuts) are required, their implementation would require an Emergency Drought Order</i></p>		

If a WRZ is in deficit, the actual level of service that customers experience is likely to be below a water company's target level of service. If a resource zone is in surplus, then the level of service will be above the target level. The risk to Company levels of service is assumed to be minimal when all WRZs are in supply-demand balance. Further details of the situation in each WRZ are given in section 4.

2.7 Current situation regarding development of supply areas

Table 2.3 shows Icosa Water's inset appointments at September 2018.

The NAV appointment for West Raynham was granted to Icosa Water in April 2017 and commenced in June 2017 along with full site adoption of network and customers.

The NAV appointment for Rosewood Park was granted to Icosa Water in February 2018 and commenced in February 2018 along with full site adoption of network and customers.

Table 2.3 shows the current number of connections transferred at the end of September 2018 together with projected long-term development proposals by the current management company for each WRZ.



Table 2.3 Current stage of development at Icosa Water sites

Icosa Water Ref No	Site	Number of Connections				Current Development Stage (%)
		Domestic		Non-Household		
		Current	Ultimate	Current	Ultimate	
ZAAW01	West Raynham	170	258	22	22	66%
ZBSE01	Rosewood Park	50	341	5	5	14%

Notes:

- Current refers to the actual numbers of connected customers at the end of September 2018
- Ultimate refers to the expected number of connections at full build-out

2.8 Icosa Water’s WRMP for inset development areas

This Water Resources Management Plan (WRMP) has been prepared to comply with the statutory requirements of the Water Resources Management Plan Regulations 2007, issued by the Secretary of State in exercise of the powers conferred by the Water Act 2003, in accordance with the Water Resource Planning Guideline (WRPG) issued by the Environment Agency in April 2007, and subsequent updates and revisions.

The document has been prepared in line with the latest WRMP Guidelines including the interim update released in April 2017 and most recent WRMP tables version 16 as released in May 2017.

In preparing this WRMP, Icosa Water has referred principally to the following documents with their accompanying appendices and notes:

- The legislative requirements for water companies to prepare and maintain a water resources management plan as set out in the Water Industry Act 1991 (as amended by the Water Act of 2003), and subsequent directions and regulations including the Water Resources Management Plan Regulations 2007, and the Water Resources Management Plan Direction 2012.
- Anglian Water Services’ “Draft Water Resources Management Plan”, 2017.
- South East Water’s “Revised Water Resources Management Plan 2020 to 2080”,



2018.

- EA, Ofwat, Defra and the Welsh Government (2012), “Water resources planning guideline – October 2012”.
 - The guiding principles for developing a water resources management plan
 - The technical methods and instructions
- EA (2017) Water resources planning guideline interim update April 2017.
- EA (2012) Water resources planning guideline - navigation tool for smaller water companies.

In preparing this WRMP, Icosa Water has specifically focused on:

- Establishing the demand balance for the development and assessing whether additional water resources might be needed within the plan’s lifetime.
- Ensuring Icosa Water meets its statutory duties to put in place resilient and cost-effective plans to meet its customers’ needs in the coming years.
- Ensuring Icosa Water operates in an environmentally and socially sustainable way so that it does not prejudice the needs of future generations.

The plan is in effect a stand-alone document that provides a realistic strategy for managing water resources, setting out clearly the data and assumptions used to support and justify the preferred strategy adopted by Icosa Water.

2.9 The scope of the plan

The April 2017 WRMP guidance document contains a detailed recommended structure for a water resources management 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 baseline supply-demand balances by computing whether there is a water surplus or deficit in each year of the planning period. Baseline supply-demand balances are prepared for both dry year average demand and the critical period (peak week demand).
- 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. Final supply-demand balances are prepared for both dry year average demand and the critical period (peak week demand).

As mentioned in section 2.4, the principle source of company supplies will be provided by bulk transfers/cross border supplies from incumbent water companies and not from Icosa Water's own sources.

Currently AWS forecast a reduction in water available for use in excess of 10% by 2044/45 due to climate change, sustainability reductions and extreme drought, and has subsequently developed investment and operations strategies to mitigate the impacts. In the same way, SEW has strategies in place to mitigate against a similar level of impact.

The major source of carbon emissions is associated with above ground assets in the production delivery and distribution input of treated water. Icosa Water does not produce, own or operate any above ground related water assets which would impact on climate change and therefore has not taken this aspect into account when developing the WRMP.

Icosa Water recognises the importance to the environment and consequential impact of carbon emissions associated with the production and operation of a treated water supply network. As part of its diligence in producing its WRMP Icosa has consulted with regional incumbents in terms of their overall assessment of greenhouse gas emissions associated with current NAV licensees.

The estimate of incumbent's "company" greenhouse gas emission values are shown in table below. From this is calculated the max TC02e per ML/day associated with each bulk supply water quality zone, for the planning period based on expected demands.



Table 2.4 Estimate of carbon emissions

Icosa Water Ref No	Site	Estimated of companies Total Greenhouse gas emissions 2017/18	Estimate of Icosa Water Greenhouse gas emissions	Maximum contracted annual bulk supply	Baseline Demand 2020/21	Forecast emissions 2020/21	Forecast emissions 2044/45
		KTCO2e	TCO2e/ML	ML/yr	ML/d	TCO2e	TCO2e
ZAAW01	West Raynham	142	0.344	68.9	0.188	0.065	0.065
ZBSE01	Rosewood Park	54	0.286	69.1	0.189	0.054	0.054

Incumbents have confirmed that they have developed investment and operational strategies to mitigate and reduce the impact of carbon emissions within the development areas over the duration of the planning period. They have provided an estimate of the KTCO2e values of the ML/d demand delivered at the bulk meter supply point of each inset area, derived from total distribution output, the associated cost of the resultant reduction in sustainable carbon emissions scheme resolutions are outlined within the incumbents “feasible options” and set out within their respective WRMP submissions.

Icosa Water will continue to work closely with the incumbents to reduce greenhouse gas emissions through demand management and continue to review the impact that climate change has on its operating position. Any reduction in CO2 arising from demand management initiatives by Icosa Water over the period of the plan will be reflected in the incumbent’s sustainable carbon emission valuations.

Because the principle source of supplies to the two WRZs are via bulk supplies, there is no requirement for Icosa Water to carry out a deployable output assessment, nor any associated assessment of how sustainability reductions or the impact of climate change might affect supplies.

The maximum quantity of water allowed for in bulk supply agreements is aimed at ensuring that no deficits in the balance between supply and demand occur within the 25-year planning period. As a result, an appraisal of options to remove the deficit is not required. However, this conclusion is dependent upon the reliability of the baseline demand forecast. It is also



dependent upon the granting of planning permission for further development, in particular in the West Raynham WRZ.

At this stage in Icosa Water's development, there is very little usable information on water consumption to enable Icosa Water to robustly identify differences in patterns of use by customers. This information will be collected over time and will become available for future input on which to base demand forecasts. Forecasts of demand have therefore been based on industry averages and values measured, observed, or forecast within the supply areas of the incumbent water companies. A headroom allowance has been added to the demand forecasts to allow for uncertainties in the supply-demand forecasts.

As the risk of supply shortages is low and data on actual demand or leakage is lacking, the plan has been kept relatively simple. However, supply-demand balances have been defined, and a structure of reporting set out. Monitoring systems are in place so that annual reviews, and subsequent versions of the WRMP can utilise actual demand/consumption and leakage data as they become available to refine the estimates and assumptions made in this report.

2.10 A summary of changes made to the draft WRMP

As set out in section 2.2 above, Icosa Water submitted a "Statement of Response" to the Secretary of State in September 2018. A copy of the statement is included in Appendix A. The Statement of Response set out changes that would be made to the draft WRMP as a consequence of representations made following public consultation on the draft plan. The following summarises the key changes made to the draft plan and responds to other comments:

- The final plan includes details of, and a supply-demand balance for Rosewood Park (formerly known as Barnhorn Green)
- Data for the inset areas that were known about before publication of the draft WRMP can be found in section 4.
- The final plan includes the average annual risk to customers of restrictions to the supply of drinking water. These are aligned to the levels of service of the incumbent water companies.
- Greenhouse gas emissions have been assessed and are consistent with those published by the incumbent water companies.
- The final plan sets out how it proposes to achieve 100% metering. The possible water saving is around 15% of pcc, but this will have little or no impact as there are only three



unmeasured properties, and in the demand forecast these have been attributed with the same pcc as the other previously unmeasured properties.

- Initially, Icosa Water will actively monitor for leakage using data available from bulk meters and AMR meters. As more data becomes available over time, Icosa will introduce active leakage control to manage leakage. The need for this will be reviewed over the next five years. See section 3.4 for more discussion on leakage.
- Leakage information has been presented in a consistent manner in the WRMP.
- The final plan includes more details of the bulk supply agreements with AWS and SEW. These agreements are for the duration of the planning period.
- Separate sections have been included for the two WRZs in section 4.
- The final plan includes a scenario test for additional development in the West Raynham WRZ. There will be no significant impact on customers other than disruption caused by developers building works if further development takes place.
- AWS's WRMP proposes an improvement to its Level of Service for the imposition of standpipes and rota cuts. This will apply to Icosa Water's customers in the West Raynham WRZ and is shown on table 2.1.
- The final plan includes an evaluation of resilience to drought and non-drought related hazards – see section 7.
- The final plan does not set out the methodology Icosa Water will use to forecast leakage when appropriate data becomes available. Further work is required over the next five years to ascertain a proportionate approach for such small WRZs. At this stage, calculation of unaccounted for water is likely to be simplistic based on volumes supplied to customers compared with volumes received from AWS and SEW via the bulk supplies. Icosa will report progress on leakage calculations and forecasting likely leakage levels in its WRMP annual reviews.
- Icosa Water will ascertain the need to develop an Active Leakage Control strategy over the next five years.
- The final plan includes correctly populated revised tables
- The final plan will be easy to locate on Icosa Water's website.
- The text has been amended to try to make the meaning clearer and to correct typos.
- Section 4 sets out from where demand forecast data has been derived.
- The section on Environmental Implications (section 5) has been revised.
- The final WRMP tables and supply-demand balance now include an allowance for non-households.
- The assumptions regarding property numbers are set out clearly in sections 4.2 and 4.3.



- The demand forecasts in the final Plan uses the same dry year and peak week factors as those of the incumbent water companies.
- The section on target headroom has been amended to include greater explanation.



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 WRZ 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 and with a new and revised plan due after five years.

3.2 Deployable output

Icosa Water does not own or operate water supply sources of its own. All supplies come from bulk transfers from the incumbent water companies – in this case AWS and SEW. There are no exports out of Icosa Water supply areas.

In general, the quantity of water to be made available in each WRZ has been negotiated with AWS and SEW 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 the inset areas at projected final development, i.e. after all of the currently proposed development is complete.

It should be noted that, subject to planning approval (which has not yet been applied for), additional development could take place in the West Raynham WRZ. This development, is made up of around 200 additional domestic properties. Icosa Water has carried some scenario testing to show the effect on the supply-demand balance should this development take place.

Quantities are defined in terms of an annual maximum volume in m³/year, a maximum daily volume in m³/day and a maximum instantaneous flow in l/s. Values are set out in the bulk supply agreements between Icosa Water and AWS, and Icosa Water and SEW, for the two inset areas. The agreements are summarised in Table 3.1.

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 (see section 3.3.2). 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 AWS and SEW save in exceptional circumstances when supplies could be reduced. AWS and SEW are entitled to reduce bulk supplies in cases of emergency or ‘Force Majeure’. Droughts are considered an emergency.

Table 3.1 Agreed limits to the bulk supply

Icosa Water Ref No	Site	Maximum instantaneous flow l/s	Maximum daily volume m ³ /day	Maximum annual volume Ml/year	Average daily flow l/sec
ZAAW01	West Raynham	6.90	196.9	68.9	1.66
ZBSE01	Rosewood Park	10.03	189.2	69.1	2.20

Notes:

- Maximum quantities are based on estimates of total water requirements at projected final development.

3.2.1 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 (e.g. boreholes, intakes, pumping stations, treatment works or mains distribution system). The basic method for calculating outage was set out in the UKWIR publication entitled “Outage Allowances for Water Resources Planning” Ref 95/WR/01/3, published August 2003.

Types of event that can be included in an outage allowance; include the following unplanned events:

- Water Quality failure
- Treatment system failure
- Power failure



- System failure

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 Icosa Water does not operate any sources or treatment works; therefore, the majority of the outage events listed above will originate in the system upstream of the point of connection for the bulk supply.

These types of events will therefore be taken into account in the incumbent water companies' assessment of WAFU, but not Icosa Water's. Any uncertainties relating to the reliability of the bulk transfers are allowed for under Target Headroom.

3.3 Demand

In line with Government policy, all new properties will be metered using the latest AMR metering technology for domestic and commercial supplies.

Table 2.2 shows the number of properties that have been connected by September 2018. All of these properties have been metered with the exception of three domestic properties in the West Raynham WRZ. Icosa Water propose that these properties will eventually be metered – the following options will be considered:

- apply for permission to compulsory meter the properties (this is possible as West Raynham is in an area categorised as being in “serious water stress”);
- meter the properties for data monitoring purposes, but continue to charge on an unmeasured basis; or
- wait for change of occupancy.

The final plan assumes these will be metered over the next three years on change of occupancy.

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 wastewater 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, Icosa Water has used consumption data provided by the incumbent water companies for the areas in which the Icosa Water WRZs sit (see the assumptions on each WRZ in sections 4.2 and 4.3). Household consumption data for both incumbent water companies is based on micro-component analysis.

The current development at West Raynham was formally ex RAF housing stock serviced via an existing bore hole that was subject to over abstraction. All properties in this inset area are pre-1960 with a small percentage of refurbishment. Planning permission is currently being sought to expand the development with an additional 88 new properties which will be built to modern standards and will include water efficient measures.

Metering is generally believed to lower per capita consumption by up to 17% and so the fact that all properties in this inset will be metered is an important consideration. Currently, all but three properties are metered.

All properties in the Rosewood Park WRZ are newly constructed, metered, properties.

3.3.1 Domestic demand

In general, there is a tendency for underlying domestic demand to increase each year due to the following factors:

- Improving lifestyles – our lifestyles are becoming increasingly convenience-based with more use of washing machines, dishwashers, and we take more baths and showers. Our leisure activities, particularly in the garden, also create increased demand for water.
- Smaller households - We are also increasingly living in smaller numbers in homes. Less people in homes use more water per person than larger families.

This underlying trend is offset by the greater efficiency in water use achieved by

- New designs in buildings and appliances
- Water saving devices
- Individual metering reducing consumer consumption patterns
- Reduced leakage due to new network asset



Domestic demand is estimated as the product of the number of properties times their occupancy (number of people per property) times per capita consumption (pcc – expressed in litres/head/day or l/h/d). The Government’s water strategy for England sets out a vision for the year 2030:

“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.”

As the great majority of construction in Icosa Water inset areas will occur after October 2017, new housing should be built to the 125 l/h/d/ standard. It might be expected that over time, and with Icosa Water’s commitment to aim for the highest levels of water efficiency, it will be possible to achieve lower pcc rates. For the purpose of arriving at bulk supply agreements, Icosa Water has assumed a constant pcc of 150 l/h/d for domestic demand throughout the planning period. For the purpose of this WRMP, Icosa Water has based its demand forecasts on data obtained from the incumbent water companies (see the assumptions set out in sections 4.2 and 4.3). Whether or not this level of efficiency is being achieved will become clear when data from domestic meters become available.

The number of domestic connections at full development in the inset area has been defined by the developers (Table 2.2) although in the case of future development areas there will be 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 economies.

The assumed rates of new development can be found in sections 4.2 and 4.3. However, these will depend on the size of the overall developments. 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 additional bulk supply connections need 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 occupancy rates based on data provided by the incumbent water companies (see sections 4.2 and 4.3).



As more consumption information becomes available, Icosa will be able to more accurately forecast demand for each WRZ and compare with the incumbent water companies' forecasts.

3.3.2 Peaking factors

The estimation of domestic demand using pcc factors and household occupancy produces an average annual rate of demand in a normal year (NYAA). Demand is higher than this in a dry year (DYAA) and considerably higher during the peak demand week of the year (average day peak week or ADPW).

Dry year factors (DYAA/NYAA) can vary between 1% and 10%, and peak week factors (ADPW/NYAA) can vary between 10% and 40%. For the purpose of arriving at bulk supply agreements, Icosa Water has used a peak week factor of 1.2. For the purpose of the demand forecasts in this final WRMP, Icosa Water has based the factors on data from the incumbent water companies (see sections 4.2 and 4.3)

A ratio of 1.2 may be conservatively high for inset areas as we believe that most newer houses have smaller gardens than their older counterparts. Together with Icosa Water's water use efficiency campaigns, this will serve to reduce peak demand. The figures used in the final plan provide an indication of whether peak demands might give rise to possible supply problems in the future.

3.3.3 Commercial demand

There are 22 existing commercial properties connected at the West Raynham development all of which for the purpose of the final WRMP are considered to have demand profiles lower than the equivalent domestic demand as they are all small cottage industry type units with little or no usage other than toilet and washing facilities.

In the Rosewood Park inset area, there at the end of September 2018 there were five commercial properties. Four of these are small cottage industry type units with little or no usage other than toilet and washing facilities. The fifth non-household is a care home. The developer has provided the forecast demand for this property.



For any future developments where commercial entities will be serviced by Icosa Water, industry demand modelling values for commercial developments related to internal floor area and the number of people working or living there will be used. Where actual demands are known due to the specific nature of the commercial build then Icosa Water will use this data to calculate supply and demand values. The property mix can vary enormously, as can water consumption expressed per person or per square metre. Commercial demand will therefore need to be calculated separately for each WRZ. This is not expected to apply to either of the two WRZs reported on in this final WRMP.

3.3.4 Impact of climate change on demand

The consensus is that in South East England, climate change will result in hotter and drier summers and warmer wetter winters. This is likely to result in higher consumption through people taking more showers and baths, and watering their gardens more.

AWS estimate that this will lead to an increase in demand of 2% by the end of the planning period for the West Raynham site, and SEW estimate an increase in demand of up to 3% in the Rosewood Park area by the end of the planning period.

Such increases are small in relation to the uncertainties in pcc at these developments. A small allowance has been made in the calculation of target headroom for this uncertainty in demand.

3.3.5 Water efficiency

As stated in section 1.3, Icosa Water is committed to achieving high levels of water-use efficiency. Water efficiency is an integral part of resource planning and Icosa Water has a statutory duty to promote the efficient use of water. Key to this is support for customer behavioural change. Icosa Water believes that it is important to support and assist customers with these changes and this will be the key strand of Icosa Water's work during the planning period along with promoting its environmental policy objectives.

Icosa Water provides information on its web site which sets out water efficiency guidance focusing on education, advice and raising awareness.

Icosa Water will work with developers to ensure all new buildings are designed with water efficiency in mind.



The effects of Icosa Water's water efficiency programme are reflected in its demand forecast as follows:

- The pcc for new properties is 125 l/h/d in the West Raynham WRZ and 129 l/h/d in the Rosewood Park WRZ (consistent with the incumbent water companies plans).
- Icosa Water will work with customers in the older housing stock in the West Raynham WRZ over the planning period to ensure pcc does not rise despite lifestyle pressures.

The effect of metering on the pcc of the older housing stock in the West Raynham WRZ will be monitored. As more data becomes available over the next five years, the potential for a more proactive water efficiency programme will become evident. Icosa Water will report on this in the Annual Reviews of its WRMP.

3.4 Leakage

In their guidance for the 2019 Periodic Review, Ofwat are challenging companies to set stretching leakage performance commitment levels to:

- achieve forecast upper quartile performance (in relation to leakage per property per day and leakage per kilometre of main per day) where this is not being achieved – or justify why this is not appropriate;
- achieve at least a 15% reduction in leakage (one percentage point more than the largest reduction commitment at PR14) – or justify why this is not appropriate; and
- achieve the largest actual percentage reduction achieved by a company since PR14 – or justify why this is not appropriate.

Companies are also required to justify their leakage performance commitments relative to the minimum level of leakage achievable.

A requirement to use the method described in Consistency of Reporting Performance Measures (UKWIR 2017) is set out in the interim update of the Water resources planning guideline (April 2017)

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' or background 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 (l/prop/d).
- Total leakage (losses from the distribution system plus customer side leakage) may be more appropriately expressed in m³/kilometre/day.

The former allows for different densities of housing while the latter takes account of the length of distribution main from source to customer. Leakage is also often expressed in terms of the percentage 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 its inset applications, Icosa Water has agreed target rates for "unaccounted-for-water" of 5 to 10 % 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 its supply-demand balance. UFW rates as low as 5% will be difficult to achieve, except perhaps initially when all the properties and pipe connections are new.

As the network ages, leakage rates are likely to rise. Nevertheless, it is company policy to strive for the lowest practicable rates and this is embodied in our supply-demand balance calculations which assume a leakage rate of 5% of DI at the beginning of the planning period rising to 10% by the end. This compares to AWS's annual leakage of 17% of DI in the base year.

As stated previously, the development sites are only now providing meaningful data in terms of demand balance hence 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. At this stage, Icosa Water does not have sufficient data available to carry out a detailed water balance and is not able to improve on the assumptions made in its draft WRMP.



Over the next five years, will carry out a review of available data and will consider the most appropriate methodology for estimating the level of unaccounted for water in the supply-demand balance. Progress will be reported in Icosa Water's Annual Review of its WRMP. In the meantime, regular monitoring of demands and trends in readings from bulk meters will continue. Initially, calculation of unaccounted for water is likely to be simplistic based on assumed night time usage, metered volumes supplied to customers and volumes received via the bulk supplies.

In older systems, approximately 30% of leakage is thought to come from customer' supply pipes. With a fully metered network, detection of supply pipe leakage should be identified more rapidly. Icosa Water has included an allowance for underground supply pipe leakage (USPL) in its WRMP tables. As more data becomes available the figures for USPL can be reviewed and demand forecasts updated as part of annual reviews of the WRMP. Meanwhile, Icosa Water will work customers to ensure that supply pipe leakage is identified and dealt with early.

Leakage control is managed within each inset area under the responsibility of the Operational Manager.

An inset area will be designated as a District Metering Area (DMA) from the point of connection from the regional incumbent. Flows into the DMA will be recorded via a bulk metered supply.

The Icosa Water business development portfolio at this stage does not require a structured team of leakage technicians in which case it may be prudent to outsource some functionality to assist with leakage monitoring.

It is anticipated that in the longer term a dedicated leakage management team will be suitably structured dependant on infrastructure and assets. At this time any leakage identified on the new network will be dealt with on a reactive basis.

All personnel engaged in working on water networks system will be competent i.e. authorised, trained and accredited to the appropriate hygienic standards and in possession of the National Water Hygiene card.

Each DMA will have leakage targets agreed based on an appraisal of the levels of leakage for that supply area.

The assessment considers all supply, demand and environmental issues appropriate for the individual DMA.



The requirements for additional supporting functions for the management and control of leakage have not been fully identified at this stage.

It is anticipated that support for the maintenance of telemetry and instrumentation equipment will be outsourced. These will be progressed on a contractual basis.

Water balance – Icosa Water will undertake a regular water balance of its distribution network using data extracted from data loggers installed on the bulk meter or as provided by the incumbent pursuant to its contractual obligations.

AMR – All customers within the Icosa network will be metered using AMR 3G or LoRa metering web-based technology. Remote 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.

Data software - Arad Metering Services software enables the transfer of data onto Icosa Water billing system and records details of metered consumption usage and trending of total night lines.

Leakage City-Mind is an automated application designed to calculate leakage and manage leakage targeting and activity at DMA level. Its prime source of corporate information will be from logger data and site information. The application will calculate the net flow in each DMA to determine daily demand and night flow figures. Standard leakage methodologies are used to convert values to rolling weekly and monthly summaries used for leakage reporting.

Network Records

Asset Information System is a graphical asset information system (GIS) holding records of the company's mains and underground assets. Records will be held on the company's geographical system for operational and customer enquiries.

Records of all strategic, boundary, isolating valves, and their mode of operation are clearly marked and referenced on GIS along with hydrants PRV/NRV and other operating assets.

LCA (Leakage Control Areas). All assets within each LCA are clearly defined within the boundary area and shown on GIS and assigned to a DMA.

AZNP (Average Zone Night Pressure). The night pressure at the average property height within the DMA will be identified on GIS as a reference point for pressure management purposes.



Records of leakage investigation and activities by DMA will be recorded on leakage activity sheets. Data will be fed into the company's "Leakage Reporting System" for analysis. Data will include details of boundary valve check and step test log.

Icosa Water aims to ensure that leaks on private pipes are repaired promptly. Leaks and bursts on private pipes are a major contributor to losses within the system.

The Water Services Association produce a document entitled "A Guide to Water Service Pipes" in which it defines the boundaries where the company's responsibilities end and the customer's responsibilities begin. The guidance document has been adopted as standard practice by Icosa Water.

Where a leak or burst is evident on private domestic mains or services, Icosa Water has published a set of service standards for dealing with leakage issues. In this respect Icosa Water, as the asset manager, adopts the standards and policies applicable within the incumbent's operating region and published at that time.

New Property - Where a leak is detected or reported on private pipes the customer will be advised to contact the developer/builder under the guarantee and a waste notice served on the owner.

Existing Property - Where a leak is detected or reported on private pipes the occupier will be issued with a series of letters/waste notices informing them of their responsibility to effect repairs.



3.5 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.

There are two accepted methods for calculating target headroom; the 1998 methodology (UKWIR 1998) and the 2003 methodology (UKWIR 2002). The latter presents an improved methodology which combines probability distributions of deployable output, demand, outage and headroom to provide a probability-weighted balance of supply. This permits an assessment of the probability of supply failure at any given time to be obtained which can then be used to evaluate the success of any planned changes to the supply-demand balance. This method is particularly recommended where significant investment is required to develop new resources to close a supply-demand deficit.

In small resource zones where there is no immediate supply-demand balance issue, the simpler 1998 methodology is considered adequate. This method has therefore been used to estimate target headroom for the current WRMP. The method involves assigning a score to each source of uncertainty depending on the degree of uncertainty and the scale of its impact on the supply-demand balance. Only those uncertainties that lie outside the direct control of the water company are considered. A total of 11 factors are identified in the method as potential sources of uncertainty; 8 supply-related and 3 demand-related (see Table 3.2).



Table 3.2 The factors that determine Target Headroom (Source Table 3.1 (p.58) of UKWIR (2002))

Level	Supply Related	Score Range
S1	Vulnerable surface water licences	0 to 10
S2	Vulnerable groundwater licences	0 to 10
S3	Time limited licences	0 to 15
S4	Bulk transfers	0 to 5
S5	Gradual pollution of sources causing a reduction in abstraction	0 to 15
S6	Accuracy of supply-side data	0 to 5
S7	Single source dominance and critical periods	0 to 15
S8	Uncertainty of impact of climate change on source yield	0 to 10
Demand Related		
D1	Accuracy of sub-component data	0 to 5
D2	Demand forecast variation	0 to 15
D3	Uncertainty of impact of climate change on demand	0 to 5

Each factor is evaluated separately for each resource zone with the scores for an individual zone aggregated. Some scores remain constant over time (e.g. the uncertainty attached to single site dominance) while others vary (e.g. the increasing uncertainty attached to the impact of climate change). This means there will be a minimum of 2 points in time at which uncertainty must be evaluated – the present day and the end of a planning horizon. Headroom scores are interpolated linearly between these 2 points. However, any change in WAFU (e.g. due to a new source or bulk supply connection coming online) creates a new planning horizon so there can potentially be several planning horizons at which headroom must be evaluated.

As all of Icosa Water’s future planning for supplies will be directly bulk transfers, the company has to plan for none of the supply related uncertainty associated with vulnerable or time-limited licences (S1, S2 and S3).

Supplies to Icosa Water (WAFU) are effectively fixed by the terms of the bulk supply agreements and so from Icosa Water’s point of view climate change (S8) and the threat of gradual pollution (S5) have no direct impact on WAFU. Similarly, as the estimate of WAFU has not been based on supply-side data (e.g. records of river flow or groundwater levels), the accuracy of these data (S6) is not an issue. There could be indirect effects from climate



change or gradual pollution if these factors influence the reliability of the bulk supply from AWS but this uncertainty is accounted for under factor S4. Finally, bulk transfers are specifically excluded from any consideration of single source dominance and critical periods (S7). As a result, all supply-side headroom factors have been scored zero for all of Icosa Water's inset areas except S4 – bulk transfers.

S4 takes into account the reliability of the transfers from AWS and SEW and the confidence that Icosa Water can have in the long-term sustainability of these sources of water. Because these transfers have operated for such a short period of time and have not yet reached their full capacity, their reliability cannot be assessed from historic data. Icosa Water has satisfied itself that AWS and SEW have properly planned to overcome any deficit in their own supply-demand balances over the planning period, and has confidence in the ability of AWS and SEW to maintain the bulk supplies to West Raynham and Rosewood Park. Nevertheless, there is always a risk of failure of a bulk supply and hence Icosa Water has assigned risk factors of three out of five for the start of the planning period and four out of five for the end of the planning period.

Demand related uncertainty is high due to the present lack of metering information to indicate levels of consumption. In the absence of such information, factor D1 has been scored as five out of five to reflect the complete lack of sub-component demand data. This factor can be reduced in subsequent WRMP updates as metering information becomes available.

The overall uncertainty associated with Icosa Water's demand forecasts has been scored as four out of 15 for demand factor D2 again due to the lack of historic data.

Climate change is one of the biggest single risk factors for both AWS and SEW in their resource planning for the next 25 years. However, much of this risk is associated with the impact on the deployable output of sources. Periods of increasingly hot and/or dry weather will increase peak demand but the impact is thought to be relatively small and hence Icosa Water has scored this uncertainty as nil out of five at the start of the planning period, and one out of five at the end of the planning period.

Overall, target headroom is calculated to rise slightly during the planning period from 6.5% to 7.7% of WAFU (see Table 3.3).



Table 3.3 Derivation of headroom scores for both inset areas

Level	Supply Related	Score Range	
		2017/2018	2045/2050
S1	Vulnerable surface water licences	0	0
S2	Vulnerable groundwater licences	0	0
S3	Time limited licences	0	0
S4	Bulk transfers	3	4
S5	Gradual pollution of sources causing a reduction in abstraction	0	0
S6	Accuracy of supply-side data	0	0
S7	Single source dominance and critical periods	0	0
S8	Uncertainty of impact of climate change on source yield	0	0
Demand Related			
D1	Accuracy of sub-component data	5	5
D2	Demand forecast variation	0	4
D3	Uncertainty of impact of climate change on demand	0	1
Total score		8.0	10.5
	Target Headroom (% of WAFU)	6.5	7.7



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 will be different for each WRZ as new inset areas come on line and some of the values used to estimate demand also vary. The detailed supply-demand balance for the current inset areas is discussed in the following sub-sections.

For the purposes of this report, each Icosa Water inset area is treated as a separate WRZ, as discussed in section 1.2.

Details of each WRZ and the assumptions made are set out in the sections below.

This section will be updated as new inset areas are licensed. Updates will be included in the annual review of the WRMP.

4.2 West Raynham water supply zone

4.2.1 Introduction

Icosa Water's West Raynham WRZ lies to south of East Rudham and is supplied from the AWS North Fenland WRZ. The development consists of 170 existing RAF housing stock with 22 cottage industry type commercial units located within existing outbuildings. A further 88 domestic units have been put into planning for approval. Allowances for the additional demand have been taken into consideration in terms of the WRMP.

Icosa Water has renewed the entire water distribution network. It has up graded the system from an old iron network to new High-Performance Polyethylene (HPPE) mains and services. All properties have been transferred to the new network and provided with new service connections and 3G AMR water meters for drive by meter reading and data download.

AMR metering has been installed on 98% of customer connections having given existing customers a metering option for billing. Three domestic properties remain unmeasured.



There is potential for an additional 200 household units as a long-term development strategy taking the total household and non-household units up to circa 480 by the end of the planning period. This additional development is subject to planning approval. Icosa Water has carried out a scenario test to determine the need for additional water. The test shows that this expansion will require additional water resource from Anglian Water and will probably require an upgrade to the AW network in order to meet projected demands.

4.2.2 Current water supply arrangements

Icosa Water has negotiated an initial bulk supply agreement to supply the equivalent of 300 households. The maximum quantities to be supplied under this agreement are listed in Table 3.1.

The point of connection from the AW network is located in the village of East Rudham AW has upgraded the existing network to meet the demands of the development. Icosa Water completed the installation of 3.8Km of new 180mm HPPE water main from the point of connection in East Rudham.

Sub meters have been installed on the water network to ensure efficient management of network and monitor demands including water balance data usage.

4.2.3 Current demands

There are currently 170 household properties connected to the new network with a further 22 low volume non-household commercial supplies. The demand of each domestic unit is assumed to be slightly lower than an average household.

Icosa Water is currently collecting domestic meter consumption data for billing purposes, this demand information will provide Icosa Water with meaningful company data of actual water consumption (pcc data) which will be used to more accurately predict water supply-demand forecasts. These forecasts will be used to inform and update the WRMP in annual reviews.



4.2.4 Demand forecasts and projections

It is expected that a further 88 units will be built over the next seven years making a total of 280 household and non-household units. Demands for this additional development have been included within the projected supply-demand forecast figures.

There will be an estimated 500 domestic properties at full build-out, however, planning consent has not been granted for the additional 200 properties as yet. The precise rate of future development is not known as interim planning discussions are ongoing and will depend on many factors, not least the country's economic recovery from recession.

For the purpose of the WRMP, we have assumed the build rate shown in section 4.2.7. Any additional development over this number will be subject to revision of the bulk meter agreement with AWS and additional network upgrade to meet the increase in supply and demand requirements.

The assumptions used for demand forecasts and the source of those assumptions can also be found in section 4.2.7

4.2.5 Deployable output and outage allowance

The maximum annual transfer volume written into the existing bulk supply agreement is 68.9 m³/yr. (0.189 MI/d). This effectively represents the current deployable output of the system.

Icosa Water has not made a separate allowance for outage, but has included the uncertainty associated with the bulk supply in the target headroom allowance.

4.2.6 The baseline supply-demand balance

Once the development is completed to its designed output of 280 units the maximum annual volume of 68.9 MI/yr will be sufficient to meet future demand requirements including target headroom. See the graphs below.

The graphs show the:

- a) Base Line Water Supply-Demand Balance (DYAA).
- b) Base Line Water Supply-Demand Balance (DYCP)



For the inset area as produced from WRMP tables 2019 V14.

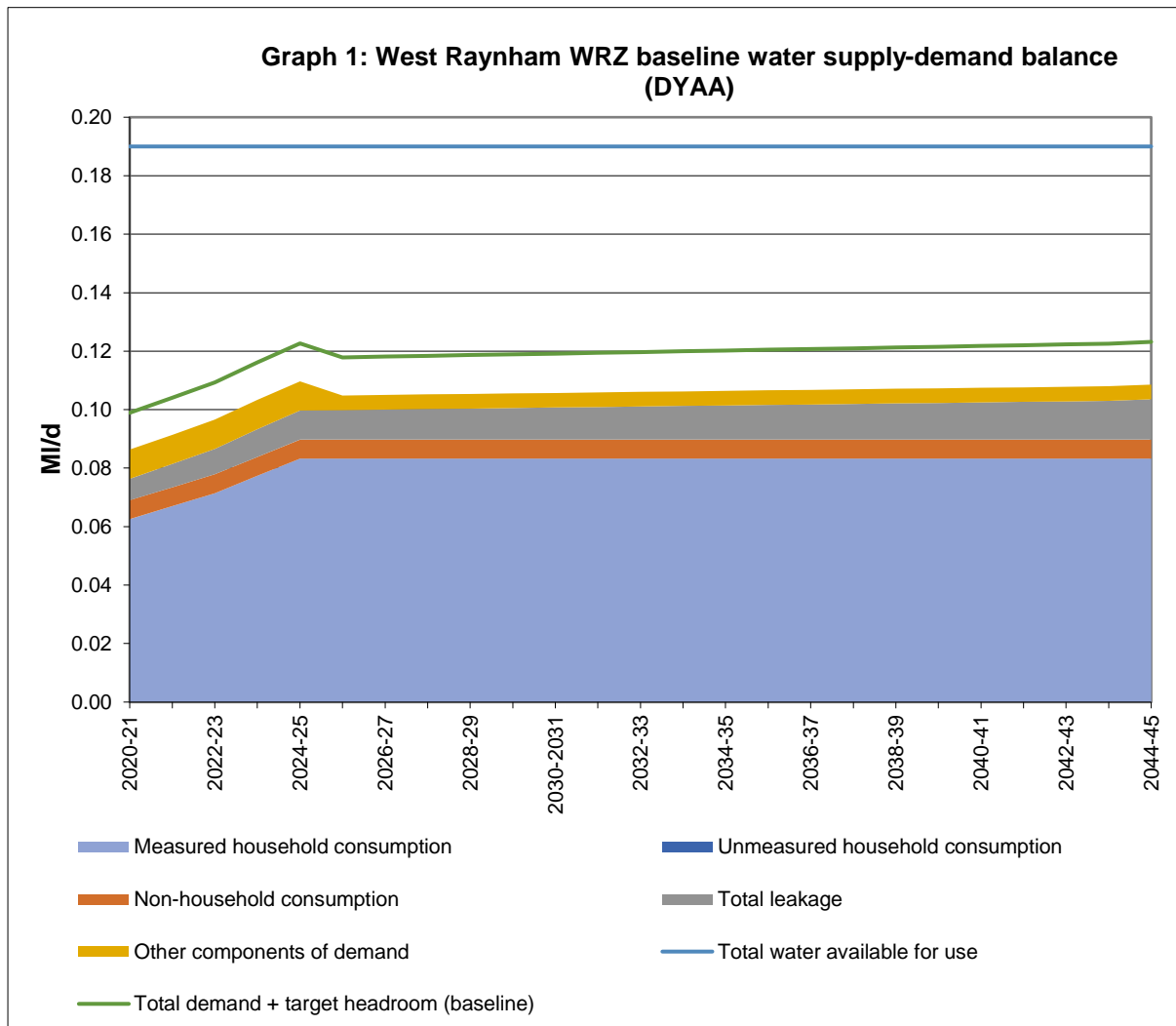


Figure 4.1 West Raynham WRZ baseline water supply-demand balance (DYAA)



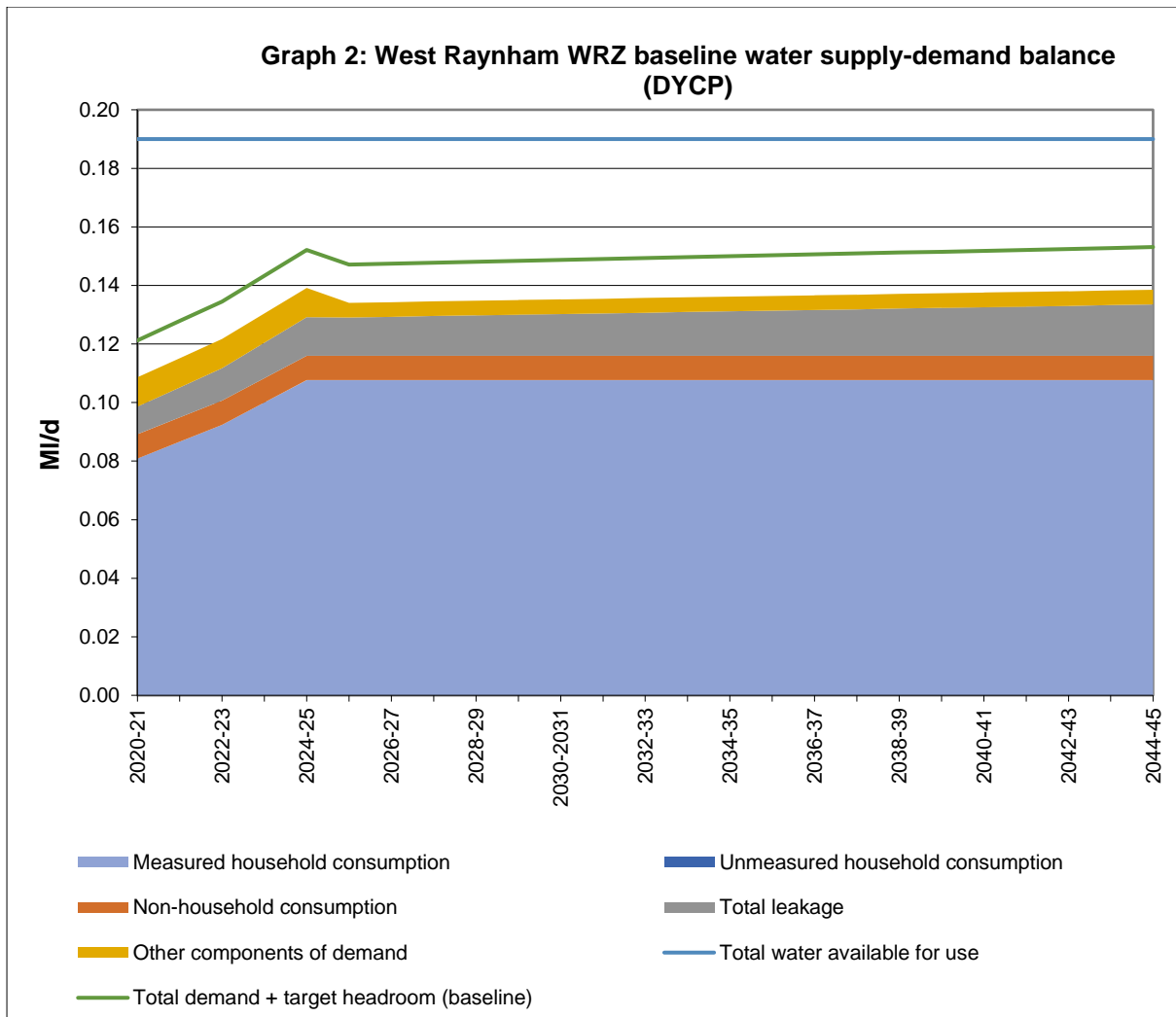


Figure 4.2 West Raynham WRZ baseline water supply-demand balance (DYCP)

4.2.7 Summary tables of assumptions

Table 4.1 Property numbers

	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2044/45
Total unmeasured household	3	2	1	0	0	0	0	0	0
New measured household	0	8	0	10	15	15	20	20	0
Unmeasured to measured	0	1	1	1	0	0	0	0	0
Total measured household	167	176	177	188	203	218	238	258	258
Total households	170	178	178	188	203	218	238	258	258
Total measured non-household	22	22	22	22	22	22	22	22	22
Total Properties	192	200	200	210	225	240	260	280	280



Table 4.2 Other assumptions

		2017/18	2025/26	2044/45	Source
PCC existing households at 2017/18	l/h/d	142.6	142.6	142.6	AWS
PCC new households from 2018/19	l/h/d	125	125	125	Icosa
Occupancy rate for households		2.3	2.3	2.3	AWS
Average consumption for non-households	l/prop/d	285	285	285	Icosa
Distribution losses as a percentage of DI	%	5%	-	10%	Icosa
Distribution system operational use	MI/d	0.01	0.005	0.005	Icosa
Dry year factor (DYAA/Annual Average DI)		1.029	1.029	1.029	AWS
Peak week factor (DYCP/Annual Average DI)		1.33	1.33	1.33	AWS

For level of service for security of supply, see Table 2.1.

4.2.8 Final-planning supply-demand balance

As there is no deficit in baseline supply-demand balance, the only difference between the final plan and the baseline is the change of three currently unmeasured households to measured. This has no impact on the supply-demand balance.

The graphs below show:

- a) Final Planning Water Supply-Demand Balance (DYAA)
- b) Final Planning Water Supply-Demand Balance (DYCP)



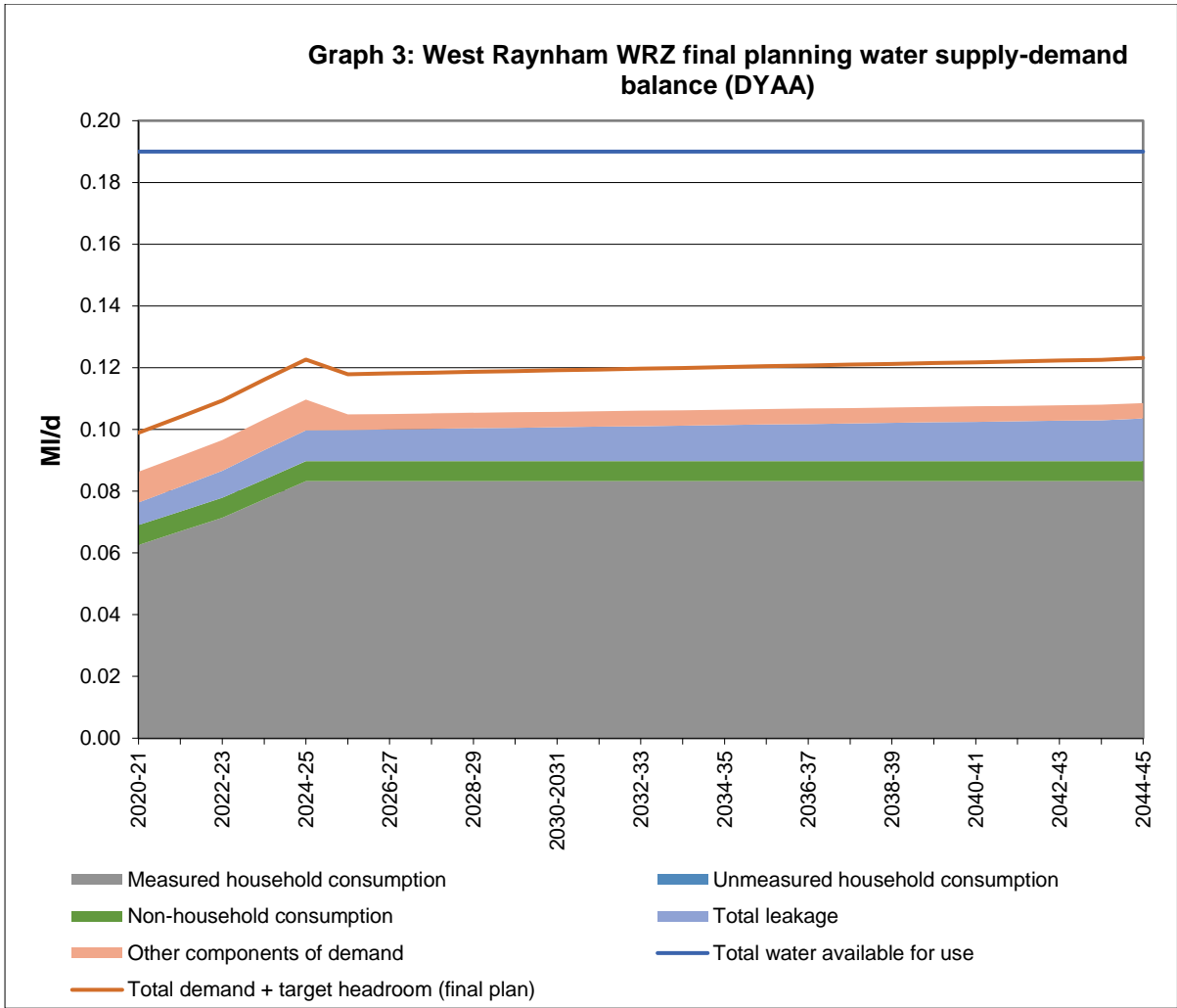


Figure 4.3 West Raynham WRZ final planning water supply-demand balance (DYAA)



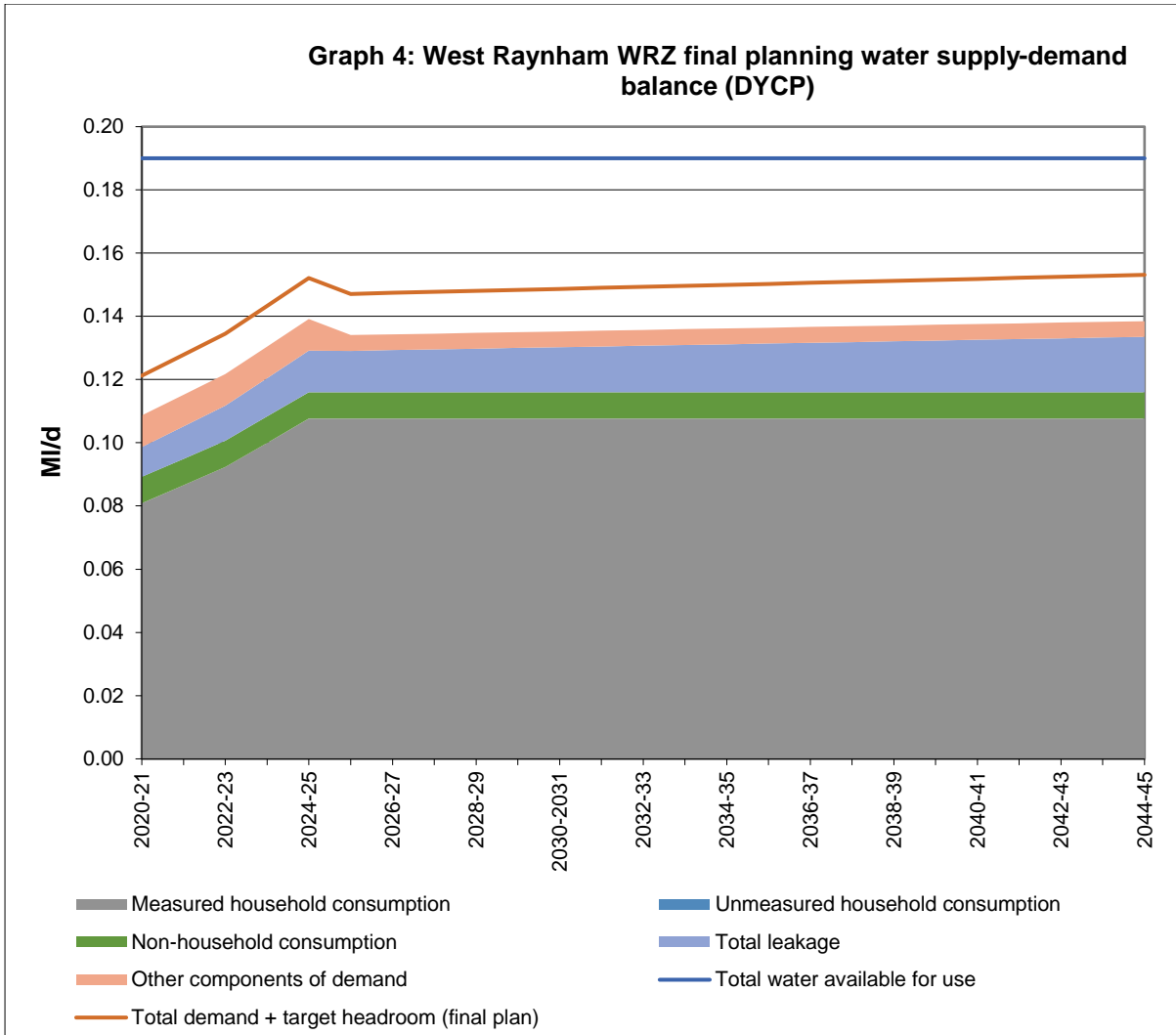


Figure 4.4 West Raynham WRZ final planning water supply-demand balance (DYCP)



4.2.9 Scenario testing

An agreement has been reached with AWS that should the development have planning approval for additional units above the 300 assigned then a network upgrade will be required to meet any additional demands.

It is not anticipated that this additional supply and demand requirement will occur until circa 2028. For the purpose of scenario testing, Icosa Water has carried out an additional demand forecast assuming the additional 200 units are constructed at a rate of 20 per annum from 2025/26. This scenario forecast shows that should the additional units be constructed, it will be necessary to make a new agreement with AWS and make the necessary network upgrade by ZZZZ. This forecast will be updated as more consumption data becomes available.

The graph below shows the supply-demand balance should the additional development take place. It shows that should the additional development take place, additional supplies will be required from 2032/33.

In the meantime, Icosa Water will continue to monitor demand and update its forecast accordingly. If demand is higher than forecast, or if the development occurs, then depending on the size of the development, Icosa Water will firstly consider demand management measures to resolve any potential imbalance, and secondly will consider the need to negotiate an additional supply from AWS.



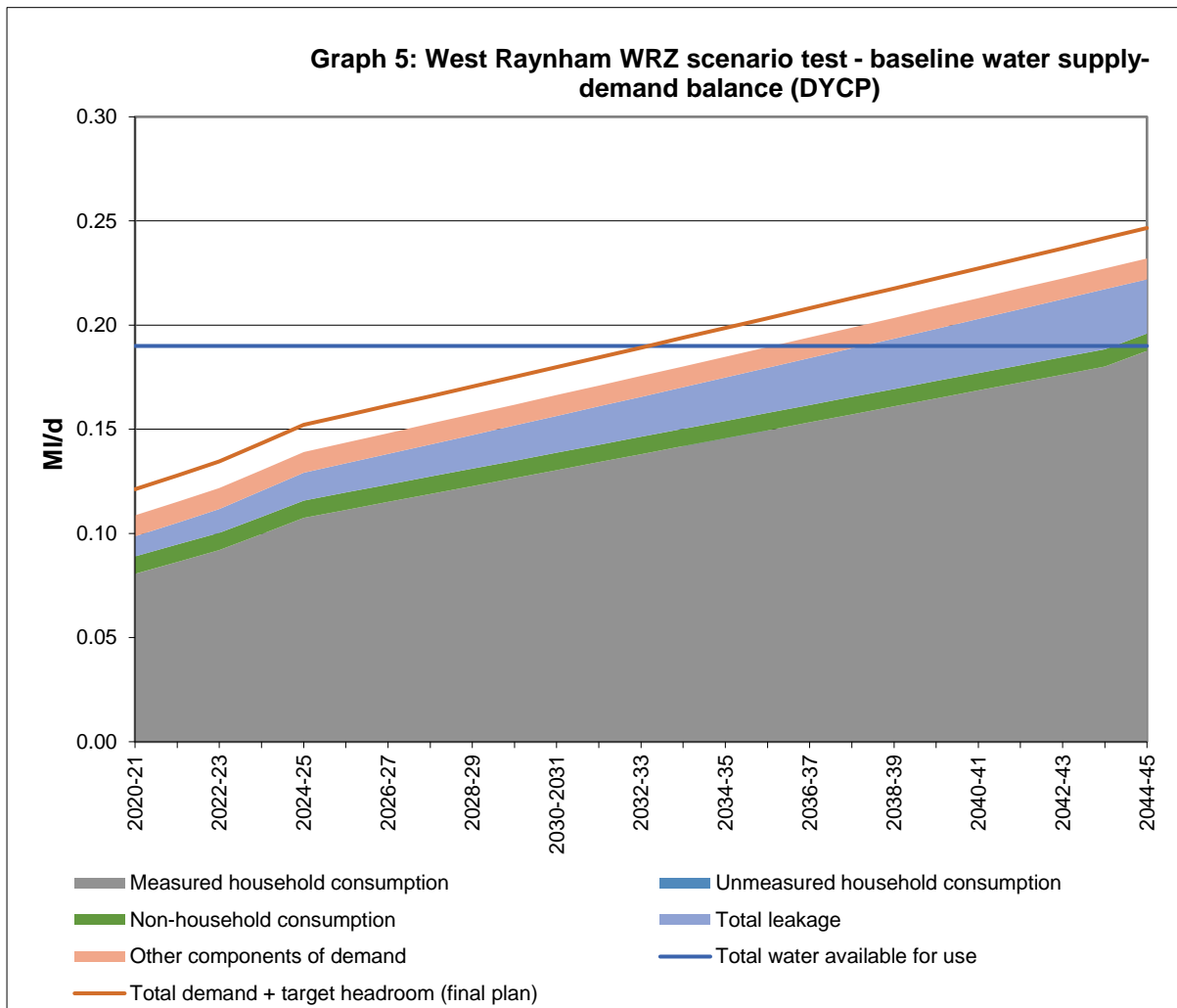


Figure 4.5 West Raynham WRZ scenario test - baseline water supply-demand balance (DYCP)

4.3 Rosewood Park water supply zone

4.3.1 Introduction

Icosa Water’s Rosewood Park WRZ lies to the west of Bexhill-on-Sea and is supplied from the SEW Eastbourne WRZ. The development consists of 341 new homes to be built over the next four years together with four cottage industry type commercial units and a care home.

The entire water distribution network is being constructed by Icosa Water’s contractor in new High-Performance Polyethylene (HPPE) pipe. The contractor is Water Industry Registration Scheme approved. All properties will be fitted with 3G AMR water meters for drive by meter reading and data download.



There are no plans for further development of the site.

4.3.2 Current water supply arrangements

Icosa Water has negotiated an initial bulk supply agreement with SEW to supply the equivalent of 341 households, four small non-households and a care home. The maximum quantities to be supplied under this agreement are listed in Table 3.1.

The point of connection from the SEW network is located in Barnhorn Road (A259).

Sub meters have been installed on the water network to ensure efficient management of network and monitor demands including water balance data usage.

4.3.3 Current demands

There are currently 50 household properties connected to the new network with a further 4 low volume non-household commercial supplies and a care home. The developer has provided forecast consumption figures for the care home.

Icosa Water is currently collecting domestic meter consumption data for billing purposes. This demand information will provide Icosa Water with meaningful company data of actual water consumption (pcc data) which will be used to more accurately predict future water supply-demand forecasts. These forecasts will be used to inform and update the WRMP in annual reviews.

4.3.4 Demand forecasts and projections

It is expected that a further 291 units will be built over the next seven years making a total of 346 household and non-household units. Demands for this additional development have been included within the projected supply-demand forecast figures.

No further development is forecast for this WRZ.

For the purpose of the WRMP, we have assumed the build rate shown in section 4.3.7. The assumptions used for demand forecasts and the source of those assumptions can also be found in section 4.3.7



4.3.5 Deployable output and outage allowance

The maximum annual transfer volume written into the existing bulk supply agreement is 69.05 MI/yr (equivalent to 0.189 MI/d). This effectively represents the current deployable output of the system.

As reported in Section 1.3, due to the receipt of additional information while preparing this final plan, Icosa Water is considering the need to renegotiate the bulk supply agreement with SEW to increase the volume required to meet peak week demands. For details of how Icosa Water will deal with this see 4.3.6 and 4.3.8 below.

Icosa Water has not made a separate allowance for outage, but has included the uncertainty associated with the bulk supply in the target headroom allowance.

4.3.6 The baseline supply-demand balance

Once the development is completed to its designed output of 280 units the maximum annual volume of 69.1 MI/yr should be sufficient to meet future demand requirements including target headroom, especially during the critical period (peak week). See the graphs below.

As the development proceeds, Icosa Water will continue to monitor demand and update its forecast accordingly. If demand is higher than forecast, then Icosa Water will firstly consider demand management measures to resolve any potential imbalance, and secondly will consider the need to negotiate an additional supply from SEW.

The graphs below show the:

- a) Base Line Water Supply-Demand Balance (DYAA).
- b) Base Line Water Supply-Demand Balance (DYCP)



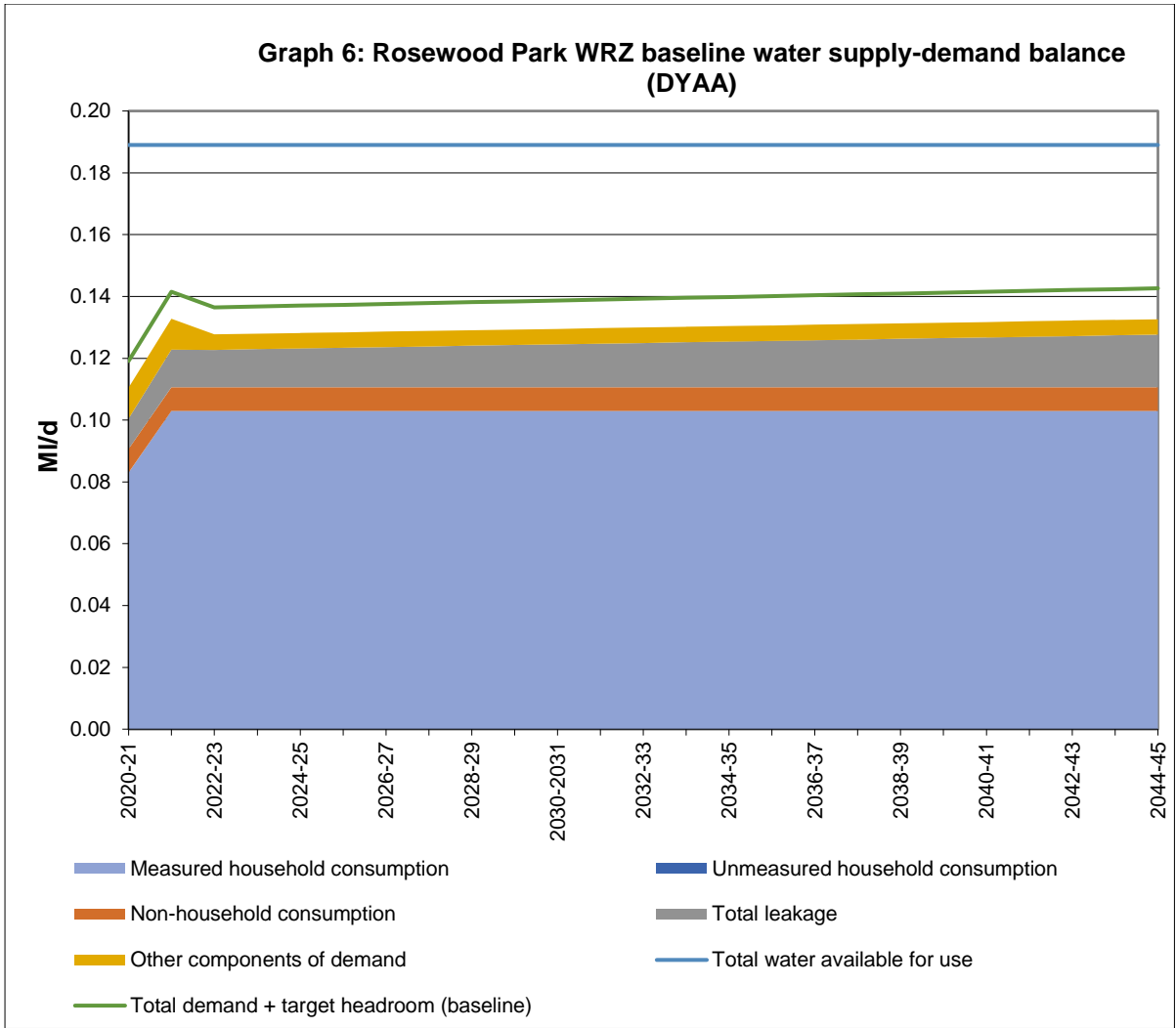


Figure 4.6 Rosewood Park WRZ baseline water supply-demand balance (DYAA)



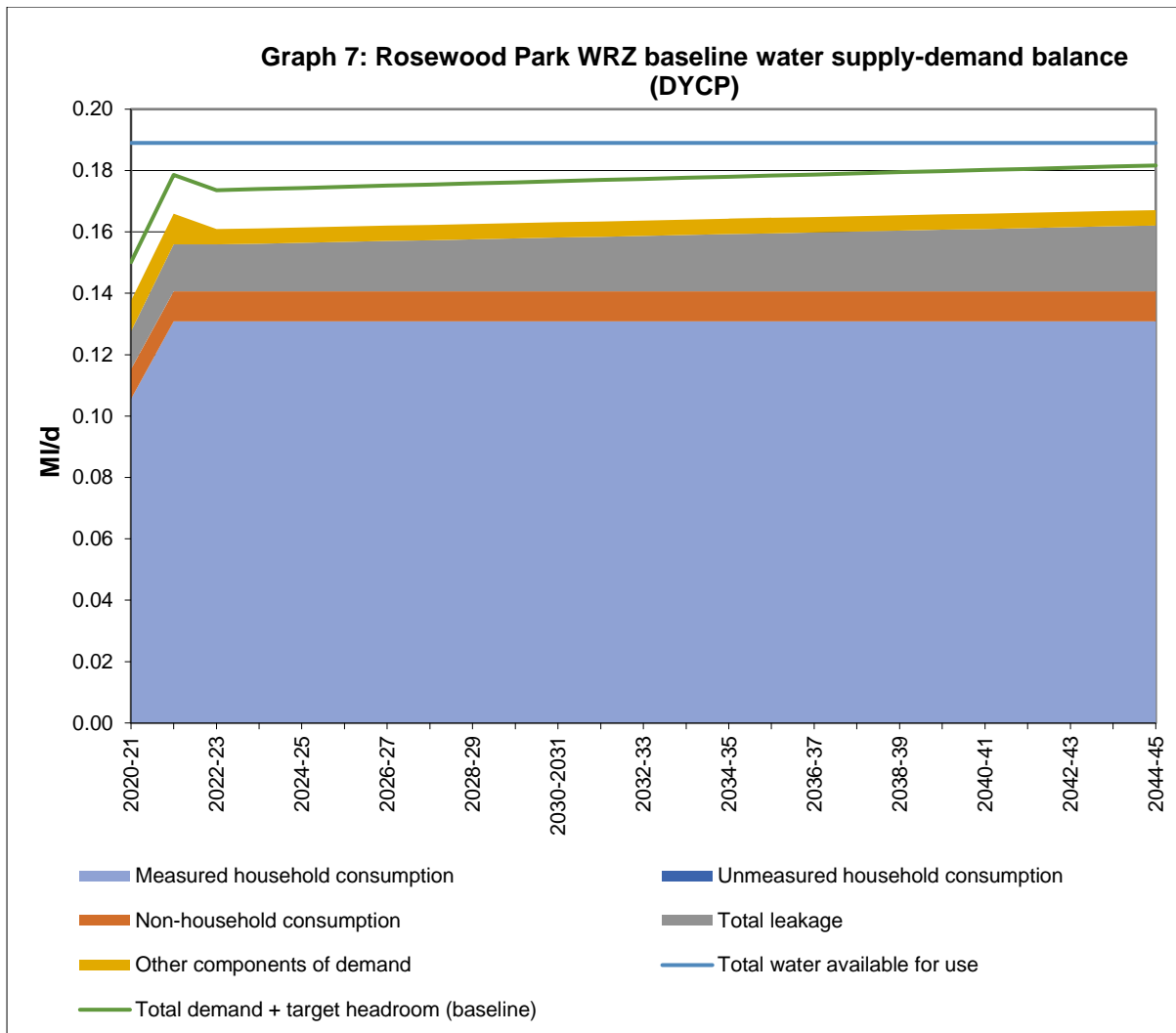


Figure 4.7 Rosewood Park WRZ baseline water supply-demand balance (DYCP)

4.3.7 Summary tables of assumptions

Table 4.1 Property numbers

	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2044/45
Total unmeasured household	0	0	0	0	0	0	0	0	0
<i>New measured household</i>	50	75	75	75	66	0	0	0	0
<i>Unmeasured to measured</i>	0	0	0	0	0	0	0	0	0
<i>Total measured household</i>	50	125	200	275	341	341	341	341	341
Total households	50	125	200	275	341	341	341	341	341
Total measured non-household	0	0	0	0	0	0	0	0	0
Total Properties	50	125	200	275	341	341	341	341	341



Table 4.2 Other assumptions

		2017/18	2025/26	2044/45	Source
PCC existing households at 2017/18	l/h/d	129	129	129	SEW
PCC new households from 2018/19	l/h/d	129	129	129	SEW
Occupancy rate for households		2.3	2.3	2.3	SEW
Peak daily demand for non-households	m ³ /d	88	88	88	Icosa
Distribution losses as a percentage of DI	%	5%	-	10%	Icosa
Distribution system operational use	MI/d	0.01	0.005	0.005	Icosa
Dry year factor (DYAA/NYAA DI)		1.018	1.018	1.015	SEW
Peak week factor (ADPW/NYAA DI)		1.294	1.294	1.294	SEW

For level of service for security of supply, see Table 2.2.

4.3.8 The final planning supply-demand balance

To enable Icosa Water to meet the imbalance in the baseline supply-demand balance (see 4.3.6 above), Icosa Water are considering the need to renegotiate the bulk supply agreement with SEW to ensure that average and critical period (peak week) demands are satisfied for the planning period.

The final planning graphs shown below include the additional bulk supply quantities required to meet the deficit.

The graphs below show the:

- a) Final Planning Water Supply-Demand Balance (DYAA)
- b) Final Planning Water Supply-Demand Balance (DYCP)



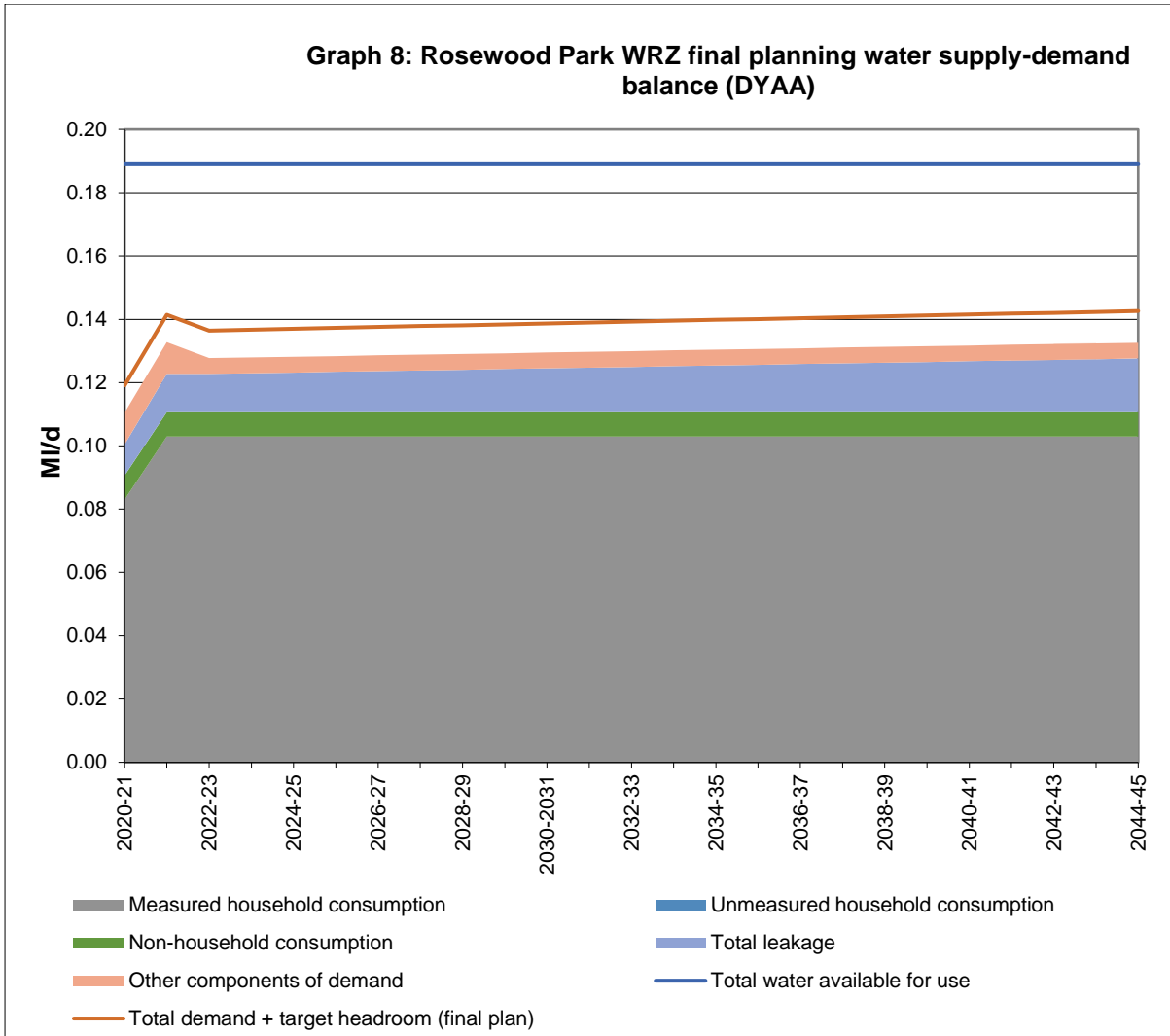


Figure 4.8 Rosewood Park WRZ final planning water supply-demand balance (DYAA)



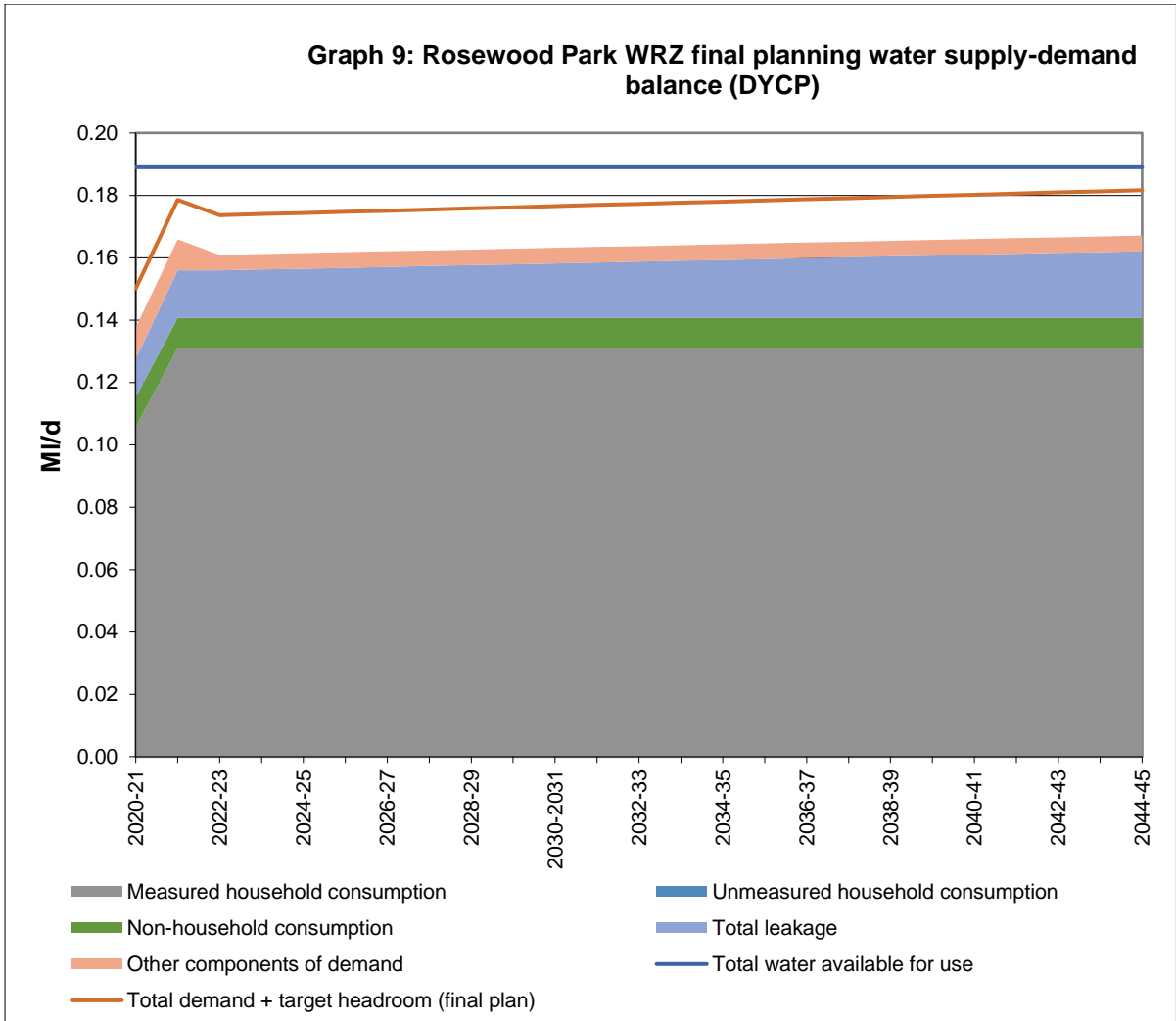


Figure 4.9 Rosewood Park WRZ final planning water supply-demand balance (DYCP)

4.2.9 Scenario testing

No scenario testing has been carried out for the Rosewood Park WRZ. Icosa Water will monitor consumption as the size of the development increases. Consumption will be reviewed as part of the WRMP annual review and should additional supplies be required, this will be negotiated with SEW.



5 Environmental regulatory requirements

Icosa Water will work closely with the incumbent water companies as required in assessing the potential impact of licenced abstraction in designated or environmentally sensitive areas under the terms of:

- The Water Framework Directive
- The Wildlife and Countryside Act (including consideration of invasive non-native species)
- The CRoW Act
- Habitats regulations
- The Environment Agency's Restoring Sustainable Abstractions (RSA) programme, local Environment programme sustainability investigations
- Abstraction reform
- Biodiversity action plans
- Catchments Abstraction Management Strategies (CAMS).

However, given that Icosa Water will not be operating any of its own sources in this first WRMP, it is not considered to be a major issue that needs to be addressed within this plan.



6 Strategic Environmental Assessment (SEA)

The SEA process enables all options considered by Icosa Water during the formulation of the preferred strategy, to be appraised against Icosa Water's own environmental objectives. This process thereby allows Icosa Water 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 address this topic specifically within the WRMP.



7 Resilience

Defra, the Environment Agency, the Drinking Water Inspectorate and Ofwat have advised water companies that customers' water needs must be met in a safe, resilient and efficient way, while protecting the environment and respecting good supply practice and the needs of other water users. This is becoming ever more challenging as water resources face increasing pressures from climate change, population growth, societal expectations and increasing environmental aspirations.

The Ofwat Resilience Task and Finish Working Group define "resilience" as follows:

"Resilience is the ability to cope with, and recover from, disruption, and anticipate trends and variability in order to maintain services for people and protect the natural environment now and in the future."

The primary drivers for resilience planning are set out in UKWIR's "Resilience Planning: Good Practice Guide" (Report Ref No. 13/RG/06/02). They are:

- Drought
- Flooding
- Extreme, prolonged cold spells
- Climate change

The Guide also sets out a list of hazards, both weather and non-weather related. Icosa Water has carefully considered these drivers and hazards, and is satisfied that its plan has sufficient and appropriate levels of resilience in order to maintain services for people while protecting the natural environment now and in the future.

These hazards are listed below together with Icosa Water's response to them. In summary:

- General. The majority of the hazards listed are more likely to affect the incumbent water company's ability to deliver a bulk supply to Icosa Water's sites. Icosa Water has reviewed the incumbent water companies WRMPs (Anglian Water's and South East Water's) and is satisfied that these companies have properly considered resilience and have resilient plans in place.
- Drought. Please refer to Icosa Water's Drought Plan.
- Flooding. Icosa Water has studied the Environment Agency's flood risk maps for its two WRZs, West Raynham and Barnhorn Green, and is satisfied that flooding does



not pose a significant risk. Both WRZs are outside of Flood Zone 3.

- Extreme, prolonged cold spells. The reticulation networks in both WRZs are newly laid in MDPE. The mains have been laid in accordance with NJUG guidelines to ensure protection against prolonged cold spells. Icosa Water’s website includes a section on “Getting ready for Autumn” providing advice to customers on guarding against the harsh effects of winter – the aim being to try and reduce leaks on customers’ properties resulting from the effects of freeze/thaw. Further, Icosa Water has put in place measures for dealing promptly with leaks identified in its network.
- Climate change. Climate change has the potential to affect source yields and customer usage over time.
- The availability of water is covered by the bulk supply agreements with the incumbent suppliers.
- Icosa Water will work with its customers to encourage the efficient use of water. In addition, the target headroom allowance includes a small allowance for the uncertainty associated with climate change.
- Other hazards – see Appendix A.



8 Board assurance and governance

8.1 Process

This final WRMP has been written with the assistance of Icosa Water's consultant, Black and Veatch, and has been subject to Black and Veatch quality assurance procedures.

Icosa Water has also worked with the Environment Agency during the development of the WRMP.

8.2 Board approval

The Board of Icosa Water has been kept apprised of development of the WRMP. The Board is satisfied that the final WRMP identifies the challenges faced by the environment, customers, and the company, and that it has incorporated feedback received from customers and stakeholders. To the best of its knowledge, the Board is satisfied that the final WRMP will enable the company to face medium term challenges and to prepare for longer term future challenges.

The Board approved the final version of the plan before publication. The website includes a statement by the directors to this effect.



9. References

- AWS (2017), "Draft Water Resources Management Plan" Anglian Water, 2017.
- SEW (2018), "Revised Water Resources Management Plan". South East Water 2018
- Defra (2008), "Future Water – The Governments' water strategy for England," February 2008.
- EA (2012), "Water resources planning guideline navigation tool," Environment Agency, October 2012.
- EA (2011), "Water resources planning guideline," Environment Agency, interim update, April 2017.
- Water Framework Directive
- Drinking Water Directive
- Water Resources Act 1991
- Environment Act 1995
- 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, Sir William Halcrow & Partners for UK Water Industry Research Limited, 1995.
- UKWIR/EA (1998), "A practical method for converting uncertainty into headroom," Report Ref. No. 98/WR/13/1, Sir William Halcrow & Partners for UK Water Industry Research Limited and Environment Agency, 1998.
- UKWIR (2002), "An improved methodology for assessing headroom", Report Ref. No. 02/WR/13/2, Mott MacDonald for UK Water Industry Research Limited, 2002
- UKWIR 2013 "Resilience Planning: Good Practice Guide" (Report Ref No. 13/RG/06/02).
- UKWIR 2017 "Resilience Performance Measures, Costs and Stakeholder Communication" (Report Ref No. 17/RG/06/4



10 Glossary of terms and abbreviations

Abbreviation	Term	Description
AMP6	Asset Management Plan	5 year planning period and infrastructure investment programme period 2019 - 2024
AMR	Automated 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 Ltd	Name and title Incumbent water company - 'Anglian Water'
CAMS	Catchment Abstraction Management Strategy	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 & 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
	Icosa Water	Inset appointed water company
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/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
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	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 Icosa Water distribution 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
SEW	South East Water	Name and title Incumbent water company - 'South East Water'
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 A – Resilience – other hazards

Further to Section 7, and with reference to the UKWIR report “Resilience Planning: Good Practice Guide” Report Ref. No. 13/RG/06/02, Icosa Water has considered the risks and hazards that could challenge the requirement for customers’ water needs to be met in a safe, resilient and efficient way, while protecting the environment and respecting good supply practice and the needs of other water users.

A brief summary of these follows:

Weather and climate related

- Coastal flooding: no impact
- Drought/Prolonged hot/dry weather: accounted for in the demand forecast and levels of service
- Excessive cold and ice/snow:
 - mains laid at depth to avoid freezing
 - customers given advice on protection against freeze/thaw
 - Icosa Water prepared for quick response to identified leakage
- Fluvial flooding: Icosa Water has studied the Environment Agency’s flood risk maps for its two WRZs, West Raynham and Barnhorn Green, and is satisfied that flood does not pose a significant risk. Both WRZs are outside of Flood Zone 3.
- Ground water flooding: as for fluvial flooding.
- Landslip/subsidence: there has been no evidence of landslip or subsidence on either site.
- Sea level rise: both sites are above any foreseeable rise sea level
- Lightning strike: loss of power could be a risk to bulk supplies. Generally, the incumbent water companies will have standby power available
- Storms and gales:
 - loss of power could be a risk to bulk supplies. Generally, the incumbent water companies will have standby power available;
 - access problems for mains repairs could present short term problems.

Procurement and staffing

- Potentially a risk to the bulk supplies. Icosa Water has reviewed the incumbent water companies WRMPs (Anglian Water’s and South East Water’s) and is satisfied that these companies have properly considered resilience and have resilient plans.

Pollution incidents

- Low risk to Icosa Water’s WRZs.
- Potentially a risk to the bulk supplies. Icosa Water has reviewed the incumbent water companies WRMPs (Anglian Water’s and South East Water’s) and is satisfied that these companies have properly considered resilience and have resilient plans.

Physical damage

- Potentially a risk to the bulk supplies. Icosa Water has reviewed the incumbent water companies WRMPs (Anglian Water’s and South East Water’s) and is satisfied that these companies have properly considered resilience and have resilient plans.



Societal

- Third party interventions (e.g. misconnections, metal theft, emptying inappropriate material into manholes). Low risk on WRZs themselves. Icosa Water monitor water delivered via the bulk supply. Significant changes that could be as a consequence of third party interventions (e.g. illegal use of water) are investigated.
- Other societal hazards: potentially a risk to the bulk supplies. Icosa Water has reviewed the incumbent water companies WRMPs (Anglian Water's and South East Water's) and is satisfied that these companies have properly considered resilience and have resilient plans.

Communications and power

- General - potentially a risk to the bulk supplies. Icosa Water has reviewed the incumbent water companies WRMPs (Anglian Water's and South East Water's) and is satisfied that these companies have properly considered resilience and have resilient plans.
- Cyber attack – Icosa Water take the risk of cyber security seriously, and have the necessary systems and back-up in place to minimise the risk of cyber attack.

Geological processes

- Generally not a risk to Icosa Water's WRZs. Potentially a risk to the bulk supplies. Icosa Water has reviewed the incumbent water companies WRMPs (Anglian Water's and South East Water's) and is satisfied that these companies have properly considered resilience and have resilient plans.

Miscellaneous

- Generally only a low risk to Icosa Water's WRZs. Potentially a risk to the bulk supplies. Icosa Water has reviewed the incumbent water companies WRMPs (Anglian Water's and South East Water's) and is satisfied that these companies have properly considered resilience and have resilient plans.

