

Water Neutrality Study: Part A – Individual Local Authority Areas

Final Report

July 2021

www.jbaconsulting.com

**Crawley Borough Council
Chichester District Council**

This page is intentionally blank.

JBA Project Manager

Richard Pardoe MSc MEng
 Pipe House
 Lupton Road
 Wallingford
 OX10 9BS

Revision History

Revision Ref/Date	Amendments	Issued to
S3-P01 11/03/2021	Draft Report	Anthony Masson (CBC) Louise Bardsley (NE)
S3-P02 22/06/2021	2 nd Draft Report	Nick Price (SW) Anthony Masson (CBC)
A1-C03 02/07/2021	Final Report	Anthony Masson (CBC)

Contract

Prepared by Richard Pardoe MSc MEng
 Senior Analyst

Reviewed by Paul Eccleston BA CertWEM CEnv MCIWEM
 C.WEM
 Technical Director

Purpose

This document has been prepared as a Final Report for Crawley Borough Council. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by Crawley Borough Council for the purposes for which it was originally commissioned and prepared.

JBA Consulting has no liability regarding the use of this report except to Crawley Borough Council.

Copyright

© Jeremy Benn Associates Limited 2021.

Carbon Footprint

A printed copy of the main text in this document will result in a carbon footprint of 201g if 100% post-consumer recycled paper is used and 262g if primary-source paper is used. These figures assume the report is printed in black and white on A4 paper and in duplex.

JBA is aiming to reduce its per capita carbon emissions.

Executive summary

Significant concerns regarding the current Southern Water abstraction at Hardham (and any increase in abstraction required to serve planned development), have been raised by the Environment Agency and Natural England. The latter has advised that it cannot conclude with certainty that this process is not having an adverse impact on site integrity through a reduction in water levels and potential water quality impacts that are leading deterioration of habitat at designations including Amberley Wild Brooks SSSI, Pulborough Brooks SSSI that are part of Arun Valley SPA, Arun Valley SAC and Arun Valley Ramsar site. Natural England has advised the Crawley Borough, Chichester District and Horsham District Councils that development in the Sussex North part of the Gatwick sub-region must not add to this adverse effect. Water Neutrality has been proposed as a potential means to allow development to proceed without increasing abstraction from Hardham, and this report is the first stage in providing evidence on how this might be achieved.

The Hardham groundwater abstraction supplies water to the Sussex North Water Resource Zone (WRZ). This zone covers the majority of Crawley (excluding Gatwick Airport and Maidenbower), Horsham, part of Chichester local authority area and part of the South Downs National Park. This report addresses just Crawley and Chichester. The other authorities will be included in Part B of this work, where the in-combination affect is considered.

Water neutrality is defined in this study as:

"For every new development, total water use in the region after the development must be equal to or less than the total water-use in the region before the new development."

This study will estimate the additional water demand from growth in Crawley and Chichester and identify measures that could be used to first reduce demand, and then offset that demand in order to achieve neutrality. At this stage of the study, the focus is on identifying possible mitigation options and assessing the possible impact, further analysis will be carried out in later stages to produce a more accurate assessment of impact.

Measures that could be applied include:

- household and non-household visits (also called water audits) to provide advice on the wise use of water, and to fit water saving devices
- expansion of Southern Water's leakage reduction programme above their business plan
- extension to the metering programme followed by adoption of smart meters at a faster rate than required in the existing water company business plan
- adoption of rainwater harvesting or grey water recycling in new builds and retrofitting them in existing housing
- where practical, adoption of a largescale rainwater harvesting scheme to remove demand from toilet flushing in a large business park

Southern Water already have an ambitious programme of water efficiency measures as part of their Target 100 activities. This limits the options that the Local Authorities have to independently achieve neutrality as any measure to achieve neutrality must be in addition to measures already planned. Further discussion is recommended with Southern Water to understand the extent of the Target 100 programme, what contribution could be made to neutrality from measures it contains, and whether there is an opportunity to go faster or further than the Southern Water's plan.

The analysis in this report shows that a package of measures is likely to be required in order to achieve neutrality, with no one measure likely to offset the total demand.

In Crawley, this is likely to include a significant contribution from non-household schemes such as the large-scale retrofitting of rainwater harvesting in the Manor Royal Main Employment Area.

In Chichester, achieving water neutrality within the area in the Sussex North WRZ will be challenging as there is little contribution from non-household sources, and it may not be achievable in isolation.

This study is being carried out in three parts, of which this report is Part A. Part B will explore the in-combination impact of all of the local authorities in the WRZ collectively. Finally, Part C will build on the analysis in parts A and B and develop a draft plan to achieve water neutrality.

Contents

1	Introduction	7
1.1	Background	7
1.2	General approach	8
2	Considerations for Water Neutrality	9
2.1	Accepted definitions	9
2.2	Working towards a water neutrality plan	9
2.3	Spatial scale	10
2.4	Temporal scale	10
2.5	Achieving Water Neutrality	11
3	Baseline – Southern Water Actions	12
3.1	Introduction to the Water Resource Management Plan	12
3.1.1	Target 100	14
3.1.2	Water re-use scheme	17
3.1.3	Implications for Water Neutrality	17
4	Water neutrality - Demand reduction	18
4.1	Introduction	18
4.2	Efficiency targets	18
4.3	Efficiency measures	20
4.4	Education	21
4.5	Water labelling	22
4.6	Rainwater harvesting	23
4.7	Greywater recycling	25
5	Offsetting	25
5.1	Introduction	25
5.2	Metering	25
5.3	Leakage reduction	26
5.4	Tariffs	26
5.5	Household visits	26
5.6	Other measures	27
5.6.1	Non-household visits	27
5.6.2	Wastewater discharges	27
5.6.3	Strategic transfers and re-zoning	28
5.6.4	Agriculture and industry	28
5.7	Funding	29
5.7.1	Potential sources	29
5.7.2	Water company programmes	29
5.7.3	Local Authority projects	29
5.7.4	Nutrient neutrality example	29
6	Methodology	30
6.1	Water neutrality calculator	30
6.2	Demand scenarios	30
7	Water Neutrality in Crawley	31
7.1	Growth in Crawley	31
7.2	Water demand	31
7.3	Offsetting options	32
7.3.1	Leakage reduction	32
7.3.2	Metering	32
7.3.3	Household visits	32
7.3.4	Non-household visits	33

7.3.5	Application of BREEAM standards	33
7.3.6	Rainwater harvesting	33
7.3.7	Wastewater redirection	34
7.4	Summary	34
7.5	Conclusions and recommendations	38
8	Water Neutrality in Chichester	38
8.1	Growth in Chichester	38
8.2	Demand scenarios	38
8.3	Offsetting options	39
8.3.1	Leakage reduction	39
8.3.2	Metering	39
8.3.3	Household visits	39
8.3.4	Non-household visits	40
8.3.5	Application of BREEAM	40
8.3.6	Rainwater Harvesting	41
8.3.7	Wastewater redirection	41
8.4	Summary	41
8.5	Conclusions and recommendations	44
9	Future work	45
9.1	Discussion points	45
9.2	Next stages	47

List of Tables

Table 3.1	Key elements of the WRMP19 strategy (Central supply area)	13
Table 4.1	Demand scenarios	19
Table 7.1	Growth forecast for CBC	31
Table 7.2	Demand scenarios	31
Table 7.3	Number of properties requiring home visit in each demand scenario	33
Table 7.4	Offsetting options for CBC (in isolation)	36
Table 8.1	Growth in Chichester	38
Table 8.2	Demand scenarios	38
Table 8.3	Number of properties requiring a home visit in each scenario	40
Table 8.4	Offsetting options for Chichester (in isolation)	42
Table 9.1	Stakeholder comments	45

List of Figures

Figure 1.1	Sussex North Water Resource Zone	7
Figure 1.2	Location of abstractions in relation to protected sites	8
Figure 4.1	Consumer water efficiency measures	21
Figure 4.2	Example mandatory water label from Australia	22
Figure 4.3	Domestic water use	23
Figure 5.1	Location of Crawley WwTW relative to the Sussex North WRZ	28
Figure 7.1	Additional water demand scenarios in Crawley	31
Figure 8.1	Water demand in Chichester in various scenarios	39

1 Introduction

1.1 Background

Southern Water supplies water to Crawley Borough, Horsham District, the northern part of Chichester District and South Downs National Park Authority from its Sussex North Water Resource Zone (WRZ). Within this WRZ there are a number of water sources, one of which is a groundwater source at Hardham – one of a number of groundwater and surface water abstractions around Pulborough.

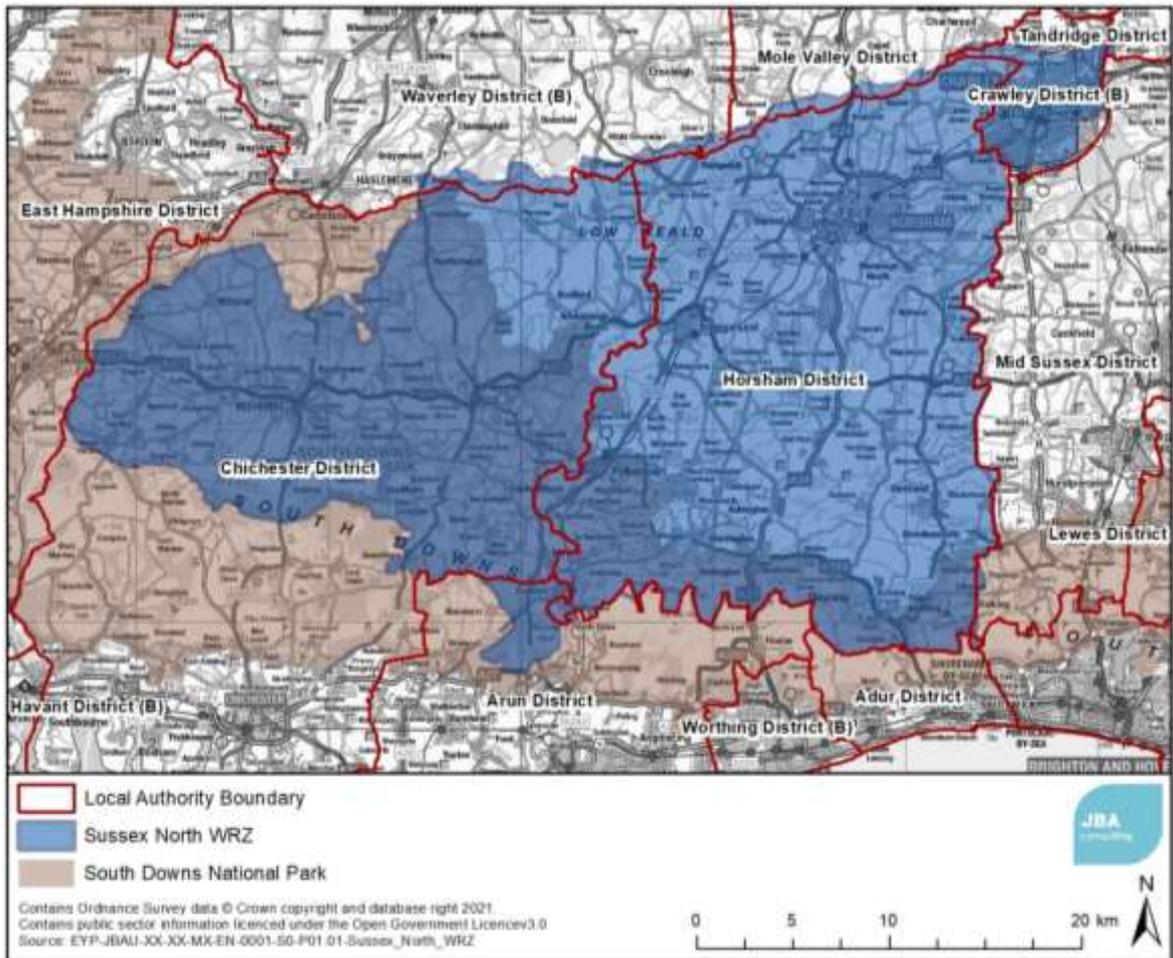


Figure 1.1 Sussex North Water Resource Zone

Natural England has raised significant concern regarding the current abstraction (and any increase in abstraction required to serve planned developed development), advising that it cannot conclude with certainty that this process is not having an adverse impact on site integrity through a reduction in water levels and deterioration of habitat at designations including Amberley Wild Brooks SSSI, Pulborough Brooks SSSI and Arun Valley SPA, Arun Valley SAC and Arun Valley Ramsar site (shown in Figure 1.2 below).

Investigations and discussions between Southern Water, the Environment Agency and Natural England on the long-term sustainability of the Hardham abstraction are ongoing, including a sustainability investigation to assess what level of ground and surface water abstractions are sustainable. In the meantime, Natural England has advised the Councils that development in the Sussex North part of the Gatwick sub-region must not add to this potential adverse effect. Water Neutrality has been proposed as a potential means to allow development to proceed without increasing abstraction from Hardham, but further evidence on how this might be achieved is required.

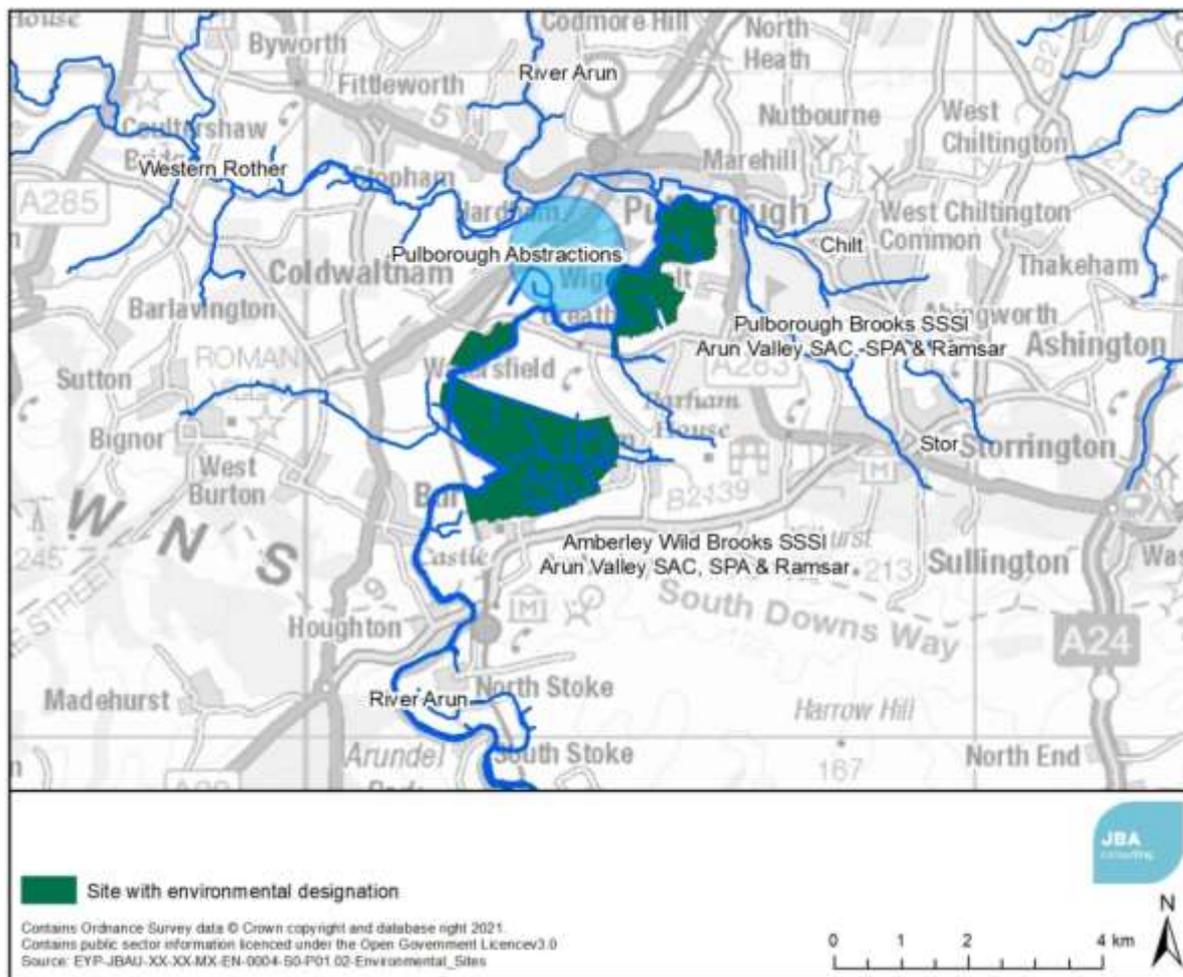


Figure 1.2 Location of abstractions in relation to protected sites

JBA Consulting has been commissioned to provide a water neutrality assessment to calculate the individual and in-combination impacts of the currently proposed development on water demand within Sussex North WRZ, providing advice on specific measures required to support and achieve water neutrality.

1.2 General approach

The study will be broken into three parts.

Part A: Individual Local Authority Areas Assessment

Using forecasts of growth during the plan period provided by Crawley Borough Council and Chichester District Council, the study will need to calculate the individual impact of each local authority on water resources. The contribution that could be theoretically possible from different measures (at this stage we are just considering the approximate order of magnitude impact of each measure), both under control of the council and other stakeholders will be presented. As part of Horsham District Council's (HDC's) Habitats Regulation Assessment, a technical note on water neutrality has been prepared, and so no further analysis on HDC is required in part A of this study.

Part B: In-combination Assessment

The individual authority assessments will then be combined into a WRZ-wide assessment.

Part C: Determine Mitigation

The third part of this study will build on the analysis in parts A and B and develop a draft plan to achieve water neutrality.

2 Considerations for Water Neutrality

2.1 Accepted definitions

The starting point for a definition of water neutrality is usually the definition developed by Therival et al. (undated):

"For every new development, total water use in the region after the development must be equal to or less than the total water-use in the region before the new development."¹

This definition was adapted by the EA in 2009 for use in the Thames Gateway feasibility study to include mention of offsetting:

"...total demand for water should be the same after new development is built, as it was before. That is the new demand for water should be offset in the existing community by making existing homes in the area more water efficient."²

Both definitions allow flexibility in the application in terms of spatial scale and context, however the inclusion of offsetting in the second definition may shift the focus away from efforts to reduce the demand in new developments as much as possible before offsetting is applied. For this reason, Waterwise have adopted a new definition in their recent review of water neutrality in the UK.

"For every new development, water demand should first be minimised, then any remaining water demand offset, so that the total demand on public water supply in a defined region is the same after development as it was before"³

This tighter definition, whilst appropriate for some studies, may miss opportunities to address unsustainable abstraction at Hardham through other means not relating directly to the public water supply.

Although the title of this study is about water neutrality, the objectives of the work should not be obscured by the definition or constraints of water neutrality. The objective is for growth within the study area to be accommodated sustainably, without contributing to a detrimental environmental impact within the Sussex North Water Resource Zone. Options for achieving this that are outside of a true definition of water neutrality should also be considered. The first definition of water neutrality therefore provides the simplest definition for use in this study.

2.2 Working towards a water neutrality plan

Over the last decade, a number of Water Cycle Studies (WCSs) supporting Local Plans have included water neutrality assessments. To the best of our knowledge, this is, however, the first case in the UK where a Local Planning Authority may be required to demonstrate a deliverable plan for achieving water neutrality, in order to demonstrate that the Local Plan will not have an adverse impact on designated sites. In this respect,

1 Water Resources in the Built Environment (P125), edited by Booth and Charlesworth (2014). Published by Wiley.

2 Water Neutrality: An improved and expanded water resources management definition, Environment Agency (SC080033/SR1) (2009) Accessed online at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291675/scho1009bqzr-e-e.pdf on: 08/03/2021

3 A Review of Water Neutrality in the UK, Waterwise (2021). Accessed online at:

<https://www.waterwise.org.uk/knowledge-base/a-review-of-water-neutrality-in-the-uk-2021/> on: 08/03/2021

the technical assessments outlined in section 1.2 are the first steps towards developing a water neutrality plan which will need to go well beyond the scope of previous water neutrality assessments, which have been desktop exercises presenting how water neutrality could be achieved. In order for a water neutral plan to meet the tests of certainty required by the Habitats Regulations in light of caselaw, Natural England have confirmed that it will need to set out:

- A framework for the overall delivery and monitoring of the plan.
- Which measure(s) will be applied (allowing some flexibility for innovation and technological and societal change over the plan lifetime).
- Identification of which party will lead the delivery of each measure, and to what timescales.
- How measures will be secured and delivered
- Define how delivery of the plan will be financed.
- Identify how measures will go beyond or at a quicker pace than those already in Southern Water's business plan.

The development of a water neutrality plan may be considered to be analogous to nutrient management plans which have been developed for various catchments over recent years, which set out how nutrients can be managed at-source on new developments, through treatment at wastewater treatment works and through mitigation measures such as changing agricultural practices. Several nutrient management plans are now functioning, and mitigation measures are being funded through developer contributions. Reaching this stage has taken several years, and there will be useful lessons to be learnt from the development of nutrient management plans when developing a water neutrality plan.

2.3 Spatial scale

Water neutrality can in theory be achieved at various spatial scales. Individual developments could be made water neutral if they had their own (or an alternative) sustainable water resource, or it could be achieved at the community, settlement, local authority, or water resource zone scale. It is perhaps easier to conceptualise at the Water Resource Zone scale and can align with freely available water company data, and it is this scale that is relevant to the appropriate assessment.

When considering growth in a small part of a Water Resource Zone, care must be taken to not count water savings that are already being used to offset growth elsewhere. For instance, if Crawley's growth plan is sustainable based on retrofitting housing elsewhere in the WRZ, such as in the north of Horsham, care must be taken to ensure that this same scheme is not already being used to offset growth in Horsham. A co-ordinated plan between local authorities in the same water resource zone is recommended. This study will look first at the individual Local Authority scale, and then the Water Resource Zone scale considering the in-combination effect of all LPAs when considering water neutrality.

2.4 Temporal scale

Whilst the region being considered is important – the timeframe water neutrality is achieved in is also critical. For instance, water neutrality may be theoretically possible during the timeframe of the local plan, but if there is a mismatch between the increase in demand from new development, and the reduction in demand from existing development, then there could be a period when abstraction of water resource is not sustainable, and environmental damage is likely.

The target should therefore be to achieve water neutrality for the whole of the plan period, and to maintain it afterwards. The implications of this are that measures such as retrofitting may need to start well in advance of a development being built unless there is sufficient environmental capacity to accommodate a short-term deficit. This may require the application of Grampian conditions.

2.5 Achieving Water Neutrality

Achieving water neutrality involves a twin track approach. First the demand for water from the new development must be reduced as far as is practicable, then this remaining demand should be offset within the region. In following this approach, the volume that requires offsetting can be reduced, reducing the cost of the overall scheme. This is noted in the Waterwise neutrality definition, and they define three steps to achieve water neutrality in their recent review:

- Reduce water demand in the new development through improvements in efficiency
- Re-use water where possible
- And finally offset the remaining water demand from new development.

Southern Water has an ambitious target in its 2019 Water Resource Management Plan (WRMP19) that aims to reduce household water consumption to 100 litres per person per day on average by 2040. Their plan includes many measures typically associated with achieving water neutrality, such as home visits and smart metering.

Section 3 will therefore first identify what measures are currently planned in the Sussex North WRZ as part of activities by Southern Water. Section 4 will then go on to identify demand reduction and offsetting measures that may be used, highlighting where there is synergy between SW's actions and a water neutrality plan, and where there are risks that a benefit may be double counted.

Where an action has already been factored into the WRMP, it should not be used to subsequently offset growth to achieve neutrality.

3 Baseline – Southern Water Actions

3.1 Introduction to the Water Resource Management Plan

Water Resource Management Plan (WRMP)

Each water company must prepare and maintain a water resources management plan (WRMP) that shows how it will manage and develop water resources to balance supply and demand for water over the next 25 years. Companies must review their plans every year and prepare and revise them every five years.

The plan process involves:

- an assessment of water demand and how this is predicted to change during the plan period
- the available water resources including how this may change due to climate change, and the need to protect the environment
- and a plan of how any supply-demand deficit will be addressed

This forms an extensive set of documents published by each water company.

Southern Water's WRMP and associated annexes can be found here:

<https://www.southernwater.co.uk/our-story/water-resources-planning/water-resources-management-plan-2020-70>

Water Resource Zones are the geographical areas used by water companies to develop forecasts of supply and demand and supply vs demand balances. The WRZ describes an area within which supply infrastructure and demand centres are linked such that customers in the WRZ experience the same risk of supply failure. A WRZ may have a single point of supply or (as is the case in Sussex North), multiple points of abstraction.

The area that Southern Water serve is split into three supply areas (Western, Central and Eastern), the relevant one for this study being the Central Supply Area. This is further divided into three water resource zones: Sussex North, Brighton, and Worthing.

The baseline demand forecast in the WRMP is based on growth forecasts collated by Experian for SW, Affinity Water, Portsmouth Water, SES Water and South East Water. It was completed early in 2017 and in line with Government guidance, it was based on published draft and adopted local plans. Water Resources South East have commissioned Edge Analytics to undertake a similar assessment for the whole south east of England. This will be used to inform the next round of WRMPs, to be published in 2024.

If no action were taken, Southern Water's WRMP19 notes that the Central Supply Area, including the Sussex North WRZ would experience a deficit in the supply-demand balance during the course of the next 50 years. It also outlines the key elements of the plan aimed at addressing the deficit. These are summarised in Table 3.1 below (taken from WRMP Annex 10⁴).

For each supply area, SW calculate the future supply-demand balance during a 1 in 200-year drought, but moving to a 1 in 500-year design scenario for WRMP24. In the Central area, they anticipate that the supply demand balance would move into deficit early in the planning period with a further decrease as a result of potential sustainability reductions in 2027-28.

4 WRMP Annex 10 – Strategy for the Central Area, Southern Water (2019). Accessed online at:

The Environment Agency’s sustainable abstraction programme is aimed at protecting and restoring habitats under the Habitats Regulations (Special Areas of Conservation), safeguarding and restoring sites of Special Scientific Interest (SSSIs), and protecting section 41 habitats and species (habitats and species of principle importance for the conservation of biodiversity under National Environment and Rural Communities Act 2008), as well as ensuring waterbodies do not deteriorate under the water framework directive and improve where this is achievable. This programme also has to contribute to the relevant objectives in the Government’s 25 Year Environment Plan, including those for designated sites and biodiversity.

Requirements for investigations, and where appropriate reductions in abstractions – referred to as sustainability reductions, are set out in the EA’s Water Industry National Environment Programme (WINEP) which is issued every five years.

A number of investigations are ongoing in the Central supply area, and this is a cause of uncertainty in the SW supply-demand balance and therefore the extent and scale of actions that are required.

Table 3.1 Key elements of the WRMP19 strategy (Central supply area)

Scheme	Details
Reduce leakage by 50% by 2050	Leakage reduction activity to achieve 15% reduction in leakage by the AMP7 ⁵ and 50% reduction by 2050
Work with customers to save more water	The Target 100 programme aims to achieve an average PCC of 100 l/p/d by 2040. This includes a “basket” of measures to improve water efficiency – explain in more detail in 3.1.1
Pulborough licence variation by 2025	Additional groundwater abstraction enabled by varying the existing licence condition for the Pulborough groundwater source (by not restricting groundwater abstraction when river flows are low) will help secure water supplies to the north Sussex area
Water re-use scheme from Littlehampton WTW by 2030	Transfer of treated effluent from Littlehampton WwTW near the coast to a new discharge point to the western River Rother, upstream of the Pulborough surface water abstraction
Coastal desalination by 2030	New supply from coastal water at Shoreham
Asset enhancement schemes	Development of additional nitrate treatment, implementation of catchment management, treatment of pesticides and rehabilitation of existing boreholes
In-stream catchment management	Gather evidence to implement in-stream river restoration on the River Arun and Western Rother
Additional metering	Extension of the metering programme to increase domestic meter penetration from 88% to 92% by the end of AMP 7 (2025). In Sussex North this equates to 6,795 additional meters at a cost of £2.5M (£369 / meter)

During 2019-20 a scheme that was promoted in Southern Water’s previous 2014 WRMP was due to be implemented to optimise use of the groundwater abstraction at Hardham to allow additional benefit to be realised during the autumn period. Due to concerns raised by Natural England over the sustainability of the Hardham groundwater licence this scheme was not implemented. This has led to a baseline supply-demand deficit for the Sussex North WRZ which is greater than forecast in WRMP19 and so Southern Water

5 AMP stands for Asset Management Period, a 5-yearly planning period used by the Water Companies. AMP7 is 2020 to 2025, AMP8 – 2025 to 2030, AMP9 – 2030 to 2035 etc
 EYP-JBAU-XX-XX-RP-EN-0001-A1-C03-Water_Neutrality_Assessment_Part_A

are working with the EA to identify and implement short-term mitigation actions to reduce the risk to customers and the environment in parallel with implementing the supply and demand schemes set out in its WRMP19.

Another element in the WRMP19 strategy is the licence variation at Pulborough to decouple the groundwater and surface water abstraction licence and allow groundwater abstraction to continue in extreme drought scenarios when the flow in the River Rother has fallen below the Minimum Residual Flow (MRF) condition specified in the abstraction licence.

As discussions on the sustainability of the Hardham abstraction (one of the abstraction points at Pulborough) is ongoing, this licence variation is unlikely to be granted, and a sustainability reduction may be applied to the groundwater source. Not only will the expected benefits of the aforementioned schemes not be realised, but the current deployable output is likely to fall as a result.

Sustainability reduction

A programme that looks to maintain or enhance the water environment by making reductions in the volume of water that can be abstracted. For example, where a habitat is being adversely affected by abstraction of water – a reduction or cessation of that abstraction may be required in order to prevent damage being done, or in order to enhance the habitat.

The measures in the WRMP are designed to maintain the supply-demand balance over the WRMP period. Should a reduction in abstraction at Hardham be required, further measures are required that go beyond that planned for in the WRMP in order to maintain a supply demand balance. This study assumes that any increase in groundwater abstraction at Hardham would not be acceptable, and therefore mitigation in the form of water neutrality is required in order to allow planned growth to proceed. Measures contained in the WRMP strategy are considered to be part of the baseline supply-demand balance for this water neutrality study and therefore cannot be used as a means of achieving water neutrality.

3.1.1 Target 100

The Target 100 programme aims to achieve a PCC of 100l/p/d by 2040⁶. It includes a “basket” of measures and is split into short-term (AMP7 - 2020 to 2025), medium-term (AMP8 – 2025 to 2030) and longer-term (AMP9 and beyond 2030+). These are described in Annex 6 of the WRMP19⁷ and summarised below.

Water companies have a statutory duty to promote efficient use of water. Ongoing baseline water efficiency activity carried out by SW includes:

6 Based on Normal Year Annual Average (NYAA) planning scenario

7 Water Resources Management Plan 2019 – Annex 6: Options Appraisal, Southern Water (2019). Accessed online at: <https://www.southernwater.co.uk/media/3671/wrmp19-annex6-options-appraisal.pdf> on: 08/03/2021
EYP-JBAU-XX-XX-RP-EN-0001-A1-C03-Water_Neutrality_Assessment_Part_A

- **Carrying out free home visits, designed to provide water saving information, advice, and bespoke water saving product installation**
- **Education programmes in primary and secondary schools**
- **Providing information via the SW website on water saving**
- **Offering discounted water-saving products on the SW website**
- **Working in partnership with Waterwise and the Energy Saving Trust.**

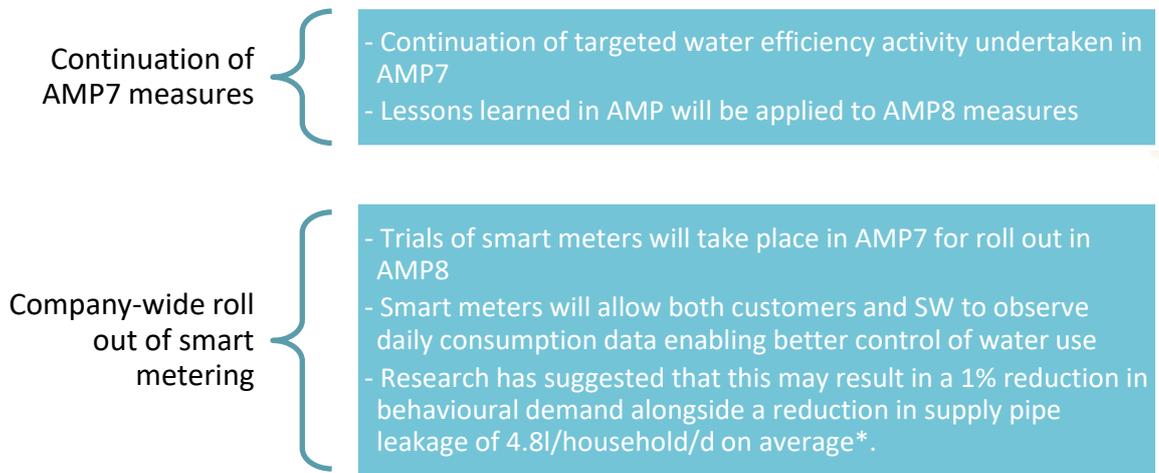
These are included in the baseline demand forecast before the inclusion of additional options identified in the WRMP.

Short-term 2020-2025 (AMP7) measures

Continuation of the home visit programme	<ul style="list-style-type: none"> - SW currently undertake home visits to promote water efficiency. These can result in a 10% saving (in addition to savings achieved through metering) - this will be combined with leak detection for plumbing losses or supply-pipe leaks
Continuation of the schools programme	<ul style="list-style-type: none"> - A partnership approach where the school receives a free visit and free products in return for helping to educate the children on the importance of water and how to use it wisely
Rewards scheme	<ul style="list-style-type: none"> - A scheme is planned to reward customers for conserving water offering rewards for reducing water use on a monthly basis - This will be rolled out in Hampshire first, but likely to be introduced in the Central area towards the end of AMP7 - Enabled by a increase in meter reading frequency from six-monthly to monthly - If reading is high - the customer will be offered a package of support including a home visit, if low they will be rewarded in a scheme similar to a supermarket loyalty card
Real-time meter reading	<ul style="list-style-type: none"> - Trials of devices that can read meters and send the reading to the customer using their Wi-Fi. - This provides the customer with near real-time information on their consumption and take steps to conserve water - If the trial is successful, 100,000 devices could be rolled out over AMP7
Tools and systems	<ul style="list-style-type: none"> - Development of tools and systems that allow identification of significant increases in consumption - SW can then engage with customer to determine if the increase is due to change in circumstances or leakage
Support for customers on affordability scheme	<ul style="list-style-type: none"> - Where customers are being assessed for inclusion on an affordability scheme, they will also be assessed for high consumption and offered water efficiency support
Working with developers	<ul style="list-style-type: none"> - SW are working with developers to build more water efficient homes - Introduction of a free connection charge for water efficient homes

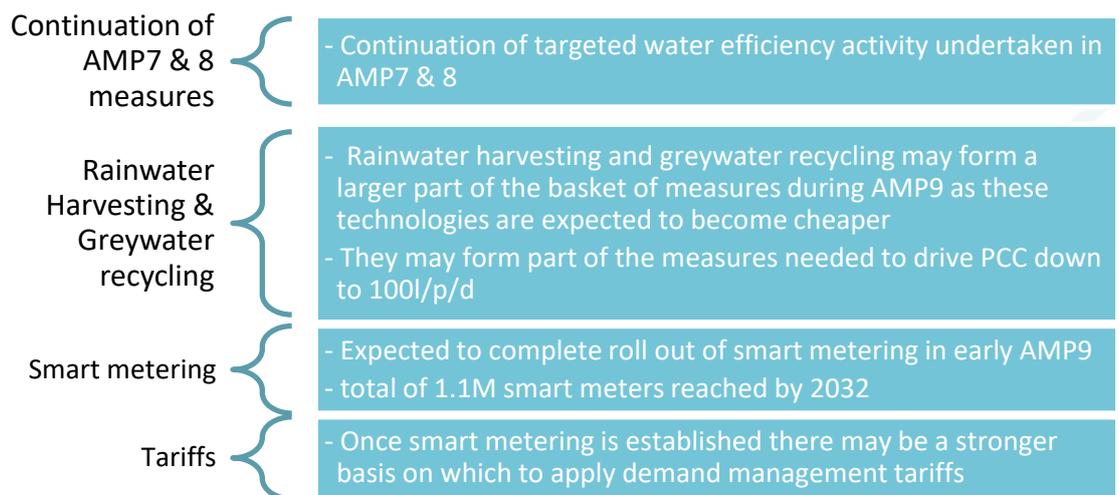
SW do not currently consider rainwater harvesting (RwH) and grey water recycling (GwR) a viable option to roll out across their supply area due to the high unit cost of installing at existing properties. However, they note that they may be considered on a case-by-case basis in the short-term. RwH and GwR are explained in detail in 4.6 and 4.7.

Medium-term 2025-2030 (AMP 8) measures



* UKWIR, 2012b, "Smart Metering in the Water Sector Phase 3: Making the Case", UKWIR Ref. 12/CU/02/13.

Longer-term 2030+ (AMP9 and beyond)



3.1.2 Water re-use scheme

The Littlehampton WwTW indirect potable⁸ water reuse scheme proposes the transfer of treated effluent from Littlehampton WwTW near the coast to a new discharge point to the western River Rother, upstream of the Pulborough surface water abstraction. This would prolong production at Pulborough during a drought. Once abstracted at Pulborough, this water would help meet demand in the Sussex North WRZ. 20MI/d represents the upper end of the reliable flow that could be expected from Littlehampton WwTW. This is scheduled to provide benefit from 2027/28.

3.1.3 Implications for Water Neutrality

Southern Water's WRMP was approved by Ofwat and published in December 2019. Meanwhile the sustainability of the groundwater abstraction at Hardham (one of the abstraction points at Pulborough) is still under discussion.

The programme of measures planned by Southern Water in the WRMP period are a welcome contribution to managing water resources in the south east. However, in

⁸ Potable water refers to water that is safe to drink
EYP-JBAU-XX-XX-RP-EN-0001-A1-C03-Water_Neutrality_Assessment_Part_A

using such an extensive basket of measures, achieving water neutrality on a large scale such as for a local authority, is difficult as there is a need to show that measures put in place to achieve water neutrality are above and beyond what is already being used in order to manage the supply-demand deficit in the WRMP.

Further information may be required from Southern Water in order to understand the scope of the Target 100 measures, in particular the level of ambition regarding home visits, and whether there is scope for an extension to this programme funded as part of a water neutrality plan. Consideration should also be given as to what contingences may be being considered by SW in the event that a sustainability reduction at Hardham was found to be required.

4 Water neutrality - Demand reduction

4.1 Introduction

This section outlines measures that may be available to LPAs within the Sussex North WRZ as part of a water neutrality plan both to reduce demand from planned growth, and to offset remaining additional demand.

4.2 Efficiency targets

Some increase in water demand in the region from planned development during the local plan period (prior to mitigation) is inevitable. However, it can be minimised by making the site as water efficient as possible.

Per Capita Consumption (PCC) is used as a measure of water use and is the amount of water that is used by one person in one day. It is usually measured in litres per person per day (l/p/d) but may be expressed in litres per head per day (l/h/d). In this study l/p/d is used to avoid confusion with litres per household.

**The average PCC in Southern Water’s “Sussex North” WRZ is 135 l/p/d
For a home without a water meter, it is 160 l/p/d and for a home with a water meter it is 131 l/p/d**

Local plan policy can require new residential developments to adopt minimum water efficiency targets.

Building regulations

Building regulations currently state that new build housing should achieve a minimum of 125 l/p/d. A tighter target of 110l/p/d is allowed if the local authority can establish a clear need based on available evidence.

Southern Water – Target 100

Southern Water have committed in their Water Resource Management Plan to a water efficiency policy that aims to achieve a PCC of 100 l/p/d by 2040. SW have therefore advised the Councils that a target of 100 l/p/d should be adopted in policy for new build properties, and 80l/p/d for strategic developments where master planning and community level schemes can provide greater saving.

The Target 100 figure is proposed to be adopted within Crawley and Horsham, with this standard reflected in the emerging Local Plans of both authorities. This represents a tightening of standards from those sought through adopted Local Plans, where a figure of 110l/p/d is currently required. The 110l/p/d target is also sought in Chichester through its adopted Local Plan (Policies 12 and 40⁹). However, in order to achieve

9 Chichester Local Plan: Key Policies 2014-2029, Chichester District Council (2014). Accessed online at: https://www.chichester.gov.uk/media/24759/Chichester-Local-Plan---Key-Policies-2014---2029/pdf/printed_version.pdf on: 22/04/2021

water neutrality, more ambitious targets, particularly on larger developments should be considered.

Ofwat report into long term reductions in water demand

Ofwat published a study in 2018 into the long-term potential for reductions in household water demand¹⁰. In this report, different scenarios for future water use were created based on a range of drivers, public acceptance, policy ambition, and factors such as climate change, resulting in different levels of ambition in terms of the scope for PCC reduction in 50 years’ time.

Their research showed that a demand as low as 49l/p/d was possible with high tech solutions such as waterless toilets, integration of “smart” devices, innovative tariffs and “pay-per-use” services. As this study requires the development and adoption of new technology, and a significant shift in behaviour, we consider it to be too ambitious for a study on water neutrality for application during the next twenty years. However, it provides a useful indication for what might be achieved in the future.

An ambitious but more realistic scenario was modelled where water scarcity is widely recognised as an important issue, markets in water resources and water services results in widespread competition and local providers delivering integrated services. It includes extensive use of RWH and GwR as well as some smart devices. This scenario resulted in a PCC of 62 l/p/d.

The Ofwat report also presents a scenario based on the installation of water efficient fittings, changing behaviours (less baths, minimising running taps etc.), maximising use of eco settings on appliances such as washing machines and dishwashers, and the use of water butts in the garden. In this scenario, a water use of 86 l/p/d was achieved.

This is supported by research conducted by the Energy Saving Trust (EST)¹¹ that showed that the best commercially available domestic technology could achieve 95 l/p/d, and the best commercially available technology (including non-domestic technology) could achieve 85 l/p/d.

This study will model the building regulations scenario as a baseline (summarised in Table 4.1), as well as Southern Water’s Target 100 ambition. Further scenarios where water demand is cut more dramatically are also modelled including a “realistic achievable” consumption of 85 l/p/d based on current available technology, and an ambitious target of 62 l/p/d based on adoption of new technology and significant behaviour change. In reality it may be that during the local plan period, the level of ambition and available technology changes and a transition occurs from the Target 100 or realistic achievable consumption towards the “ambitious” consumption.

Table 4.1 Demand scenarios

Demand scenario	Per Capita Consumption (l/p/d)
Building Regs. Standard	125
Building Regs. Optional	110
Target 100	100
Realistic achievable	85
Ambitious	62

10 The long-term potential for deep reductions in household water demand, Ofwat (2018). Accessed online at: <https://www.ofwat.gov.uk/wp-content/uploads/2018/05/The-long-term-potential-for-deep-reductions-in-household-water-demand-report-by-Artesia-Consulting.pdf> on: 08/03/21

11 Water Labelling Options: Cost Benefits Analysis, Welsh Government (2020). Accessed online at: <https://www.waterwise.org.uk/knowledge-base/est-welsh-government-water-labelling-report-2020/> on: 08/03/2021

Water efficiency targets are not limited to domestic properties. The Building Research Establishment (BRE) publish an internationally recognised environmental assessment methodology for assessing, rating, and certifying the sustainability of a range of buildings.

New homes are most appropriately covered by the Home Quality Mark¹², and commercial, leisure, educational facilities and mixed-use buildings by the Building Research Establishment Environmental Assessment Methodology (BREEAM) UK New Construction Standard¹³. There are also standards for application in refurbishment and fit-out¹⁴ of commercial buildings and to certify buildings in use¹⁵.

The BREEAM New Construction Standard awards credits across nine categories, four of which are related to water: water consumption, water monitoring, leak detection and water efficient equipment. This leads to a percentage score and a rating from “Pass” to “Outstanding”. Crawley’s adopted and emerging Local Plan both require all new non-residential buildings to achieve BREEAM ‘Excellent’ rating for water. The Councils have the opportunity to seek BREEAM status for all new, non-residential buildings, or the refurbishment standard could be applied on change of use.

4.3 Efficiency measures

In order to achieve the water efficiency targets there are a number of measures that should be incorporated into new build housing. These are listed below in Figure 4.1. These same measures can be retrofitted to existing housing and many can also be applied to non-household settings such as wash facilities and canteens in office buildings.

Water efficiency fittings can however be removed after installation. Further evidence is required in later stages of this project to inform a precautionary buffer that can be added to calculations to account for this affect.

12 Home Quality Mark, BRE, (2018). Accessed online at:

<https://www.homequalitymark.com/professionals/standard/> on: 08/03/2021

13 BREEAM UK New Construction, BRE, (2018). Accessed online at: <https://www.breeam.com/NC2018/> on: 08/03/2021

14 BREEAM Refurbishment and Fit-out, BRE (2014). Accessed online at: <https://www.breeam.com/ndrefurb2014manual/> on: 08/03/2021

15 What BREEAM In-use assesses, BRE (2020). Accessed online at: https://files.bregroup.com/breeam/BREEAM-In-Use-International_What-BIU-Assesses.pdf on: 08/03/2021

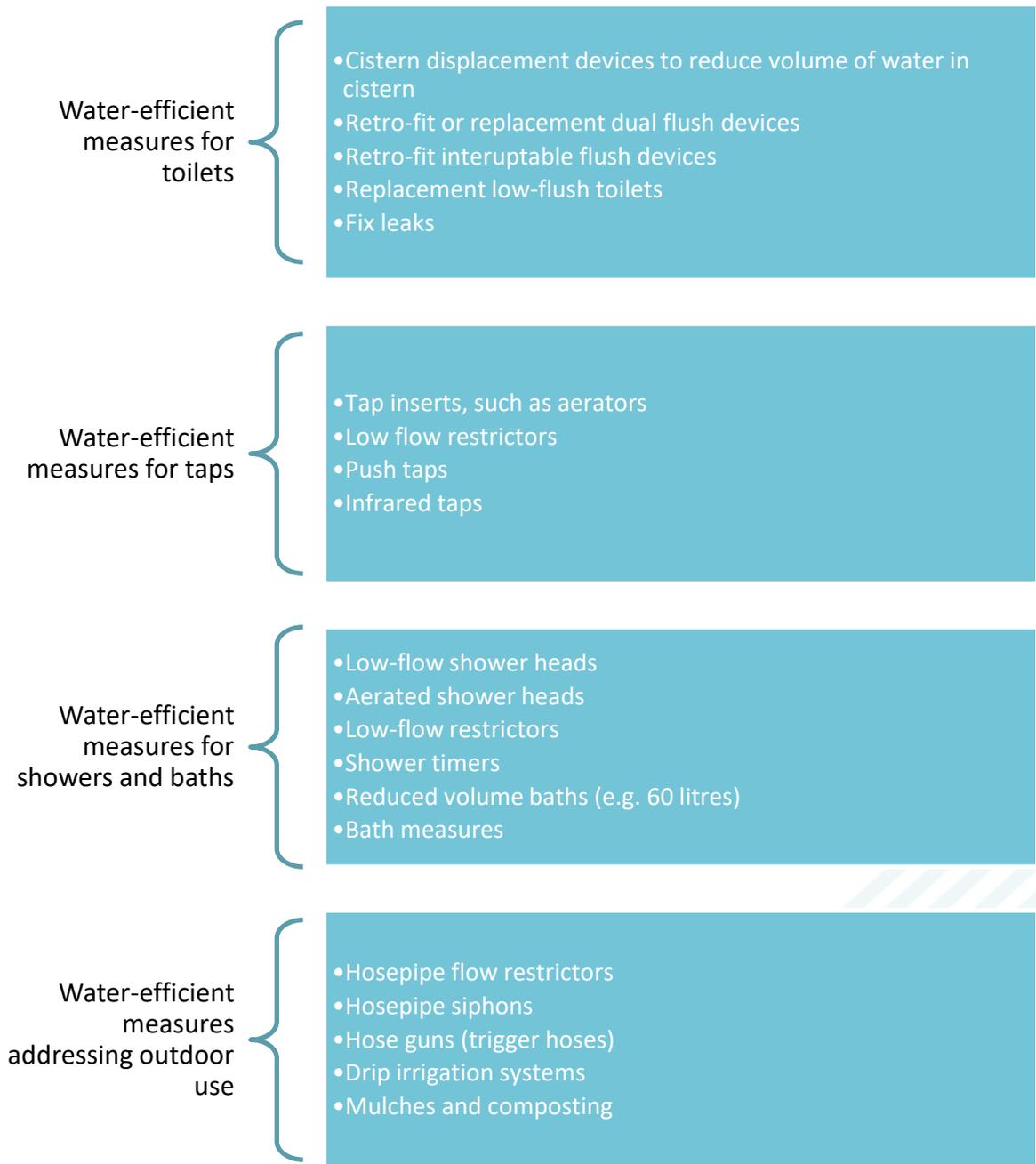


Figure 4.1 Consumer water efficiency measures
(adapted from Booth and Charleswell 2014)

4.4 Education

Despite a few recent news stories about future water shortages in England, awareness of water scarcity is fairly low, and some way behind awareness of climate change and energy use.

Raising awareness of the need to save water, the reason and benefits of fitting water efficient devices and the importance of maintaining existing efficient devices where already fitted are an important part of demand reduction activities, and in maintaining that reduction over time.

Southern Water are already communicating with customers on this topic and run a schools scheme as part of the Target 100 activities. They do not regularly communicate with non-household customers in the same way, and there may be some benefit from an education / awareness programme aimed at businesses.

It is difficult to quantify the impact an education programme will have directly on PCC, and so no specific figure for demand reduction will be included within calculations. However, we would recommend that education and awareness form an integral part of any water neutrality plan.

Education and promotional campaigns

- Encourage community establishments (e.g. schools, hospitals) to carry out self audits on their water use
- Deliver water conservation message to schools and provide visual material for schools
- Building awareness with homeowners/tenants
- Engage with businesses to encourage water conservation

4.5 Water labelling

Research has shown that a water labelling scheme has a large part to play in future reductions in water demand. The Energy Saving Trust produced an independent review of the costs and benefits of water labelling in the UK¹⁶ and found that a government-led mandatory scheme linked to building regulation is projected to reduce PCC by 6.3 litres per day within 10 years, raising to a saving of 31.4 l/d after 25 years. Such a scheme would see fixtures, fittings and appliances given a rating based on their water use in a similar manner to the energy use of products such as refrigerators and lightbulbs, and minimum standards included in building regulations. Such a scheme has been implemented successfully in Australia, and an example water label is shown in Figure 4.2 below.

However, as a scheme of this sort would require Government Legislation to enable, it has not been directly included in any of the scenarios in this study, but is likely to contribute to general water efficiency and public awareness later in the plan period. Achieving such a scheme may require concerted lobbying of government by stakeholders including NE, EA, SW and Councils.



Figure 4.2 Example mandatory water label from Australia

16 Independent review of the costs and benefits of water labelling options in the UK, Energy Saving Trust (2019). Accessed online at: <https://www.waterwise.org.uk/wp-content/uploads/2019/02/Water-Labeling-Summary-Report-Final.pdf> on: 08/03/2021

Over time, water companies have reported an erosion of the benefits of fitting/retro-fitting water efficient fittings in the UK, as they are replaced by inefficient fittings. This points to either a need for rolling programmes of retro-fitting or mandatory efficiency requirements for fittings and appliances.

4.6 Rainwater harvesting

Rainwater harvesting (RwH) is the capture of water falling on buildings, roads or pathways that would normally be drained via a surface water sewer, infiltrate into the ground or evaporate. In the UK, this water cannot currently be used as a drinking water supply as there are strict guidelines on potable water, but it can be used in other systems within domestic or commercial premises.

Systems for collection of rainwater can be simple water butts attached to a drainpipe on a house, or it could be a more complex underground storage system, with pumps to supply water for use in toilet flushing and washing machines. By utilising rainwater in this way there is a reduced dependence on mains water supply for a large proportion of the water use in a domestic property.

Research by the Energy Saving Trust reports the contribution to total water use from different domestic uses. This is reproduced in Figure 4.3 below. RwH can be used to supply water uses where non-potable water is required. In the diagram below it can be seen that if toilet flushing, laundry, garden watering and car washing utilised water from RwH, a 33% saving in water use could be achieved.

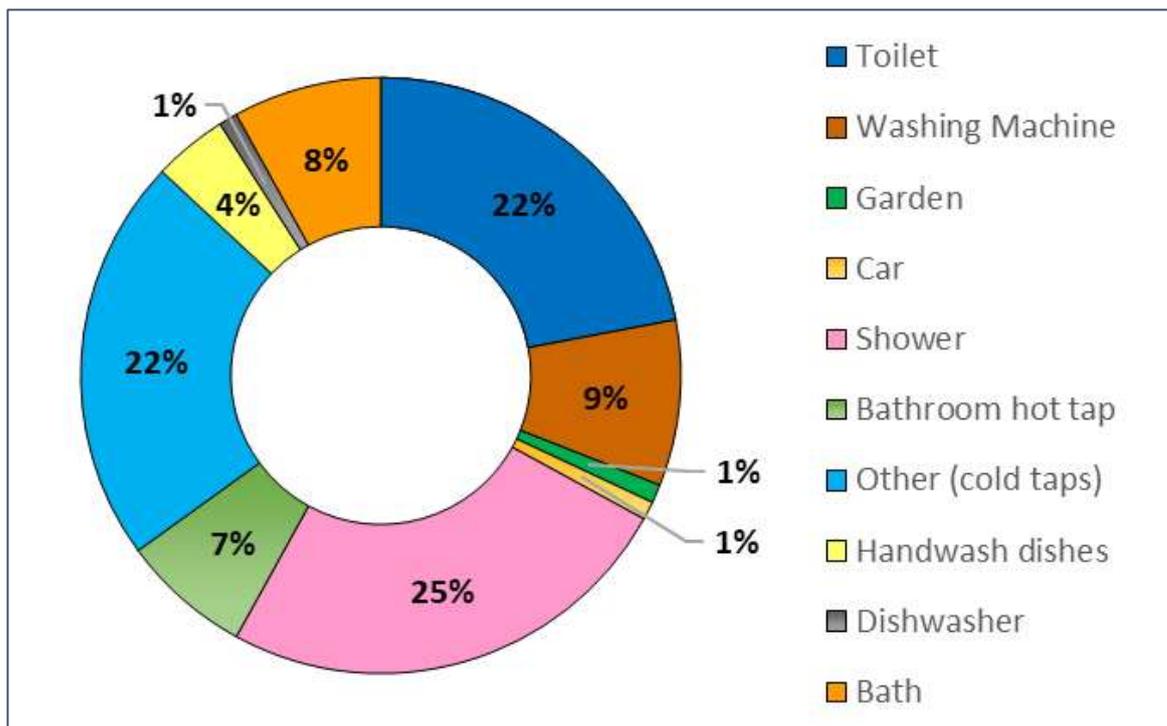


Figure 4.3 Domestic water use

Benefits of Rainwater Harvesting

- RWH reduces the dependence on mains water supply – reducing bills for homeowners and businesses
- Less water needs to be abstracted from river, lakes and groundwater
- Stormwater is stored in a RWH system reducing the peak runoff leaving a site providing a flood risk benefit (for smaller storms)
- By reducing surface water flow, RWH can reduce the first flush effect whereby polluted materials adhering to pavement surfaces during dry periods are removed by the first flush of water from a storm and can cause pollution in receiving watercourses.

Challenges of Rainwater Harvesting

- Dependency on rainfall can limit availability of harvested rainwater during drought and hot weather events.
- Increased capital (construction) costs to build rainwater harvesting infrastructure into new housing (£900 for a 1 or 2 bed apartment, £2,181 for a 2 bed terrace and £2,674 for a 3 or 4 bed semi or detached home)
- Payback periods are long as the cost of water is low so there is little incentive for homeowners to invest. For further information see: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/353387/021c_Cost_Report_11th_Sept_2014_FIN_AL.pdf

The local hydrology and the end use of the water harvested should also be taken into account when considering RWH systems to ensure that the expected benefit is realised. For example, a large new development in a headwater catchment can alter the hydrological regime by reducing the volume of water that is infiltrated to recharge groundwater or makes its way back to surface water bodies. If rainwater that would otherwise be infiltrated is collected and used for toilet flushing, it will end up in the sewer system, and discharged elsewhere – possibly in a different water resource zone. In this case, the effect within this WRZ may be neutral. Largescale RWH schemes should therefore be considered on a site-by-site basis where there is no hydrological impact.

RWH is not currently being considered in the early stages of the Target 100 plan. Therefore, there may be an opportunity to offer this in both new build houses, and as a retrofit in existing properties.

The Waterwise independent review of RWH and GwR performed by consultants Ricardo, notes that integration of a RWH system is more cost effective in new build properties. It goes on to report consumer research that shows greater enthusiasm for RWH integrated into new build properties, but little interest from developers¹⁷.

The relatively high cost of a retrofit domestic system capable of providing water for toilet flushing and laundry makes it a less attractive option for implementation as part of a water neutrality plan. However, it is included in the analysis due to the high potential to reduce water demand.

RWH can offer the largest potential water saving in a non-household setting. Many commercial buildings have a large roof area that is ideal for the collection of rainwater. One collection system could potentially provide water for toilet flushing for multiple

¹⁷ Independent review of costs and benefits of RWH and GwR, Waterwise (2020). Accessed online at: https://waterwise.org.uk/wp-content/uploads/2020/09/Ricardo_Independent-review-of-costs-and-benefits-of-RWH-and-GWR_Appendices-A1-A2-1.pdf on: 08/03/2020
EYP-JBAU-XX-XX-RP-EN-0001-A1-C03-Water_Neutrality_Assessment_Part_A

businesses. However, the plan should recognise that the capacity of RWH systems are finite and they may run dry during prolonged dry weather, and so be less effective when they are most needed.

4.7 Greywater recycling

Greywater refers to water that has been “used” in the home in appliances such as washing machines, showers and hand basins. Greywater recycling (GwR) is the treatment and re-use of this water in other systems such as for toilet flushing. By their nature, GwR systems require more treatment and are more complex than RWH systems, and there are limited examples of their use in the UK.

Greywater re-use refers to systems where wastewater is taken from source and used without further treatment. An example of this is water from a bath or shower being used on plants in the garden. This sort of system is easy to install and maintain. However, as mentioned above, the lack of treatment to remove organic matter means the water cannot be stored for extended periods.

Greywater recycling refers to systems where wastewater undergoes some treatment before it is used again. These systems are complex and require a much higher level of maintenance than RWH or greywater re-use systems.

Domestic water demand can be significantly reduced by using GwR, and unlike with a RWH system where the availability of water is dependent on the weather, the source of water is usually constant (for instance if it is from bathing and showering). However, the payback period for a GwR system is usually long, as the initial outlay is large, and the cost of water relatively low. Viability of greywater systems for domestic applications is therefore currently limited. However, communal systems may offer more opportunities where the cost can be shared between multiple households and may be of particular use in new large developments and flatted developments where they can be incorporated from the start.

5 Offsetting

5.1 Introduction

Once demand has been reduced as far as practicable through improvements in efficiency and water re-use options such as RWH, the remaining water demand should be offset. This could be in the form of water company actions such as leakage reduction and metering or could involve retrofitting existing properties to reduce their water demand. Offsetting must be applied in the same region as the demand that is being offset i.e., within the same water resource zone. The following section outlines various opportunities to offset water demand that could contribute towards achieving water neutrality.

5.2 Metering

Installing a water meter has been shown to reduce water consumption, with unmetered properties in the South East having an average PCC of 160l/p/d compared with 120 for metered households. Although it should be noted that the reduction in demand where customers that are still unmetered are switched to a meter may be lower than customers that switched earlier in the process. Southern Water has a metering programme ongoing, and as this has already been factored into their Water Resources Management Plan, this should not be used as a method for achieving water neutrality. Current metering penetration in the Sussex North WRZ is 88%, and the preferred option plan in Southern Water’s WRMP predicts achieving 92% by 2025.

Extending metering to closer to 100% was not taken forward as an option in the WRMP as it was not cost effective. There may therefore be little scope to include an extension to the metering programme in a water neutrality plan, and the additional saving may be minimal.

Smart meters offer an advantage over a standard meter as they provide customers a more visual indication of current water use and help to identify leaks, and alongside

education are likely to have a significant role to play in encouraging a culture change in domestic water use. Trials of smart meters are planned in AMP7 for roll out in AMP8 as part of an extensive programme, so whilst they will contribute to baseline demand falling, they are not available as an offsetting measure for water neutrality.

5.3 Leakage reduction

A significant volume of water is lost each year through leakage. Leaks on the pipework owned by the water company are the water company's responsibility to fix, and a programme of leakage reduction is included in the water resource management plan. Southern Water's latest WRMP contains a forecast leakage reduction of 3.6Ml/d by 2037 in the Sussex North WRZ in their preferred option plan. However, as this is already factored into the water resource calculations, it should not be used to offset new development.

Leakage in a customer's supply pipes (between the water company's boundary valve and the customer's internal plumbing) is the responsibility of the property owner, but also appears within the water company's total leakage. As the price of water is relatively low, and the potential cost of re-instatement (if excavations are required) is high, there is often little incentive for property owners to resolve minor leaks. Current SW policy offers one supply pipe leak repair per property throughout a year free of charge.

Leakage can also occur within a property from leaky cisterns, taps, and garden hose or damage to pipework. These could be reduced through better leakage detection, for instance through more vigilance on bills, smart metering, or through a water audit.

Schemes aimed at reducing leakage should not be limited to domestic properties. Significant opportunities may exist for offsetting demand by reducing leakage in public buildings, schools, and commercial properties.

For inclusion in a water neutrality scheme, leakage reduction would need to go beyond the current plan i.e., funding would need to be available to increase leakage reduction from for example 15% by 2025 to 16-17% over the same period and be measurable as separate to the current plan.

5.4 Tariffs

An alternative tariff structure could provide an incentive for consumers to modify their water usage behaviour. These can include a "rising block" tariff where the price increases once a threshold is reached, for example when the target PCC is exceeded and "seasonal" tariffs where the price is increased during periods for example when water resources are under pressure in the summer.

The Ofwat report on long term reductions in water demand outlines four aspects that a demand management tariff needs to deliver: *"the tariff should be fair, it should not be overly complex to understand or implement, it should take account of household size i.e., the occupancy (so that high occupancy households are not disadvantaged), and the tariff should provide feedback to customers on their water consumption in order for them to make an informed change of behaviour"*.

As the impact of demand management tariffs is uncertain and is not a measure that could readily be included in a water neutrality plan for immediate application, they have not been considered further in this study. However, they remain a useful option for the future.

5.5 Household visits

Water demand in existing properties can be reduced by retrofitting those properties with simple water saving devices or installing water re-use systems.

The starting point for these schemes is usually a water audit to investigate the current level of water efficiency and identify opportunities. A retrofitting scheme is most effective when backed up with an education / awareness programme to promote the need to save water.

The Waterwise review of water neutrality contains figures provided by Welsh Water, Southern Water and Brighton and Hove City Council on the cost and potential water savings of a typical water audit, reported to be £48 - £100 per house and 30 to 40 litres per home per day saving. The Greater Brighton Water Plan¹⁸ states a cost provided by Southern Water as £70 - £100 per home and a typical saving of 36 litres per household.

The Target 100 programme includes home visits aimed at encouraging water use and as this has already been factored into the WRMP care must be taken to ensure that a water neutrality benefit is not claimed that is already part of the baseline demand.

The WRMP does not include details of how many home visits are planned as part of Target 100. It may be possible for the programme of visits to be expanded if further funding was available. These could be either performed by the water company (funded by developers) or by an independent party coordinating with Southern Water. Further information is required from Southern Water in order to be able to fully scope this option.

5.6 Other measures

5.6.1 Non-household visits

Since the opening of non-household market in 2017, SW do not communicate directly with non-household customers. There is therefore potential for non-household water saving visits aimed at reducing water use in businesses. These could provide advice on water saving toilets and urinals and water efficient tap fittings or retrofitting RWH systems. Advice could also be provided to staff that could be taken home and applied in a domestic setting. This may be in partnership with the new water supplier or could be with an independent body.

5.6.2 Wastewater discharges

Water is abstracted from Sussex North WRZ, but much of Crawley and Horsham is served by Crawley WwTW. This discharges to the north, and into the River Mole catchment as shown in Figure 5.1. There is therefore a net flow out of the WRZ via Crawley WwTW. If this treated wastewater were to be discharged back into the WRZ catchment, it could contribute to maintaining river flow. This could work in a similar way to SW's Littlehampton indirect reuse scheme described in 3.1.2.

This could be achieved by connecting new development in the south west of the Crawley WwTW catchment into a wastewater catchment discharging to the Arun such as Horsham WwTW, pumping a wastewater flow from Crawley WwTW south to the Arun catchment, or building a new WwTW to serve growth in that area with a point of discharge on the Arun.

The cost of this may be significant and would need to be subject to a water quality assessment to ensure that there was no detrimental impact on water quality in the Arun and downstream catchment – this could create additional challenges with Habitats Regulatory compliance in the relevant local plans.

18 Greater Brighton Water Plan, Greater Brighton Economic Board (2020). Accessed online at: <https://present.brighton-hove.gov.uk/documents/g9985/Public%20reports%20pack%2014th-Jul-2020%2010.00%20Greater%20Brighton%20Economic%20Board.pdf?T=10> on: 08/03/2020
EYP-JBAU-XX-XX-RP-EN-0001-A1-C03-Water_Neutrality_Assessment_Part_A

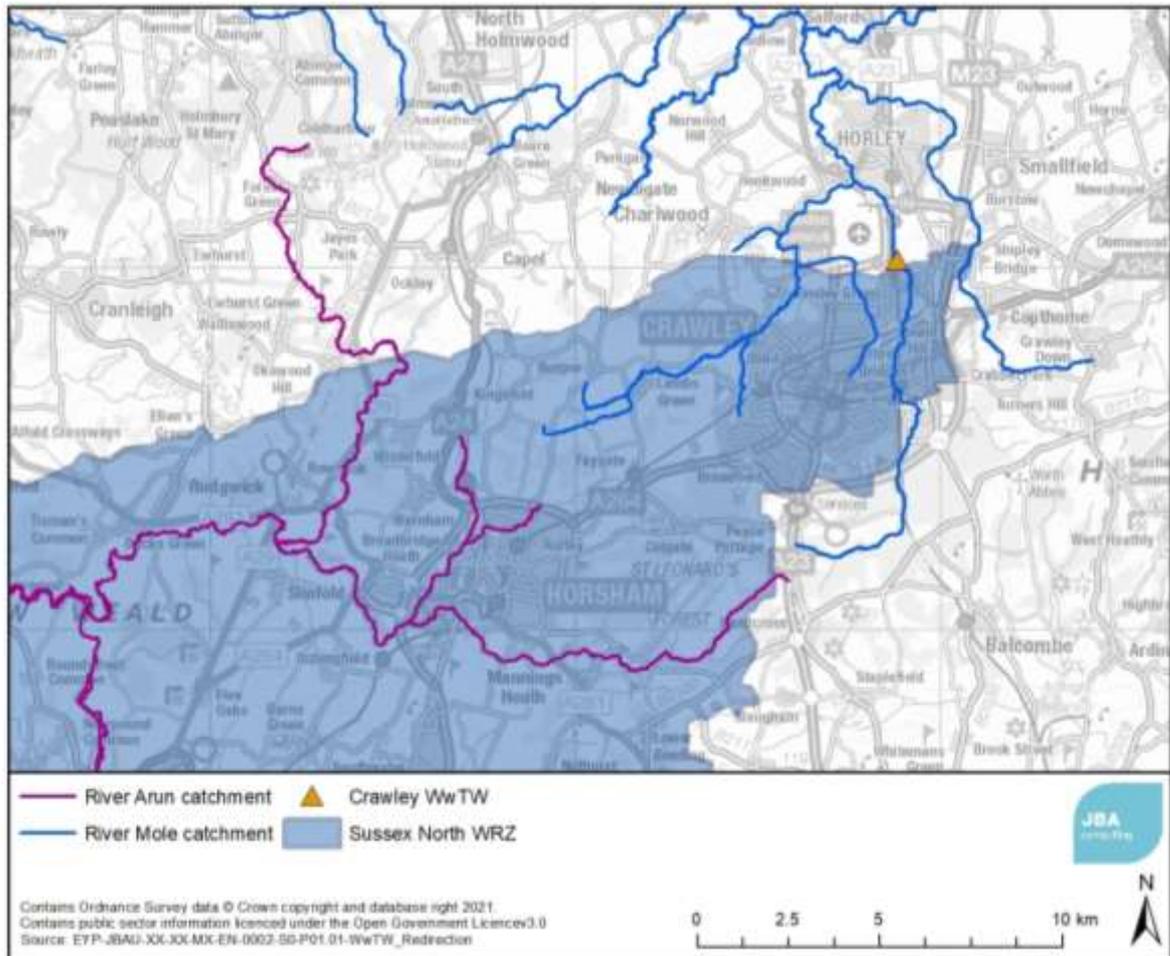


Figure 5.1 Location of Crawley WwTW relative to the Sussex North WRZ

5.6.3 Strategic transfers and re-zoning

It may also be possible to serve growth in the Sussex North WRZ via a strategic transfer of water from an adjacent WRZ that has fewer constraints on water resources. Whilst not within the definition of water neutrality, which states that offsetting should be within the same region, if water demand were reduced in an adjacent region (such as the Sussex Worthing WRZ) that already has a transfer set up with the Sussex North WRZ, it may be possible to use the reduction in demand in one WRZ to increase the transfer into the other zone.

As a short-term mitigation scheme to offset the non-delivery of the 2019-20 Hardham Wellfield Reconfiguration scheme, Southern Water are proposing to re-zone some customers (mainly non-household) in the Manor Royal area of Crawley to be supplied by SES Water. This will take some of the pressure off the Hardham abstraction. This mitigation option was received after the first draft of this report, the extent and timing of this mitigation will be confirmed in the next Part of this study.

5.6.4 Agriculture and industry

Non-household demand makes up approximately one third of the total demand in Sussex North, although it should be noted that this is not evenly distributed between LPAs. Part of this will be from employees and their use of toilets, wash facilities and canteens and is addressed in sections above, but a significant part of this will also be from industrial uses and agriculture (although a farm or industrial complex with a large water demand may have its own abstraction licence which will not appear in the water company data).

The emerging Water Resources South East (WRSE) regional plan will consider all water uses, not just public water supply, and all uses should be included in a water neutrality plan.

Data is available for non-household uses in Southern Water's Central Area, but it is not broken up by WRZ. Within the WRZ there will also be significant variation in the types of industrial uses with minimal agricultural use in the mostly urban Crawley, and minimal industrial use in the northern part of Chichester.

There may be opportunities to advise companies with a high-water usage how to save water through changes to their processes, for example using re-circulated water as cooling water rather than that taken from the public water supply. These visits would involve bespoke solutions and would be highly dependent on the mix of industry in each LPA area. It is therefore difficult to quantify a potential benefit without further information. Local Planning Authorities may have little opportunity to influence water use by agricultural users, since most agricultural activities are carried out under permitted development rights.

5.7 Funding

5.7.1 Potential sources

All of the measures described above would require some form of funding, whether that is from developers, LPAs, the water company or the public.

Potential sources of funding are:

- National government
- Local government (via council tax and/or business rates)
- Developer contributions (via S106 or CiL or a separate water neutrality scheme)
- Water consumers via water bills

Although there is a cost to implement, there is also a benefit to consumers via a reduction in household bills, both water bills by consuming less water, and energy bills through a reduction in the demand for hot water. The EST report estimated that, by reducing water demand in the home to 85 l/p/d (realistic-achievable scenario), an annual saving of £44 per home could be achieved.

5.7.2 Water company programmes

Southern Water have an ambitious water efficiency programme which involves household visits and smart metering. However, it is unclear how much of this programme could contribute towards neutrality if it is already factored into the WRMP.

5.7.3 Local Authority projects

LPAs currently work with multiple stakeholders to deliver projects funded by developers through the Community Infrastructure Levy or Section 106 contributions. Although the demands on these sources of funding are extensive, this is an existing mechanism that could be used.

5.7.4 Nutrient neutrality example

In response to the requirement for development to be Nutrient Neutral in certain areas such as the Solent in order to protect sensitive habitats, a number of schemes have been set up in order to allow development to proceed within environmental constraints. These involve the creation of an online nitrate trading platform by Defra, allowing developers to buy credits that enable new habitat to be created that support wildlife and perform a nitrate removal function. Local councils have also set up a scheme where developers make a payment per dwelling to offset their nitrate. A water neutrality plan should consider lessons learned from nutrient neutrality schemes as they develop further.

6 Methodology

6.1 Water neutrality calculator

A water neutrality calculator was developed as part of a research and development project at JBA. This estimates the future water use based on local authority growth forecasts and published water company data. It also estimates the volume of water that could be offset through retrofitting properties, leakage reduction, metering, and other identified measures.

In Part A of this research, the local authority boundary has been taken as the area over which neutrality will be applied. The water company data, for instance on potential future leakage, has therefore been apportioned to local authority area based on the split of population within the WRZ in each LPA area.

The Water Resources Market Information tables for the Sussex North WRZ published in February 2020 have been used.

It is important when undertaking calculations as part of a water neutrality plan to account for uncertainty. The expected water efficiency saving may not be realised in full, so if water neutrality is only just achieved, in theory the plan may not be sustainable in reality. Headroom should therefore be built into any future plan.

6.2 Demand scenarios

A range of household demand scenarios will be included for each local authority based on the analysis in 4.2 and shown in Table 7.2 and Table 8.2.

The non-household demand was estimated based on the number of employees. The British Water code of practice, "Flows and Loads 4"¹⁹ was used to create an equivalent PCC for employees based on a blended rate between office workers with and without a canteen (100l wastewater per day and 50l respectively), adjusted down to reflect a five-day working week. An assumption was made that approximately 75% of employees eat in a canteen^{20,21} (skewed by larger businesses being more likely to have a canteen). This gives an estimated PCC of 63 l/p/d for employees. This was applied to the Building Regulation scenarios and the Target 100 scenario. Where a more ambitious household PCC was being applied, this report assumes that a more ambitious non-household target is also applied via the BREEAM New Construction standard. In the "realistic achievable" scenario, a 40% reduction in demand is applied (a PCC of 37.9 l/p/d) and in the "ambitious" scenario the exemplar standard of a 65% reduction in demand is applied producing a PCC of just 22.1 l/p/d.

19 Code of Practice – Flows and Loads 4, British Water (2014). Accessed online at:

<https://www.britishwater.co.uk/code-of-practise-flows-and-loads-4-on-sizing-criteria-treatm.aspx> on: 08/03/2021

20 Workplace report, Labour Research Department (2015). Accessed online at:

<https://www.lrdpublications.org.uk/printarticle.php?pub=WR&iss=1758&id=idp10120192> on: 08/03/2021

21 Do you have lunch at the work canteen? Statistica (2017). Accessed online at:

<https://www.statista.com/statistics/690159/work-canteen-for-lunch-united-kingdom-uk/#statisticContainer> on: 08/03/2021

7 Water Neutrality in Crawley

7.1 Growth in Crawley

CBC provided an up-to-date growth forecasts for this study containing recent completions, sites already in the planning system and local plan allocations. An estimate of windfall was also included. Growth during the whole of the plan period was included (starting in 2018) and is summarised in Table 7.1 below.

Table 7.1 Growth forecast for CBC

Type	Growth 2018 to 2037
Housing (completions, extant planning and allocations)	5,278 dwellings
Windfall allowance	1,440 dwellings
Employment	5,780 approx. new employees*

* Estimated based on employment use type and standard employment densities

7.2 Water demand

Water demand in the five scenarios defined in Table 7.2 was calculated and is shown in Figure 7.1 below.

Table 7.2 Demand scenarios

Demand scenario	Household PCC (l/p/d)	Non-household PCC (l/p/d)	Additional Water Demand (MI/d)
Building Regs. Standard	125	63	2.417
Building Regs. Optional (adopted 2015 Local Plan)	110	63	2.171
Target 100	100	63	2.007
Realistic achievable	85	37.9	1.615
Ambitious	62	22.1	1.146

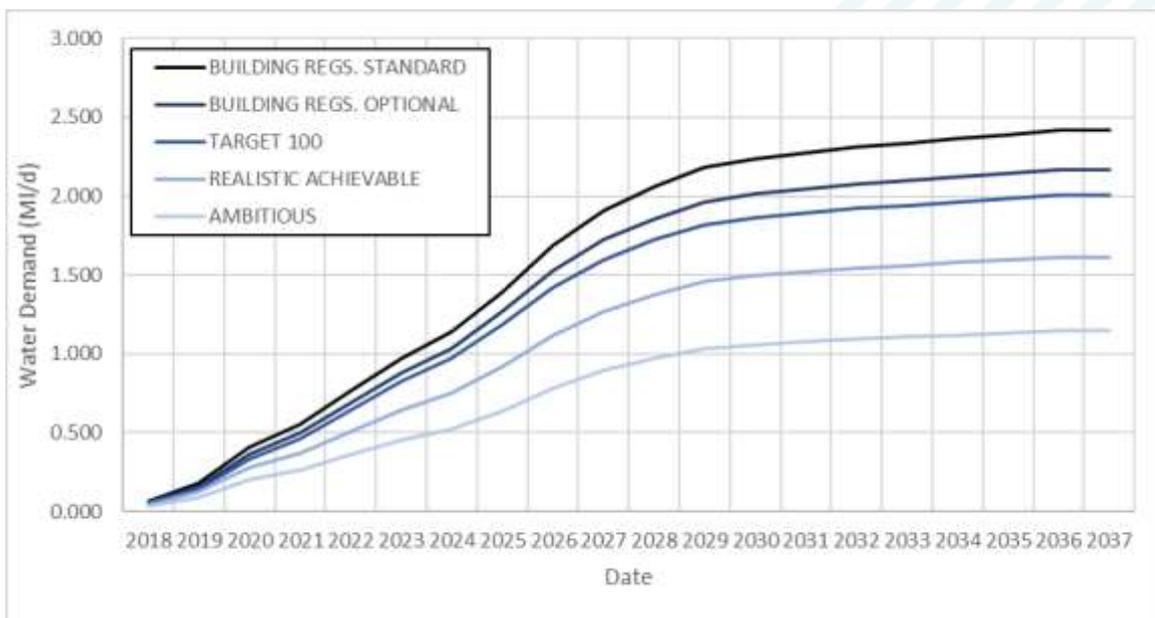


Figure 7.1 Additional water demand scenarios in Crawley

7.3 Offsetting options

7.3.1 Leakage reduction

Southern Water publish their forecast leakage reduction at the WRZ level as part of the Water Resources Market Information (WRMI) tables. To obtain an approximate estimate for the contribution from Crawley, the Ordnance Survey Open UPRN address dataset²² was used on the basis that the more addressable locations there were, the more pipework and hence opportunities for leakage. Based on this dataset 35% of the leakage in the Sussex North WRZ is estimated to be within Crawley.

The SW WRMP contains an objective to reduce leakage by 15% by 2025 and 50% by 2050, and a year by year forecast in their WRMI tables. If SW were to increase their leakage reduction activities by 10% (i.e., a further 10% of water saved in addition to the planned saving) then this measure could contribute **0.13 MI/d** to offsetting demand by 2037. However, additional leakage reduction between now and PR24 would have to be paid for by developers as it goes beyond what has been budgeted for and agreed with the regulator.

7.3.2 Metering

The contribution from extending the metering programme is difficult to calculate as the customers that do not currently have a meter are likely to have higher water demand and may be less likely to see a saving. Assuming 100% metering penetration was achieved, and the installation of the meter had the effect of reducing household consumption by 12-14%²³ observed during the SW universal metering programme, then a contribution to neutrality of up to **0.2 MI/d** could be achieved. However, as the cost and difficulty of installing meters increases the closer to 100% the programme gets, total penetration is unlikely, costs will be high and the reduction in PCC achieved may be less.

7.3.3 Household visits

Southern Water have reported a 36-litre per household saving on average as a result of a household visit. Therefore, if every household (estimated to be 45,234 based on ONS data²⁴) received a visit and achieved the expected saving, a total water demand saving of **1.63 MI/d** could be possible. That would be enough to completely offset additional demand from growth in the “ambitious” scenario and the “realistic achievable” scenario. Table 7.3 shows the number of household visits that would be required in each demand scenario. It highlights how a retrofit programme can be far more successful if demand is first limited by implementing strong water efficiency policies to reduce demand prior to offsetting. In both the building regulations standard scenarios, water neutrality could not be achieved by offsetting demand through home visits alone, and even if more ambitious targets were set for new build housing, other measures are likely to be required.

Although the result for the more ambitious scenarios is encouraging, household visits are included in the Target 100 activities and form part of the PCC reduction expected in the WRMP. Without knowing the number of household visits anticipated as part of Target 100, it is not possible to estimate a contribution that could be made towards neutrality by expanding this programme.

22 Unique Property Reference Number – A unique numeric identifier for every addressable location in Great Britain.

23 WRMP Annex 6 – Options Appraisal, Southern Water (2019). Accessed online at:

<https://www.southernwater.co.uk/media/3671/wrmp19-annex6-options-appraisal.pdf> on: 08/03/2021

24 2018-based: Principal projection, Office for National Statistics (2018). Accessed online at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/householdprojectionsforengland> on: 08/03/2021

Table 7.3 Number of properties requiring home visit in each demand scenario

Demand scenario	Total additional water demand (MI/d)	No. properties requiring home visit to offset total	% Properties in LPA area visited
Building Regs. Standard	2.417	67,149	148%
Building Regs. Optional	2.171	60,305	133%
Target 100	2.007	55,742	123%
Realistic achievable	1.615	44,868	99%
Ambitious	1.146	31,837	70%

7.3.4 Non-household visits

According to ONS figures²⁵ there were 96,000 employee jobs in 2019, made up of 69,000 full time and 26,000 part time jobs. Based on the PCC estimated in 6.2, this represents a total demand from employees in Crawley of 5.184MI/d.

If 25% of employees could be reached with a non-household visit and provided water saving advice, water efficient fittings for basins, and the same percentage saving observed in household PCC after a visit was achieved, a saving of **0.16MI/d** could be achieved.

7.3.5 Application of BREEAM standards

Application of the BREEAM new construction standard has been incorporated into the demand forecasts for employment land. The refurbishment and fit-out standard could be applied to commercial properties whenever a building changed hands, although in many cases this will not trigger a planning application. In the “realistic achievable” scenario a reduction of employee PCC of 25.3 l/p/d was estimated (based on a 40% improvement in water efficiency). If the same saving was realised when a commercial property changed hands, for a business with 100 employees the saving would be 2,529l/d. If 40 such transactions took place in a year, a **0.1 MI/d** impact could be achieved.

7.3.6 Rainwater harvesting

Household

As discussed in 4.6, RWH has the potential to reduce water demand by a third if the RWH system was used for both toilet flushing and laundry. These would equate to a reduction in PCC from 134.9 (average for Sussex North) to approximately 90 l/p/d, a saving of 44.5 l/p/d. The cost of retrofitting a system of this type into existing housing stock is likely to be prohibitive at a few thousand pounds per property. However, there may be potential to incorporate it into new build housing. It is particularly suited to larger developments where it can be incorporated into site landscaping or in flatted, multi-story developments where it can be used as part of the SuDs storage and installed within the basement of the building. If all new build homes were installed with RWH systems, and the saving of 44.5 l/p/d was achieved, the total saving would be **0.4MI/d**. (Based on 4,000 houses over the remaining plan period, excluding windfall). However, with an estimated cost of approximately £2,000 per house (dependent on the size /

25 Labour Market Profile: Crawley, ONS (2019). Accessed online at:

type of dwelling, number of properties served etc)^{26,27} this programme could cost £8,000,000 and could only offset a quarter of the demand in the “realistic achievable” scenario.

Non-household

The Manor Royal Business Improvement District is situated in the north of Crawley and employs 30,000 across an area of 240 hectares²⁸. There are many large buildings with roof areas ideal for collection of rainwater either for individual businesses or to input to a communal system shared between multiple businesses.

Assuming all 30,000 of those employees were to flush the toilet on average twice a day (ignoring urinal use), and each flush consumed 10l (approx. based on a mix of older and newer fittings), the daily water demand (adjusted for the number of working days in the year) would be **0.42MI/d**.

In order to provide that volume of water (annual demand of 153MI), a large area of roof space, would be required. For the Crawley area, an annual rainfall of 607mm/yr could be expected and so, to provide sufficient volume, a minimum roof area of 252,000m² would be required. This equates to thirty buildings with a roof space of 100m by 84m of which there are several in that business park.

Although the focus of the calculations above is on the Manor Royal Main Employment Area, a contribution could be obtained from other non-residential buildings for example in Lowfield Heath or the Three Bridges Corridor.

7.3.7 Wastewater redirection

All of the growth within Crawley is served by Crawley WwTW. A transfer scheme therefore has the potential to offset all of the growth in Crawley. This could be achieved by either transferring a volume of treated effluent equivalent to the additional water demand from Crawley WwTW to a point in the Arun catchment (similar in principle to the Littlehampton scheme described in 3.1.2.) or wastewater in the south west of Crawley could be pumped into the Horsham catchment for treatment. Both these schemes would come at a considerable capital cost, and would be subject to extensive study, environmental impact assessment and water quality assessment.

7.4 Summary

The analysis shows that the only measures capable of achieving water neutrality in isolation are:

- largescale retrofitting of domestic properties with Rwh systems; and
- redirecting wastewater from Crawley WwTW to the Arun catchment.

Both of these schemes would come at a considerable cost, for instance a Rwh retrofitting programme that achieved a 2.007 MI/d saving (offsetting the Target 100 demand) would require almost every house in Crawley to be retrofitted at a cost of approximately £95M. The cost per unit would need to come down considerably or shared across multiple households for widespread adoption of Rwh to be successful. Redirecting either wastewater or treated effluent would be a major capital project for Southern Water and may not be feasible or cost effective. Any plan along these lines would need to be in the next SW business plan so would not be started until after 2024 at the earliest.

26 Independent review of costs and benefits of Rwh and GWR, Waterwise (2020). Accessed online at: https://waterwise.org.uk/wp-content/uploads/2020/09/Ricardo_Independent-review-of-costs-and-benefits-of-RWH-and-GWR_Appendices-A1-A2-1.pdf on: 08/03/2020

27 Housing Standards Review, Department for Communities and Local Government (2014). Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/353387/021c_Cost_Report_11th_Sept_2014_FINAL.pdf on: 11/05/2021

28 Topic Paper 5 – Employment Needs and Land Supply, Crawley Borough Council (2020). Accessed online at:

<https://crawley.gov.uk/sites/default/files/2021-01/Topic%20Paper%205%20-%20Employment%20Needs%20and%20Land%20Supply.pdf> on: 08/03/2021
EYP-JBAU-XX-XX-RP-EN-0001-A1-C03-Water_Neutrality_Assessment_Part_A

Therefore, a range of measures is required in order to reach 100% neutrality. Large contributions could come from businesses. The analysis shows that 42% of the neutrality target could be achieved by non-household visits, a shared RWH or GwR system in the Manor Royal Main Employment Area, and application of the BREEAM standards when commercial properties change hands (although this last measure may be difficult to apply as a change of ownership is outside planning control).

Further contributions from the extension of household metering and expansion of the leakage reduction programme are possible.

There is a significant uncertainty in the contribution that could be made from household visits. 1.6MI/d is theoretically possible if every household was visited, however, the Target 100 programme includes this measure and it is not clear how many visits are planned, and how the supply-demand balance may change if sustainability reductions are required in the Pulborough abstractions. Discussions are required with Southern Water to explore this further.

Table 7.4 Offsetting options for CBC (in isolation)

Mitigation option	Potential water saving (MI/d)	% of neutrality target 100 l/p/d	% of neutrality target 85 l/p/d	% of neutrality target 62 l/p/d	Opportunities	Challenges	Party best placed to deliver
Leakage reduction	0.13	6%	8%	11%	Contractors already in place – extension to existing programme	Upfront funding required if SW are to deliver beyond their existing agreed plan	Southern Water
Metering	0.2 (max)	10%	12%	17%	Contractors already in place – extension to existing programme	Last unmetered households may be difficult to convert and may not provide the expected savings	Southern Water
Household visits	0.82 based on 50% of households 1.63 (max)	41% to 81%	51% to 101%	72% to 142%	Relatively cost effective Contractors already in place – extension to existing programme	This is already included in Target 100 activities – uncertain how much could contribute to neutrality	Southern Water
Non-household visits	0.16	8%	10%	14%	Potentially large gains especially at sites with large numbers of employees	SW may not be the retail supplier for all non-household customers(SW would remain as the wholesale supplier)	Partner needs to be identified
Application of BREEAM in commercial properties	0.1	5%	6%	8%	Requiring BREEAM would have other environmental benefits		CBC through local plan policy
RwH – Newbuild household	0.4 (max)	18%	24%	34%	Greater opportunity to integrate with design and include community scale systems than retrofit.	Significant cost – may not be supported by developer	Developer

Mitigation option	Potential water saving (MI/d)	% of neutrality target 100 l/p/d	% of neutrality target 85 l/p/d	% of neutrality target 62 l/p/d	Opportunities	Challenges	Party best placed to deliver
RwH – retrofit household	2.01 (max)	94%	118%	168%		Significant cost for a single household and uptake uncertain and voluntary so not likely to achieve full uptake.	Partner needs to be identified
RwH – retrofit commercial	0.42	18%	24%	34%	Largescale scheme shared between businesses is more cost effective (other smaller scale schemes may be possible elsewhere in CBC)	Persuading companies to invest in the present climate may be difficult	Manor Royal Business District
Education	Unknown				Awareness of water scarcity is low -	Difficult to quantify benefits or demonstrate success	Southern Water / Waterwise
Wastewater re-direction	Complete	100%	100%	100%		Significant capital cost and potential environmental impact	Southern Water
New water supplier from outside WRZ	Unknown				Utilise water resources from neighbouring WRZs	No identifiable surpluses in neighbouring zones. May require strategic transfer from outside region.	None identified through the WRMP19 process

7.5 Conclusions and recommendations

It is likely that a package of measures will be required in order for the water neutrality target to be met in Crawley. This is likely to consist of:

- An expansion of the leakage reduction programme
- Visits to businesses in Crawley to encourage more efficient use of water, and to offer water saving devices
- Implementation of a largescale rainwater harvesting or greywater recycling system in the Manor Royal Main Employment Area
- Application of the BREEAM Refurbishment standard when commercial buildings change hands supported by grants to fit water saving technology
- Discussions with Southern Water are required to understand the extent of the household visits as part of the Target 100 activities in order to assess the likely contribution of household visits to a neutrality plan.

8 Water Neutrality in Chichester

8.1 Growth in Chichester

Chichester District Council provided growth figures for the area of Chichester supplied from the Sussex North WRZ. This includes the parishes of Kirdford, Loxwood, Plaistow & Ifold and Wisborough Green. 431 houses are planned in total during the study period, and no employment land was identified. This is summarised in Table 8.1 below. This study excludes the land that falls within the South Downs National Park where the Local Planning Authority is the National Park Authority, not Chichester District Council. This growth will be incorporated in Part B of this study.

Table 8.1 Growth in Chichester

Type	Growth 2018 to 2037
Housing completions	21 dwellings
Housing commitments (at 31 March 2020)	130 dwellings
Potential allocations	250 dwellings
Windfall allowance	30 dwellings
Employment	No employment development planned

8.2 Demand scenarios

The same demand scenarios applied to Crawley will be applied in Chichester. This are shown in Table 8.2 and the resulting water demand is represented in Figure 8.1.

Table 8.2 Demand scenarios

Demand scenario	Household PCC (l/p/d)	Non-household PCC (l/p/d)	Additional Water Demand (Ml/d)
Building Regs. Standard	125	63	0.131
Building Regs. Optional	110	63	0.116
Target 100	100	63	0.105
Realistic achievable	85	37.9	0.089
Ambitious	62	22.1	0.065

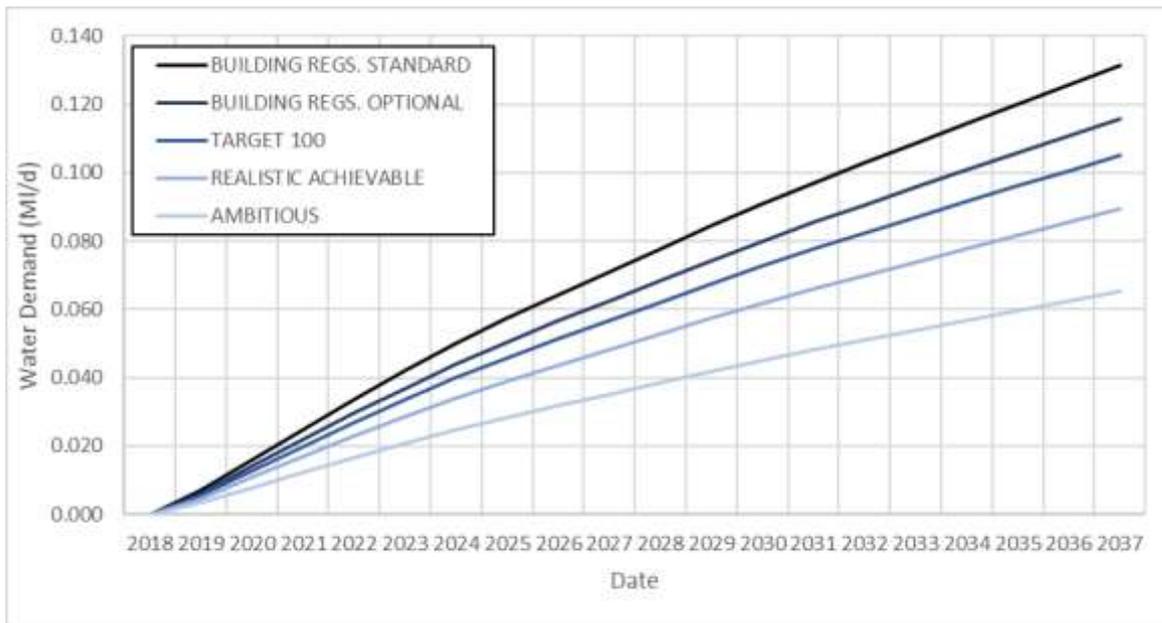


Figure 8.1 Water demand in Chichester in various scenarios

8.3 Offsetting options

8.3.1 Leakage reduction

Southern Water publish their forecast leakage reduction at the WRZ level as part of the Water Resources Market Information (WRMI) tables. To obtain an approximate estimate for the contribution from Chichester, the Ordnance Survey Open UPRN address dataset²⁹ was used on the basis that the more addressable locations there were, the more pipework and hence opportunities for leakage. Based on this dataset 2.5% of the leakage in the Sussex North WRZ is estimated to be within Chichester.

The SW WRMP contains an objective to reduce leakage by 15% by 2025 and 50% by 2050, and a year by year forecast in their WRMI tables. If SW were to increase their leakage reduction activities by 10% (i.e., a further 10% of water saved in addition to the planned saving) then this measure could contribute **0.01 MI/d** to offsetting demand by 2037.

8.3.2 Metering

The contribution from extending the metering programme is difficult to calculate as the customers that do not currently have a meter are likely to have higher water demand. They may include customers that are reluctant to get a water meter as they are unable or unwilling to reduce their water use and may therefore be less likely to see a saving. Assuming 100% metering penetration was achieved (on an estimated 400 unmetered properties in the north of Chichester), and the installation of the meter had the effect of reducing household consumption by 12-14%³⁰ observed during the SW universal metering programme, then a contribution to neutrality of up to **0.009 MI/d** could be achieved. However, as the cost and difficulty of installing meters increases the closer to 100% the programme gets, total penetration may be unlikely, costs will be high and the reduction in PCC achieved may be less.

8.3.3 Household visits

Southern Water have reported a 36-litre per household saving on average as a result of a household visit. Therefore, if every household (estimated to be approx. 2,500 in

29 Unique Property Reference Number – A unique numeric identifier for every addressable location in Great Britain.

30 WRMP Annex 6 – Options Appraisal, Southern Water (2019). Accessed online at:

<https://www.southernwater.co.uk/media/3671/wrmp19-annex6-options-appraisal.pdf> on: 08/03/2021

that part of Chichester based on ONS data³¹ and the UPRN dataset) received a visit and achieved the expected saving, a total water demand saving of **0.09 MI/d** could be possible. That would be enough to completely offset additional demand from growth in the “ambitious” scenario and the “realistic achievable” scenario. Table 8.3 shows the number of household visits that would be required in each demand scenario. It highlights how a retrofit programme can be far more successful if demand is first limited by implementing strong water efficiency policies to reduce demand prior to offsetting. In both the building regulations standard scenarios, water neutrality could not be achieved by offsetting demand through home visits alone, and even if more ambitious targets were set for new build housing, other measures are likely to be required.

Although the result for the more ambitious scenarios is encouraging, household visits are included in the Target 100 activities and form part of the PCC reduction expected in the WRMP. Without knowing the number of household visits anticipated as part of Target 100, it is not possible to estimate a contribution that could be made towards neutrality by expanding this programme.

Table 8.3 Number of properties requiring a home visit in each scenario

Demand scenario	Total additional water demand (MI/d)	No. properties requiring home visit to offset total	% Properties in LPA area visited
Building Regs. Standard	0.131	3,649	144%
Building Regs. Optional	0.116	3,211	127%
Target 100	0.105	2,919	115%
Realistic achievable	0.089	2,482	98%
Ambitious	0.065	1,810	72%

8.3.4 Non-household visits

According to ONS figures³² there were 61,000 employee jobs in Chichester in 2019, made up of 39,000 full time and 22,000 part time jobs. JBA did not have access to data showing the distribution of these employees but based on the distribution of addressable locations from the UPRN dataset, and assuming that the distribution of jobs is the same (which is likely to overestimate) 2,850 of these employees are within the WRZ. Based on the PCC estimated in 6.2, this represents a total demand from employees in Chichester of 0.148MI/d.

If 25% of employees could be reached with a non-household visit and provided water saving advice, water efficient fittings for basins, and the same percentage saving observed in household PCC after a visit was achieved a saving of **0.005MI/d** could be achieved.

As the northern part of Chichester is not a high employment area this is likely to be an overestimate of the contribution from non-household visits.

8.3.5 Application of BREEAM

The refurbishment and fit-out standard could be applied to commercial properties whenever a building changed hands. However, as the number of businesses in that area of Chichester is low – this is unlikely to provide a significant contribution to neutrality.

31 2018-based: Principal projection, Office for National Statistics (2018). Accessed online at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/householdprojectionsforengland> on: 08/03/2021

32 Labour Market Profile: Crawley, ONS (2019). Accessed online at:

<https://www.nomisweb.co.uk/reports/lmp/la/1946157342/report.aspx> on: 08/03/2021

8.3.6 Rainwater Harvesting Household

As discussed in 4.6, RWH has the potential to reduce water demand by a third if the RWH system was used for both toilet flushing and laundry. These would equate to a reduction in PCC from 134.9 (average for Sussex North) to approximately 90 l/p/d, a saving of 44.5 l/p/d. The cost of retrofitting a system of this type into existing housing stock is likely to be prohibitive at a few thousand pounds. However, there may be potential to incorporate it into new build housing, particularly on larger developments. If all new build homes in Chichester were installed with RWH systems, and the saving of 44.5 l/p/d was achieved, the total saving would be **0.019MI/d**. (Based on 432 houses). However, with an estimated cost of approximately £2,000 per house this programme would cost £864,000 and could only offset 21% of the demand in the “realistic achievable” scenario.

Non-household

There are a limited number of large commercial buildings within the WRZ in Chichester and so a largescale RWH scheme is unlikely to make a significant contribution to neutrality.

8.3.7 Wastewater redirection

A similar scheme to that suggested in Crawley would not work in Chichester as the discharge from WWTW serving growth in WRZ remains within the WRZ. However, an extension to the Southern Water Littlehampton re-use scheme could offset growth. It would need to be shown to be in addition to what is already planned if it were to contribute to neutrality though, as this already forms part of SW’s WRMP.

8.4 Summary

The analysis shows that the only single measure capable of achieving water neutrality in isolation is largescale retrofitting of domestic properties with RWH systems. This would come at a considerable cost, for instance a RWH retrofitting programme that achieved a 0.089 MI/d saving (offsetting the “realistic achievable” scenario demand) would require every house in Chichester to be retrofitted at a cost of approximately £5M. The cost per unit would need to come down considerably or shared across multiple households for widespread adoption of RWH to be successful.

Achieving neutrality in the part of Chichester within the Sussex North WRZ is made more difficult as the opportunities to offset demand using non-household options are limited.

Contributions from the extension of household metering and expansion of the leakage reduction programme are possible.

There is a significant uncertainty in the contribution that could be made from household visits. 1.6MI/d is theoretically possible if every household was visited, however the Target 100 programme includes this measure and it is not clear how many visits are planned, and how the supply-demand balance may change if sustainability reductions are required in the Pulborough abstractions. Discussions are required with Southern Water to explore this further.

Table 8.4 Offsetting options for Chichester (in isolation)

Mitigation option	Potential water saving (MI/d)	% of neutrality target 100 l/p/d	% of neutrality target 85 l/p/d	% of neutrality target 62 l/p/d	Opportunities	Challenges	Party best placed to deliver
Leakage reduction	0.01	10%	11%	15%	Contractors already in place – extension to existing programme	Upfront funding required if SW are to deliver beyond their existing agreed plan	Southern Water
Metering	0.01 (max)	10%	11%	15%	Contractors already in place – extension to existing programme	Last unmetered households may be difficult to convert and may not provide the expected savings	Southern Water
Household visits	0.045 based on 50% of households 0.09 (max)	42% to 86%	51% to 101%	69% to 138%	Relatively cost effective Contractors already in place – extension to existing programme	This is already included in Target 100 activities – uncertain how much could contribute to neutrality	Southern Water
Non-household visits	0.005 Likely to be an overestimate)	5%	6%	8%	Potentially large gains especially at sites with large numbers of employees	Very limited opportunities within the north of Chichester SW may not be supplier for all non-household customers	Partner needs to be identified
Application of BREEAM in commercial properties	Negligible	N/A	N/A	N/A	Requiring BREEAM would have other environmental benefits	Limited number of large commercial buildings in this area	CDC through local plan policy
RwH – Newbuild household	0.019 (max)	18%	22%	30%	Greater opportunity to integrate with design and include community scale systems than retrofit.	Significant cost – may not be supported by developer	Developer

Mitigation option	Potential water saving (MI/d)	% of neutrality target 100 l/p/d	% of neutrality target 85 l/p/d	% of neutrality target 62 l/p/d	Opportunities	Challenges	Party best placed to deliver
RwH – retrofit household	0.113 (max)	108%	127%	174%		Significant cost for a single household and uptake uncertain and voluntary so not likely to achieve full uptake.	Partner needs to be identified
RwH – retrofit commercial	Negligible	N/A	N/A	N/A		No opportunities identified	N/A
Education	Unknown				Awareness of water scarcity is low -	Difficult to quantify benefits or demonstrate success	Southern Water / Waterwise
Wastewater re-direction	Complete	100%	100%	100%	Could offset total demand in existing scheme	Extension to Littlehampton scheme over and above the WRMP may not be possible	Southern Water
New water supplier from outside WRZ	Unknown				Utilise water resources from neighbouring WRZs	No identifiable surpluses in neighbouring zones. May require strategic transfer from outside region.	None identified through the WRMP19 process

8.5 Conclusions and recommendations

It is difficult to achieve water neutrality in Chichester District in isolation unless part of the Target 100 activities can be used to offset growth. The total demand that requires offsetting is fairly low, so it could be achieved by offsetting measures within other authorities in the WRZ. It is likely a package of measures will be required in order for the water neutrality target to be met in Chichester. This is likely to consist of:

- An expansion of the leakage reduction programme
- Visits to businesses in Chichester to encourage more efficient use of water, and to offer water saving devices
- Discussions with Southern Water are required to understand the extent of the household visits as part of the Target 100 activities in order to assess the likely contribution of household visits to a neutrality plan.

9 Future work

9.1 Discussion points

This document is the first part in the preparation of a Water Neutrality Plan, and probably the first such plan in the UK. During the review process of this report, a number of queries and issues were raised by stakeholders that are best addressed during the formulation of the draft plan (Part C). These have been captured in Table 9.1 below, and should be used to inform the scope of Part C.

Table 9.1 Stakeholder comments

Stakeholder	Comment
Lepus (HRA consultants)	"My understanding is that NE and Southern Water are currently undertaking a number of studies to provide the link between abstractions, change in water levels and changes in habitat / species distribution. It would be useful to know what work NE and Southern Water are doing to define this impact"
CBC	"There is a question here of how 'offsetting' is defined where it involves actions that are independent of the grant of consent. If the consent is not conditional on the offsetting actions occurring, then how certain can anyone be that they will actually occur? And how is the offsetting achieved by the actions attributed to particular developments? Surely there has to be a way of tying this down more precisely in order for it to be possible to say that a given development is 'water neutral'? Would it be sufficient for this to be agreed through a ScG or similar? Would any monitoring be required to ensure that the savings were achieved? Noting that the 'certainty' required by Natural England is quite a high bar."
CBC	"What would be the legislation/legal status of this?" (the Water Neutrality Plan)
Lepus	<p>"Before development comes forward. There needs to be a 'hook' in the plan which will ensure that development will only come forward once mitigation has been implemented to achieve overall neutrality."</p> <p>In terms of the HRA, case law indicates that mitigation must be effective, timely, reliable, guaranteed to be delivered and as long term</p>

Stakeholder	Comment
	<p>as necessary. The 'hook' in planning policy to achieve this must reflect this requirement.</p> <p>Just a note from an HRA perspective on consideration of future reductions in other plans / policy in relation to the Dutch Ruling.</p> <p>The Dutch Nitrogen Ruling CJEU Cases C-293/17 & C-293/18</p> <p>In HRA appropriate assessment we cannot take account of the future benefits of other wider measures if the expected benefits are uncertain (para 130). This may be because:</p> <ul style="list-style-type: none"> • procedures to implement measures are not yet in place; or • scientific knowledge doesn't allow benefits to be identified or quantified <p>But the HRA appropriate assessment can take account of all measures above where the expected benefits are certain at the time of the assessment.</p> <p>I wonder how we would quantify and ensure enforcement of some of these behavioural changes – the HRA needs to rely upon mitigation which is, beyond reasonable scientific doubt, effective, timely, reliable, guaranteed to be delivered and as long term as necessary.</p> <p>How would we demonstrate that such measures will in reality take place in the future?</p>
CBC	(On timing of implementing measures) "How does this work when we are bringing forward the same developments under the existing adopted Local Plan, which was considered without this being an issue raised in the HRA? Should we be requiring mini-HRAs for all planning applications as they are doing in Wealden/Mid Sussex in relation to the air quality impacts on the Ashdown Forest? Or is the borough's adopted Local Plan enough?"
CDC	On the uncertainty on environmental impact - "Don't we have clear advice on this point at present?"
Lepus	Given metering and household visits are relying on a behavioural change I would wonder how we would be confident in reductions. The leakage reductions (above) would be more reliable as presumably SW would sign up to a more ambitious target over a certain time period.
CBC	Responsibility for these measures is spread across various stakeholders and is outside the planning process to a large extent, so question arises as to how the resulting savings are attributed to Crawley and to the Local Plan period.
SW	"Have you considered the long term effects of Covid-19 which will likely result in more people working from home in future?"
NE	NE make the point that mitigation can only effective if supplied from Hardham. Further information about how the Water Resource Zone is arranged, and evidence that mitigation will have an impact on Hardham is required.

9.2 Next stages

Part A of this study introduced the concepts of water neutrality, assessed the requirement for offsetting under different scenarios and identified possible offsetting and demand reduction measures. This was completed for Crawley Borough Council and Chichester District Council in isolation. A technical note was prepared by Aecom for Horsham District Council as part of their HRA process. Part B will build on this work and look at the water neutrality at the Water Resource Zone level, taking into account contributions of growth from all LPAs in the zone. Parts A and B will then be used as the basis for a draft water neutrality plan which will form Part C of this study.

Engagement between the LPAs, Southern Water, Natural England and the Environment Agency will be key to making Part C successful. A stakeholder workshop is recommended early in Part C to discuss:

- A spatial extent and timeframe for neutrality
- The measures identified in part A and B, how they might be implemented and by which party
- How the impact of measures in the plan will be measured and used to offset growth



Offices at

Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Isle of Man
Limerick
Newcastle upon Tyne
Newport
Peterborough
Saltaire
Skipton
Tadcaster
Thirsk
Wallingford
Warrington

Registered Office
1 Broughton Park
Old Lane North
Broughton
SKIPTON
North Yorkshire
BD23 3FD
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
Follow us:  

Jeremy Benn Associates Limited

Registered in England 3246693

JBA Group Ltd is certified to:
ISO 9001:2015
ISO 14001:2015
OHSAS 18001:2007

