Sussex North Water Neutrality Study: Part C – Mitigation Strategy

Final Report

December 2022

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Crawley Borough Council
Chichester District Council
Horsham District Council

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Contract

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Purpose

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Executive summary

Background

Southern Water (SW) supplies water to Horsham District, parts of Crawley Borough, the northern part of Chichester District (and parts of the South Downs National Park within those Local Authorities) from its Sussex North Water Resource Zone (WRZ). Within this WRZ there are several water sources, one of which is a groundwater source near Pulborough.

Natural England (NE) has raised significant concerns regarding the current abstraction (and any increase in abstraction required to serve any 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 supply and deterioration of habitat at designations including Amberley Wild Brooks Site of Special Scientific Interest (SSSI), Pulborough Brooks SSSI and Arun Valley Special Protection Area (SPA), Arun Valley Special Area of Conservation (SAC) and Arun Valley Ramsar site.

Investigations and discussions between SW, the Environment Agency (EA) and NE on the long-term sustainability of the Pulborough abstraction are ongoing, including a sustainability investigation to assess what level of ground and surface water abstractions are sustainable. In the meantime, NE has advised the Local Planning Authorities (LPAs) that development in the Sussex North WRZ region must not add to this potential adverse effect.

This can be achieved by making development within the WRZ "water neutral". In other words:

"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."

In practical terms this means first reducing demand for water from the new development as far as practicable, and then offsetting the remaining demand elsewhere within the same region.

The alternative approach would be to restrict growth to a level that has already been accounted for in SW's 2019 Water Resource Management Plan (WRMP) – significantly less than is currently proposed in the commissioning LPAs' emerging Local Plans.

Beyond this regulatory requirement for the LPAs to demonstrate water neutrality to fulfil their responsibilities under the Habitats Regulations, this is an opportunity, for the first time in the UK, to facilitate development at the Local Plan level which does not lead to increased water abstraction and its consequent pressures on the environment. In doing so there are some significant additional benefits in terms of reduced carbon emissions from treating, supplying, and heating water, as well as reduced water and energy bills for consumers.

The objective

This report outlines a strategy to achieve water neutrality within the Sussex North WRZ, throughout the timeframe covered by the Local Plans of Crawley Borough Council (CBC), Chichester District Council (CDC) and Horsham District Council (HDC), and South Downs National Park Authority (SDNPA) up to 2038/39.

The objective of the Strategy is to enable the Local Plans to proceed towards adoption. To deliver the Strategy, there will be an LPA-led Scheme to provide water offsetting. Priority of access to offsetting delivered through the LPA-led Offsetting Scheme should therefore be given to sites allocated in Local Plans and/or identified in the associated, published Local Plan housing trajectories (for example an allowance for Windfall). Strategic-scale windfall development (which falls outside the Local Plans' Strategic Approach) would not be prioritised.

This Strategy includes:

- the current growth forecasts of the commissioning LPAs that must be made water neutral;
- recommended targets for water efficiency in new builds;
- the contribution that Southern Water are making through their water demand reduction activities as part of their WRMP;
- the remaining water demand to be offset;
- recommended methods to achieve this offset; and
- an outline of how an offsetting scheme may be managed.

The information contained in this Strategy – also referred to as Part C, supersedes the information presented in Parts A and B.

This Strategy has been written in collaboration with the commissioning LPAs, South Downs National Park Authority (SDNPA), Southern Water, Natural England and the Environment Agency, seeking additional input from the Department for Environment, Food and Rural Affairs (Defra), the Department for Levelling Up, Housing and Communities (DLUHC), West Sussex Country Council (WSCC), and Mid Sussex District Council (MSDC). Through the process of this study, engagement and input has been pursued with the Home Builders Federation (HBF), the Land Promoters and Developers Federation (LPDF), Homes England (HE), and several manufacturers of water efficiency technologies.

Growth in Sussex North

The LPAs within the Sussex North WRZ collectively propose to deliver nearly 20,000 houses supported by additional school places and employment land as part of their emerging Local Plans.

LPA	Number of houses within Local Plan period (without full planning permission)	Indicative number of employees
CBC	3,960	5,780
CDC	1,796	None identified in Sussex North
HDC	12,800	4,590
SDNPA	1,244	345
Total	**19,800**	**10,715**

This is the best information available at the point of finalising the Strategy and can be relied upon for setting the overarching, strategic approach to water neutrality in order to meet the requirements of the Habitats Regulations for the Local Plans. These estimates are subject to change as a result of the further development of the Local Plans as they approach and go through examination, and the trajectory of growth is susceptible to significant variability as a result of economic factors. This Strategy seeks to be sufficiently flexible to remain a robust basis on which to proceed.

Reducing water demand

To achieve water neutrality, water demand should first be reduced as low as practicable, before the remaining demand is offset in the wider area, in this case the water resource zone. This can be done by requiring a more ambitious water efficiency standard in new build households and in new build non-household development.

The commissioning LPAs have adopted Local Plan policies requiring design of new homes to the Building Regulations Optional Standard of 110 litres per person per day (l/p/d). These have each been found sound at previous examinations, reflecting that this is an area of serious water stress. There is now a need to achieve water neutrality, and so water efficiency standards that exceed the Building Regulations Optional standard are required.

This Strategy recommends a water efficiency target of 85 litres per person per day is adopted for all new build housing in the WRZ. Non-household development should achieve a score of three credits within the water (Wat 01 Water Consumption) issue category for the BREEAM New Construction Standard, achieving 40% reduction compared to baseline standards. This allows the overall additional water demand during the Local Plan period to be reduced.

The table below presents the additional water demand by the end of the Local Plan period where the 85l/p/d target is adopted verses the 110l/p/d target. Throughout this report, the unit "megalitres per day" (Ml/d) is used, a megalitre being one million litres or 1,000 cubic metres. By way of comparison, an Olympic swimming pool contains 2.5Ml of water. The volume of additional water demand from growth by the end of the Local Plan period is therefore equivalent to roughly two Olympic swimming pools of water being abstracted every day in the 85l/p/d scenario, and a further half an Olympic swimming pool per day in the 110l/p/d scenario.

Water efficiency target	Total water demand during Local Plan period (to 2038/39) (Ml/d)
BUILDING REGS. OPTIONAL (110l/p/d)	**5.916**
REALISTIC ACHIEVABLE (85l/p/d)	**4.943**

Setting a tighter standard for water efficiency does not guarantee that the eventual water-use in a development will be as expected, or that it will stay at the designed figure. Ensuring the defined target for water efficiency is met will also require an element of behaviour change. A targeted programme to raise awareness of why water saving is needed, and the correct use and maintenance of the fittings and fixtures installed is therefore required.

Southern Water's contribution

Water companies must produce a WRMP which defines how they will maintain a balance of water supply to water demand. Part of the current SW WRMP (WRMP19) is a strategy to reduce water demand on the network through a reduction in household per capita consumption and a reduction in leakage.

The Strategy makes allowance for the demand management measures already targeted by SW as part of their current WRMP. This will effectively offset part, but not all, of the growth proposed within the emerging Local Plans. A new plan (WRMP24) will run from 2025.

Remaining demand to offset

The graph below shows the predicted water demand from new development if the Optional Building Regulations target of 110l/p/d were adopted (the top dotted line), and if a target of 85l/p/d were adopted (the bottom solid line).

The bars represent the contribution from SW's water demand reduction activities that are factored into their SW current WRMP (including a 10% safety margin) after sites with extant planning permission on or before September 2021 have been taken into account.

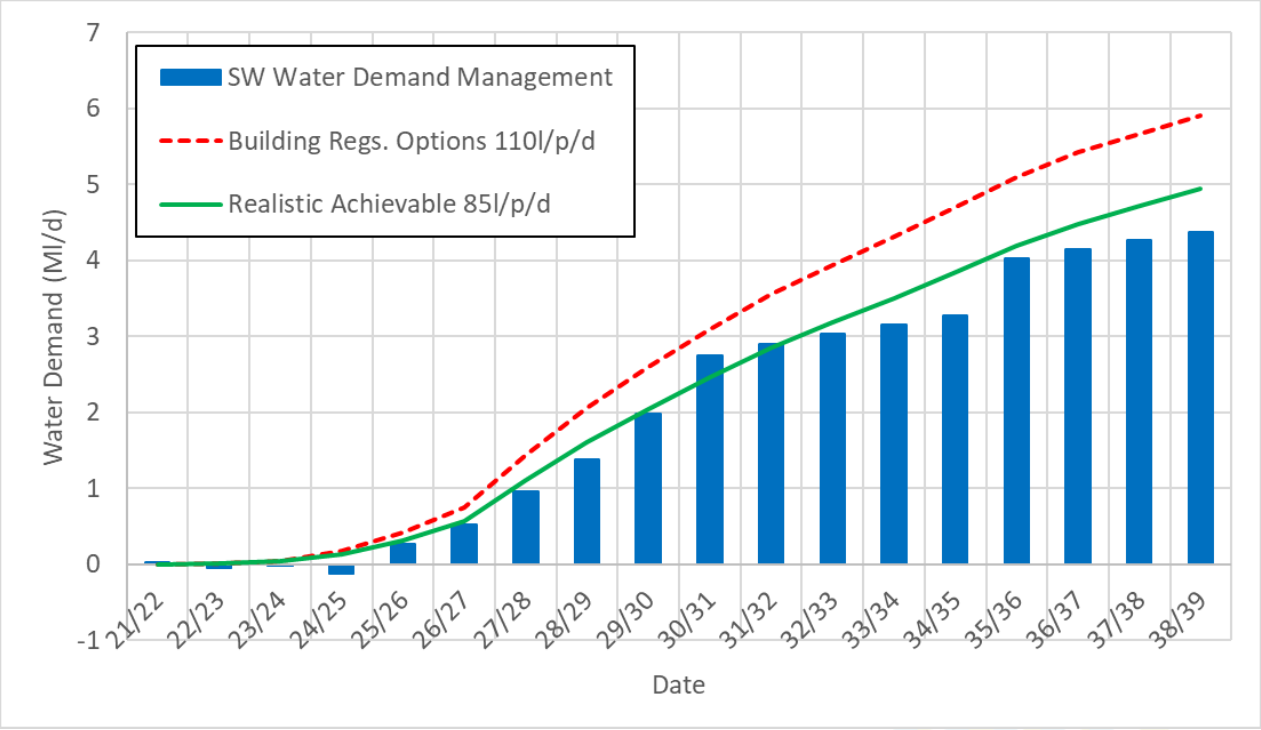
Where there is a gap between the lines and the bars, offsetting is required in order to make growth in that year water neutral, with the maximum gap being the total amount of offsetting required to make the plan water neutral overall.

It can therefore be seen that if the Optional Building Regulations target of 110l/p/d were maintained, a significant amount of offsetting would be required throughout the plan period.

If the more ambitious target of 85l/p/d were adopted this figure would be significantly reduced. This has implications for the Strategy both in the cost of delivering an offsetting scheme, and the available capacity for offsetting in Sussex North, which is not unlimited.

Offsetting must be in place before the water demand is generated, for instance before new houses are occupied. If it is not possible to provide sufficient offsetting, either because it cannot be delivered fast enough, or there is not enough available offsetting to meet demand, this will restrict the amount of growth that can go ahead.

If the 110l/p/d target were maintained, 6,345 new dwellings could be built in Sussex North up to 2030 whilst not increasing abstraction at Pulborough (after SW's contribution and before offsetting). This increases to 8,335 if the more ambitious target of 85l/p/d were adopted. Developers are able to build to this tighter target, and a decay factor has been included in the calculations within this Strategy as a precaution against water use increasing over time.



Offsetting measures

A number of potential offsetting measures were assessed while defining this Strategy. Where available, information on cost and expected impact was

obtained from vendors, or from published literature. Of these measures, four are particularly recommended as part of the Strategy:

- Flow restrictors – a device which is retrofitted to existing properties to reduce the volume of water used in the property. This device has been used in a trial by Crawley Homes in 2022, and in trials by Affinity Water elsewhere in the country.
- Water efficiency in schools – consisting of water audits, retrofitting water efficient devices, and where practical installing rainwater harvesting.
- Non-household rainwater harvesting (RwH) – commercial buildings offer a large potential for RwH due to their extensive roof areas. In a non-household setting, RwH can be used to meet the demand from toilet flushing, as well as other uses such as vehicle washing.
- Golf course irrigation –The British and International Golf Greenkeepers Association carried out a survey in 2019 and reported that just under 50% of golf facilities rely on mains potable water supply for irrigation. Assuming these figures are reflective of the golf courses within Sussex North, there is large potential for saving water if an alternative source of water for irrigation could be found. Other recreational uses such as sports grounds, swimming pools and leisure centres should also be investigated.

Analysis of these four options showed that the schools retrofit programme achieves lowest cost per litre, but it also has the lowest potential capacity for water demand savings. An offsetting scheme consisting of flow regulators has the theoretical potential to deliver all the offsetting required in Sussex North, and having gone through a trial with Crawley Homes, comes with a high level of certainty. However, whilst mathematically offsetting could be achieved using this measure alone, in practical terms, other measures may need to be utilised alongside these devices.

Pilot projects of water efficiency in schools, and non-household rainwater harvesting are recommended to be developed. Should these measures prove successful and deliverable, they can be applied alongside flow restrictors, potentially at lower cost.

This analysis assumes the target of 85l/p/d is adopted. If the 110l/p/d target is maintained, there would not be sufficient capacity from flow regulators, and schools retrofitting to provide sufficient offsetting to meet the increased water demand. An offsetting scheme would therefore need to rely on less certain options to deliver that offsetting, increasing the complexity and risk of an offsetting scheme.

Offsetting Scheme

The Strategy proposes an LPA-led offsetting scheme (referred to as "the Offsetting Scheme") which can provide sufficient certainty that the growth collectively identified in the respective Local Plans overall, alone and in

combination, will be water neutral. Individual or market-led schemes are outside of LPA control and may occur alongside the Strategy.

Water neutrality is required as long as there is potential for an adverse effect on the sensitive habitats in the Arun Valley. In practice this means it is required until Southern Water can provide an alternative water source to replace groundwater abstraction at Pulborough.

Once a long-term solution has been put in place by SW, a water neutrality scheme may no longer be required. For this reason, it is proposed that the Offsetting Scheme outlined in this Strategy runs to 2030, when it is reviewed. An extension to the Offsetting Scheme to cover a further period may then be required. In this way the Strategy can be shown to achieve water neutrality for the entirety of the Local Plan period, whilst not running an offsetting scheme longer than is required.

Water neutrality is required at the WRZ level, and therefore the LPA-led Offsetting Scheme should act across LPA boundaries, with offsetting costs and benefits shared. This will allow a more consistent approach and a more stable cost.

An LPA-led Offsetting Scheme will require an operating body that will administer it, collect funding, pay offset providers and monitor results. This body will need to work closely with SW to monitor their progress in reducing overall PCC in the WRZ, which will be a critical component in the Strategy. It will also be important to monitor the difference between actual water demand from new development and its designed water demand.

LPA monitoring of growth (both permissions and completions) on a monthly basis and reporting on a yearly basis will also be key to ensure sufficient offsetting is in place prior to occupation of development (i.e., when the additional water demand is experienced). Therefore, close communication with developers will be required.

When a developer submits a planning application, a water neutrality statement will need to be provided. This will identify the type of development, how much new water demand will be generated, the water efficient fittings and technologies to be applied, and details of any offsetting to be delivered by the developer or a third-party.

The developer will then pay a fee per litre of offsetting required (where offsets are provided via the LPAs' approved partners). This would be collected by the Offsetting Scheme and used to deliver the appropriate level of offsetting within the WRZ.

It is proposed that the total cost of delivering the required offsetting volume is spread across all development (required to be water neutral) opting into the Offsetting Scheme during the Local Plan period. This will significantly reduce the cost for individual developers, in particular smaller developers where the burden of offsetting on a smaller scheme would be greater. Developers will be

required to contribute to the offsetting programme throughout the period covered by the Offsetting Scheme.

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1 Introduction

1.1 Background

1. Southern Water supplies water to Horsham District, part of Crawley Borough, the northern part of Chichester District (and parts of the South Downs National Park within those Local Authorities) from its Sussex North Water Resource Zone (WRZ). Within this WRZ there are several water sources, one of which is a groundwater source near Pulborough.
2. Natural England (NE) has raised significant concerns regarding the current abstraction (and any increase in abstraction required to serve planned 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 supply and deterioration of habitat at designations including Amberley Wild Brooks Site of Special Scientific Interest (SSSI), Pulborough Brooks SSSI and Arun Valley Special Protection Area (SPA), Arun Valley Special Area of Conservation (SAC) and Arun Valley Ramsar site.
3. Investigations and discussions between Southern Water (SW), the Environment Agency (EA) and NE on the long-term sustainability of the Pulborough abstraction are ongoing, including a sustainability investigation to assess what level of ground and surface water abstractions are sustainable. In the meantime, NE has advised the Local Planning Authorities (LPAs) that development in the Sussex North WRZ must not add to this potential adverse effect. Water Neutrality (as defined in Section 1.2 below) is one way to allow development to proceed without increasing abstraction from Pulborough. This Strategy sets out the evidence on how this might be achieved.
4. The alternative approach would be to restrict growth to a level that has already been accounted for in SW's Water Resource Management Plan. This is significantly less than is currently being considered in the commissioning LPAs' emerging Local Plans.
5. Beyond this regulatory requirement for the LPAs to demonstrate water neutrality to fulfil their responsibilities under the Habitats Regulations, this is an opportunity, for the first time in the UK, to facilitate development at the Local Plan level which does not lead to increased water abstraction and its consequent pressures on the environment. In doing so there are some significant additional benefits in terms of reduced carbon emissions from treating, supplying, and heating water, as well as reduced water and energy bills for consumers.
6. To help the affected Local Authorities to progress their respective Local Plans, JBA Consulting has been commissioned to provide a water

neutrality assessment to calculate the individual and in-combination impacts of the development currently proposed on water demand within Sussex North WRZ, providing advice on specific measures required to support and achieve water neutrality. This study is divided into three parts:

Part A: Individual Local Authority Areas Assessment

7. Part A of this work introduced the concept of water neutrality and investigated the measures that may be possible to achieve it. It went on to examine at a high level the feasibility of achieving neutrality in Crawley Borough and Chichester District (acting individually). Horsham District Council (HDC) had previously commissioned a technical note on water neutrality as part of their Habitats Regulations Assessment (HRA) process and so did not take part in Part A. The contribution that could be theoretically possible from different measures (at this stage only the approximate order of magnitude impact of each measure was considered), both under control of the council and other stakeholders was presented. Part A was completed in June 2021.

Part B: In-combination Assessment

8. The Part B report combined the individual authority assessments (including HDC's earlier work) into a WRZ-wide assessment using the same methodology for assessment as Part A. Part B was completed in April 2022.

Part C: Determine Mitigation Strategy

9. The third part of this study (this document) builds on the analysis in Parts A and B and develops a draft strategy to achieve water neutrality. The purpose of the Strategy is to demonstrate that the Local Plan growth of the commissioning LPAs can be delivered in compliance with the Habitat Regulations (i.e., that the Local Plans will be water neutral). Important information from Parts A and B is restated, and calculations updated where appropriate to create a standalone document that can be read in isolation of the first two parts. It consists of:

    - a summary and further update of the growth accounted for in the study from each LPA in the water resource zone;
    - a recommendation for a new build water efficiency standard, including how this may be achieved and an indicative cost;
    - options for offsetting remaining water demand, including Southern Water's existing contribution, and indicative costs for each offsetting option(s); and
    - a draft strategy to achieve water neutrality will then be presented including recommendations for appropriate measures, how these may be funded, delivered, and monitored.

10. Further work will be required to implement the Strategy that is not included within this scope of work. This will include setting up the appropriate governance structure, conducting a procurement exercise to obtain accurate costings for implementing mitigation measures or offsetting, and development of the detailed processes and procedures for running and reporting a neutrality scheme. Until such a time as a strategy is agreed and implemented, development management applications will remain subject to the Natural England position statement.

1.2 Water neutrality background

11. In this study the simple definition of water neutrality set out below was adopted:

12. ***"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."***

13. 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.

14. Over the last decade, some Water Cycle Studies (WCSs) supporting Local Plans have included water neutrality assessments. However, to the best of our knowledge, this is the first case in the UK where LPAs need to demonstrate a deliverable strategy for achieving water neutrality, to demonstrate that the Local Plan will not have an adverse impact on designated sites. In this respect, the technical assessments outlined in Part A and Part B 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 theoretically be achieved. For a water neutrality strategy to meet the tests of certainty required by the Habitats Regulations in light of caselaw, the strategy will need to set out:

- a framework for the overall delivery and monitoring of the Strategy;

- which measure(s) will be applied (allowing some flexibility for innovation and technological and societal change over the lifetime of the Strategy);
- identification of which partner will lead the delivery of each measure, and to what timescales – linked to development delivery timetables;
- how measures will be secured and delivered;
- define how delivery of the Strategy will be financed; and
- identify how measures will go beyond or at a quicker pace than those already in Southern Water's business plan or associated strategic plans such as their water resource management plan or drought plan.

1.3 Key definitions

15. Two important terms will be used in this report that for clarity will be defined here.

16. The "Strategy" refers to this document and outlines how the Local Plans of the commissioning LPAs will be water neutral.

17. An "Offsetting Scheme" to reduce water demand in the wider WRZ is required as part of the Strategy. Within the period covered by the Strategy, a long-term solution may be implemented by SW. The Offsetting Scheme may therefore only need to be in place for part of the period covered by the Strategy.

1.4 Natural England Position Statement

18. On 14 September 2021 Natural England published a position statement (Natural England, 2021) defining an interim position for applications in the Sussex North WRZ. NE advised that:

19. "...this matter should be resolved in partnership through Local Plans across the affected authorities, where policy and assessment can be agreed and secured to ensure water use is offset for all new developments within Sussex North. To achieve this Natural England is working in partnership with the relevant authorities to secure water neutrality collectively through a water neutrality strategy.

20. Whilst this strategy is evolving, Natural England advises that decisions on planning applications should await its completion. However, if there are applications which a planning authority deems critical to proceed in the absence of the strategy, then Natural England advises that any application needs to demonstrate water neutrality."

21. Further clarification (Natural England, 2022) was provided in February 2022:

22. "For the avoidance of doubt, since the 2017 Regulations cannot be applied retrospectively, the requirement for Water Neutrality will not apply to any projects with full planning permission prior to the Natural England Statement being published on 14 September 2021, in addition this would equally apply to not requiring future developments to mitigate the impact of those developments already granted full permission at that point."

23. For this reason, only development that does not yet have full planning consent, or has been granted full consent after 14 September 2021, will be considered in this study. This development must demonstrate water neutrality, which is required to ensure that planned growth comes forward in compliance with the Habitats Regulations.

1.5 Geographic extent

24. Any development within the Sussex North WRZ must be water neutral for the whole of the period covered by the water neutrality Strategy. Southern Water (SW) have confirmed the area affected which is shown in Figure 1.1.

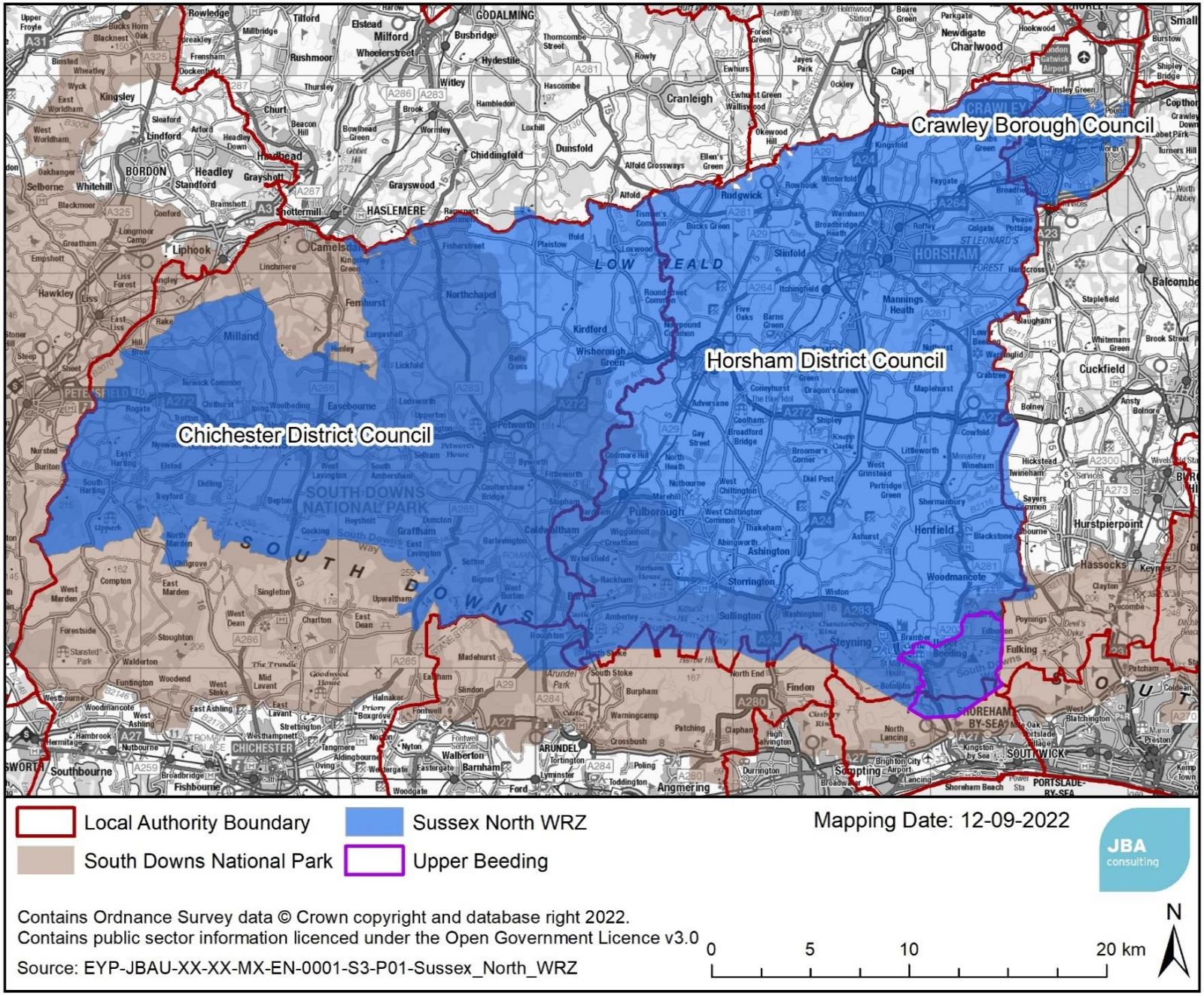

Figure 1.1 Sussex North Water Resource Zone

25. The definitive map of the zone is produced by Southern Water, who will periodically review and reissue this map if any changes occur as a result of future rezoning. The official map will be published by the LPAs at a scale sufficient to identify whether an individual development site is within or outside of the zone.

26. The area around Upper Beeding in the south east of the WRZ, does not usually receive its water from the Pulborough abstractions, instead having its own supply. However, there is still a connection to Pulborough, and so development in this area could contribute to an increased water demand in the water resource zone and therefore must be water neutral.

27. Measures to offset water demand can be applied anywhere in the WRZ except the area around Upper Beeding as in normal conditions these measures will not reduce water demand in the wider WRZ.

1.6 Timeframe of the water neutrality Strategy

28. Water neutrality is required as long as there is potential for an adverse effect on the sensitive habitats in the Arun Valley. In practice this means it is required until Southern Water can provide an alternative water source to replace groundwater abstraction at Pulborough. Time is required to allow SW to identify, design, obtain funding and construct an alternative source through their business plan and Water Resource Management Plan (WRMP) and business planning processes. It is therefore unlikely that a new source could be available before 2030. This strategy will therefore take the approach that neutrality will be required throughout the time frame covered by the Local Plans of CBC, CDC and HDC; a period up until 2038/2039. This will be referred to in the rest of the report as the "Local Plan period".

29. Once a long-term solution has been put in place by SW, a water neutrality scheme may no longer be required. For this reason, it is proposed that the Offsetting Scheme outlined in this Strategy runs to 2030, when it is reviewed. An extension to the Offsetting Scheme to cover a further period may then be required. In this way the Strategy can be shown to achieve water neutrality for the entirety of the Local Plan period, whilst not running an offsetting scheme longer than is required. This may need to be addressed through future Local Plan reviews as appropriate.

30. The application of offsetting measures should be demonstrated to be in place ahead of demand throughout this period. In practice this will require continuous monitoring of the delivery of development, water demand, and offsetting measures, along with annual reporting against this Strategy.

1.7 Stakeholder engagement during the preparation of this Strategy

31. The development of this Strategy evolved over a period of intense engagement between the key stakeholders, including:

- a two-day workshop in March 2022 including all councils, SW, EA, NE, Home Builders Federation (HBF), Land Promoters and Developers Federation (LPDF);
- Executive group meetings;
- Steering group meetings;
- meetings with SW, Department for Levelling Up, Housing and Communities (DLUHC), Defra, South East Water (SEW), NE and EA;
- a market-engagement exercise including an online questionnaire, and structured interviews with potential offset measure suppliers;
- an engagement exercise with developers to discuss the cost of different water efficiency targets;
- input from an early pilot study with Crawley Homes; and
- feedback on the draft Strategy from Waterwise.

2 Outline Strategy

2.1 Objective

33. This chapter will outline a strategy to achieve water neutrality including how water efficiency targets may be used to reduce demand, and how the remaining new demand may be offset.

34. The LPAs within the Sussex North WRZ collectively propose growth of nearly 20,000 houses supported by additional school places and employment land as part of their emerging local plans. This comes at a time when the South East of England is under considerable water stress, and it cannot be concluded with certainty that the existing water abstraction in the WRZ is not causing environmental damage.

35. A water neutrality strategy is therefore required to deliver the planned development set out in local plans while avoiding adverse impacts on designated sites. It must provide the appropriate certainty that the predicted growth in the local plans can be water neutral and outline a route to achieve this.

36. Whilst the focus of this Strategy is Local Plan growth, development that comes forward outside of the Local Plan will still have to achieve water neutrality. This Strategy has not made allowance, within the Offsetting Scheme, for development outside of that identified in emerging Local Plans. Instead of utilising the Offsetting Scheme to show water neutrality, applicants for such development will probably need to demonstrate water neutrality by different means.

37. Whilst water neutrality has been considered for individual developments before, this is the first time in the UK that a strategy has been applied to an entire Local Plan(s) or at the water resource zone scale. Therefore, there is no template to follow, and although there are similarities with the issue of nutrient neutrality from a regulatory perspective, there is no established offsetting scheme and the route to establishing water neutrality is significantly different.

38. The alternative to achieving water neutrality is no development or significantly reduced development, and whilst the Strategy may result in a cost to developers, (all Local Plans are subject to viability assessments and so this will be considered when setting the other policy expectations), the Strategy seeks to find the balance between increased build costs and realistic potential offsetting schemes.

39. It should be remembered that water neutrality is not sufficient in itself to meet environmental obligations to restore the environment. It is preventing further damage to the system whilst the long-term solution is implemented.

2.2 New build standards

40. The first step to achieve water neutrality is to reduce demand as far as practicable. This can be done by new build housing, employment and schools being built to higher standards of water efficiency. For residential properties, this would mean going further than current building regulations (which contain an optional standard of 110 l/p/d), and for new non-household development this would mean achieving a score of three credits within the water (Wat 01 Water Consumption) issue category for BREEAM New Construction Standard (BRE, 2018), achieving 40% reduction compared to baseline standards.

41. Building to tighter water efficiency standards will reduce the work required to offset the remaining demand, but it does come at an additional financial cost. This cost must be balanced with the cost of offsetting, as well as the certainty of delivering the desired impact overall. Less stringent water efficiency standards for new development would commensurately increase the need for offsetting elsewhere. Therefore, the potential to achieve greater water efficiency in new build, and the scope to offset the water demand impacts from development, is a delicate balance that also needs to be considered.

42. Proposals to achieve tighter water efficiency standards are presented in Section 4.3.

2.3 Offsetting

43. The remaining demand once tighter water efficiency standards have been applied, must be offset by reducing water demand elsewhere in the WRZ. This could include measures such as household and non-household visits, flow restrictors, retrofitting of rainwater harvesting (RwH) or greywater recycling (GwR) systems, extending the coverage of water metering and leakage reduction. The potential for, feasibility and costs of such interventions as well as the level of certainty are considered in detail in Section 5.

44. The delivery of offsetting measures could take several forms, including:

- individual developers arranging their own offsets;
- market-led schemes; and
- Local Authority-led scheme(s).

45. Each of these has pros and cons, and there may be room for all three to be used in the WRZ. Whatever the mechanism for the delivery of offsetting measures, processes will be required to enable the LPAs, as the Competent Authorities (the public body responsible for decision making), to scrutinise and approve the offsetting measures. This Strategy focuses on an LPA administered scheme, hereafter referred to as the "Offsetting Scheme" which can provide sufficient certainty that

the growth collectively identified in the respective Local Plans overall, alone and in combination, will be water neutral. Individual or market-led schemes are outside of LPA control but may occur alongside the Strategy.

46. Water neutrality is required at the WRZ level, and therefore the LPA-led Offsetting Scheme should act across LPA boundaries, with offsetting costs and benefits shared. This will allow a more consistent approach and a more stable cost.

47. A scheme based on individual LPAs acting alone is likely to increase the overall cost by having multiple administration and procurement costs as well as reducing the potential for economies of scale. SW's targets for reducing household per capita consumption (PCC) are at the WRZ level and not based on LPA boundaries, and so further analysis of the WRMP data by SW would be required to allocate their benefit between LPAs.

2.4 Operation of the Offsetting Scheme

48. An LPA-led Offsetting Scheme will require an operating body that will administer it, collect funding, pay offset providers and monitor results. This body will need to work closely with SW to monitor their progress in reducing overall PCC in the WRZ, which will be a critical component in the Offsetting Scheme. LPA monitoring of growth (both permissions and completions) on a monthly basis and reporting on a yearly basis will also be key to ensure sufficient offsetting is in place prior to occupation of development. Therefore, close communication with developers will be required.

49. When a developer submits a planning application, a water neutrality statement will need to be provided. This will identify the type of development, how much new water demand will be generated, the water efficient fittings and technologies to be applied, and details of any offsetting to be delivered by the developer or a third-party. The developer will then pay a fee based on their design daily consumption (l/d) (where offsets are provided via the LPAs' approved partners). This would be collected by the Offsetting Scheme and used to deliver the appropriate level of offsetting within the WRZ.

50. The actual offsetting delivered through an LPA-led Offsetting Scheme is likely to be from a range of options which may vary in type, quantity and availability from year to year and could be applied anywhere within the WRZ. Individual developments are therefore not linked to the success of individual offsetting projects, rather the cost and benefits of each project are pooled to reduce the risk and provide a consistent cost across all developments and from year to year.

51. The central body administering the Offsetting Scheme will need to monitor the effectiveness of offsetting projects delivered to ensure that

sufficient water savings had been made to allow development to proceed and set an appropriate and fair cost of offsetting. It will also be important to monitor the difference between actual water use in new developments and the design water use. Both of these could require the amount of offsetting to be adapted through the Offsetting Scheme.

52. Monitoring will also be required for development outside an LPA-led Offsetting Scheme, and offsetting must be in place prior to occupation.

53. Should insufficient offsetting be available in a given year (as a sum of the contribution from the Scheme and from SW's water demand reduction activities) it may be necessary to restrict growth in the following year by way of Grampian Conditions in order to maintain neutrality. This is more likely to occur if the Building Regulations Optional target of 110l/p/d is maintained as the amount of offsetting required is greater. Essential infrastructure such as schools, fire stations etc, should be protected in the Strategy to ensure that sufficient offsetting is available for them to proceed.

54. The objective of the Strategy is to enable the Local Plans to proceed towards adoption. Priority of access to offsetting delivered through the LPA-led Offsetting Scheme should therefore be given to sites allocated in Local Plans and/or identified in the associated, published Local Plan housing trajectories (for example an allowance for Windfall). Speculative development, that may not be compliant with the Local Plan (to be defined individually by the LPAs) would not be prioritised in the Strategy.

55. Should more offsetting be delivered than is required for the following year, the benefit can be carried over into subsequent years.

3 Water demand forecast

3.1 Objectives

56. This section provides an estimate of the increase in water demand in the Sussex North WRZ as a result of development set out in the LPAs' Local Plans to 2038/39. This updated information supersedes estimates presented in the Part A and Part B reports. This is the best information available at the point of finalising the Strategy and can be relied upon for setting the overarching, strategic approach to water neutrality in order to meet the requirements of the Habitats Regulations for the Local Plans. These estimates are subject to change as a result of the further development of the Local Plans as they approach and go through examination, and the trajectory of growth is susceptible to significant variability as a result of economic factors.

57. This Strategy seeks to be sufficiently flexible (through regular reviews of growth forecasts and offsetting delivered) to remain a robust basis on which to proceed.

58. Moving from the Strategy into the implementation and operation phases of the Offsetting Scheme, it is anticipated that this forecast will need to be monitored monthly and reported annually, as part of the implementation and monitoring of the Water Neutrality Strategy, in order to ensure that the demand side of the water neutrality calculation is based on up-to-date information. A delay to implementation could result in a delay to growth in the early part of the Local Plan period, it would not result in that growth falling out of scope of the Strategy.

59. Two water efficiency scenarios will be presented in this Strategy, a business-as-usual approach where the Optional Building Regulations Target of 110 l/p/d will be adopted, and what was referred to as the "Realistic Achievable" scenario presented in Parts A and B of 85l/p/d with an accompanying reduction in non-household consumption based on using the BRE BREEAM New Construction standard (defined below).

60. The calculations in this report assume all the water demand generated from a development site is additional (new) water demand. This may not be the case if there is a change of use, and net increase in water use should be used to calculate the actual water demand to offset on a water neutrality statement.

3.2 Growth assumptions

3.2.1 Overview

61. All LPAs in the Sussex North WRZ provided updated forecasts for growth during their respective Local Plan periods. Where possible, a predicted trajectory was included, and where detailed information was not available (in the case of CDC, and for the employment forecasts),

growth was divided equally across the plan period allowing a yearly estimate of growth to be made.

62. Part of the Sussex North WRZ (Crawley North Phase 1 and 2) has been re-zoned to SES Water meaning that area will no longer receive its water from the Pulborough abstractions. This area has therefore been removed from the forecast presented in Parts A and B.

63. The growth figures in this Strategy are a snapshot in time, based on the best available information, and as the Strategy is implemented, are likely to change. Monitoring reports should be used to obtain the latest figures after implementation.

3.2.2 Housing

64. Predicted housing growth within the Sussex North WRZ during the Local Plan period is presented in Table 3.1. This is made up of Local Plan allocations and an allowance for windfall. Additional housing that already has full extant planning permission will be delivered during the plan period, but this growth represents an existing commitment and so does not need to be water neutral. This is not included in water demand requiring offsetting but is factored into the Southern Water contribution as baseline demand.

Table 3.1 Planned housing growth by Local Authority

LPA	Number of houses within Local Plan period (without full planning permission)
CBC	3,960
CDC	1,796
HDC	12,800
SDNPA	1,244
Total	**19,800**

3.2.3 Non-household growth

65. Predicted employment growth during the Local Plan period is presented in Table 3.2.

Table 3.2 Predicted employment growth by LPA

LPA	Indicative number of employees (net full time equivalent jobs increase)
CBC	5,780
CDC	None identified in Sussex North
HDC	4,590
SDNPA	345
Total	**10,715**

66. A PCC of 50l/p/d for each employee is used in this Strategy for non-household growth in order to estimate a water demand.

67. Where a more ambitious household PCC is being applied, this report assumes that a more ambitious non-household target is also applied via the BREEAM New Construction standard (which awards 3 credits under the measure 'Wat01' for a 40% improvement in water consumption compared to the baseline for that type of building). In the "realistic achievable" scenario, a 40% reduction in demand is therefore applied - a PCC of 30 l/p/d.

68. Further information on deriving a non-household PCC can be found in Appendix B.

69. This Part C Report has taken account of employment growth numbers set out in the emerging Crawley Local Plan. It is anticipated that much of Crawley's employment growth will come forward at a single site that is proposed to be allocated through the draft Local Plan, referred to as Gatwick Green. The Gatwick Green site is situated outside of the Sussex North Water Resource Zone, so would not be subject to water neutrality. However, given the draft status of the Local Plan, the proposed allocation has not yet been subject to examination or confirmed within an adopted Local Plan. Therefore, a precautionary approach has been applied in this report, with Crawley's planned employment growth included within the calculations as being subject to water neutrality (averaged out over the Plan period) to account for a scenario where Gatwick Green does not come forward.

70. Whilst there is an element of capacity in the Strategy that would potentially enable small-scale non-business commercial or community led applications to access the offsetting scheme, such uses are not explicitly planned in Local Plans and would represent a form of windfall development. It will be for the Offsetting Scheme to establish if/how such development will be able to access these offsets, and how these might be prioritised in relation to Local Plan allocations.

71. Growth in household population is expected to lead to an increase in the number of school places required, with a resulting increase in water demand, either from new schools, or from an increase in the number of pupils at existing schools. West Sussex County Council (WSCC) provided an estimate of the number of new school places required during the plan period to inform this study.

72. WSCC also collated data from water meters for maintained schools in the county (not including academies) to calculate an average water use for different types of schools. The three years before the Covid-19 pandemic (April 2017 to March 2020) were chosen to provide the most up to date and realistic figures. The results of this assessment are shown in Table 3.3.

Table 3.3 Average water use for different school types (WSCC)

Education facility	Average water use for facility (litres /pupil/day)
Nursery	49
Primary	14
Secondary & Sixth Form	10
Special Educational Needs School	37

73. The average water use, and estimated number of new school places were used to calculate a water demand from new school places in Sussex North. This was found to be 0.18Ml/d by the end of the water neutrality Strategy period.

3.3 Water-use in construction

74. Water is used in construction projects for cement mixing, dust suppression, and vehicle washing amongst others. Development will therefore lead to a temporary increase in water demand while construction is underway. However, growth forecasts provided by the LPAs are not significantly higher than in recent history, and so are unlikely to result in a significant increase in water demand. Construction water is therefore considered to be included in the background water demand forecast for the WRZ, no additional construction water use will be factored into the growth forecast. This approach has been confirmed by NE.

3.4 Summary

75. The predicted additional water demand from growth outlined in the Local Plans (including an allowance for windfall) at the end of the Local Plan period (2038/39) is summarised in Table 3.4.

Table 3.4 Additional water demand generated by the end ofthe Local Plan period (2021 to 2038/39)

Water efficiency target	BUILDING REGS. OPTIONAL (110l/p/d) (Ml/d)	REALISTIC ACHIEVABLE (85l/p/d) (Ml/d)
Total water demand	5.916	4.943

4 Reducing water demand

4.1 Overview

76. This section outlines how water demand in new build housing and non-household development can be minimised through a tighter water efficiency standard and presents indicative costs and methods for achieving that standard.

77. To achieve water neutrality, water demand should first be reduced as low as practicable, before the remaining demand is offset in the wider area, in this case the water resource zone. This can be done by requiring a more ambitious water efficiency standard in new build households and in new build non-household development.

78. Crawley Borough, Horsham District, and the South Downs National Park Authority already have an adopted Local Plan policy requiring the Building Regulation Optional Standard of 110 litres per person per day (l/p/d). These are respectively found in the Crawley Local Plan 2030, Policy ENV9 (December 2015), the Horsham District Planning Framework, Policy 37 (November 2015), and the South Downs Local Plan, SD48 (July 2019). Chichester Local Plan, Policy 40 (July 2015) requires the developer to demonstrate consideration has been given to the achievement of a minimum of 110 l/p/d. These have each been found sound at previous examinations, reflecting that this is an area of serious water stress. There is now a need to achieve water neutrality, so water efficiency needs to go beyond this existing approach.

79. Achieving a higher standard is likely to come at a cost, and this should be considered alongside the cost of offsetting the remaining water demand, and the available capacity.

80. Part B presented some indicative costs of offsetting housing under different efficiency scenarios. As will be explained in Section 5.2, the offsetting options that these costs were based on are no longer available. Those costs also assumed that there was sufficient offsetting potential to accommodate a less stringent standard.

4.2 Definition of a water efficiency standard

81. Building to a standard beyond the building regulations optional standard of 110 l/p/d can be achieved through a number of methods.

82. Water efficient fittings such as low flow showers, tap aerators, etc. could be used to restrict the volume of water used in a house while showering or washing etc. A flow restrictor can be used which reduces the flow to a property and can be installed on the customer side of the water meter. Water demand (on the network) can also be reduced by using rainwater harvesting or greywater recycling.

83. This Strategy proposes that all new build housing be built to a water efficiency standard of 85 l/p/d evidenced through the Building Regulations Part G calculator (UK Government, 2016).

84. Non-household development should achieve a score of three credits within the water (Wat 01 Water Consumption) issue category for BREEAM New Construction Standard (BRE, 2018), achieving 40% reduction compared to baseline standards. For the purpose of this Strategy, this means a 40% reduction on the non-household per capita consumption figure used in the water demand calculations (outlined in Appendix B).

85. This approach is supported by research conducted on behalf of Ofwat (Artesia Consulting, 2018) and the Energy Saving Trust (Energy Saving Trust, 2020) which is discussed in detail in Appendix C.

86. If the 110l/p/d target were maintained, 6,345 new dwellings could be built in Sussex North up to 2030 whilst not increasing abstraction at Pulborough (after SW's contribution and before offsetting). This increases to 8,335 if the more ambitious target of 85l/p/d were adopted.

87. Monitoring of the actual water use compared with the designed water use from new development will be required, and the amount of offsetting may need to be adapted accordingly through the Offsetting Scheme.

4.3 Cost of achieving tighter standards

4.3.1 Overview

88. Building to a standard of 85 l/p/d will cost more than building to a standard of 110 l/p/d. The additional cost of meeting a tighter standard is an important part of the LPAs' Local Plan viability assessment work. However, available cost information is limited, and in some cases quite dated. To define a cost of achieving the more stringent water efficiency targets required to achieve neutrality, the following sources of information have been used:

- Housing Standards Review – Cost Impacts, (UK Government, 2014);
- Independent review of the costs and benefits of rainwater harvesting and grey water recycling options in the UK, (Waterwise, 2020);
- Independent review of the costs and benefits of water labelling options in the UK – Extension Project, (Energy Saving Trust, 2019);

- Evidence to Support 100 l/p/d in areas of water neutrality (Defra, 2022); and
- a developer engagement exercise undertaken in spring 2022 involving the Home Builders Federation, the Land Promoters and Developers Federation and Homes England (Appendix D.3).

89. Costs from historic studies were updated to a 2021 baseline using the Bank of England inflation calculator (Bank of England, 2022).

4.3.2 Definition of cost for meeting 85l/p/d

90. Residential properties currently built within Sussex North (and with full extant planning permission) are likely to be built to a standard of 110l/p/d due to existing planning policies.

91. Engagement with developers, and information from Defra has indicated that a target of 100l/p/d is favoured by some developers and could be achieved with "minimal additional cost". However, a target of 100l/p/d would make minimal contribution to achieving water neutrality, and as will be described in a subsequent section, the opportunities for offsetting in Sussex North are limited. If a standard of 100 l/p/d or stricter were adopted, there may not be sufficient offsetting capacity to achieve water neutrality to meet the anticipated development levels required by the draft Local Plans in order to meet the standard method. This is regardless of the relative cost of offsetting vs new build demand reduction.

92. An engagement exercise (outlined in Appendix D.3) was carried out with developers to obtain indicative costs of building to a target of 85l/p/d from a baseline of 110l/p/d. Limited responses were received, however the information that was received outlined two different approaches to achieving 85l/p/d.

93. A fittings-based approach would cost between £349 and £431 per dwelling. Where appliances are not part of the standard fit-out this cost range would increase to £1,049 to £1,531.

94. An approach using greywater recycling would result in a cost of between £4,000 and £4,340 per dwelling.

95. For the purposes of viability testing, the upper figures of the range for the fittings-based approach should be used (£431 per dwelling if appliances are included, and £1,531 if they are not).

96. Achieving 85 l/p/d is possible with a fittings-based approach. However, feedback from housebuilders has identified a risk that the consumer experience may lead to those fittings being replaced early with less water efficient goods, and the benefit being lost. More certainty in achieving 85l/p/d could be gained by requiring GwR on all housing. However, this would increase the cost significantly.

97. To account for the risk of water efficient fittings being replaced with less water efficient fittings, a decay rate was factored into the calculations. This was based on a Defra report (Defra, 2021) stating the half-life of water efficiency savings (following a household water efficiency visit performed by a water company) was 8.4 years. This was factored into the calculations by modelling an increase in the PCC of new build houses over time between 85l/p/d and 110l/p/d using the 8.4-year half-life. This is likely to be an over-estimate of the decay rate as some development such as Council housing will be less likely to see water efficient fittings removed.

98. As shown in Table 4.1 below, meeting a standard of 85l/p/d for new development proposed across the Sussex North LPAs would result in a total additional water demand of 4.94Ml/d by the end of the Local Plan period. This is significantly less than the water demand should the baseline 110l/p/d level be maintained (5.92Ml/d).

99. This approach seeks to strike a balance, recognising some of the concerns of developers so as to not disproportionately increase the cost of new housing, whilst recognising that offsetting options in Sussex North are limited meaning that it is necessary to go significantly further than the water efficiency standard set out in current building regulations. This still leaves a significant amount to offset, which is discussed in the subsequent chapter. Should offsetting opportunities be insufficient to meet the overall requirement, or to meet demand in the initial years of the Plan period, then discussions will be needed in relation to quantum and/or timing and phasing of development delivery and/or additional or increased offsetting measures. This is much more likely if the 110l/p/d target is maintained.

100. Monitoring of the houses built during the first five years of the Strategy is recommended to assess the actual water use, and any changes over time. A future standard could then be modified based on the requirement at the time.

101. Setting a tighter standard for water efficiency does not guarantee that the eventual water-use in a development will be as expected, or that it will stay at the designed figure. Ensuring the defined target for water efficiency is met will also require an element of behaviour change. A targeted programme to raise awareness of why water saving is needed, and the correct use and maintenance of the fittings and fixtures installed is therefore required.

102. Information on the water-efficient fixtures and fittings installed in a new build residential property could be provided as part of the homeowner's pack provided by the developer.

103. More general advice on water saving behaviour could be provided by Southern Water, in collaboration with the LPAs and with input from Waterwise where appropriate.

Table 4.1 Additional water demand generated by the end of the Local Plan period (2021/22 to 2038/39) in different efficiency scenarios

Scenario	Total (Ml/d)
BUILDING REGS. OPTIONAL (110l/p/d)	**5.916**
REALISTIC ACHIEVABLE (85l/p/d)	**4.943**

5 Offsetting additional demand

5.1 Introduction

104. Whatever water efficiency standard is applied for new build, a commensurate amount of offsetting will be needed if water neutrality is to be achieved. This section sets out how the remaining water demand can be offset in the WRZ. Southern Water's contribution to demand management, and the amount of growth accounted for in their Water Resource Management Plan (WRMP) will be discussed, and options identified in Parts A and B will be summarised before the offsetting methods proposed in the Strategy are presented.

5.2 Southern Water contribution

5.2.1 Summary of Southern Water measures

105. The Strategy makes allowance for the demand management measures already targeted by SW as part of their current WRMP. This will effectively offset part, but not all, of the growth proposed within the emerging Local Plans. This is quantified in the section below.

106. Water companies must produce a WRMP which defines how they will maintain a balance of water supply to water demand. Part of the current SW WRMP (WRMP19) is a strategy to reduce water demand on the network through a reduction in household per capita consumption and also a reduction in leakage. The targets for both these are published in their Water Resources Market Information tables (Southern Water, 2020) (Updated 29 July 2020). When the current WRMP was written, available growth forecasts from the LPAs in the WRZ, based on growth figures from adopted Local Plans at that time, were used to provide an estimate for the additional water demand.

107. Growth assumptions will be reviewed by SW in the course of developing their next WRMP (WRMP24). The Strategy will need to be reviewed once this is published in 2024/25.

108. The LPAs are in the process of reviewing their respective Local Plans for the next 15-year period. The growth assumed in the current WRMP is a lower level of growth than is set by the Government's standard housing methodology and being considered by the commissioning LPAs. However, due to overlapping plan periods, not all development set out in the adopted Local Plans has yet come forward and will continue to form part of anticipated growth within the WRZ. This means that some of the growth currently proposed in the emerging Local Plans has already been accounted for in SW's current WRMP.

109. Assuming an overall supply-demand balance is maintained through re-zoning and strategic transfers, the demand reduction activities already

planned by SW to account for development in the WRZ will effectively offset a large proportion of growth in the Local Plan period.

110. All of the calculations in this report have assumed that a positive supply-demand balance is maintained throughout the Local Plan period by SW (i.e., demand does not exceed available supply).

111. The WRMP contains a number of measures identified by SW to reduce water demand in the Sussex North WRZ. These include a programme of work to reduce leakage on the SW network, and activities aimed at reducing household demand through improvements in water efficiency, leading to a reduction in per capita consumption.

112. The WRMP sets out that the total contribution from leakage reduction through the Local Plan period (to 2038/39) is predicted to be 3.71Ml/d by 2038/39, and the contribution from household demand reduction is predicted to be 2.28Ml/d, a total of 5.99Ml/d.

113. Southern Water must demonstrate that it is minimising the use of the Pulborough Abstraction and they are using their WRMP and Drought Plan demand management commitments to mitigate the impacts of their existing abstraction before growth. The Strategy assumes that the demand reduction activities outlined above (in paragraph 112) are not required to fulfil SW's obligations under the Habitats Regulations to reduce and mitigate the current abstraction at Pulborough.

5.2.2 Uncertainty in Southern Water figures

114. Although Southern Water are committed to their programme of water demand reduction through their current WRMP, there is a risk that the targeted reductions in per capita consumption published in their Water Resources Market Information tables (July 2020) may not be met. This could occur for several reasons, a recent example being Covid-19 causing a delay to the household visit programme. Drought and prolonged dry weather are also factors that have contributed to increased water demand.

115. Given the uncertainties as a result of external factors such as Covid-19 and the 2022 drought, a 10% safety margin has been incorporated into the calculations dealing with SW's demand management measures. The contribution from SW including the safety margin is therefore 5.39Ml/d by 2038/39. The year-by-year breakdown of SW's targets for water demand reduction can be found in Appendix E.

116. All the calculations in this report rely on SW delivering their published WRMP targets within this 10% margin. If SW is unable to achieve demand reduction within this margin, this could mean that a lower proportion of Local Plan growth is effectively offset by SW's activities, and additional offsetting will be required as part of the Local Planning Authority water neutrality Scheme. This could have an impact on the

delivery and phasing of housing, and / or increase the cost of an offsetting programme.

5.2.3 Sites with extant planning permission

117. Development that already had planning permission on the date of the Natural England advice being issued (September 2021) does not have to be water neutral. However, it will still contribute to water demand in Sussex North, and forms part of the growth factored into SW's WRMP.

118. Therefore, the available contribution from SW to achieve neutrality first needs to account for sites with extant planning before any remaining contribution can be used to offset Local Plan growth.

119. For example, by 2023, SW have planned for 0.65Ml/d of water demand reduction (including the 10% margin). However, new water demand from the expected housing completions (sites with full planning permission issued in or prior to September 2021) would produce a water demand of 0.75Ml/d. Until SW's WRMP demand reduction activities have accounted for this committed growth, no further contribution from SW would be available to account for Local Plan growth. This point, where SW demand reduction has caught up with committed growth, is likely to occur in 2025.

120. On this basis, any growth coming forward beyond committed growth (with full planning permission issued on or prior to September 2021) would not be able to take account of water demand reduction by SW until 2025 at the earliest, and additional offsetting would be required.

121. Since an Offsetting Scheme is unlikely to be able to deliver significant offsetting in 2023 (as it will still be in the process of being set up), the amount of growth that could be accommodated in 2023 is limited until SW interventions have caught up with committed growth.

5.2.4 Remaining demand to offset

122. The purpose of the Strategy is to demonstrate that the Local Plan growth of the commissioning LPAs can be delivered in compliance with the Habitats Regulations (i.e., that Local Plans will be water neutral). The graph in Figure 5.1 and the accompanying tables in Appendix A provide a yearly estimate of the predicted new water demand from growth, the demand reduction contribution from SW, and the remaining demand that must be offset.

123. The graph shows the predicted water demand if the Optional Building Regulations target of 110l/p/d were adopted (the top dotted line), and if a target of 85l/p/d were adopted (the bottom solid line).

124. The bars represent the contribution from SW's water demand reduction activities that are factored into their current WRMP (including the 10%

margin) after sites with extant planning permission on or before September 2021 have been taken into account.

125. There is no contribution available for Local Plan growth from SW up to 2025 (due to the existing demand from sites with full planning permission as of September 2021). After this date, a significant proportion of the new water demand from Local Plan growth would be accounted for in SW's WRMP demand reduction activities.

126. The maximum deficit between demand and SW's contribution and when that is predicted to occur is shown in Table 5.1. These represent the total amount of water that would need to be offset under each water efficiency scenario.

127. It can be seen that whilst the difference in the two water efficiency scenarios does not appear large in 2030, it has grown significantly by 2039. This has implications for the capacity of an offsetting scheme, which may not be able provide sufficient offsets if a scheme is needed beyond 2030.

Table 5.1 Maximum deficits in water demand

Water efficiency scenario	Maximum deficit up to 2029/30 (Ml/d)	Maximum deficit up to 2038/39 (Ml/d)
85 l/p/d	0.25 (in 2024/25)	0.57 (in 2038/39)
110l/p/d	0.67 (in 2028/29)	1.54 (in 2038/39)

128. It may be necessary to plan more offsetting than this to account for the risk of under delivery in the Offsetting Scheme.

129. These tables are based on growth forecasts provided by the commissioning LPAs in September 2022. These figures are expected to change as the actual planning applications are made, and the SW WRMP24 evolves.

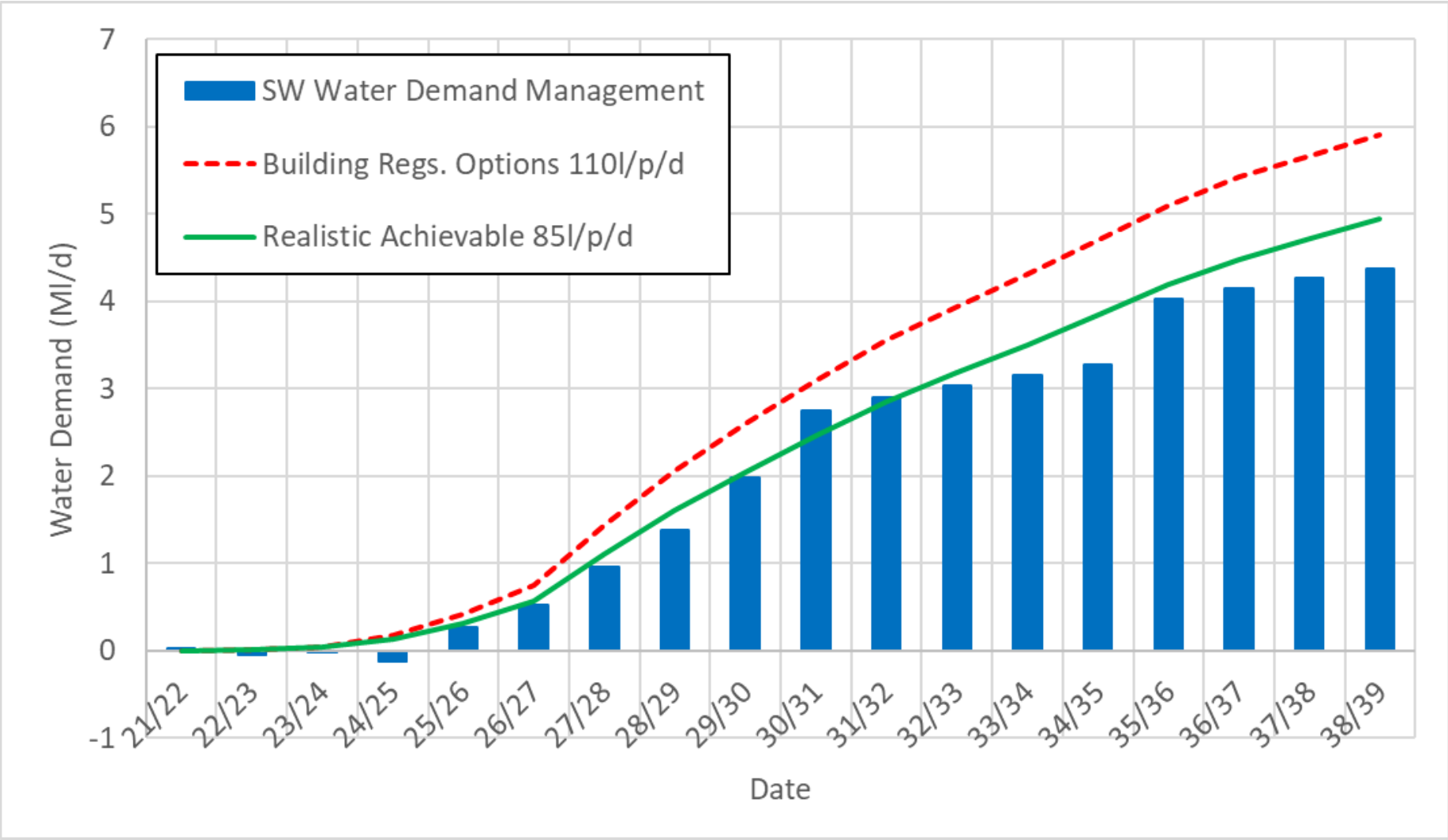

Figure 5.1 Balance of new demand vs SW's contribution from water demand management

5.3 Offsetting measures

5.3.1 Introduction

130. The Part B report identified measures that had the potential to be included in a strategic offsetting scheme. As part of their WRMP, SW have plans to reduce per capita consumption and are using many of the measures previously identified to do this. There is a limited capacity in each of these measures, and so SW's activities (acknowledging that they are making positive contribution to the WRZ), restrict the ability to deliver further offsetting using these measures. It is also important that the benefit from these measures is not double counted if a measure SW are already applying is used in an offsetting strategy.

131. SW have confirmed that in order to ensure separation between the Water Neutrality Strategy, and their own WRMP activities, non-household demand reduction will only be undertaken outside Sussex North to avoid double counting of benefits.

132. Table 5.2 below summarises the measures discussed in Part B, and whether they can be considered further in this strategy. Further information about each of the measures can be found in Appendix F.

Table 5.2 Summary of offsetting measures

Measure	Included in Strategy	Comments
Flow regulators	Yes	See Section 5.3.2
Schools programme	Yes	See Section 5.3.3
Retrofit Rainwater harvesting – non-household	Yes	See Section 5.3.4
Golf course irrigation	Yes - but unquantifiable at present	See Section 5.3.5
Non-household visits	Yes – but unquantifiable at present	SW have confirmed they will not be undertaking non-household activities within Sussex North as part of the WRMP (focusing on other WRZs). A non-household water efficiency programme can therefore be delivered in Sussex North. Many of the non-household opportunities rely upon the Scheme having access to data on existing

Measure	Included in Strategy	Comments
		water usage by non-household customers, data which is held by the retail suppliers. Successful implementation of these opportunities would therefore rely upon significant collaboration from the retail suppliers active within Sussex North, and potential additional support from Market Operator Services Limited (MOSL) and Southern Water to assist engagement with the retailers. SW's planning for a non-household scheme is at an early stage, and they are not able to provide indicative costs for this Strategy. They will also be undertaking activities which, whilst important, would not have the level of certainty required for an offsetting scheme. Pilot studies of non-household visits could be initiated early in the period covered by the Strategy, and if successful, applied alongside other measures, but this option will not be presented in the current Strategy.
Household visits	No	SW have recently stated that as a result of changing working patterns due to Covid-19, more water is currently being used in the WRZ than expected when their WRMP was prepared. As a result of this, SW need to carry out more household visits (amongst other measures) to meet their targets to reduce overall PCC in Sussex North (which provides a significant contribution to the Water Neutrality Strategy). Household visits would therefore no longer be available to use as part of an offsetting programme, as the customers that would be targeted in the offsetting Scheme would now be needed as part of SW's WRMP activities, rather than unlock

Measure	Included in Strategy	Comments
		additional capacity and it is not possible to determine which customers would now be included in SW's work.
Retrofit Rainwater harvesting - household	No	Rainwater Harvesting (RwH) RwH has the potential to reduce water demand by a third if the RwH system was used for both toilet flushing and laundry. However, the cost and disruption of retrofitting a system into existing housing (at a few thousand pounds per property) may limit the uptake for this sort of measure unless there are incentives for homeowners to come forward and financial support is available. The baseline cost per litre of an offsetting Scheme based on RwH would be between £54 and £72 per litre per day saved. This makes it a very expensive option in comparison to others so is not considered further in the Strategy.
Retrofit Greywater recycling - household	No	Greywater Recycling (GwR) has the same potential to reduce water demand as RwH, with the added benefit of greater certainty of supply in extended periods of dry weather. The cost per litre is similar to RwH (in the region of £59 per litre per day) and so will not be considered further in this Strategy.
Retrofit Greywater recycling – non-household	No	Opportunities may exist where there is sufficient supply of greywater (for example in a hotel where greywater is generated in showers). However, application in an existing hotel would require extensive replumbing to provide separate wastewater and water supply pipework. This option will not therefore be included in the Strategy, but LPAs may wish to explore this on a case-by-case basis.

Measure	Included in Strategy	Comments
Leakage reduction	No	Southern Water are working to reduce their leakage rates and have targets as part of their WRMP to reduce this further. Discussions with SW have shown that achieving these further leakage reduction targets will be challenging, as the programme already planned by SW will target the leaks with the highest cost-benefit ratio. This programme may need to be extended further in order to ensure SW's targets are met, and so a further extension beyond this in order to provide offsetting is not possible to plan or provide an indicative cost on. This option is not considered further in the Strategy.
Metering	No	Approximately 88% of households in Sussex North currently have a water meter compared to a national average of about 50%. This is expected to increase to approximately 91% during the Local Plan period. SW have advised that there is little scope to increase this further in a cost-effective way as the remaining properties are the most challenging (and costly) to convert. This option is therefore not considered further as an offsetting option. Smart metering should be considered but is likely to be part of future work by SW and is unlikely to contribute to this Strategy.

5.3.2 Flow regulator

133. A pilot project is currently underway in Crawley, trialling the use of a flow regulator device, retrofitted to existing properties to reduce the volume of water used in the property. This is currently focused on a trial of 100 dwellings but could, if successful, be rolled out more widely across the Crawley Homes stock.

134. This same device has been fitted in an Affinity Water trial area and found to save 64 litres per household per day (Cenergist, 2020). A conservative estimate of 20l per person per day will be applied in calculations in this report, but the benefit could be higher. The pilot scheme underway with Crawley Homes can be used to refine this figure once complete, and the pilot scheme used the same figure of 20l/p/d as its baseline (Crawley Homes, 2022). Early results of this trial indicate a similar water saving to the Affinity Water project is being achieved.

135. Crawley Homes have a housing stock of 8,223 properties. CBC have advised that 60% is a realistic proportion of housing stock available for retrofitting. If 60% of CBC housing stock could be fitted with this device, this would provide 0.25Ml/d of demand reduction in Sussex North. There are a further 2,500 housing association properties in Crawley that may provide a further saving of 0.08Ml/d. Elsewhere in Sussex North, Horsham has limited council owned stock, with 6,500 units being managed by registered providers. Whilst these are not directly under council control, the potential for offsetting is 0.20Ml/d and creating a potential saving both in water bills and energy costs for the occupants of these houses. If it were part of a central offsetting Scheme, it could be delivered at no cost to the registered provider or tenants.

136. The combined offsetting potential across both Horsham and Crawley is 0.52Ml/d (assuming 60% of properties are retrofitted). This measure alone, if all available capacity were used, could theoretically be enough to offset growth during the period up to 2029/30. This measure alone would not be sufficient if the 110l/p/d water efficiency target were maintained. A procurement process with potential suppliers will identify the realistic installation rate of these devices. Whilst offsetting could theoretically be achieved using this measure alone, in practical terms, other measures may need to be utilised alongside these devices.

137. Opportunities can be sought to combine fitting a flow regulator with providing education on water saving to promote behaviour change alongside the benefit of the device itself.

5.3.3 Schools water efficiency programme

138. There are 94 schools within the Sussex North WRZ contributing a total water demand of 0.46Ml/d on average through the year. A reduction in water usage in these existing buildings has the potential to offset some of the additional growth within the WRZ. Within this figure there are different types of school (Nursery, Primary, Secondary and Special schools) and different types of management / governance. 44 schools are "County Schools" where WSCC own the land and buildings and have responsibility for maintenance. A retrofitting programme would be

simplest to implement in these schools. Other management types such as Academies, Foundation schools, Voluntary aided etc may also be able to contribute, but this would be on a voluntary basis as WSCC have no direct influence.

139. Waterwise produced an "Evidence Base for Large-scale Water Efficiency" in 2011 which included the findings of six separate water efficiency programmes in schools (Waterwise, 2011). This involved retrofitting water efficient fittings in 633 schools in five regions and was delivered by the EA and water companies.

140. The results of this study demonstrated a mean water saving of 1,340 litres per pupil per year at a cost of £0.51 per litre per day. A saving of approx. 20% in water demand. This cost has been uplifted to a 2021 based on the Bank of England inflation calculator (Bank of England, 2022), providing an updated cost of £0.61 per litre per day.

141. Within West Sussex the 44 county schools under direct influence of WSCC, generate an estimated water demand of 0.19Ml/d (based on billing information for a selection of schools in West Sussex provided by WSCC). If an equivalent programme of retrofitting was conducted on all the existing schools in Sussex North and the same result was obtained, the maximum saving would be 0.04Ml/d – approximately 20% of the total required to offset all additional school water demand (from new schools and expansion of existing schools). The potential from all types of school in Sussex North is 0.09Ml/d.

142. The water use derived from billing information from schools in Sussex North indicated water use was on average less than that reported in the Waterwise evidence base. Some schools in Sussex North have also had water efficiency work carried out. A water efficiency programme in schools within Sussex North may therefore not provide the same reduction in water demand. This has been factored into the calculations by reducing the available capacity from an offsetting scheme.

143. In order to offset water demand from new school places (both expansion to existing schools and new schools) in Sussex North, 0.18Ml/d of water savings are required.

144. A water efficiency retrofitting scheme is therefore unlikely to offset additional school water demand by itself.

145. The Waterwise report focuses on savings made by installing water efficient fittings. There is potential for further savings if RwH were used in addition to this. Data from a Thames Water study shows that in a typical school, approximately 60% of water demand comes from toilet and urinal flushing, both of which could be replaced with rainwater.

146. The maximum likely impact from this measure if schools under council control were retrofitted with a RwH system is 0.12Ml/d and 0.27Ml/d if every school in Sussex North were fitted. Installing RwH in existing schools is challenging as toilets are often distributed throughout the school site, requiring multiple systems, which would increase the cost.

147. This should be investigated as part of a water audit during the water efficiency visits, and where a school is laid out in a way that a RwH system could be installed in a cost-effective way, this measure should be considered. In these cases, the cost of installing a system will be similar to the costs presented for an office building (5.3.4 below). Schools may also consider whether toilet facilities may be centralised and redesigned as part of building maintenance and renewal programmes, and RwH installed as part of this process.

148. Priority from an offsetting programme in schools should go to offsetting new schools, and an increase in pupil numbers at existing schools.

149. A water efficiency programme in schools has several benefits. Measures delivered in schools are less likely to be replaced as may be the case in a domestic setting and are more likely to be maintained. The installation of water efficiency measures, or RwH could be accompanied by the delivery of an educational programme increasing awareness of the need for water saving, having a benefit both in school, and in the home.

5.3.4 Rainwater Harvesting – Non household

150. Commercial buildings offer a large potential for RwH due to their extensive roof areas. The cost of retrofitting would depend on the size of the system required and the complexity of the installation.

151. In a non-household setting, rainwater can be used to meet the demand from toilet flushing, and where it is present, uses such as vehicle washing. The demand from these sources will be balanced against the collection area (usually the roof area) and the available space for storage.

152. Fitting a RwH system will require new pipework, the cost of which will vary depending on whether toilets are situated on an external wall, in one block or distributed throughout the building.

153. Two RwH suppliers were interviewed as part of the market engagement exercise and provided some guideline pricing for retrofitting office buildings.

154. Two sizes of offices were discussed, an office with 50 employees and one with 500. A below ground tank was assumed for both.

155. Equipment costs for these two cases are expected to be in the region of £3,500 and £35,000 respectively.

156. Installation costs are difficult to define as each site may be different, but it is expected that this could be approximately the same as the equipment costs. Based on the system being used to remove the toilet flushing demand in both cases, the cost per litre per day removed from public water supply is in the range £50-£100.

157. Agricultural buildings are likely to be at the lower end of this scale as it is more likely that above ground storage may be used, or that excavated earth could be stored on site.

158. Defining the potential capacity that could be delivered by RwH in non-household applications is difficult. If schemes were limited to toilet flushing, in order to provide 0.28Ml/d of offsetting (uplifted to account for uncertainty of delivery – see Section 5.4.2), assuming two 4l flushes per day (an assumption provided by a RwH supplier), a total of 35,000 employees would be required to shift from mains fed to rainwater fed toilets. For comparison, there are 96,000 employee jobs in Crawley, 54,000 in Horsham, and approximately 2,850 within Sussex North in Chichester.

159. Delivering such a widespread Scheme based on toilet flushing would be unlikely as although individual companies would not have to bear the cost of the Scheme, there may be disruption and the financial incentive via water bill savings is not significant.

160. Other water uses, such as agriculture and vehicle washing are therefore likely to be required as well as toilets.

5.3.5 Golf course irrigation

161. The British and International Golf Greenkeepers Association (BIGGA) carried out a survey in 2019 (BIGGA, 2019) reported that just under 50% of golf facilities rely on mains potable water supply for irrigation. The report also notes that the water industry suggests the figure is higher at 66%.

162. Castle Water (a water retailer) state that a typical golf course uses between 0.379Ml to 3.79Ml of water per week in the summer months (Castle Water, 2020). Assuming these figures are reflective of the golf courses within Sussex North, there is large potential for saving water if an alternative source of water for irrigation could be found.

163. According to Ordnance Survey Greenspace mapping, there are 12 golf courses within Sussex North, although at least one golf course is being promoted for conversion to other uses. Further research is required to understand the capacity of an offsetting Scheme within Sussex North, and as the majority are not in public ownership, participation would be on a voluntary basis. However, the potential of this approach to contribute significantly to an offsetting Scheme may be large.

164. Other recreational uses such as polo grounds, swimming pools and leisure centres should also be investigated.

5.4 Defining a cost for offsetting

5.4.1 Overview

165. An offsetting Scheme will require a cost per litre charge which will be used to calculate a developer contribution to achieving neutrality. This will be made up of the cost of delivering the offsetting Scheme as well as overheads associated with running the Scheme. Costs presented in Part B were based upon an extension to SW's programme of household visits which are no longer available for offsetting. Waterwise present an offsetting cost in their recent reports (Waterwise, 2021). However, this is also based on a programme of household visits which are not possible here, so this cost cannot be applied in the Sussex North WRZ.

166. This section presents indicative costs of an offsetting Scheme based on the measures identified in 5.3 above.

5.4.2 Scheme delivery

167. Four offsetting options have been used to define an indicative offsetting cost.

- Flow restrictors.
- Schools retrofit.
- Non-household RwH retrofit.
- Golf course irrigation.

168. Analysis of these offsetting options, which included the market engagement exercise (described in Appendix F.1) as well as further research, allowed an estimated "per litre saved" cost for each of these measures to be defined. Each option was assigned a score for certainty of cost, delivery and impact. The cost certainty score was used to uplift the original cost per litre figure to account for uncertainty where information on cost was limited. For example, the estimated cost of delivering an offsetting scheme based on removing irrigation from the mains supply at golf courses is highly uncertain so has received a large uplift, the cost of a schools' retrofitting programme is based on a published report of a trial of 600 schools so has a greater level of certainty.

169. Impact certainty has been used to adjust the size of the required offset. For example, for a schools' retrofitting programme, the results of the trials showed that the mean water efficiency saving was achieved in 84% of the schools. The remaining schools did not see a reduction. In order to meet the demand from the maximum deficit during the period up to 2030 of 0.25Ml/d, an offsetting scheme capable of achieving a

saving greater than 0.25Ml/d is required in order to ensure sufficient offsetting is delivered.

170. Finally, the delivery certainty score has been used to adjust the maximum capacity from each option. For example, the maximum capacity for an offsetting programme of work in schools is 0.09 Ml/d (if every school in Sussex North was retrofitted); however, it is unlikely to be possible to implement offsetting in every school, as some may already have had schemes implemented, or may be unwilling or unable to engage. The maximum capacity should therefore be adjusted down.

171. Table 5.3 presents an indicative cost per litre for the four potential offsetting options, with the appropriate certainty adjustments applied. The schools retrofit programme achieves lowest cost per litre, but it also has the lowest potential capacity for water demand savings. An offsetting Scheme consisting of flow regulators has the potential to deliver all the offsetting required in Sussex North (up to 2029/30 assuming 85l/p/d is applied), and having gone through a trial with Crawley Homes, comes with a high level of certainty. A cost of offsetting should therefore be based on applying this measure, whilst pilot projects of water efficiency in schools, and non-household rainwater harvesting are developed. Should these measures prove successful and deliverable, they can be applied alongside flow restrictors, potentially at lower cost.

172. On the basis of the above, and the evidence analysis as set out in Table 5.3 below, the cost of delivering offsetting, excluding other Scheme costs such as overheads and procurement is between £2.20 and £3.30 per litre per day. For the purpose of viability testing, the upper figure in this range should be used, noting that this does not include the costs of setting up and running a scheme. As explained in Section 6.2, the contribution made from SW's demand reduction activities means that only a proportion of the total water demand from a new development needs to be offset.

Table 5.3: Indicative cost (£/l/d) for shortlisted offsetting measures (excludes all overheads)

Offsetting option	Indicative cost (£/l/d)	Cost certainty	Adjusted cost (£/l/d)	Impact certainty	Size of Scheme required (Ml/d)	Indicative cost of Scheme (to 29/30) (£)	Estimated capacity of Scheme (Ml/d)	Potential % contribution of overall offsetting required
Flow restrictors	2 to 3	Very High	2.20 to 3.30	Very High	0.28	609,852 to 914,779	0.52	100%
Schools' efficiency retrofit	0.61	Very High	0.67	High (Based on trials)	0.29	196,151	0.045	11%
Non-household RwH retrofit	1.00	High	1.25	Very High	0.28	346,507	Unknown	N/A
Golf course irrigation	8.17	Low	14.30	Very High	0.32	4,503,804	Unknown	N/A

(Very high = 90%, High = 75%, Medium = 50%, Low = 25%)

173. The costs presented in this table are indicative and based on the research and conversations conducted by JBA over the course of this project. They are sufficiently accurate, based on the best information available, and suitable for the high-level purposes of local plan viability assessment. The figures provided in this Strategy begin to establish the levels at which a financial contribution towards offsetting the remaining water use from new development should be set. Notwithstanding this, it is recognised that a formal procurement exercise to commission an offsetting programme has not been conducted, and quotations have not been received from any suppliers. All costs presented in this report should therefore be used with a degree of caution. It is strongly recommended that a formal procurement process is conducted as soon as possible to provide firm costs.

174. The indicative costs identified here exclude all overheads. Section 6.6 considers what other costs will need to be considered to derive a total Scheme cost.

175. Education will be an important element of the Strategy. Opportunities should be sought to combine any offsetting measures with education and information on the need to save water and how this can be done through changes in behaviour.

6 Offsetting Scheme

6.1 Key principles

176. The following key principles should apply to an Offsetting Scheme:

- Water neutrality must be maintained throughout the period covered by the Strategy up to and including 2039 – at no point should net water use increase as a result of planned development.
- The Offsetting Scheme may only be required for part of the period covered by the Strategy.
- The objective of the Strategy is to demonstrate that the Local Plan growth can be delivered in compliance with the Habitats Regulations.
- Water demand and offsetting benefits are applied across the WRZ and not at LPA or individual development level.

6.2 General approach

177. Each year a certain amount of new water demand will arise from development built in that year. For development throughout the Local Plan period to be water neutral, this additional demand must be offset before occupation (i.e., when the additional water demand is experienced).

178. As explained in Section 5.2 above, up to 2025, SW must account for expected completions from sites with full extant planning permission on or prior to September 2021.

179. There is therefore no SW contribution available for Local Plan growth until 2025. This highlights the requirement for some offsetting to be delivered as early as possible within the period covered by the Water Neutrality Strategy to avoid delays in the delivery of growth from the Local Plans. This might be difficult to achieve while an offsetting Scheme is still being implemented.

180. Figure 5.1 in Section 5 and the tables in Appendix A show the maximum deficit between Southern Water's contribution and new water demand arising from growth is predicted to be 0.25Ml/d in 2024/25 and 0.57Ml/d in 2038/39 if a water efficiency target of 85l/p/d is adopted. This is the total volume of offsetting required during the Local Plan period. As water demand must be offset completely each year, offsetting is required ahead of demand.

181. Significant offsetting will be required early in the plan period and needs to be funded. If an annual cost of offsetting is defined based purely on the volume delivered in that year and passed on to the developers building that year by way of a developer contribution, the cost to

developers in the first part of the plan will be high, and then fall to zero once sufficient offsetting is delivered. This burden will therefore be disproportionate for developers ready to deliver housing immediately and could encourage developers to hold onto land until the cost decreases or disappears. A consistent fair price is therefore needed across the Local Plan period.

182. Planning on a yearly basis could also lead to fluctuations in the price of offsetting. For developers to understand their expected financial contribution to offsetting, the cost per litre needs to be defined early in the Strategy and some stability maintained to allow developers, and the offsetting provider to plan effectively. This cost should be index linked.

183. It is proposed that the total cost of delivering the required offsetting volume is spread across all development (required to be water neutral) opting into the Offsetting Scheme during the Local Plan period. This will significantly reduce the cost for individual developers, in particular smaller developers where the burden of offsetting on a smaller scheme would be greater. It also allows a consistent cost to be applied throughout the Offsetting Scheme. If developers wish to utilise the water savings it provides, developments that become occupied at any time during the period covered by the Offsetting Scheme will be required to contribute to the offsetting programme.

184. Once a long-term solution has been put in place by SW, a water neutrality Offsetting Scheme may no longer be required. For this reason, it is proposed that the Offsetting Scheme outlined in this Strategy run to 2030, when it is reviewed. An extension to the Offsetting Scheme, including an updated offsetting cost, to cover a further period may then be required. In this way the Strategy can be shown to achieve water neutrality for the entirety of the Local Plan period, whilst not running an offsetting scheme longer than is required.

185. Spreading the cost of the programme across the Local Plan period does have one significant drawback, namely the need for up-front funding. The volume of offsetting required each year will depend on the planned growth in the following year. For example, if 1000 houses are required in year 2 of the Strategy, a water demand of 0.20Ml/d would be generated (based on 85l/p/d). If the Southern Water contribution that year is predicted to be 0.15Ml/d, a further offset of 0.05Ml/d would be required. Funding needs to be available to deliver that offsetting work. The illustration below uses an average occupancy in order to demonstrate how the remaining water demand to offset is calculated for 1,000 houses. When calculating the charge for developers, the estimated water use will be based on the actual proposal.

Illustration of offsetting volume calculations	
Number of dwellings	1000 (a)
Occupancy (people per dwelling)	2.5 (b)
Per capita consumption (l/p/d)	85 (c)
Conversion factor Ml to l	1,000,000 (d)
New demand (Ml/d) (a)x(b)x(c)/(d)	0.21 (e)
SW contribution from demand reduction (Ml/d)	0.15 (f)
Remaining demand to offset (Ml/d) (e)-(f)	0.06 (g)

186. A plan which delivers offsetting when it is needed, but spreads the cost in a fair way, will have a funding deficit at the start of the plan which will not be resolved until the end of the plan. In particular, due to the Southern Water contribution being in deficit in the early years (see Section 5), upfront funding will be required in order for the LPAs to administer the Offsetting Scheme and ensure sufficient offsetting has been achieved for development to proceed.

187. Predicting the total cost of an Offsetting Scheme over an extended period is challenging. Contractual agreements with offset providers are likely to cover fixed and relatively short periods of work.

188. In order to address this, it is proposed that five yearly planning periods are used – mirroring the planning cycles used in the water industry. This would mean that the first period would therefore end in 2025 (the end of AMP7 which runs from 2020-25). This shorter initial period will reduce the risk in implementation of the Strategy as adjustment can be made at a relatively early stage. A formal procurement exercise should take place to agree a price of delivering a defined volume of water demand reduction over a defined period. The price of offsetting would be fixed for that period and then reviewed to ensure that the cost of the programme relative to developer contributions is proportionate. It would also allow for adjustments with inflation, and changes to predicted levels of growth.

189. Future reviews of the Offsetting Scheme should take into account the next WRMP (WRMP24).

6.3 Defining the offsetting requirement

190. The amount a developer would have to pay into the Offsetting Scheme will depend on the agreed offsetting cost per litre and the size of their development. The size of the development and amount of offsetting required should be calculated in the water neutrality statement as part of the planning application. It is recommended that the WRc Water Efficiency Calculator for New Dwellings (WRc, 2022) (or equivalent in accordance with Appendix A of Approved Document G of Building Regulations) is used to calculate the expected water use. Water demand would depend on an assumed occupancy rate. The

calculations in this report have used the average occupancy across Sussex North stated in the SW WRMP. Individual planning applications would require a more accurate figure based on the size of the type of housing in the proposal. The commissioning LPA's own figures should be used for these calculations.

191. Monitoring of the actual water-use compared with the design water-use on a sample of developments should be carried out. Should actual water-use be higher, further offsetting may be required to compensate for this.

192. The calculations in this report assume that all the water demand generated from a development site is "new" water demand. This may not be the case if there is a change of use, and in such cases the net increase in water use should be used to calculate the actual water demand to offset on a water neutrality statement.

193. Non-household demand would require a bespoke calculation based on predicted use.

194. A basket of measures is likely to be required in order to provide sufficient offsetting during the Offsetting Scheme period. In selecting and prioritising offsetting measures, the Offsetting Scheme operator will need to consider:

- the costs of individual measures (£/l/d saved) and their cost contribution to the overall Offsetting Scheme;
- the volume of offsetting that can be delivered by each measure per year, including the capacity of suppliers;
- the level of certainty that the measure will deliver the planned offsetting; and
- other risks, for example restrictions due to dependencies on single suppliers.

195. It is highly recommended that pilot schemes for schools' efficiency retrofit, non-household RwH retrofit, and golf course irrigation are developed, to build confidence in the deliverability and costs of these options.

196. The fitting of flow restrictors, having already undergone a successful trial that has demonstrated cost-effectiveness with no evidence of detrimental customer experience is the most developed of the current set of offsetting measures, so would be appropriate for moving towards a more widescale roll-out during the early years of the Offsetting Scheme.

6.4 Alternative offsetting approaches

197. The section above discussed how a centrally run Offsetting Scheme could work, where the offsetting measures are shared across the WRZ,

and the costs are borne by all development that opts into the Offsetting Scheme.

198. This approach keeps the cost of offsetting relatively low as it is shared between all developers. An alternative is for the benefits from each offsetting project delivered to stay within the organisation or LPA that delivered it.

199. As an illustration, in a shared offsetting "pot" a total offset of approximately 0.25Ml/d is required. This is the maximum deficit during the period 2021/22 to 2029/30 between new water demand from growth, and the contribution from SW's demand management activities. The amount of offsetting required for each development site is then only a percentage of its new water demand as the contribution from SW's demand management activities already accounts for a large proportion of the water demand. A developer therefore only needs to pay for a proportion of their overall water demand. If the cost per litre of offsetting were £3.30/l/d the total cost of delivering the entire offsetting programme would be approximately £825,000. This excludes any scheme overheads outlined in paragraph 206. If this were spread across all the development during the Offsetting Scheme period (8,604 dwellings up to 2030) the cost per dwelling would be approximately £96 (ignoring employment in this illustration for simplicity).

Illustration deriving a cost per dwelling for an LPA shared Offsetting Scheme

Total offsetting required (Ml/d)	0.25 (a)
Cost of offsetting (£/l)	3.30 (b)
Total cost of offsetting scheme (£) (a) x (b)	825,000 (c)
Total number of dwellings up to 2030	8,604 (d)
Cost per dwelling (£/dwelling) (c) / (d)	95.89 (e)

200. If an LPA wanted to ensure that the benefit of delivering an offsetting project in their area could be used to support development within that area only, then the cost could no longer be spread across all Sussex North growth, and the whole demand from that development site would need to be offset (i.e., the SW contribution through their demand reduction activities could not be used). For example, if a housing scheme of 100 houses were to be delivered, the total new demand would be 21,250l/d and would cost £71,125. If the cost of this scheme was borne just by the development the cost per house would then be approximately £701 (based on an occupancy rate of 2.5). Elsewhere there would be a reduced requirement for offsetting, and so the contribution from other private developers would be significantly less.

Illustration deriving a cost per dwelling for non-shared Offsetting Scheme for a development of 1000 houses

Number of houses	100 (a)
Average occupancy (people per dwelling)	2.5 (b)
Per capita consumption (l/p/d)	85 (c)
Total water demand (l/d) (a) x (b) x (c)	21,250 (d)
Cost of offsetting (£/l)	3.30 (e)
Total cost to offset development (£) (d) x (e)	70,125 (f)
Cost per dwelling (£/dwelling) (f) / (a)	701.25 (g)

201. Another approach to offsetting is to allow a commercial market to develop, using market forces to set the cost of offsetting, and drive technology improvements to improve efficiency. This approach would take some time to develop, and the burden on individual developers early in the scheme could be considerable. There is also no certainty that a market led scheme would deliver sufficient and timely offsetting in order to ensure offsetting is in place prior to development in all case. Significant monitoring by LPAs would still be required.

6.5 Development outside an LPA Scheme

202. This report focusses on an LPA-led, centrally managed, offsetting scheme, but there is room for developers to find their own offsetting options, or for a third-party market led scheme to be implemented alongside an LPA scheme.

203. Any offsetting delivered outside of the central scheme needs to be recorded and verified, which will require coordination between the LPAs to carry out this task.

204. A significant amount of offsetting delivered outside of a central offsetting scheme will impact on the amount of remaining offsetting required overall.

6.6 Funding and costing

205. The principal costs of achieving water neutrality are the costs of meeting water efficient design in housing and non-household buildings, which will be met directly by the developer, and the costs of providing offsetting, which will be met through developer contributions to the Offsetting Scheme.

206. Developer contributions would be collected through Section 106 agreements at the time of granting planning permission. The wording of these agreements would need to be developed by the LPAs, and it is recommended that a consistent template agreement is developed for use by all of the LPAs. The costs of individual offsetting options are outlined in section 6. The total costs of the Offsetting Scheme will also need to include:

- procurement of mitigation measures;
- maintenance of offsetting measures if directly implemented by LPAs;
- management costs;
- reviewing, approving and monitoring;
- governance and reporting;
- legal costs;
- insurances (where not covered by LPAs); and
- an allowance for risk.

207. These costs are not known at present and have not been included in any of the offsetting costs presented in this Strategy. A detailed business plan should be developed for the Offsetting Scheme.

208. The Offsetting Scheme operating body should plan for costs to be uplifted annually in line with an appropriate measure of inflation.

209. The charges to developers will be based on a cost per litre of water demand per day. The example below illustrates how this would be calculated using illustrative figures only.

210. As shown in Section 5.2.1, a large proportion of the additional water demand during the Local Plan period is already accommodated in SW's WRMP19, which will be updated in WRMP24. If the cost of a Scheme is applied equally across all development, each developer would only have to offset a proportion of their growth in order to be water neutral.

211. This proportion is the ratio of the maximum offset required to the total water demand during the period covered by the Scheme.

212. In the period 2021 to 2030 this ratio is 0.123 if a target of 85l/p/d is adopted, and 0.257 if a target of 110l/p/d is adopted. This means that effectively 88% of growth (in each development) will be water neutral

due to SW's demand reduction activities in their WRMP. And the remaining 12% will need to be made water neutral by the Scheme. This increases to 26% if the target of 110l/p/d is maintained.

Illustration of calculating a Scheme cost (excluding all overheads)	
Total offsetting required (Ml/d)	0.25 (a)
Cost £/l/d	£3.30 (b)
Total Scheme cost (a) x (b) x 1,000,000	£825,000 (c)
Total growth during Scheme to 2030 (Ml/d)	2.04 (d)
Ratio of offsetting to growth (a) / (d)	0.123 (e)
Illustration of applying unit cost to a housing development	
Number of units	100 (f)
Average occupancy (persons/unit)	2.5 (g)
Population (f) x (g)	250 (h)
Per capita consumption (l/p/d)	85 (i)
Site water demand (l/d) (h)x(i)	21,250 (j)
Site water demand to offset (l/d) (j)x(e)	2,614 (k)
Site contribution to Scheme (b)x(k)	£8,626 (l)
Contribution per unit to Scheme (l)/(f)	£86.26 (m)

213. The figure above is just the cost of the offsetting measure itself. Other costs in paragraph 206 need to be added to this.

214. Community Infrastructure Levy (CIL) Regulations 2010 (Regulation 122) sets out that a planning obligation may only constitute a reason for granting planning permission for the development if the obligation is:

- (a) necessary to make the development acceptable in planning terms;
- (b) directly related to the development; and
- (c) fairly and reasonably related in scale and kind to the development.

215. These three tests are met in the case of S106 agreements being used as a means of collecting payment to offset water demand. Offsetting is required to comply with the Habitats Regulations in respect of the impact of additional water demand generated by the development site. The offsetting amount, and therefore cost, is directly related to that development and is scaled based on the volume of additional water demand generated by the site.

7 Operation, Financing and Governance

7.1 Introduction

216. The water neutrality Offsetting Scheme is expected to co-ordinate several million pounds of offsetting activity (plus costs to set up and run the Scheme) in the period up to 2030. Over the same period, several hundred developments will be required to submit water neutrality statements, sign-up to Section 106 agreements and make payments into the scheme. Consequently, this will be an operation of significant scale and complexity, especially given that it is a first in the UK and will operate across four LPAs (CBC, CDC, HDC, SDNPA) and WSCC.

217. This Strategy sets out key objectives of the structures required to operate, finance, govern and monitor a water neutrality scheme. The following principles have been agreed by the LPAs and should shape how the Offsetting Scheme is set up:

- Operate as a single scheme across the Sussex North water resource zone.
- Prioritise development which is identified in or required to support the Local Plans of the four LPAs (for example schools, essential infrastructure and public services).
- Be self-financed based on developer contributions over the plan period but seek contributions (financial or in-kind) from key stakeholders including Southern Water and central government to assist the Scheme to be established.

7.2 Operation and financing

7.2.1 Operating models

218. Consideration will need to be given to the body that will operate the Offsetting Scheme. The following options, plus any others which can be identified, should be considered, with suitable legal advice:

- the Offsetting Scheme is operated collectively by the LPAs;
- one LPA operates the Offsetting Scheme under contract with the others;
- a Special Purpose Vehicle (SPV) established with each LPA as shareholders; or
- outsourcing the operation to a third party.

7.2.2 Responsibilities of the operating body

219. In establishing the operating body, the LPAs will need to consider the following issues:

- establishment and maintenance of a database of new demand from development and offsetting planned, in progress and

completed such that water neutrality can be monitored and forecast on a monthly basis and reported annually;

- co-ordinate offsetting measures undertaken directly by the LPAs;
- review and approve offsetting measures provided by developers or third parties directly contracted by developers;
- procure offsetting measures to be undertaken by third parties;
- manage the Offsetting Scheme budget, including income from developer contributions, income from stakeholders or loans and spend on offsetting measures and the management of the Offsetting Scheme;
- preparation of annual and special reports as specified by the governing body;
- additional, targeted activities as specified by the Offsetting Scheme governing body, for example research into new offsetting sources, monitoring of the effectiveness of offsetting and water efficient designs; and
- maintain a water neutrality website where all key documents relating to the Offsetting Scheme can be accessed, including the Strategy, the latest map of the Sussex North area, and the annual reports.

7.2.3 Financial management

220. The LPAs should consider whether section 106 contributions are to be paid directly to the LPAs and then into the scheme, or directly into the Scheme.

221. Arrangements for preparing, auditing and approval of the Offsetting Scheme's accounts should be established, appropriate to the type of entity that will operate the Offsetting Scheme.

222. A scheme of delegation should be established for the approval of spend from the Offsetting Scheme fund.

223. As a result of the profile of development, the timing of funding being collected and of the offsetting delivered, the Offsetting Scheme is anticipated to operate at a substantial loss during the early years. As a priority, the LPAs should establish suitable sources of funding for this period.

224. In other parts of the UK where Natural England has issued advice requiring nutrient neutrality, Department for Levelling Up, Housing and Communities (DLUHC) and the Planning Advisory Service (PAS) have funded additional staff to support developers and LPAs with identifying and securing mitigation (Natural England, 2022). It is recommended that similar support is sought to assist establishment of the water neutrality Offsetting Scheme.

225. The LPAs should establish, at an early stage, how a surplus in Offsetting Scheme budget be resolved once all of the Offsetting Scheme's liabilities have been discharged.

226. Likewise, provision should be made at the establishment of the Offsetting Scheme for how risk will be shared between the LPAs in the event that the Offsetting Scheme operates at a loss. This should be relative to the volumes of development undertaken under the Offsetting Scheme within each LPA.

7.3 Responsibilities of stakeholders in the Scheme

7.3.1 Overview

227. The following responsibilities have been identified for the key stakeholders in the Offsetting Scheme.

7.3.2 The Local Planning Authorities

228. The LPAs will need to operate closely with the Scheme operating body, in order to ensure its smooth operation. Their key responsibilities will include:

- reviewing and recommending approval or rejection of water neutrality statements submitted with planning applications;
- setting Local Plan policies which support delivery of the Offsetting Scheme, in particular which support the 85l/p/d water efficiency target for new homes;
- provide monthly updates on completions, approvals, committed development and any major windfall developments which could significantly impact water demand;
- use the Offsetting Scheme as a new non-statutory consultee on planning applications, and take consideration of their assessments of water neutrality statements;
- where operating as a provider of offsetting measures, LPAs should liaise closely with the Offsetting Scheme operators in order to ensure that the offsets delivered can be utilised by the Offsetting Scheme; and
- in-kind support from existing LPA functions e.g., procurement, legal.

7.3.3 Southern Water

229. Southern Water will need to work closely with the Scheme operators to:

- report progress towards development of alternative water supplies and the expected programme for these.
- provide regular updates (at least quarterly) of the progress of their demand management measures against the targets set in the Water resource Management Plan, and of activities to reduce

abstraction at Pulborough that are required for its licence and strategic plan mitigation whilst maintaining the supply-demand balance;

- where possible, and whilst remaining within the allocated funding approved by Ofwat, accelerate or enhance offsetting measures in Sussex North in particular in developing and delivering the next Water Resources Management Plan 2024 and Business Plan for AMP8 (2025-2030);
- collaborate in a timely manner with the Offsetting Scheme operators to carry out analysis to provide confidence and sufficient certainty in the Offsetting Scheme's operation. One example would be to develop improved evidence on the replacement rate of fittings following occupation of new homes and the impact on their water demand. As the water provider, Southern Water has the customer relationships and access to billing information that will be crucial to support monitoring studies.
- Provide in-kind technical support to the Offsetting Scheme operators, for example through sharing findings of water efficiency trails in other areas and as an industry link to ongoing research elsewhere is the UK.

7.3.4 Natural England

230. Natural England has advised that water neutrality needs to be resolved strategically through Local Plans. Their role will include:

- continued engagement with the emerging Strategy and ahead of Local Plan submissions;
- response to appropriate assessments – though these are likely to be standardised once the solution is up and running;
- statutory responses to submitted plans;
- review of annual water neutrality reports prepared by the Offsetting Scheme operators and submitted by the Water Neutrality Executive Board;
- continued engagement and role as statutory consultee on the licence review, sustainability investigation and accompanying work on the WRMP24, Periodic Review 24 (PR24) with Environment Agency and Southern Water; and
- continued monitoring of, and work with owners to improve condition of Arun Valley Protected Sites.

7.3.5 Environment Agency

231. The Environment Agency's principal roles relate to their regulatory duties with respect to abstraction management and reviewing of Water Resource Management Plans and water company Business Plans. These would include:

- seeking to ensure that Southern Water's WRMP24 and Business Plan for the 2024 Periodic Review (PR24) address the specific needs of Sussex North; and
- reviewing annual water neutrality reports prepared by the Offsetting Scheme operators and submitted by the Water Neutrality Executive Board.

7.4 Governance

232. The LPAs have set up a governance structure, led by a Water Neutrality Executive Board, comprised of chief executives and heads of service from the District, Borough and County Councils, the South Downs National Park, Natural England, Southern Water and the Environment Agency. The structure was developed to support the development of this Strategy and parallel activities moving into the Offsetting Scheme set-up. Full details of the existing structure are provided in Appendix G.

233. It is envisaged that this structure will need to develop and evolve as the Offsetting Scheme moves into the set-up and implementation phases. Consideration should be given as to whether it is necessary to separate the governance of the operating body (which could include matters of finance and commercial confidentiality), from the governance of the Offsetting Schemes' progress and effectiveness at demonstrating water neutral development.

234. In designing the governance structure, consider any costs of governance which aren't met under the day-to-day operations of the member organisations, and include these within the overhead costs of the Scheme.

235. The role of the Offsetting Scheme governance should encompass:

- establishment of an Offsetting Scheme operating body and appointment of its lead officer or managing director;
- engagement with DLUHC and DEFRA;
- oversight of the Offsetting Scheme operator, recommended at monthly intervals initially, possibly reducing when the Offsetting Scheme is well established;
- review annual water neutrality reports;
- definition of targeted monitoring activities to be led by the Offsetting Scheme operators, required to address specific areas of uncertainty. It is envisaged that these would be undertaken on a risk-based approach, targeting areas of greatest uncertainty first.
- In the event that forecasts indicate that water neutrality cannot be achieved for a period of the plan, agree on which developments should be prioritised. The principal of preference being given to development identified with the Local Plans

(including windfall development accounted for within Local Plans) and essential infrastructure and public services required to support these. It is unlikely that there will be offsetting capacity within an LPA-led Offsetting Scheme for large scale, speculative development. Instead of utilising the Offsetting Scheme to show water neutrality applicants for such development will likely need to demonstrate water neutrality by different means.

7.5 Key Recommendations

236. The Strategy makes the following key recommendations:

- The Water Neutrality Strategy should cover the period up to the end of a combined Local Plan periods of the commissioning LPAs (up to 2038/39).
- A water efficiency target of 85l/p/d should be adopted for new build housing.
- Non-household development should achieve a score of three credits within the water (Wat 01 Water Consumption) issue category for BREEAM New Construction Standard, achieving 40% reduction compared to baseline standards.
- The Strategy will include an Offsetting Scheme which will run up to the end of 2029/30. This should be reviewed in 2030 based on whether a long-term solution has been implemented by Southern Water.
- The Offsetting Scheme should be LPA-led, and operated collectively across LPAs, with the costs and benefits shared.
- Developer contributions should be collected via Section 106 agreements.
- Flow regulators are most appropriate for providing offsetting in the early part of the Strategy.
- Pilot studies for a water efficiency programme in schools, non-household rainwater harvesting, and reduction in golf course irrigation should be set up, and if successful implemented alongside the flow regulator in the Offsetting Scheme.
- A procurement process for delivering offsetting measures should be started as soon as possible to obtain accurate costing for offsetting measures.
- Monitoring is a key activity in the Strategy and should include:
    - Actual water demand in new build development
    - Impact of offsetting measures installed (such as flow regulators)
    - Water demand savings delivered by SW
- New homeowners should be provided information on the need to save water in Sussex North, and on the correct use and maintenance of water efficiency fixtures and fittings.
- Opportunities should be sought to incorporate education into offsetting measures in order to raise awareness of the need to save water.

8 Glossary

Term	Description
AMP	Asset Management Plan (AMP) Price limit periods in the water sector are sometimes known as Asset Management Plan (AMP) periods. The current period (2020-25) is commonly known as AMP 7 because it is the seventh price review period since privatisation of the water industry in 1989.
BRE	Building Research Establishment
BREEAM	Building Research Establishment Environmental Assessment Method BREEAM is the world's longest established method of assessing, rating, and certifying the sustainability of buildings.
CBC	Crawley Borough Council
CDC	Chichester District Council
CfSH	Code for Sustainable Homes A voluntary national standard to improve the sustainability of new housing. This was scrapped in 2016.
Competent Authority	For the purposes of the Conservation of Habitats and Species Regulations 2017, where the potential for likely significant effects cannot be excluded, a competent authority must make an appropriate assessment of the implications of the plan or project for that site, in view the site's conservation objectives. The competent authority may agree to the plan or project only after having ruled out adverse effects on the integrity of the habitats site. The "Competent Authority" includes any Minister of the Crown, government department, statutory undertaker, public body of any description or person holding public office. Public body in this case includes Local Planning Authorities.
Defra	Department for Environment Food and Rural Affairs
DLUHC	Department for Levelling-Up, Housing and Communities
EA	Environment Agency
Grampian Condition	A planning condition that precludes the implementation of development permitted by a planning permission until some step required by the condition has been undertaken. In the case of this Strategy, it could be used to ensure offsetting is in place prior to occupation of a development.
GwR	Greywater Recycling
Half-life	Half-life is the time required for a quantity to reduce to half its initial value. Within this strategy it is used to show how long it takes for the benefits of a water efficiency intervention to fall by half.

Term	Description
HDC	Horsham District Council
HRA	Habitats Regulations Assessment
JBA	Jeremy Benn Associates Ltd
l/p/d	Litres per person per day
Ml/d	Megalitres per day (Million litres per day)
NE	Natural England
Ofwat	Water Industry Regulator
PAS	Planning Advisory Service
PCC	Per Capita Consumption The per capita consumption is the average volume of water used by one person in a day. It is defined as the sum of the measured household consumption of clean water and unmeasured household consumption of clean water divided by the total household population. This is often expressed in litres per person per day (l/p/d)
Ramsar	The Convention on Wetlands of International Importance, more commonly known as the Ramsar convention after the city where it was signed in 1971, aims to protect important wetland sites.
RwH	Rainwater Harvesting
SAC	Special Areas of Conservation (SACs) - support rare, endangered or vulnerable natural habitats, plants and animals (other than birds). SACs are protected under the Conservation of Species Regulations 2017 as amended.
SDNPA	South Downs National Park Authority
SPA	Special Protection Areas (SPAs) - support significant numbers of wild birds and habitats. SPAs are protected under the Conservation of Species Regulations 2017 as amended.
SPV	Special Purpose Vehicle
SSSI	Site of Special Scientific Interest Sites of Special Scientific Interest (SSSI) are designated and legally protected under the Wildlife and Countryside Act 1981, Section 28G places a duty to take reasonable steps, consistent with the proper exercise of the authority's functions, to "further to the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest"
SuDS	Sustainable Drainage System Drainage solutions that provide a natural alternative to the direct channelling of surface water through an artificial network of pipes and sewers to nearby watercourses.
SW	Southern Water

Term	Description
Waterwise	An independent, not-for-profit non-governmental organisation (NGO) focussed on reducing water consumption in the UK.
WCS	Water Cycle Study
WRMP	Water Resource Management Plan Water Resource Management Plans are statutory documents that all water companies must produce at least every five years. They set out how the water company intends to achieve a secure water supply for their customers while protecting and enhancing the environment.
WSCC	West Sussex County Council
WRZ	Water Resource Zone A Water Resource Zone is an area in which the abstraction and distribution of water is self-contained and is used to meet demand within that area. (This may include strategic transfers between WRZs)

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10 Appendices

A Appendix A - Water demand by year

237. Table 10.1 and Table 10.2 show the water demand by year where new build housing is built to a water efficiency standard of 85l/p/d, and estimated contribution from SW from their demand reduction activities in their WRMP is factored in. The yearly capacity for housing growth from the Local Plan is presented as two figures. One before and one after the employment growth is taken into account. Both of these tables show the capacity before any offsetting is carried out.

238. The remaining capacity is calculated as follows:

Example calculation for 2025	
SW contribution from WRMP	1.21Ml/d (a)
Water demand from sites with extant planning	0.94Ml/d (b)
Occupancy rate for measured property (from WRMP)	2.4 (c)
Water efficiency target	85 l/p/d (d)
Conversion factor Ml to l	1,000,000 (e)
Remaining SW contribution (a) – (b)	0.27Ml/d (f)
Remaining capacity for dwellings (f) x (e) / (d) x (c)	1,311 dwellings

239. The occupancy rate used in this calculation is taken from the Water Resources Market Information tables published by Southern Water. The value for 2025 has been used, but this varies by year.

240. Table 10.3 and Table 10.4 show these same calculations where new build housing is built to the Building Regulations Optional standard of 110l/p/d.

241. These tables are based on growth forecasts provided by the commissioning LPAs in September 2022. These figures are expected to change as the actual planning applications are made, and the SW WRMP evolves.

Table 10.1 Water demand by year in 85l/p/d scenario 2021 to 2030

Year	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30
Water demand 85l/p/d (Ml/d)	0.00	0.01	0.04	0.13	0.32	0.57	1.11	1.60	2.04
SW Contribution (Ml/d)	0.18	0.38	0.65	0.73	1.21	1.52	1.97	2.41	3.00
SW Contribution (minus full extant planning) (Ml/d)	0.02	-0.04	-0.02	-0.12	0.27	0.53	0.95	1.39	1.98
Capacity for Local Plan growth (Dwellings)	0	0	0	0	1,311	1,197	2,016	2,034	2,764
Capacity for Local Plan growth with employment growth delivered (Dwellings)	0	0	0	0	1,040	1,050	1,816	1844	2,585

Table 10.2 Water demand by year in 85l/p/d scenario 2031 to 2039

Year	30/31	31/32	32/33	33/34	34/35	35/36	36/37	37/38	38/39
Water demand 85l/p/d (Ml/d)	2.46	2.85	3.18	3.50	3.85	4.19	4.48	4.71	4.94
SW Contribution (Ml/d)	3.77	3.91	4.05	4.18	4.30	5.06	5.17	5.28	5.39
SW Contribution (minus full extant planning) (Ml/d)	2.75	2.89	3.03	3.16	3.28	4.04	4.15	4.26	4.37
Capacity for Local Plan growth (Dwellings)	3,603	581	515	470	408	3,560	347	415	368
Capacity for Local Plan growth with employment growth delivered (Dwellings)	3,427	409	355	313	248	3,400	196	275	228

Table 10.3 Water demand by year in 110l/p/d scenario 2021 to 2030

Year	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30
Water demand 110l/p/d (Ml/d)	0.00	0.01	0.05	0.18	0.42	0.75	1.44	2.05	2.59
SW Contribution (Ml/d)	0.18	0.38	0.65	0.73	1.21	1.52	1.97	2.41	3.00
SW Contribution (minus full extant planning) (Ml/d)	0.02	-0.04	-0.02	-0.12	0.27	0.53	0.95	1.39	1.98
Capacity for Local Plan growth (Dwellings)	0	0	0	0	1,023	945	1,593	1,642	2,237
Capacity for Local Plan growth with employment growth delivered (Dwellings)	0	0	0	0	700	777	1,384	1,440	2,044

Table 10.4 Water demand by year in 110l/p/d scenario 2031 to 2039

Year	30/31	31/32	32/33	33/34	34/35	35/36	36/37	37/38	38/39
Water demand 110l/p/d (Ml/d)	3.10	3.56	3.94	4.31	4.71	5.10	5.43	5.67	5.92
SW Contribution (Ml/d)	3.77	3.91	4.05	4.18	4.30	5.06	5.17	5.28	5.39
SW Contribution (minus full extant planning) (Ml/d)	2.75	2.89	3.03	3.16	3.28	4.04	4.15	4.26	4.37
Capacity for Local Plan growth (Dwellings)	2,902	580	545	515	478	2,917	448	494	457
Capacity for Local Plan growth with employment growth delivered (Dwellings)	2,711	391	366	340	301	2,739	278	331	294

B Appendix B - Definition of non-household per capita consumption

242. In Part B the non-household demand was estimated based on the number of employees. The British Water code of practice, "Flows and Loads 4" (British Water, 2013) 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. This gave a figure of 63l/p/d.

243. During the stakeholder workshops, this was challenged as being too high. Further research has identified alternative figures between 16l/p/d (Ciria) and 50l/p/d (South Staffs Water, Undated). The 50l/p/d figure has been adopted for this work as a precautionary approach.

244. 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 30 l/p/d).

C Appendix C - Definition of a water efficiency target

245. Ofwat published a study in 2018 into the long-term potential for reductions in household water demand (Artesia Consulting, 2018). 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.

246. 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 much of the solutions needed to reach 49l/p/d would require the development and adoption of new technology, and a significant shift in behaviour, we consider it to be too ambitious to take forward as part of this Strategy for the Sussex North WRZ, at least for the early years of the plan period. However, it provides a useful indication for what might be achieved in the future.

247. 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 result 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.

248. 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 properties with gardens. In this scenario, a water use of 86 l/p/d was achieved.

249. This is supported by research conducted by the Energy Saving Trust (EST) 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 (Energy Saving Trust, 2020).

250. Two developers with development planned in Sussex North provided anecdotal evidence via Defra that if too low an efficiency standard was introduced, this would impact customer experience and make it more likely that customers would remove water efficiency products within the first two years, faster than when a bathroom is replaced, which typically after 8 years. However, they had no issue with building to a standard of 100 l/p/d. In the same consultation, the Home Builders Federation (HBF) stated that "100 l/p/d was just about achievable with minimal increase in cost."

251. There is a risk that if 85 l/p/d were implemented based on a fittings approach, within a short space of time, those fittings are swapped for higher water use fittings. This would mean that a house built to 85 l/p/d house, may in a relatively short space of time, become, a higher water user.

252. Incorporating RwH or GwR within a development can provide the reduction in water demand without impacting on the customer experience as the water demand from toilet use and washing machines can be met through rainwater or greywater (from the shower). Water efficient fittings should still be utilised, but there is more flexibility in their specification. This may avoid the risk of new build demand being higher than expected.

253. Through the market engagement exercise described in Section D.3, suppliers of RwH and GwR were contacted. The cost of incorporating RwH or GwR on a new-build property is lower than a retrofit as it can be built into the design at an early stage, and the people required to install it are already on-site. For large developments, a GwR supplier may provide training for the builder on the first system, then return to commission the system, reducing the cost of installation. If underground storage is required, this can be provided at the same time as other excavations further reducing the cost compared to a retrofit system.

D Appendix D - Cost of achieving water efficiency targets

D.1 Housing Standards Review:

254. The 2014 housing standards review examined the cost of achieving different levels of the (now defunct) Code for Sustainable Homes (CfSH). It showed the additional cost of achieving a PCC of less than 105 l/p/d from the usual industry practice would be between £7 and £10 per dwelling depending on the type.

255. Going further and achieving a PCC of less than 80 l/p/d would cost between £1,004 and £3,010 depending on dwelling type. The jump in cost between these two levels was due to the anticipated requirement to use RwH to achieve 80 l/p/d. These costs are summarised in Table 10.5

Table 10.5 Cost of achieving higher levels within CfSH

Dwelling type	Level 1 and 2 (≤120 l/p/d)	Level 3 and 4 (≤105 l/p/d)	Level 5 and 6 (≤80 l/p/d)
1 Bed Apartment	-	£7	£1,004
2 Bed Apartment	-	£7	£1,004
2 Bed Terrace	-	£7	£2,456
3 Bed Semi-detached	-	£10	£3,010
4 Bed Detached	-	£10	£3,010

D.2 Independent review of the costs and benefits of rainwater harvesting and grey water recycling options in the UK

256. Waterwise commissioned a report (from Ricardo) on the costs and benefits of RwH and GwR systems (Waterwise, 2020). Costs of different sized schemes were presented based on the reported costs contained in survey responses from suppliers. Unfortunately, these costs are averaged from a small number of responses and skewed towards commercial schemes that are different in design to most residential development being planned in the Sussex North WRZ. For example, RwH applied to a school, office complex or hotel would require only internal distribution pipework, whereas a significant, below-ground distribution network would be required to supply low to medium density housing developments. The costs in the Waterwise report cannot, therefore, be used in this study to provide a reliable cost per dwelling. The particularly low number of responses for GwR schemes reflects how new this technology is for residential developments in the UK.

257. The report does state the cost of a small-scale domestic system as £900 to £3,000, which is comparable to the RwH costs obtained in the market engagement study. For large-scale schemes, the costs appear to be greater for GwR than RwH, however, the size bands used by Ricardo are different, so it is not possible to directly compare the costs.

D.3 Developer engagement exercise

258. As there is limited published information on the cost of achieving tighter water efficiency standards, an engagement exercise was conducted in order to gain an understanding of costs from developers. The Homebuilders Federation (HBF) and Land Promoters and Developers Federation (LPDF) were asked to contact their members with a request for indicative costs of meeting a target of 85 l/p/d from a baseline of 110 l/p/d.

259. No response was received from the HBF, but LPDF passed on the request. Two developers and one land promoter responded.

260. Homes England were also contacted with the same request however they were unable to provide information on the cost of achieving tighter standards.

261. The land promoter used a recent development example where bids were received from a number of developers. The cost varied based on the method chosen to achieve 85l/p/d.

262. Where a water efficient fittings approach was used, the cost range was £249 to £331 per dwelling. In addition, a further £100 would be required to upgrade fitted appliances to more water efficient models.

Note that for some units, where appliances are not part of the standard fit-out, this additional cost would rise to £800 to £1,200.

263. Where GwR was specified, the cost increased to between £4,000 and £4,340. RwH was not used in any of the proposals.

D.4 Defra

264. Defra provided a briefing note (08 June 2022) in support of a standard of 100 l/p/d. this presented an analysis of the Energy Saving Trusts "Independent review of the costs and benefits of water labelling options in the UK".

265. The cost of achieving 95 l/p/d using an efficient fittings approach was stated as an additional £322 per home.

E Appendix E – SW Contribution

Table 10.6 SW Contribution from water demand management 21/22 to 29/30

Year	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30
SW contribution from water demand reduction	0.21	0.43	0.73	0.82	1.35	1.69	2.19	2.68	3.34
SW after 10% safety margin	0.18	0.38	0.65	0.73	1.21	1.52	1.97	2.41	3.00

Table 10.7 SW Contribution from water demand management 30/31 to 38/39

Year	30/31	31/32	32/33	33/34	34/35	35/36	36/37	37/38	38/39
SW contribution from water demand reduction	4.19	4.35	4.50	4.64	4.78	5.62	5.74	5.87	5.99
SW after 10% safety margin	3.77	3.91	4.05	4.18	4.30	5.06	5.17	5.28	5.39

F Appendix F - Offsetting measures

F.1 Market engagement exercise

266. There is limited published information on the cost of implementing offsetting options such as RwH and GwR and the figures that are available are in some cases quite old. A market engagement exercise was therefore carried out to obtain up to date costs for the offsetting measures being assessed.

267. A vendor search was carried out to identify potential suppliers of the following services:

- Household and non-household water efficiency visits
- Consumer leakage reduction
- Non-household leakage reduction
- Consumer side pressure reduction
- Household and non-household rainwater harvesting
- Household and non-household greywater recycling
- Network leakage reduction
- Water neutrality as an overall package
- Water efficiency education

268. A questionnaire was prepared in Microsoft Forms to obtain the following information from vendors:

- Are you able to offer the measure?
- A description of the measure
- Has the measure been implemented (and at what scale)?
- If no, has a pilot study been carried out?
- Are you able to provide an indicative cost? (Including assumptions used)
- Are you able to provide an indicative benefit? (Including assumptions used)
- Any additional comments on the use of this measure.

269. A link to this questionnaire was sent to the vendors identified along with a briefing note explaining the purpose of the research and reassuring potential vendors that commercial confidentiality would be protected. i.e., costs would not be published alongside information to identify the company responding.

270. This was sent to 20 companies, and 8 responses were received (two responses were received from Southern Water.

271. Responses were received on:

- Retrofitting household RwH (cost information provided)
- Retrofitting non-household RwH (cost information provided)
- Retrofitting household GwR (cost information provided)
- Retrofitting non-household GwR (cost information provided)
- Household water efficiency visits (costs not provided)
- Non-household water efficiency visits (costs not provided)
- Household leakage reduction (costs not provided)
- Non-household leakage reduction (costs not provided)
- Educational activities (costs not provided)
- Water neutrality as service (costs not provided)

272. No responses were received on:

- Consumer pressure reduction
- Network leakage reduction

273. Follow up interviews were carried out with Southern Water and two other potential suppliers of offsetting measures. These discussions provided insights in the costs, benefits and factors to consider for RwH and GwR and are included in F.5 to F.8.

274. Conversations with SW clarified that household water efficiency visits, and leakage reduction were included in their T100 programme and could not be used for additional offsetting in Sussex North.

F.2 Household visits

275. This is a visit to an existing residential customer (which could be in person or virtual) to undertake water saving activities, which could be in the form of a water audit, providing advice on water saving, and fitting water efficient fitting such as tap aerators or flush cistern volume reducers.

276. Typically, these are carried out by the water company, focussing on high-consumption households. There is potential that Councils and Housing Associations could undertake such visits on their own housing stock. Southern Water are currently undertaking household visits as part of their Target 100 programme. An offsetting scheme utilising household visits would have to be either conducted by, or with the cooperation of Southern Water to ensure that households were not visited twice.

277. Southern Water have reported a 36-litre per household saving on average as a result of a household visit (Greater Brighton, 2020). This was achieved prior to the COVID-19 pandemic, and high consumption

households were targeted. Since the start of the pandemic, SW have seen this figure reduce to 24 litres per household.

278. SW have recently stated that as a result of changing working patterns due to Covid-19, more water is currently being used in the WRZ than expected when their WRMP was prepared. As a result of this, SW need to carry out more household visits (amongst other measures) to meet their targets to reduce overall PCC in Sussex North (which provides a significant contribution to the Water Neutrality Strategy).

279. Household visits would therefore no longer be available to use as part of an offsetting programme, as the customers that would be targeted in the offsetting scheme would now be needed as part of SW's WRMP activities, rather than unlock additional capacity and it is not possible to determine which customers would now be included in SW's work.

F.3 Non-household visits

280. Due to market separation in 2017, Southern Water (along with other wholesale water companies) ceased much of their activities to promote water efficiency in the non-household sector. A 2020 parliamentary briefing (UK Parliament, 2020) found that non-household retail competition "has not yet delivered on expectations for water efficiency improvements." There may therefore be significant opportunities in this area to reduce non-household demand.

281. SW have confirmed they will not be undertaking non-household activities within Sussex North as part of the WRMP (focusing on other WRZs). A non-household water efficiency programme can therefore be delivered in Sussex North.

282. In other WRZs, SW's non-household programme will consist of:

- a smart meter installation programme, followed by interventions based on data from their billing to prompt less water use;
- a smarter tariff programme to incentivise lower water use, including a phased removal of the discount tariff for large users;
- an annual community-based Water Efficiency Fund, inviting and funding bids made by communities for water-efficiency projects;
- an annual Bid Assessment Framework Fund, inviting and funding bids made by retailers delivering water efficiency projects for their customers;
- an annual Water Recycling Fund, inviting and funding bids made by retailers willing to replace potable water with treated effluent (where it is safe to do so), such as golf courses for watering grass, washing commercial vehicles or for road cleaning; and
- a programme of work to reduce the volume of potable water used in SW's own wastewater treatment works.

283. Of the measures listed above, the first involving smart meter installation and interventions based on the resulting data, most readily lends itself to LPA-led offsetting Scheme and provides the most certainty.

284. Many of the non-household opportunities rely upon the Scheme having access to data on existing water usage by non-household customers, data which is held by the retail suppliers. Successful implementation of these opportunities would therefore rely upon significant collaboration from the retail suppliers active within Sussex North, and potential additional support from Market Operator Services Limited (MOSL) and Southern Water to assist engagement with the retailers.

285. The complexity and cost of undertaking water audits in a non-household setting will vary significantly based on the size of the business and their activities. In a simple office building with kitchen area and toilets, a water audit would be similar to one undertaken in a residential setting and would be likely to achieve similar results at a similar cost per litre to household water audits.

286. The cost of a household visit was reported in Part B as £100 per household, and the predicted water demand saving was 25l/household. The cost per litre of a household visit is therefore £4/l/d based on information provided by SW.

287. Water audits in non-household settings where potable water is being used in industrial processes or in leisure activities would be more complex and would need to be assessed on a case-by-case basis, with the highest water users being prioritised for advice. Where there is scope to switch away from or reduce the volume of potable water used, the water saved could be significant.

288. For the purpose of defining a cost and benefit for this Strategy, the cost of a non-household visit could be based on the cost per litre for a household visit. This provides a conservative figure, with just water use in toilets and sinks addressed, but with additional savings possible in some circumstances.

F.4 Schools programme

289. There are 94 schools within the Sussex North WRZ contributing a total water demand of 0.46Ml/d on average through the year. A reduction in water usage in these existing buildings has the potential to offset some of the additional growth within the WRZ. Within this figure there are different types of school (Nursery, Primary, Secondary and Special schools) and different types of management / governance. 44 schools are "County Schools" where WSCC own the land and buildings and have responsibility for maintenance. A retrofitting programme would be simplest to implement in these schools. Other management types such

as Academies, Foundation schools, Voluntary aided etc may also be able to contribute, but this would be on a voluntary basis as the County Council have no direct influence.

290. Waterwise produced an "Evidence Base for Large-scale Water Efficiency" in 2011 which included the findings of six separate water efficiency programmes in schools (Waterwise, 2011). This involved retrofitting projects in 633 schools in five regions and was delivered by the EA, Essex and Suffolk Water, Severn Trent Water, Southern Water, Thames Water and Business Stream.

291. The retrofitting measures varied from school to school but included:

- Dual-flush retrofit.
- Cistern dams and displacement devices.
- Retrofit push taps.
- In-line flow regulators.
- Outlet aerators.
- Adjustment to existing push or timed taps.
- Urinal control devices.

292. The results of this study demonstrated a mean water saving of 1,340 litres per pupil per year at a cost of £0.51 per litre per day. A saving of approx. 20% in water demand. This cost has been uplifted to a 2021 based on the Bank of England inflation calculator, providing an updated cost of £0.61 per litre per day.

293. In order to offset water demand from new school places in Sussex North, 0.18Ml/d of water savings are required.

294. Within West Sussex the 44 community schools under direct influence of WSCC, generate an estimated water demand of 0.19Ml/d. If an equivalent programme of retrofitting was conducted on all the existing schools in Sussex North and the same result was obtained, the maximum saving would be 0.04Ml/d – approximately 20% of the total required to offset all additional school water demand. Other types of schools will therefore be required in order to offset all school growth. The potential from these remaining types of schools is 0.09Ml/d.

295. The waterwise report focuses on savings made by installing water efficient fittings. There is potential for further savings if RwH were used in addition.

296. Data from a Thames Water study shows in a typical school 70% of the water demand come from toilet flushing, urinal flushing and washing hands. With the exception of handwashing, rainwater could replace potable water, reducing demand by up to 60%.

297. Priority from this measure should go to offsetting new schools, and an increase in pupil numbers at existing schools.

298. A programme in schools has several benefits. Measures delivered in schools are less likely to be replaced as may be the case in a domestic setting and are more likely to be maintained. The installation of water efficiency measures, or RwH could be accompanied by the delivery of an educational programme increasing awareness of the need for water saving, having a benefit both in school, and in the home.

F.5 Rainwater Harvesting – Household

299. RwH has the potential to reduce water demand by a third if the RwH system was used for both toilet flushing and laundry, however the cost and disruption of retrofitting a system into existing housing (at a few thousand pounds per property) may limit the uptake for this sort of measure unless there are incentives for homeowners to come forward and financial support is available. However, the potential is significant, equating 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.

300. Four responses were received in the market engagement exercise from companies able to offer retrofitting of RwH to residential properties. Each were keen to stress that installation costs will vary based on available space, existing pipework and access.

301. Supply of a single dwelling system is between £1,000 and £3,000 depending on the size. Installation cost for a simple retrofit is up to £5,000, a total cost of between £6,000 and £8,000. This could be reduced if building work was already taking place on the house, or if an overground storage tank were used.

302. The baseline cost per litre of an offsetting scheme based on RwH would therefore be between £54 and £72 per litre per day saved. This makes it a very expensive option in comparison to other offsetting options so is not considered further in the Strategy.

F.6 Rainwater Harvesting – non-household

303. Commercial buildings offer a large potential for RwH due to their large roof areas. The cost of retrofitting would depend on the size of the system required and the complexity of the installation.

304. In a non-household setting, rainwater can be used to meet the demand from toilet flushing, and where it is present, uses such as vehicle washing. The demand from these sources will be balanced against the collection area (usually the roof area) and the available space for storage.

305. The British Standard BS8515 dictate that 18 days storage must be provided, however longer periods may be considered if there are concerns on resilience and to increase the certainty that mains water will not be used in a prolonged dry spell. This could increase the cost as larger storage tanks or more extensive excavations may be required. This storage may be above or below ground, and internal or external to the building depending on available space and the requirements of that site. Below ground storage will require excavation (and removal of material) and is therefore likely to increase the cost. It is possible to combine RwH storage with the storage requirements of the site's Sustainable Drainage System (SuDS), thereby reducing overall storage requirements and costs. Guidance on calculating combined storage volumes is provided in the SuDS Manual (Ciria, 2015). Inclusion of RwH as part of a site's SuDS system should not preclude meeting the objective of multifunctional SuDS as defined in the PPG (UK Government, 2022). For example, ponds and wetlands can be used to store surface water for use in RwH systems, site irrigation and other non-potable uses.

306. Fitting a RwH system will also require new pipework, the cost of which will vary depending on whether toilets are situated on an external wall, in one block or distributed throughout the building.

307. Two RwH suppliers were interviewed as part of the market engagement exercise and provided some guideline pricing for retrofitting office buildings.

308. Two sizes of offices were discussed, an office with 50 employees and one with 500. A below ground tank was assumed for both.

309. Equipment costs for these two cases are expected to be in the region of £3,500 and £35,000 respectively.

310. Installation costs are difficult to define as each site may be different, but it is expected that this could be approximately the same as the equipment costs. Based on the system being used to remove the toilet flushing demand in both cases, the cost per litre per day removed from public water supply is in the range £50-£100.

311. Agricultural buildings are likely to be at the lower end of this scale as it is more likely that above ground storage may be used, or that excavated earth could be stored on site.

312. Defining the potential capacity that could be delivered by RwH in non-household applications is difficult. If schemes were limited to toilet flushing, in order to provide 0.25Ml/d of offsetting, assuming two 4l flushes per day (assumption provided by RwH supplier), a total of 35,000 employees would be required to shift from mains fed to

rainwater fed toilets. For comparison, there are 96,000 employee jobs in Crawley, 54,000 in Horsham, and approximately 2,850 within Sussex North in Chichester (the figure for SDNPA is not known).

313. Delivering such a widespread scheme based on toilet flushing would be unlikely as although individual companies would not have to bear the cost of the scheme, there may be disruption and the financial incentive via water bill savings is not significant.

314. Other water uses, such as agriculture and vehicle washing are therefore likely to be required as well as toilets.

F.7 Greywater Recycling – household

315. Like RwH, GwR has the potential to reduce water demand by a third if the GwR system was used for both toilet flushing and laundry.

316. In the market engagement exercise, only two companies were able to offer household GwR, however one of these stated this it was not commercially viable.

317. Information on cost was supplied by the other vendor who stated a cost of £4,600 for supply of the system. A further £2,000 would be required for installation and modifications to pipework., giving a total cost of £6,600. The cost per litre per day is therefore very similar to RwH and is not considered further in this Strategy.

F.8 Greywater Recycling – non-household

318. Greywater recycling works by collecting the water used in processes such as showering or clothes washing and using this for another use such as toilet flushing. In the non-household setting, particularly in offices, the source of greywater may therefore be limited, and even where showers are present, the usage may not provide sufficient water to justify retrofitting the system.

319. There may however be some businesses where this could be explored.

F.9 Golf course irrigation

320. The British and International Golf Greenkeepers Association (BIGGA) carried out a survey in 2019 (BIGGA, 2019) reported that just under 50% of golf facilities rely on mains potable water supply for irrigation. The report also notes that the water industry suggests the figure is higher at 66%.

321. Castle Water (a water retailer) state that a typical golf course uses between 378.5m^3 to 3,785m^3 of water per week in the summer months (Castle Water, 2020). Assuming these figures are reflective of the golf courses within Sussex North, there is large potential for saving water if an alternative source of water for irrigation could be found.

322. The R&A is a leading body in golf, with a remit to engage and support golf activities around the world. They have launched the R&A Golf course 2030 Water Security project (R&A, 2022) to increase preparedness of UK and Irish golf courses for climate change and promote long term water security. As part of this project case studies have been prepared with examples of where courses have either reduced their reliance on mains water or become self-reliant for water. Identified measures included boreholes, rainwater harvesting from driving range roofs, or rainwater fed storage reservoirs for supplying irrigation systems.

323. 22 case studies were analysed to identify the volume of water switched away from mains supply, and the costs involved. Each scheme varies considerably in cost depending on the nature of it, but the aggregated values allow a cost per litre per day to be defined. This was calculated to be £8.17/l.

324. According to Ordnance Survey Greenspace mapping, there are 12 golf courses within Sussex North. If these courses are at the lower end of Castle Water's estimate, peak water use in the summer could be as high as 2.25Ml/d, (although averaged over a year this will be considerably less). Further research is required to understand the capacity of an offsetting scheme within Sussex North, and as the majority are not in public ownership, participation would be on a voluntary basis., However, the potential of this approach to contribute significantly to an offsetting scheme may be is large.

F.10 Flow regulator

325. A pilot project is currently underway in Crawley, trialling the use of a flow regulator device, retrofitted to existing properties to reduce the volume of water used in the property. This is currently focussed on a trial of 100 dwellings but could if successful be rolled out more widely across the Crawley Homes stock.

326. This same device has been fitted in an Affinity Water area and found to save 64 litres per household per day. A conservative estimate of 20l per person per day will be applied in calculations in this report, but the benefit could be higher. The pilot scheme underway with Crawley Homes can be used to refine this figure once complete.

327. Crawley Homes have a housing stock of 8,223 properties. If 60% of CBC housing stock could be fitted with this device, this would provide 0.25Ml/d of demand reduction in Sussex North. There are a further 2,500 housing association properties in Crawley that may provide a further saving of 0.08 Ml/d. Elsewhere in Sussex North, Horsham has limited council owned stock, with 6,500 being managed by registered providers. Whilst these are not directly under council control, the potential for offsetting is 0.20Ml/d and creating a potential saving both in water bills and energy costs for the occupants of these houses. If it were part of a central offsetting scheme, it could be delivered at no cost to the registered provider or tenants.

328. The combined offsetting potential across both Horsham and Crawley is 0.52Ml/d (assuming 60% of properties are retrofitted).

329. 60% has been proposed by CBC as a realistic proportion of Crawley Homes housing stock available for retrofitting. This is based on the following factors:

- A small proportion of housing stock will be situated outside the Sussex North WRZ.
- Some dwellings cannot be retrofitted with this device due to issues with the pipework.
- Some properties built since 2010 are likely to be more water efficient and so would not be prioritised.

G Appendix G - Current governance structure

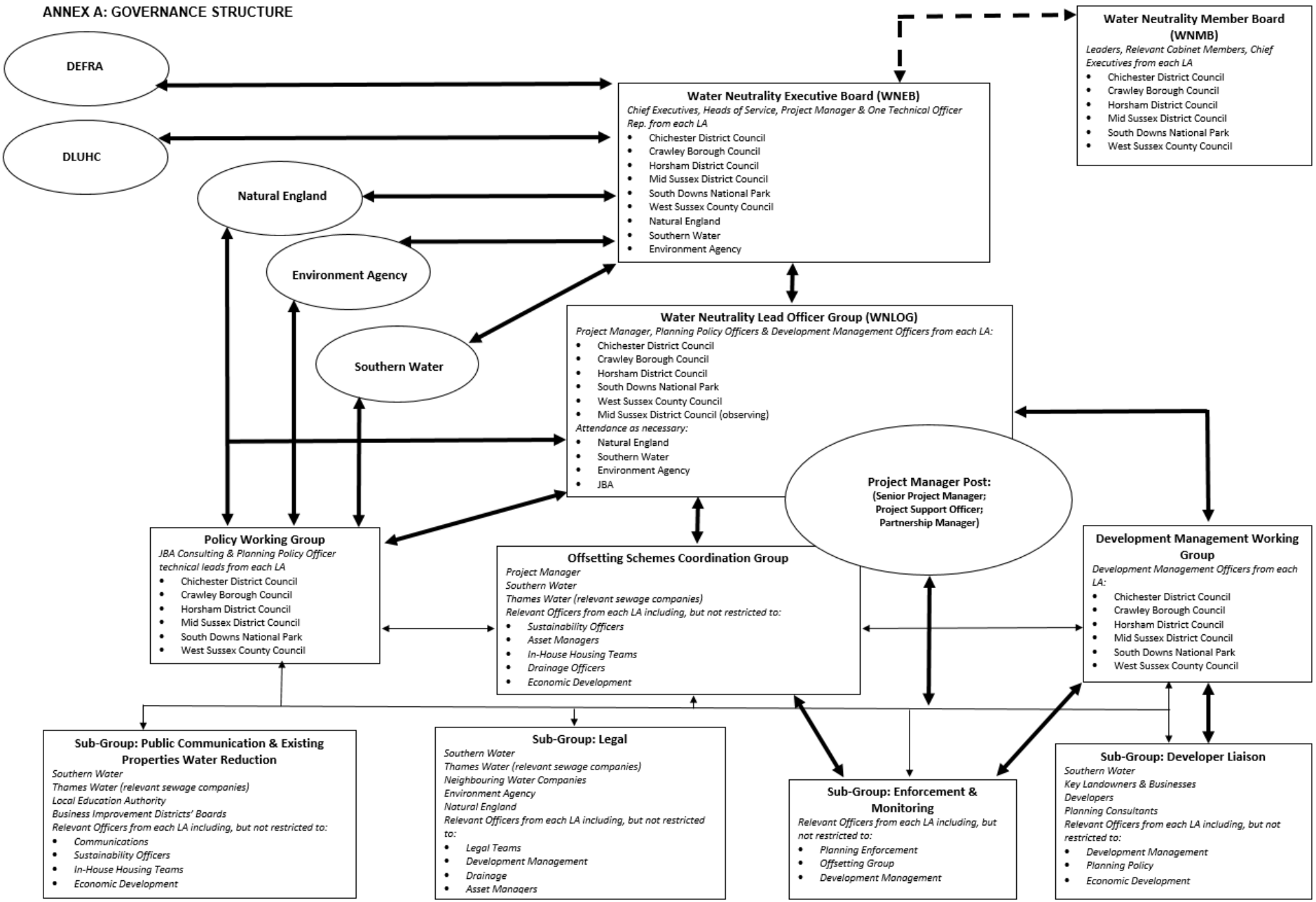

Figure 10.1 Governance structure defined by commissioning LPAs

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

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