Lewes District Council - Water Cycle Study

Scoping Report

Lewes District Council

Project number: 60676353

March 2023

Delivering a better world

Quality information

Prepared by	Checked by	Verified by	Approved by
Sophie Brewer Consultant	Sarah Littlewood Principal Consultant	Carl Pelling Technical Director	Una McGaughrin Associate Director

Revision History

Revision	Revision date	Details	Authorized	Name	Position
P01	January 2023	Draft	CP	Carl Pelling	Technical Director
P02	March 2023	Final	CP	Carl Pelling	Technical Director

Distribution List

# Hard Copies	PDF Required	Association / Company Name

Prepared for:

Lewes District Council

Prepared by:

AECOM Limited
3rd Floor, Portwall Place
Portwall Lane
Bristol BS1 6NA
United Kingdom

T: +44 117 901 7000
aecom.com

Table of Contents

1. Introduction 6
1.1 WCS Scope 6
1.2 Objectives 6
1.3 Study governance 7
1.4 Report structure 7
2. Study Area and Growth 8
2.1 Study area 8
2.2 Growth 8
3. Baseline Assessment 10
3.1 Legislative and policy context 10
3.2 Current infrastructure provision 12
3.3 Settlement pattern 13
3.4 Water environment 14
3.5 Flood risk 19
4. Wastewater Treatment 21
4.1 Wastewater in the Study Area 21
4.2 Drainage and Wastewater Management Plans 22
4.3 Management of WwTW Discharges 24
4.4 Water quality and discharges 28
5. Water Supply 29
5.1 Abstraction Licensing Strategies 29
5.2 Water Resource Planning 30
6. Nature-based Solutions 34
7. Summary 38
8. Recommendations for Detailed Water Cycle Study 40
Appendix A Policy and Legislative Drivers Shaping the WCS 41
Appendix B Site Specific Policies 43
Appendix C WFD classifications for water bodies in the study area 44
Appendix D SFRA Maps 49
Appendix E DWMP Review 51

Figures

Figure 1-1: The water environment and water services infrastructure components 6
Figure 2-1: Study Area 8
Figure 3-1: Bedrock geology and watercourses within the study area 15
Figure 3-2: Superficial geology and watercourses within the study area 16
Figure 3-3: SSSIs within study area 18
Figure 6-1: Working with Natural Processes potential across the LDC study area 35
Figure 8-1: Overflows exceeding discharge frequency threshold per annum at Peacehaven Brighton WwTW 51
Figure 8-2: Overflows exceeding discharge frequency threshold per annum at Newhaven East 52
Figure 8-3: Overflows exceeding discharge frequency threshold per annum at Goddards Green WwTW 53

Tables

Table 3-1: Description of the WFD surface water body status 10

Table 3-2: SSSIs located within the LDC study area 17
Table 4-1: Summary of WwTWs in the LDC study area 21
Table 4-2: Reliable limits of conventional treatment technology for wastewater 24
Table 4-3: WwTW with numeric permits DWF headroom assessment results 27
Table 4-4: WwTW with descriptive permits DWF capacity assessment results 27
Table 5-1: Water resource availability status categories 29
Table 5-2: Resource availability classification within the LDC study area 30
Table 5-3: South East Water WRMP Preferred Plan Schemes for WRZ2 (Haywards Heath) 32
Table 5-4: South East Water Updated Draft WRMP Preferred Plan Schemes 32
Table 6-1: Natural Flood Management case studies and opportunities in the LDC study area 36
Table 7-1: Summary table of opportunities and constraints for growth in LDC study area 38

1. Introduction

1.1 WCS Scope

A Scoping Water Cycle Study (WCS) has been developed for Lewes District Council (LDC) as part of the evidence base to inform the spatial strategy of the Local Plan.

The objective of the WCS is to identify any constraints on planned housing growth that may be imposed by the water cycle. The WCS then identifies how these can be resolved i.e. by ensuring that appropriate Water Services Infrastructure (WSI) can be provided to support the proposed development, including the planning policy required to deliver it. It should provide a strategic approach to the management and use of water which ensures that the sustainability of the water environment in the area is not compromised. A broad overview of the interaction between the water environment and WSI which the WCS is concerned with is provided in Figure 1-1.

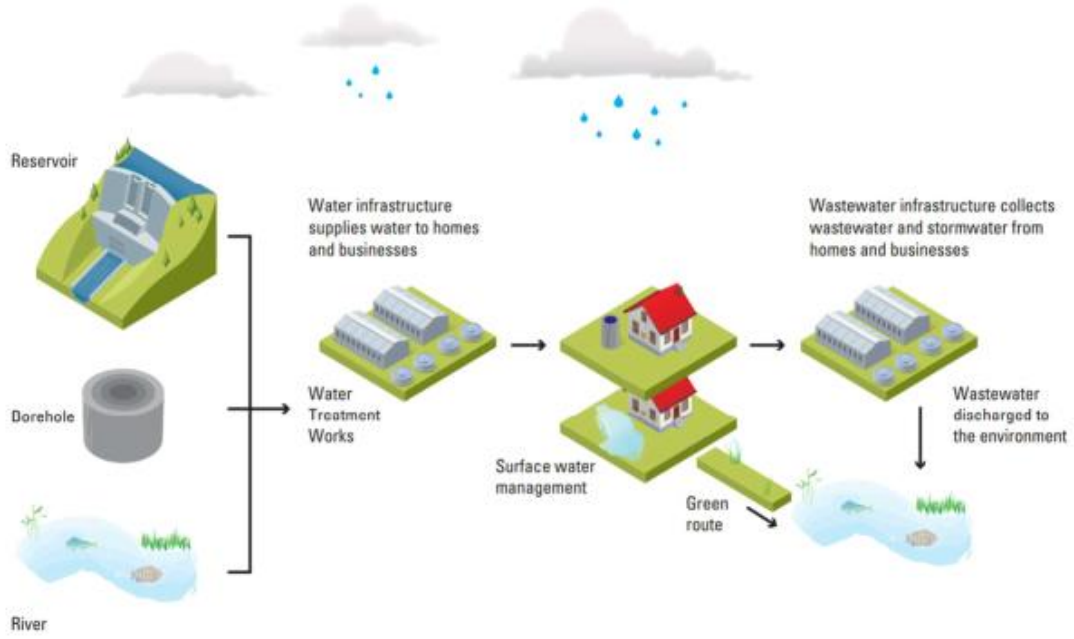


Figure 1-1: The water environment and water services infrastructure components

The aim of the Scoping WSC is to identify if existing water infrastructure capacity and environmental capacity could constrain growth across LDC study area (excluding the areas within the South Downs National Park Authority (SDNPA) area) and if there are any gaps in the evidence that are needed to make this assessment.

The Scoping WCS identifies recommendations for a Detailed WCS where there is greater certainty in the potential location for future development based on other opportunities and constraints.

1.2 Objectives

The objectives of this Scoping WCS are to:

- Establish the proposed study area.
- Establish growth numbers to be assessed and key locations including needs for existing commitments.
- Provide a summary of key items of relevance from existing evidence.
- Identify baseline environmental conditions that include Environmental Designations (RAMSAR, SPAs, SACs, SSSIs, Local Wildlife Sites, and Local Nature Reserves).
- Outline the evidence gaps and constraints on growth including:

  - Quantifying existing Wastewater Treatment Work (WwTW) headroom to allow identification of existing housing capacity at each WwTW and permit improvement headroom for water quality Conditions compared to limits of conventional treatment.
  - Quantifying water supply capacity.
  - Identifying flood risk constraints and opportunities.
- Review the potential for water linked nature-based solutions (such as Natural Flood Management (NFM) using available mapping and catchment plans which would support a Detailed WCS.
- Summarise the next steps required for undertaking a Detailed WCS.

1.3 Study governance

The Scoping WCS has been carried out with guidance and input from the following organisations:

- LDC
- South Downs National Park Authority (SDNPA)
- East Sussex Lead Local Flood Authority (East Sussex LLFA)
- Southern Water (SW)
- South East Water (SEW)
- Environment Agency (including reference to the Environment Agency WCS guidance[1])

In addition, a number of web based searches were undertaken for additional organisations identified by LDC, including Ouse and Adur Rivers Trust (OART) and Sussex Flow Initiative (SFI).

1.4 Report structure

This Scoping WCS report provides a succinct overview of the technical review and assessments which have been developed. The report is supported by a series of technical appendices which expand on the themes within the report or provide detail of the analysis and wider evidence base that has supported each aspect of the WCS.

The remainder of this report is structured as follows:

- Section 2: **Study area** definition and growth assessed.
- Section 3: **Baseline assessment** – including policy context, current water infrastructure services and water-based constraints and opportunities.
- Section 4: **Wastewater treatment** – a review of the current and future wastewater flow within the study area to identify where proposed growth might be constrained by treatment capacity.
- Section 5: **Water supply strategy** – a review of the planned water supply strategies.
- Section 6: **Nature-based solutions** – a review of the constraints and opportunities for water-linked nature-based solutions.
- Section 7: **Summary** – a summary of the Scoping WCS assessments.
- Section 8: **Recommendations** – a summary of the recommendations for a Detailed WCS.

[1] Available online at: https://www.gov.uk/guidance/water-cycle-studies (accessed January 2023)

2. Study Area and Growth

2.1 Study area

The Scoping WCS area is the LDC area excluding areas within the SDNPA as displayed in Figure 2-1. The SDNPA is excluded from this WCS as the SDNPA is its own planning authority and have already undertaken a WCS. This Scoping WCS focusses on areas in LDC where LDC have a responsibility for planning, however the WCS has considered areas outside of the LDC planning authority boundary which could have potential cross-boundary interactions.

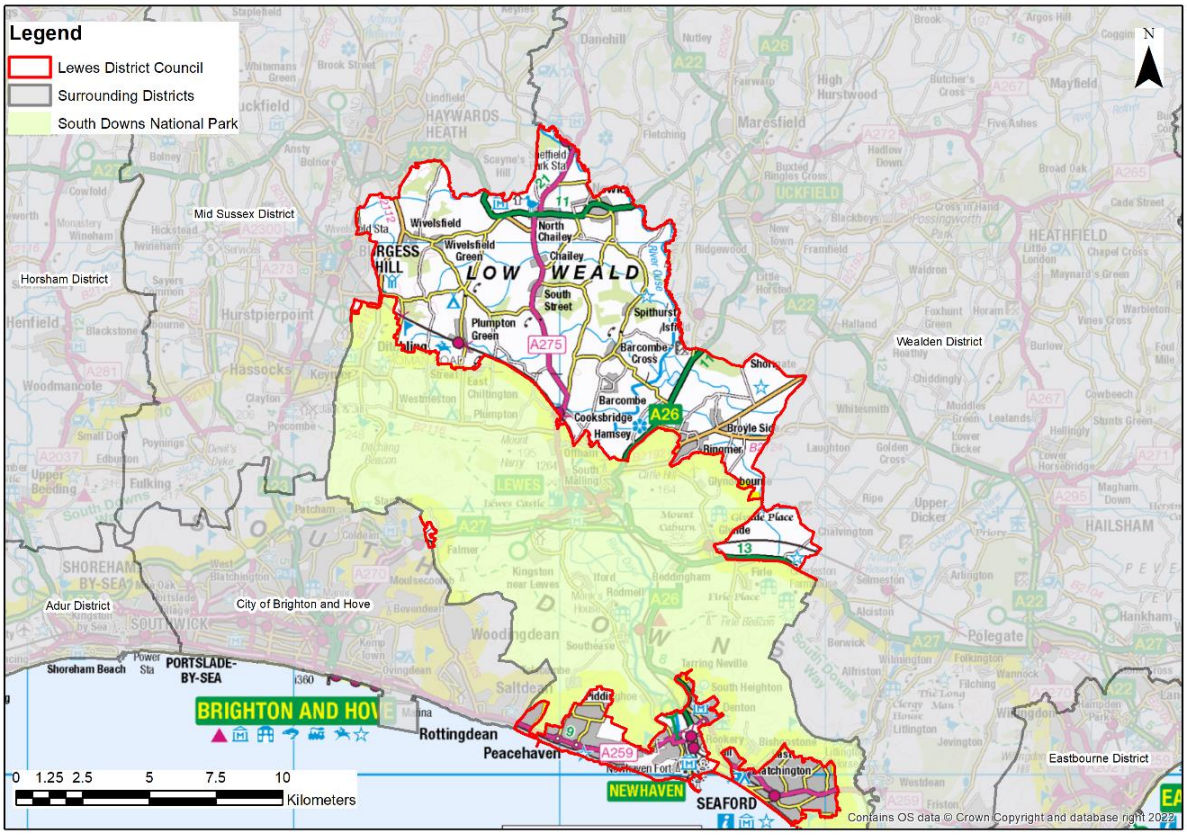


Figure 2-1: Study Area

2.2 Growth

The Lewes District Local Plan[2] was adopted in 2016 and sets out the scale, type and location of key development proposed in the district to 2030. The policies related to growth are Spatial Policy 1 and 2. This growth is related to the current adopted Local Plan and the Scoping WCS is providing the evidence base for the emerging proposed growth associated with the new Local Plan. Subsequently, a Detailed WCS will be undertaken to provide further evidence to inform the new Local Plan.

Spatial Policy 1 – Provision of housing and employment land

- In the period between 2010 and 2030, a minimum of 6,900 net additional dwellings will be provided in the plan area (this is the equivalent of approximately 345 net additional dwellings per annum).

[2] Lewes District Local Plan (2016). Available online at: https://www.lewes-eastbourne.gov.uk/_resources/assets/inline/full/0/257159.pdf (accessed September 2022)

- In the period between 2012 and 2031, in the region of 74,000 square metres of employment floorspace will be provided in the plan area. 60,000 square metres of this floorspace will be as industrial space, and 14,000 square metres will be as office space.

Spatial Policy 2 – Distribution of Housing

Part of the total 6,900 net additional dwellings will be met as follows:

- 1,020 completions in the period between April 2010 and April 2015
- The delivery of 1,558 commitments across the plan area
- An allowance for 600 dwellings to be permitted on unidentified small-scale windfall sites during the plan period and subsequently delivered
- An allowance for 125 dwellings to be permitted on rural exception sites during the plan period and subsequently delivered.

The remaining 3,597 net additional dwellings will be distributed as follows:

(1) Housing to be delivered on the following strategic site allocations:

- Land at North Street, Lewes – 415 net additional units
- Land at Old Malling Farm, Lewes – 240 net additional units
- Land to the north of Bishops Lane, Ringmer – 110 net additional units
- Land at Greenhill Way, Haywards Heath (within Wivelsfield Parish) – 113 net additional units
- Land at Harbour Heights, Newhaven – 400 net additional units
- Land at Lower Hoddern Farm, Peacehaven – 450 net additional units.

(2) Planned housing growth at the following settlements:

- Lewes – a minimum of 220 net additional units
- Newhaven – a minimum of 425 net additional units
- Peacehaven and Telscombe – a minimum of 255 net additional units which will all be contingent upon developers identifying and demonstrating to the satisfaction of the local highway authority, and delivering, a co-ordinated package of multi-modal transport measures required to mitigate the impacts of development on the A259
- Seaford – a minimum of 185 net additional units
- Burgess Hill (within Wivelsfield Parish) – a minimum of 100 net additional units
- Barcombe Cross – a minimum of 30 net additional units
- North Chailey – a minimum of 30 net additional units
- South Chailey – a minimum of 10 net additional units
- Cooksbridge – a minimum of 30 net additional units
- Ditchling – a minimum of 15 net additional units
- Newick – a minimum of 100 net additional units
- Plumpton Green – a minimum of 50 net additional units
- Ringmer and Broyle Side – a minimum of 215 net additional units
- Wivelsfield Green – a minimum of 30 net additional units

(3) About 200 net additional units in locations to be determined.

At the time of finalising the Scoping WCS, studies were ongoing to further refine the growth plans in the LDC study area. This report forms part of that evidence base.

3. Baseline Assessment

The existing water environment and water infrastructure provision has formed the basis upon which constraints to development have been assessed. The baseline assessment comprises a review of relevant legislation and policy, existing infrastructure provision, water environment and current flood risk.

3.1 Legislative and policy context

A list of key legislative drivers shaping the Scoping WCS is detailed in Appendix A. The primary drivers for this study are the Water Environment (Water Framework Directive (WFD)) Regulations 2017 and the Conservation of Habitats and Species Regulations 2017 (as amended).

3.1.1 Water Framework Directive

The environmental objectives of the WFD, as published in the Environment Agency's River Basin Management Plans (RBMPs)[3] and relevant to this WCS are:

- To prevent deterioration of the status of surface waters and groundwater,
- To achieve objectives and standards for protected areas, and
- To aim to achieve good status for all water bodies or, for heavily modified water bodies and artificial water bodies, good ecological potential and good surface water chemical status.

These environmental objectives are legally binding, and all public bodies should have regard to these objectives when making decisions (such as Local Plan development) that could affect the quality of the water environment. The Environment Agency publishes the status and objectives of each surface water and groundwater body on the Catchment Data Explorer[4]. Surface water bodies can be classed as high, good, moderate, poor or bad status; Table 3-1 gives a description of each of the status classes. Groundwater body status is classified on the basis of quantitative and chemical status and can be classified as good or poor.

Table 3-1: Description of the WFD surface water body status

Status	Description
High	Near natural conditions. No restriction on the beneficial uses of the water body. No impacts on amenity, wildlife or fisheries
Good	Slight change from natural conditions as a result of human activity. No restriction on the beneficial uses of the water body. No impact on amenity or fisheries. Protects all but the most sensitive wildlife.
Moderate	Moderate change from natural conditions as a result of human activity. Some restriction on the beneficial uses of the water body. No impact on amenity. Some impact on wildlife and fisheries.
Poor	Major change from natural conditions as a result of human activity. Some restrictions on the beneficial uses of the waterbody. Some impact on amenity. Moderate impact on wildlife and fisheries.
Bad	Severe change from natural conditions as a result of human activity. Significant restriction on the beneficial uses of the water body. Major impact on amenity. Major impact on wildlife and fisheries with many species not present.

The WFD Regulations are important to the WCS as provision of new WSI needs to ensure that the objectives of the Regulations are not compromised by ensuring that additional demand for water and discharge of additional wastewater does not adversely impact on the current and future status of waterbodies.

[3] South East river basin district river management plan (2022). Available online at: https://www.gov.uk/guidance/south-east-river-basin-district-river-basin-management-plan-updated-2022 (accessed January 2023)
[4] Available online at: https://environment.data.gov.uk/catchment-planning/ (accessed September 2022)

3.1.2 Conservation of Habitats and Species Regulations

The Conservation of Habitats and Species Regulations 2017 have designated some sites as areas that require protection in order to maintain or enhance the rare ecological species or habitats associated with them.

Although the Regulations do not directly set overarching environmental standards related to water quality and quantity (flow or level), the Regulations can, by the requirement to ensure no detrimental impact on designated sites, require site specific water quality, water level and water flow targets to be set for specific locations. This may in turn, require restrictions on discharges to (or abstractions) from water bodies which are hydrologically connected to water dependant habitats. These Regulations are important to the WCS as the provision of new WSI needs to ensure no detrimental impact on designated sites through abstraction and discharge impacts.

3.1.3 Adopted Local Plan

The Lewes District Local Plan[2] contains policies relevant to the WCS. The policy relating to water quality is Core Policy 10:

Core Policy 10 – Natural Environment and Landscape Character

Key points relating to water quality in Core Policy 10 include:

- *Ensure that water quality is improved where necessary or maintained where appropriate (including during any construction process) and that watercourses (including groundwater flows) are protected from encroachment and adverse impacts in line with the objectives of the South East River Basin Management Plan. Where appropriate, the local planning authority will seek the enhancement and restoration of modified watercourses.*

The Local Plan contains Core Policy 12 which relates to flood risk:

Core Policy 12 – Flood Risk, Coastal Erosion, Sustainable Drainage and Slope Stability

Key points relating to flood risk in include:

- *Steering development away from areas of flood risk. Development in areas of flood risk will be required to meet the national Sequential and Exception tests, where relevant.*
- *Where site specific flood risk assessments are required, directing applicants to demonstrate that the development and its means of access will be safe from flooding without increasing the risk of flooding elsewhere. Development should seek to reduce overall flood risk where possible.*
- *Requiring flood protection, resilience, resistance and mitigation measures appropriate to the specific requirements of the site. Such measures will be expected to have regard to the character of the natural and built environment of the site and surroundings, to climate change implications and to biodiversity.*
- *Liaising closely with the Environment Agency and East Sussex County Council on development and flood risk.*
- *Seeking the appropriate management of surface water runoff and ensuring there will be no increase in surface water runoff from new developments. This will include requiring new development to incorporate Sustainable Drainage Systems (SuDS), unless it is demonstrated that SuDS are not technically appropriate. The local planning authority will consult East Sussex County Council, the lead local flood authority, on the whole life management and maintenance of SuDS.*
- *Ensuring development avoids areas of undeveloped coastline unless it specifically requires a rural coastal location, meets the sequential test and does not have other adverse impacts.*
- *Preventing development on unstable areas of coastline and areas at risk of erosion and slope failure, such as those identified in the South Downs Shoreline Management Plan[5] [6].*

The Local Plan also contains Core Policy 14 which relates to sustainable water use:

[5] Beachy Head to Selsey Bill (South Downs) Shoreline Management Plan (2006). Available online at: https://www.brighton-hove.gov.uk/sites/default/files/2020-02/Beachy-Head-to-Selsey-Bill-SMP-FINAL.pdf (accessed January 2023)
[6] Whilst not in the adopted policy, other documents should be considered, including Brighton Marina to Newhaven Western Harbour Arm Plan: https://www.lewes-eastbourne.gov.uk/_resources/assets/inline/full/0/258572.pdf (accessed March 2023)

Core Policy 14 – Renewable and Low Carbon Energy and Sustainable Use of Resources

Key points relating to sustainable water use in Core Policy 14 include:

- *Require all new dwellings to achieve water consumption of no more than 110 litres per person per day, unless it can be demonstrated that it would not be technically feasible or financially viable. All new non-residential developments over 1000 square metres (gross floorspace) will be expected to achieve the BREEAM 'Very Good' standard and developers will be expected to provide certification evidence of the levels achieved in the relevant requirements/standards at the planning application stage.*

There are other site specific spatial policies relating to the WCS which are summarised in Appendix B.

3.1.4 Other strategies or plans

Full details of other relevant strategies or plans which relate to the water environment or provision of WSI for development in the study area are provided in Appendix A. The key strategies or plans most relevant to the WCS include, but are not limited to:

- Adur and Ouse River Catchment Drainage and Wastewater Management Plan (DWMP) (Southern Water, 2022).
- Lewes District Council Level 1 Strategic Flood Risk Assessment (AECOM, 2023).
- Water Resource Management Plan (WRMP) (South East Water, 2019).
- Water Resources South East (WRSE) Draft Regional Plan (WRSE, 2022).
- Adur and Ouse Catchment Management Plan (Adur and Ouse Partnership, 2012).

3.2 Current infrastructure provision

Two infrastructure providers operate within the study area:

Sewerage and wastewater treatment provider:

- Southern Water are responsible for providing sewerage and wastewater treatment to the LDC study area.

Potable water supply and network provider:

- South East Water are responsible for providing potable (clean) water to the majority of the LDC study area.
- Southern Water are responsible for providing potable water to a small area of the LDC study area, in eastern Saltdean and a small part of western Peacehaven.

As South East Water are the dominant supplier of potable water in the LDC study area, the South East Water WRMP has been used to inform this Scoping WCS, however, if development is highlighted to be located in areas where Southern Water provide potable water in the new Local Plan, the Southern Water WRMP should be considered as part of a Detailed WCS.

The average household per capita consumption (PCC) for South East Water is 150 l/h/d (litres per head per day) as stated in their WRMP[7].

3.2.1 WSI planning

It is important to consider the planning timelines, both in terms of the Local Plan and for water and sewerage providers in terms of the funding mechanisms for new water supply and water treatment infrastructure. There are elements of water company planning that are pertinent to the WCS and specifically, with regard to integration with spatial planning timelines for Local Planning Authorities (LPAs). Water companies have a statutory duty to supply water and wastewater services and therefore input to the planning process.

Financial and Asset Planning

[7] South East Water Resources Management Plan (2019). Available online at: https://cdn.southeastwater.co.uk/Publications/Water+resources+management+plan+2019/south-east-water-final-wrmp-2020-2080.pdf (accessed September 2022)

Water company planning for asset management and funding is governed by the Asset Management Plan (AMP) process which runs in 5 year cycles. The Office for Water Services (Ofwat) is the economic regulator of the water and sewerage industry in England and Wales and regulates this overall process.

In order to undertake maintenance of its existing assets and to enable the building of new assets (asset investment), water companies seek funding by charging customers according to the level of investment they need to make. The process of determining how much asset investment is required is undertaken in conjunction with:

- The Environment Agency as the regulator determining investment required to improve the environment,
- The Drinking Water Inspectorate (DWI) who determine where investment is required to improve quality of drinking water, and,
- Ofwat who, along with the Environment Agency, require water companies to plan sufficiently to ensure security of supply (of potable water) to customers during dry and normal years.

The outcome is a Business Plan which is produced by each water company setting out the required asset investment over the next 5 year period, the justification for it and the price increase required to fund it.

Overall, the determination of how much a water company can charge its customers is undertaken by Ofwat. Ofwat will consider the views of the water company, the other regulators (Environment Agency, DWI) and consumer groups such as the Consumer Council for Water when determining the price limits it will allow a water company to set in order to enable future asset investment. This process is known as the Price Review (PR) and is undertaken in 5 year cycles. When Ofwat make a determination on a water company's business plan, the price limits are set for the following 5 years allowing the water company to raise funds required to undertake the necessary investment within the AMP round. The current AMP period is known as AMP7 and it covers PR9 which runs from 1st April 2020 to 31st March 2025. Water and Sewerage Companies are currently in the process of developing their business plans for PR24 that will influence their future investment in AMP8 (April 2025 to March 2030).

Water Resources

Water Resources South East (WRSE) is an alliance of the six water companies that supply drinking water across South East England, including South East Water and Southern Water who cover the LDC study area. WRSE are working to develop a regional plan that presents a regional solution to make water supplies more resilient and address the projected future shortfall in the region's water resources. The draft regional plan was published in November 2022 and the final version is due to be published in 2023. Further information about the regional plan is available in Section 5.

WRMP

Water companies undertake medium to long term planning of water resources in order to demonstrate that a there is a long-term plan for delivering sustainable water supply within its operational area to meet existing and future demand. This is reported via a statutory WRMPs produced every five years to coincide with each of the water companies' five-yearly asset management (or business) plans. Further information on WRMPs is available in Section 5.

Draft DWMP

Water companies undertake long-term planning of wastewater management to improve drainage and environmental water quality. This is reported via a DWMP which is a long-term plan spanning 25 years that sets out how water and wastewater companies intend to extend, improve, and maintain a robust and resilient drainage and wastewater system. Further information on DWMPs is available in Section 4.

3.3 Settlement pattern

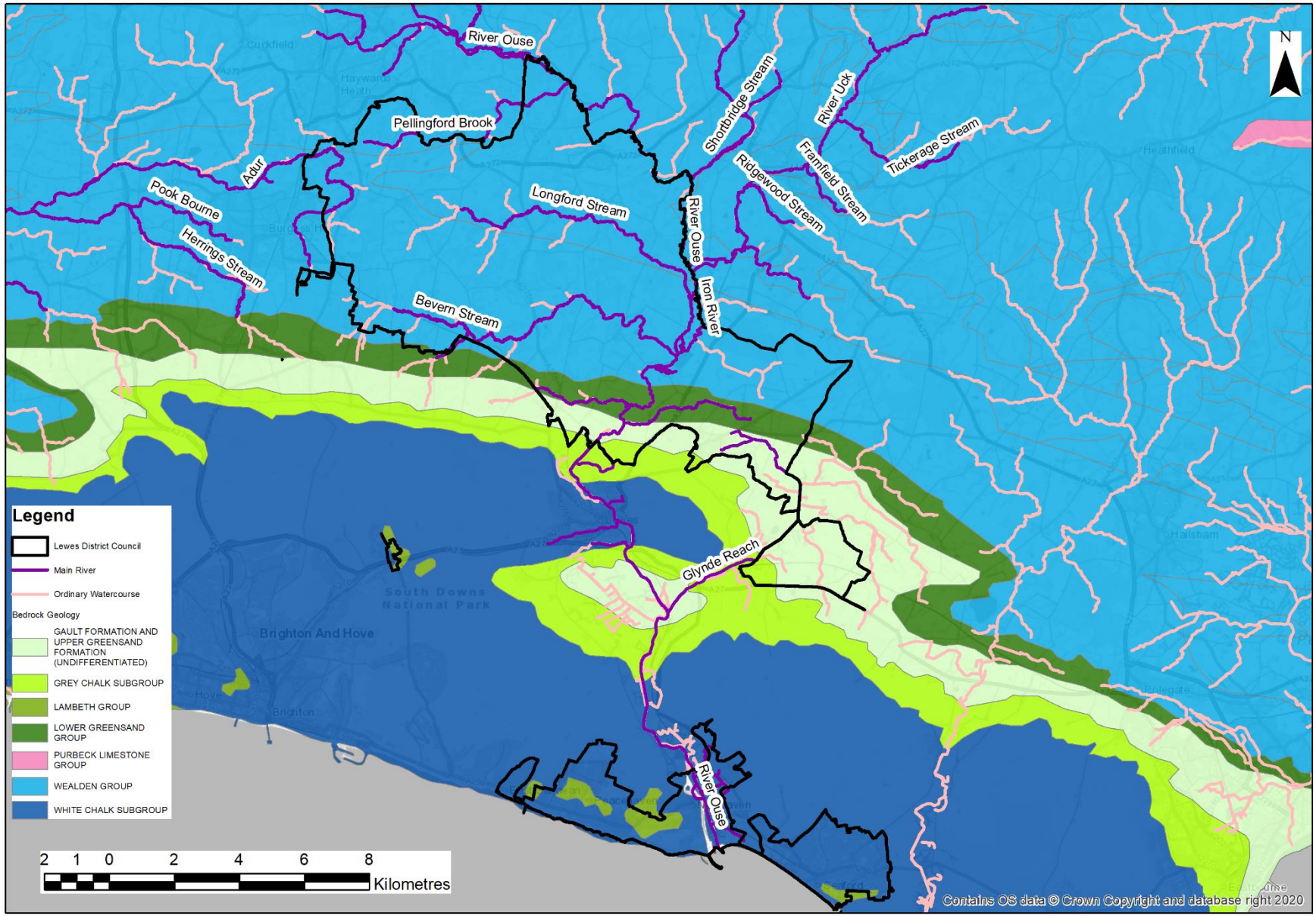
The Lewes District covers an area of 292 km^2, extending from the English Channel coast in the south, through the South Downs National Park and into the countryside of the Sussex Weald to the north. The total population is 97,500, 77% of whom live in the five urban areas of Lewes, Newhaven, Peacehaven, Seaford and Telscombe Cliffs/East Saltdean. The remainder of the population live in 23 predominately rural parishes. This Scoping WCS focusses on the area outside of the South Downs National Park Authority where LDC are responsible for spatial planning and development. The settlement areas covered within the Scoping WCS can be seen in Section 7.

3.4 Water environment

The principal watercourses and underlying geology in the LDC study area are shown on Figure 3-1 and Figure 3-2. The primary river system in the LDC study area is the River Ouse which has an extensive catchment (647km^2) and is fed by a number of small streams. The headwaters of the Ouse is underlain by the Tunbridge Wells Sands formation, a geological unit that forms part of the Wealden Group, whilst the valley of the lower Ouse comprises thick alluivium underlain by chalk. The tidal limit is at Barcombe Mills (6.5km upstream of Lewes) just downstream of the confluence with the River Uck.

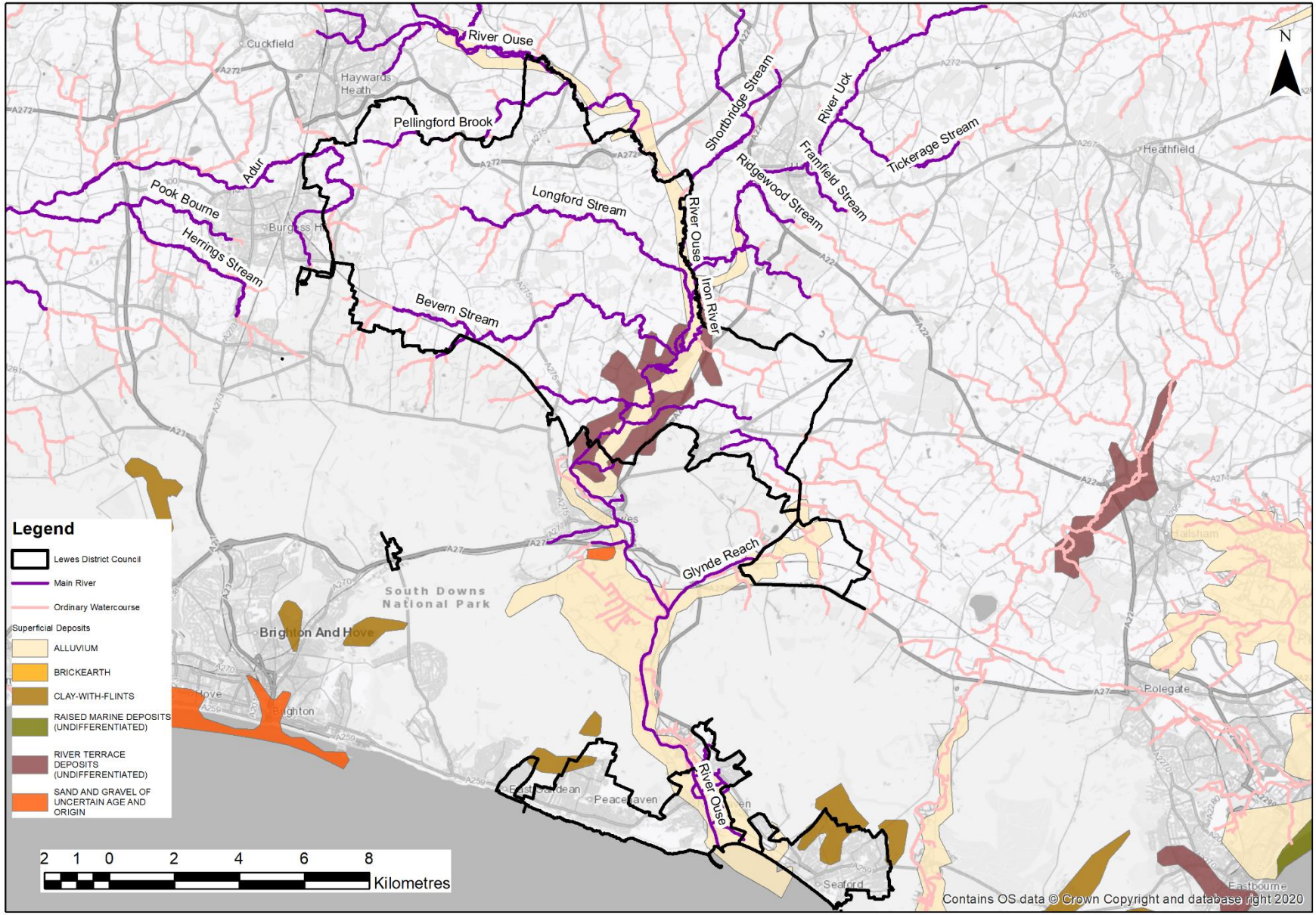
In the upper catchment of the Ouse the main tribtuary is the River Uck, whilst in the middle sections it is joined by the Longford Stream, the Iron River and the Bevern Stream. The only significant tribtuary in the lower reaches of the Ouse is the Glynde Reach. Most of the tribtuaries in the upper catchment rise from the sandstones and clays of the Wealden Group, whereas those in the middle section originate in the chalk uplands of the South Downs.

The only other significant watercourse in the district is part of the River Adur, where the headwaters of the Eastern Arm rises on Ditchling Common which is located within the boundaries of the LDC study area.



Contains British Geological Survey materials © UKRI 2022

Figure 3-1: Bedrock geology and watercourses within the study area



Contains British Geological Survey materials © UKRI 2022

Figure 3-2: Superficial geology and watercourses within the study area

3.4.1 Rivers

The WCS provides information on the quality and quantity pressures on the rivers in the LDC study area as these pressures can impact upon habitats, for example low flows can increase water temperatures and can impact oxygen levels. The WFD classifications for surface waters in the LDC study area, as taken from 2019 classification data, are provided in Appendix C. Where the status of the water bodies is less than 'Good' status, the 'Reasons for Not Achieving Good' (RNAG) status identifies where abstractions and/or discharges related to existing WSI are a confirmed pressure for waterbodies. The RNAG status has been taken from the latest information available on the Environment Agency Catchment Data Explorer[8] (August 2022).

With respect to water quality, the surface waters in the LDC area generally have 'Moderate' physico-chemical status, with phosphate commonly being the parameter which restricts Good status (many water bodies being 'Poor' status for this parameter). The chemical status for all surface waters is 'Fail'; however, all surface waters 'Support good' for hydromorphological status related to flow and geomorphological condition.

3.4.2 Groundwater

There are four WFD groundwater bodies within the LDC study area. The WFD classifications as taken from 2019 classification are provided in Appendix C. The RNAG status has been taken from the latest available information on the Environment Agency Catchment Data Explorer (May 2022).

Two of the four WFD groundwater bodies have 'Good' overall status and two have 'Poor' overall status. The RNAG status identifies that abstractions and poor nutrient management are a confirmed pressures for the failing waterbodies.

Water resource availability for groundwater in two of the four groundwater bodies are identified as having restricted water available and two are identified as having water available; further details on water resource availability are available in Section 5.

3.4.3 Potential water dependent habitats

There are three Sites of Special Scientific Interest (SSSI) in the LDC study area which may be materially water dependent, as summarised in Table 3-2 and shown in Figure 3-3.

Table 3-2: SSSIs located within the LDC study area

Site Name	SSSI Area (ha)	Main habitat	Condition	Potential hydrological connectivity to WSI
Plashett Park Wood	157.61	Broadleaved, Mixed and Yew Woodland - Lowland	Favourable	Located nearby to Barcombe Reservoir, which is an abstraction source for SEW, and therefore has the potential to be affected by abstractions linked to growth. No identified potential connectivity to WwTW
Ditchling Common SSSI	66.50	Acid Grassland – Lowland Broadleaved, Mixed and Yew Woodland - Lowland	11.77% Unfavourable – Declining 78.36% Unfavourable – Recovering 9.87% Favourable	Located in close proximity downstream of Wivelsfield WwTW
Chailey Common SSSI	170.89	Broadleaved, Mixed and Yew Woodland – Lowland Dwarf Shrub Heath - Lowland	80.37% Unfavourable – Recovering 19.63% Favourable	Located in close proximity of Newick WwTW. Located in close proximity upstream of Chailey WwTW.

[8] Available online at: https://environment.data.gov.uk/catchment-planning (accessed January 2023)

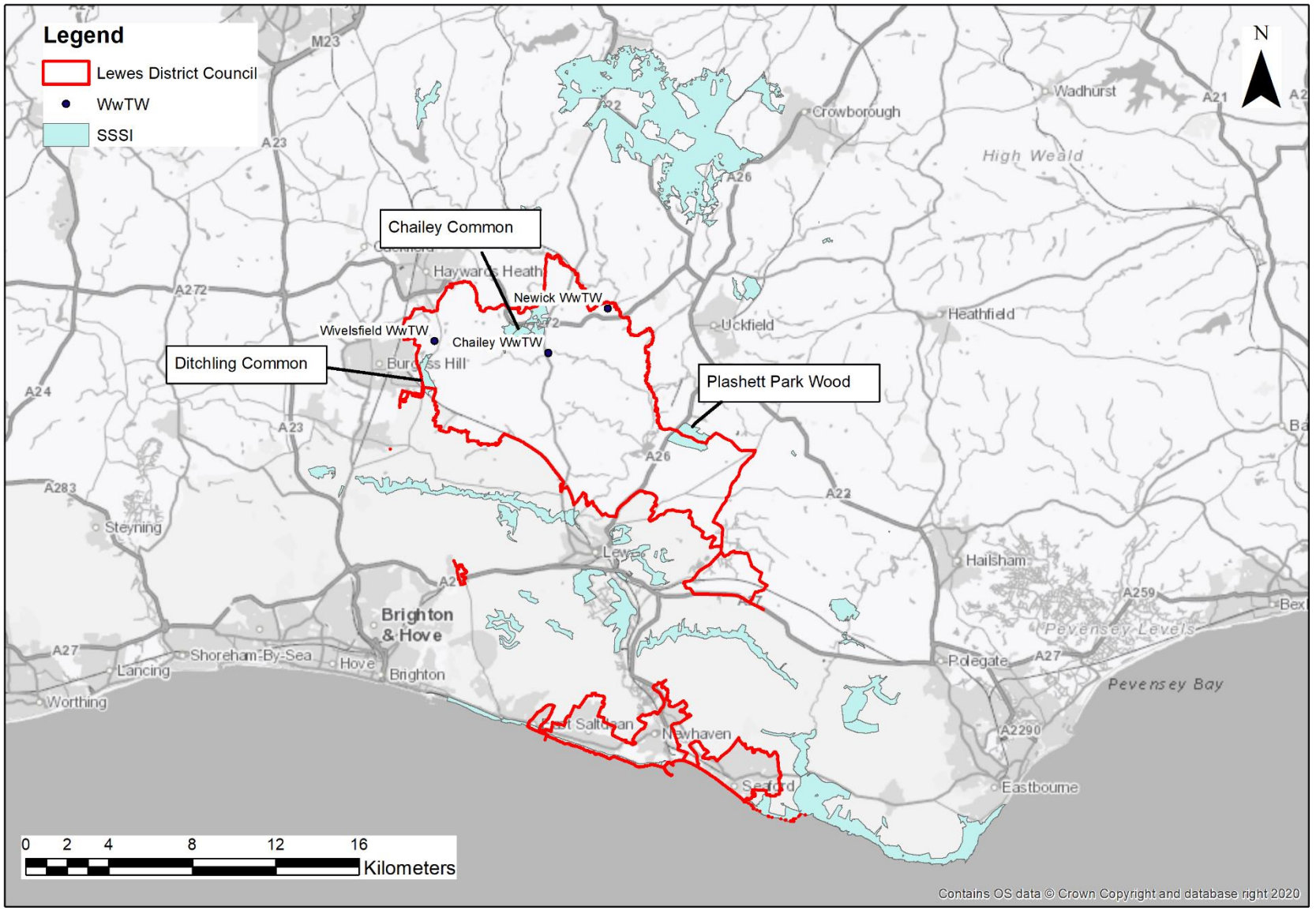


Figure 3-3: SSSIs within study area

There are two Local Nature Reserves within the LDC study area which are potentially hydrologically linked to a WwTW as they are located in close proximity to a WwTW:

- Castle Hill, Newhaven.
- Chailey Common.

These Local Nature Reserves have been identified as not likely to be impacted by abstractions linked to growth as they are not in close proximity to any abstraction locations for SEW.

3.5 Flood risk

An overview of the key flood risk characteristics within the LDC study area, drawn from the Level 1 Strategic Flood Risk Assessment (SFRA)[9], are summarised in the sections below.

3.5.1 Fluvial flooding

Reference to the Flood Map for Planning[10] and the Level 1 SFRA shows that the majority of the LDC study area is located within Flood Zone 1 which corresponds to low probability of flooding from rivers, as seen in Appendix D. Areas of Flood Zone 2 (medium probability) and Flood Zone 3 (high probability) are concentrated around the River Ouse. Flood Zones 2 and 3 cover many roads and several settlements, including Barcombe Ho. Less extensive areas of Flood Zones 2 and 3 are also associated with the tributaries of the Pellingford Brook, Bevern Stream, and Longford Stream upstream of Lewes. Flood Zones 2 and 3 associated with the Longford Stream encompass parts of the village of Plumpton Green.

The Environment Agency's Reduction in Risk of Flooding from Rivers and Sea due to Defences[11] dataset indicates that with the exception of the banks of the Lower Ouse in Newhaven, no areas are recognised as having a reduced level of fluvial risk in the LDC study area.

3.5.2 Coastal flooding

Reference to the Flood Map for Planning[10] and the Level 1 SFRA shows Flood Zones 2 and 3 for coastal areas within the LDC area which can be seen in Appendix D. Flood Zones 2 and 3 for coastal flooding are restricted to areas of seafront in Peacehaven and Seaford (extending up to 500m inland in the case of the latter), as well as the tidal reaches of the lower Ouse in Newhaven. Parts of Newhaven are at risk of tidal flooding including the ferry port, the harbour, and an industrial estate. According to the Flood Map for Planning[10], sea defences are present along Seaford Bay. Flooding from the River Ouse can occur during tide locking where flows from the River Ouse are unable to discharge through tidal flaps.

The Environment Agency's Reduction in Risk of Flooding from Rivers and Sea due to Defences[11] dataset indicates that parts of Newhaven and Seaford have a reduced risk of coastal flooding.

3.5.3 Surface water flooding

Overland flow and surface water flooding typically arise following periods of intense rainfall, sometimes of short duration, that is unable to soak into the ground or enter drainage systems. It can run quickly off land and result in localised flooding.

Appendix A Figure 5 in the Level 1 SFRA shows the risk of flooding from surface water. This shows that the risk of surface water flooding is concentrated around watercourses in the district, most notably the River Ouse, the Longford Stream and the Bevern Stream. The risk of surface water flooding also increases markedly in urbanised areas, with this being most pronounced in Newhaven, Seaford and Peacehaven.

[9] AECOM (2023) Lewes District Council Level 1 Strategic Flood Risk Assessment.
[10] Available online at: https://flood-map-for-planning.service.gov.uk/ (accessed January 2023)
[11] Available online at: https://www.arcgis.com/home/webmap/viewer.html?url=https%3A%2F%2Fenvironment.data.gov.uk%2Farcgis%2Frest%2Fservices%2FEA%2FReductionInRiskOfFloodingFromRiversAndSea%2FMapServer&source=sd (accessed March 2023)

3.5.4 Groundwater flooding

Groundwater flooding occurs when water levels in the ground rise above the ground surface. The geology has a major influence on where this type of flooding takes place; it is most likely to occur in low-lying areas underlain by permeable rocks (aquifers).

Appendix A Figure 6 in the SFRA maps the Susceptibility to Groundwater Flooding which identifies areas where geological conditions could enable groundwater flooding to occur. This shows areas in the south and east of the LDC study area as having the potential for groundwater flooding to occur at the surface with these areas being especially associated with tributaries of the River Ouse such as the Bevern Stream and Longford Stream. These areas include settlements such as Newhaven, Broyle Side, Plumpton, Barcombe Cross and Chailey. LDC have identified localised flooding in Newick and Newhaven.

3.5.5 Sewer flooding

Sewer flooding can occur as a result of infrastructure failure, for example blocked sewers or failed pumping stations. It can also occur when the system surcharges due to the volume or intensity of rainfall exceeding the capacity of the sewer, or if the sewer becomes blocked by debris or sediment.

The Level 1 SFRA provides mapping of historical sewer flooding incidents in the LDC study area within the last 10 years (2012 – 2022) which can be seen in Appendix D. This shows that there is a high frequency of sewer flooding incidents in the LDC study area, with these being most prevalent in areas containing major watercourses (Longford Stream, Bevern Stream and the River Ouse). This suggests that there is a potential fluvial and tidal influence on incidents of sewer flooding within the district, namely that high water levels in receiving watercourses may cause water to back up through sewerage networks, causing their design capacity to be exceeded.

3.5.6 Reservoir flooding

There are a number of large, raised reservoirs as defined under the Reservoir Act (1975) with the potential to cause flooding within the LDC study area if failure were to occur. These have been identified as follows:

- Ardingly Reservoir near Ardingly.
- Searles Lake north of Newick.
- Arlington Reservoir near Arlington.
- Framfield Upper south-east of Uckfield.
- Plashett Park Upper Lake near Rose Hill.
- Barcombe Reservoir near Barcombe Mills.

Appendix A Figure 7 in the Level 1 SFRA shows the potential extent of flooding in the unlikely event of a failure of these waterbodies when river levels are normal (‘dry’ day scenario) and when rivers have already overtopped their banks (‘wet’ day scenario). The mapping shows that the area at risk follows the floodplains and valleys of the Rivers Ouse and Uck respectively, with the majority of this flooding occurring regardless of the river levels. Reservoir flood risk only extends to parts of the Ouse Valley south of Lewes such as Newhaven when rivers are in flood (i.e. the ‘wet’ day scenario).

4. Wastewater Treatment

A review of current and future wastewater flow within the LDC study area has been undertaken to understand where growth may be constrained by treatment capacity within the current discharge permit for the relevant WwTW catchments.

4.1 Wastewater in the Study Area

Table 4-1 presents the WwTW catchments within the LDC study area and close vicinity which are all operated by Southern Water. The settlements which are within the LDC study area are in bold. The Population Equivalent served has been taken from the Southern Water Drainage and Wastewater Management Plan (DWMP) which has a baseline year of 2020[12]. The Population Equivalent is an approximation of the total population served as the calculation includes non-household flows. Southern Water have also provided Population Equivalent data for 2021 which has been used in the calculations in this section as this is the most up to date information. It should be noted that for some WwTW catchments, the majority of development served is outside of the Scoping WCS LDC study area, for example Peacehaven Brighton, Goddards Green, and Wivelsfield.

Table 4-1: Summary of WwTWs in the LDC study area

WwTW Catchment	Settlements Served	Population Equivalent Served	Receiving Waterbody
Peacehaven Brighton	Brighton, Bevenden, Brighton Marina Village, Falmer, Patcham, Portslade, Poynings, Preston, Pyecombe, Rottingdean, Saltdean, Southwick, Hove, **Peacehaven**	288,429	The English Channel
Newhaven East	Lewes, **Newhaven**, Piddinghoe, South Heighton, Tarring Neville, **Seaford**, Bishopstone, Norton	58,692	The English Channel
Goddards Green	Burgess Hill, Hassocks, Albourne, Clayton, Ditchling, Hursterpoint, Sayers Common, Bolney	54,789	Unnamed watercourse
Neaves Lane Ringmer	Lewes, Beddingham, Firle, Glynde, Laughton, **Ringmer**	4,852	Glynde Reach
Newick	Lewes, **Newick**, Sheffield Park, **North Chailey**	3,954	River Ouse
Barcombe New	Lewes, **Plumpton Green**, **South Chailey**, **Barcombe**	3,309	Bevern Stream
Wivelsfield	**Wivlesfield Green**, Haywards Heath, Burgess Hill, **Wivlesfield**	1,669	Unnamed watercourse
Cooksbridge	**Cooksbridge**, Lewes	358	Tributary of the River Ouse
Smallholdings Ringmer	**Ringmer**, Lewes	56	Tributary of the River Ouse
Hamsey	**Hamsey**, Lewes	37	River Ouse
Chailey	**North Chailey**, Lewes	27	Unnamed watercourse
Stamford Buildings Firle	Firle, Lewes	25	Tributary of Glynde Reach
Barcombe Church	**Barcombe**, Lewes	21	Tributary of the River Ouse
Highbridge East Chiltington	East Chiltington, Lewes	18	Bevern Stream

[12] Available online at: https://www.southernwater.co.uk/media/3855/adur-and-ouse-dwmp-strategic-context.pdf (Accessed December 2022)

4.2 Drainage and Wastewater Management Plans

DWMPs are long term plans spanning 25 years that set out how water and wastewater companies intend to extend, improve, and maintain a robust and resilient drainage and wastewater system. Southern Water have committed to producing a DWMP by the end of March 2023. Full details of the DWMP process that Southern Water have undertaken to date are provided on Southern Water's website[13]. The following provides a brief synopsis, relevant to the WCS.

The DWMP involves three levels of planning:

- Level 1: The Southern Water operating region.
- Level 2: The 11 river basin catchments in the Southern Water operating region.
- Level 3: The 381 WwTW catchments in the Southern Water operating region.

Planning objectives (PO) are used in the DWMP process to assess the current and future performance of the drainage and wastewater systems and identify where action and/or future investment is required. Six POs have been defined by Water UK[14] for all water companies to use within their DWMPs which are[15]:

1. Internal sewer flooding risk – internal flooding of a domestic or business premises by wastewater.
2. Pollution risk – pollution from any wastewater source on land or in water.
3. Sewer collapse risk.
4. Risk of sewer flooding in a 1 in 50 year storm – this is a severe storm which has a 2% chance of occurring in any 12 month period.
5. Storm overflow performance – this is non-compliance of a storm overflow with the permit issued by the Environment Agency which specifies the amount, frequency and concentration allowed to be discharged into the receiving water.
6. Risk of WwTW quality compliance failure – this is non-compliance of a WwTW with its permit.

Southern Water identified two further POs:

7. Annualised Flood Risk (or hydraulic overload) – this is flood risk arising from different severities of rainfall[16].
8. WwTW compliance with the Environment Agency's permit relating to the Dry Weather Flow (DWF) arriving at the WwTW[17].

Southern Water held workshops with partner organisations in each river basin catchment to discuss the need for any additional POs and through the assessment of proposed additional objectives at the workshops identified six additional POs:

9. Achieve Good Ecological Status (GES) or Good Ecological Potential (GEP).
10. Improve surface water management and reduce surface water flooding.
11. Secure nutrient neutrality.
12. Reduce groundwater pollution.
13. Improve bathing waters.
14. Protect shellfish waters.

Southern Water have developed a regional draft DWMP for their operating area which describes the investment planning for each WwTW catchment and sets out how the WwTW systems will provide a resilient future over the next 25 years. A DWMP has been developed for each of the 11 river basin catchments in the Southern Water operating region. The LDC study area is within the Adur and Ouse catchment.

[13] Available online at: https://www.southernwater.co.uk/dwmp (accessed January 2023)
[14] Water UK is a membership body representing the UK water industry who work with companies to promote best practice to ensure customers receive high quality tap water at a reasonable price and that the environment is protected and improved.
[15] For full definition of each Water UK PO, please refer to: https://www.water.org.uk/wp-content/uploads/2020/07/BRAVA-planning-objectives-for-the-first-cycle-of-DWMPs.pdf
[16] Further information on the PO is available at: https://www.southernwater.co.uk/media/4555/brava-methodology_annualised-flood-risk.pdf
[17] Further information on the PO is available at: https://www.southernwater.co.uk/media/4550/brava-methodology_wtw-dwf-compliance.pdf

4.2.1 Adur and Ouse Catchment DWMP

A Risk Based Catchment Screening (RBCS)[18] has been undertaken by Southern Water to highlight where there is a current and/or potential risk of vulnerability in the WwTW catchment to future changes against 17 indicators set out in guidance published by Water UK[19]. Southern Water added an additional indicator on customer complaints as this provides a flag for catchments with ongoing or outstanding concerns. The results of the assessment are used to identify if the WwTW catchment has met the criteria under the Water UK DWMP guidance for requiring progression to the Baseline Risk and Vulnerability Assessment (BRAVA) stage of the DWMP.

A BRAVA[20] assessment has been undertaken to assess each of the planning objectives for each of the WwTW catchments flagged in the RBCS. Each planning objective at each WwTW catchment is assessed using the following criteria:

Key:	Primary Drivers
Customer	C
Hydraulic	H
Operational	O
Quality	Q
Unknown	U

Key:	Cell Colour Coding
	Not Flagged *
	Not Applicable **
	Not Significant
	Moderately Significant
	Very Significant

The output of the BRAVA shows:

- The current risks and issues for each WwTW catchments providing a baseline to assess future risks against.
- How those risks may change in future and when they might change.
- The primary drivers behind the future changes in risk.

The BRAVA results and understanding of the causes of risks and drivers have been used to propose an investment strategy for each WwTW catchments. A risk based approach was used to identify the WwTW catchments which require progressing to Problem Characterisation in the first round of DWMPs. For the identified WwTW catchments, a Problem Characterisation[21] assessment has been undertaken to identify the causes of risks identified by the BRAVA.

Following the Problem Characterisation, an Options Development and Appraisal (ODA) stage is carried out to identify and appraise solutions to problems identified to determine what investments are put forward to manage and reduce risks in the WwTW catchment.

The DWMP has also identified which WwTWs will be more affected by population growth and infiltration into sewers, in terms of DWF[22]. Using population growth forecasts and estimating infiltration into the sewer network based on flows recorded at the WwTW, the DWMP has estimated when the DWF permit may be exceeded if no further actions are taken to increase the capacity of the WwTW.

Summary of DWMP review

Overall, 6 of the 14 WwTW catchments in the LDC study area were not identified as having any significant risks (Smallholdings Ringmer, Hamsey, Chailey, Stamford Buildings Firle, Barcombe Church, and Highbridge East Chiltington), however these are the WwTW catchments which serve the fewest people.

The BRAVA results show that growth will increase the risks of non-compliance with DWF permits from the Environment Agency in 5 of the 14 WwTWs in the LDC study area (Newhaven East, Goddards Green, Neaves

[18] Available online at: https://www.southernwater.co.uk/media/3856/adur-and-ouse-rbcs-summary.pdf (accessed October 2022)
[19] Available online at: https://www.water.org.uk/wp-content/uploads/2020/01/Water_UK_DWMP_Framework_Appendices_September-2019-B.pdf (accessed October 2022)
[20] Available online at: https://www.southernwater.co.uk/media/4247/adur-and-ouse_combined.pdf (accessed October 2022)
[21] Available online at: https://www.southernwater.co.uk/dwmp/adur-and-ouse-catchment/problem-characterisation-adur-and-ouse (accessed October 2022)
[22] Available online at: https://www.southernwater.co.uk/media/5257/technical-summary-growth-and-creep-final.pdf (accessed October 2022)

Lane Ringmer, Barcombe New, and Cooksbridge). This means further investment will be needed in the future to increase the capacity of the WwTWs to accommodate new homes and businesses. As described in Section 2.2, the current Local Plan suggests larger amounts of planned housing growth in Newhaven and Peacehaven which could place further pressure on the WwTW catchments.

Goddards Green WwTW is the only WwTW highlighted as having potential to exceed its DWF capacity by 2050.

The Problem Characterisation assessment[21] identified that climate change is expected to have an impact on WwTWs, especially Peacehaven Brighton and Newhaven East where there is already a very significant risk from rainfall related flooding. The flooding risk will increase by 2050 in all WwTWs unless measures are taken to manage and reduce these risks.

The proposed investment strategy in 6 of the 14 WwTWs has been identified as Improve (Peacehaven Brighton, Newhaven East, Goddards Green, Neaves Lane Ringmer, Newick, and Barcombe New) as the current performance of the drainage and wastewater system needs to be improved to reduce the impacts on customers and/or the environment.

Appendix E provides a detailed summary for each of the WwTW that serve development within the LDC study area.

Table 7-1 in Section 7 indicates how the results of the DWMP assessments influence potential future growth opportunities in the LDC study area.

4.3 Management of WwTW Discharges

4.3.1 Wastewater Treatment

As the wastewater treatment provider, Southern Water are required to use the best available techniques (defined by the Environment Agency as the best techniques for preventing or minimising pollutants and impacts on the environment) to ensure emission limit values stipulated within each WwTW's discharge permit conditions are met.

Through application of the best available techniques in terms of wastewater treatment, the reliable limits of conventional treatment (LCT) have been determined for the key parameters of Biochemical Oxygen Demand (BOD)[23], ammonia and phosphate, and are provided in Table 4-2.

Table 4-2: Reliable limits of conventional treatment technology for wastewater

Water Quality Parameter	Limits of Conventional Treatment
Ammonia	1.0 mg/l 95 percentile limit[24]
BOD	5.0 mg/l 95 percentile limit[24]
Phosphate	0.25 mg/l annual average[25]

As the wastewater undertaker for the area, Southern Water has a general duty under Section 94 of the Water Industry Act 1991 to provide effectual drainage which includes providing additional capacity as and when required to accommodate planned development. However, this legal requirement must also be balanced with the price controls as set by the Water Services Regulatory Authority (Ofwat) which ensure that Southern Water has sufficient funds to finance its functions, and at the same time protect consumers' interests. The price controls affect the bills that customers pay, and the sewerage services consumers receive, and ultimately ensure wastewater assets are managed and delivered efficiently.

Consequently, to avoid potential inefficient investment, Southern Water generally do not provide additional infrastructure to accommodate growth until there is certainty that development is due to come forward. WCS' therefore have an important role in the water company planning process by helping to identify areas for potential future investment based on long-term plans for growth and development.

[23] Amount of oxygen needed for the biochemical oxidation of the organic matter to carbon dioxide in 5 days. BOD is an indicator for the mass concentration of biodegradable organic compounds.
[24] Considered within the water industry to be the current LCT using best available techniques.
[25] National Asset Management Plan 6 (AMP6) trials to investigate new sewage treatment technologies to reduce Phosphate treatment were completed in 2017 and a new Technically Achievable Limit (TAL) of 0.25 mg/l for Phosphate has been agreed between water companies and the Environment Agency.

All WwTWs are issued with a permit to discharge by the Environment Agency, which sets out conditions on the maximum volume of treated wastewater that it can discharge and also limits on the quality of the treated discharge. These limits are set in order to protect the water quality and ecology of the receiving waterbody.

4.3.2 Flow Condition

The flow element of the discharge permit, described as Dry Weather Flow (DWF)[26], determines an approximation of the maximum number of properties that can be connected to a WwTW catchment. When discharge permits are issued, they are generally set with a flow 'headroom', which acknowledges that allowance needs to be made for future development and the additional wastewater generated. This allowance is referred to as 'permitted headroom'.

This headroom provides an indication as to the quantity of new dwellings which can be connected to the WwTW before a revised discharge permit would need to be considered.

4.3.3 Quality Conditions

The quality conditions applied to the discharge permits are derived to ensure that the water quality of the receiving waterbody is not adversely affected in terms of concentration of physico-chemical elements including ammonia, nitrate, BOD, and phosphate. However, currently not all WwTW discharge permits are set to equate maintaining the current WFD status of the receiving waterbody due to the discharge permits being issued prior to implementation of the WFD. Consequently, some discharge permits, if operated to the full flow limit (i.e. all permitted headroom is used), could lead to a significant deterioration in water quality and possibly WFD status.

An assessment needs to be undertaken to determine what new quality conditions would need to be applied to the discharge under the following circumstances:

- When a new or revised discharge permit is required, or
- When a new or revised discharge permit is not required, but a significant quantity of development is proposed to connect to a WwTW.

If the quality conditions remain unchanged, the increased flow of wastewater received, treated, and discharged at the WwTW would result in an increase in the quantity and load[27] of determinants being discharged to the receiving waterbody. This may have the effect of deteriorating water quality and hence, an increase in permitted discharge flow can result in the need for more stringent conditions on the quality of the discharge.

The requirement to provide a higher standard of treatment may result in an increase in the intensity of treatment processes at a WwTW, which may also require improvements or upgrades to be made to the WwTW to allow the new conditions to be met. In some cases, it may be possible that the quality conditions required to protect water quality and ecology are not achievable with conventional treatment processes and as a result, this WCS assumes that a new solution would be required in this situation to allow growth to proceed.

4.3.4 Headroom Assessment Results

In the LDC study area, 8 of the 14 WwTW catchments have numeric limits set as part of their DWF permit and 6 have descriptive permits with no numerical limits set. Descriptive permits are typically for WwTWs which serve a small population and are monitored on a less regular basis because when using a risk based approach, these should not be causing significant impacts to the environment. Two different approaches have been used to provide information on the headroom capacity at the WwTWs as described below for the WwTWs with numeric DWF permits and the WwTWs with descriptive permits.

The headroom capacity at each WwTW catchment with a numeric DWF permit has been assessed using current per capita consumption levels (150 l/h/d) and using a measured discharge flow based on the average of the 2020 and 2021 Q80 DWF values provided by Southern Water; this measured DWF was compared to the maximum DWF which each WwTW is allowed to discharge under its current permit conditions to give a residual flow permit capacity. The total Population Equivalent for 2021 provided by Southern Water has been used in the calculation to provide an approximation of existing dwelling numbers which includes domestic, trade effluent, non-resident,

[26] DWF is a measure of the flow of foul water only to a WwTW (excludes additional flow as a result of excessive rainfall or groundwater infiltration entering the sewer network).
[27] Concentration is a measure of the amount of a pollutant in a defined volume of water, and load is the amount of a substance discharged during a defined period of time.

and cess Population Equivalent. The capacity for additional dwellings was then calculated based on the residual flow permit capacity and recorded in Table 4-3. An assumption for additional infiltration has also been allowed for by adding 25% to the calculation of DWF for each dwelling.

The capacity for additional dwellings has been estimated for two scenarios: first, where 100% of the DWF permit is reached and secondly, where 80% of the DWF permit is reached. The headroom capacity and capacity for additional dwellings has also been assessed under the scenario where per capita consumption is 118 l/h/d in line with South East Water's aim of per capita consumption in 2045 and using the Population Equivalent for 2050 which was provided by Southern Water.

It is not possible to calculate the headroom capacity for the WwTWs which have a descriptive permit, however the descriptive permit provides the maximum Population Equivalent that the WwTW could serve and therefore the theoretical maximum number of dwellings that the WwTW could serve has been estimated, as seen in Table 4-4.

The results of the headroom assessment shows that there is capacity for additional dwellings at all the WwTWs which have numeric DWF permits in the LDC study area under current water use where 100% of the DWF permit would be reached apart from at Wivelsfield WwTW. At Wivelsfield WwTW the results show that the current DWF permit is being exceeded. Newhaven East WwTW has limited headroom for additional dwellings, with an estimated capacity for 149 additional dwellings where 100% of the DWF permit would be reached. Cooksbridge WwTW also has limited headroom for additional dwellings, with an estimated capacity for 10 additional dwellings where 100% of the DWF permit would be reached. Under the scenario where per capita consumption is 118 l/h/d, there is significantly more capacity for additional housing.

For the WwTWs where there are descriptive permits, there is potential for a maximum of 803 dwellings to be served by each of the following WwTWs: Smallholdings Ringmer and Chailey. There is potential for a maximum of 100 dwellings to be served by each of the following WwTWs: Hamsey, Stamford Buildings, Barcombe Church, and Highbridge East Chiltington. However, it should be noted that the potential number of dwellings is the theoretical maximum and the current Q80 DWF for each WwTW is unknown; in addition, WwTW's with descriptive consents are often small and may not have the treatment process capacity to treat flows to the maximum Population Equivalent as set out in the permit.

Even where there is headroom capacity, it may not be possible to provide for the maximum number of potential dwellings, as the increase in DWF could result in the need to upgrade the WwTW to ensure this additional flow can be managed and that water quality is not negatively impacted as a result of the additional flow.

Table 4-3: WwTW with numeric permits DWF headroom assessment results

WwTW Catchment	Current DWF Permit (m^3/d)	Current Headroom Capacity		Approx. additional dwelling capacity up to 100% DWF permit with current use	Approx. additional dwelling capacity up to 80% DWF permit with current use	Approx. additional dwelling capacity up to 100% DWF permit with 118 l/h/d	Approx. additional dwelling capacity up to 80% DWF permit with 118 l/h/d
		Current DWF Q80 (m^3/d)	Calculated Headroom (m^3/d)				
Peacehaven Brighton	78304	51750	26554	49804	20431	102473	57100
Newhaven East	14027	13921	106	149	Capacity exceeded	16092	7964
Goddards Green	9917	9196	748	1628	Capacity exceeded	3097	Capacity exceeded
Neaves Lane Ringmer	959	841	118	237	Capacity exceeded	691	135
Newick	1182	666	516	930	504	2061	1376
Barcombe New	623	399	224	650	288	460[28]	99[28]
Wivelsfield	275	294	-19	Capacity exceeded	Capacity exceeded	140	Capacity exceeded
Cooksbridge	91	84	7	10	Capacity exceeded	131	78

Table 4-4: WwTW with descriptive permits DWF capacity assessment results

WwTw Catchment	Current Population Equivalent	Existing equivalent number of dwellings	Maximum Population Equivalent WwTW could serve according to permit	Maximum equivalent number of dwellings
Smallholdings Ringmer	65	26	2000	803
Hamsey	32	13	250	100
Chailey	11	4	2000	803
Stamford Buildings Firle	29	11	250	100
Barcombe Church	23	9	250	100
Highbridge East Chiltington	27	11	250	100

[28] Based on current population/dwellings, the existing l/h/d is ~111 l/h/d. The future projection is based on 118 l/h/d, therefore this would mean a slight increase in usage, explaining the apparent reduction in potential future dwellings (i.e. users are slightly less efficient in their water usage based on current water usage and population/dwellings).

4.4 Water quality and discharges

A review of the current and future wastewater quality consents within the LDC study area has been undertaken to identify where proposed growth might be constrained by limits of conventional treatment.

The DWMP BRAVA includes Planning Objectives relevant to water quality which are:

- Risk of WwTW quality compliance failure – this is non-compliance of a WwTW with its permit.
- Achieve Good Ecological Status (GES) or Good Ecological Potential (GEP).

The results of the BRAVA show that only Newick and Wivelsfield WwTW were highlighted as having a significant risk of WwTW quality compliance failure in 2020 or 2050. Wivelsfield WwTW was also the only WwTW highlighted as having a significant risk of wastewater operations being a reason for a waterbody not achieving GES or GEP in 2050.

6 of the 10 surface water bodies in the LDC study area are not achieving 'Good' ecological status for several reasons, including wastewater discharge, as seen in Appendix C. This identifies that discharges remain a risk to WFD status related to water quality and additional growth may exacerbate this position. The WwTWs which are located within the 6 surface water bodies are:

- Newick WwTW
- Highbridge East Chiltington WwTW
- Neaves Lane Ringmer WwTW
- Stamford Buildings Firle WwTW
- Wivelsfield WwTW

It is not possible to undertake any quantitative water quality assessment calculations as part of this Scoping WCS because LDC are in the process of developing their spatial strategy for the Local Plan and future housing numbers are not currently available. In order to complete a quantitative water quality impact assessment, estimated growth numbers within each WwTW catchment is required. Water quality assessments, including Load Standstill calculations and River Quality Planning (RQP) modelling will be considered on a case by case basis as part of a Detailed WCS.

5. Water Supply

This section provides a review of the current water resource availability as well as planned water supply strategies to identify constraints to future growth.

5.1 Abstraction Licensing Strategies

The Environment Agency manages water resources at the local level through the use of abstraction licensing strategies (ALS). Within the ALS, the Environment Agency's assessment of the availability of water resources is based on a classification system that gives a resource availability status which indicates:

- The relative balance between the environmental requirements for water and how much is licensed for abstraction,
- Whether water is available for further abstraction, and,
- Areas where abstraction needs to be reduced.

The categories of resource availability status are shown in Table 5-1. The classification is based on an assessment of a river system's ecological sensitivity to abstraction-related flow reduction. This classification can then be used to assess the potential for additional water resource abstractions.

Table 5-1: Water resource availability status categories

Indicative Resource Availability Status	License Availability
Water available for licensing	There is more water than required to meet the needs of the environment. New licences can be considered depending on local and downstream impacts.
Restricted water available for licensing	Full Licensed flows fall below the Environmental Flow Indictors (EFIs). If all licensed water is abstracted there will not be enough water left for the needs of the environment. No new consumptive licences would be granted. It may also be appropriate to investigate the possibilities for reducing fully licensed risks. Water may be available if you can 'buy' (known as licence trading) the entitlement to abstract water from an existing licence holder.
No water available for licensing	Recent actual flows are below the EFI. This scenario highlights water bodies where flows are below the indicative flow requirement to help support Good Ecological Status (as required by the Water Framework Directive. No further consumptive licences will be granted. Water may be available if you can buy (known as licence trading) the amount equivalent to recently abstracted from an existing licence holder.
Discharge Rich Waterbodies	These waterbodies have a modified flow that is influenced by reservoir compensation releases or they have flows that are augmented. These are often known as 'regulated rivers' and may be managed through an operating agreement often held by a water company. The availability of water is dependent on these operating agreements. There may be water available for abstraction, the Environment Agency would need to be contacted to find out more.

The Environment Agency aims to protect the annual flow variability in rivers, from low to high flow conditions through the application of flow statistics derived from flow data collected at river gauging stations. Flow statistics are expressed as the percentage of time that flow is exceeded. Resource availability is calculated by the Environment Agency at four different flow scenarios:

- Q95 (lowest),
- Q70,
- Q50, and
- Q30 (highest).

Q95 is the flow exceeded for 95% of the time and is used as a low flow indicator. Q30 is the flow exceeded for 30% of the time and is considered to be a high flow.

5.1.1 Adur and Ouse Catchment

The classification of each of the Water Resource Management Units (WRMU) in the LDC study area within the Adur and Ouse catchment[29] has been summarised for the surface waterbodies in Table 5-2.

Table 5-2: Resource availability classification within the LDC study area

River – WRMU	Surface Water (flow exceedance scenarios)			
	Q30	Q50	Q70	Q95
AP3 – Barcombe Ultrasonic (River Ouse)	Water available for licencing	Water available for licencing	Water available for licencing	Water available for licencing
AP4 – Clappers Bridge (Bevern Stream)	Restricted water available for licencing	Restricted water available for licencing	Discharge rich waterbodies	Discharge rich waterbodies
AP6 – Gold bridge (River Ouse)	Restricted water available for licencing	Restricted water available for licencing	Discharge rich waterbodies	Discharge rich waterbodies
AP9 – Ardingly (River Ouse)	Water available for licencing	Water available for licencing	Water available for licencing	Water available for licencing

Consumptive abstraction within AP3 and AP9 is available 95% of the time and in AP4 and AP6 only available in restricted licence form above Q50.

5.1.2 Groundwater Availability

Water resource availability for groundwater in the Brighton Chalk Block[29] and Seaford and Eastbourne Chalk Block[30] are identified as having restricted water available. This means that the groundwater unit balance shows more water is licensed than the amount available, but that recent actual abstractions are lower than the available amount or that there are known local impacts likely to occur on dependant wetlands, groundwater levels or cause saline intrusions but with management options in place. In restrictive groundwater units, no new consumptive licenses will be granted. Water may be available if you can buy (known as licence trading) the entitlement to abstract water from an existing licence holder. Water resource availability for groundwater in the Lower Greensand Adur and Ouse Waterbody[29] and the Adur and Ouse Hastings Beds[29] are identified as having water available. This means that the groundwater unit balance shows groundwater available for licensing. New licences can be considered depending on impacts on other abstractors and on surface water.

5.2 Water Resource Planning

Water companies undertake medium to long term planning of water resources in order to demonstrate that a there is a long-term plan for delivering sustainable water supply within its operational area to meet existing and

[29] Environment Agency (2019) Adur and Ouse Abstraction Licensing Strategy. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/793422/Adur_and_Ouse_Abstraction_Licensing_Strategy.pdf
[30] Environment Agency (2019) Cuckmere and Pevensey Levels Abstraction Licensing Strategy. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/793425/Cuckmere_Pevensey_Abstraction_Licensing_Stategy.pdf

future demand. This is reported via a statutory WRMPs produced every five years to coincide with each of the water companies' five-yearly asset management (or business) plans.

WRMPs are a key document for a WCS as they set out how demand for water from population growth within a water company's supply area can be met, taking into account the potential impacts of climate change and the need for the environment to be protected. As part of the statutory process, the plans must be approved by both the Environment Agency and Natural England (as well as other regulators) and hence the outcomes of the plans can be used directly to inform whether growth levels being assessed within a WCS can be supplied with a sustainable source of water supply.

Water companies manage available water resources within key zones, called Water Resource Zones (WRZs). These zones share the same raw resources for supply and are interconnected by supply pipes, treatment works and pumping stations. As such, the customers within these zones share the same available 'surplus of supply' of water when there is more available water than demand; but also share the same risk of supply when demand for water is greater than the available supply (i.e. deficit of supply). Water companies undertake resource modelling to calculate if there is likely to be a surplus of available water or a deficit in each WRZ by the end of their WRMP plan period once additional demand from growth and other factors such as climate change are taken into account.

The latest South East WRMP was published in 2019 and the information within this has been used to inform the WCS. The study area falls within WRZ2 (Haywards Heath). The current published WRMP is near the end of its cycle and an updated draft has been published which was under consultation between November 2022 – February 2023; this has also been reviewed.

5.2.1 Water Resource Planning in the Study Area

The WRSE draft regional plan was published in November 2022 for consultation and looks ahead from 2025 – 2075. The regional plan will be reflected in the WRMPs of the six member companies. The best value regional plan provides a regional solution to securing South East England's water supplies from 2025 – 2075 and includes four priorities:

1. Efficient use of water and minimal wastage across society through reducing leakage and maintaining a lower level of water use.
2. New water sources that provide sustainable and resilient supplies through transfers from other regions, reservoirs, water recycling, desalination, and improving groundwater abstraction and storage.
3. A network that can move water around the region through using existing transfers and establishing new transfers.
4. Catchment and nature-based solutions that improve the water environment that is relied upon including river restoration, nutrient and sediment reduction, working with farmers to improve land management practices, water retention measures such as natural flood management and Sustainable Drainage Schemes (SuDS).

The WRSE regional plan identifies a water recycling scheme to be completed in Peacehaven in 2041 to supplement supplies in Arlington reservoir in East Sussex. It also identifies the potential for a new reservoir at Broyle Place near Lewes to be completed in 2075. The plan identifies new water transfers across the South East England region.

5.2.2 Supply-Demand Strategy for South East Water

The South East Water WRMP identifies that water supply within WRZ2 (Haywards Heath) is supplied from a number of sources:

- 54% of water is supplied by two surface water sources,
- 39% of water is supplied by 14 groundwater sources from the Ashdown Beds and chalk aquifers, and
- 7% of water is supplied by inter-company transfer from Southern Water.

South East Water's assessment of available water in their baseline predictions (without any future measures) identifies that the Sussex WRZ, which includes WRZ2 (Haywards Heath), is in surplus from 2020/21 (+11.1 Ml/d) through to 2024/25 (+7.8 Ml/d) and then is in deficit from 2029/30 (-3.9 Ml/d) up to 2079/80 (-57.2 Ml/d) under average conditions. The WRMP states that the most significant driver of the deficits between 2025 and 2045 are

sustainability reductions (these are reductions in abstraction licence amounts to protect habitats and water bodies impacted from over abstraction), while the impacts of population growth and climate change influence the longer term forecast to 2079/80.

South East Water have identified a number of schemes that will benefit the WRZ2 (Haywards Heath). The measures which are proposed to maintain the supply-demand balance show that the available supplies will be sufficient to meet expected demand to provide a reliable and environmentally resilient water supply. The measures for WRZ2 (Haywards Heath) are summarised in Table 5-3.

Table 5-3: South East Water WRMP Preferred Plan Schemes for WRZ2 (Haywards Heath)

Period	Preferred Plan Schemes
2020 – 2025	Leakage reductions Water efficiency
2025 – 2045	Leakage reductions Water efficiency Increased connectivity between WRZ2 and WRZ7
2045 – 2080	Leakage reductions Water efficiency Increased connectivity between WRZ3 and WRZ2

5.2.3 Water Efficiency in the Study Area

In order to ensure water efficiency in the future, South East Water have proposed plans to reduce water consumption through a series of demand management measures as agreed with the Environment Agency. To improve water efficiency, South East Water partnered with Advizzo and piloted a scheme where customers receive a six monthly water use report that compares their water use with that of their neighbourhood and offers tips on how to save water; this scheme is being rolled out to all customers between 2020 – 2025. South East Water also have a joint project with Centrica to evaluate the benefits of their Hive home leak detector that provides real time data and a WiFi connected application to identify irregular water use events and internal plumbing losses to assist in rectifying plumbing losses in homes across the supply area. It is hoped that by reducing the long-term demand for water, the supply of water can be controlled to help ensure that water is available in the future.

South East Water have a preferred plan to reduce per capita consumption from 150 litres per head per day (l/h/d) in 2017/18 to 139l/h/d by 2025, 118l/h/d by 2045 and 90l/h/d by 2080. As a result of a compulsory metering programme which commenced in 2011, it is expected that 90% of the households which South East Water serve will be metered by 2019/20. Meter penetration is expected to continue to increase to about 91% at 2044/45 as a result of all future new homes being metered and some further voluntary opting for meters.

5.2.4 South East Water Updated Draft WRMP

As the current South East Water WRMP is near the end of its current cycle, an updated WRMP is currently being produced covering the period 2025 – 2075 and a draft version was consulted on recently. The final version is due to be published in September 2023. The updated draft WRMP[31] has been reviewed and the preferred plan measures relevant for the LDC study area are summarised in Table 5-4. It should be noted that the WRMP is in draft format and therefore the preferred plan schemes are subject to regulatory determination.

Table 5-4: South East Water Updated Draft WRMP Preferred Plan Schemes

Period	Preferred Plan Schemes
2025 - 2030	Demand management (leakage reductions and water efficiency New company transfers
2031 to 2040	Demand management (leakage reductions and water efficiency) New regional water transfers

[31] South East Water Draft Water Resources Management Plan 2025 to 2075 Technical Overview (2022). Available online at: https://cdn.southeastwater.co.uk/Publications/wrmp/2._dWRMP24_Technical_Overview_Document-web_version.pdf (accessed March 2023)

Period	Preferred Plan Schemes
2041 to 2075	Demand management (leakage reductions and water efficiency) New regional water transfers New company transfers Developing a scheme to operate surface water and groundwater sources more conjunctively on the River Ouse in WRZ2 (Haywards Heath) Developing a new water recycling facility to treat effluent from Peacehaven WwTW Building a new reservoir at Broyle Place

6. Nature-based Solutions

This section summarises case studies and opportunities for water linked Nature-based Solutions (NBS) and Natural Flood Management (NFM) in the LDC study area.

The Working with Natural Processes (WWNP) project[32] created a toolbox of mapped data and methods to assist with identification of potential locations for WWNP. Figure 6-1 shows the WWNP potential in the LDC study area and indicates that:

- There is potential for wider catchment, riparian, and floodplain woodland in the northern part of the LDC study area.
- There are woodland constraint areas in the northern part of the LDC study area and significant woodland constraints in the southern part, including the urban areas of Peacehaven, Newhaven and Seaford. These are areas where it is not suitable for woodland creation as the areas are unlikely to allow woodland to establish, for example due to urbanisation.
- There is potential for runoff attenuation features across the northern part of the LDC study area.
- There is potential for floodplain reconnection in both the northern and southern parts of the LDC study area, for example along the River Ouse, Longford Stream and Bevern Stream.

The River Ouse Catchment Flood Management Plan (CFMP)[33] identifies proposed actions to manage flood risk in the sub-areas of the River Ouse which includes the use of Nature-based Solutions such as:

- Investigating the removal of structures to restore rivers and floodplains to a naturally functioning state in the High Weald and Middle Ouse sub-area.
- Exploring Natural England's agri-environmental and woodland scheme grants to help fund the change of land use and land use management to increase water retention in the High Weald and Middle Ouse sub-area.
- Undertaking pre-feasibility studies focusing on opportunities for flood storage and increased floodplain inundation in the High Weald and Middle Ouse sub-area and The Brooks and Lower Ouse sub-area.
- Undertaking a study to investigate the potential for an upstream flood storage area which would be provided upstream of Uckfield in the High Weald and Middle Ouse sub-area.
- Implementing schemes to increase floodplain inundation downstream of Lewes and upstream of Newhaven in the Brooks and Lower Ouse sub-area.
- Seeking out funding and partnership opportunities in connection with new developments and consider options for redevelopment of more open river corridors through Uckfield, to reduce the number of properties in the floodplain and therefore reduce the number of properties at risk of flooding in the Uckfield sub-area.
- Putting in place policies within the local development frameworks that work towards long-term protection and reinstatement of a functioning floodplain through Uckfield through sustainable land management in the Uckfield sub-area.
- Putting in place policies within the local development frameworks that work towards long-term protection and re-creation of the Scrase Bridge Stream and West Common Stream in the Haywards Heath sub-area.

[32] Available online at: https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/working-with-natural-processes-to-reduce-flood-risk (accessed January 2023)
[33] Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/293870/Ouse_Sussex_Catchment_Flood_Management_Plan.pdf (accessed November 2022)

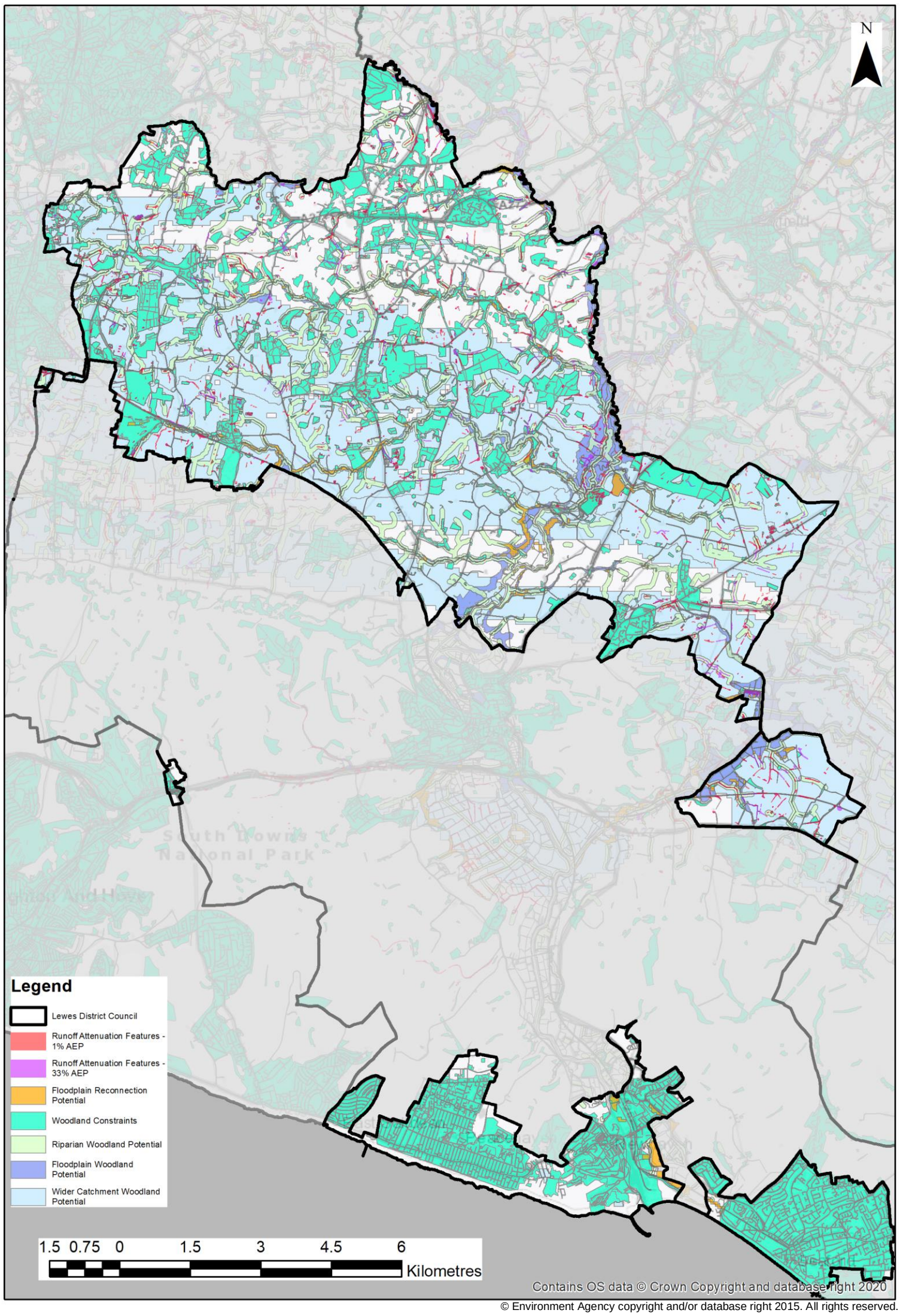


Figure 6-1: Working with Natural Processes potential across the LDC study area

Existing NFM projects and catchment studies have been reviewed to identify current schemes present in the LDC study area and where opportunities have been identified for future NFM projects as seen in Table 6-1.

Table 6-1: Natural Flood Management case studies and opportunities in the LDC study area

Organisation	NFM case study/opportunities
Ouse & Adur Rivers Trust (OART)	The OART are a registered charity working to protect, restore and enhance the rivers, streams, estuaries, and lakes within the Adur and Ouse catchment. **Adur Catchment NFM Project**[34] – Working in partnership with the Environment Agency, the OART have received funding to build an evidence based strategy to reduce the risk of flooding to properties across the Adur catchment. Until 2023, the NFM Officer will be liaising with landowners, local authorities, and community groups to gain a greater understanding of the impact of heavy rainfall across the catchment and build a strategic approach to delivering interventions. This will include: - Supporting improvements to soil structure and the rebuilding of organic matter levels. - Modifying flood banks to improve channel diversity, water holding capacity and/or reconnecting rivers with their floodplains. - Introducing leaky woody debris dams to slow the flow. - Introducing wetlands, ponds, and scrapes as features in the floodplain to provide increased water storage.
OART	**Ouse Valley NFM**[35] – Working in partnership with LDC, the OART have been designing and delivering NFM projects across the district since 2016. Focus is currently on the villages of Ringmer and Wivelsfield as well as the Cuilfail community in Lewes itself. NFM interventions include urban wetlands, ponds, leaky dams, and large scale river enhancements to re-connect the River Ouse to its floodplain.
Sussex Flow Initiative (SFI)	The SFI[36] is a NFM project working with and restoring natural processes to reduce flood risk within the River Ouse catchment. SFI was formed in 2012 as a partnership between the Woodland Trust, Sussex Wildlife Trust, and the Environment Agency. It is further supported by funding from LDC. **Washland restoration at Ashurst Organics**[37] – In 2017, the SFI worked with a local organic farmer and a contractor to create new flood storage, via a network of 7 wildlife scrapes created along the course of a relict stream channel. The site comprises of around 33 hectares of land in the Bevern Stream sub-catchment of the River Ouse. **Leaky Dams**[38] – The SFI have installed leaky dams in multiple areas across the LDC study area. 108 leaky dams were installed in streams and ditches in Plashatt Wood and 30 leaky dams were installed in woodland streams in North Common. **Floodplain Storage**[38] – A 0.05ha floodplain storage pond has been created at Green Lane Farm in Ringmer.
OART and SFI	**The Bevern Stream and Plumpton Mill Stream Sub-Catchment Survey and Mapping for Flood Resilience and River Quality Assessment**[39] – A GIS study was undertaken to identify areas where NFM features could be suitable. The Bevern and Plumpton Mill Streams are positioned in the mid-area of the catchment which is less of a priority for NFM interventions. The GIS mapping identified 68 sites as having the potential to retain more water and aligning these features to local land use suggests that there are at least 8 ponds that could be enhanced to hold more water.

[34] Available online at: https://oart.org.uk/project/natural-flood-management/ (accessed November 2022)
[35] Available online at: https://oart.org.uk/project/natural-flood-management/ (accessed November 2022)
[36] To note, the SFI is being re-named to Wild Ouse from April 2023.
[37] Available online at: http://www.sussexflowinitiative.org/uploads/1/6/3/1/16313516/washland_case_study.pdf (accessed November 2022)
[38] Available online at: https://adurandousecatchment.org.uk/about/map/ (accessed November 2022)
[39] OART and SFI (2017) The Bevern Stream and Plumpton Mill Stream Sub-Catchment Survey and Mapping for Flood Resilience and River Quality Assessment.

Organisation	NFM case study/opportunities
OART and SFI	**Longford Stream Sub-Catchment Survey and Mapping for Flood Resilience and River Quality Assessment**[40] – A GIS study was undertaken to identify areas where NFM features could be suitable. The Longford Stream sub-catchment has a wide range of opportunities for NFM, including the potential for wider catchment, riparian and floodplain planting, runoff attenuation features and floodplain reconnection and storage. In total 16 hectares of floodplain could be reconnected with the Longford Stream. The Ouse woodland hydrology model was used in the study and identified a number of existing woodlands which could have significant interaction with the river network; these woodlands could represent important areas on which to focus further investigations into when considering the potential for increased water storage through the addition of woody dams.

Nature-based Solutions provide wider benefits for the water environment and water resource as well as improving flood risk including:

- Naturalising floodplains can improve the hydrological regime as well as hydromorphological and biological function.
- Slowing and holding back flow can increase the potential for aquifer recharge.
- Land use improvements can benefit water quality by trapping sediment.
- Improvement of habitats and biodiversity.
- Can enable integrated water management, providing resilience to flooding when there is too much water, and resilience to drought when there is too little water.

[40] OART and SFI (2019) Longford Stream Sub-Catchment Survey and Mapping for Flood Resilience and River Quality Assessment.

7. Summary

Table 7-1 provides a red, amber, and green assessment summary of the settlement areas listed in the adopted Local Plan (2010-2030) which are within the LDC study area, undertaken using professional judgement, highlighting the opportunities and constraints for potential future development. The opportunities and constraints in the table should inform identification of settlements to take forward into the Detailed WCS stage to support identification of future development in the emerging Local Plan. Other evidence based studies should also be used to inform future development in the emerging Local Plan..

Table 7-1: Summary table of opportunities and constraints for growth in LDC study area

Settlement Category	Settlement Area	WwTW serving the Settlement Area	Does the WwTW have DWF capacity?	Does the area have potable water available?[41]	Risk from flooding	Any Nature-based Solution (NbS) opportunities identified by WWNP project?
District Centre	Seaford	Newhaven East	Limited WwTW DWF capacity.	Restricted potable water available in Brighton Chalk Block.	Parts of Seaford are located within Flood Zone 3 and there are areas of surface water flood risk, but there have been a low number of historic sewer flooding incidents in the postcode area.	No NbS opportunities identified, as woodland growth is constrained in the area.
	Newhaven	Newhaven East	Limited WwTW DWF capacity.	Restricted potable water available in Brighton Chalk Block.	A large area of Newhaven is located within Flood Zone 3, there are areas of surface water flood risk and a high number of historic sewer flooding incidents in the postcode area.	Some areas have NbS opportunities available for floodplain reconnection but the majority of the area is woodland constrained.
	Peacehaven	Peacehaven Brighton		Restricted potable water available in Brighton Chalk Block.	Seafront in Peacehaven is located within Flood Zone 3 but remaining area within Flood Zone 1. There are some areas of surface water flood risk and a moderate number of historic sewer flooding incidents in the postcode area.	No NbS opportunities identified, as woodland growth is constrained in the area.
Rural Service Centre	Newick	Newick		Located closest to AP6 which is classified as having limited potable water available for Q30 and Q50 and is classified as in an area with discharge rich waterbodies for Q70 and Q95.	Newick is mostly located within Flood Zone 1, with the northern area located within Flood Zone 3. The area has limited surface water flood risk but is in an area with a high number of historic sewer flooding incidents in the postcode area.	There is some potential for NbS including runoff attenuation features and riparian woodland, however there are areas with woodland constraint.
	Ringmer	Neaves Lane Ringmer, Smallholdings Ringmer	At Neaves Lane Ringmer WwTW, there is some DWF capacity, however the WwTW has already used over 80% of its DWF permit.	Located closes to AP9 which has potable water available.	Ringmer is located within Flood Zone 1 with surface water flood risk, however it is located within an area of moderate historic sewer flooding incidents in the postcode area.	There is some potential for NbS including wider catchment woodland potential, riparian woodland potential, and runoff attenuation features, however large area has woodland constraints.
Service Village	Barcombe Cross	Barcombe Church, Barcombe New		Located closest to AP9 which has potable water available.	Majority of area is located within Flood Zone 1, but there are areas of Flood Zone 3 in the northern area with some surface water flood risk. There have been a moderate number of historic sewer flooding incidents in the postcode area.	There is some potential for NbS including floodplain woodland potential and riparian woodland potential in the northern parts, but majority of the area has woodland constraints.
	Plumpton Green	Barcombe New		Located closest to AP4 which is classified as having limited potable water available for Q30 and Q50 and is classified as in an area with discharge rich waterbodies for Q70 and Q95.	Majority of area is located within Flood Zone 1, but there are areas of Flood Zone 3 with some surface water flood risk. There have been a high number of historic sewer flooding incidents in the postcode area.	There is some potential for NbS including riparian woodland potential, floodplain reconnection potential and runoff attenuation features, but the majority of the area has woodland constraints.
	Wivelsfield Green	Wivelsfield	WwTW current DWF exceeds DWF permit.	Located closest to AP6 which is classified as having limited potable water available for Q30 and Q50 and is classified as in an area with discharge rich waterbodies for Q70 and Q95.	Wivelsfield is located within Flood Zone 1 but there are areas of surface water flood risk. There have been no historic sewer flooding incidents in the postcode area.	There is some potential for NbS including wider catchment woodland potential, riparian woodland potential and runoff attenuation features, however there are some areas of woodland constraint.
Local Village	Broyle Side	N/A	N/A - Settlement area is not listed as being served by a WwTW in the DWMP.	Located closest to AP9 which has potable water available.	Most of the area of Broyle Side is located within Flood Zone 1, but there is an area of Flood Zone 3 and some surface water flood risk. There have been a moderate number of historic sewer flooding incidents in the postcode area.	There is some potential for NbS including some riparian woodland potential and runoff attenuation features, however the majority of the area has woodland constraints.
	Cooksbridge	Cooksbridge	At Cooksbridge WwTW, there is some DWF capacity, however the WwTW has already used over 80% of its DWF permit.	Located closest to AP9 which has potable water available.	Most of the area is within Flood Zone 1, however there is a Flood Zone 3 extent in the north and some surface water flood risk. There have been a high number of historic sewer flooding incidents in the postcode area.	There is opportunity for NbS including wider catchment woodland potential, riparian woodland potential and some floodplain reconnection potential.
	Chailey North	Newick		Located closest to AP6 which is classified as having limited potable water available for Q30 and Q50 and is classified as in an area with discharge rich waterbodies for Q70 and Q95.	Area is located within Flood Zone 1 with small areas of surface water flood risk, however, there have been a high number of historic sewer flooding incidents in the postcode area.	The area has some NbS opportunities including runoff attenuation features and a small amount of riparian woodland potential, however the majority of the area has woodland constraints.

[41] This has been based on ALS, however water resources are managed on a larger scale and therefore could influence the potable water availability.

Settlement Category	Settlement Area	WwTW serving the Settlement Area	Does the WwTW have DWF capacity?	Does the area have potable water available?[41]	Risk from flooding	Any Nature-based Solution (NbS) opportunities identified by WWNP project?
Hamlet	Chailey South	Barcombe New		Located closest to AP6 which is classified as having limited potable water available for Q30 and Q50 and is classified as in an area with discharge rich waterbodies for Q70 and Q95.	Area is located within Flood Zone 1 with small areas of surface water flood risk, however, there have been a high number of historic sewer flooding incidents in the postcode area.	The area has some NbS opportunities including runoff attenuation features and some riparian and wider catchment woodland potential, however the majority of the area has woodland constraints.
	South Street	N/A	N/A - Settlement area is not listed as being served by a WwTW in the DWMP.	Located closest to AP6 which is classified as having limited potable water available for Q30 and Q50 and is classified as in an area with discharge rich waterbodies for Q70 and Q95.	Area is located within Flood Zone 1 with small areas of surface water flood risk, however, there have been a high number of historic sewer flooding incidents in the postcode area.	The area has some NbS opportunities including runoff attenuation features, wider catchment woodland potential and some riparian woodland potential, however there are areas of woodland constraint.
	South Heighton	Newhaven East	Limited WwTW DWF capacity.	Restricted potable water available in Brighton Chalk Block.	A large area of South Heighton is located within Flood Zone 3, with a small amount of surface water flood risk area. There have been a high number of historic sewer flooding incidents in the postcode area.	No opportunities identified in the area of NbS and some of the area has woodland constraints.
	Barcombe	Barcombe Church, Barcombe New		Located closest to AP9 which has potable water available.	Area is located within Flood Zone 1 with small areas of surface water flood risk, however, there have been a moderate number of sewer flooding incidents in the postcode area.	There is opportunity for NbS as Barcombe is located within an area of wider catchment woodland potential.
	Chailey Green	N/A	N/A - Settlement area is not listed as being served by a WwTW in the DWMP.	Located closest to AP6 which is classified as having limited potable water available for Q30 and Q50 and is classified as in an area with discharge rich waterbodies for Q70 and Q95. ted closest to AP6 which has limited potable water available or in an area with discharge rich waterbodies.	Most of the area is located within Flood Zone 1, however there is an area of Flood Zone 3 running through Chailey Green and some areas of surface water flood risk. There have been a high number of historic sewer flooding incidents in the postcode area.	There is opportunity for NbS as Chailey Green is located within an area of riparian woodland potential.
	Hamsey	Hamsey	N/A - WwTW has a descriptive DWF permit and therefore capacity is unknown.	Located closest to AP9 which has potable water available.	Hamsey is located within areas of Flood Zone 2 and 3 and there are large areas of surface water flood risk. There have been a moderate number of historic sewer flooding incidents in the postcode area.	There is opportunity for NbS including wider catchment, riparian and floodplain woodland potential areas, and some areas of floodplain reconnection potential.
	Wivelsfield	Wivelsfield	WwTW current DWF exceeds DWF permit.	Located closest to AP6 which is classified as having limited potable water available for Q30 and Q50 and is classified as in an area with discharge rich waterbodies for Q70 and Q95.	Located within Flood Zone 1 with limited surface water flood risk and there have been no historic sewer flooding incidents in the postcode area.	There is some opportunity for NbS including riparian and wider catchment woodland potential, and runoff attenuation features, however there are some areas of woodland constraint.

8. Recommendations for Detailed Water Cycle Study

Based on the assessments undertaken in this Scoping WCS, the following recommendations are made for a Detailed WCS:

- Depending on the timing of the Detailed WCS, review information covered in the Scoping WCS to check that the information remains relevant and if necessary, update information. The emerging WRMP and DWMP must be used as well as the updated regional plan.
- Understand proposed housing numbers and where planned growth will take place as LDC further develops the spatial growth strategy of the new Local Plan (2020-2040).
- Using proposed growth spatial information, including proposed growth from outside the LDC study area:
  - understand if there is enough water supply and consider whether further water efficiency measures or policies are required related to water use to support sustainable growth
  - examine whether existing WwTWs can cope with increased load, including water quality assessment calculations and identify whether alternative treatment solutions may be required.
- Identify which receiving waterbodies have information available for numerical water quality modelling through liaison with the Environment Agency.
- Assess whether there are any location-specific water related environmental risks once it is understood where proposed growth will take place.
- Review whether there is sufficient land with a low risk of flooding for development, once proposed housing numbers and proposed growth locations are understood. If land in flood risk areas will be required, identify if the flood risk can be managed at the catchment scale through NFM. Also review whether increased discharge from WwTWs will increase flood risk.
- Consider the impact of climate change on proposed growth to understand whether it will be resilient. Consider if there are opportunities to contribute to climate change mitigation, for example though NBS provision such a planting woodland.
- Assess network capacity for strategic growth locations (wastewater and water supply) in liaison with SW and SEW and consider the impact on combined sewer overflow events.
- Identify the likely infrastructure required to accommodate the proposed growth or identify opportunities within the water cycle to increase capacity for proposed growth without new infrastructure.
- Identify key partners needed to make use of any opportunities identified.

Appendix A Policy and Legislative Drivers Shaping the WCS

Directive/Legislation/Guidance	Description
The Conservation of Offshore Marine Habitats and Species Regulations 2017	Provides for the designation of Special Protection Areas.
Building Regulations Approved Document G – sanitation, hot water safety and water efficiency (March 2010)	The current edition covers the standards required for cold water supply, water efficiency, hot water supply and systems, sanitary conveniences and washing facilities, bathrooms and kitchens and food preparation areas.
Environment Act 1995	Sets out the role and responsibility of the Environment Agency.
Environment Act 2021	Provides a legal framework for environmental governance in the UK. Brings in measures for improvement of the environment in relation to waste, resource efficiency, air quality, water, nature and biodiversity, and conservation.
Environmental Protection Act 1990	Integrated Pollution Control (IPC) system for emissions to air, land and water.
Flood & Water Management Act 2010	The Flood and Water Management Act 2010 is the outcome of a thorough review of the responsibilities of regulators, local authorities, water companies and other stakeholders in the management of flood risk and the water industry in the UK. Its key features relevant to this WCS are: 1. To give the Environment Agency an overview of all flood and coastal erosion risk management and unitary and county councils the lead in managing the risk of all local floods. 2. To encourage the uptake of sustainable drainage systems by removing the automatic right to connect to sewers and providing for unitary and county councils to adopt SuDS for new developments and redevelopments. 3. To widen the list of uses of water that water companies can control during periods of water shortage and enable Government to add to and remove uses from the list. 4. To enable water and sewerage companies to operate concessionary schemes for community groups on surface water drainage charges. 5. To make it easier for water and sewerage companies to develop and implement social tariffs where companies consider there is a good cause to do so, and in light of guidance that will be issued by the Secretary of State following a full public consultation.
Future Water, February 2008	Sets the Government's vision for water in England to 2030. The strategy sets out an integrated approach to the sustainable management of all aspects of the water cycle, from rainfall and drainage, through to treatment and discharge, focusing on practical ways to achieve the vision to ensure sustainable use of water. The aim is to ensure sustainable delivery of water supplies and help improve the water environment for future generations.
The Groundwater (Water Framework Directive) (England) Direction 2016	To protect groundwater against pollution by 'List 1 and 2' Dangerous Substances.
The Conservation of Habitats and Species Regulations 2017	To conserve the natural habitats and to conserve wild fauna and flora with the main aim to promote the maintenance of biodiversity taking account of social, economic, cultural and regional requirements. In relation to abstractions and discharges, can require changes to these through if they are impacting on designated European Sites. Also the legislation that provides for the designation of Special Areas of Conservation provides special protection to certain non-avian species and sets out the requirement for Appropriate Assessment of projects and plans likely to have a significant effect on an internationally designated wildlife site.
Land Drainage Act 1991	Sets out the statutory roles and responsibilities of key organisations such as Internal Drainage Boards, local authorities, the Environment Agency and Riparian owners with jurisdiction over watercourses and land drainage infrastructure.
National Planning Policy Framework	Planning policy in the UK is set by the National Planning Policy Framework (NPPF). NPPF advises local authorities and others on planning policy and operation of the planning system. A WCS helps to balance the requirements of various planning policy documents and ensure that land-use planning and water cycle infrastructure provision is sustainable.
Pollution Prevention and Control Act (PPCA) 1999	Implements the IPPC Directive. Replaces IPC with a Pollution Prevention and Control (PPC) system, which is similar but applies to a wider range of installations.

Ramsar Convention	Provides for the designation of wetlands of international importance
Urban Waste Water Treatment Directive (UWWTD)	This Directive concerns the collection, treatment and discharge of urban waste water and the treatment and discharge of waste water from certain industrial sectors. Its aim is to protect the environment from any adverse effects caused by the discharge of such waters.
Water Act 2003	Implements changes to the water abstraction management system and to regulatory arrangements to make water use more sustainable.
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017	The WFD, combines water quantity and water quality issues together. An integrated approach to the management of all freshwater bodies, groundwaters, estuaries and coastal waters at the river basin level has been adopted. The overall requirement of the directive is that all river basins must achieve 'Good ecological status' by 2015 or by 2027 if there are no grounds for derogation. The Environment Agency is the body responsible for the implementation of the WFD in the UK. The Environment Agency have been supported by UKTAG[42], an advisory body which has proposed water quality, ecology, water abstraction and river flow standards to be adopted in order to ensure that the water bodies in the UK (including groundwater) meet the required status[43]. Standards and waterbody classifications are published via River Management Plans (RBMP) the latest of which were completed in 2015.
Natural Environment & Rural Communities Act 2006	Covering Duties of public bodies – recognises that biodiversity is core to sustainable communities and that Public bodies have a statutory duty that states that "every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity.
Water Resources Act 1991	Protection of the quantity and quality of water resources and aquatic habitats. Parts have been amended by the Water Act 2003.
Wildlife & Countryside Act 1981 (as amended)	Legislation that provides for the protection and designation of SSSIs and specific protection for certain species of animal and plant among other provisions.

Strategies and Plans

Category	Author	Document Name	Publication Date
Water Resources	Southern Water	Adur and Ouse River Catchments Drainage and Wastewater Management Plan	2022
Water Resources	South East Water	Water Resources Management Plan	2019
Water Resources	Environment Agency	South East River Basin Management Plan	2022
Water Resources	Water Resources South East	Draft Regional Plan for South East England	2022
Water Resources	Adur and Ouse Partnership	Adur and Ouse Catchment Management Plan	2012
Local Plan	Lewes District Council South Downs National Park Authority	Lewes District Local Plan Part 1 Joint Core Strategy 2010 to 2030	2016
Flood Risk	AECOM	Lewes District Council Level 1 Strategic Flood Risk Assessment	2023

[42] The UKTAG (UK Technical Advisory Group) is a working group of experts drawn from environment and conservation agencies. It was formed to provide technical advice to the UK's government administrations and its own member agencies. The UKTAG also includes representatives from the Republic of Ireland.
[43] UK Environmental Standards and Conditions (Phase I) Final Report, April 2008, UK Technical Advisory Group on the Water Framework Directive.

Appendix B Site Specific Policies

Spatial Policy (SP)	Policies relating to the WCS
SP3 – North Street Quarter and adjacent Eastgate area, Lewes	Development incorporates the early provision of flood defences to an appropriate standard and to the approval of the Environment Agency. Development provides a connection to the sewerage and water supply systems at the nearest point of adequate capacity, as advised by Southern Water, and ensures future access to the existing sewerage and water supply infrastructure for maintenance and upsizing purposes.
SP4 – Old Malling Farm, Lewes	A site specific flood risk assessment is required to be undertaken and an appropriate surface water drainage strategy as advised by the appropriate body and implemented as agreed. The development will provide a connection to the sewerage system at the nearest point of adequate capacity, as advised by Southern Water.
SP5 – Land at Greenhill Way/Ridge Way, Haywards Heath (within Wivelsfield Parish)	A site specific flood risk assessment is required to be undertaken and an appropriate surface water drainage strategy is agreed by the appropriate body and implemented accordingly. The development will provide a connection to the sewerage and water supply systems at the nearest point of adequate capacity, as advised by Southern Water, and ensure future access to the existing sewerage and water supply infrastructure for maintenance and upsizing purposes.
SP6 – Land north of Bishops Lane, Ringmer	An appropriate surface water drainage strategy is required to be agreed by the appropriate body and implemented accordingly. The development will provide a connection to the sewerage system at the nearest point of adequate capacity, as advised by Southern Water.
SP7 – Land at Harbour Heights, Newhaven	The development will provide a connection to the sewerage system at the nearest point of adequate capacity, as advised by Southern Water.
SP8 – Land at Lower Hoddern Farm, Peacehaven	The development will provide a connection to the sewerage system at the nearest point of adequate capacity, as advised by Southern Water.

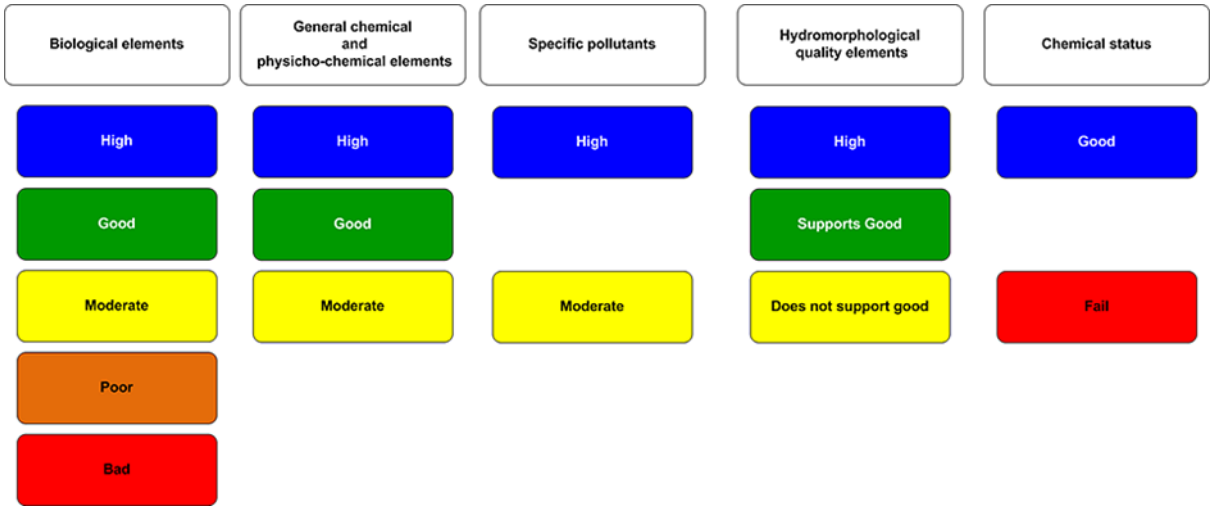
Appendix C WFD classifications for water bodies in the study area

Surface water bodies

Defining the overall WFD 'status' of a waterbody is a complex assessment that combines standards for chemical quality and hydromorphology (habitat and flow conditions), with the ecological requirements of an individual waterbody catchment. The 'overall status' of a waterbody is derived from the classification hierarchy made up of 'elements', and the type of waterbody will dictate what types of elements are assessed within it. Under the WFD, the worst-case classification is assigned as the overall surface water body status, that is, a 'one-out-all-out' system. The following is an example of the classification hierarchy and the diagram illustrates the classifications applied within the hierarchy:

Overall water body status or potential

- Ecological or Chemical status (e.g. ecological)
    - Component (e.g. biological quality elements)
        - Element (e.g. fish)



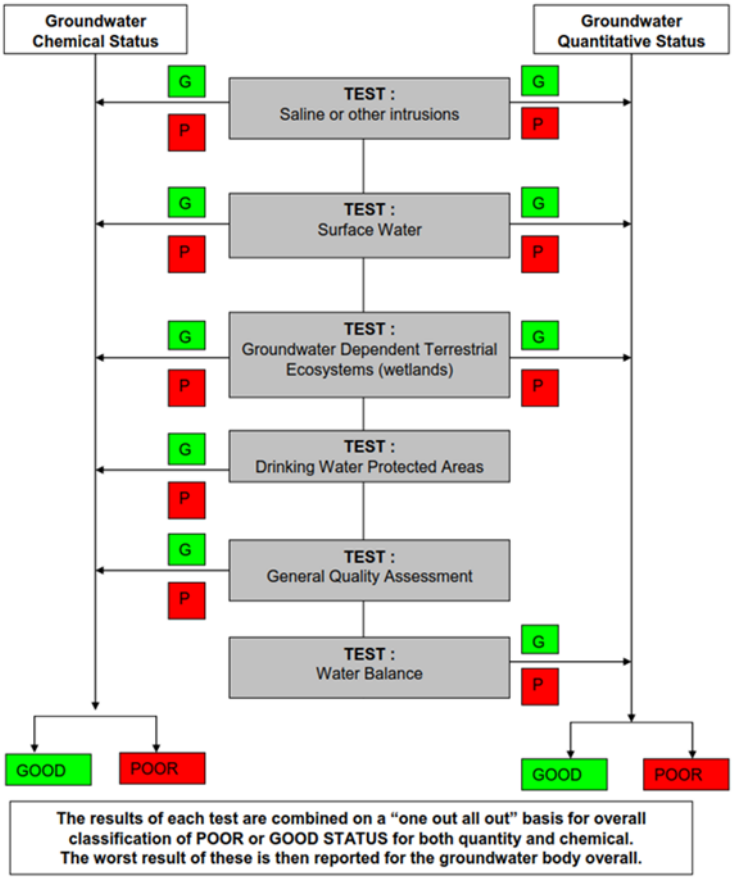
WFD classifications of surface water bodies in Lewes District Council area (Status in 2019)

Waterbody ID	Waterbody name	Catchment	Current 2019 status	Target status/ potential	Physico-chemical 2019 status				Chemical status	Biological status	Hydromorphological status	Reasons for Not Achieving Good (2019)
					Overall Phys-chem status	Ammonia	Dissolved Oxygen	Phosphate				
GB107041012710	Middle Ouse	Ouse Upper	Moderate	Good (2027) – Low confidence	Moderate	High	High	Poor	Fail	Moderate	N/A	Sewage discharge Barriers – ecological discontinuity
GB107041012560	Ouse between Isfield and Coast Water Body	Ouse Upper	Moderate	Good (2027) – Low confidence	Moderate	High	High	Poor	Fail	Poor	N/A	Poor livestock management Poor nutrient management Sewage discharge Barriers – ecological discontinuity
GB107041012960	Longford Stream Water Body	Ouse Upper	Moderate	Good (2027) – Low confidence	Good	High	Good	Good	Fail	Moderate	Supports good	Drought Barriers – ecological discontinuity
GB107041012570	Bevern Stream Water Body	Ouse Upper	Moderate	Good (2027) – Low confidence	Moderate	High	Good	Poor	Fail	Moderate	Supports good	Poor nutrient management Sewage discharge Barriers – ecological discontinuity Natural conditions
GB107041012641	Uck (Ridgewood Stream to Ishurst) Water Body	Ouse Upper	Poor	Moderate (2015)	Moderate	High	High	Poor	Fail	Poor	Supports good	Poor soil management Sewage discharge Misconnections Flood protection - structures
GB107041012670	Pellingford Brook Water Body	Ouse Upper	Moderate	Good (2027) – Low confidence	Moderate	High	Good	Moderate	Fail	Moderate	Supports good	Urbanisation Poor soil management Poor livestock management
GB107041012950	Iron River Water Body	Ouse Upper	Poor	Good (2027) – Low confidence	Moderate	High	Bad	Good	Fail	Poor	Supports good	Poor nutrient management Private sewage treatment Barriers – ecological discontinuity Natural conditions

Waterbody ID	Waterbody name	Catchment	Current 2019 status	Target status/ potential	Physico-chemical 2019 status				Chemical status	Biological status	Hydromorphological status	Reasons for Not Achieving Good (2019)
					Overall Phys-chem status	Ammonia	Dissolved Oxygen	Phosphate				
GB107041012510	Glynde Reach Water Body	Ouse Upper	Poor	Good (2027) – Low confidence	Moderate	High	Bad	Poor	Fail	Poor	Supports good	Poor nutrient management Poor livestock management Sewage discharge Misconnections Reservoir/impoundment – non flow related Barriers – ecological discontinuity
GB107041012590	Little Horsted Stream Water Bod	Ouse Upper	Bad	Good (2027) – Low confidence	Good	High	High	Good	Fail	Bad	Supports good	Poor livestock management Barriers – ecological discontinuity Land drainage – operational management
GB107041012220	Adur (Burgess Hill) Water Body	Adur Upper	Poor	Good (2027) – Low confidence	Moderate	High	Moderate	Moderate	Fail	Poor	Supports good	Transport drainage Poor nutrient management Contaminated land Misconnections Sewage discharge Urbanisation Barriers – ecological discontinuity Natural conditions

Groundwater bodies

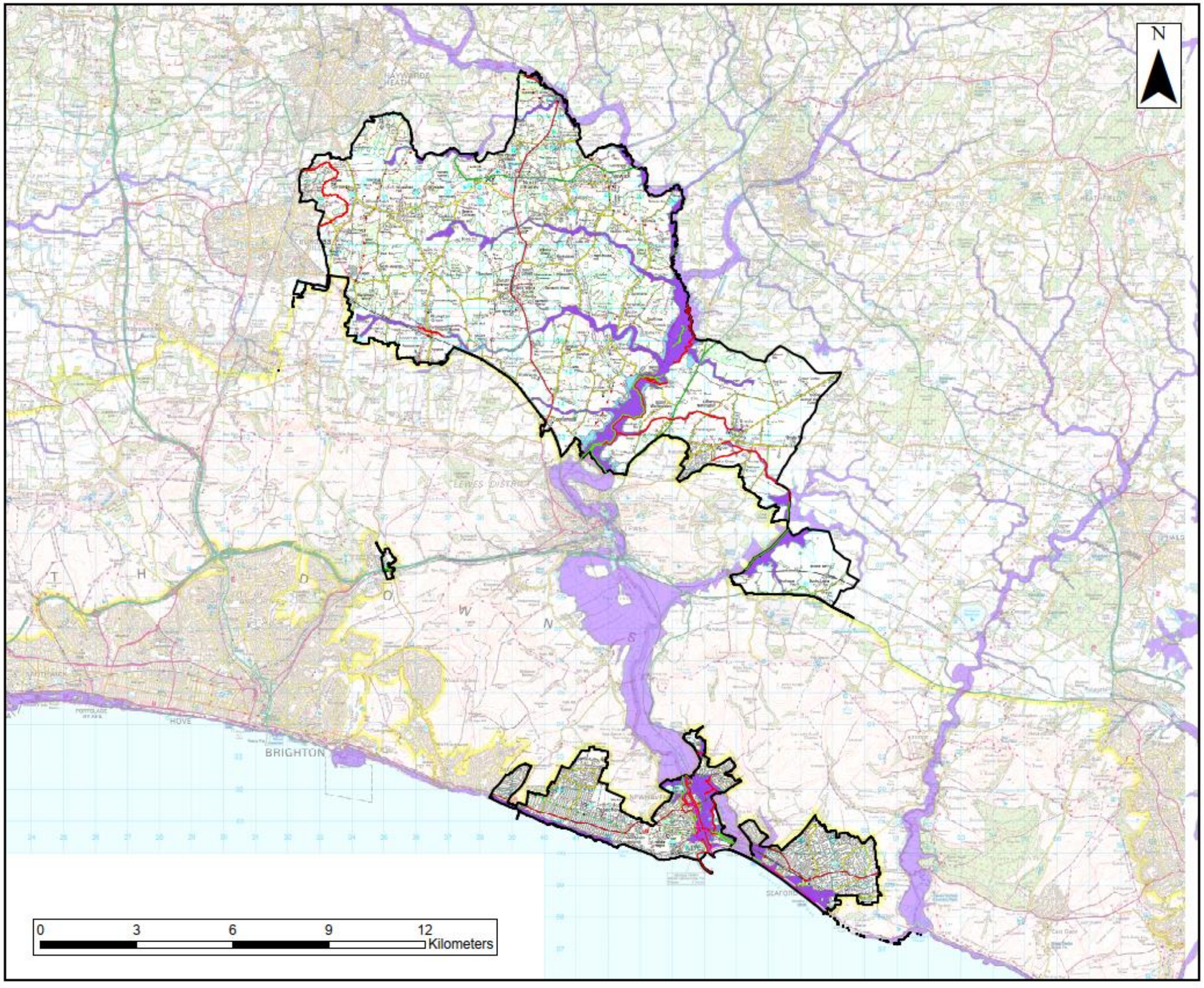
Under the WFD, groundwater body status is classified on the basis of quantitative and chemical status. Groundwater bodies are separated into Groundwater Management Units (GWMUs) and Water Resource Management Units (WRMUs). GMUs are sub-divisions of the groundwater to aid the resource assessment process. WRMUs are sub-divisions according to the water resource availability and the management of water. Status is assessed primarily using data collected from the Environment Agency monitoring network; therefore the scale of assessment means that groundwater status is mainly influenced by larger scale effects such as significant abstraction or widespread diffuse pollution. The worst-case classification is assigned as the overall groundwater body status, in a 'one-out all-out' system, similar to that of surface water body status.



WFD classifications of groundwater bodies in Lewes District Council area (Status in 2019)

Waterbody ID	Waterbody Name	Current Status (2019)	Target Status Objective	Quantitative Status	Chemical Status	Reasons for Not Achieving Good
GB40701G502500	Brighton Chalk Block Water Body	Poor	Good (2060)	Poor	Poor	Poor nutrient management Groundwater abstraction
GB40701G501100	Seaford and Eastbourne Chalk Block Water Body	Poor	Good (2027) – Low confidence	Poor	Poor	Poor nutrient management
GB40702G502000	Adur and Ouse Hastings Bed Water Body	Good	Good (2015)	Good	Good	N/A
GB40701G502400	Lower Greensand Adur and Ouse Water Body	Good	Good (2015)	Good	Good	N/A

Appendix D SFRA Maps



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

Flood Defences

- Beach
- Embankment
- Natural High Ground
- Wall

Lewes DC Boundary

Flood Zone 3

Flood Zone 2

NOTES

1 This map shows the predicted likelihood of fluvial flooding based on the Environment Agency's Flood Map for Planning (Rivers and the Sea) and catchment modelling studies, which may be subject to revision in the future. The Flood Map for Planning is available online at https://flood-map-for-planning.service.gov.uk/.

2. The probability of fluvial flooding is divided into the following categories:

Flood Zone 1- Land having a less than 0.1% annual probability of river flooding (1 in 1,000 chance each year). Show as clear on the Flood Map.

Flood Zone 2- Land having between a 1% and 0.1% annual probability of river flooding (between 1 in 100 and 1 in 1,000 chance each year.

Flood Zone 3- Land having a 1% or greater annual probability of river flooding (>1 in 100 chance).

Flood Zone 3B- Land where water has to be stored in times of flood, also known as the functional floodplain.

Purpose of Issue: DRAFT

Client: LEWES DISTRICT COUNCIL

Project Title: LEWES DISTRICT COUNCIL LEVEL 1 SFRA

Drawing Title: APPENDIX A FIGURE 4 - ENVIRONMENT AGENCY FLOOD ZONES

Drawn	Checked	Approved	Date
RJG	RM	-	17/08/2022

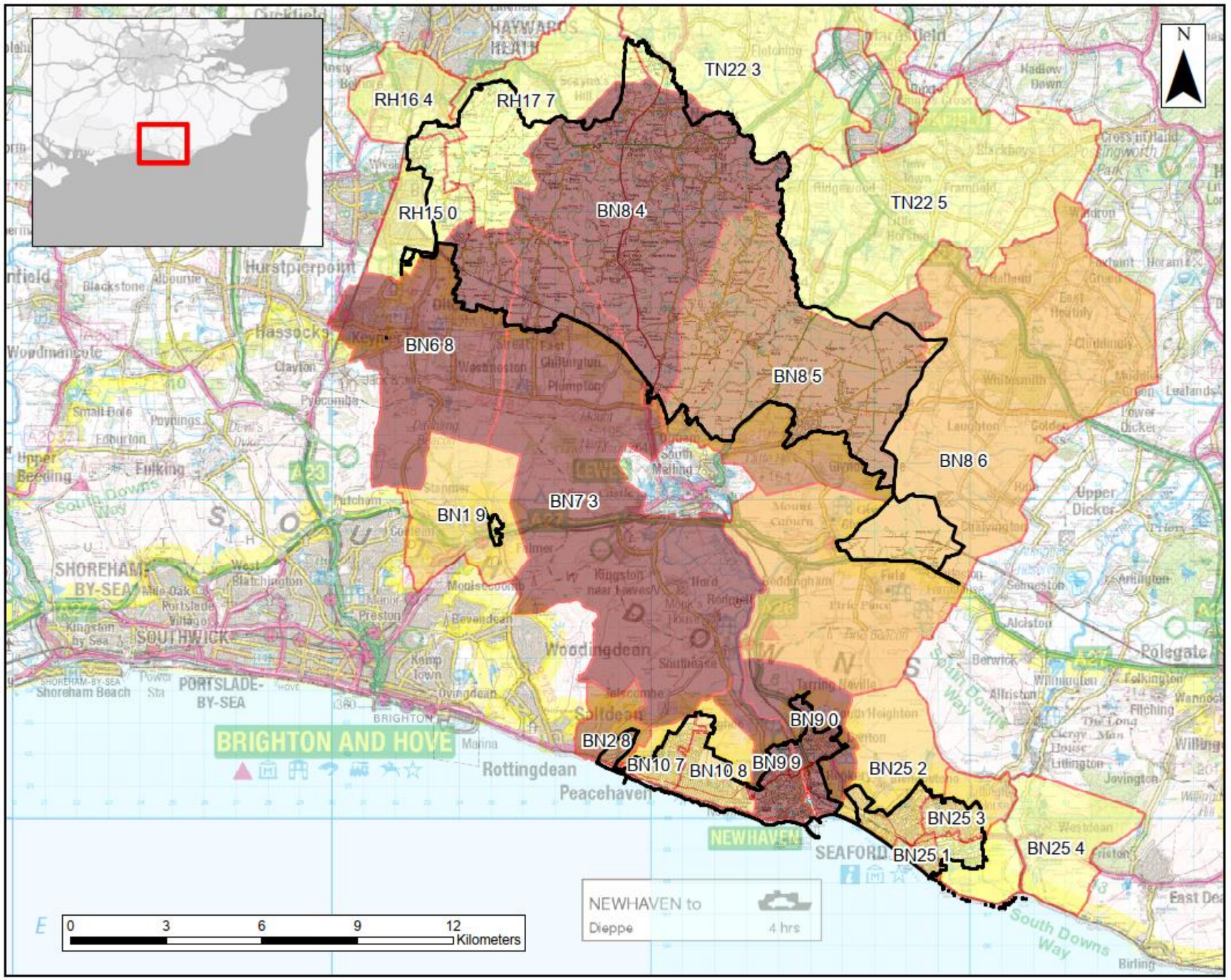
AECOM Internal Project No.	Scale @ A3
60676353	1:110,000

AECOM
3rd Floor Portwall Place
Portwall Lane
Bristol, United Kingdom
T +44 (0)117 316 0700
aecom.com

AECOM

Drawing Number: FIGURE A4

Rev: 01



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

Lewes DC Boundary

No. of sewer flooding incidents in each 4-digit postcode

- 0
- 1-10
- 11-50
- 51-100
- 101-200

NOTES

Southern Water have provided records of sewer flooding incidents in the Lewes District Council area over the 10 year period 2012-2022. For confidentiality reasons, the records have been reported at the postal district level, as reflected in the figure here.

Purpose of Issue: DRAFT

Client: LEWES DISTRICT COUNCIL

Project Title: LEWES DISTRICT COUNCIL LEVEL 1 SFRA

Drawing Title: APPENDIX A - SEWER FLOODINGINCIDENTS OVER THE PERIOD 2012-2022

Drawn	Checked	Approved	Date
RJG	RM	-	17/08/2022

AECOM Internal Project No.	Scale @ A3
60676353	1:110,000

AECOM
1st Floor Portwall Place
Portwall Lane
Bristol, United Kingdom
T +44 (0)117 233 8700
aecom.com

AECOM

Drawing Number: FIGURE 10

Rev: 01

Appendix E DWMP Review

Peacehaven Brighton

Peacehaven Brighton WwTW catchment was identified in the RBCS as requiring further analysis through BRAVA. The BRAVA results identified the following planning objectives (POs) as significant risks:

- PO1 – Internal sewer flooding risk was assessed as Moderately Significant in 2020 with the primary driver as Customer. The Problem Characterisation assessment was undertaken for Peacehaven Brighton WwTW and identified that the total number of connections in the wastewater system means that there have been between 1.68 and 3.35 incidents per 10,000 connections per year. Blockages caused 82% of all incidents recorded in the wastewater system.
- PO4 – Risk of sewer flooding in a 1 in 50 year storm was assessed as Very Significant in 2020 and 2050 with the primary driver as Hydraulic. The Problem Characterisation assessment identified that the hydraulic model of the sewer network indicated for 2020 that approximately 9600 – 9700 properties within the wastewater system are in areas that could flood by water escaping from sewers and by 2050 the number of properties at risk increases to 9800 – 9900.
- PO5 – Storm overflow performance was identified as Very Significant in 2020 and 2050 with the primary driver as Hydraulic. Figure 8-1 shows the overflows that discharge above the low threshold set for storm overflow discharges to Shellfish Waters, Bathing Waters and Freshwater.

	Number of overflows		Threshold for number of discharges per annum		
	2020	2050	Low	Medium	High
Shellfish Waters	0 Medium	0 Medium	Less than 8	Between 8-10	10 or more
Bathing Waters	1 High	1 Medium	Less than 3	Between 3-10	10 or more
Freshwater	1 High	1 High	Less than 20	Between 20-40	40 or more

Figure 8-1: Overflows exceeding discharge frequency threshold per annum at Peacehaven Brighton WwTW

- PO7 – Risk of flooding due to hydraulic overload was assessed as Moderately Significant in 2020 and Very Significant in 2050 with the primary driver as Hydraulic. The Problem Characterisation indicates that the existing capacity of the wastewater network can be exceeded during 1 in 30 year storms (or more frequent events) and that the risk will increase due to future growth, urban creep and/or climate change by 2050. The annualised number of properties at risk per 10,000 connections is 1726 in 2020 and 3084 in 2050.
- PO10 – Surface water management was assessed as Very Significant with the primary driver as Hydraulic. The Problem Characterisation assessment indicated that there is very significant interaction between surface water flooding and flooding from sewers in the wastewater system. The cause of this localised flooding is the capacity of the drainage network in these areas to convey both wastewater and surface water runoff. During a 1 in 20 year storm, surface water runoff constitutes 96.6% of the flow in the sewers, foul water from homes constitutes 2.5%, business constitutes 0.2% and the baseflow constitutes 0.7%.
- PO 12 – Groundwater pollution was assessed as Very Significant with the primary driver as Operational. The Problem Characterisation assessment identified that sewer survey data indicates that parts of the sewer network are in poor condition and likely to leak sewage.
- PO13 – Bathing waters was assessed as Moderately Significant with the primary driver as Unknown. The Problem Characterisation assessment indicated that the risks from the wastewater system on Brighton Central bathing waters led to an assessment of Moderately Significant, however further investigations are required to better understand the causes of risks and the drivers.

The BRAVA also identified the forecast growth increase from 2020 to be 10% by 2035 and 14% by 2050. The proposed investment strategy was identified as Improve which means the current performance of the drainage and wastewater system needs to be improved to reduce the impacts on customers and/or the environment. The WwTW catchment is highlighted as a Medium level of concern which is the level of concern that planning objectives could be significantly affected by current or future risks, without intervention.

Peacehaven Brighton WwTW is not identified as a WwTW exceeding its DWF capacity in 2020 or 2050.

Peacehaven Brighton WwTW catchment was taken through the ODA stage and identified and appraised the following potential solutions[44]:

- Enhanced maintenance: customer education and proactive jetting.
- Pipe rehabilitation programme: CCTV surveys, sewer integrity checks and re-lining to reduce exfiltration within Special Protection Zones and Ground Nitrate Zones.
- Flood storage: Attenuate excess flows in sewer network using storage tanks to reduce risk of flooding. Option priced based on storage tanks, however surface water separation is the preferred approach.
- Upsize sections of local sewers and storage tanks to accommodate flows from future development
- Study: Model improvements, including flow surveys for storm and DWF, and model calibration.

Newhaven East

Newhaven East WwTW catchment was identified in the RBCS as requiring further analysis through BRAVA. The BRAVA results identified the following POs as significant risks:

- PO2 – Pollution risk was assessed as Moderately Significant in 2020 with the primary driver as Operational. The Problem Characterisation assessment was undertaken for Newhaven East WwTW and identified that there has been between 24.51 and 49.01 incidents per 10,000km of sewer per year (a threshold set by Ofwat) so the risk is in the Moderately Significant band. Asset operational issues at pumping stations and WwTWs are the main causes of incidents, contributing to 80% of all incidents recorded.
- PO3 – Sewer collapse risk was assessed as Very Significant in 2020 with the primary driver as Operational. The Problem Characterisation identified that there have been more than 9.44 incidents per 1,000km of sewer per year (a threshold set by Ofwat) so the risk is in the Very Significant band. The causes of these collapses and bursts is due to the age and condition of the sewers.
- PO4 – Risk of sewer flooding in a 1 in 50 year storm was assessed as Moderately Significant in 2020 and 2050 with the primary driver as Hydraulic. The Problem Characterisation assessment identified that the hydraulic model of the sewer network indicated for 2020 that approximately 1100 properties within the wastewater system are in areas that could flood by water escaping from sewers and by 2050 the number of properties at risk increases to 1600 – 1700.
- PO5 – Storm overflow performance was assessed as Very Significant in 2020 and 2050 with the primary driver as Hydraulic. Figure 8-2 shows the overflows that discharge above the low threshold set for storm overflow discharges to Shellfish Waters, Bathing Waters and Freshwater.

	Number of overflows		Threshold for number of discharges per annum		
	2020	2050	Low	Medium	High
Shellfish Waters	0 Medium	0 Medium	Less than 8	Between 8-10	10 or more
Bathing Waters	1 High	1 Medium	Less than 3	Between 3-10	10 or more
Freshwater	2 High	2 High	Less than 20	Between 20-40	40 or more

Figure 8-2: Overflows exceeding discharge frequency threshold per annum at Newhaven East

- PO7 – Risk of flooding due to hydraulic overload was assessed as Very Significant in 2020 and 2050 with the primary driver as Hydraulic. The Problem Characterisation indicates that the existing capacity of the wastewater network can be exceeded during 1 in 30 year storms (or more frequent events). The annualised number of properties at risk per 10,000 connections is 246 in 2020 and 410 in 2050.
- PO8 – Dry Weather Flow compliance was assessed as Moderately Significant in 2050 with the primary driver as Quality. The Problem Characterisation indicates that the predicted DWF in 2050 is expected to be between 80% and 100% of the current permit.
- PO10 – Surface water management was assessed as Moderately Significant in 2050 with the primary driver as Hydraulic. The Problem Characterisation assessment indicated that there is very significant interaction between surface water flooding and flooding from sewers in the wastewater system. The cause of this localised flooding is the capacity of the drainage network in these areas to convey both wastewater and surface water runoff. During a 1 in 20 year storm, surface water runoff constitutes 94.2% of the flow in

[44] Available online at: https://www.southernwater.co.uk/media/6797/peacehaven-brighton-brig-ineeds.pdf (accessed October 2022)

the sewers, foul water from homes constitutes 3.8%, business constitutes 1.6% and the baseflow constitutes 0.5%.

- PO12 – Groundwater pollution was assessed as Moderately Significant in 2020 with the primary driver as Operational. The Problem Characterisation assessment identified that sewer survey data indicates that parts of the sewer network are in poor condition and likely to leak sewage.

The BRAVA also identified the forecast growth increase from 2020 to be 19% by 2035 and 26% by 2050. The proposed investment strategy was identified as Improve which means the current performance of the drainage and wastewater system needs to be improved to reduce the impacts on customers and/or the environment. The WwTW catchment is highlighted as a Medium level of concern.

Newhaven East WwTW is not identified as a WwTW exceeding its DWF capacity in 2020 or 2050.

Newhaven East WwTW catchment was taken through the ODA stage and identified and appraised the following potential solutions:

- Improved resilience: Wastewater Pumping Station/Wastewater Treatment Works.
- Pipe rehabilitation programme: CCTV surveys, sewer integrity checks and re-lining to reduce exfiltration within Groundwater Protection Zones and to increase integrity.
- Attenuate excess flows in sewer network using storage tanks to reduce risk of flooding. Option priced based on storage tanks, however surface water separation is the preferred approach.
- Review permit for WwTW with the Environment Agency and deliver associated works to increase the capacity of the WwTW.
- Study: Model improvements, including flow surveys for storm and DWF, and model calibration.

Goddards Green

Goddards Green WwTW catchment was identified in the RBCS as requiring further analysis through BRAVA. The BRAVA results identified the following POs as significant risks:

- PO2 – Pollution risk was assessed as Very Significant in 2020 with the primary driver as Operational. The Problem Characterisation assessment was undertaken for Goddards Green WwTW and identified that there have been more than 49.01 incidents per 10,000km of sewer per year (a threshold set by Ofwat) so the risk is in the Very Significant band. Asset operational issues at pumping stations and WwTWs are the main causes of incidents, contributing to 60% of all incidents recorded.
- PO3 – Sewer collapse risk was assessed as Very Significant in 2020 with the primary driver as Operational. The Problem Characterisation identified that there have been more than 9.44 incidents per 1,000km of sewer per year (a threshold set by Ofwat) so the risk is in the Very Significant band. The cause of these collapses and bursts is due to the age and condition of the sewers.
- PO4 – Risk of sewer flooding in a 1 in 50 year storm was assessed as Moderately Significant in 2020 and 2050 with the primary driver as Hydraulic. The Problem Characterisation assessment identified that the hydraulic model of the sewer network indicated for 2020 that approximately between 1100 – 1200 properties within the wastewater system are in areas that could flood by water escaping from sewers and by 2050 the number of properties at risk increases to 1600 – 1700.
- PO5 – Storm overflow performance was assessed as Very Significant in 2020 and 2050 with the primary driver as Hydraulic. Figure 8-3 shows the overflows that discharge above the low threshold set for storm overflow discharges to Shellfish Waters, Bathing Waters and Freshwater.

	Number of overflows		Threshold for number of discharges per annum		
	2020	2050	Low	Medium	High
Shellfish Waters	-	-	Less than 8	Between 8-10	10 or more
Bathing Waters	-	-	Less than 3	Between 3-10	10 or more
Freshwater	1 High 1 Medium	1 High 2 Medium	Less than 20	Between 20-40	40 or more

Figure 8-3: Overflows exceeding discharge frequency threshold per annum at Goddards Green WwTW

- PO7 – Risk of flooding due to hydraulic overload was assessed as Moderately Significant in 2020 and Very Significant in 2050 with the primary driver as Hydraulic. The Problem Characterisation indicates that the existing capacity of the wastewater network can be exceeded during 1 in 30 year storms (or more

frequent events) and that the risk will increase due to future growth, creep and/or climate change by 2050. The annualised number of properties at risk per 10,000 connections is 340 in 2020 and 595 in 2050.

- PO8 – Dry Weather Flow compliance was assessed as Very Significant in 2050 with the primary driver as Quality. The Problem Characterisation indicates that the predicted DWF in 2050 is expected to exceed the current permit.
- PO10 – Surface water management was assessed as Moderately Significant in 2020 with the primary driver as Hydraulic. The Problem Characterisation assessment indicated that there is very significant interaction between surface water flooding and flooding from sewers in the wastewater system. The cause of this localised flooding is the capacity of the drainage network in these areas to convey both wastewater and surface water runoff. During a 1 in 20 year storm, surface water runoff constitutes 92.3% of the flow in the sewers, foul water from homes constitutes 4.3% and the baseflow constitutes 3.5%.

The BRAVA also identified the forecast growth increase from 2020 to be 26% by 2035 and 33% by 2050. The proposed investment strategy was identified as Improve which means the current performance of the drainage and wastewater system needs to be improved to reduce the impacts on customers and/or the environment. The WwTW catchment is highlighted as a Low level of concern.

Goddards Green WwTW is identified as a WwTW which could exceed its DWF capacity. In 2020, the WwTW has 20% spare DWF capacity but in 2050, the spare DWF capacity is -3%.

Neaves Lane Ringmer

Neaves Lane Ringmer WwTW catchment was identified in the RBCS as requiring further analysis through BRAVA. The BRAVA results identified the following POs as significant risks:

- PO2 – Pollution risk was assessed as Moderately Significant in 2020 with the primary driver as Operational.
- PO4 – Risk of sewer flooding in a 1 in 50 year storm was assessed as Moderately Significant in 2020 and 2050 with the primary driver as Hydraulic.
- PO5 – Storm overflow performance was assessed as Very Significant in 2020 and 2050 with the primary driver as Hydraulic.
- PO8 – Dry Weather Flow compliance was assessed as Moderately Significant in 2050 with the primary driver as Quality.

The BRAVA also identified the forecast growth increase from 2020 to be 13% by 2035 and 18% by 2050. The proposed investment strategy was identified as Improve as the current performance of the drainage and wastewater system needs to be improved to reduce the impacts on customers and/or the environment. The WwTW catchment is highlighted as a Low level of concern.

Naeves Lane Ringmer WwTW is not identified as a WwTW exceeding its DWF capacity in 2020 or 2050.

Newick

Newick WwTW catchment was identified in the RBCS as requiring further analysis through BRAVA. The BRAVA results identified the following POs as significant risks:

- PO4 – Risk of sewer flooding in a 1 in 50 year storm was assessed as Moderately Significant in 2020 and 2050 with the primary driver as Hydraulic.
- PO5 – Storm overflow performance was assessed as Moderately Significant in 2020 and 2050 with the primary driver as Hydraulic.
- PO6 – Risk of WwTW quality compliance failure was assessed as Moderately Significant in 2050 with the primary driver as Quality.
- PO7 – Risk of flooding due to hydraulic overload was assessed as Moderately Significant in 2020 and Very Significant in 2050 with the primary driver as Hydraulic.

The BRAVA also identified the forecast growth increase from 2020 to be 17% by 2035 and 25% by 2050. The proposed investment strategy was identified as Improve which means the current performance of the drainage and wastewater system needs to be improved to reduce the impacts on customers and/or the environment. The WwTW catchment is highlighted as a Low level of concern.

Newick WwTW is not identified as a WwTW exceeding its DWF capacity in 2020 or 2050.

Barcombe New

Barcombe New WwTW catchment was identified in the RBCS as requiring further analysis through BRAVA. The BRAVA results identified the following POs as significant risks:

- PO2 – Pollution risk was assessed as Very Significant in 2020 with the primary driver as Operational.
- PO4 – Risk of sewer flooding in a 1 in 50 year storm was assessed as Moderately Significant in 2020 and 2050 with the primary driver as Hydraulic.
- PO5 – Storm overflow performance was assessed as Very Significant in 2020 and 2050 with the primary driver as Hydraulic.
- PO8 – Dry Weather Flow was assessed as Moderately Significant in 2050 with the primary driver as Quality.

The BRAVA also identified the forecast growth increase from 2020 to be 14% by 2035 and 23% by 2050. The proposed investment strategy was identified as Improve which means the current performance of the drainage and wastewater system needs to be improved to reduce the impacts on customers and/or the environment. The WwTW catchment is highlighted as a Low level of concern.

Barcombe New WwTW is not identified as a WwTW exceeding its DWF capacity in 2020 or 2050.

Wivelsfield

Wivelsfield WwTW catchment was identified in the RBCS as requiring further analysis through BRAVA. The BRAVA results identified the following POs as significant risks:

- PO6 – Risk of WwTW quality compliance was assessed as Moderately Significant in 2050 with the primary driver as Quality.
- PO9 – GES/GEP was assessed as Very Significant in 2020 with the primary driver as Hydraulic.

The BRAVA also identified the forecast growth increase from 2020 to be 14% by 2035 and 31% by 2050. The proposed investment strategy was identified as Prepare which means the current risks and performance is acceptable so continue to maintain the existing system, but it is required to actively invest now to plan and prepare for future risks and performance issues. The WwTW catchment is highlighted as a Low level of concern.

Wivelsfield WwTW is not identified as a WwTW exceeding its DWF capacity in 2020 or 2050.

Cooksbridge

Cooksbridge WwTW catchment was identified in the RBCS as requiring further analysis through BRAVA. The BRAVA results identified the following POs as significant risks:

- PO8 – Dry Weather Flow compliance was assessed as Moderately Significant in 2050 with the primary driver as Quality.

The BRAVA also identified the forecast growth increase from 2020 to be 13% by 2035 and 22% by 2050. The proposed investment strategy was identified as Sustain which means that current performance is acceptable but risks will increase in the future. The strategy is to continue to maintain but as assets need replacing, look to increase capacity to keep pace with climate change, development, and asset condition to sustain the existing level of performance into the future. The WwTW catchment is highlighted as a Low level of concern.

Cooksbridge WwTW is not identified as a WwTW exceeding its DWF capacity in 2020 or 2050.

Smallholdings Ringmer

Smallholdings Ringmer WwTW catchment was identified in the RBCS as requiring further analysis through BRAVA. The BRAVA results did not identify any POs as significant risks.

The BRAVA identified the forecast growth increase from 2020 to be 12% by 2035 and 21% by 2050. The proposed investment strategy was identified as Maintain which means that the current performance is within acceptable limits and there are no major concerns for the future. The strategy is to continue to maintain, replace assets like for like when needing replacement and accept that climate change and growth may cause slight deterioration in levels of performance.

Smallholdings Ringmer is not identified as a WwTW exceeding its DWF capacity in 2020 or 2050.

Hamsey

Hamsey WwTW catchment was identified in the RBCS as requiring further analysis through BRAVA. The BRAVA did not identify any POs as significant risks.

The BRAVA identified the forecast growth increase from 2020 to be 91% by 2035 and 101% by 2050. The proposed investment strategy was identified as Maintain which means that current performance is within acceptable limits and there are no major concerns for the future. The strategy is to continue to maintain, replace assets like for like when needing replacing and accept that climate change and growth may cause slight deterioration in levels of performance.

Hamsey WwTW is not identified as a WwTW exceeding its DWF capacity in 2020 or 2050.

Chailey

Chailey WwTW catchment was not identified in the RBCS as requiring further analysis through BRAVA.

Stamford Buildings Firle

Stamford Buildings Firle WwTW catchment was not identified in the RBCS as requiring further analysis through BRAVA.

Barcombe Church

Barcombe Church WwTW catchment was not identified in the RBCS as requiring further analysis through BRAVA.

Highbridge East Chiltington

Highbridge East Chiltington WwTW catchment was not identified in the RBCS as requiring further analysis through BRAVA.

AECOM Limited
3rd Floor, Portwall Place
Portwall Lane
Bristol BS1 6NA
United Kingdom

T: +44 117 901 7000
aecom.com