Runnymede Water Cycle Study: Phase 1 Scoping

Runnymede Borough Council

January 2018

Quality information

Prepared by	Checked by	Approved by
Bernadine Maguire Principal Flood Risk & Coastal Consultant Miguel Headley Graduate Engineer	Chris Gordon Senior Environmental Engineer Bernadine Maguire Principal Flood Risk & Coastal Consultant	Carl Pelling Associate Director

Revision History

Revision	Revision date	Details	Authorized	Name	Position
1	15/11/2017	Draft for Client and Stakeholder comment	16/11/2017	Carl Pelling	Associate Director
2	19/12/2017	Final for issue	04/01/2018	Carl Pelling	Associate Director
3	09/01/2018	Final	10/01/2018	Carl Pelling	Associate Director

Prepared for:

Runnymede Borough Council

Prepared by:

AECOM Infrastructure & Environment UK Limited
Midpoint
Alencon Link
Basingstoke
Hampshire RG21 7PP
UK

T: +44(0)1256 310200
aecom.com

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List of Acronyms

AMP	Asset Management Plan
AWS	Affinity Water Services
BAP	Biodiversity Action Plan
BGS	British Geological Society
BOD	Biochemical Oxygen Demand
BREEAM	Building Research Establishment Environmental Assessment Method
CAMS	Catchment Abstraction Management Strategy
CBA	Cost Benefit Analysis
CFMP	Catchment Flood Management Plan
CIL	Community Infrastructure Levy
CIRIA	Construction Industry Research and Information Association
CLG	Communities and Local Government
CRC	Carbon Reduction Commitment
DEFRA	Department for Environment, Food and Rural Affairs
DWF	Dry Weather Flow
EFI	Environmental Flow Indicator
GI	Green Infrastructure
GWR	Greywater Recycling
HA	Highways Agency
l/h/d	Litres/head/day (a water consumption measurement)
LCT	Limits of Conventional Treatment
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LPA	Local Planning Authority
Ml	Mega Litre (a million litres)
NE	Natural England
NPPF	National Planning Policy Framework
OAHN	Objectively Assessed Housing Need
OFWAT	The Water Services Regulation Authority (formerly the Office of Water Services)
ONS	Office for National Statistics
OR	Occupancy Rate
P	Phosphorous
Q95	The river flow exceeded 95% of the time
RAG	Red/Amber/Green Assessment
RBC	Runnymede Borough Council
RBD	River Basin District
RBMP	River Basin Management Plan
RoC	Review of Consents (under the Habitats Directive)
RQP	River Quality Planning (tool)
RWH	Rainwater Harvesting
S106	Section 106 (Town and Country Planning Act 1990)
SAC	Special Area for Conservation
SFRA	Strategic Flood Risk Assessment
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
TWUL	Thames Water Utilities Limited
UKCIP02	United Kingdom Climate Impacts Programme 2002
UKCP09	United Kingdom Climate Projections 2009
UKTAG	United Kingdom Technical Advisory Group (to the WFD)
UKWIR	United Kingdom Water Industry Research group
UWWTD	Urban Wastewater Treatment Directive
WCS	Water Cycle Study
WFD	Water Framework Directive
WN	Water Neutrality
WRC	Water Recycling Centre
WRMP	Water Resource Management Plan
WRMU	Water Resource Management Unit (in relation to CAMS)
WRZ	Water Resource Zone (in relation to a water company's WRMP)
WSI	Water Services Infrastructure
WwTW	Wastewater Treatment Works

Executive Summary

Background

Runnymede Borough Council (RBC) is currently preparing the Runnymede Local Plan and requires supporting evidence in relation to the water environment. In response to consultation on the emerging Local Plan, the Environment Agency has requested further investigation into foul water treatment capacity to ensure growth in the district does not impact on water quality. In addition, the Borough falls within an area of demonstrable 'water stress' as defined by the Environment Agency and planned growth (in addition to other pressures) is forecast to lead to a supply demand deficit within the next ten years.

A Scoping Water Cycle Study (WCS) was commissioned to form an evidence base for further decision-making on the water environment within the planning process and to ensure the Local Plan meets the requirements of the National Planning Policy Framework (NPPF) with respect to the water environment and water infrastructure provision.

Water Resources Key Findings

The Scoping WCS considered the potential impact on water resources and water supply infrastructure as a result of the planned growth across the Borough and the outcome is summarised below:

· The majority of consumptive water abstraction for public water supply is abstracted from groundwater sources.

· Water resources within a catchment are assessed and monitored by the Environment Agency. Abstraction Licensing Strategies (ALS) set out how water abstraction will be managed at a local level. Runnymede is covered by the Thames Catchment ALS which states that there is currently no water available for abstraction at low flows throughout the Thames Catchment Abstraction Management Strategy (CAMS) area. Any new abstractions in direct connectivity with a river are subject to strict conditions to ensure no deterioration of the watercourse.

· Affinity Water Services (AWS) supplies water to the Borough, which is covered by the Wey Water Resource Zone (WRZ). Without the implementation of supply and demand measures, AWS's most recent Water Resource Management Plan (WRMP) (2014) forecasts an increasing water supply deficit in the Wey WRZ under dry year annual average conditions driven by a combination of population increase and climate change. Increased housing projections resulting from a change in the preferred spatial strategy to increase the housing target in Runnymede could potentially increase this deficit further. Whilst AWS has plans in place to secure supply, there is significant pressure on water resources in this area, which could benefit from initiatives to encourage reduced water consumption.

Recommendations

- Due to demonstrable 'Water Stress' in the region, water efficiency in new developments should be maximised through the inclusion of a water efficiency policy in the Local Plan. It is recommended that this be in line with the Building Regulations optional standard of 110 l/h/d.
- A detailed assessment of water supply network capacity should be carried out, led by AWS, to identify potential infrastructure constraints that will require future investment to accommodate the proposed growth.

Water Quality Key Findings

The Scoping WCS considered the potential impact on water quality as a result of the planned growth across the Borough. The review considered the impact of growth on wastewater treatment and wastewater network infrastructure which would serve the growth. The outcome is summarised below:

· Wastewater collection and treatment in Runnymede is provided by Thames Water Utilities Ltd (TWUL).

· The Environment Agency sets standards for treated effluent discharged into rivers, estuaries and the sea from water companies through the issue of a permit to discharge for each wastewater treatment works (WwTW). Each permit has a permitted Dry Weather Flow (DWF), which describes the volume that can be discharged from WwTWs under normal operating conditions.

· Review of the planned growth areas against the existing catchment areas for the WwTWs serving the Borough identified that the proposed development sites were located within or directly adjacent to areas currently served by

Chertsey WwTW. Therefore, it was assumed that Chertsey WwTW would receive wastewater from all proposed growth and it was the only WwTW that was considered further within the Scoping WCS. The current measured flow and consented DWF for Chertsey WwTW was provided by TWUL and the Environment Agency. The remaining volumetric capacity was calculated as the difference between these two figures. On this basis Chertsey WwTW does not have sufficient headroom in terms of permitted discharge volumes for the all of the projected growth in the Runnymede Plan period (up to 2031) within the existing permit. The capacity assessment suggests that around 92% of Runnymede's projected growth could be accommodated before the permit would be exceeded. This would allow for phasing of upgrades over time subject to use of the headroom not impacting upon water quality targets in the receiving watercourse.

· Before the end of the plan period, a new permit to discharge for Chertsey WwTW would be required, and the quality conditions on this permit would need to be reviewed to ensure there is no impact on water quality targets as set by the Water Framework Directive (WFD) within the Chertsey Bourne and Lower Thames water bodies. An assessment is also required for the use of headroom within the existing permit and water quality modelling of the increases in discharge would be required. It is not possible to determine the full impact at scoping stage, and this will require further detailed study through a collaborative approach.

· Future development must consider existing wastewater network constraints and it should be considered how infrastructure upgrades can both alleviate and improve existing problems.

Recommendations

- Further water quality assessment work in an Outline Study will be required to determine the necessary permit conditions and any associated upgrade works to sewerage infrastructure to accommodate the projected growth in Runnymede and to ensure there is no deterioration to the water environment.
- Further work in an Outline Study, involving input from TWUL and the Environment Agency should review current water quality issues in the Chertsey Bourne and Lower Thames to confirm whether the existing permit needs to be changed and/or an upgrade to the wastewater treatment process at Chertsey WwTW is required.
- Further work within an Outline Study should be undertaken to determine the impact of using and exceeding headroom and to determine the feasibility of a new permit at Chertsey WwTW which serves Runnymede. This work would also review whether using this headroom will affect the water quality requirements of hydrologically linked downstream ecological designations. Collaborative work will be required with Thames Water and the Environment Agency, particularly to define baseline usable headroom within the existing permitting regime.
- A detailed assessment of wastewater network capacity should be carried out, led by TWUL, to identify potential infrastructure constraints that will require future investment to accommodate the proposed growth. This should be reported in the Outline WCS through a site assessment.

Flood Risk & Water Environment Key Findings

The Borough drains via a series of ordinary watercourses and main rivers which are tributaries of the Lower Thames. All surface water bodies in the Borough which are classified under the WFD have been reviewed to summarise their status related to physico-chemical indicators and any identified influencing factors of not achieving good status as required by the WFD. All of the waterbodies in the Borough are not currently achieving 'Good' status with two at 'Poor' status. Physical modifications have been confirmed as one cause of preventing 'Good' status in a number of cases. In addition, water industry activity is identified as a suspected or probable influence of preventing Good status combined with agricultural runoff.

The Chertsey Bourne (Chertsey to River Thames confluence) watercourse would receive additional treated wastewater discharges as a result of growth and is identified as being at Poor ecological status/potential with Phosphate classified as 'Poor'. The current status has been attributed to water industry activity, ranging from confirmed point source continuous sewage discharges to suspected point source incidents.

The Borough has a number of Sites of Special Scientific Interest (SSSI) with water dependant species. A more detailed ecological assessment would be required to determine whether growth may have a detrimental impact on any of these sites.

The main source of flooding in Runnymede is from rivers with more localised areas at risk from surface water and groundwater flooding. New development must maintain areas of functional floodplain storage currently providing protection to the settlements in the Borough. Significant expansion of urban areas into Greenfield sites must consider the impact on surface water management; maximising the use of Sustainable Drainage Systems (SuDS) in new developments to help improve water quality, water reuse and relieve pressure on the sewerage network.

Recommendations

- As part of an Outline study, a more detailed ecological assessment should be carried out to identify water-dependant species which may be impacted by increased development in the catchment.
- As part of an Outline study, further investigation could be carried out in collaboration with TWUL and Surrey County Council (SCC) in relation to locations of known sewer flooding, particularly where surface water is entering the foul sewer network, to ensure new development does not exacerbate known problems and where possible alleviates existing risk.
- An assessment of the potential impact on flood risk resulting from the increase in discharge from Chertsey WwTW should be undertaken as part of the Outline WCS. RBC should work with SCC as the Lead Local Flood Authority for Runnymede and statutory consultee on the use of Sustainable Drainage in new developments to clarify minimum requirements for SuDS relevant to the Borough.

1 Introduction

1.1 Background

Runnymede is located in North West Surrey only twenty miles from Central London, and is strategically located at the junction of the M25 and M3 motorways. It has excellent road and rail connections to the capital and by road to Heathrow Airport. There is good access to the wider South East Region by the motorway network and the Reading – Waterloo and Weybridge – Waterloo railway lines.

Runnymede Borough Council (RBC) is currently preparing the Runnymede 2031 Local Plan which will set out the level of development required in the Borough over the period 2015-2031 to meet identified needs, including needs for housing, employment and retail. In addition, the Borough falls within one of the designated 'Areas of serious water stress'[1] and planned growth (in addition to other pressures) is forecast to lead to an increasing supply demand deficit[2].

This Scoping Water Cycle Study (WCS) has been commissioned to form an evidence base for further decision-making on the water environment within the planning process and to ensure the Local Plan meets with the requirements of the National Planning Policy Framework (NPPF) with respect to the water environment and water infrastructure provision.

1.1 Objectives of the Water Cycle Study

The overall objective of the Runnymede WCS is to identify any constraints on housing and employment growth planned for the Borough up to 2031 that may be imposed by the water cycle and how these can be resolved i.e. by ensuring that appropriate water infrastructure is provided to support the proposed development. Furthermore, it will provide a strategic approach to the management and use of water which ensures that the sustainability of the water environment in the Borough is not compromised.

Using national and local Environment Agency guidance, the Runnymede WCS is being undertaken in stages. The first stage of this study, the Scoping stage, has undertaken a review of the water cycle position and provided an overview of the following specific items:

- Capacity issues with regards to water treatment works, clean water network and water resources in Runnymede;
- Capacity issues with regards to wastewater treatment capacity in Runnymede;
- Potential impacts of future water abstraction and wastewater discharge near water dependent European Sites; and
- Baseline water quality issues with respect to the discharge of wastewater and surface water.

The outputs of the study aim to inform development of the Local Plan and help RBC to select and develop in the most sustainable locations, minimising the impact on the environment, water quality, and water resources. Further details of the progression of the Phase 1 Scoping report are included within Section 2.3: Stages of a Water Cycle Study.

The impacts of flood risk within the Borough have been assessed within the update to the Level 1 Strategic Flood Risk Assessment (SFRA). The outputs from this study have informed this Scoping WCS.

Stakeholders and consultation

The study has been undertaken following discussions with, and using data provided by, the following key stakeholders:

- Affinity Water Services;
- Environment Agency;
- Runnymede Borough Council;
- Surrey County Council; and
- Thames Water Utilities Ltd.

[1] Environment Agency (2013) Water Stressed areas – final classification. July 2013
[2] Affinity Water (2014) Final Water Resources Management Plan 2015 – 2020. Available at https://stakeholder.affinitywater.co.uk/water-resources.aspx. Accessed 11th August 2017.

2 Runnymede Water Cycle Study

2.1 The Water Cycle

In its simplest form, the Water Cycle can be defined as 'the process by which water is continually recycling between the earth's surface and the atmosphere'. Without considering human influences, it is simply the process by which rain falls, and either flows over the earth's surface or is stored (as groundwater, ice or lakes) and is then returned to the atmosphere (via evaporation from the sea, the soil, surface water or animal and plant life) ready for the whole process to repeat again.

In the context of this study, the 'water cycle' has a broader definition than the simple water or 'hydrological' cycle. The human influence on the water cycle introduces many new factors into the cycle through the need to abstract water from the natural environment, use it for numerous purposes and then return to the natural system (Figure 2-1). The development and introduction of technology such as pipes, pumps, drains, and chemical treatment processes has meant that human development has been able to manipulate the natural water cycle to suit its needs and to facilitate growth and development. 'Water Cycle' in this context is therefore defined as both the natural water related environment (such as rivers, wetland ecosystems, aquifers etc.), and the water infrastructure (hard engineering focused elements such as: water treatment works, supply pipelines and pumping stations) which are used by human activity to manipulate the cycle.

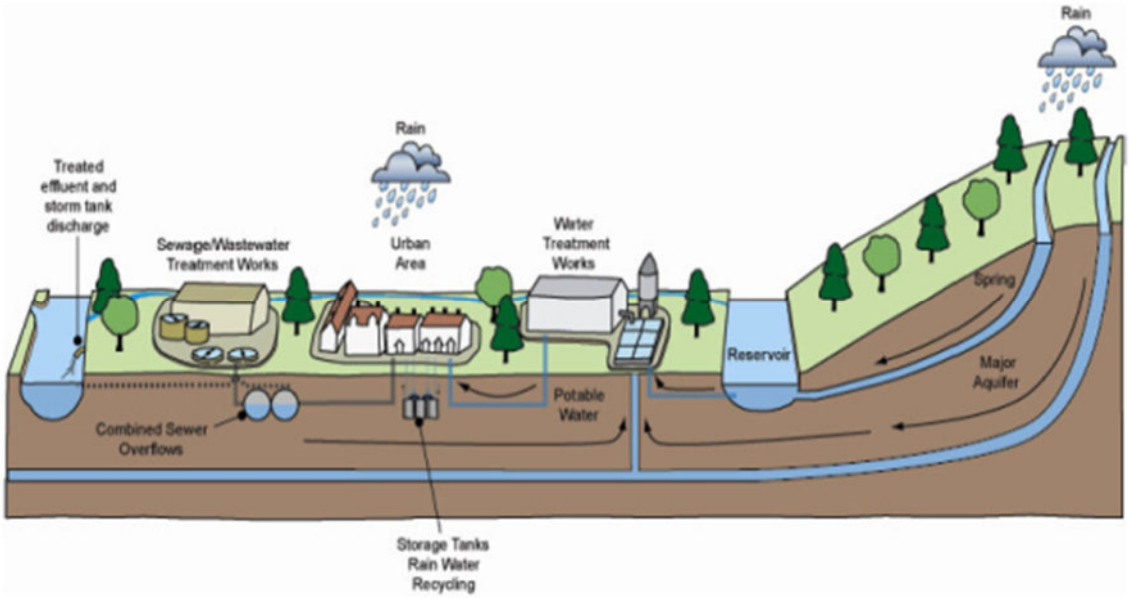

Figure 2-1 The Water Cycle Study (Source: Environment Agency[3])

2.2 Implications for Development

In directly manipulating elements of the water cycle, man affects many changes to the natural water cycle which can often be negative. To facilitate growth and development, there is a requirement for clean water supply which is taken from natural sources (often depleting groundwater stores or surface systems); the treatment of waste water which has to be returned to the system (affecting the quality of receiving waters); and the alteration and management of natural surface water flow paths which has implications for flood risk. These impacts can indirectly affect ecology which can be dependent on the natural features of a water cycle for example wading birds and wetland habitat, or brown trout breeding in a Chalk stream which derives much of its flow from groundwater sources.

In many parts of the UK, some elements of the natural water cycle are considered to be at, or close to their limit in terms of how much more they can be manipulated. Further development will lead to an increase in demand for water supply and a commensurate increase in the requirement for waste water treatment; in addition, flood risk may increase if development is not planned for in a strategic manner. The sustainability of the natural elements of the water cycle is therefore at risk.

A WCS is an ideal solution to address this problem. It will ensure that the sustainability of new development is considered with respect to the water cycle, and that new water infrastructure introduced to facilitate growth is planned for in a strategic

[3] Water Cycle Study Guidance, Environment Agency
http://webarchive.nationalarchives.gov.uk/20140328084622/http://cdn.environment-agency.gov.uk/geho0109bpff-e-e.pdf

manner; in so doing, the WCS can ensure that provision of water infrastructure is sufficient such that it maintains a sustainable level of manipulation of the natural water cycle.

2.3 Stages of a Water Cycle Study

Environment Agency guidance on Water Cycle Studies (WCS)[4] and more recent guidance for the Thames area[5] advises that they should generally be undertaken in three stages; scoping, outline and detailed, however in many cases not all stages will be necessary. The scoping study will identify whether an outline study is needed and the outline would identify whether a detailed study is needed.

It is a decision for the Local Authority about whether they have sufficient evidence to address the following points and progress with a WCS:

1. Urban development only occurs within environmental constraints;
2. Urban development occurs in the most sustainable location;
3. Water cycle infrastructure is in place before development, and
4. Opportunities for more sustainable infrastructure options have been realised.

RBC have acknowledged that additional work should be undertaken in the form of this scoping WCS to identify if any tensions between the growth proposals being developed in the Local Plan and environmental requirements are likely to arise and how to help address these.

2.3.1 Scoping Water Cycle Study

The scoping study determines the key 'water-cycle' areas where development is likely to either impact on the water environment, or is likely to require significant investment in water infrastructure (i.e. pipes, or treatment) to service new development.

Its key purpose is to define whether there are significant constraints that would need further assessment to determine whether these affect either the location of allocation options, or the amount of development that can be provided within an allocation site.

It is a high level assessment that looks at town-wide or area-wide issues. The level of assessment covers whether:

- There is a potential for an area-wide negative supply and demand balance for potable water i.e. demand is likely to be greater than supply for the growth area;
- There are any ecologically sensitive sites that have a hydrological link to development i.e. an SAC wetland site located on a river downstream of discharges from a wastewater treatment works;
- A town has a history of sewer flooding and hence potential restrictions on new connections from development; and
- Local watercourses have water quality concerns which will be made worse if further discharge of wastewater from new development occurs.

A scoping study therefore defines the study area, defines the key stakeholders required to input to the study and concludes what issues require further investigation and ultimately, what the scope of the Outline Water Cycle Study should be.

In line with Environment Agency Guidance[3, 4], the scoping study looks to answer the following questions or identify where there are knowledge gaps which would justify further work to determine if growth can be supported:

Water Resources

- Is there enough water?
- Does the water company's approach to water resources make sure there is enough water available to serve the projected growth levels?
- Is there enough capacity in the existing abstraction licences for the proposed development?

[4] Environment Agency (2009) Water Cycle Study Guidance. Accessed via http://webarchive.nationalarchives.gov.uk/20140328144444/http://cdn.environment-agency.gov.uk/geho0109bpff-e-e.pdf
[5] Environment Agency (2016) Water Cycle Study Requirements and Guidance – Thames Area.

- Will existing licences remain valid?
- Can abstraction be reduced with better management practices?
- If new major infrastructure is needed, can it be provided and funded in time?
- Is it sustainable?

Water Quality

- Will the proposed housing growth have a detrimental impact on water quality?
- Is there sufficient environmental capacity within the receiving water environment to accommodate the resulting increase flow and pollutant loads from the Sewage Treatment Works as the result of the planned housing growth?
- If not, are there alternative discharge locations that will not cause a failure of water quality targets or causing deterioration in water quality?
- Is there an increased risk of discharges from storm water overflows causing an adverse water quality impact?
- Will the sewerage undertaker need to apply to increase the level of treated sewage effluent that is allowed to be discharged under the existing environmental permits at allow future growth?
- Will the quality standard on the Environmental Permit need to be tightened to meet existing or future water quality standards as a result of the proposed growth (e.g. WFD)?
- Can the existing sewerage and wastewater treatment networks cope with the increased wastewater the proposed growth will generate?
- If new major infrastructure is required (wastewater treatment works, major pumping mains or sewer mains) can they be provided and funded in time?

In addition, it has been requested that the scoping study seeks to answer the following questions in relation to flood risk and the water environment:

Flood Risk and Water Environment

- Will increased discharge from Sewage Treatment Works increase flood risk?
- Are there other location specific environmental risks that need to be considered, for example relating to biodiversity or conservation requirements? Or opportunities?
- What opportunities are there for multiple benefits such as restoring floodplain and improving ecology?
- Are there multi use options that will provide water resources, flood risk management and water quality benefits?

2.3.2 Outline and Detailed Water Cycle Studies

Outline Study

An Outline Study considers all of the ways in which new development will impact on the water environment or water infrastructure specific to where growth is most likely to be targeted. It is usually undertaken during consideration of allocation sites such that it can inform the decision process in terms of where development will be targeted for each authority. Where there is likely to be an impact on the water environment, a key aim of the Outline study is to provide Local Planning Authorities (LPAs) with the evidence base which ensures that water issues have been taken into account when deciding the location and intensity of development within an authority's planning area as part of the development of the Local Plan. It also aids in setting core policies related to water as part of any Supplementary Planning Documents (SPD). Finally, it gives the water company an evidence base to its business plans which determine how much they can charge customers to invest in upgrades and the provision of new infrastructure required to service proposed development.

It could be that the Outline Study identifies that water cycle issues are not significant, and that new development can be implemented without significant new investment. If this is the case, a detailed study may not be required. However, if new infrastructure is required, or an impact on the water environment cannot be ruled out as significant, a detailed water cycle study will need to be undertaken for a specific solution or site specific allocations.

Detailed Study

A detailed study can vary significantly in its scope and remit. However, its key purpose is to define what specific infrastructure and mitigation is required to facilitate development where significant infrastructure solutions are required. Usually, it can only be undertaken once decisions have been made on the location of allocations and the likely intensity and type of development within them. Dependent on the findings of the Outline Study, there could be the potential requirement to undertake detailed and complex studies in order to define exactly what infrastructure or mitigation is required.

The Detailed study can be undertaken in conjunction with the development of DPDs such as Area Action Plans and should provide the evidence base to site specific policies in SPDs.

2.4 Integration with the Planning System

As part of the Local Plan making process, LPAs are required to produce evidence based studies which support the selection processes used in deciding on final growth targets and areas to be promoted for growth. The WCS is one such example of an evidence-based study which specifically addresses the impact of proposed growth on the 'water cycle'.

As part of RBC's overall strategy to meet future growth targets in a sustainable way, the WCS will make up one of a number of strategic studies which will form part of the evidence base supporting the production of the Runnymede 2035 Local Plan.

2.5 National, Regional and Local Drivers and Policies

The WCS is driven by and shaped by several EU Directives, UK legislation and guidance on water, as shown in Table 2-1 below. In some cases, these drivers are also water and flood managed based legislative compliance issues for the Local Plan, and the WCS will be required to demonstrate how compliance with these legislative drivers will be met

Table 2-1 EU Directives & UK Legislation & Guidance on Water

Directive/Legislation/Guidance	Description
Birds Directive 2009/147/EC	Provides for the designation of Special Protection Areas.
Eel Regulations 2009	Provides protection to the European eel during certain periods to prevent fishing and other detrimental impacts.
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. The Pitt Review of the 2007 flood was a major driver in the forming of the legislation. Its key features relevant to this WCS are: · 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. · To encourage the uptake of sustainable drainage systems by removing the automatic right to connect to sewers. · 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. · To enable water and sewerage companies to operate concessionary schemes for community groups on surface water drainage charges. · 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 issued by the Secretary of State.
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.
Groundwater Directive 80/68/EEC	To protect groundwater against pollution by 'List 1 and 2' Dangerous Substances.

Directive/Legislation/Guidance	Description
Habitats Directive 92/44/EEC and Conservation of Habitats & Species Regulations 2010	To conserve the natural habitats of 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, it can require changes to these through the Review of Consents (RoC) process if they are impacting on designated European Sites. Also, it is 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.
Making Space for Water, 2004	Outlines the Government's strategy for the next 20 years to implement a more holistic approach to managing flood and coastal erosion risks in England. The policy aims to reduce the threat of flooding to people and property, and to deliver the greatest environmental, social and economic benefit.
National Planning Policy Framework	Planning policy in the UK is set by the National Planning Policy Framework (NPPF). Supported by the online Planning Practise Guidance (PPG) NPPF advises local authorities and others on planning policy and operation of the planning system.
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) 91/271/EEC	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 regulate arrangements to make water use more sustainable.
Water Framework Directive (WFD) 2000/60/EC	The WFD is the most significant piece of water legislation since the creation of the EU. The overall requirement of the directive is that all waterbodies in the UK must achieve "Good Status". The current review cycle has established this target for 2027. The definition of a waterbody's 'status' is a complex assessment that combines standards for water quality with standards for hydromorphology (i.e. habitat and flow quality) with ecological requirements. The Environment Agency is the body responsible for the implementation of the WFD in the UK. The Environment Agency have been supported by UKTAG[6], an advisory body which has proposed water quality, ecology, water abstraction and river flow standards to be adopted in order to ensure that water bodies in the UK (including groundwater) meet the required status[7]. The two key aspects of the WFD relevant to the wastewater assessment in this WCS are the policy requirements that: - development must not cause a deterioration in status of a waterbody[8]; and - development must not prevent future attainment of 'good status', hence it is not acceptable to allow an impact to occur just because other impacts are causing the status of a water body to already be less than good.
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. Also sets out flood defence responsibilities of the Environment Agency for main rivers
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.

[6] 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.
[7] UK Environmental Standards and Conditions (Phase I) Final Report, April 2008, UK Technical Advisory Group on the Water Framework Directive.
[8] i.e. a reduction High Status to Good Status as a result of a discharge would not be acceptable, even though the overall target of good status as required under the WFD is still maintained

2.5.1 Water Company 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 two elements of water company planning that are pertinent to the Runnymede Scoping WCS and specifically, with regard to integration with spatial planning timelines for LPAs.

Financial and Asset Planning
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 of 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 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 increases 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 five years allowing the water company to raise the funds required to undertake the necessary investment within the AMP round.

Water Resource Planning
Water companies are required to produce Water Resource Management Plans (WRMP) on a statutory basis covering 25 year planning horizons. WRMPs set out how a water company plans to provide and invest in existing and new water resource schemes (e.g. reservoirs, desalination) to meet increases in demand for potable supply as a result of new development, population growth and climate change over the next 25 year period. The WRMPs must be updated in 5 yearly cycles to coincide with the Price Review and AMP process. The most recent WRMP covering Runnymede Borough was published in 2015 covering the period 2015 to 2040 (WRMP14).

The Scoping WCS will help provide an evidence base both for RBC's statutory Local Plan process and justification for the relevant water sewerage providers' Strategic Business Plans for any investment required in AMP7 (2020-2025) and beyond.

Additional Information
In addition to the legislation and guidance set out above, the following studies and reports are relevant to and, where available, have been used within the Runnymede Scoping WCS:

- Thames Catchment Abstraction Licensing Strategy (2014);
- Thames River Basin Management Plan (2015);
- Runnymede Strategic Housing and Land Availability Assessment (SHLAA) (2014);
- Runnymede 2035 Additional Sites and Options Consultation (2017);
- Site allocation information provided by RBC;
- Surrey Local Flood Risk Management Strategy (2017); and

3 Development in Runnymede

3.1 Runnymede Borough

Runnymede Borough lies in north-west Surrey, approximately twenty miles south-west of Central London (Figure 3-1). The area is bordered to the north-east by the River Thames and the administrative area of Windsor and Maidenhead to the north and north-west; Spelthorne Borough Council to the north-east; Elmbridge Borough Council to the south-east; Woking Borough Council to the south; and Surrey Heath Borough Council to the south-west.

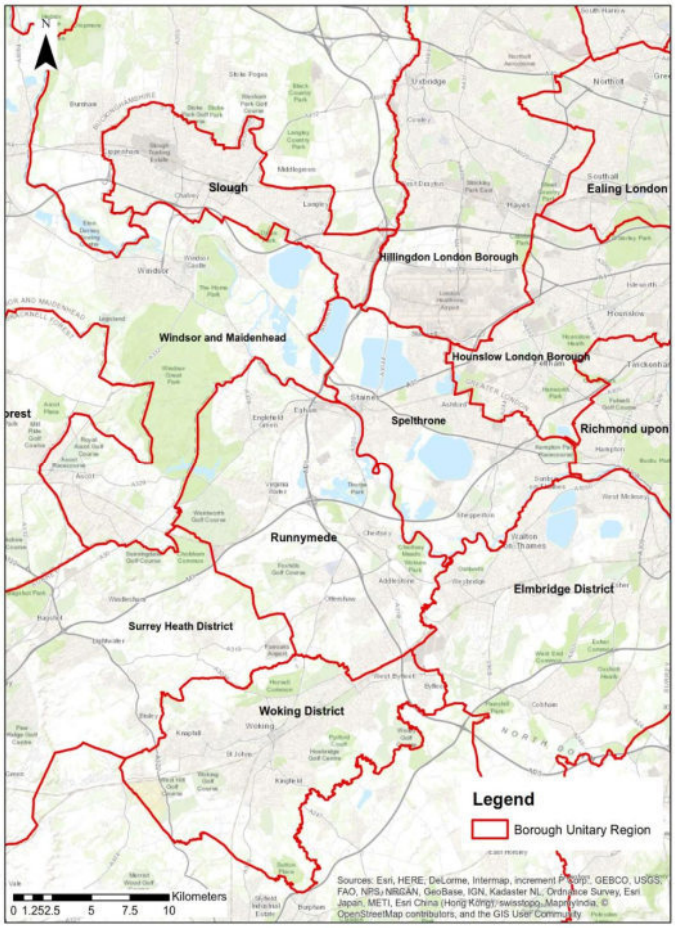

Figure 3-1 Location map of Runnymede Borough

Runnymede is a small Borough when compared with most of the other Surrey authorities, measuring only eight miles from north to south. The Borough contains approximately 80,500 people in 32,700 households[9]. The Borough has three main settlement areas: Chertsey, Egham and Addlestone, with significant areas of Green Belt (6078 hectares of the total Borough area of 7,804 hectares).

Runnymede is also one of the top 10 local authorities for flooding in England with over 5000 properties at risk in a 1% annual probability river flood[10]. Furthermore over half of the Borough is located within 5km of the Thames Basin Heaths Special Protection Area (TBHSPA).

3.2 Future growth

RBC concluded its first round of public consultation on the Local Plan (known as the Issues, Options and Preferred Approaches (IOPA) consultation) in August 2016. Within this document RBC set out that its preferred spatial strategy was to adopt a minimum housing target of between approximately 302 and 383 dwellings per annum between 2016-2031 rolled forward to 2035 and taking account of housing completions in 2015-2016. This would give an indicative plan target of 5,740 to 7,280 dwellings based on the assumption in the Strategic Land Availability Assessment (SLAA) of discounting supply by 20%.

[9] Census 2011 Summary for Runnymede available from https://www.runnymede.gov.uk/article/4677/Borough-profile
[10] Runnymede Borough Council (2017) Level 1 Strategic Flood Risk Assessment

Employment needs would be met through sites with existing permissions or the regeneration of existing employment sites with storage & distribution uses encouraged in suitable locations. RBC is currently carrying out its second round of public consultation on the Local Plan (known as the Additional Sites and Options (ASO) consultation). In this document, following the collation of additional evidence, RBC is now recommending that it changes its preferred spatial strategy and would seek to deliver an increased housing target of between 408 and 427 dwellings per annum. An employment allocation for a minimum of 34,500sqm of B8 (Storage or distribution) floorspace is also now recommended.

The Runnymede 2035 Additional Sites and Options consultation document identifies the preferred sites to accommodate future growth in the Borough. The majority of new development occurs in or adjacent to the larger towns and villages where there is already a wide range of facilities available as outlined in Figure 3-2. Between 400m and 5km of the TBHSPA, mitigation in the form of Suitable Accessible Natural Greenspace (SANG) is required where new residential development is proposed. A small part of the Borough on its western side is also located within 400m of the TBHSPA, where residential development is not acceptable.

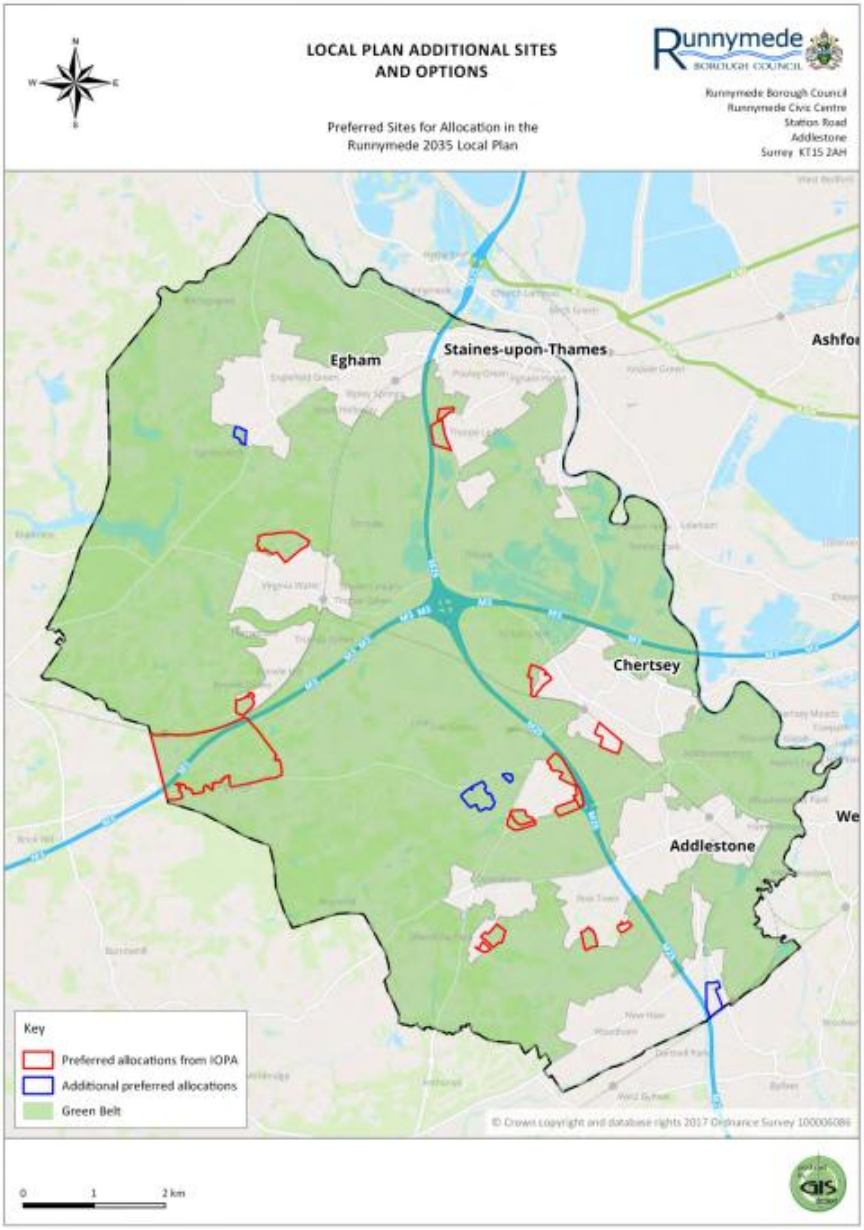

Figure 3-2 Preferred sites for allocation in the Runnymede Local Plan[11]

3.2.1 Housing growth

Table 3-1 outlines the preferred allocations as contained in the Runnymede 2035 Additional Sites and Options consultation document. Whilst these figures are subject to potential change through the local plan development process,

[11] Runnymede Borough Council (2017) Runnymede Local Plan 2035: Additional Sites & Options Consultation Document

they give an indication of RBC's position on overall housing numbers and the proposed distribution of growth. In terms of phasing, it is estimated that over 1,000 new homes are likely to be delivered by 2020.

Table 3-1 Preferred housing allocations in the Runnymede 2035 Additional Sites and Options Consultation Document[13]

Site name	Proposed number of dwellings
Brox Road Nursery, Ottershaw	40
Coombelands Lane, Addlestone	40
Hanworth Lane, Chertsey	325
Pyrcroft Road, Chertsey	275
Longcross Garden Village	1,718
Blays House, Blays Lane, Englefield Green	90
Egham Gateway West, Egham	60
Egham Gateway East, Egham	45
St Peters Hospital, Chertsey	400
Parecl B, Veterinary Laboratory site, Rowtown	150
Chertsey Bittams. Parcel A-Green Lane	175
Chertsey Bittams. Parcel B-Woodside Farm	110
Chertsey Bittams. Parcel C-Land east of Woodside Farm	35
Chertsey Bittams. Parcel D-Oracle Park	200
Chertsey Bittams. Parcel E-land east and west of Wheelers Green	100
Thorpe Lea Road North, Egham	85
Thorpe Lea Road West, Egham	200
Virginia Water North	120
Virginia Water South	150
Ottershaw East	230
Addlestone West, Station Road	70
Addlestone East, Station Road	70
Total:	**4,688**

In addition to the preferred sites identified above, the Scoping WCS incorporates all proposed development sites (of 5 dwellings or greater) across the Borough at differing stages of development which have been put forward to meet the future growth targets, including:

- Sites under construction;
- Sites with planning permission;
- Strategic Land Availability Assessment (SLAA) sites;
- Draft & adopted allocations; and
- Windfall Sites.

Table 3-2 provides an overview of the total number of dwellings to be built within the plan period within development sites and therefore assessed as part of the Scoping WCS.

Table 3-2 Runnymede Housing Commitments and Allocations

Type of Site	No. units
Residential (including windfall allowance)	6,662
Student & older accommodation	3,837
Traveller sites	34
Total Potential residential growth to be assessed	**10,533**

3.2.2 Employment Growth

In addition to housing growth, RBC are also planning for future business land provision. Reflecting the proposals within the Runnymede 2035 Additional Sites and Options consultation document, Site Capacity Analysis and existing commitments, the planned areas in Table 3-3 have been included in the demand and supply analysis within the scoping WCS. A high level assessment of job numbers and approximate water use has been made based on a number of assumptions in line with other RBC planning documents as follows:

- 1 job per 12.5m^2 office (B1) floorspace;
- 1 job per 43m^2 industrial (B2) floorspace (or where use class not specified);
- 1 job per 65m^2 storage and warehousing/distribution (B8);
- Average employment consumption is 16 l/h/d[12].

Table 3-3 Indicative employment floorspace figures and assumed water requirements

Site name	Proposed area of new employment	Jobs expected to be generated	Approximate water use requirement (m3/day)
Byfleet Road, New Haw	20,000 sqm B8 (storage & distribution) floorspace	308	4.93
	6,000 sqm B1 (office) floorspace	480	7.68
Longcross Garden Village	79, 025 sqm office park (mix of ancillary uses & services)	5,259[13]	84.14
	36,000 sqm Sui Generis		
Meadlake Place, Thorpe Lea Road	1,159 sqm B1 floorspace	93	1.49
Units 4-9, Weybridge Business Park, Addlestone Road	1,253 sqm B1 floorspace	100	1.6
TAMESIS 1, The Glanty	7666 sqm B1 floorspace	613	9.81
Former Reservoir Site, Lovett Road	5,853 sqm B1 floorspace	468	7.49
Chilsey House, Chilsey Green Road	463 sqm B1 floorspace	37	0.59
Land fronting The Glanty including land north and south of Lovett Road	12,883 sqm B1 floorspace	1,027	16.4
Culverdon House, Abbots Way	571 sqm B1 floorspace	46	0.74
Three Stars Industrial Estate	1,302 sqm flexible use	27	0.43
31 The Causeway	18,132 sqm B1 floorspace	1,500	24
Quantum House, 59 Guildford Street	170 sqm B1 floorspace	13	0.21
Otterhill Farm, Rowtown	114 sqm B1 floorspace	9	0.14
Milton House, 27 Station Road	45 sqm B1 floorspace	3	0.05
Thorpe Industrial Estate	258 sqm flexible use	5	0.08
Plot D, Hanworth Lane, Chertsey	353 sqm flexible use	14	0.22
Heritage House, Egham	22 sqm B8 floorspace	0	0
Nursery Barn, Otterhill Farm, Rowtown	168 sqm B1C (light industrial) floorspace	4	0.06
52 Station Road, Egham	103 sqm B1 floorspace	8	0.13
	Total:	**10,014**	**160.19**

[12] CIRIA (2006) Water Key Performance Indicators and benchmarks for offices and hotels. CIRIA C657. London 2006
[13] The Longcross Garden Village site has an extant planning permission and the number of jobs has been taken from the planning application documentation.

4 Water Cycle Environment and Infrastructure baseline

4.1 Introduction

This section describes the environmental and infrastructure baseline within Runnymede with regards to the various components of the water cycle. It is important to establish the baseline and hence spare capacity of the water environment and associated water/wastewater infrastructure because a basic assumption of the WCS is that it is preferential to maximise the use of existing facilities without causing negative effects upon the existing water environment. This is to reduce cost, reduce the impact to existing communities and to allow early phasing of some new development, negating the need to rely on longer lead in times associated with securing funding for new infrastructure through the statutory water company planning process.

Initial assessments of the potential impacts from the proposed level of growth in Runnymede and recommendations for further investigations are provided in Section 5.

4.2 Water Environment

4.2.1 Climate

Runnymede falls within the Southern climate region as identified by the Met Office[14]. The annual temperature range for this region is less pronounced than in some parts of the UK and the typical temperatures experiences throughout the year tend to be above the UK average.

In terms of rainfall, the Southern region is one of the drier parts of the UK with on average less than 800 mm per year (compared with annual totals around 500 mm in the drier parts of eastern England and over 4000 mm in the western Scottish Highlands). Rainfall throughout the year in Southern England tends to have an uneven distribution with greater average monthly rainfall totals experienced between October to January, inclusive.

4.2.2 Thames River Basin District

Runnymede falls within the Thames River Basin District (RBD), which consists of 17 management catchments and includes many interconnected rivers, lakes, groundwater and coastal waters. These catchments range from chalk streams and aquifers to tidal and coastal marshes; there are 414 rivers, canals and surface water transfers, 73 lakes, one coastal and 10 estuarine waterbodies[15]. According to the Thames RBMP, 39 waterbodies currently achieve Good or better ecological status/potential, 320 waterbodies at Moderate ecological status/potential, and 139 at Poor or less ecological status/potential. The river basin district is mostly rural to the west and very urban to the east where it is dominated by Greater London. Around 17% of the river basin district is urbanised and the rural land is mainly arable, grassland and woodland. The Thames RBD has a rich diversity of wildlife and habitats, supporting many species of global and national importance from chalk streams such as the River Kennet to the Thames Estuary and salt marshes. A number of SSSI's and groundwater dependent ecosystems are linked to water quality. Key issues affecting both groundwater and surface water in the catchment include physical modifications, point source pollution from wastewater and urban runoff, diffuse pollution from agricultural runoff and reduced flow and water levels.

The majority of the Borough lies within the Wey and Trib management catchment, which has only one operational catchment of the same boundary, known as Wey. A small area adjacent to the River Thames from Coopers Hill to Chertsey lies within the Maidenhead and Sunbury management catchment, which has only one operational catchment of the same boundary, known as Thames Lower.

4.2.2.1 Wey catchment

The Wey catchment consists of 31 rivers, canals and surface water transfers and 11 lakes. The Wey Valley contains valuable floodplain grazing marsh, a priority UK Biodiversity Action Plan habitat that provides feeding opportunities for wintering wading birds. The catchment also contains large areas of lowland heathland, which is important internationally. Protected species include otters that are slowly returning to the Wey catchment, while numbers of water voles are decreasing, mainly because of mink in the area. Native brown trout can be found in the catchment, mostly in the headwaters. The key issues preventing some parts of the surface waterbodies from meeting WFD standards are associated with agriculture and rural land management, water industry and urban and transport.

[14] http://www.metoffice.gov.uk/climate/uk/regional-climates/so Accessed 10th August 2017
[15] http://environment.data.gov.uk/catchment-planning/RiverBasinDistrict/6 Accessed 14th August 2017

4.2.2.2 Thames Lower catchment

The non-tidal Lower River Thames catchment consists of 12 rivers, canals and surface water transfers and 5 lakes which provide benefits to many people and businesses as well as the economy. It provides drinking water for a large population, including much of Greater London, it is managed to protect local people and property from flooding, and is maintained for boating. Physical modifications and pollution from wastewater are the main challenges for the water environment within this catchment. Changes to water bodies, including over 61 major weir structures and man made river bank protection structures has reduced and damaged the natural habitat and created barriers to free fish movement.

4.2.3 Geology & Groundwater

Four distinct regions of bedrock underlie the Borough (see Figure 4-1) including:

- the London Clay Formation (Clay, Silt and Sand) in the north and north-east including Egham;
- the Claygate Member (Sand, Silt and Clay) underlying parts of the centre of the Borough including Thorpe;
- the Bagshot Formation (Sand) in the south, south-east and parts of the west of the Borough including Chertsey and Addlestone; and
- the Windlesham Formation (Sand, Silt and Clay) in small parts of the west around Foxhills golf course.

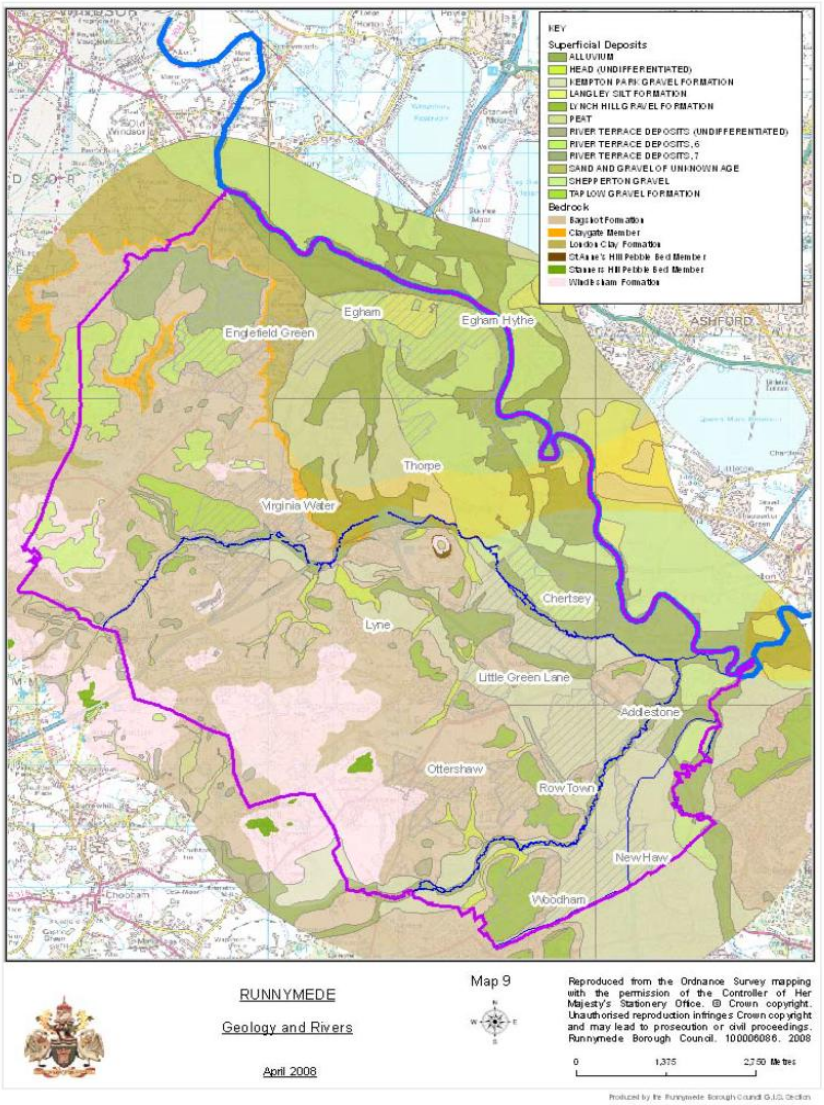

Figure 4-1: Geology within Runnymede[16]

The bedrock underlying the majority of the borough is defined as a secondary A aquifer. The exception is the north eastern quadrant of the borough covering the Egham and Thorpe areas which is designated as unproductive strata. The

[16] Runnymede Borough Council.(2008) Local Development Framework: Biodiversity. Available at https://www.runnymede.gov.uk/CHttpHandler.ashx?id=5004&p=0. Accessed 14th August 2017.

superficial deposits present in the Borough are classified in places as principal aquifers and in others, secondary aquifers (primarily Secondary A aquifers but in some places Secondary (undifferentiated) aquifers).

The Thames River Basin Management Plan (RBMP) has identified no Water Framework Directive (WFD) groundwater bodies within the Borough. Runnymede Borough lies within the Thames Catchment Abstraction Management Strategy (CAMS) area and it identifies the presence of an area of confined Chalk in the mid-Thames, south of Windsor, but this lies outside of the Borough.

4.2.4 Abstractions

The dominant use of abstracted water in the study area is for public water supply and to a lesser extent industry and agriculture. These abstractions are from groundwater and surface water (rivers)[17].

4.2.5 Rivers

There are 12 main rivers that run through Runnymede. The River Thames is the principal main river and its main tributaries being the River Wey, Chertsey Bourne and Addlestone Bourne (see Fig. 4-2). There are an additional 8 main rivers which are, in turn, tributaries of these latter three rivers. Subsidiary to the main rivers there is an extensive network of ordinary watercourses across Runnymede which drain into the main rivers.

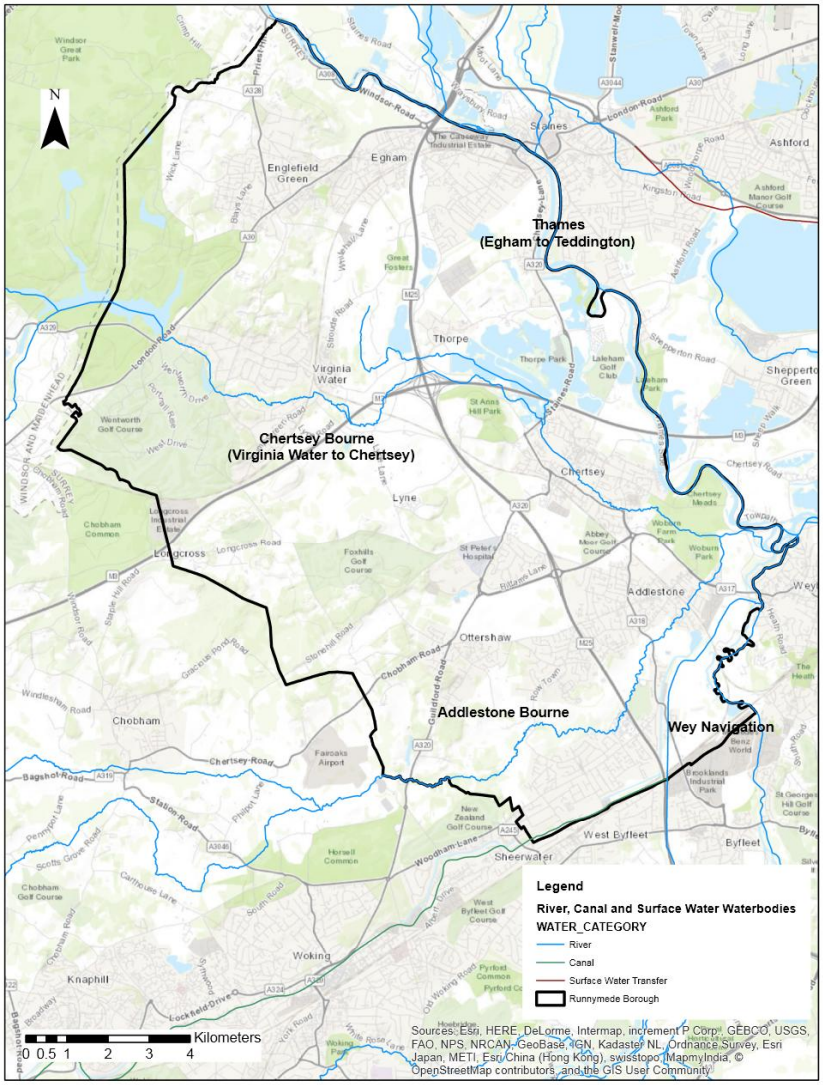

Figure 4-2 Watercourses of Runnymede

Lower Thames
The River Thames (Lower) flows along the north eastern boundary of the Borough.

[17] Environment Agency (2014) Thames Catchment Abstraction Licensing Strategy.

River Wey
The River Wey flows along the south eastern boundary of the Borough. The catchment of the Wey lies within Hampshire and Surrey and has a total area of approx. 904 km2. It falls approximately 190m in level, and is approximately 104 km in length from its source in Hampshire to the confluence with the Thames near Weybridge urban centre. The Lower Wey is navigable from its confluence with the Thames up to Godalming. It includes a number of navigation channels separate from the Main River, with water levels regulated by structures such as locks and weirs.

Chertsey Bourne
The Chertsey Bourne flows from Virginia Water Lake in the west through Chertsey to join the Thames at Hamm Court.

Addlestone Bourne
The Addlestone Bourne is a tributary of the Wey with it upper catchments at Chobham and Bagshot. Within the Borough it flows from just upstream of Dunford Bridge on the A320 in Ottershaw through Addlestone to join the Wey at Weybridge.

4.2.6 WFD Status

It is important to ensure any increase in sewage discharges from proposed developments will not lead to deterioration of existing surface water and groundwater quality. This should be approached through effective design of wastewater and surface drainage infrastructure and in combination with other measures, assist in the achievement of Good Ecological status or potential for waterbodies under the WFD by 2021 or 2027. The WFD classifications for surface water bodies in Runnymede, as taken from the Thames RBMP, are given in Table 4-1 below.

Legend to Table 4-1: Hierarchy of WFD status

Status	Definition
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 waterbody. 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 water body. 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.

Table 4-1 WFD classifications of surface water bodies in Runnymede

Waterbody name	Current 2015 status	Target status/potential	Physico-chemical 2015 status				Reasons for not achieving Good	
			Overall Phys-chem status	Ammonia	Dissolved Oxygen	Phosphate	Activity	Certainty
Chertsey Bourne (Virginia to Chertsey) (GB10663901707)	Moderate	Good (by 2027)	Good	High	Good	Good	Agriculture and rural land management Physical modifications (impoundments) – Morphology	Confirmed
							Other Physical modification (Barriers) – ecological discontinuity	Confirmed
							Recreation (Physical modification)	Confirmed
Chertsey Bourne (Chertsey to River Thames confluence) (GB106039017030)	Moderate	Poor (2015)	Moderate	Good	Moderate	Poor	Water Industry Point Source (continuous sewage discharge) – Macrophytes & Phytobenthos Combined	Confirmed
							Water Industry Point Source (Incidents) – Dissolved Oxygen	Suspected
The Moat at Egham (GB106039017060)	Poor	Good (by 2027)	Moderate	Good	Bad	Moderate	Recreation (Physical modification)	Confirmed
							Drought – Invertebrates, Macrophytes & Phytobenthos Combined	Probable
							Water Industry Intermittent sewage discharge – Invertebrates, Macrophytes & Phytobenthos Combined	Probable
							Other Physical modification (Barriers) - Invertebrates	Confirmed
							Agriculture and rural land management Physical modification (Land drainage) – Invertebrates, Macrophytes & Phytobenthos Combined	Probable
							Other Surface water abstraction – Hydrological Regime	Suspected

Addlestone Bourne (Mill/Hale to Chertsey Bourne) (GB106039017020)	Moderate	Good (by 2027)	Moderate	High	Good	Moderate	Water Industry Point source (continuous sewage discharge) – Macrophytes & Phytobenthos Combined	Probable
Wey Navigation (Pyrford reach) (GB106039017910)	Moderate	Good (by 2027)	Moderate	High	Good	Moderate	Water Industry Point source (continuous sewage discharge) – Phosphate	Probable
							Recreation (Physical modification)	Confirmed
							Navigation (Physical modification)	Confirmed
Thames (Cookham to Egham) (GB106039023231)	Moderate	Moderate (2015)	Moderate	High	High	Moderate	Water Industry Point source – Phosphate	Suspected
							Agriculture and rural land management Diffuse source – Phosphate	Suspected
Thames (Egham to Teddington) (GB106039023232)	Poor	Poor (2015)	Moderate	High	High	Moderate	Water Industry Point Source (continuous sewage discharge) – Phosphate, Macrophytes & Phytobenthos Combined	Probable
							Agriculture and rural land management Diffuse source – Phosphate, Macrophytes & Phytobenthos Combined	Probable

4.3 Ecology and Biodiversity

The WFD imposes the duty to ensure that provision of water supply is sustainable and does not adversely impact the natural ecology of our rivers, by reducing the flow to levels below those required to sustain the ecology. Equally, the impact of discharges should not lead to a deterioration in status or prevent a waterbody reaching 'Good' status.

Runnymede contains a large number of sites of scientific and ecological importance varying from local non-statutory to international designations (see Figure 4-3). There are 35 Sites of Nature Conservation Importance (SNCI) which cover 881.7 hectares together with 27.8km of rivers and streams and 2.9ha of pond. One of the SNCI sites, Chertsey Meads which was denotified as a Site of Special Scientific Interest (SSSI) has been designated a Local Nature Reserve (LNR). There are five SSSIs in Runnymede covering a total area of 147.52 hectares. Some of the SSSIs, such as Thorpe Hay Meadow, are individual habitats, whilst others, such as Langham Pond have a number of mixed habitats. Of the total area of SSSIs, 91.51% is in a 'favourable' or 'unfavourable recovering' condition[18]. Thorpe Park No.1 Gravel Pit SSSI is also designated a Specially Protected Area (SPA) and a Ramsar wetland of international importance. In addition, there are four SSSIs adjacent to the Runnymede boundary: Dumsey Meadow; Horsell Common, which is also designated part of the Thames Basin Heath Special Protection Area (TBHSPA); Ockham and Wisley Common, which is also part of the TBHSPA; and Chobham Common, which is a Special Area of Conservation (SAC) and a National Nature Reserve (NNR) as well as a TBHSPA.

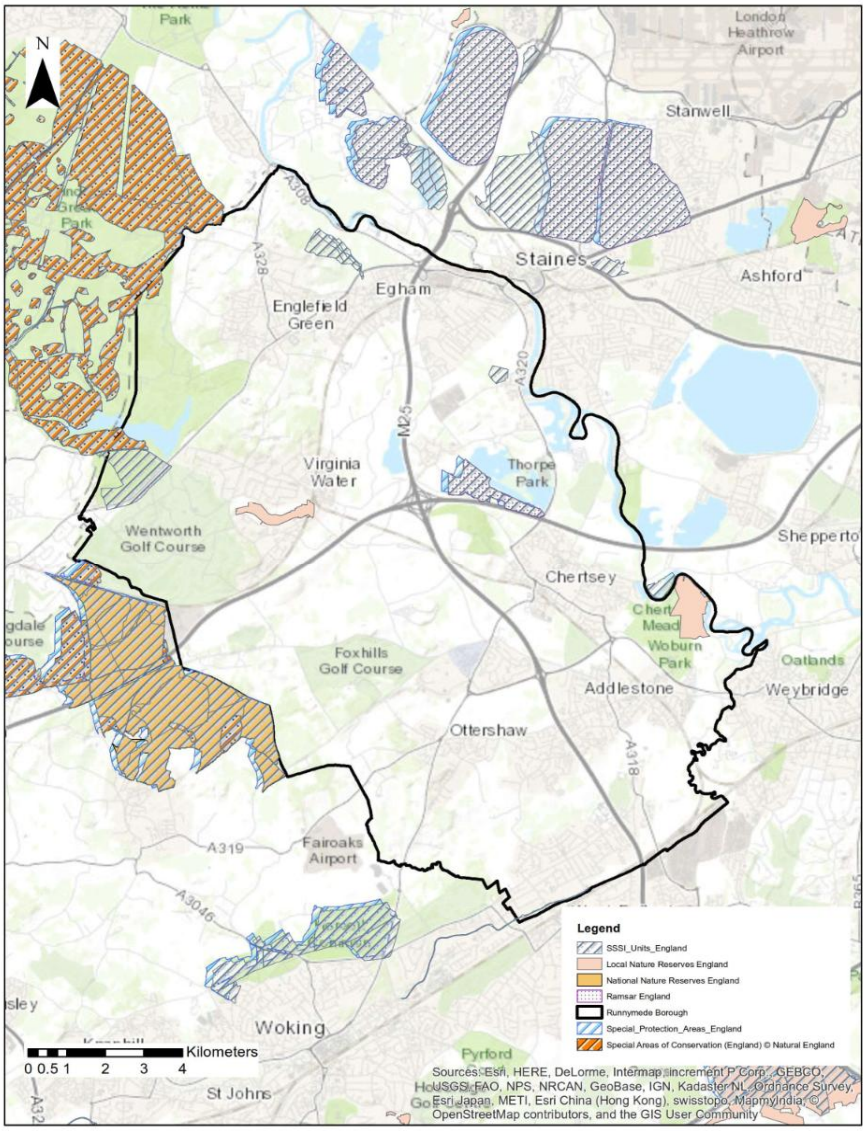

Figure 4-3: Map of nature conservation and designated sites in and adjacent to Runnymede

A number of hydrologically connected sites within Runnymede are home to local wetland flora species that require the specialist conditions to grow. A high-level review has identified some of these sites and associated species of specialist

[18] Runnymede Borough Council (2014) Runnymede Local Plan Sustainability Appraisal Scoping Report. Available at https://www.runnymede.gov.uk/article/7997/Sustainability-Appraisal-policy-documents-and-guidance. Accessed 29th August 2017.

flora and fauna which are summarised in Table 4-2. It should be noted that a more detailed ecological assessment could lead to additional species being identified and a further expansion of this list.

Table 4-2 Statutory sites in Runnymede with identified wetland flora species

Site name	Main hydrological link	Main habitat	Specialist flora	Specialist fauna
Thorpe Park No. 1 Gravel Pit SPA & SSSI	The Moat	Standing open water		Gadwall *Anas strepera* Shoveler *Anas clypeata*
Langham Pond SSSI	Ordinary watercourse discharging to Lower Thames	Standing open water	Four British duckweeds *Lemna* species Whorled water-milfoil *Myriophyllum verticillatum* Orange foxtail grass *Alopecurus aequalis* Greater water parsnip *Sium latifolium*	Variable damselfly Coenagrion pulchellum Little Grebe Water Rail
Thorpe Hay Meadow SSSI	Meadlake Ditch	Hay meadow - lowland	Lesser knapweed Centaurea nigra. Yellow rattle Rhinanthus minor Meadow-fescue grass *Festuca pratensis* Meadow barley *Hordeum secalinum* Smooth hawk's-beard *Crepis capillaris* Common reed Phragmites australis Meadow brome *Bromus commutatus* Meadow foxtail grass *Alopecurus pratensis* Yorkshire-fog grass *Holcus lanatus* Pepper saxifrage *Silaum silaus* Meadow-sweet *Filipendula ulmaria* Mmeadow cranesbill *Geranium pratense*, Clustered bell-flower *Campanula glomerata* Cowslip *Primula veris* Hoary plantain *Plantago media* Salad burnet *Sanguisorba minor* Lady's bedstraw *Galium verum* Purple willow *Salix purpurea* Almond willow *Salix triandra* Aquatic liverwort *Riccia fluitans*	
Windsor Forest & Great Park SSSI	Chertsey Bourne	Woodland Standing open water	Atlantic acidophilous beech Adder's tongue fern *Ophioglossum vulgatum* Mat grass *Nardus stricta* Lousewort *Pedicularis sylvatica* Bitter vetch *Lathyrus montanus* Harebell *Campanula rotundifolia*	Violet click beetle *Limoniscus wolaceus* Stag beetle *Lucanus cervus*

Recommendation

1. As part of an Outline study, a more detailed ecological assessment should be carried out to identify water-dependant species which may be impacted by increased development in the catchment.

4.4 Flood Risk

It is important for the WCS to include an assessment of the constraints of flood risk, and the infrastructure required to mitigate it as a result of proposed growth. Both flood risk to, and flood risk from development needs to be considered.

The SFRA is currently being updated alongside this Scoping WCS, in accordance with the NPPF and the corresponding Planning Practice Guidance (PPG), to provide a strategic overview of flood risk within the district from fluvial, surface, ground and artificial water sources of flooding. The revised SFRA will incorporate policy changes and updated flooding information and modelling, which has become available since the Runnymede SFRA was previously published in 2009.

The development of the SFRA will aid RBC in their application of the Sequential Test for potential site allocations and inform the Sustainability Appraisal and subsequent planning policies. If it is required, this information will be incorporated into the next stage of the WCS, and assessed in relation to the proposed development site allocations to ensure that:

- The risk of flooding to the potential development areas is quantified and the development is steered away from high risk areas (Flood Zones 2 and 3);

- Any flood mitigation measures are planned in a strategic manner; and

- There is no deterioration to existing communities' standard of protection.

Flooding from rivers

Flooding from the River Thames and its main tributaries; Chertsey Bourne, Addlestone Bourne and River Wey, are the main source of flooding in Runnymede[19]. The floodplain of the River Thames is fairly extensive on its eastern side within Runnymede, due to the flat, low lying nature of the land, and presents the greatest fluvial flood risk for the Borough. The Thames Catchment Flood Management Plan (CFMP) identifies this area in Runnymede as developed floodplain with no formal built flood defences. The mechanism for flooding from the River Thames is generally prolonged episodes of heavy rainfall. A review of modelled fluvial risk identifies a number of areas at medium to high risk of flooding from rivers:

- The floodplain of the Lower Thames affects the north eastern and eastern areas of the Borough including Egham and Chertsey.

- The Chertsey Bourne and Addlestone Bourne are connected in the south by the Woodham Park Stream, but have separate outfalls into the River Wey, which subsequently outfalls into the River Thames. Areas potentially at risk from flooding from the Bourne and the River Wey include Woodham, New Haw and Addlestone.

There are also areas along the rivers that act as a functional flood plain for storage space in times of a flood, which are essential to consider as part of the site allocation process. These areas are largely in the low lying areas adjacent to the Lower Thames and Chertsey Bourne.

Flooding from surface water

In Runnymede, south of the M3, drainage has traditionally been served by surface water sewers in the urban areas of Addlestone, Woodham and Ottershaw. To the north of the M3, there are virtually no adopted public surface water sewers. Here, drainage is controlled by SuDS that allow infiltration into the ground. The difference in drainage approach stems from the former administrative areas that made up the Borough: Chertsey Urban District Council and Egham Urban District Council.

Each ward in Runnymede has some areas that are likely to be at some risk from surface water flooding including parts of each of the Borough's main urban centres at Egham, Chertsey and Addlestone. A number of areas at risk from surface water flooding are located adjacent to the Borough's smaller watercourses and other waterbodies.

Surface Water Management is a key consideration when assessing development within large areas. The urbanisation of large areas of greenfield land alters the way in which rainfall can drain away and has the potential to increase the rate and amount of water that enters watercourses causing an increase in flood risk. In many cases, the management of surface water is achieved via a requirement to restrict runoff from developed sites to the pre-development site usage. This is generally achieved by incorporating a range of SuDS which aim to maximise the amount of rainwater which is returned to the ground (infiltration) and then to hold back (attenuate) excess surface water.

Suitable surface water management measures should be incorporated into new development designs in order to reduce and manage surface water flood risk to, and posed by a proposed development. The implementation of SuDS is now a material planning consideration for all major developments. Surrey County Council (SCC), as Lead Local Flood Authority (LLFA), is the statutory consultee regarding the implementation of SuDS in all major developments in the Borough and they have developed an Advice Note[20] in relation to the requirement for surface water drainage in major planning

[19] Runnymede Borough Council (2017) Level 1 Strategic Flood Risk Assessment
[20] Surrey County Council (2017) SuDS Advice Note. Accessed via https://www.surreycc.gov.uk/__data/assets/pdf_file/0006/116169/SuDS-Advice-Note-2017.pdf

applications. Informed inclusion of SuDS in development presents an opportunity to alleviate known issues with sewer flooding in parts of Runnymede's urban centres, where connections of surface water into the foul sewer have compounded capacity problems (discussed further below in Section 4.6.1).

Flooding from groundwater

In Runnymede, one of the areas which have historically experienced groundwater flooding is Egham, where the EA currently provides a groundwater alert or warning service. The potential for groundwater flooding is the greatest in the Egham and Thorpe which ties in with the geology and topography of the Borough. In Chertsey the risk is lower and throughout the remainder of the Borough, in general there is considered to be limited potential for groundwater flooding to occur, although pockets with higher potential or no potential can be observed.

Flooding from other sources

Other sources of potential flooding within the Borough include the reservoirs and canals. There are a number of reservoirs located either within or adjacent to Runnymede which have the potential to cause flooding. In general, the risk of dam failure on reservoirs is considered extremely low given the ongoing flood assessments and statutory management plans prepared by reservoir undertakers.

The Basingstoke Canal/Wey Navigation, located on the southern boundary of the Borough, has the potential to cause flooding through breach or overtopping. The risk of flooding is very low given that water levels are artificially controlled; however, the potential exists for flood water to be conveyed down the canal if the control measures fail or if an embankment breach were to occur.

4.5 Water Resources and Supply

4.5.1 Water Resource Management

Water resources within a catchment are assessed and monitored by the Environment Agency. The river catchment is split up into a number of individual units whose status is assessed through an Abstraction Licensing Strategy (ALS) as part of the Catchment Abstraction Management Strategy (CAMS) process. ALS are strategies for the management of water resources at a local level and set out how water abstraction will be managed. They outline where water is available, and also, if relevant, where current rates of abstraction need to be reduced to allow the balance between the needs of abstractors, other water users and the aquatic environment to be protected. Runnymede lies with the Thames CAMS area (see Figure 4-5) and is covered by the Thames ALS published in May 2014.

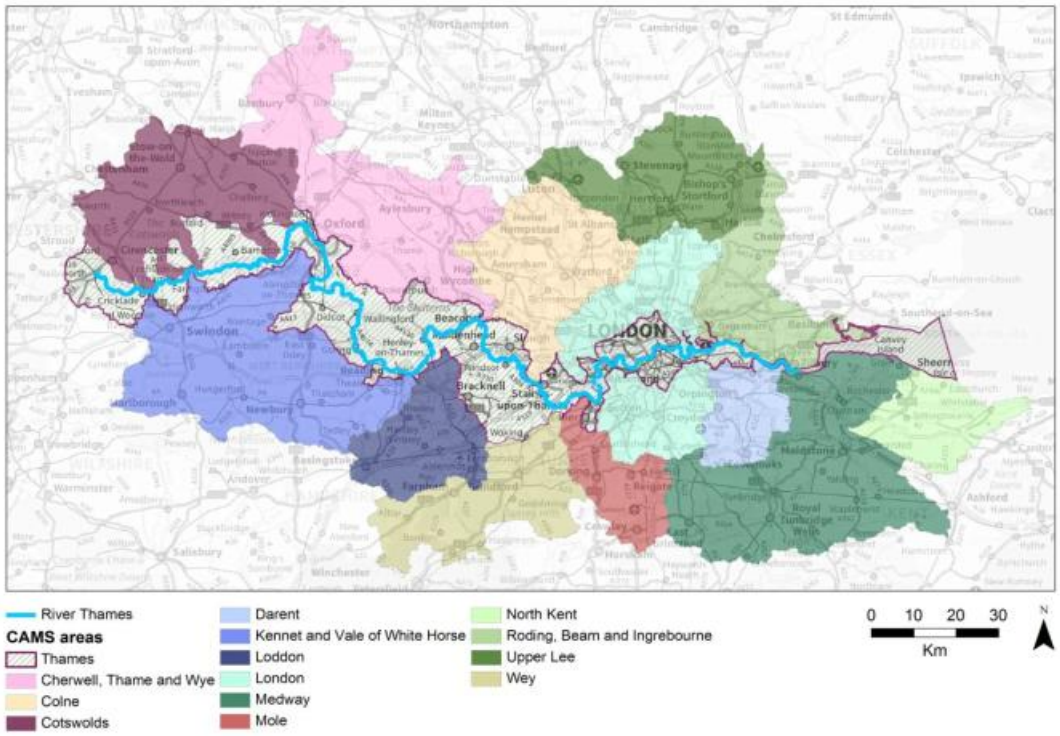

Figure 4-4 The CAMS areas of the Thames and Thames tributaries[22]

The Thames ALS states that there is currently no water available for abstraction at low flows throughout the Thames CAMS area. This ALS classification is significantly influenced by the flow requirements of the lower Thames downstream

(at Kingston) and flow recorded at this location dictates permitted abstraction volumes throughout the Thames River Basin District (including all tributaries). A bespoke strategy for new consumptive abstractions has been produced by the Environment Agency to ensure the requirements of the Lower Thames at Kingston are met[21], whereby any new surface water abstractions or groundwater abstractions in direct hydraulic continuity with a river are subject to conditions when abstraction can take place. A WFD assessment must be provided for new abstractions 2Ml/d or above to show it will not cause deterioration under the WFD or prevent the waterbody achieving Good ecological status/potential. Consumptive groundwater licenses which do not have direct impact on river flows may be permitted with restrictions.

4.5.2 Water Supply

Affinity Water Services (AWS) supplies water to the Borough, which is covered by Water Resource Zone (WRZ) 6 (part of the Central Region), also known as the Wey WRZ. The primary water resources in AWS's Central region are largely groundwater (60%), with the remainder from surface water sources and imports from neighbouring water companies (40%)[22]. In the Wey WRZ water imports are provided by TWUL, with export available to South East Water.

AWS's 2014 WRMP states that under baseline dry year annual average conditions in the Wey WRZ, a water supply deficit was identified in 2015 and without implementation of new demand and supply measures, is forecast to grow to a deficit of >10 Ml/d by 2040. This deficit is driven largely by a combination of increase in demand due to population growth and reduction in supply due to the impact of climate change and sustainability reductions in the 2015-2020 period. These sustainability reductions are reductions in the licenced volume of water which AWS can abstract to feed into public supply for reasons of environmental impact. There is also a deficit forecast under baseline peak conditions by 2040 of >10 Ml/d. The peak condition scenario is the main investment driver for planning.

Since local authority data was collected to prepare WRMP14, population and housing growth forecast by a number of authorities has been updated; in Runnymede there has recently been an increase in the forecast number of properties across the Wey WRZ between 2017 and 2035. This increase prompted a review of water supply in the short term where in early 2017, AWS identified that they could accommodate additional projected growth in the Wey WRZ. The proposed solution to resolve the supply-demand deficit in the Wey WRZ is using demand management including leakage reduction, enhanced water efficiency measures for households and rollout of metering towards the end of the plan period, along with supply management through bulk imports from neighbouring water companies and local source recommissioning. These measures coupled with measures throughout the other seven WRZs will impact the supply / demand balance positively (see Figure 4.6).

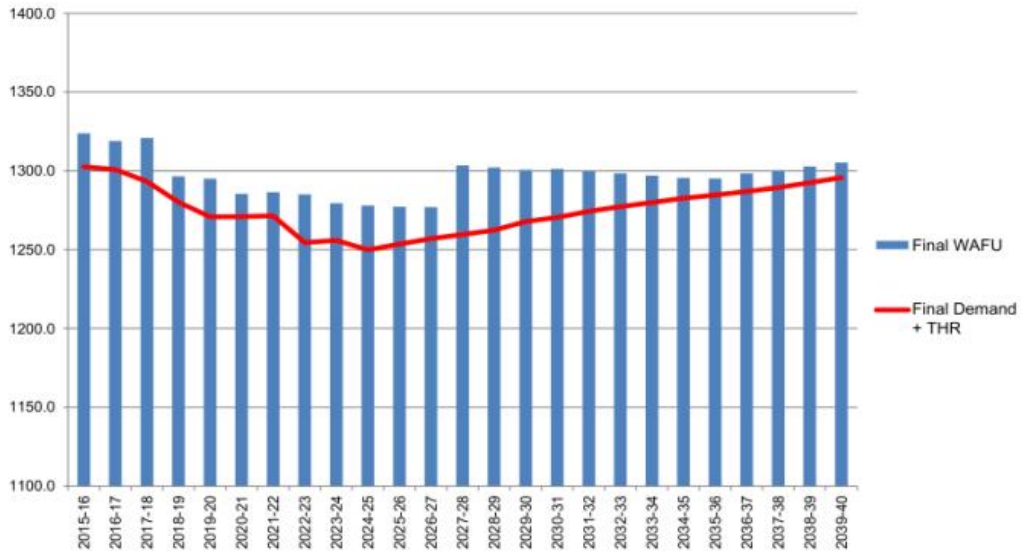

Figure 4-5: Supply/demand balance with the AWS preferred plan implemented showing the water available or use (WAFU) and final demand plus target headroom (THR)[23]

4.5.3 Water supply infrastructure

The AWS WRMP14 identifies a number of network improvements required to deliver the sustainability reductions and drought resilience across the network to be delivered in the 2015-2020 period but none of these fall within the Wey WRZ.

[21] Environment Agency (2014) Thames Catchment Abstraction Licensing Strategy
[22] Affinity Water (2014) Final Water Resources Management Plan 2015 – 2040. Available at https://stakeholder.affinitywater.co.uk/water-resources.aspx. Accessed 11th August 2017.
[23] Affinity Water (2014) Final Water Resources Management Plan 2015 – 2040.

It is likely that this issue will need to be revisited in the development of the next WRMP to ensure that revised housing projections are factored into the review of future infrastructure capacity.

AWS provided a high-level capacity check in May 2017 (as part of the Infrastructure Needs Assessment for the Borough[24]) for the proposed developments identified as site allocations by RBC to identify whether reinforcement works will be required to ensure supply. The sites were allocated to one of the four main supply areas and network performance assessed for a) current demand and b) future demand, including future developments both in AWS records and the preliminary list of allocated sites provided to them. This assessment identified that major reinforcements would be required in parts of the network with the aim to recover the current level of service and the loss of capacity in the network due to the additional load. The required reinforcements would be funded by developer contributions relative to the impact of their development on the network. Given that the future growth figures have increased slightly since this assessment was undertaken by AWS, it will need to be revisited to ensure any further reinforcements to the network that might be needed are identified.

Recommendation

2. A detailed assessment of water supply network capacity should be carried out, led by AWS, to identify potential infrastructure constraints that will require future investment to accommodate the proposed growth.

4.6 Wastewater Treatment and Collection

Wastewater treatment and collection infrastructure within Runnymede is owned and operated by **Thames Water Utilities Ltd** (TWUL). The Environment Agency sets standards for effluent discharged into rivers, estuaries and the sea from water companies and industry, through the issue of a permit to discharge issued under the 1991 Water Resources Act. These discharge permit standards are set individually for each wastewater treatment works (WwTW).

Chertsey WwTW is the only WWTW located within Runnymede and discharges to the Chertsey Bourne a short distance upstream from the River Thames. Chertsey WwTW's drainage catchment is solely within the Runnymede Borough and serves the majority of the numerous small settlements located throughout the rural areas of the Borough. As sewerage catchments do not follow administrative boundaries, some wastewater originating from a small area of London Road, Virginia Water is also served by Ascot WwTW which is situated outside the Borough. The catchment for a number of other WwTW's lie on or adjacent to the boundary of Runnymede Borough but they currently receive no wastewater from within the Borough and therefore have been excluded for further consideration within the Scoping. These include Lightwater WwTW, Weybridge WwTW, Windsor WwTW and Wisley WwTW.

The permitted dry weather flow (DWF) limits are shown below in Table 4-3 for both Chertsey and Ascot WwTWs. DWF is a unit of measure, used by the Environment Agency in a discharge permit to describe the volume that can be discharged from WwTWs under normal operating conditions. Essentially it is supposed to represent the proportion of flow treated by a WwTW that is made up of foul (or waste) water and not surface water which is generated from rainfall events and is derived from measured flow statistics for each WwTW. A UKWIR project WW21/D developed a measure of DWF which concluded that the measure of DWF that would be the most appropriate was the 20th percentile (Q80)[25].

Table 4-3 WwTW Permitted DWF limits

WwTW	Max Daily Flow (m^3/d)	Permitted DWF (m^3/day)
Chertsey	-	23,284
Ascot	2	-

The purpose of this Scoping WCS is to establish the baseline capacity at the WwTWs serving the Borough to treat wastewater flows from proposed growth within the conditions of the current permit. Reviewing the proposed housing and employment growth across the Borough, each of the sites are located adjacent to or within an area which is already served by Chertsey WwTW. As there are no proposed growth sites located within the area currently served by Ascot WwTW, this has been scoped out for further consideration. Therefore, the assumption has been applied that only Chertsey WwTW is likely to serve future development sites and hence, the remainder of this section focuses on Chertsey

[24] Runnymede Borough Council (2017) Runnymede Infrastructure Needs Assessment – Stage 1A and 1B Report.
[25] An Improved Definition of Sewage Treatment Works Dry Weather Flow, Manuel Starr, 2006

WwTW only. The study aims to review likely water quality risks from additional discharge and to determine whether more detailed modelling as part of an Outline stage study is required.

The volume element of the discharge permit determines the maximum number of properties that can be connected to a WwTW catchment. When discharge permits are issued, they are generally set with a volume 'freeboard', which acknowledges that allowance needs to be made for additional connections. This allowance is termed 'permitted headroom' and determines how many properties can be connected to the WwTW before a new discharge permit would need to be issued (and hence how many properties can connect without significant changes to the treatment infrastructure).

Quality conditions are then applied to the discharge permit to ensure that the water quality of the receiving waterbody is not adversely affected, even when the maximum amount of flow is discharged. However, many of these permit conditions were set prior to the implementation of the WFD and its specific objectives, and in some cases, using the available headroom could result in WFD deterioration even in cases where the headroom is not fully utilised and discharge flow volumes would remain within the permit limits. The WCS approach needs to determine whether the existing permitted flow would be exceeded and/or use of the permitted headroom could affect WFD compliance, and hence determine the need for a new permit and potential improvements in treatment process infrastructure at WwTW. In so doing, it needs to consider whether these conditions are achievable within the limits of current treatment technology and whether alternative solutions need to be implemented..

In order to carry out the assessment of capacity within Chertsey's WwTW discharge permit, the current consented DWF and the measured flow were obtained from TWUL and the Environment Agency. The volumetric capacity can be calculated as the difference between the measured flow and the consented DWF. Table 4-4 presents the volumetric capacity for Chertsey WwTW along with an initial assessment of the additional flow expected to be generated from the growth being considered in the Runnymede 2035 process (including anticipated Windfall sites each year).

Table 4-4 DWF consent capacity at Chertsey WwTW in Runnymede serving areas of proposed new developments

WWTW	Settlements served	Receiving watercourse	Measured flow Q80 (m3/d)	Current DWF capacity (m3/d)	Proposed new homes to be served by WwTW	Additional flow generated by proposed new homes (m3/d)[26]	Additional flow from proposed employment requirement (m3/d)	Allowance for infiltration (m3/d)[27]	Total additional flow (m3/d)	Residual flow capacity (m3/d)	Approx. residual housing capacity
Chertsey	Addlestone, Chertsey, Egham, Englefield Green, New Haw, Ottershaw, Thorpe, Row Town, Virginia Water & Woodham	**Chertsey Bourne (Virginia to Chertsey)**	19,895	3,389	6662 homes 3837 student/older accommodation 34 Traveller sites	2512	160	909	3581	-192	-633

[26] Assumption that consumption per new domestic property is 125 litres per head per day (l/h/d) in accordance with the Affinity WRMP (2014) with a household occupancy rate of 2.43 calculated from Office for National Statistics (ONS) population and household projections for 2035. Assumption that student & older accommodation occupancy rate have an occupancy rate of 1 per unit with 125 l/h/d consumption. Assumption that traveller sites are the same as new domestic properties in relation to consumption & occupancy rate.

[27] TWUL provided information on the level of sewer infiltration for Chertsey WwTW which was calculated as 34% of the current DWF. This percentage has been applied to the additional flow to calculate the allowance for infiltration.

The initial analysis of current headroom at Chertsey WwTW indicates that current projections for development over the plan period cannot be accommodated within the existing permit. Therefore, the level of growth proposed within Runnymede will require assessment of the water quality implications of using the headroom and the need for a revised discharge permit.

4.6.1 Wastewater Discharges and water quality

It should be noted that pollution from wastewater is identified within the Thames RBMP as potentially impacting WFD standards in both the Wey and the Lower Thames catchments, particularly in terms of phosphate concentrations. As identified in Table 4-1 above, continuous point source discharge is often identified in combination with diffuse discharge from agricultural and land use practices as contributing to less than good phosphate status in a number of waterbodies, although confidence is only suspected or probable. Only those waterbodies anticipated to receive additional flow as a result of the growth proposals for Runnymede have been described in further detail below.

The Moat at Egham (GB106039017060) is identified as being at 'Poor' ecological status/potential with dissolved oxygen (DO) classified as 'Bad'. The current status has not been attributed to one particular activity; rather there are a considerable number of listed reasons why the waterbody is not achieving 'Good', ranging from confirmed physical modifications to various probable/suspected activities.

Chertsey Bourne (Chertsey to River Thames confluence) (GB106039017030) is identified as being at Poor ecological status/potential with phosphate classified as 'Poor'. The current status has been attributed to water industry activity, ranging from confirmed point source continuous sewage discharges to suspected point source incidents.It is confirmed that the continuous discharges are affecting macrophytes and phytobenthos achieving 'Good' and it is suspected that incident discharges are affecting DO. This water body receives flow from Chertsey WwTW, which would receive wastewater from all of the proposed development.

Thames (Egham to Teddington) (GB106039023232) is also identified as being at Poor ecological status/potential. The current status has not been attributed to one particular activity; rather there are a multiple of listed reasons why the waterbody is not achieving 'Good', ranging from confirmed physical modifications to various probable/suspected activities. The Chertsey Bourne discharges into the Thames (Egham to Teddington). It has been demonstrated that it is probable that continuous sewage discharges are preventing phosphate and macrophytes and phytobenthos achieving 'Good'.

At present there are three proposed measures within the RBMP linked to improving the status of waterbodies by 2021 in the Wey Catchment[28] which relate to the water industry. The location of the identified measures are outside of Runnymede, however, bearing in mind the suspected influence of wastewater discharges on water quality within the Borough, it should remain a consideration of TWUL that the Environment Agency may choose to review and update permitted discharges through their ongoing review process. This may in turn have implications for processing capacity and upgrade requirements.

It is not possible to determine how use of the permitted headroom and exceedance of the current permitted flow volume would affect water quality at the scoping stage. The increase in flow to Chertsey WwTW would be significant, and the Chertsey Bourne is impacted by several discharges from urban centres upstream which will also be subject to increases in growth and wastewater discharge. The scoping study has highlighted that pressures from wastewater discharges (and other sources) are already affecting the current water quality and WFD status of the Chertsey Bourne and subsequently the Lower Thames, and hence a more detailed water quality modelling exercise would be required to determine the full extent of impact from additional discharge (including upstream catchment pressures).

It is recommended that this is considered through further assessment in an Outline WCS via a collaborative approach between the Council, the Environment Agency and Thames Water.

[28] http://environment.data.gov.uk/catchment-planning/RiverBasinDistrict/6 Accessed 14th August 2017

Recommendation

3. Further work in an Outline Study, involving input from TWUL and the Environment Agency should review current water quality issues in the Chertsey Bourne and Lower Thames to confirm whether the existing permit needs to be changed and/or an upgrade to the wastewater treatment process at Chertsey WwTW is required.
4. Further water quality assessment work in an Outline Study will be required to determine the necessary permit conditions and any associated upgrade works to sewerage infrastructure to accommodate the projected growth in Runnymede and to ensure there is no deterioration to the water environment.

4.6.2 Wastewater networks

Across the Borough there are a series of sewer networks and associated operational infrastructure, such as pumping stations, which provide conveyance of foul wastewater from existing developed areas to Chertsey WwTW and conveyance of stormwater to the nearest watercourse (where the two sewer systems are separate). The capacity of these sewer networks is limited due to their existing size and when their capacity is exceeded it can result in sewer surcharging and flooding.

Causes of sewer flooding are complex and can be related to a combination of groundwater or other flood water incursion, and surface water connections rather than solely a foul capacity issue. However it is important that where constraints on capacity are known, future development does not exacerbate the risk and remediation schemes are developed with an understanding of future growth targets. Records of sewer flooding in the Borough over the last ten years highlight the areas most affected, as follows:

- Postcode area KT16 8 (covers Penton Hook, Laleham Burway & parts of eastern Chertsey);

- Postcode area TW20 8 (covers Thorpe, Thorpe Lea, Thorpe Green, Pooley Green, Hurst Lane & parts of Egham Hythe); and

- Postcode area TW20 9 (covers majority of Egham & Ennglefield Green south of A30).

TWUL develop specific drainage strategies for areas at risk of sewer flooding to define how they will address this along with growth related issues but at present there are have been no drainage strategies developed for any areas within Runnymede.

5 Findings, Constraints and Recommendations

This scoping study has set out the water environment and water infrastructure baseline for Runnymede and how it may be affected by growth numbers and locations proposed over the Local Plan period. It has also sought to determine whether there is sufficient evidence to answer key WCS questions, as set out in the relevant WCS guidance, relating to the provision of sufficient water services infrastructure and protection of the water environment, and to determine whether further study is required in the form of an Outline WCS. The relevant questions for each water cycle topic, and the extent to which the scoping study has been able to address them, is set out below.

5.1 Water Resources

The Scoping WCS has considered whether there is sufficient evidence to answer six key questions relating to the provision of water resources. Responses to these questions are provided below, and where required, what the recommendation is either for further work, or the implementation of an action for the study stakeholders.

Is there enough water?

The Thames ALS states that there is currently no water available for abstraction at low flows throughout the Thames CAMS area. Any new abstractions in direct connectivity with a river are subject to strict conditions to ensure no deterioration of the watercourse.

Runnymede is supplied with water by AWS and sits entirely within the Wey WRZ where a water supply deficit was identified in 2015, compared with 2011/12 as the base year representing a normal year, and forecast to grow to a deficit of >10 Ml/d by 2040. This demonstrates that without new measures, there is insufficient water available to meet increased demands from growth in Runnymede

Does the water company's approach to water resources make sure there is enough water available to serve the projected growth levels?

In order to address the supply and demand balance in Wey WRZ over the planning period, the WRMP14 proposes to focus on demand management including leakage reduction, enhanced water efficiency measures for households and rollout of metering towards the end of the plan period, along with supply management through bulk imports from neighbouring water companies and local source recommissioning. It is anticipated by AWS that with delivery of this strategy the water supply will sufficiently meet the projected demand over the plan period (to 2040). Forecasts for water supply availability in WRMP14 were based on housing projections provided prior to development of the Runnymede 2035 Local Plan. However, since the publication of the WRMP14, increased housing need projections have prompted a review of water supply in the short term whereby AWS has identified that they could accommodate additional projected growth in the Wey WRZ.

Is there enough capacity in the existing abstraction licences for the proposed development?

AWS's WRMP14 and subsequent assessment of revised housing growth projections confirm this to be the case.

Will existing licences remain valid?

There is no current indication that existing licenses will not remain valid.

If new major infrastructure is needed, can it be provided and funded in time?

A high-level capacity check by AWS in May 2017 for the site allocations identified that major reinforcements would be required in parts of the network to recover the current level of service and the loss of capacity in the network due to the additional load. AWS are planning for their next WRMP (2020 – 2015) which will account for the increased housing projection now planned for the Runnymede Borough.

Can abstraction be reduced with better management practices? Is it sustainable?

AWS are working with the Environment Agency to identify where abstractions may be environmentally harmful and proposing solutions to address any required reductions in abstraction or implement river restoration work. Of sites identified for action, none are currently located within Runnymede[29].

[29] Affinity Water (2015) Final Annual Review - Water Resources Management Plan 2015 – 2035.

5.1.1 Summary

AWS has confirmed through their WRMP that a supply demand deficit is forecast to increase and have consequently developed a suite of options to manage water provision over the short to medium term to 2040. Since the publication of the WRMP14, increased housing need projections have prompted a review of water supply in the short term whereby AWS has identified that they could accommodate additional projected growth in the Wey WRZ but have identified that major reinforcements would be required in parts of the network with the aim to recover the current level of service and the loss of capacity in the network due to the additional load.

Whilst abstraction licensing planning identifies constraints on future new consumptive licenses in the Thames CAMS area, it is not currently considered by AWS that new licenses are required to meet the water supply need to 2040.

Whilst AWS has demonstrated that they have sufficient plans in place to meet water demand for the plan period, there remains significant uncertainty around how population growth and climate change may impact on water supplies, which will require regular monitoring. In terms of sustainable management of the water environment and future supply, supporting a reduction in water use is a more reliable and sustainable approach than seeking out new options for abstractions or water transfer routes in the future. Considering the demonstrated water stress in this region, it is strongly encouraged that the Local Plan includes a policy to encourage reduced water use in all new developments so that current resources can be used with maximum efficiency.

Recommendation

5. Due to demonstrable 'Water Stress' in the region, water efficiency in new developments should be maximised through the inclusion of a water efficiency policy in the Local Plan. It is recommended that this be in line with the Building Regulations optional standard of 110 l/h/d.

5.2 Water Quality

This scoping study has addressed whether there is sufficient evidence to answer eight key questions relating to growth and potential effects on water quality. Three questions, as outlined below have been covered in the initial response, with answers to the five remaining questions provided in subsequent paragraphs.

- **Will the proposed housing growth have a detrimental impact on water quality?**
- **Is there sufficient environmental capacity within the receiving water environment to accommodate the resulting increase flow and pollutant loads from the Sewage Treatment Works as the result of the planned housing growth?**
- **Will the sewerage undertaker need to apply to increase the level of treated sewage effluent that is allowed to be discharged under the existing environmental permits to allow future growth?**

All of the WFD designated surface water bodies in Runnymede are currently failing to achieve Good Status with almost half only meeting Poor Status in the last review cycle linked to numerous activities within the catchment. The Thames RBMP identifies pollution from sewage discharge as a factor affecting the achievement of Good Status on parts of both the Chertsey Bourne and Lower Thames catchments, although certainty varies and often combined with agricultural influences. In addition, there are no specific RBMP measures in place related to wastewater discharges in the Borough.

As all of the areas of proposed new development are located adjacent to or within an area which is already served by Chertsey WwTW it has been assumed for the purposes of the Scoping WCS that they would all be served by this WwTW. The existing permit at Chertsey WwTW has been reviewed alongside the current measured flow and anticipated additional flow resulting from current growth projections. This initial review has highlighted that there is not sufficient permitted headroom capacity within the WwTW permit to accept all proposed growth.

In order to accommodate all of the planned growth in Runnymede, an increase in the volume of permitted treated effluent discharges will be required at the Chertsey WwTW. The impact of this on the receiving Chertsey Bourne and River Thames should be subject to detailed analysis of the permitted loadings of Phosphate, Ammonia and BOD within the permit to ensure growth does not lead to deterioration of the waterbody status or prevent the achievement of good status in the river. This needs to consider a catchment approach.

Recommendation

6. Further work within an Outline Study should be undertaken to determine the impact of using and exceeding headroom and to determine the feasibility of a new permit at Chertsey WwTW which serves Runnymede. This work would also review whether using this headroom will affect the water quality requirements of hydrologically linked downstream ecological designations. Collaborative work will be required with Thames Water and the Environment Agency, particularly to define baseline usable headroom within the existing permitting regime.

- **Will the quality standard on the Environmental Permit need to be tightened to meet existing or future water quality standards as a result of the proposed growth (e.g. WFD)?**
- **If not, are there alternative discharge locations that will not cause a failure of water quality targets or causing deterioration in water quality?**

The Scoping Study has identified that there will be a need to apply for a new permit for Chertsey WwTW and that further work is required to determine whether the quality conditions need to be tightened. The potential for alternative discharge locations will need to be considered as part of the further assessment work.

Is there an increased risk of discharges from storm water overflows causing an adverse water quality impact?

Whilst this has not been highlighted as a risk in this Scoping WCS, the strict implementation of sustainable drainage systems in new developments, overseen by SCC as statutory consultee, should reduce pressure on combined sewers from large storm events, separating it completely or releasing at a controlled rate. With this policy in place, new development should not increase the risk of discharges from storm water overflows.

Recommendation

7. As part of an Outline study, further investigation could be carried out in collaboration with TWUL and SCC in relation to locations of known sewer flooding, particularly where surface water is entering the foul sewer network, to ensure new development does not exacerbate known problems and where possible alleviates existing risk.

Can the existing sewerage and wastewater treatment networks cope with the increased wastewater the proposed growth with generate?

As well as assessing the capacity of WwTW and receiving watercourses, it is essential to determine the capacity in the sewer network and transmissions of wastewater to the works from individual developments. A number of settlements in the district have suffered from sewer flooding which is often influenced by wider concurrent flooding issues. RBC should engage with TWUL and SCC to progress solutions where sewer surcharging is linked to surface water entering the foul sewer network. The scale of growth planned for Runnymede may require upgrades to the sewerage network.

If new major infrastructure is required (wastewater treatment works, major pumping mains or sewer mains) can they be provided and funded in time?

It has not been identified in this Scoping WCS, that major infrastructure, in terms of new WwTWs, would be required to accommodate proposed growth; however, this conclusion is dependent on further work related to Chertsey WwTW. Water quality modelling recommended for the Outline WCS is likely to require treatment upgrades at Chertsey WwTW and an assessment of the feasibility of these upgrades needs to be included in the Outline assessment.

In relation to wastewater networks, large developments will require new sewer networks to serve them, which should be planned in detail with TWUL as they are brought forward. The Chertsey WwTW has significant capacity to accommodate growth at present. However if the proposed development is to be progressed within the plan period, it will be essential to work strategically with TWUL and the Environment Agency to ensure adequate network infrastructure, appropriate flood mitigation and protection of the water environment are in place. It needs to be considered if the sewer network will have sufficient capacity to transmit additional wastewater flows to the WwTW specific to key development sites.

Recommendation

8. A detailed assessment of wastewater network capacity should be carried out, led by TWUL, to identify potential infrastructure constraints that will require future investment to accommodate the proposed growth. This should be reported in the Outline WCS through a sites assessment.

5.2.1 Summary

The initial analysis undertaken in this Scoping study suggests the capacity at Chertsey WwTW, which is assumed will receive wastewater from all proposed growth, does not have sufficient headroom within the existing permit in terms of permitted discharge volumes for the all of the projected growth in the Runnymede 2035 Plan period. The capacity assessment suggests that around 92% of Runnymede's projected growth could be accommodated before the permit would be exceeded which would allow for phasing of upgrades over time. Further work should be undertaken to determine the impact of using headroom and implementing a new permit at Chertsey WwTW on water quality requirements of hydrologically linked downstream ecological designations and overall WFD waterbody status.

RBC should consult TWUL in relation to locations of new development in areas at risk of surface water flooding to ensure existing problems are not exacerbated.

Further work should therefore be undertaken and reported in an Outline study to determine the type and timing of infrastructure solutions required to protect water quality and determine network upgrade solutions for specific sites.

5.3 Flood Risk & Water Environment

- **Will increased discharge from Wastewater treatment works (WwTWs) increase flood risk?**
- **Are there other location specific environmental risks that need to be considered, for example relating to biodiversity or conservation requirements? Or opportunities?**
- **What opportunities are there for multiple benefits such as restoring floodplain and improving ecology?**
- **Are there multi use options that will provide water resources, flood risk management and water quality benefits?**

There is only one European designated site within Runnymede (Thorpe Park No.1 Gravel Pit) but a number of SSSIs have been identified with wetland flora supporting protected species, which could potentially be affected by development within the Borough. For the wetland habitats of the Borough the key challenges include the effects of development in respect of excessive abstraction, loss of habitat, changes in hydrology and water quality. Development changes to land drainage and hydrology, habitat fragmentation and degradation and loss, remain considerations as they can result in deterioration in water suitability, as well as the effects of invasion of alien species on native fauna and flora, the effects of recreational use, and the effects of climate change.

The predominant flood risks in Runnymede are fluvial with areas of medium to high risk identified associated with all the major rivers in the Borough affecting settlements of Egham, Chertsey, Woodham, New Ham and Addlestone. Development considerations must include a number of factors in relation to this risk; that existing risk to properties must not be increased by development and that development should avoid areas identified at highest risk, in line with the sequential approach. Where development is not specifically identified as a settlement at risk, the downstream consequences of larger developments such as at Longcross Garden Village must be taken into consideration. This includes potential increase in discharge from WwTWs as a result of new development. It is estimated that the additional flow from Chertsey WwTW, generated by the proposed growth at the end of the plan period, could increase annual mean flow within the Chertsey Bourne by up to 8%.

Recommendation

9. An assessment of the potential impact on flood risk resulting from the increase in discharge from Chertsey WwTW should be undertaken as part of the Outline WCS.

Whilst flooding from surface water is not currently identified as a major source of flooding in Runnymede, increasing urban expansion and pressure on the drainage network combined with more intense storms as a result of climate change are likely to increase the risk. TWUL has identified an issue of incursion of surface water into the foul sewer network which could be a contributing factor to sewer flooding of properties. Policies encouraging the implementation of SuDS on all new developments are recommended to help address risks from surface water and sewer flooding but also to contribute to water quality improvements where urban runoff is affecting waterbody status and to provide multiple benefits to improve the landscape, local biodiversity and connectivity for ecosystems.

The implementation of SuDS in new development should mitigate potential pollution associated with urban runoff from new developments. Additionally preventing surface water from entering the sewerage system can contribute to relieving sewer flooding problems and the number of untreated spills into water bodies during wet periods. It is recommended that Local Plan policy sets minimum requirements for runoff reduction and treatment through the use of Sustainable drainage systems.

Recommendation

10. RBC should work with SCC as the Lead Local Flood Authority for Runnymede and statutory consultee on the use of Sustainable Drainage in new developments to clarify minimum requirements for SuDS relevant to the Borough.

Based on the scoping review of the impact of growth on water resources and wastewater treatment discussed above, there is no indication that proposed growth would have an adverse effect on water dependant sites through wastewater discharge; however, this should be confirmed as part of the Outline study. Regular reviews by AWS have not identified negative impacts on environmental designation as a result of abstraction within Runnymede.

The updated Runnymede Level 1 Strategic Flood Risk Assessment (2017) and Surrey Local Flood Risk Management Strategy (2017) should be consulted for a more detailed assessment of flood risks in the Borough alongside these WCS scoping conclusions.

6 Recommendations

The final recommendation from the Phase 1 Scoping WCS is that an Outline WCS should be undertaken to include the following elements:

- Review of current water quality issues in the Chertsey Bourne and Lower Thames, with input from TWUL and the Environment Agency, to confirm whether the existing permit needs to be changed and/or an upgrade to the wastewater treatment process at Chertsey WwTW is required.
- Further water quality assessment work to determine the necessary permit conditions for the Chertsey WwTW discharge and any associated treatment upgrade works to accommodate the projected growth in Runnymede and to ensure there is no deterioration to the water environment.
- To determine the impact of a new permit at Chertsey WwTW which serves Runnymede. This work would also review the usable permitted headroom within the existing permit to determine whether using this headroom will have WFD implications as well as the water quality requirements of hydrologically linked downstream ecological designations. Collaborative work will be required with TWUL and the Environment Agency, particularly to define baseline usable headroom within the existing permitting regime.
- An ecological assessment to identify water-dependant species which may be impacted by increased development in the catchment.
- An assessment of water supply network capacity, led by AWS, to identify potential infrastructure constraints that will require future investment to accommodate the proposed growth.
- An assessment of wastewater network capacity, led by TWUL, to identify potential infrastructure constraints that will require future investment to accommodate the proposed growth.
- Further investigation, in collaboration with TWUL and SCC, in relation to locations of known sewer flooding, particularly where surface water is entering the foul sewer network, to ensure new development does not exacerbate known problems and where possible alleviates existing risk.
- An assessment of the potential impact on flood risk resulting from the increase in discharge from Chertsey WwTW.