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# Elmbridge Water Cycle Study: Phase 1 Scoping

## Part 1 – Draft Report

Elmbridge Borough Council

Project number: 60565750

May 2018

## Quality information

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## Revision History

Revision	Revision date	Details	Authorized	Name	Position
1	23/05/18	Draft Pt 1	24/05/2018	Sarah Kelly	Regional Director, Water

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## Table of Contents

<b>1.</b>	<b>Introduction</b> .....	<b>4</b>
1.1	Background.....	4
1.2	Objectives of the Water Cycle Study.....	4
<b>2.</b>	<b>Elmbridge Water Cycle Study</b> .....	<b>5</b>
2.1	The Water Cycle .....	5
2.2	Implications for development .....	6
2.3	Stages of a Water Cycle Study .....	6
2.4	Stages of a Water Cycle Study .....	7
2.5	Integration with the Planning System.....	9
2.6	National, Regional and Local Drivers and Policies .....	9
<b>3.</b>	<b>Elmbridge Borough</b> .....	<b>13</b>
3.1	Elmbridge Borough .....	13
<b>4.</b>	<b>Water Cycle Environment and Infrastructure Baseline</b> .....	<b>14</b>
4.1	Introduction .....	14
4.2	Water Environment .....	14
4.3	Ecology and Biodiversity.....	21
4.4	Flood Risk.....	25
4.5	Water Resources and Supply .....	27
4.6	Wastewater Treatment and Collection .....	29
<b>5.</b>	<b>Summary</b> .....	<b>33</b>
5.1	Water Environment .....	33
5.2	Water resources and supply .....	33
5.3	Wastewater treatment and collection .....	34
5.4	Next steps.....	34

## Figures

Figure 2-1: The Water Cycle Study (Source: Environment Agency).....	6
Figure 3-1 Elmbridge Borough Council Settlement Areas .....	13
Figure 4-1: Management catchments within the River Thames District (Extract from the Thames RBMP).....	15
Figure 4-2: the bedrock geology of Elmbridge (Extract from the Elmbridge SFRA (2015)).....	17
Figure 4-3 Main watercourses of Elmbridge.....	18
Figure 4-4 Statutory Designated sites in and around Elmbridge Borough.....	22
Figure 4-5: The CAMS area of the Thames and Thames Tributaries .....	27
Figure 4-6: Supply/demand balance with the AWS preferred plan implemented showing the water available or use (WAFU) and final demand plus target headroom (THR).....	28
Figure 4-7: Recorded incidents of external sewer flooding in Elmbridge (Extract from 2015 SFRA).....	32

## Tables

Table 2-1: EU Directives & UK Legislation & Guidance on Water .....	9
Table 4-1: WFD classifications of surface water bodies in Elmbridge .....	20
Table 4-2: Wildlife sites that contain linking pathways to each relevant STW .....	21
Table 4-3: WwTW Consented DWF limits .....	29
Table 4-4: DWF consent capacity at Esher and Weybridge STWs in Elmbridge.....	30

# 1. Introduction

## 1.1 Background

Elmbridge is located in north Surrey, approximately 20 miles south-west of Central London with excellent road and rail connections to London, Heathrow Airport and the wider South East Region. Elmbridge Borough Council (EBC) is currently preparing the Elmbridge 2035 Local Plan which will set out the level of development required in the Borough over the period 2015-2035 to meet identified needs, including those for housing, employment and retail.

Elmbridge Borough is identified by the Environment Agency as falling within one of the designated 'Areas of serious water stress'<sup>1</sup> and planned growth (in addition to other pressures) is forecast to lead to an increasing supply demand deficit, according to the two main water suppliers in the Borough; Affinity Water (AWS)<sup>2</sup> and Thames Water (TWUL)<sup>3</sup>.

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)<sup>4</sup> with respect to the water environment and water infrastructure provision.

## 1.2 Objectives of the Water Cycle Study

The overall objective of the Elmbridge WCS is to identify any constraints on housing and employment growth planned for the Borough up to 2035 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 Elmbridge WCS is being undertaken initially as a phase 1 Scoping study, which will determine whether further phases are required. The Scoping phase will provide a review of the water cycle position including an overview of the following specific items:

- Capacity issues with regards to water treatment works, clean water network and water resources in Elmbridge;
- Capacity issues with regards to wastewater treatment capacity in Elmbridge;
- 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.

EBC has chosen to commission the Phase 1 Scoping WCS in two Parts as described below. This report forms Part 1 of the overall Phase 1 Scoping study;

- Part 1 - To establish required baseline data, identify gaps in knowledge and identify the appropriate organisations to input to the study. To be carried out in advance of overall growth number identification and site allocation and as such only covers specific elements set out in the Environment Agency Thames region guidance.
- Part 2 - To assess baseline data against housing growth figures and preferred sites to identify issues and questions to be considered in order to determine whether an outline study is required

<sup>1</sup> Environment Agency (2013) Water Stressed areas – final classification. July 2013

<sup>2</sup> Affinity Water (2018) Draft Water Resources Management Plan. Available at [https://www.affinitywater.co.uk/docs/Draft\\_Water\\_Resources\\_Management\\_Plan\\_2020-2080\\_March%202018.pdf](https://www.affinitywater.co.uk/docs/Draft_Water_Resources_Management_Plan_2020-2080_March%202018.pdf). Accessed 16/05/18

<sup>3</sup> Thames Water (2017) Water Resources Management Plan 2019. Available at <https://www.thameswater.co.uk/-/media/Site-Content/Your-water-future-2018/WRMP-Sections/dWRMP19-Section-00---Executive-summary-221217.pdf>. Accessed 16/05/2018

<sup>4</sup> DCLG (2012) National Planning Policy Framework. March 2012  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/6077/2116950.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf)

## DRAFT

The outputs of the study aim to inform development of the Local Plan and help EBC 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 are being assessed concurrently within the update to the Level 1 Strategic Flood Risk Assessment (SFRA).

### 1.2.1 Stakeholders and consultation

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

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

## 2. Elmbridge 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.

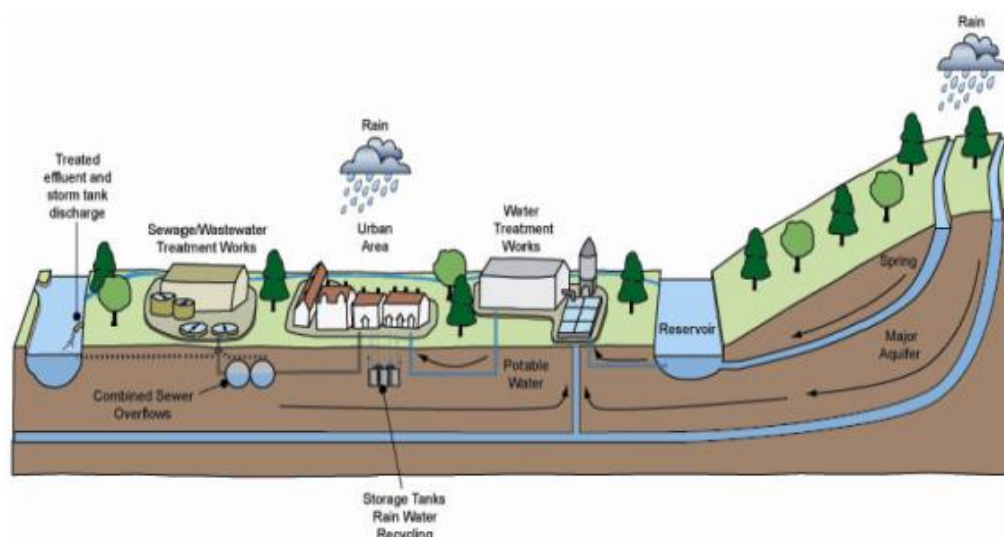


Figure 2-1. The Water Cycle Study (Source: Environment Agency<sup>5</sup>)

## 2.2 Implications for development

Anthropogenic changes to the natural water cycle are often detrimental. 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 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)<sup>3</sup> and more recent guidance for the Thames Area<sup>6</sup> 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.

<sup>5</sup> Water Cycle Study Guidance, Environment Agency  
<http://webarchive.nationalarchives.gov.uk/20140328084622/http://cdn.environment-agency.gov.uk/geho0109bpff-e-e.pdf>

<sup>6</sup> Environment Agency (2016) Water Cycle Study Requirements and Guidance – Thames Area.

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EBC has 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. This will be undertaken through Part 2 of the Scoping WCS.

## 2.4 Stages of a 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, the proposed scope of the Outline Water Cycle Study.

In line with Thames Area Guidance<sup>6</sup>, 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. The majority of these questions cannot be answered until completion of Part 2 of the Scoping report. However this report (Part 1) will highlight existing concerns likely to be compounded by housing growth.

### 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?
- 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?

## DRAFT

- 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, the guidance advises preparation of the scoping WCS alongside an SFRA in order to demonstrate any proposed development will not increase flood risk. In turn, the following questions should be addressed 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?

## 2.4.1 Outline and Detailed Water Cycle Studies

### 2.4.1.1 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.

### 2.4.1.2 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.



## 2.5 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 EBC'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 emerging Elmbridge 2035 Local Plan.

## 2.6 National, Regional and Local Drivers and Policies

The WCS is driven 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 management 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	<p>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:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• To encourage the uptake of sustainable drainage systems by removing the automatic right to connect to sewers. (NB this part of the Act – Schedule 3 is yet to be enacted)</li> <li>• 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.</li> <li>• To enable water and sewerage companies to operate concessionary schemes for community groups on surface water drainage charges.</li> <li>• 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.</li> </ul>
Floods Directive 2007/60/EC	The EU Floods Directive, transposed into UK law as the Flood Risk Regulation 2009 sets out a three stage process to approach flood risk management
Flood Risk Regulations 2009	<ul style="list-style-type: none"> <li>• Member states to undertake preliminary Flood Risk Assessments by 2011 for all river basins and associated coastal zones</li> <li>• Where risks exist, flood hazard maps and flood risk maps to be developed by 2013</li> <li>• By 2015, Flood Risk Management Plans to be produced for the identified areas outlining measures to reduce probability of flooding and its potential consequences</li> </ul> <p>These steps should be reviewed every 6 years in a cycle coordinated with the Water Framework Directive (WFD) implementation cycle.</p>

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Directive/Legislation/Guidance	Description
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.
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). The NPPF advises local authorities and others on planning policy and operation of the planning system.
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."
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
Sustainable Drainage Systems. House of Commons: Written Statement (HCWS161)	Places expectations on Local Planning Authorities to ensure that sustainable drainage systems for the management of runoff are put in place for all major development unless demonstrated to be inappropriate. It proposes to make Lead Local Flood Authorities a statutory consultee on planning applications for surface water management (later confirmed under <a href="#">The Town and Country Planning (Development Management Procedure) (England) Order 2015</a> )
Urban Waste Water Treatment Directive (UWWTD) <a href="#">91/271/EEC</a>	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 <sup>7</sup> , 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 <sup>8</sup> .  The two key aspects of the WFD relevant to the wastewater assessment in this WCS are

<sup>7</sup> 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.

<sup>8</sup> UK Environmental Standards and Conditions (Phase I) Final Report, April 2008, UK Technical Advisory Group on the Water Framework Directive.

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Directive/Legislation/Guidance	Description
	<p>the policy requirements that:</p> <ul style="list-style-type: none"> <li>– development must not cause a deterioration in status of a waterbody<sup>9</sup>; and</li> <li>– 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.</li> </ul>
Water, People, Places, 2013	Guidance which outlines the process for integrating sustainable drainage systems (SuDS) into the master planning of large and small developments.
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.

## 2.6.1 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 Elmbridge Scoping WCS and specifically, with regard to integration with spatial planning timelines for the LPA.

### 2.6.1.1 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.

### 2.6.1.2 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

<sup>9</sup> 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

## DRAFT

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. Water supply to the Borough of Elmbridge is covered by two companies, Affinity Water (AWS) and Thames Water (TWUL), and thus there are two WRMP reports which relate to the borough. Both AWS (2018)<sup>10</sup> and TWUL (2017)<sup>11</sup> have published Draft WRMPs outlining their proposals to maintain a sustainable balance between water supplies and demand for water for the periods of 2020 – 2080 and 2020 – 2100 respectively.

The Scoping WCS will help provide an evidence base both for EBC'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.

### 2.6.1.3 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 Elmbridge Scoping WCS (Part 1):

- Thames Catchment Abstraction Licensing Strategy (2014);
- Thames River Basin Management Plan (2015);
- Strategic Housing Market Assessment (SHMA) for Kingston upon Thames and North East Surrey Authorities (2016); and,
- Surrey Local Flood Risk Management Strategy (2017).

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<sup>10</sup> Affinity Water (2018) Draft Water Resources Management Plan. Available at [https://www.affinitywater.co.uk/docs/Draft\\_Water\\_Resources\\_Management\\_Plan\\_2020-2080\\_March%202018.pdf](https://www.affinitywater.co.uk/docs/Draft_Water_Resources_Management_Plan_2020-2080_March%202018.pdf). Accessed 16/05/18

<sup>11</sup> Thames Water (2017) Water Resources Management Plan 2019. Available at <https://www.thameswater.co.uk/-/media/Site-Content/Your-water-future-2018/WRMP-Sections/dWRMP19-Section-00---Executive-summary-221217.pdf>. Accessed 16/05/2018

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# 3. Elmbridge Borough

## 3.1 Elmbridge Borough

Elmbridge Borough is situated in the north of Surrey, immediately south-west of London. The area is bordered in the north east by the River Thames and the administrative areas of Spelthorne Borough and the Royal Borough of Richmond upon Thames; to the east by the London Borough of Kingston upon Thames; to the south by Mole Valley District and Guildford Borough; and to the west by the Boroughs of Woking and Runnymede.

Elmbridge covers an area of approximately 96km<sup>2</sup>; of which approximately 58% is greenbelt and 42% is urban area. Elmbridge has 8 Settlement Areas as identified in Figure 3-1 which are used for planning purposes. There are 2 Main Settlement Areas of Weybridge and Walton-on-Thames located in the west and north of the Borough respectively; 4 Suburban Settlement Areas of Esher; Hersham; Thames Ditton, Long Ditton, Hinchley Wood and Weston Green; and East and West Molesey; the Suburban Village of Claygate in the east of the Borough; and the Service Centre and Rural Fringe of Cobham, Oxshott, Stoke D'Abernon and Downside in the south.

Elmbridge has a unique position as a highly desirable area as a result of its location as a Surrey Borough in close proximity to London and its high quality environment. As a result of good accessibility by rail and road to Central London, and within easy reach of Heathrow and Gatwick Airports, the M25 and the M3, land values are high and development pressure intense.

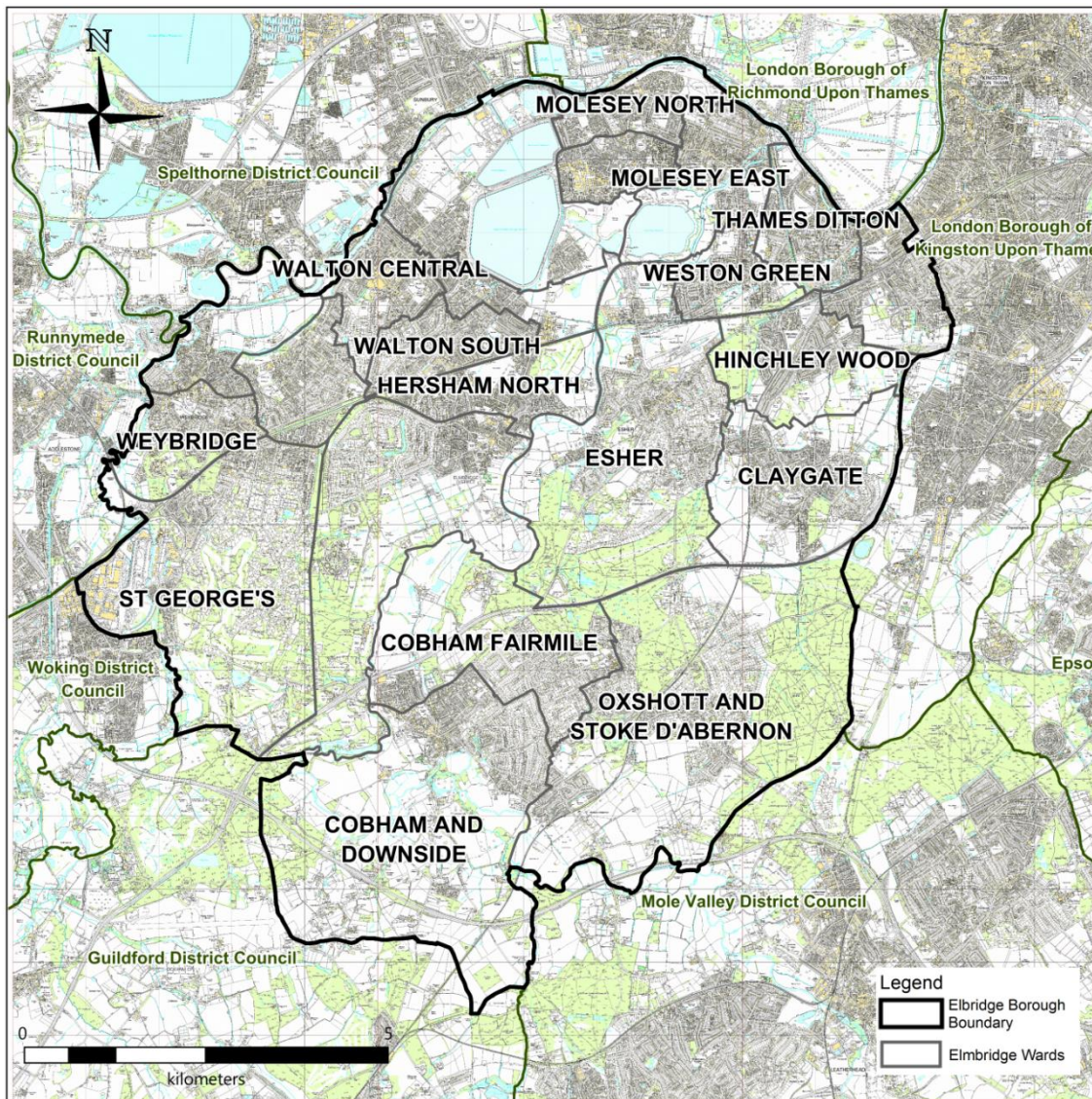


Figure 3-1 Elmbridge Borough Council Settlement Areas

## 4. Water Cycle Environment and Infrastructure Baseline

### 4.1 Introduction

This section describes the environmental and infrastructure baseline within Elmbridge 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.

### 4.2 Water Environment

#### 4.2.1 Climate

Elmbridge falls within the Southern climate region as identified by the Met Office<sup>12</sup>. The annual temperature range for this region is less pronounced than in some parts of the UK and the typical temperatures experienced 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

Elmbridge falls within the Thames River Basin District (RBD), which consists of 17 management catchments and includes many interconnected rivers, lakes, groundwater and coastal waters (Figure 4-1). 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<sup>13</sup>. 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 national and global 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 is located within the Mole management catchment; however, there are some areas in the northern and western edges of the Borough within other catchments. The River Thames forms the northern boundary of the Borough and falls within the Maidenhead and Sunbury Management Catchment. The westernmost region of Elmbridge lies within the Wey and Trib management catchment.

<sup>12</sup> <http://www.metoffice.gov.uk/climate/uk/regional-climates/so> Accessed 29/03/18

<sup>13</sup> <http://environment.data.gov.uk/catchment-planning/RiverBasinDistrict/6> Accessed 29/03/18

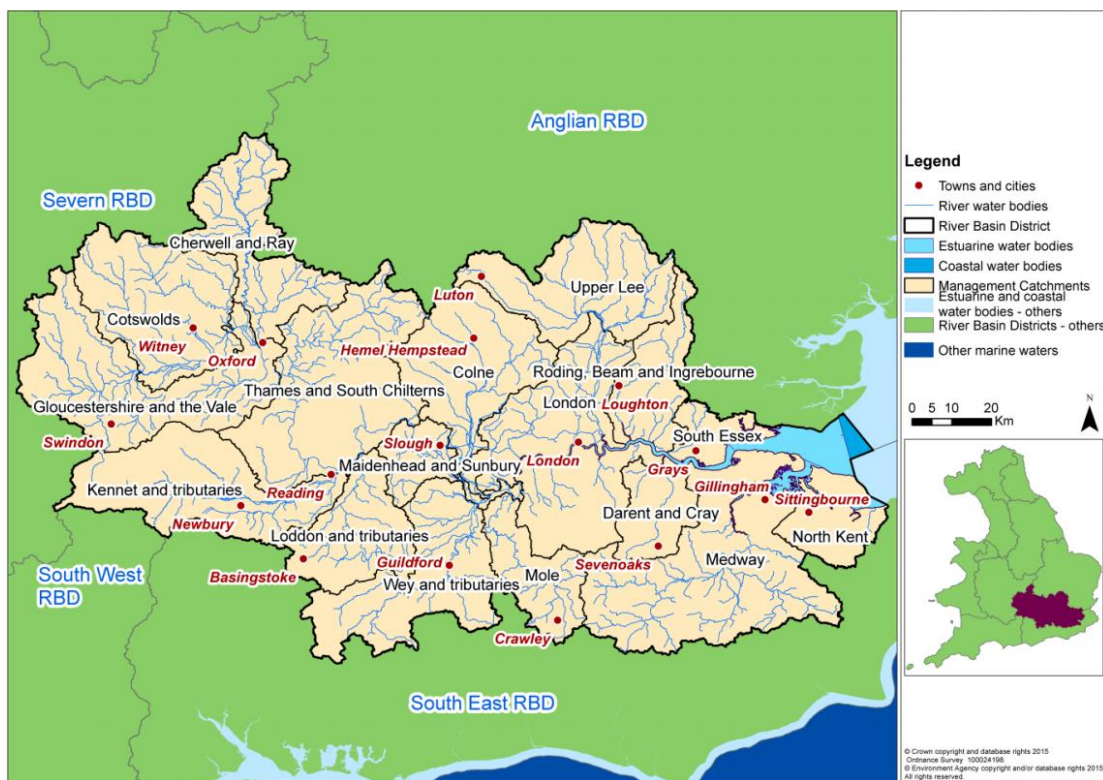


Figure 4-1: Management catchments within the River Thames District (Extract from the Thames RBMP<sup>14</sup>)

Within the Mole management catchment there are two operational catchments: the Mole Lower and Rythe and the Mole Upper Trib. However, it is only the Mole Lower and Rythe which extends into Elmbridge Borough.

#### 4.2.2.1 Mole Lower at Rythe

The Mole Lower and Rythe catchment consists of 9 rivers, canals and surface water transfers (4 of which are defined as 'heavily modified') and two lakes. The Mole is characterised as a lowland river which cuts its way through the North Downs near Box Hill. Despite the fact that this river is heavily altered in places, there are large areas where it can be defined as semi-natural. Included within this operational catchment is the Rythe, despite it not actually being connected to the Mole. Much of this catchment lies on impermeable rock which means that the river levels respond rapidly to heavy rainfall. Included within this catchment there are twelve Sites of Special Scientific Interest (SSSIs), notably the Mole Gap to Reigate Escarpment SSSI.

#### 4.2.2.2 Thames Lower

The non-tidal Lower River Thames catchment consists of 12 rivers, canals and surface water transfers and 5 lakes, all of which provide benefits to local people and businesses as well as the general economy. This catchment 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 have reduced and damaged the natural habitat and created barriers to free fish movement.

#### 4.2.2.3 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.

<sup>14</sup> Environment Agency (2015) Thames River Basin District: River basin management plan

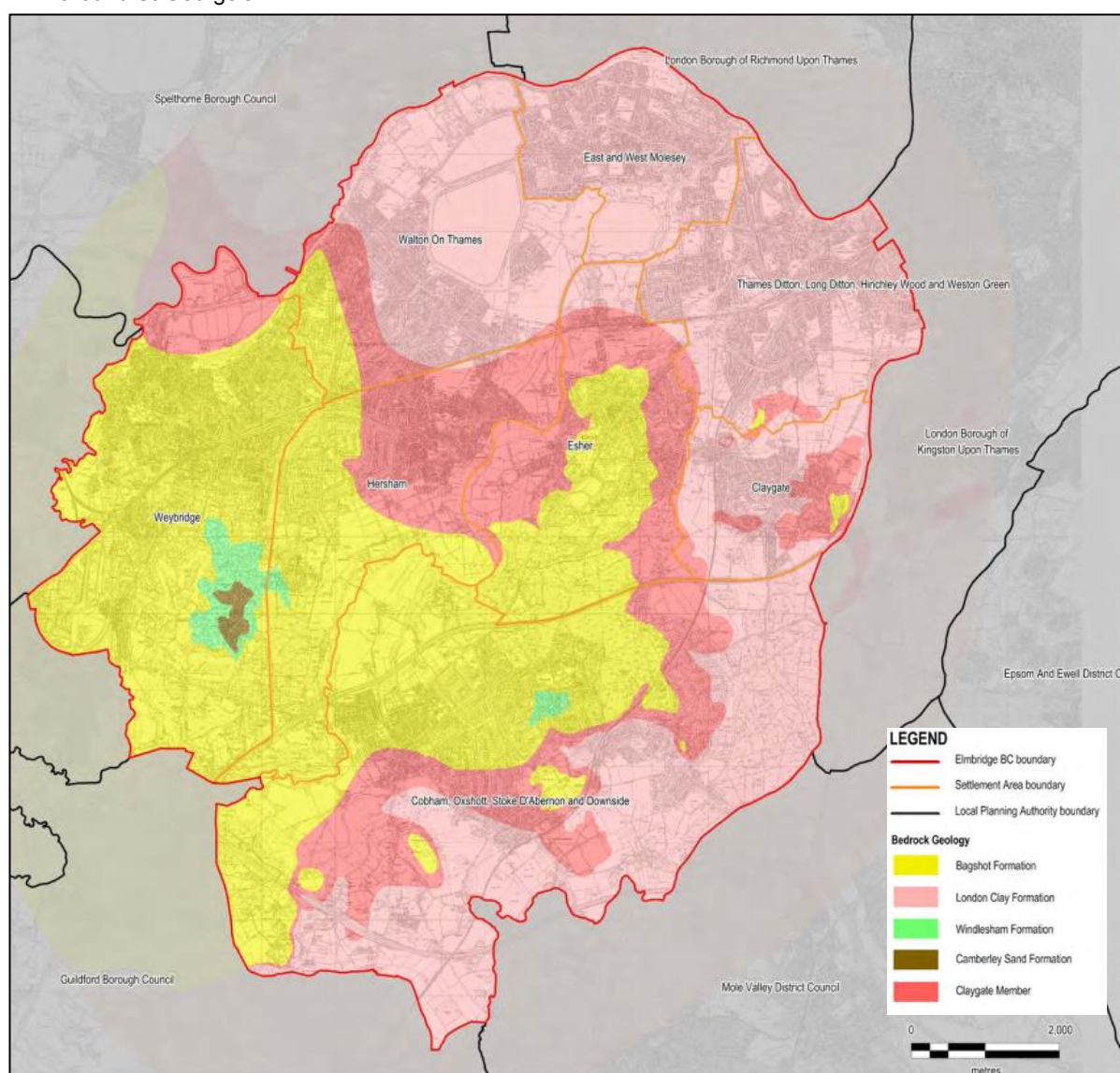
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## 4.2.3 Geology and Groundwater

Five distinct regions of bedrock underlie the Borough (© Ordnance Survey Crown Copyright. All rights reserved. Environment Agency 100026380 2018. Based upon BGS Geology 625k, with the permission of the British Geological Survey

Figure 4-2) including:

- The London Clay Formation (Clay and Silt) in the north and the eastern and westernmost regions of the borough;
- The Claygate Member (Sand, Silt and Clay) underlying the majority of Hersham and parts of Cobham and Oxshot;
- The Bagshot Formation (Sand) underlies the central and western regions of the borough. These regions include Weybridge and Brooklands
- The Windlesham Formation (Sand, Silt and Clay) in the southwest of the Borough around St George's Hill, and a small area in the south around Fairmile; and,
- A very small area of Camberley Sand Formation (Sand) enclaved in the Windlesham Formation, located around St George's Hill.





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### Figure 4-2: the bedrock geology of Elmbridge (Extract from the Elmbridge SFRA (2015))

The bedrock underlying the western region of the Borough (around Cobham, Hersham and Weybridge) is designated a secondary aquifer. The Environment Agency defines this as a permeable layer capable of supporting water supplies at a local, rather than strategic scale, and in some cases forming an important source of baseflow to rivers. The remaining area of the Borough is designated unproductive strata, which is defined as strata with low permeability, having negligible significance for water supply or river baseflow.

Superficial deposits overlay approximately 50% of the Borough, primarily the northern parts, with a stretch also running along the line of the River Ember and the River Mole. In addition to these, there are also smaller isolated areas of superficial deposits located around the Cobham and Weybridge settlement areas. The majority of these superficial deposits are composed of Quaternary age river terrace deposits, alluvium and head.

The superficial deposits present along the corridor of the River Wey and River Mole are classified as principal aquifer. The Environment Agency defines this as having intergranular permeability, which can provide a high level of water storage, and support water supply and/or river baseflow on a strategic scale.

#### 4.2.3.1 Groundwater Vulnerability

In a similar manner to the geological conditions and aquifer designations, the corridor adjacent to the River Thames, River Mole and River Wey has a Major Aquifer High and Intermediate designation on the Groundwater Vulnerability mapping.

The northern parts of Weybridge and Esher are defined as Minor Aquifer High and the southern parts of these areas are designated Minor Aquifer Intermediate.

The Environment Agency defines Source Protection Zones (SPZ) around all major public and private water supply abstractions in order to safeguard groundwater resources from potentially polluting activities. There is only one small area defined as a SPZ in the Borough which is Desborough Island adjacent to the River Thames to the north of Weybridge,

#### 4.2.3.2 Abstractions

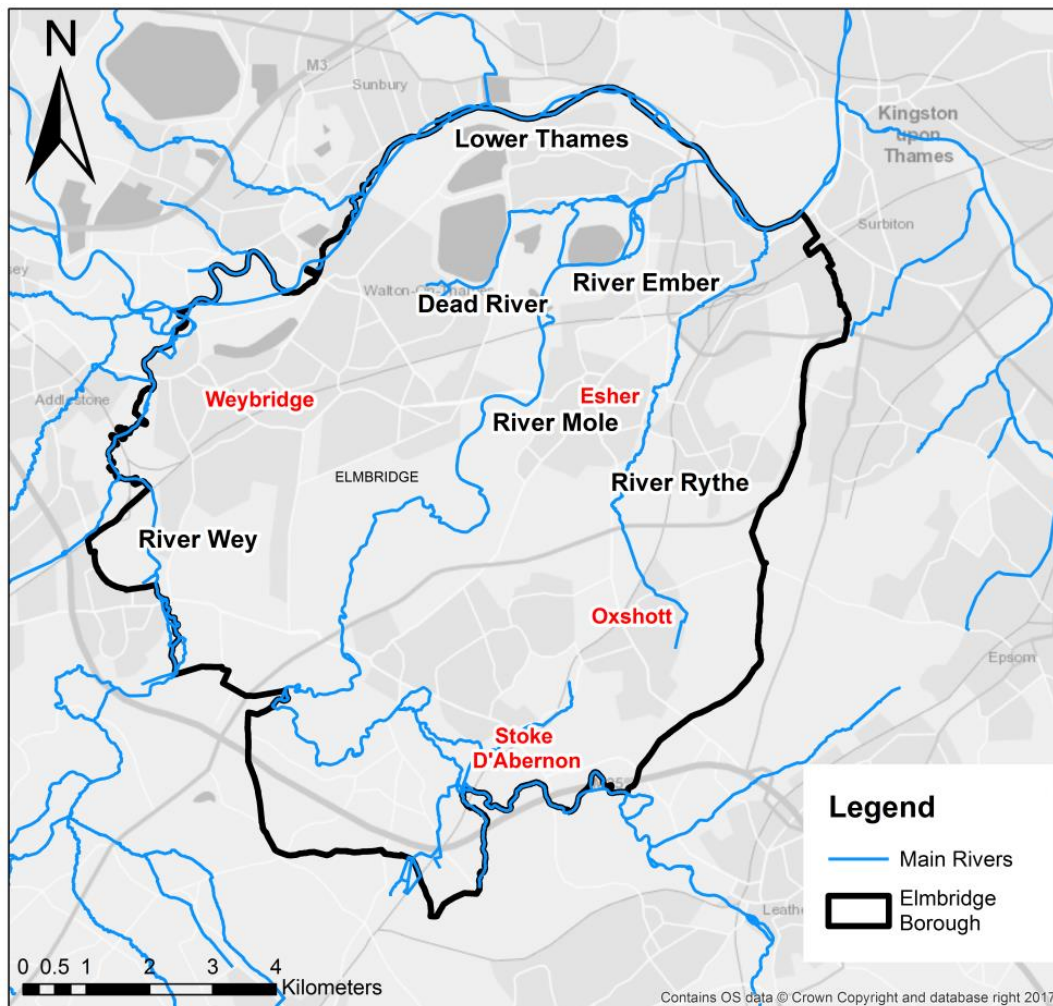
The dominant use of abstracted water in the study area is for public water supply and to a lesser extent industry and agriculture. These abstractions are from groundwater and surface water (rivers)<sup>15</sup>.

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<sup>15</sup> Environment Agency (2014) Thames Catchment Abstraction Licensing Strategy.

## 4.2.4 Rivers

There are six Main Rivers present within the Borough, as illustrated in Figure 4-4:



**Figure 4-3 Main watercourses of Elmbridge**

### 4.2.4.1 River Mole

The River Mole is a tributary of the River Thames which rises in West Sussex near Horsham. It forms the southern boundary of the Borough, entering the Borough slightly southwest of Stoke D'Abernon. From here, the river generally flows northwards, with the channel splitting in two before the Island Barn Reservoir. The southern pathway is defined as the River Ember, whereas the northern pathway is a continuation of the River Mole. These watercourses re-join approximately 50m west of the A309, entering the Thames downstream of Hampton Court Palace.

### 4.2.4.2 River Ember

The River Ember is the larger, southern branch of the River Mole which flows south of the Island Barn Reservoir. Downstream of the reservoir the Ember flows parallel to the Mole until the two watercourses remerge. Approximately 400m downstream this watercourse meets its confluence with the Thames, slightly downstream of Hampton Court Palace.

### 4.2.4.3 River Wey

The River Wey flows along the western boundary of the Borough. The catchment of the Wey lies within Hampshire and Surrey and has a total area of approximately 904 km<sup>2</sup>. 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.

## DRAFT

### 4.2.4.4 Dead River

The Dead River flows in a north-easterly direction from Walton-on-Thames, round the Queen Elizabeth II Storage Reservoir and through West Molesey, where it joins the River Mole. The Dead River is the only significant tributary of the Lower Mole. The Dead River drains a catchment of approximately 5km<sup>2</sup>, 50% of which is urbanised. It has one small tributary in the upper reaches, which is approximately 0.25km long.

### 4.2.4.5 River Rythe

The River Rythe rises near Oxshott, in the Prince's Coverts woodland and flows northwards, through Claygate and along the edge of Hinchley Wood. The river then follows the Portsmouth Road towards Thames Ditton, and runs into the River Thames near Ferry Road, forming the boundary between Kingston and Thames Ditton.

### 4.2.4.6 Lower Thames

The River Thames (Lower) flows along the northern boundary of the Borough between Weybridge and Thames Ditton. The Lower Thames floodplain is relatively broad and flat and the river itself contains several islands. The normal tidal limit of the River Thames occurs at Teddington Weir, approximately 5km downstream from Thames Ditton (TQ 1675 7149), but on a high tide, the tidal influence can extend as far back upriver as Molesey Weir.

### 4.2.4.7 Ordinary Watercourses

As well as Main Rivers there are a number of smaller Ordinary Watercourses in the Borough, which form the tributaries of the Main Rivers. These are smaller streams, ditches and drainage channels, the majority of which are open channels. There are some small sections of culverted watercourses around Stoke D'Abemon in the south of the Borough.

## 4.2.5 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 Elmbridge, 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.

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**Table 4-1 WFD classifications of surface water bodies in Elmbridge**

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
Mole (Hersham to R. Thames conf at East Molesey) (GB 106039017622)	Moderate	Moderate by 2015	Moderate	Moderate	High	Poor	Water Industry Point Source (incidents) - Ammonia	Confirmed
							Water Industry Point Source (intermittent sewage discharge)	Probable
Mole (Horley to Hersham) (GB 106039017621)	Moderate	Moderate by 2015	Moderate	Good	High	Poor		
Rythe (GB 106039017650)	Poor	Good by 2027	Moderate	Good	Good	Poor		
Downside Ditches and Bookham Brook (GB 106039017600)	Moderate	Not Assessed	-	-	-	-		
Thames (Egham to Teddington) (GB 106039023232)	Poor	Poor by 2015	Moderate	High	High	Moderate	Urban Diffuse Source (transport drainage) - Phosphate	Probable
							Agriculture – Arable Diffuse Source (poor nutrient management) - Phosphate	Probable
							Water Industry Diffuse Source (continuous sewage discharge) - Phosphate	Probable
Wey (Shalford to River Thames confluence at Weybridge) (GB 106039017630)	Moderate	Moderate by 2015	Moderate	High	High	Moderate	Water Industry Point Source (continuous sewage discharge)	Suspected
Hogsmill (GB 106039017440)	Moderate	Moderate by 2015	Moderate	High	High	Poor		

## 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.

### 4.3.1 Impacts of increased wastewater discharge on designated sites

Two sewage treatment works have been identified as processing 99% of flows from Elmbridge Borough; Esher STW and Weybridge STW (wastewater management is discussed further in Section 4.6). A review has been carried out to identify any statutory designated sites which are hydrologically connected to either of the two main works. At scoping stage, no detailed analysis has yet been carried out regarding the impacts of proposed new development on the capacity and discharge at the works. Therefore this is a precautionary review of sites with potential to be impacted by an increase in discharge or change in water quality parameters.

The receiving watercourses for both STWs were traced downstream from each STW discharge location. Where a receiving watercourse enters, or passes adjacent to, a statutory designated wildlife site that has potential to be vulnerable to changes in hydrology (based on the available information such as citations), these are identified and discussed in the following section. The discussion relating to individual STWs includes, where required, recommendations to ensure that future development does not adversely affect statutory designated wildlife sites.

Where it was not possible to determine if a site was hydrologically linked to the watercourse (i.e. merely in close proximity), the site was included in the discussion of the assessment as a precaution. Following this process, one statutory designated wildlife site has been identified as being hydrologically connected to Weybridge STW and/or Esher STW;

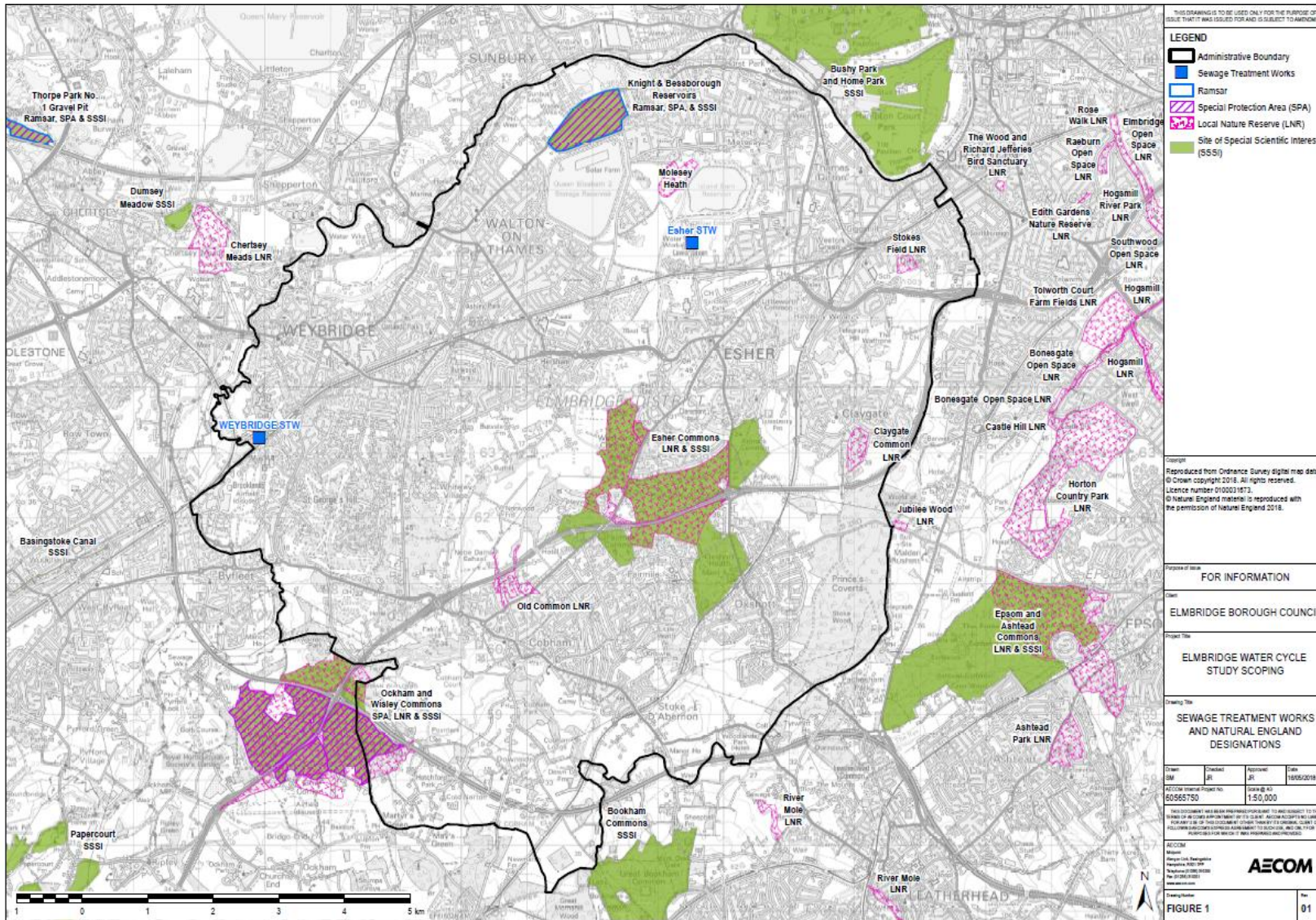
- Bushy Park and Home Park Site of Special Scientific Interest (SSSI).

The location of this site is illustrated in Figure 4-4. All other statutory designated sites identified within the borough are remote from watercourses into which the STWs discharge treated effluent. Table 4-2 indicates the linking pathways between the identified STWs and Bushy Park and Home Park SSSI.

**Table 4-2. Wildlife sites that contain linking pathways to each relevant STW**

SWT	Wildlife Site	Distance from the Discharge Point (km)
Weybridge (discharges to the River Wey)	Bushy Park and Home Park SSSI	9.9 km downstream of the discharge point on the River Wey.
Esher (discharges to the River Ember)	Bushy Park and Home Park SSSI	3.0 km downstream of the discharge point on the River Ember.

Figure 4-4 Statutory Designated sites in and around Elmbridge Borough



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### 4.3.2 Impacts on Ecology within Designated Sites

#### 4.3.2.1 Weybridge STW

This STW discharges into the River Wey. After 3.6 km the River Wey joins the River Thames at Hambaugh Island. From Hambaugh Island, Chertsey Meads Local Nature Reserve (LNR) is located approximately 0.9km upstream the River Thames. Chertsey Meads LNR (6.8 km downstream) is an open area of remnant floodplain meadow between the banks of the Chertsey Bourne and the River Thames. The grassland is unusual due to containing flowering plant species usually found in chalk grassland. This is due to calcium carbonate being deposited onto the site through flood events by the River Thames. The stretch of the River Thames within this region is above the tidal limit of the River Thames (at Teddington Lock). As Chertsey Meads LNR is located upstream from the confluence of the River Thames with the River Wey, it should not be affected by discharge from this STW.

After 9.4 km (5.6 km downstream after joining the River Thames) the River Thames flows past Knight and Bessborough Reservoirs. Knight and Bessborough Reservoirs encompass Knight and Bessborough Reservoirs SSSI, and part of the South West London SPA and Ramsar site. These sites are designated for supporting important populations of over-wintering waterfowl, such as gadwall (*Anas strepera*) and shoveler (*Anas clypeata*). These reservoirs are contained within raised artificial embankments and although outflow to the Thames from the Reservoirs occurs, inflow into the designated sites from the Thames does not. As such, these designations are unlikely to be affected by water discharge of this STW.

The River Thames flows past Bushy Park and Home Park SSSI 13.4 km downstream from the STW. Bushy Park and Home Park SSSI comprises a mosaic of habitats which includes acidic grasslands, neutral grasslands, woodland and wetlands. The site sits on the floodplain of the River Thames. Parts of the site act as riverine floodplain, particularly those with superficial deposits of alluvium. The site is therefore hydrologically connected to the River Thames.

The current Water Framework Directive (WFD) status of the Wey (Shalford to River Thames confluence at Weybridge) is Moderate, with the objective of achieving Moderate status by 2015, and more specifically Good status for fish by 2027. The reason for the status being limited to Moderate is currently unknown. However, the current status for invertebrates is High, Moderate for Macrophytes and Phytobenthos, and Moderate for fish.

#### 4.3.2.2 Esher STW

This STW discharges into the River Ember. After 2.7 km the River Ember joins the River Thames at Cigarette Island. From Cigarette Island, Bushy Park and Home Park SSSI is located 0.3km downstream. Information outlining how the site is hydrologically connected to the River Thames is stated above.

The current Water Framework Directive (WFD) status of the Rythe catchment is Poor, with the objective of achieving Good status by 2027. Status is currently limited to Poor due to the status being 'Bad' for fish and 'Poor' for Macrophytes and Phytobenthos.

### 4.3.3 Impacts on Ecology outside Designated Sites

Whilst the above assessment is primarily focused on the impact on ecologically designated sites, the following section discusses ecology outside of designated sites. The limitations of a Water Cycle Study mean it is not possible for such a discussion to be exhaustive or spatially very specific.

In addition to impacts on designated sites, a range of other UK or Surrey BAP species or otherwise protected/notable species that are found in the Borough of Elmbridge can be affected by wastewater discharge. These include:

- Water vole (protected through Wildlife & Countryside Act 1981 and a Surrey BAP species);
- Grass snake (partially protected through Wildlife & Countryside Act 1981 and Surrey BAP species);
- Common toad and natterjack toad (Surrey BAP species);
- Great crested newt (legally protected through Conservation of Habitats & Species Regulations 2010, Wildlife & Countryside Act 1981 and a Surrey BAP species);
- Birds such as bittern, kingfisher (protected through Wildlife & Countryside Act 1981 and a UK BAP species), lapwing, snipe and redshank (Surrey BAP species);

## DRAFT

- Fish (UK BAP );
- Invertebrates such as white clawed crayfish (protected through Wildlife & Countryside Act 1981 and a Surrey BAP species); and,
- Otter (legally protected through Conservation of Habitats & Species Regulations 2010, Wildlife & Countryside Act 1981 and a Surrey BAP species).

Similarly important habitats (all listed in the Surrey BAP) include:

- Wet woodlands
- Lowland meadows
- Lowland heathland
- Lowland dry acid grassland
- Eutrophic standing water
- Rivers
- Lowland fen
- Reedbeds
- Floodplain grazing marsh

All of these habitats and species are present (or possibly present) in the Borough of Elmbridge.

As part of any future work such as an Outline WCS, a more detailed assessment could be carried out to identify more specific impacts of proposed development. Reviewing proposed housing numbers and development locations in Part 2 of the Scoping study will provide more confidence in the likelihood of impacts.



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### 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 previous Elmbridge SFRA was produced in 2015.

The development of the SFRA will aid EBC 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.

#### 4.4.1 Flooding from Rivers

A large proportion of the Borough is located in areas that have a Medium and High probability of flooding from rivers (i.e. Flood Zones 2 and 3). The floodplain of the Lower Thames affects the northern and north east fringe of the Borough, including Walton, Molesey and Thames Ditton. Weybridge and the western edge of the Borough are within the floodplain of the River Wey. The River Mole and the River Rythe flow northwards through the Borough and the floodplains associated with these watercourses affect the settlements of Cobham, Stoke D'Abernon, Downside, Esher, Claygate, West End, Hersham, Walton and Molesey.

#### 4.4.2 Flooding from Land

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

Surface water flooding is believed to be widespread across the Borough, with notable areas at risk including:

- Thames Ditton where there are a large number of wetspots;
- Ponding of surface water along the low-lying floodplain of the Middle Mole, including areas such as Cobham Park;
- Recreation grounds and playing fields around Weybridge;
- Ponding of surface water along Brooklands Road and Locke King Road, south of Weybridge town centre; and,
- Surface water flooding in the residential area between Burwood Park and Hersham.

#### 4.4.3 Flooding from Groundwater

In broad terms there is limited potential for groundwater flooding to occur in the central part of the Borough, including the Weybridge urban area, Esher and Cobham. The potential for groundwater flooding is greater in Hersham, Walton-on-Thames and East and West Molesey, where the underlying geological conditions are more permeable.

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### 4.4.4 Flooding from Sewers

Within the Borough of Elmbridge there is the potential for flooding from sewers to occur. According to the DG5 Register, which was supplied by TWUL in 2015 to support the Level 1 SFRA<sup>16</sup>, 1-5 properties have been affected by internal flooding in the western regions of Esher, Claygate and Weybridge, and as many as 21-30 properties in East Moseley. External flooding has affected a broader area, with Esher being the most affected area (6-10 in the last 10 years). It should, however, be noted that these are all flooding events which have been reported to TWUL by home owners, those events which go unreported do not appear on the register.

#### **Position Statement May 2018**

Sewer flooding summary to be updated following review of revised DG5 information provided to support the updated SFRA.

### 4.4.5 Flooding from Reservoirs

There are four large (>25,000m<sup>3</sup>) water supply reservoirs located within the Borough, the Queen Elizabeth II Storage Reservoir, Bessborough Reservoir and Knight Reservoir all located within Walton-on-Thames and Island Barn Reservoir in East and West Molesey. In addition to these, the Queen Mary Reservoir is located in neighbouring Spelthorne Borough to the north. TWUL is responsible for the management of these reservoirs and ensuring all required safety standards are met.

Reservoirs in the UK have an extremely good safety record. The Environment Agency is the enforcement authority for the Reservoirs Act 1975 in England and Wales. All large reservoirs must be inspected and supervised by reservoir panel engineers. It is assumed that these reservoirs are regularly inspected and essential safety work is carried out. These reservoirs therefore present a minimal risk.

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<sup>16</sup> URS (2015), Elmbridge Borough Council Level 1 Strategic Flood Risk Assessment

## 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. ALSs 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. Elmbridge lies with the Thames CAMS area (see Figure 4-5) and is covered by the Thames ALS published in May 2014.

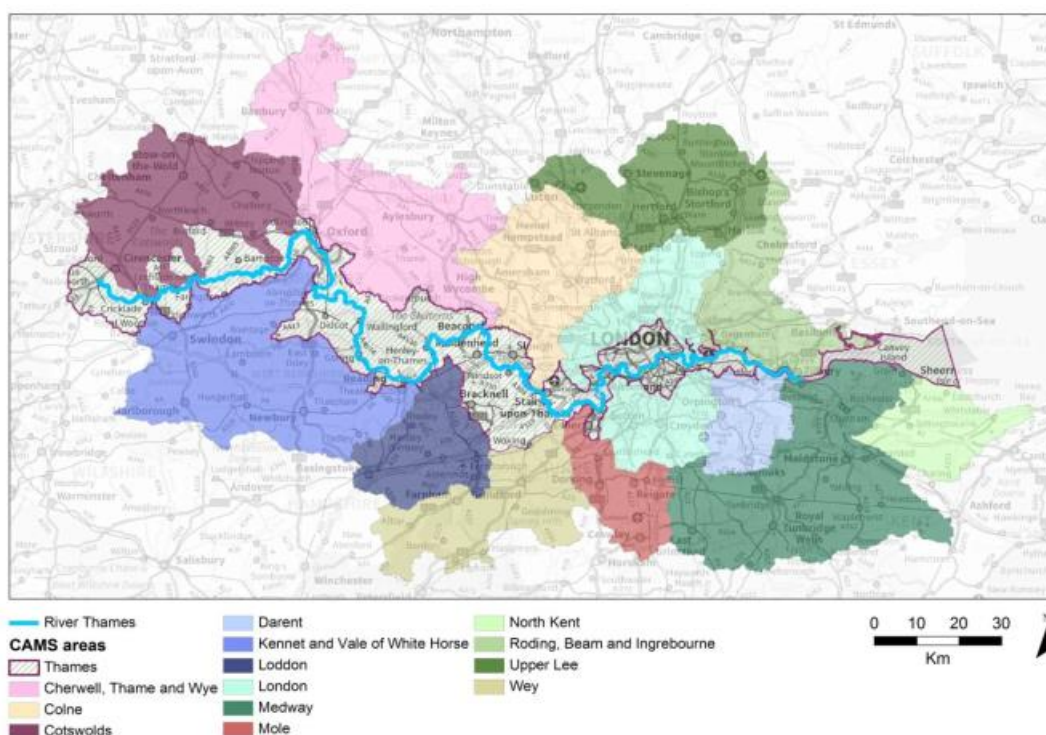


Figure 4-5: The CAMS area of the Thames and Thames Tributaries<sup>17</sup>

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, 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

AWS supplies water to the majority of the Borough, with TWUL supplying water to the north-eastern region, notably the populated areas of Esher, Claygate and Thames Ditton.

#### 4.5.2.1 Affinity Water Services

The area of the Borough which is supplied by AWS 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

<sup>17</sup> Affinity Water (2014) Final Water Resources Management Plan 2015 – 2040. Available at <https://stakeholder.affinitywater.co.uk/water-resources.aspx>. Accessed 09/04/18.

**DRAFT**

groundwater (60%), with the remainder (40%) from surface water sources and imports from neighbouring companies<sup>12</sup>. In the Wey WRZ water imports are provided by TWUL, with export available to South East Water.

A forecast water supply deficit was identified by AWS through the WRMP process and without implementation of new demand and supply measures the deficit is forecast to increase >10 MI/d by 2040. This deficit is driven largely by a combination of an 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.

Since local authority data was collected to prepare WRMP14, population and housing growth forecast by a number of authorities has been updated; in Elmbridge 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 4-6: Supply/demand balance with the AWS preferred plan implemented showing the water available or use (WAFU) and final demand plus target headroom (THR)<sup>18</sup>

**4.5.2.2 Thames Water**

The area of the Borough supplied by TWUL is covered by the London WRZ. The Thames basin is one of the most intensively used water resource systems in the world, with approximately 55% of effective rainfall being licensed for abstraction, 82% of which is being used for public water supply. Approximately 80% of the water supplied within this region is derived from surface water sources (largely from banded storage reservoirs) and 20% from groundwater<sup>19</sup>, with the potential to also abstract and treat brackish estuarine water at the desalination plant in Beckton.

TWUL’s Draft Water Resources Management Plan 2019<sup>20</sup> states that the baseline water supplies are forecast to reduce over the forthcoming planning period, with water available for use (WAFU) expected to decline under dry year conditions from 2184.7 MI/d in 2016/17 to 1955.5 MI/d by 2099/00. This expected decline has been attributed to climate change (approximately 125 MI/d by 2044/45), trading agreements (40 MI/d by 2099/00), sustainability reductions and projected population growth.

<sup>18</sup> Affinity Water (2014) Final Water Resources Management Plan 2015 – 2040.

<sup>19</sup> Thames Water (2014) Final Water Resources Management Plan 2015 - 2040

<sup>20</sup> Thames Water (2017) Draft Water Resources Management Plan 2019: Section 4: Current and future water supply

## DRAFT

The TWUL WRMP19 Resource Options report<sup>21</sup> has scoped in several potentially feasible solutions to resolve the expected supply-demand deficit. Some of the selected options include:

- Teddington Direct River Abstraction (DRA) – the transfer of up to 268 MI/d of tertiary treated effluent from Mogden WWTW to above Teddington Weir to allow further upstream abstraction of freshwater from the River Thames;
- Non-Potable Water Reuse – A feasible technological approach for addressing urban water management challenges. A study found that up to 33 MI/d of water could be saved through the implementation of non – potable water, by harvesting rainwater and stormwater, and/or recycling greywater<sup>22</sup>. Stakeholder acceptance is, however, an important ingredient for a water reuse schemes success; and,
- Planned Indirect Potable Reuse (IPR) – This is the reclamation of wastewater effluent that would otherwise be potentially lost to the sea as a water resource. TWUL has identified five IPR sub-options which, in total, have a combined deployable output of 816.5 MI/d.

Within Appendix BB (Water Framework Directive Compliance Assessment) of the TWUL Draft WRMP<sup>23</sup> it is indicated that the Teddington DRA and Beckton Water Reuse schemes do not currently comply with the objectives of the WFD, based on either a lack of certainty of impact (Beckton – regarding the impacts on the middle Tideway water body), or the precise extent of mitigation required (Teddington). It is suggested that physical mitigation and/or the development of suitable operating conventions are needed to ensure WFD compliance.

## 4.6 Wastewater Treatment and Collection

Wastewater treatment and collection within Elmbridge is owned and operated by 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 sewage treatment works (STW).

The Borough of Elmbridge is served by Esher, Hogsmill, Leatherhead, Mogden, Weybridge and Wisley Sewage treatment works, with the majority of Elmbridge draining to Esher (83%) and Weybridge (16%).

The consented dry weather flow (DWF) limits are shown in Table 4-3 for both Esher and Weybridge STWs. DWF is a unit of measure used by the Environment Agency in a discharge permit to describe the volume that can be discharged from STWs under normal operating conditions. Essentially it is supposed to represent the proportion of flow treated by a STW that is made up of foul (or waste) water, not surface water which is generated from rainfall events, and is derived from measured flow statistics for each STW. The UKWIR project WW21/D developed a measure of DWF which concluded that the measure of DWF that would be most appropriate was the 20<sup>th</sup> percentile (Q80)<sup>24</sup>.

**Table 4-3: WwTW Consented DWF limits**

STW	Consented DWF (m <sup>3</sup> /day)	Measured flow Q80 (m <sup>3</sup> /day)
Esher	35,200	26,042
Weybridge	10,303	6,655

The purpose of this Scoping WCS is to establish the baseline capacity at the major STWs serving the Borough to treat wastewater flows from proposed growth within the conditions of the current permit. The assumption that the Esher and Weybridge STWs are likely to serve future development sites has been made; therefore the remainder of this section focusses on these STWs only.

The volume element of the discharge permit determines the maximum number of properties that can be connected to a STW 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 STW before a new

<sup>21</sup> Thames Water (2017) WRMP19 Resource Options: Fine Screening Report Update

<sup>22</sup> Ove Arup & Partner Ltd (2017), Non-potable water reuse as a demand management option for WRMP19 – Options appraisal report, June 2016 (<https://www.thameswater.co.uk/wrmp>)

<sup>23</sup> Thames Water (2017) Draft Water Resources Management Plan 2019: Water Framework Directive Assessment

<sup>24</sup> An Improved Definition of Sewage Treatment Works Dry Weather Flow, Manuel Starr, 2006

## DRAFT

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 a STW. 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 Esher and Weybridge's STW discharge permits, the current consented DWF and the measured flows 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 the Esher and Weybridge STWs.

**Table 4-4: DWF consent capacity at Esher and Weybridge STWs in Elmbridge**

STW	Percentage of Elmbridge served (%)	Measured flow Q80 (m <sup>3</sup> /day)	Current DWF capacity (m <sup>3</sup> /day)	Dwelling capacity (dwellings)	STW capacity before development (%)
Esher	83	26,042	9,158	31,186	26
Weybridge	16	6,655	3,648	12,422	35

The initial analysis of current headroom at both Esher and Weybridge WwTWs indicates that each WwTWs has the capacity to allow for potential growth within the Borough.

### 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 the WFD standards of 45% of waterbodies within this river basin district, including the Wey, the Lower Thames and the Mole catchments, particularly in terms of phosphate concentrations. As illustrated in Table 4-1, 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, with intermittent point source wastewater discharge being the contributing factor for the Mole catchment. Between 2009 and 2015 there were over 300 improvement schemes implemented at sewage treatment works which have been effective at helping to achieve compliance with environmental objectives. The following waterbodies are suggested to be detrimentally impacted by the release of wastewater into their associated aquatic system, according to the Environment Agency's Catchment Data Explorer<sup>26</sup> and the Thames RBMP<sup>25</sup>.

- The Mole (Hersham to R. Thames conf at East Molesey) (GB 106039017622)** is identified as being at 'Moderate' overall status, with phosphate classified as 'Poor' and ammonia as 'Moderate'. The reason as to why the overall status is 'Moderate', rather than 'Poor', is due to the fact that all the biological quality elements are classed as 'Good'. Physio-chemical elements cannot lower the ecological status/potential of a water body below 'Moderate'. The current status has been attributed to water industry activity which included 'confirmed' point source pollution incidents and 'probable' point source intermittent sewage discharge incidents. In addition to this, the Thames RBMP notes that the priority issues in the catchment are man-made modifications to the river, diffuse pollution from agriculture and, as previously mentioned, pollution from wastewater.
- The Thames (Egham to Teddington) (GB 106039023232)** is identified within the Environment Agency's Catchment Data Explorer<sup>26</sup> as being a watercourse whose WFD status is detrimentally impacted by the release of wastewater into the system. In 2015 the river was identified as being at 'Poor' overall status with phosphate classified as 'Moderate'. The 'Poor' overall status can be attributed to the fact that the

<sup>25</sup> Environment Agency (2015) Thame river basin district: River basin management plan. Available from: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/500548/Thames\\_RBD\\_Part\\_1\\_river\\_basin\\_management\\_plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/500548/Thames_RBD_Part_1_river_basin_management_plan.pdf)

<sup>26</sup> Environment Agency (2018) Catchment Data Explorer (<http://environment.data.gov.uk/catchment-planning/WaterBody/GB106039023232>) Accessed 12/04/18

## DRAFT

'macrophytes and phytobenthos combined' biological quality element is classed as 'Poor'. It is 'probable' that diffuse transport drainage, diffuse agricultural (phosphate) pollution and continuous diffuse sewage drainage are responsible for this status.

- **The Wey (Shalford to River Thames confluence at Weybridge) (GB 106039017630)** is identified as being 'Moderate' overall status, with phosphate classified as 'Moderate'. It is 'suspected' that this current status is a result of the continuous sewage discharge from a point source.
- **The Hogsmill (GB 106039017440)** is identified as being at 'Moderate' overall status, with phosphate being classed as 'Poor'. The Thames RBMP suggests that the relatively high concentration of phosphates within this waterbody arise from the discharge of wastewater from the Hogsmill sewage treatment works, having identified this potential source as an area which needs improving.

### 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 STWs, predominantly Esher and Weybridge, 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; therefore sewer surcharging and flooding can occur when their capacity is exceeded.

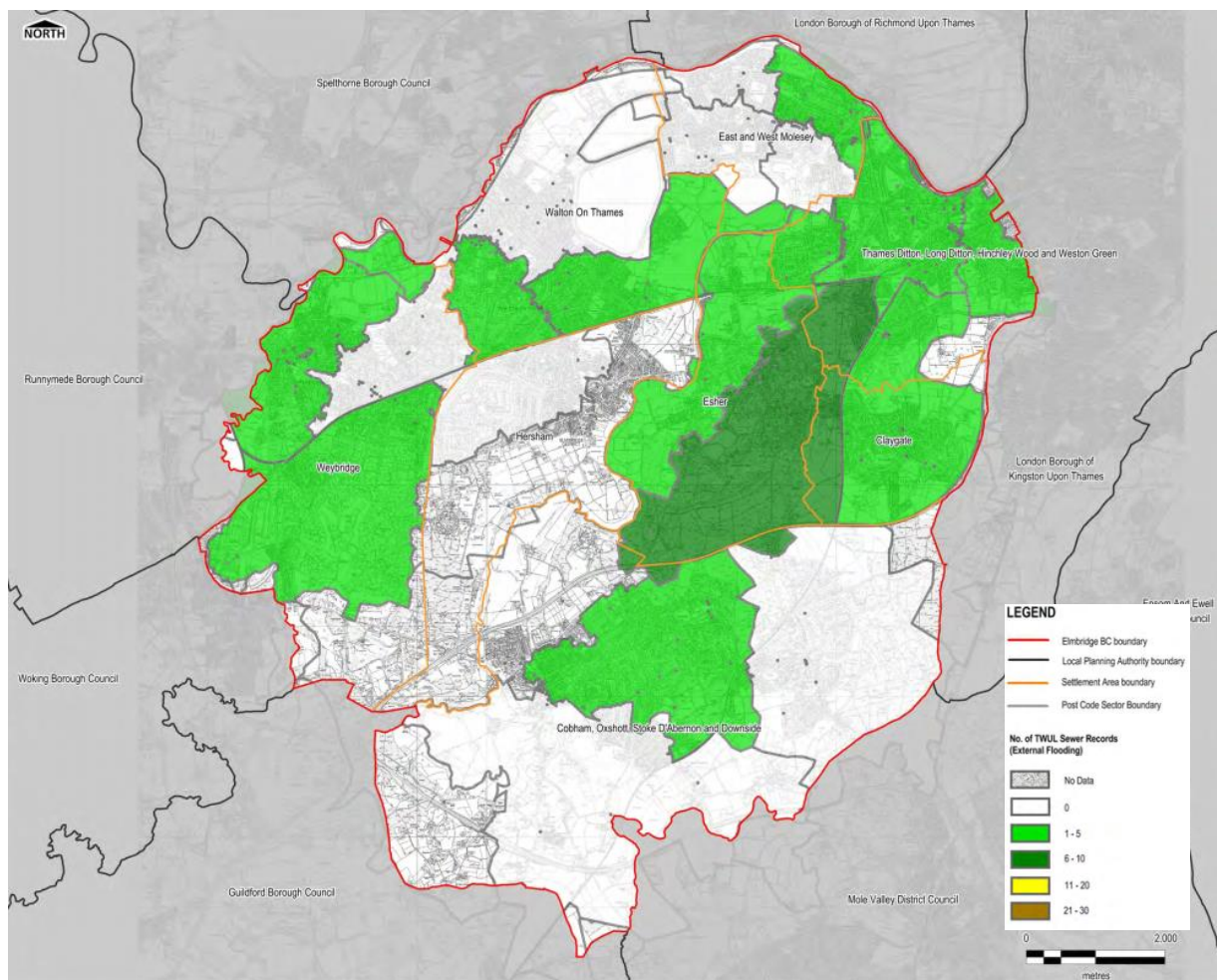
Causes of sewer flooding are complex and can be related to a combination of groundwater or other flood water incursion, and surface water connections rather than solely a foul capacity issue. However it is important that where constraints on capacity are known, future development does not exacerbate 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<sup>27</sup> highlight the areas most affected (Figure 4-7).

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 Elmbridge. TWUL have not advised of any known sewer flood hotspots over and above the DG5 records in the production of this report.

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<sup>27</sup> URS (2015) Elmbridge Strategic Flood Risk Assessment Level 1

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**Figure 4-7: Recorded incidents of external sewer flooding in Elmbridge (Extract from 2015 SFRA)**



## 5. Summary

### 5.1 Water Environment

#### 5.1.1 Water Quality

Of the seven WFD surface waterbodies located within Elmbridge, five are classified as Moderate status, whilst two, the Rythe and Thames (Egham to Teddington) are classified as Poor. The Environment Agency's Catchment Data Explorer<sup>26</sup> identifies that Water Industry activities are one of the primary reasons as to why the Mole (Hersham to R. Thames cof at East Molesey), Thames (Egham to Teddington) and Wey (Shalford to River Thames confluence at Weybridge) waterbodies are failing to achieve Good status. The Weybridge and Esher STWs discharge to the Wey and Mole respectively. Increased flow, as a result of future development, may further prevent these surface waterbodies from reaching Good status. This will be explored further in part 2 of the scoping WCS.

#### 5.1.2 Ecology

An increase in discharge from the Esher and Weybridge STW has the potential to have a detrimental impact on the Bushy Park and Home Park SSI, due to this site being hydrologically connected to both STWs. Outside of the Designated Sites, a range of other UK or Surrey BAP species have the potential to be affected by an increase in wastewater discharge through change in water quality or flow. These include, but are not limited to, water voles, great crested newts and natterjack toads. A more detailed review of ecological impacts should be carried out if the WCS is taken to Outline stage.

#### 5.1.3 Flood Risk

A large proportion of the Borough is located in areas which have a medium to high probability of fluvial flooding (Flood Zones 2 and 3) due to the presence of several main rivers, and their associated floodplains, within, and surrounding, the Borough.

The risk of surface water flooding is widespread throughout the Borough, most notably around Thames Ditton where a large number of wetspots have been identified.

It has been suggested that there is limited potential for groundwater flooding to occur within Elmbridge, whilst there is the potential for sewer flooding to occur.

### 5.2 Water resources and supply

Elmbridge lies with the Thames CAMS area (see Figure 4-6) and is covered by the Thames ALS published in May 2014. The Thames ALS states that there is currently no water available for abstraction at low flows throughout the Thames CAMS area. 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.

Affinity Water Services (AWS) supplies water to the majority of the Borough, with Thames Water (TWUL) supplying water to the north-eastern region, notably the populated areas of Esher, Claygate and Thames Ditton. Both suppliers predict a supply/demand deficit within the plan period without intervention measures.

Both AWS and TWUL have highlighted several potential solutions ensure sufficient water supply for the plan period, These include leakage reduction, enhanced water efficiency measures for households, the rollout of metering, direct river abstractions and an increase in the reuse of non-potable water. It should be noted that some proposed Thames water schemes may not comply with WFD objectives, which requires further development. Furthermore it is understood that current forecast demand within the WRMPs is lower than the most recent housing demand forecasts for Elmbridge. Ongoing engagement with water suppliers through the planning process and potential development of Outline WCS will be essential to ensure adequate water supply is planned for.

## DRAFT

### 5.3 Wastewater treatment and collection

A high level review of measured and permitted flow at Esher and Weybridge STWs indicates that, before development, both STWs (which together receive approximately 99% of the Borough's flow) have the volumetric capacity to receive further flow. The STW Capacity Assessment suggests that, before development the Esher STW has 26% capacity, whilst Weybridge has 35% capacity. However, it is presently unknown whether increasing flow resulting from new development will impact on the ability of receiving watercourses to achieve Good status under WFD or lead to the deterioration of its current status. Further recommendations on this will be included in Part 2 of the Scoping WCS following review of the proposed development sites.

### 5.4 Next steps

The next stage will be to complete Part 2 of the Scoping WCS which will investigate how proposed development locations may impact on the baseline conditions identified in this Part 1 report. A complete review of proposed development will allow the questions from the Thames Area WCS guidance (as included in Section 2.4) to be fully addressed and inform the requirement and scope for an Outline WCS.

