

# THE GOODSYARD

Environmental Statement Addendum Volume 2

September 2019 – Chapter 14 of 21

ballymore.



Hammerson

# **CHAPTER 14: WATER RESOURCES AND FLOOD RISK**

## 14.1 INTRODUCTION

- 14.1.1

This ES Addendum chapter reports the findings of an assessment of the likely significant effects on water resources, flood risk and drainage as a result of the Revised Scheme in the London Borough of Tower Hamlets (LBTH) and the London Borough of Hackney (LBH). The assessment is an amendment of the Water Resources, Flood Risk and Drainage chapter of the ES completed by Aecom in 2015.
- 14.1.2

Since that time, the Applicant has been working with the officers at the GLA, LBTH and LBH with regard to the submission of amendments to the current planning applications for determination by the current Mayor. The most significant of these amendments in terms of Water Resources, Flood Risk and Drainage is the reduction in residential accommodation, which is likely to reduce water consumption and effluent generation, and the reduced scale of the tower blocks which will require less intrusive foundations. Other amendments to the scheme have little impact on Water Resources, Flood Risk and Drainage.
- 14.1.3

This amended assessment also takes into account changes in legislation, regulations and technical guidance made since the earlier assessment and assesses the impact of the Proposed Amendments to the Revised Scheme.
- 14.1.4

The changes made in this amended assessment are summarised below. Where relevant, reference has been made to the 2015 assessment but parts of the 2015 assessment have also been reproduced to aid comprehension and reduce the need to cross-reference the earlier assessment.
- 14.1.5

The legislation, regulations and guidance have been updated where required.
- 14.1.6

The baseline for the River Thames has been updated to reflect the latest (2016) assessments of water and ecological quality of the watercourse made by the Environment Agency (EA), and the objectives within the updated River Basin Management Plan have been used. Other baseline assessments remain unchanged.
- 14.1.7

The assessment methodology and the importance assigned to identified receptors and the assessment methodology remains unchanged throughout this amendment.
- 14.1.8

The Flood Risk Assessment (**ES Addendum Volume 4, Appendix J: Water Resources and Flood Risk**) has been updated to reflect changes in guidance since the earlier assessment. Overall the anticipated flood risk to the development remains unchanged. Climate change allowances have been updated to reflect current guidance (issued 2016 with online updates).

## 14.2 SCOPE OF ASSESSMENT

- 14.2.1

This chapter of the ES Addendum assesses the likely significant effects of the Revised Scheme in terms of (topic) and is supported by the Drainage Strategy and Flood Risk Assessment (**ES Addendum Volume 4, Appendix J: Water Resources and Flood Risk**).
- 14.2.2

The chapter describes: the assessment methodology; the baseline conditions currently existing at the site and in the surrounding area; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; the likely residual effects after these measures have been employed; and the cumulative effects associated with the Revised Scheme in combination with other nearby developments.

## 14.3 KEY LEGISLATION, POLICY AND GUIDANCE CONSIDERATIONS

- 14.3.1

The Water Resources, Flood Risk and Drainage assessment has been undertaken within the context of relevant planning policies, guidance documents and legislative instruments. These are summarised below.

### Legislation and Regulation

- 14.3.2

The Water Framework Directive<sup>1</sup> (WFD) provides a framework for a European wide approach to water policy with the aim of ensuring no deterioration from their current status for all inland and near shore watercourses and water bodies, (including groundwater), and to ensure attainment of 'Good' status or better, in terms of ecological, chemical, biological and physical parameters. Therefore, any activities or developments that could cause detriment to a nearby water resource or prevent the future ability of a water resource to reach its target status, must be mitigated so as to reduce the potential for harm and allow the aims of the WFD to be realised.
- 14.3.3

The Environmental Permitting Guidance Groundwater Activities for the Environmental permitting (England and Wales) Regulations 2010 aim to prevent the input of hazardous substances and limit the input of non-hazardous pollutants to groundwater. A hazardous substance is defined as any substance or group of substances that are toxic, persistent and liable to bio-accumulate.
- 14.3.4

The Flood and Water Management Act (2010) provides for better, more comprehensive management of flood risk for people, homes and businesses, and gives guidance on sustainable drainage and flood resistance construction. This Act identifies upper tier Local Authorities (LA) to have responsibility in the management and leadership of local flooding issues as the Lead Local Flood Authority (LLFA).
- 14.3.5

The Building Regulations (2015) Drainage and Waste Disposal provide an order of priority for measures for the disposal of rainwater from roofs and paved areas. First order of priority is a soakaway or infiltration system, followed by discharge into a nearby watercourse and finally, discharge to a public sewer. Regulation of drainage from buildings is provided by Part H of the Building Regulations, Drainage and Waste Disposal.

### Planning Policy

#### National Planning Policy Framework

- 14.3.6

National planning policy is governed by the National Planning Policy Framework<sup>2</sup> (2019) (NPPF) which requires that new development should be sustainable and meet the challenges posed by climate change, flooding and coastal change. The NPPF requires that flood risk assessments for new development review flooding from all potential sources. Implementation of this requirement is met by the associated Planning Practice Guidance for Flood Risk and Coastal Change (updated 22<sup>nd</sup> October 2018).

#### London Plan

- 14.3.7

The London Plan<sup>3</sup> (2016) provides policies on new development including sustainable construction, reduction of runoff and managing flood risk. The Plan is supported by Supplementary Planning Guidance including Sustainable Design and Construction.
- 14.3.8

The draft New London Plan<sup>4</sup> (2018) would expect greenfield attenuation rates on new developments and presents a hierarchy of approaches.

#### Bishopsgate Goods Yard Interim Planning Guidance

- 14.3.9

This interim planning guidance<sup>5</sup> has been prepared jointly by the LBH, the LBTH and the Greater London Authority (GLA) in conjunction with Terry Farrell and Partners.
- 14.3.10

The interim planning guidance brings together existing planning policies, urban design guidance and place making principles to provide a framework for the future comprehensive development of the site. Key design principles include new links through the site, new public open spaces, guidance on building heights and sustainable development.
- 14.3.11

Relevant key principles include:
  - BG 17 - BG 17 – Sustainable Development - to ensure best practice in sustainable design is embedded, the future redevelopment of Bishopsgate Goods Yard should include sustainable water cycle management, including the incorporation of SuDS, water conservation measures and rainwater harvesting, where feasible.

<sup>1</sup> The European Parliament and the Council of the European Union (2000) Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy OJ L 327, 22.12.2000, p. 1–73

<sup>2</sup>MHCLG (2019) National Planning Policy Framework. Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

<sup>3</sup> GLA (2016) The London Plan. Available at: <https://www.london.gov.uk/what-we-do/planning/london-plan/current-london-plan/london-plan-2016-pdf>

<sup>4</sup> GLA (2018) The Draft New London Plan. Available at: <https://www.london.gov.uk/what-we-do/planning/london-plan/new-london-plan/download-draft-london-plan-0>

<sup>5</sup> Bishopsgate Interim Planning Guidance 2009.

**London Borough of Tower Hamlets (LBTH)**

*The LBTH Core Strategy<sup>6</sup> (2010)*

- 14.3.12 The LBTH Core Strategy was adopted by LBTH in September 2010 and forms part of the Local Development Plan (LDP). This document sets out the strategic planning policy for a 15 year period.
- 14.3.13 The following Borough-wide policies are relevant.
- 14.3.14 SP04 – Creating a Green and Blue Grid – the Council will expect all development to minimise current and future flood risk and the adverse effects on people. In particular:
- use the Sequential Test to assess and determine the suitability of land for development based on flood risk;
  - all new development that has to be located in a high risk flood zone must demonstrate that it is safe and passes the Exceptions Test (in accordance with NPPF);
  - Development across the borough should not increase the risk and effect of flooding;
  - Developments in areas of Flood Risk 2 and 3a should ensure the application of flood-resilient Design;
  - Development across the borough should not increase the risk and effect of flooding;
  - demonstrate that any Revised Scheme in a high flood risk zone is safe, passes the Exceptions Test, and applies flood-resilient design; and
  - increase the amount of permeable surfaces.
- 14.3.15 SP11 - Working Towards a Zero-Carbon Borough – requires developments to make the fullest possible contribution to the mitigation of and adaptation to climate change. The Council will tackle climate change by requiring developments to be designed and constructed to take account of the increasing risks of flooding and minimise their vulnerability to a changeable climate.
- 14.3.16 SO3 - Achieving Wider Sustainability – The Council will support measures to protect and proactively enhance the environmental quality of the borough, including harmful emissions to water.

*LBTH Managing Development Document (MDD) (April 2013)*

- 14.3.17 The Managing Development DPD forms part of the LBTH's LDP. The document sets out the proposed development management policies to be used by the LBTH in helping to determine individual planning applications and must be read alongside the Core Strategy.
- 14.3.18 Policy DM13 Sustainable Drainage requires developments to reduce water consumption and minimise current and future flood risk and the adverse effects of flooding on people by implementing the following measures:
- Development will be required to show how it reduces the amount of water usage, runoff and discharge from the site, through the use of appropriate water reuse and SuDS techniques.
  - In order to reduce the amount of water being discharged from sites, this policy requires development to both reduce the amount of water being used and reduce the run-off from hard surfacing.
  - Development should in the first instance seek to maximise the reuse of water through onsite grey water recycling and reduce the amount of water use through low flow water technologies.
  - Development should demonstrate that surface water will be controlled as near to its source as possible.
  - All development should provide details of these provisions and how they will be incorporated. Specifically a Water and Drainage Strategy should be provided for major development.
- 14.3.19 Policy DM29 Achieving a Zero-carbon Borough and Addressing Climate Change states that the Council will require the implementation of sustainable design and construction measures by:
- Implementing the London Plan sustainable design and construction policies to ensure developments incorporate sustainable measures, including, but not limited to, making the most effective use of resources such as water and aggregates, sourcing building materials sustainably, reducing pollution and waste, promoting recycling and conserving the natural environment;
  - That sustainable design assessment tools, such as the Code for Sustainable Homes and BREEAM, are used to ensure the development achieves the highest levels of sustainable design and construction.

<sup>6</sup>LBTH (2010) Core Strategy. Available at: <https://www.towerhamlets.gov.uk/Documents/Planning-and-building-control/Strategic-Planning/Local-Plan/Core-Strategy-and-MDD/Core-Strategy-low-resolution.pdf>

<sup>7</sup> London Borough of Tower Hamlets (2012). Level 2 SFRA.

<sup>8</sup> London Borough of Hackney (2010) Core Strategy. Available at: <https://www.hackney.gov.uk/core-strategy>

*LBTH Local Plan (Advanced Draft Stage)*

- 14.3.20 The LBTH Draft Local Plan states that all major development should:
- during construction, consider the impact of construction on the water supply, flood risk and drainage and implement suitable mitigation measures where required;
  - use the sequential and exceptions tests to direct development away from high flood risk areas and reduce flood risk in the borough;
  - provide a flood risk assessment if it is over 1 ha in size, with the contents specified in the Local Plan; and
  - use site design to direct the highest vulnerability uses to areas of the site with lowest flood risk and incorporate flood resilience and/or resistance measures, if over 1 ha in size.

*LBTH Level 1 Strategic Flood Risk Assessment (SFRA)*

- 14.3.21 The LBTH Level 1 (SFRA) brings together recommendations for drainage, emergency planning and development control and sets out recommendations for the development of policy within the LBTH Local Plan. The Level 2 SFRA<sup>7</sup> provides guidance on application of the sequential and exception tests to Revised Scheme is as with LBTH.

**London Borough of Hackney**

*The LBH Core Strategy (September 2010)*

- 14.3.22 The LBH Core Strategy (September 2010) Policy 31<sup>8</sup> – Flood Risk states:
- all development must contribute to the long-term flood management targets of the Thames Catchment Flood Management Plan;
  - Flood Risk must be fully assessed and Flood Risk Assessments are necessary for sites greater than 1 ha; and
  - new development should include flood resilience and resistances measures where appropriate.
- 14.3.23 The LBH Draft Local Plan 2033<sup>9</sup> Policy LP53 – Water and Flooding states that all development should:
- reduce flood risk and vulnerability; that developments over 0.5 ha must
  - submit a flood risk assessment if over 0.5 ha;
  - submit a Sustainable Drainage Strategy if they classify as a major development;
  - not increase the potential for groundwater flooding if creating basements;
  - achieve greenfield attenuation rates or demonstrate why this would be unfeasible;
  - consider the impacts of the development on sewerage infrastructure;
  - complete any water infrastructure improvements prior to occupation;
  - consider and where necessary improve existing flood defences; and
  - be water efficient and reduce water consumption.

**Technical Standards and Guidance**

- 14.3.24 Technical Standards and guidance are provided by the NPPF Planning Practice Guidance for Flood Risk and Coastal Change and Part H of the Building Regulations referred to above. In addition, guidance on the design of Sustainable Drainage Systems (SUDS) is provided by DEFRA non-statutory technical standards<sup>10</sup> and by “The SUDS Manual” published by CIRIA<sup>11</sup>.

## 14.4 CONSULTATION

- 1.2.2 In January 2014 a Scoping Opinion was issued jointly by the LBTH (Ref: PA/14/107) and LBH (Ref: 2014/0249) on the Proposed Development (see **ES Addendum Volume 4 - Appendix A Scoping**). A review of the Scoping Opinion was requested by the Applicant in March 2019 subject to the Revised Scheme. **Table 14.1** outlines the comments received in the 2014 Scoping Opinion and the 2019 Scoping Opinion Review and where they have been addressed within the documentation.

<sup>9</sup> LBH (2019) Draft Local Plan 2033. Available at: <https://hackney.gov.uk/article/4275/Local-plan-2033-LP33->

<sup>10</sup> Sustainable Drainage Systems Non-statutory technical standards for sustainable drainage systems. DEFRA March 2015

<sup>11</sup> The Suds Manual Version 2. CIRIA Report C753, 2015

Table 14.1 Scoping Opinion Comments and Response

Topic / Section	Summary of Comment	Location within the ES Addendum where comments are addressed
Water Resources and Flood Risk Assessment	Paragraph 4.121: <i>“The FRA and Water resources Chapter will need to take into account potential impacts of climate change in the assessment.”</i>	Water Resources and Flood Risk
Water Resources and Flood Risk	Paragraph 4.134: <i>“The developer needs to consider the net increase in water and waste water demand to serve the development and also any impact the development may have off site further down the network. “</i>	Water Resources and Flood Risk
2019 Scoping Opinion Review	<i>“the Applicant should undertake a thorough SuDS appraisal and specifically reference SuDS as part of the drainage solution/surface water flooding mitigation for the Proposed Development. If found to be ‘not feasible/viable’, only then can alternatives be considered.</i>  <i>...ensure that Thames Water Utilities can accommodate the increased demand in potable water and wastewater via consultation and assessment of the Proposed Developments usage.</i>	Drainage Strategy in <b>ES Addendum, Volume 4, Appendix J: Water Resources</b>  Paragraph 14.8.13

14.5 ASSESSMENT METHODOLOGY

Determination of Baseline

- 14.5.1This amendment has built upon the 2015 assessment which was based on a 1 kilometre (km) study area radius from the site for identification of sites that are hydrologically connected.
- 14.5.2Baseline conditions were established through a desk study and via consultation with the following bodies:
  - EA;
  - LBTH;
  - LBH; and
  - TWUL.
- 14.5.3Additional data were collected from the following sources:
  - Ordnance Survey (OS) Explorer 173 London North, 1:25,000 (2012);
  - British Geological Survey (BGS) Map, Sheet 270 – South London; Solid and Drift Edition (1981);
  - Landmark Envirocheck Report 49413378\_1\_1 (2013);
  - Arup Ground Contamination Risk Assessment and Outline Remediation Strategy;
  - Envirocheck Report;
  - EA website;
  - TWUL Asset Location Search;
  - LBTH Surface Water Management Plan;
  - LBTH Strategic Flood Risk Assessment (2010); and;
  - LBH Strategic Flood Risk Assessment.

- 14.5.4In addition, a Flood Risk Assessment (presented in **ES Addendum, Volume 4, Appendix J: Water Resources and Flood Risk Assessment**) assesses sources of flood risk using available data on Environment Agency flood zone extents. Other potential sources of flood risk such as surface water runoff, overland flow and groundwater have also been assessed. The FRA is supported by an Outline Drainage Strategy undertaken by WSP which details the proposed surface water management strategy for the site.
- 14.5.5The methodology used to identify the baseline conditions at the site and to assess the potential impacts to water resources and flood risk as a result of the Revised Scheme, has involved the following stages:
  - Identification of potential surface water and groundwater resources that may be potential receptors and determination of their importance;
  - Preparation of a conceptual site model, identifying feasible pollution sources and pathways during the demolition and construction works and once the Revised Scheme is completed and operational;
  - Determination of the magnitude of change of the potential impacts of the Revised Scheme on these receptors;
  - Evaluation of the likely significance of the impacts relative to the quality and quantity of the receptors (importance); and
  - Identification of suitable and appropriate mitigation measures, for all key stages of the Revised Scheme (i.e. demolition/construction and operation). An assessment is made of the significance of any residual impacts.
- 14.5.6This amendment has reviewed the 2015 baseline and provided an update for 2018 where required. In particular more recent data and objectives within the updated River Basin Management Plan have been used for the River Thames. The new Flood Risk Assessment also updates the baseline to 2018.

Prediction Methodology

- 14.5.7The prediction methodology has followed the generic approach as set-out in **Volume 2 Chapter 3, EIA Methodology** of this ES Addendum.
- 14.5.8The significance of an effect has been determined by assessing the value/sensitivity of the resource and the magnitude of an impact shown in **Table 14.52, Table 14.3** and **Table 14.5**

Table 14.52 Determining Value/Sensitivity of Resource

Value/ Sensitivity	Typical Descriptors	Typical Example	
Very High	Attribute has a high quality and rarity on a regional or national scale.	Surface Waters:	EC Designated Salmonid / Cyprinid fishery High Ecological Quality. Site protected under EU or UK wildlife legislation (SAC, SPA, SSSI, Ramsar site)
		Groundwater:	Major aquifer providing a regionally important resource or supporting site protected under wildlife legislation Source Protection Zone (SPZ) I
		Flood Risk:	Flood plain or defence protecting more than 100 residential properties from flooding
High	Attribute has a high quality and rarity on a local scale.	Surface Waters:	Good Ecological Quality Major Cyprinid Fishery Species protected under EU or UK wildlife legislation
		Groundwater:	Major aquifer providing locally important resourced or supporting river ecosystem SPZII
		Flood Risk:	Flood plain or defence protecting between 1 and 100 residential properties or industrial premises from flooding.
Medium	Attribute has a medium quality	Surface Waters:	Moderate Ecological Quality
		Groundwater:	Aquifer providing water for agricultural or industrial



Value/ Sensitivity	Typical Descriptors	Typical Example	
Low	and rarity on a local scale.		use with limited connection to surface water SPZII
		Flood Risk:	Flood plain or defence protecting 10 or fewer industrial properties from flooding
	Attribute has a low quality and rarity on a local scale.	Surface Waters:	Poor or Bad Ecological Quality
		Groundwater:	Non-aquifer
		Flood Risk:	Flood plain with limited constraints and low probability of flooding of residential and industrial properties.

Table 14.3 Determining Magnitude of Impacts

Magnitude of Potential Change		Criteria
High	Adverse	Results in loss of attribute and/or quality and integrity of the attribute
	Beneficial	Results in major improvement of attribute quality.
Medium	Adverse	Results in effect on integrity of attribute, or loss of part of attribute.
	Beneficial	Results in moderate improvement of attribute quality.
Low	Adverse	Results in some measurable change in attribute’s quality or vulnerability.
	Beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring.
Negligible		Results in effect on attribute, but of insufficient magnitude to affect the use or integrity.

Table 14.54 Effect Significance Matrix

Magnitude	Sensitivity or Value				
	Very High	High	Medium	Low	Very Low
Severe	Major	Major	Major	Moderate	Negligible
Major	Major	Major	Moderate	Moderate	Negligible
Moderate	Major	Moderate	Moderate	Minor	Negligible
Minor	Moderate	Moderate	Minor	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Limitations and Assumptions

- 14.5.9
This amended assessment has used the 2015 assessment, the Design Freeze documentation and available published information on the current condition and status of the site and anticipated changes due to future climate change. No surveys or site visits have been made to further inform the amended assessment.
- 14.5.10
The Drainage strategy to be adopted for the Revised Scheme<sup>12</sup> was available only in outline at the time the amended assessment was prepared. It has been assumed that the outline drainage methodology and target reductions in runoff rates will be achieved in the final design.

<sup>12</sup> Bishopsgate Goodsyard Outline Drainage Strategy ref DI-001. WSP, March 2019

14.6 BASELINE ASSESSMENT AND IDENTIFICATION OF KEY RECEPTORS

Baseline Assessment

Surface Water

- 14.6.1
There are no mapped surface water features on or within 1000 m of the site.
- 14.6.2
The site is approximately 100 m east of the former course of the River Walbrook (a tributary of the Thames). At present the River Walbrook is contained within a culvert beneath Curtain Road, to the east of Shoreditch High Street. The River Walbrook is not considered to be a receptor as there is no hydrological connection between the site and the Walbrook culvert.
- 14.6.3
The tidal River Thames is approximately 1.7 km to the south of the site. There is no direct connection for surface water from the site to the River Thames but as the site is drained into the Thames Water Utilities Limited (TWUL) sewer network there is a possible indirect connection from the sewer network via combined sewer overflows. The River Thames is therefore considered a receptor via this route.
- 14.6.4
Construction of the Thames Tideway Tunnel, designed to intercept combined sewer overflows and convey them to Beckton Sewage Treatment Works, commenced in 2016 and was not considered in the 2015 assessment. The Thames Tideway Tunnel is expected to be complete by 2023 and would thus be in operation in time for the operational phase of the Revised Scheme.
- 14.6.5
The quality and ecological condition of the tidal River Thames is assessed under Water Framework Directive and its classification reported in the River Basin Management Plan which is reviewed every six years by the Environment Agency. The closest section of the River Thames to the site is “Thames Middle”, classified as a heavily modified transitional water body, and the latest (2016) classification shows this stretch to be overall “Moderate” with the component ecological and chemical classifications being “Moderate” and “Fail” respectively.
- 14.6.6
The chemical classification was “Good” in 2015 and this variability may be due to point and diffuse sources, including surface water and combined sewer overflows. The Overall Water Body objective for the middle Thames is “Moderate” and it is not expected to attain a good ecological classification due to its status as heavily modified physical condition and actions to get the biological condition to good would have a significant impact on use.
- 14.6.7
The River Thames is therefore considered to be a water receptor with Medium Importance with respect to water quality.
- 14.6.8
There are no designated fisheries in the vicinity of the site. However, as the River Thames has abundant fish populations it is considered to be of Medium Importance with respect to fisheries.
- 14.6.9
According to the Envirocheck Report (available in **ES Addendum Volume 4, Appendix 8: Ground Conditions**; for the site and surrounding area, there are no surface water abstractions from the River Thames operating within 1 km of the site. The Envirocheck Report has identified four active discharge consents within 1 km of the site. None of these consents relate to discharges to the River Thames from the TWUL sewer network via Combined Sewer Overflows.
- 14.6.10
Based on the above information, the River Thames is considered to be of Low Importance in relation to abstractions and discharges, and the potential to affect the transportation and dilution of waste products as the active discharge consents are not identified as List I or II discharges.
- 14.6.11
Surface water drainage from the site will be effectively managed as described by the Drainage Strategy (**ES Addendum, Volume 4, Appendix J: Water Resources**). The outline drainage strategy proposes to greatly reduce runoff rates into the sewer network from the site by using extensive attenuation storage. Rainfall events that exceed the design capacity of the drainage network may result in surface water leaving the site and flowing into surrounding urban areas. Whilst this is a very unlikely to occur the surrounding urban areas have been considered to be a potential receptor of surface water in an exceedance event.
- 14.6.12
The 2015 assessment did not consider the surrounding urban areas as potential receptors of runoff from the site in extreme rainfall conditions though it did identify the site as not being within a Critical Drainage Area (CDA). This assessment has included these areas and assigned them as being of Very High Importance.

Groundwater

- 14.6.13
The site does not lie in a groundwater Source Protection Zone (SPZ).

14.6.14 The baseline assessment and identification of key receptors of the underlying geology and groundwater remains unchanged from that in the 2015 assessment. The underlying geology is as shown in **Table 14.5**, which is reproduced from the 2015 assessment.

Table 14.65 Anticipated Stratigraphy

Strata	Approximate Thickness (m)	Depth to Top of Stratum (mOD)
Made Ground	1.5 to 6.8	+13.0 to 16.2
Alluvium	0.4 to 1.2	+10.6 to +12.4
River Terrace Deposits (Taplow Gravels)	1.0 to 4.4	+10.0 to 12.4
London Clay	18.9 to 23.2	+6.9 to 10.4
Lambeth Group	14.6 to 16.6	-15.2 to -9.7
Thanet Sand	10.8 proven	30.5 to 27.8
White Chalk	-	-40

14.6.15 There are two aquifers identified within the sequence shown in Table 14.5. The River Terrace Deposits (Taplow Gravel Formation) is classified as a Secondary A aquifer, defined as being permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. At much greater depth the combined Thanet Sand and Chalk deposits beneath the site are understood to form a highly productive Principal aquifer capable of supporting large abstractions, including those for public supply.

14.6.16 The Secondary A aquifer (Taplow Gravels) is close to the surface and overlain by material which offers little protection from pollutants and is therefore considered to be of Medium Importance with regard to the vulnerability and use of the aquifer. The Principal aquifer within the Chalk is considered to be of Very High Importance.

**Water Resource Infrastructure**

14.6.17 As described in the 2015 assessment, Thames Water Utilities Ltd (TWUL) has undertaken an assessment on the effect of population growth within the London Water Resource Zone (WRZ) and has adopted policies designed to meet the London anticipated growth in requirement. It is considered that the effect of the Revised Scheme on water demand in the London WRZ is covered within the TWUL assessments and adequate provision has been made to accommodate the projected growth. The water resources used that supply the London WRZ are considered to be of Very High Importance.

14.6.18 The 2015 assessment did not consider water supply infrastructure in detail but did establish the presence of large diameter water supply mains within the site which it assumed were adequate to provide the water supply required. The Revised Scheme has a lower residential capacity than the earlier scheme and so impacts on the local water supply infrastructure would be reduced in comparison. The water supply infrastructure is therefore not considered to be a key receptor.

14.6.19 Development of the Drainage strategy has included a TWUL enquiry on capacity of the foul drainage system serving the area to ensure adequate provision for the disposal of both foul and surface water drainage. This was ongoing at the time of the assessment (March 2019), but further study and remedial works would be undertaken if found to be required. It is noted that the Drainage Strategy indicates surface water discharges from the area of the Revised Scheme will be reduced by approximately 90%. The drainage infrastructure serving the area is therefore not considered to be a key receptor.

14.6.20 **Table 14.6** provides a summary of the key receptors identified and their value or importance.

Table 14.6 Key Receptors

Key Receptor/Attribute	Importance
River Thames – Water quality and Ecology	Medium
River Thames – Fisheries	Medium
River Thames – Abstractions and Discharges	Low
Taplow Gravels – Secondary aquifer	Medium
Chalk – Principal Aquifer	Very High
Neighbouring Urban Area – flood risk	Very High
TWUL Water Resources – water supply infrastructure	Very High

**14.7 IDENTIFICATION AND DESCRIPTION OF CHANGES LIKELY TO GENERATE EFFECT**

14.7.1 A brief textual description of the changes likely to generate an effect follows for the construction and operation phases of the Revised Scheme.

**Construction Phase**

14.7.2 The likely pathways between the source of contamination through construction process and the associated water resources feature or attribute were identified in detail in the 2015 assessment and remain valid for the Revised Scheme these have been repeated below.

14.7.3 The following pollution sources arising from demolition / construction works that have the potential to affect water resource receptors have been identified:

- creation of preferential pathways and disturbance to groundwater;
- disturbance of existing drainage systems and water supply networks;
- disturbance of contaminated land;
- leaks and spillages of oils/hydrocarbons, etc;
- release/ mobilisation of suspended sediments; and
- concrete and cement products.

14.7.4 Construction activities may lead to the disturbance and mobilisation of physical contaminants (i.e. dust, sediments and muds). In particular, during periods of heavy rainfall, vehicle movements may generate increased surface water runoff with high volumes of suspended solids. Compaction and disturbance of soils during construction can lead to increased volumes of surface runoff during heavy rainfall, and normal surface water flow routes may be blocked or diverted by temporary structures or embankments.

14.7.5 Contaminants, oils, construction materials and suspended sediments have the potential to affect surface and ground water bodies via surface runoff, shallow interflow and infiltration. Construction activities such as piling and/or ground excavation may create new pollutant pathways from the surface to the underlying groundwater body.

**Operational Phase**

14.7.6 The occupation of the site during the operational phase is likely to increase water demand and consequent production of effluent requiring treatment.

14.7.7 The area of efficiently drained impermeable surfacing producing surface runoff will increase as a result of the Revised Scheme, and climate change is expected to increase intense rainfall totals by 20 % to 40 % during the lifetime of the Revised Scheme. These will together produce a significantly larger volume of surface runoff from the site.

14.7.8 Leaks and spillages of oils, hydrocarbons and dissolved pollutants may contaminate the drainage system.

14.7.9 The increase in effluent volume and rates of surface water runoff may result in an increase in the volume or frequency in surface water overflows in the downstream drainage network. However, the Thames Tideway Tunnel is expected to reduce the frequency of such overflows compared to the present.

## 14.8 ASSESSMENT OF LIKELY SIGNIFICANT EFFECT

Construction Phase	
Embedded Mitigation Measures	
14.8.1	These are the mitigation measures that are embedded in the design or standard practice / legislative / permitting requirements. The amended assessment has been carried out assuming these embedded mitigation measures are adopted and any additional mitigation required will be identified after the effects have been assessed assuming the embedded mitigation.
14.8.2	The proposed embedded mitigation measures will be managed through the Construction Environmental Management Plans (CEMP), Site Waste Management Plans (SWMP), Emergency Response Plans (ERP), and Health and Safety Plans (H&SP). These plans will all be completed by the principal contractor/s and sub-contractors prior to the commencement of construction activities. The mitigation measures implemented will be reviewed regularly to best suit the practices currently /being undertaken across the site and are in line with the LBTH Code of Construction Practice (CoCP) document.
14.8.3	The Construction of the Revised Scheme will be managed using the agreed (CoCP) following industry-standard guidance and will be subject to regular monitoring. The CoCP will include measures on the proper storage and use of oils, fuels and construction chemicals, provision of site-worker accommodation and sanitation facilities and management and removal of waste materials.
14.8.4	The phased approach of the Revised Scheme will allow the CoCP to be adapted as on-site experience is gained.
14.8.5	Management of surface water during construction will also feature in the CoCP and will include attenuation and settlement of surface water during the construction phase. Remediation treatment, possibly including tankering of heavily contaminated water away for specialised treatment, may be required and a water quality monitoring program established to ensure appropriate treatment is provided.
Anticipated Effects	
14.8.6	Details regarding the site demolition and construction of the Revised Scheme and a more detailed description of the design are presented in <b>Chapter 5: The Revised Scheme and Construction Overview</b> of this ES Addendum.
14.8.7	Throughout the demolition and construction phase of the Revised Scheme, there are potential sources of pollution / contamination in addition to the construction processes themselves that may potentially affect water resource receptors. For each of the sources / processes, there are particular ‘triggers’ – these are on-site actions that cause the potential impacts.
14.8.8	The likely pathways between the source of contamination through construction process and the associated water resources feature or attribute have been identified. The potential impacts (pre-mitigation) have been stated and are fundamentally the result of the interaction between the contamination source / process and the water resource feature, via a defined pathway.
14.8.9	Pollution sources arising from demolition and construction works that could affect water resource receptors comprise the following: <ul style="list-style-type: none"><li>• creation of preferential pathways and disturbance to groundwater;</li><li>• disturbance of existing drainage systems and water supply networks;</li><li>• disturbance of contaminated land;</li><li>• leaks and spillages from oils/hydrocarbons;</li><li>• suspended sediments; and</li><li>• concrete and cement products.</li></ul>
14.8.10	Other activities associated with the demolition and construction phase comprise: <ul style="list-style-type: none"><li>• additional water demand; and</li><li>• additional wastewater generation.</li></ul>

14.8.11	There are numerous sources of contamination and construction processes that have the potential to affect water resources and these are detailed in the 2015 assessment. The main issues identified are summarised below.
14.8.12	The extended period of phased construction on the site means that all construction activities apart from demolition are expected to be long term. The anticipated effects of construction are therefore also long term but may in many cases be intermittent and only applicable during a construction phase.
14.8.13	It is likely that discharge into the drainage system of surface water from the site will be required during the demolition and construction phase. Treatment and management of surface water quality and volume by the CoCP during construction is considered likely to include: <ul style="list-style-type: none"><li>• proper management of concrete and cement handling (including use of pre-mix concrete, provision of cleaning areas for washing down equipment);</li><li>• management and prevention of leaks and spills (including storage of oils in designated bunded areas, plant and machinery sited away from the drainage system, use of oil interceptors and absorbent materials);</li><li>• use of geotextile silt fences;</li><li>• regular cleaning of site access points;</li><li>• controlled earth movements;</li><li>• wheel washing facilities, and</li><li>• dewatering effluent pumped to settling tanks.</li></ul>
14.8.14	The above measures to reduce contamination of collected surface water on site prior to discharge will be included in the CoCP and the anticipated effect is therefore anticipated to be <b>Negligible</b> .
14.8.15	Implementation of these measures in the CoCP is expected to result in a Negligible effect of surface water discharges on the local area and the River Thames via drainage system.
14.8.16	Construction activities, including remediation, dewatering, drilling and piling are likely to have an impact on groundwater bodies. As the superficial groundwater in the Taplow Gravels is likely to be already in contact with disturbed ground, with an appropriate CoCP in place the resultant effects on groundwater are considered likely to be <b>Minor</b> .
14.8.17	The groundwater in the White Chalk aquifer below the London Clay Formation will be protected from most construction activity by the intervening London Clay. Old boreholes, which may exist from previous uses of the site, may provide a potential pathway for contaminants leading to the aquifer underlying aquifer and this risk will be managed through the identification and decommissioning of old boreholes on the site at an early stage.
14.8.18	The majority of the buildings will be supported on piles within the Landon Clay however, Buildings 1 and 2 will be requiring 42 m piles and will be going down into the Thanet Sand, which is hydrologically connected to the White Chalk below. There is a further possibility that Plot 8A may also require piles into the Thanet Sand, subject to further study <sup>13</sup> . This will create a potential pathway for contaminants to access the underlying White Chalk aquifer. Overall reduction of this risk has been achieved by the reduction in high rise buildings in the Revised Scheme. Provision of a suitable piling risk assessment will outline measures to protect the underlying aquifers. It will also detail careful management and monitoring requirements during the piling process and control of site conditions adjacent to the piling area including: <ul style="list-style-type: none"><li>• use of geotextile bunding around piling area;</li><li>• use of pile casings;</li><li>• dewatering prior to piling,</li><li>• sealing of pile caps, and</li><li>• provision of settlement ponds and tanks.</li></ul>
14.8.19	Implementation of these measures are expected to result in a <b>Negligible</b> effect on the Chalk aquifer.
Anticipated Effects of Applying the Minimum development parameter	
14.8.20	The assessment of construction phase effects has been based upon application of the maximum parameter for the Revised Scheme. This will give rise to the largest developable area and therefore be a conservative assessment of the likely residual effects.
14.8.21	The minimum development parameter would result in a marginal reduction of the height and scale of the proposed buildings across the scheme with the exception of the detailed buildings in Plots 2 and 7. This would have a negligible effect upon any of the assessments completed. It may result in a reduction in the number and depth of piles, though this would not result in any significant difference from the maximum parameter assessed. The minimum parameter would give rise to a lower population on site for both the commercial and residential elements which would in turn result in a corresponding reduction on the demand for water supply and foul capacity, however whilst this would be reduced it is not expected to alter the significance of the effect reported under the maximum parameter assessment and this would not result in any significant difference in the assessed effects on the water environment.

<sup>13</sup> Bishopsgate Goods Yard, Foundation Design Statement 25<sup>th</sup> February 2019



Operational Phase	
Embedded Mitigation Measures	
14.8.22	The Revised Scheme will minimise contamination and eliminate potential pathways for contamination to reach receptors. Superficial groundwater and surface water quality is therefore likely to be improved during the operation phase compared to the existing.
14.8.23	The Drainage Strategy ( <b>ES Addendum, Volume 4, Appendix J: Water Resources</b> ) is designed to provide attenuation and treatment of surface water quality to allow the site to be effectively drained and runoff rates considerably reduced. The likelihood of surface water flooding is therefore likely to be reduced compared to the existing despite anticipated increases in rainfall due to climate change.
14.8.24	The reduction in runoff rates is also likely to reduce the occurrence of combined sewer overflows from the sewer network affecting the River Thames despite an increase in effluent generated in the operational phase.
14.8.25	The residential development will be equipped with efficient water devices and designed to attain low water usage per inhabitant. A decrease in residential density is proposed in the Revised Scheme with housing reduced from 1356 units to approximately 500 units. Overall water consumption will be minimised and is much less than in the 2015 Proposed Development, reducing the impact on TWUL water resources.
Anticipated Effects	
14.8.26	The drainage strategy will create an integrated drainage system which includes attenuation designed to reduce runoff rates comparable to green field run off rates. This will minimise the possibility of sewer overflows from the downstream drainage network into the River Thames, resulting in a <b>Minor, beneficial</b> effect on the water quality, fisheries and water resource attributes of the River Thames.
14.8.27	When the Revised Scheme is completed, taking into account the embedded mitigation applied above the effect on groundwater should be <b>Negligible</b> .
14.8.28	The flood risk to residents and the surrounding area from an exceedance rainfall event will be minimised by the embedded mitigation measures outlined above. This will provide a <b>Minor, beneficial</b> effect
14.8.29	Water demand from the Revised Scheme will be increased above the existing, despite the water efficient measures embedded in the design, although demand is lessened in the amended design owing to the reduction in residential accommodation. A significant (but unknown) proportion of the increased demand is likely to be due to re-location within the supply area resulting in a reduced net effect. TWUL already has a long-term strategy aiming to achieve a surplus in target headroom, and the long-term residual impacts of the Revised Scheme on water supply are therefore considered to be <b>Negligible</b> .
Anticipated Effects of Applying the Development Parameter	
14.8.30	The predicted beneficial effects of the Revised Scheme on water resources and flood risk are likely to be reduced for the Minimum Development Parameter as the scale of the scheme would be reduced, therefore reducing the operational demand and capacity required in comparison with the maximum parameter scheme.

## 14.9 SCOPE FOR ADDITIONAL MITIGATION MEASURES

Potential Additional Mitigation Measures	
14.9.1	<p>Further site investigation may be considered at the Site in line with previous recommendations to better define the thickness of the London Clay Formation and therefore depth to the basal aquifers. This additional site investigation may then be used to re-design/ value engineer the proposed piled foundations such that they do not penetrate the London Clay Formation. Such measures may include:</p> <ul style="list-style-type: none"><li>Increasing the number of piles to reduce the loadings,</li><li>Increase the pile diameter to reduce the length, and</li><li>Consider alternative pile types which may provide better load bearing characteristics for a shorter length.</li></ul>
14.9.2	These potential additional mitigation measures will be considered as part of the detailed design stage.

### Likely Effectiveness of Additional Mitigation Measures

- 14.9.3 Redesign of the piled foundation solution may result in them remaining within the London Clay Formation, this would result in the absence of potential preferential pathways to the underlying Chalk aquifer being created and therefore reduce the potential risks.

## 14.10 RESIDUAL EFFECTS

- 14.10.1 **Table 14.7** provides a summary of the residual effects resulting from the Revised Scheme after effective implementation of the embedded and additional mitigation measures proposed above.

Table 14.7 Summary of Residual Effects

Phase	Resource or Receptor Affected	Residual Effect
Construction	River Thames – water quality and ecology	Negligible
	River Thames - Fisheries	Negligible
	River Thames – Abstractions and discharges	Negligible
	Taplow Gravels – Secondary aquifer	Minor, Adverse
	Chalk – Principal aquifer	Negligible
	Neighbouring urban area	Negligible
	TWUL – water supply infrastructure	Negligible
Operation	River Thames – water quality and ecology	Minor, Beneficial
	River Thames - Fisheries	Minor, Beneficial
	Groundwater including primary and secondary aquifers	Negligible
	Neighbouring urban area – flood risk	Minor, beneficial
	TWUL – water supply infrastructure	Negligible

## 14.11 CUMULATIVE EFFECTS

- 14.11.1 Cumulative effects are the combined effects of several development schemes (in conjunction with the Revised Scheme) which may, on an individual basis be insignificant but, cumulatively, have a significant effect.
- 14.11.2 The ES Addendum has given consideration to 'Cumulative 'Effects' for schemes located within 1 km radius from the boundary of the site as outlined in **ES Addendum, Volume 2, Chapter 3 EIA Methodology**. As outlined in previous sections of this chapter, measures exist to manage and control these impacts and reduce the magnitude of impacts and significance of impacts to a minimum. Therefore, as a result of these control measures to be utilised in the Revised Scheme and in the schemes considered within this cumulative impact assessment, and the likelihood that not all of the development sites will be under construction at the same time and therefore liable to discharge at exactly the same time, any cumulative impact is considered to be of negligible significance.
- 14.11.3 The Revised Scheme will have a beneficial impact on the surface water runoff generated compared to existing due to the attenuation measures included in the drainage strategy. Generation of surface water runoff from the schemes considered within this cumulative assessment must also not increase runoff beyond existing rates to conform with the requirements of the NPPF and the London Plan, and should also reduce them.

- 14.11.4 If this can be achieved on the surrounding development sites then a cumulative impact will be observed and this could be an impact of minor beneficial significance to the local flood risk associated with the TWUL sewer network. This could provide a minor beneficial effect on the River Thames by contributing to the reduction of the number of spills from CSOs.
- 14.11.5 It is unlikely that there will be cumulative effects on the superficial aquifer as this is limited in extent and other sites will be on different geologies.
- 14.11.6 There will be an increase in water supply requirements at the site, and the cumulative effect of the other sites considered may put pressure on sources of water supply resources in the area (e.g. rivers, reservoirs and groundwater supplies). As TWUL has undertaken an assessment on the impact of projected population growth within the London WRZ, it is considered that the impact of the Revised Scheme on water demand is covered within the TWUL assessments and adequate provision has been made to accommodate the projected growth of the other sites in the cumulative assessment. As a result, cumulative impacts resulting from an increase in water demand are considered to be of negligible significance.

## 14.12 QUALITATIVE COMPARISON OF THE 2015 PROPOSED DEVELOPMENT WITH THE 2019 REVISED SCHEME

- 14.12.1 The Proposed Amendments to the 2015 Proposed Development as a result of the Revised Scheme will not make a material change to the overall Water Resources, Flood Risk and Drainage effects presented in the 2015 ES. **Table 14.8** below shows the difference between the effects.

Table 14.8 Comparison of Residual effects between the 2015 Proposed Development and the 2019 Revised Scheme

Phase	Resource or Receptor Affected	Residual Effect (2015 Proposed Development)	Residual Effect (2019 Revised Scheme)
Construction	River Thames – water quality and ecology	Negligible	Negligible
	River Thames - Fisheries	Negligible	Negligible
	River Thames – Abstractions and discharges	Negligible	Negligible
	Taplow Gravels – Secondary aquifer	Negligible	Minor, Adverse
	Chalk – Principal aquifer	Negligible	Negligible
	Neighbouring urban area	Negligible	Negligible
	TWUL – water supply infrastructure	Negligible	Negligible
Operation	River Thames – water quality and ecology	Negligible	Minor, Beneficial
	River Thames - Fisheries	Negligible	Minor, Beneficial
	Groundwater including primary and secondary aquifers	Negligible	Negligible
	Neighbouring urban area – flood risk	Negligible	Minor, Beneficial
	TWUL – water supply infrastructure	Minor, Beneficial	Negligible

- 14.12.2 The pre-mitigation effects presented in the 2015 Proposed Development remain unchanged for the 2019 Revised Scheme, however there are some minor changes to the ultimate residual effects as outlined above. With regard to the effect upon the Taplow Gravels this is considered to increase to a minor adverse effect due to the risk associated with the impact on the Taplow Gravels, and whilst the effective implementation of a CoCP will, mitigate this risk the sensitivity of the receptor warrants this to be a minor adverse effect.

- 14.12.3 With regard to the effect upon the River Thames the effective implementation of the CoCP to include the management measures as outlined in paragraph 14.8.13 will reduce potential contamination of collected surface water on site prior to discharge and therefore is likely to result in an overall improvement of effect.
- 14.12.4 With regard to flood risk on the neighbouring urban area, with the improvement in control and reduction of surface water run off this is also expected to result in a beneficial effect over the 2015 Proposed Development.
- 14.12.5 Whilst the ultimate demand for water and reliance on infrastructure will be increased by the Revised Scheme TWUL have a responsibility to provide the required demand and infrastructure requirements and are targeting a surplus in headroom, therefore this is expected to result in a negligible effect.

## 14.13 SUMMARY AND CONCLUSIONS

- 14.13.1 The assessment has used published information to create a picture of the water resources and flood risk on the site and any potential trends that can be estimated. This information has been used to create a baseline and identify areas that could be affected by the Revised Scheme as follows:

- there are no surface waterbodies within 1 km of the site. Although the old River Walbrook runs underground in a culvert within 1 km it is hydrologically isolated from the site;
- the site is connected to the River Thames via the sewer network which can overflow into the River Thames during periods of high runoff. The water quality of this stretch of the River Thames is sometimes poor chemically but the ecology is Moderate. The artificial nature of this section of the River Thames prevents it achieving a higher ecological condition;
- although the River Thames is not classed as a Fishery there are good populations of fish in the local section;
- there is a small shallow aquifer within the gravels close to the surface on the site which may be affected by surface activities. Another, more significant aquifer lies in the White Chalk at greater depth below the site and isolated from the surface by a thick layer of the London Clay Formation;
- the site is at a low risk of flooding by rivers but there is a risk of limited flooding from surface water at present. The site lies within a heavily urbanised area and runoff from the site could affect surrounding areas if not properly managed; and
- the supply of drinking water for the London area is being managed and upgraded to deal with the continued increase in population.

- 14.13.2 The importance of each of these has been determined from the available information so that the significance of any likely impacts can be estimated.

- 14.13.3 The assessment has used published information to create a picture of the water resources and flood risk on the site and any potential trends that can be estimated. Without appropriate mitigation the Revised Scheme could have significant adverse impacts on the groundwater, surface water and flood risk arising from the construction activities and long-term increase in runoff from the site on completion. Plans to control and manage these potential impacts are normal practice for large construction sites and are expected to minimise these potential impacts so that no adverse effects result from the construction Revised Scheme.

- 14.13.4 Completion of the Revised Scheme is likely to result in permanent improvement to surface water runoff quantity and reduce the likelihood of overflows from the sewer network into the River Thames. This should result in a small improvement to the River Thames. The possibility of flooding on the site and to the surrounding area will also be reduced by the creation of a modern, effective drainage system on the site.

- 14.13.5 It is anticipated that the Revised Scheme will have no effect on the important chalk aquifer that lies at depth below the site.

- 14.13.6 There should also be no impact on water resources within the London area as a result of the Revised Scheme.

- 14.13.7 During construction it is expected that the potential impacts on water resources and flood risk will be managed through the normal control practices. When occupied the site should have a small beneficial effect on the local water environment and flood risk.

Table 14.9      Summary of Residual Effects

Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
Construction								
River Thames – water quality and ecology	Medium	Sewer overflow	Control of discharge through CoCP	Negligible, Indirect, Local Short term, Likely	Negligible	None	Negligible	Negligible
River Thames - Fisheries	Medium	Sewer overflow	Control of discharge through CoCP	Negligible, Indirect, Local, Short term Likely	Negligible	None	Negligible	Negligible
River Thames – Abstractions and discharges	Low	Sewer overflow	Control of discharge through CoCP	Negligible, Indirect, Local Short term, Likely	Negligible	None	Negligible	Negligible
Taplow Gravels – Secondary aquifer	Medium	Contamination	Control of activities through CoCP	Minor, Direct, Local, Medium, Likely	Minor, Adverse	None	Minor	Minor adverse
Chalk – Principal aquifer	Very High	Contamination	Maintaining isolation from surface via London Clay	High, Direct, Regional, Permanent Unlikely	Negligible	None	Negligible	Negligible
Neighbouring urban area	Very High	Surface water flooding	Control of activities through CoCP	High, Direct, Local, Temporary Unlikely	Negligible	None	Negligible	Negligible
TWUL – water supply infrastructure	Very High	Increase in water demand	Minimising water use	High, Direct, Regional, Temporary Unlikely	Negligible	None	Negligible	Negligible
Operation								
River Thames – water quality and ecology	Medium	Sewer overflow	Drainage Strategy - attenuation and treatment of surface water quality	Minor, Indirect, Local Short term, Likely	Minor, Beneficial	None	Minor	Minor beneficial
River Thames - Fisheries	Medium	Sewer overflow	Drainage Strategy - attenuation and treatment of surface water quality	Minor, Indirect, Local Short term, Likely	Minor, Beneficial	None	Minor	Minor beneficial
Groundwater including primary and secondary aquifers	Medium-Very High	Contamination	Drainage Strategy - attenuation and treatment of surface water quality		Negligible	None	Negligible	Negligible
Neighbouring urban area	Very High	Surface water flooding	Drainage Strategy - attenuation and treatment of surface water quality		Minor, beneficial	None	Minor	Minor, beneficial
TWUL – water supply infrastructure	Very High	Increase in water demand	Water efficiency measures		Negligible	None	Negligible	Negligible
Cumulative Effects – Construction								
None Identified	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
Cumulative Effects - Operation								
None Identified	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a