CONTENTS

7.1 INTRODUCTION

7.1.1 This Chapter of the ES assesses the likely significant effects of the Proposed Development on the environment in terms of water resources. The Chapter and its supporting Appendices describe the planning policy and legislative context; the assessment methodology; the baseline conditions at the Application Site and surroundings; the likely significant effects of the Proposed Development on the water resource receptors assessed; 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.

7.1.2 This Chapter of the ES has been prepared by Hydrock Consultants Limited, an engineering design consultancy, and was authored by Jon Cracknell (BSc, MSc), a Senior Consultant with Hydrock, reviewed by David Sullivan (BSc, CEng, MICE), a Technical Director with Hydrock, and updated by John Charlesworth (BEng), a Senior Engineer with Hydrock. All individuals are considered suitably qualified and experienced to prepare this Chapter in the role of 'competent experts' in relation to water resources.

7.2 RELEVANT POLICY

National Planning Policy Framework

7.2.1 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2019) establishes the Government's planning policies for England and how they are expected to be applied. In relation to flood risk, the primary aim of the NPPF is to ensure that flood risk is taken into account at all stages in the planning process in order to avoid inappropriate development in areas at risk of flooding, and wherever possible, to direct development towards areas at least risk of flooding. In terms of water resources and flood risk, the NPPF prescribes 'Tests' in order to protect people and property from flooding which all Local Planning Authorities are expected to follow, with a view to achieving sustainable development.

7.2.2 Paragraph 163 of the NPPF states that, when determining planning applications, Local Planning Authorities should only consider development in areas at risk of flooding where it can be demonstrated that (as informed by a site-specific Flood Risk Assessment (FRA)) the most vulnerable development is located in the area of lowest flood risk within a site, and development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any 'residual' risks can be safely managed through emergency planning and the use of Sustainable Drainage Systems (SuDS).

7.2.3 Footnote 50 to the NPPF states that a site-specific FRA is required for proposals of 1 hectare or greater in Flood Zone 1; all proposals for new development in Flood Zones 2 and 3; in an area within Flood Zone 1 which has critical drainage problems (as notified to the Local Planning Authority by the Environment Agency (EA)); and, where proposed development or a change of use to a more vulnerable use classification may be subject to other sources of flooding.

Planning Policy Guidance

7.2.4 The Flood Risk and Coastal Change Planning Practice Guidance (PPG) (Ministry of Housing, Communities and Local Government, 2014) provides additional technical guidance on flood risk and coastal change. In terms of the general planning approach to development and flood risk, the PPG sets out the following main steps to be followed:

- Assess flood risk.
- Avoid flood risk.
- Manage and mitigate flood risk.

7.2.5 The guidelines also state that in plan-making, Local Planning Authorities should apply a sequential approach to site selection so that development, as far as reasonably possible, is

located where the risk of flooding (from all sources) is lowest, taking account of climate change and the vulnerability of future uses to flood risk. In plan-making this involves applying the 'Sequential Test' and, if needed, the 'Exception Test', to Local Plans. Guidance on when and how the 'Sequential' and 'Exception' Tests should be applied to planning applications is also provided in the PPG.

7.2.6 In addition, the guidelines reiterate that Local Planning Authorities and developers should seek flood risk management opportunities (e.g. safeguarding land), and to reduce the causes and effects of flooding (e.g. through the use of SuDS in developments).

7.2.7 Furthermore, the guidelines note that when considering a major development, as defined in the Town and Country Planning (Development Management Procedure) (England) Order (Her Majesty's Stationery Office, 2015), SuDS should be provided in developments unless it is demonstrated to be inappropriate.

7.2.8 The PPG defines Flood Zones, which are split into Zone 1 (Low Probability), Zone 2 (Medium Probability), Zone 3a (High Probability) and Zone 3b (The Functional Floodplain); the flood risk 'vulnerability' of different land uses; and, the 'compatibility' of different use classes within certain Flood Zones.

7.2.9 The PPG also contains a section on water supply, wastewater and water quality. This guidance indicates that, subject to limited exemptions, water supply is unlikely to be a consideration for most planning applications as water supply is normally addressed through the Local Plan. With regards to water quality, the guidance states that it is only likely to be a significant planning consideration when a proposal would involve:

- Physical modifications to a waterbody, such as a flood storage area; channel diversions and dredging; removing natural barriers or existing weirs; constructing new locks, culverts, major bridges, barrages / dams or weirs (including for hydropower).
- Indirectly affecting a waterbody, for example:
  - As a result of new development, such as the redevelopment of land that may be affected by contamination, mineral workings, water or wastewater treatment, waste management facilities and transport schemes including culverts and bridges.
  - A lack of adequate infrastructure to deal with wastewater.

Adopted Local Plan

7.2.10 The key relevant policies from The Cherwell Local Plan 2011 - 2031 (Cherwell District Council, 2016) in relation to water resources comprise:

- PSD1: Presumption in Favour of Sustainable Development.

- ESD 1: Mitigating and Adapting to Climate Change.
- ESD 3: Sustainable Construction.
- ESD 6: Sustainable Flood Risk Management.
- ESD 7: Sustainable Drainage Systems (SuDS).
- ESD 8: Water Resources.
- Bicester 13: Gavray Drive.

Policy, Legislation and Guidance

Policy and Legislation

Environmental Protection Act (Her Majesty's Stationery Office, 1990)

7.2.11 The Environmental Protection Act 1990 provides for a risk-based framework for the identification, assessment and management of contaminated land within the UK. This is aimed at ensuring that actions taken with respect to contaminated land are directed by a technical assessment of the risk that exists in the source / pathway / receptor scenario. Relevantly, 'Contaminated Land' is defined to include the pollution of controlled waters.

Land Drainage Act (Her Majesty's Stationery Office, 1991)

7.2.12 The Land Drainage Act sets out the responsibilities given to the EA, Internal Drainage Boards, Local Authorities and riparian landowners in regard to land drainage. Under the Acts, the EA and Local Authorities have discretionary powers of management and maintenance for 'Main Rivers' and 'Ordinary Watercourses' respectively. It is the riparian owner, i.e. the owner of the land through which a watercourse flows, who is ultimately responsible for maintaining the relevant section of the watercourse in such condition that the free flow of water is not impeded.

Water Industry Act (Her Majesty's Stationery Office, 1991)

7.2.13 The Water Industry Act consolidates previous legislation on water supply and sewerage services and covers a wide range of activities required of the privatised water companies that were created in 1989. The main relevant provisions relate to the discharge of trade effluent to the public sewer for which privatised companies (i.e. sewage undertakers) act as the regulatory authorities.

Water Resources Act (Her Majesty's Stationery Office, 1991)

7.2.14 The Water Resources Act (as amended) relates to the control of the water environment. The main aspects of the Act which are relevant to the Proposed Development include provisions

concerning land drainage, flood mitigation and controlling discharges to watercourses to prevent water pollution. It also outlines the functions and responsibility of the EA in regulating the water environment.

Anti-Pollution Works Regulations (Her Majesty's Stationery Office, 1999)

7.2.15 These regulations supplement the anti-pollution works notice provisions contained in the Water Resources Act 1991, empowering the EA to serve a notice requiring remedial action to be undertaken where there is actual or potential pollution affecting controlled waters, specifically "any person who has caused or knowingly permitted poisonous, noxious or polluting matter or any solid waste to be present in controlled waters".

Water Framework Directive (European Commission, 2000)

7.2.16 The Water Framework Directive 2000/60/EC (WFD) applies to all European Union (EU) waterbodies and aims to ensure their protection from further deterioration, and that improvements in water quality are made. The assessment and protection of waterbodies is undertaken by implementing River Basin Management Plans to be prepared within a formal series of six year cycles, following the identification of River Basin Districts. In general terms, there is an onus on developers to protect and, if possible, enhance waterbodies close to proposed developments.

Water Act (Her Majesty's Stationery Office, 2003)

7.2.17 The Water Act 2003 amends the Water Resources Act 1991 and the Water Industry Act 1991. The Act brings about a number of changes, including streamlining arrangements for flood defence organisation and funding, changes to the types of abstraction licence, and places a duty on water companies to conserve water and prepare for drought.

Flood Directive (European Commission, 2007)

7.2.18 The Flood Directive 2007/60/EC requires Member States to assess whether watercourses and coastlines are at risk from flooding, to map the flood extent, assets and humans at risk in these areas, and to take adequate and coordinated measures to reduce this flood risk. The Directive requires Member States to carry out an assessment of flood risk and produce Flood Risk Management Plans in six year cycles that focus on prevention, protection and preparedness. The current plan relevant to the Application Site is the Thames River Basin District Flood Risk Management Plan 2015 – 2021.

7.2.19 The Directive is to be implemented in co-ordination with the WFD.

Flood Risk Regulations (Her Majesty's Stationery Office, 2009)

7.2.20 The purpose of the Flood Risk Regulations 2009 is to transpose the EU Floods Directive (Directive 2007/60/EC) on the assessment and management of flood risks into domestic law and to implement its provisions. In particular, the directive places duties on the EA and local authorities to prepare flood risk assessments, flood risk maps and flood risk management plans.

Flood and Water Management Act (Her Majesty's Stationery Office, 2010)

7.2.21 The Flood and Water Management Act places a series of responsibilities on County and Unitary Councils as Lead Local Flood Authorities (LLFAs) with the intention of improving flood risk management. It also removes the automatic right of connection into public water sewers and places the onus on Local Authorities to adopt SuDS.

Water Environment (Water Framework Directive) (England and Wales) Regulations (Her Majesty's Stationery Office, 2017)

7.2.22 This transposes the requirements of the WFD into UK law. Eleven River Basin Districts have been identified in England and Wales, of which the Application Site falls within the Thames River Basin District. The Regulations include a requirement for surface water bodies (which is defined to include: 'rivers', 'lakes', 'transitional waters', 'coastal waters', or 'groundwaters') to achieve 'good' status with respect to ecology and water chemistry by 2021. Progress is monitored by the EA in its role as the 'competent authority'. The current plan relevant to the Application Site is the Thames River Basin District River Basin Management Plan (EA, 2015).

Guidance

7.2.23 The following key background reports have been consulted in the preparation of this assessment:

- Cherwell Level 1 Strategic Flood Risk Assessment Update (AECOM, 2017).
- Cherwell Level 2 Strategic Flood Risk Assessment Addendum (AECOM, 2018).
- Cherwell Level 2 Strategic Flood Risk Assessment Update (AECOM, 2017).
- Cherwell Water Cycle Study (AECOM, 2017).
- Flood Risk Assessments: Climate Change Allowances (Her Majesty's Government, 2020).
- Guidelines for Environmental Impact Assessment (Institute of Environmental Management and Assessment, 2004).
- Guidelines for Environmental Impact Assessment (Institute of Environmental Management and Assessment, 2006).

- Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire (Oxfordshire County Council, 2018).
- National Standards for Sustainable Drainage Systems (Department for Environment, Food and Rural Affairs, 2011).
- Non-Statutory Technical Standards for Sustainable Drainage Systems (Department for Environment, Food and Rural Affairs, 2015).
- Sequential Test and Exception Test (Flooding) - Strategic Sites (Cherwell District Council, 2017).
- Sewers for Adoption, 8th Edition (Water UK, 2018).
- Thames Catchment Flood Management Plan (EA, 2009).
- Thames River Basin District Flood Risk Management Plan 2015 - 2021 (EA, 2016).
- Thames River Basin District River Basin Management Plan (EA, 2015).
- The Building Regulations, Approved Document H: Drainage and Waste Disposal (Her Majesty's Government, 2015).
- The SuDS Manual (CIRIA, 2015).
- Water Resources Management Plan 2019 (Thames Water, 2019).

7.3 ASSESSMENT METHODOLOGY

Scope

7.3.1 The scope of this assessment has been informed by Cherwell District Council's Scoping Opinion response (ref. 20/02469/SCOP, dated 11 November 2020) to the Scoping Report (dated September 2020), and in particular the consultation responses of the EA and Oxfordshire County Council (in their role as LLFA). A summary of the key issues raised by the EA and LLFA as requiring assessment, in relation to water resources, include the need to:

- Update the EA's flood risk model of Langford Brook to take account of the latest climate change allowance guidance.
- Adopt a 'sequential' approach to the layout of the Proposed Development, so as to limit new development within the floodplain, with any unavoidable loss of floodplain storage compensated for by the undertaking of floodplain compensation.
- Apply the Sequential and Exception Tests to the Proposed Development, if necessary.
- Assess any potential effects on the flow regime, functionality of the floodplain, and water quality of Langford Brook.
- Prepare a Surface Water Management Strategy (which incorporates SuDS) and a Flood Risk Assessment.

7.3.2 The Study Area for this Chapter principally comprises the Application Site, but extends to the relevant natural and man-made water resource catchments where necessary, i.e. the downstream Langford Brook catchment, and downstream Summerstown Ditch and Launton and Cutters Brook catchment, within which the Application Site is located; and, the Thames Water sewer network area which serves the Application Site.

7.3.3 In addition, all other areas within a 250m radius of the Application Site are included within the Study Area in order to assess the potential effects on relevant identified receptors in upstream areas.

7.3.4 This Chapter considers the existing baseline situation, as at September 2021; the assumed construction stage from 2021 - 2024; and, the post-completion stage from 2025 - 2125 (based on the industry standard assumption of new residential development having a 100 year 'design life').

Data Sources

7.3.5 The scope of this assessment, and the relevant design elements of the Proposed Development, have been informed by:

- A Topographical Survey and walkover survey of the Application Site to establish details including local topography and existing water infrastructure.
- A Desk Study and Preliminary Ground Investigation undertaken at the Application Site to confirm geological and hydrogeological conditions.
- Review of secondary data and mapping sources provided by Cherwell District Council, the EA, and Thames Water.
- Analysis of a flood risk model of Langford Brook provided by the EA.
- Consultation with Cherwell District Council, the EA, the LLFA, and Thames Water.

7.3.6 Consultations with Thames Water have identified that:

- Thames Water's Water Resources Management Plan 2019 (Thames Water, 2019), which covers the period 2020 - 2100, identifies that with the implementation of certain management measures, there are sufficient water resources available to meet the expectant future demand within the supply region, and taking account of the potential implications of climate change.
- There is an existing 350mm diameter trunk water main crossing the eastern portion of the Application Site, and a further 200mm diameter distribution main running parallel to the Application Site along Gavray Drive.

7.3.7 On the basis of the above, it is anticipated that the Proposed Development can be served by the existing potable water infrastructure. Whilst discussions are on-going with Thames Water to ascertain whether any reinforcement works are required in relation to the provision of potable water supply to the Application Site, no significant effects are anticipated and accordingly the consideration of potable water supply as a sensitive receptor has been 'scoped out' of this Chapter.

7.3.8 Taking the above into account, and noting specifically the Scoping Opinion consultation responses of the EA and LLFA, the water resource receptors to be assessed include:

- Flood risk (specifically in relation to flood risk within the Application Site and downstream catchment).
- Surface water drainage (specifically in relation to capacity / flood risk within the Application Site and downstream catchment).
- Foul water drainage (specifically in relation to capacity within the receiving sewer system / Sewage Treatment Works; and, human health, including construction workers, future Application Site occupants, and the general population within the Study Area).
- Water quality (specifically in relation to the Application Site and downstream catchment, including areas of ecological importance).

7.3.9 This Chapter draws on the assessment undertaken within the separate Flood Risk Assessment and Drainage Strategy reports submitted in support of the Planning Application for the Proposed Development (included at Appendix 7.1, 7.2 and 7.3 respectively).

Assessment Approach

7.3.10 To assess the effects of the Proposed Development, a set of threshold criteria has been defined to establish the magnitude, sensitivity and significance of the effects identified.

7.3.11 The magnitude of effects is judged on the consequences of the effect. The assessment of potential magnitude has been made in accordance with the criteria in Table 7.1.

Table 7.1: Magnitude of Effects

MAGNITUDE	Criteria
Large	Total loss or major / substantial alteration to key elements / features of the baseline conditions such that the post-development character / composition / attributes will be fundamentally changed, such as: • Flood risk posed to the Proposed Development and/or surrounding areas. • Capacity within discharge receiving environment, i.e. drainage system and/or waterbody. • Water quality within receiving waterbody.
Moderate	Loss or alteration to one or more key elements / features of the baseline conditions such that post-development character / composition / attributes of the baseline will be materially changed, i.e. loss or alteration to those attributes noted above.
Small	A minor shift away from baseline conditions. Change arising from the loss / alteration will be discernible / detectable, but not material. The underlying character / composition / attributes of the baseline condition will be similar to the pre-development circumstances / situation, i.e. measurable change to those attributes noted above.
Negligible	Very little change from baseline conditions. Change barely distinguishable, i.e. no measurable change to those attributes noted above.

7.3.12 The sensitivity of a receptor is a matter of professional judgement and is based upon the importance and vulnerability of a receptor. Table 7.2 outlines the scale of sensitivity that has been applied to the receptors identified and considered within this assessment.

Table 7.2: Sensitivity of Receptors

SENSITIVITY	Criteria
High	Little ability to absorb effect without fundamentally altering baseline condition, and/or is of international / national importance, such as: • Within Flood Zone 3 / high risk of flooding identified. • No capacity within discharge receiving environment, i.e. drainage system and/or waterbody. • Water quality recorded as 'high' or 'good' within discharge receiving waterbody, underlain by Groundwater Source Protection Zone, and/or areas classified of international / national ecological importance.
Medium	Moderate capacity to absorb effect without significantly altering baseline condition, and/or is of regional importance, such as: • Within Flood Zone 2 / medium risk of flooding identified. • Limited capacity within discharge receiving environment, i.e. drainage system and/or waterbody. • Water quality recorded as 'moderate' within discharge receiving waterbody, underlain by Principal Aquifer, and/or areas classified of regional ecological importance.
Low	Receptor tolerant of effect without detriment to baseline condition, and/or is of local importance, such as: • Within Flood Zone 1 / low risk of flooding identified. • Unlimited capacity within discharge receiving environment, i.e. drainage system and/or waterbody. • Water quality recorded as 'poor' within discharge receiving waterbody, underlain by Secondary Aquifer, and/or areas classified of local ecological importance.
Negligible	Unconstrained capacity to absorb effect without any detriment to baseline condition, and/or is of no importance, such as: • Within Flood Zone 1 / negligible risk of flooding identified. • Indefinite capacity within discharge receiving environment, i.e. drainage system and/or waterbody. • Water quality recorded as 'bad' within discharge receiving waterbody, not underlain by an aquifer, and/or no areas classified of ecological importance.

7.3.13 The significance of a potential effect is based on the combination of the magnitude and sensitivity of that effect, as set out in Table 7.3.

Table 7.3: Significance of Effects

MAGNITUDE	SENSITIVITY			
	High	**Medium**	**Low**	**Negligible**
Large	Major	Major	Moderate	Minor
Moderate	Major	Moderate	Minor	Negligible
Small	Moderate	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

7.3.14 In addition, where an effect is identified it is also assessed as: having a beneficial, adverse or negligible effect; being on a short, medium (duration of construction) or long term (duration of post-completion) basis; being permanent or temporary; and, being on a Site, Local, Borough, County, Regional, England, United Kingdom or International scale.

7.3.15 Those effects identified as 'major' or 'moderate' significance are considered to be 'significant' for the purposes of this assessment.

Uncertainties and Limitations

7.3.16 The assessment process is designed to enable robust decision-making based on the best available information about the environmental implications of a proposed development. However, there will always be some uncertainty as to the exact scale and nature of the environmental effects identified. Where this is the case, this has been highlighted in the assessment of effects. This arises through the level of detail of information available at the time of the assessment and the limitations of the prediction process itself.

7.3.17 The water resource receptors have been defined using a combination of published data sources and project-specific assessments. The availability of published data to inform this assessment is considered robust and therefore this approach is considered acceptable.

7.4 BASELINE CONDITIONS

The Current Baseline

Topography

7.4.1 Ground levels fall in a south-easterly direction from approximately 69.5 metres above Ordnance Datum (m AOD) at the western corner of the Application Site, to around 65.0m AOD adjacent to Langford Brook which flows southwards through the approximate centre of the Application Site. Ground levels then rise eastwards to a high of around 68.2m AOD, before falling towards the eastern Application Site boundary at approximately 64.9m AOD.

7.4.2 A railway embankment bounds the Application Site along its northern and western boundaries.

Hydrology

7.4.3 Langford Brook flows in open channel southwards through the approximate centre of the Application Site. The Brook enters the Application Site through a culvert beneath the railway embankment on the northern boundary, and exits via a culvert on the southern boundary beneath Gavray Drive.

7.4.4 The Brook downstream of the Application Site discharges (in turn) to the River Ray, River Cherwell and eventually the River Thames, and falls within the 'Langford Brook (source to downstream A41)' Water Framework Directive catchment, part of the 'Oxon Ray, Cherwell and Ray, Thames River Basin District'.

7.4.5 Several small drainage ditches and isolated waterbodies (ponds and surface water drainage attenuation infrastructure) are located within/within 250m of the Application Site, including notably:

- A ditch running parallel to the toe of the railway embankment on the northern boundary of the Application Site.
- A ditch to the north of the railway embankment, and a separate ditch to the south-west of the Application Site beyond Gavray Drive.
- Surface water attenuation basins serving the existing residential development to the south of Gavray Drive.
- Several small isolated ponds within the eastern portion of the Application Site, and immediately beyond the eastern Application Site boundary.

7.4.6 Langford Brook is designated as a 'Main River' whilst all other ditches and waterbodies noted above are classified as 'Ordinary Watercourses'.

7.4.7 The ditches and surface water attenuation basins within/within 250m of the Application Site discharge to Langford Brook and therefore fall within the catchment of the Brook. The isolated ponds located within the eastern portion of the Application Site, and immediately beyond the eastern Application Site boundary, are however located within a separate catchment to that of Langford Brook, known as the 'Summerstown Ditch and Launton and Cutters Brook' Water Framework Directive catchment, part of the 'Oxon Ray, Cherwell and Ray, Thames River Basin District'.

7.4.8 The watershed between the two catchments is defined by the area of high land within the eastern portion of the Application Site, such that on a broad scale the eastern portion of the Application Site falls within the 'Summerstown Ditch and Launton and Cutters Brook' Water Framework Directive catchment, whilst the western and central portions of the Application Site fall within the 'Langford Brook (source to downstream A41)' Water Framework Directive catchment.

Hydrogeology

7.4.9 British Geological Survey mapping shows the central portion of the Application Site, immediately adjacent to Langford Brook, to be underlain by superficial Alluvium deposits comprising Clay, Silt, Sand and Gravel. The superficial deposits are classified as a Secondary A Aquifer (defined as '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', and, 'generally aquifers formerly classified as minor aquifers') and as having a 'low' vulnerability (defined as 'areas that provide the greatest protection from pollution', and, 'likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability').

7.4.10 In terms of bedrock geology, broadly: the eastern portion of the Application Site is shown to be underlain by the Peterborough Member comprising Mudstone, defined as 'unproductive'; the central portion of the Application Site by the Kellaways Sand Member, which is classified as a Secondary A Aquifer, and as having a 'high' vulnerability (defined as 'areas able to easily transmit pollution to groundwater', and, 'likely to be characterised by high leaching soils and the absence of low permeability superficial deposits'); and, the western portion of the Application Site by the Kellaways Clay Member, which is defined as 'unproductive'.

7.4.11 No currently active groundwater abstractions are recorded within/within 250m of the Study Area, nor any groundwater source protection zones.

7.4.12 A Desk Study and Preliminary Ground Investigation undertaken at the Application Site (Wardell Armstrong LLP, 2007) identified a relatively shallow groundwater level within the

Application Site (recorded to between 0.1 - 0.7 metres below ground level (m bgl) in places). This is assumed to be perched groundwater on the basis of the geological and topographical conditions at the Application Site.

7.4.13 The results of chemical testing of soil and groundwater samples undertaken as part of the Desk Study and Preliminary Ground Investigation did not identify the presence of any significant contamination issues with respect to human health and controlled water.

Flood Risk

7.4.14 The EA's Flood Map for Planning shows the majority of the Application Site to be within Flood Zone 1 (land assessed as having a less than 1 in 1,000 annual probability of fluvial flooding (<0.1%)).

7.4.15 The lower-lying central portion of the Application Site, adjacent to Langford Brook, is shown to be within Flood Zone 2 (land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of fluvial flooding (1% - 0.1%) and Flood Zone 3 (land assessed as having a 1 in 100 or greater annual probability of fluvial flooding).

7.4.16 A detailed assessment of flood risk, as presented within the Flood Risk Assessment report (included at Appendix 7.1), based on the flood risk model of Langford Brook provided by the EA (which is considered the most-recent and accurate source of detailed flood risk modelling for the Brook), concludes that the majority of the Application Site is at low risk of flooding from Langford Brook. The lower-lying central portion of the Application Site, adjacent to Langford Brook, is however shown to be at risk of flooding in the 1 in 20 year, 1 in 100 year, 1 in 100 year + 35% (climate change allowance applied in accordance with latest EA guidance (Her Majesty's Government, 2020)), and 1 in 1,000 year flood events.

7.4.17 The assessment of other potential sources of flooding posed to the Application Site (i.e. tidal, surface water, groundwater, sewer, and infrastructure failure), as presented within the Flood Risk Assessment report (included at Appendix 7.1), concludes that the Application Site is at low/negligible risk of flooding from all other sources assessed.

Surface Water Drainage

7.4.18 The Application Site is currently undeveloped, with no known positive surface water drainage system currently serving the Application Site. Accordingly, any rainfall unable to infiltrate is currently likely to flow overland across the Application Site, with the prevailing topography, and ultimately discharge to either the 'Summerstown Ditch and Launton and Cutters Brook' catchment (with respect rainfall within the eastern portion of the Application Site), or

Langford Brook (with respect rainfall within the central and western portions of the Application Site).

7.4.19 Calculations undertaken as part of the Drainage Strategy reports (included at Appendix 7.2 and 7.3), indicate an existing surface water run-off rate from the Application Site of 0.8 litres/second/hectare (l/s/ha) in the 'mean annual maxima flood' (QMED), a storm event with a 0.5% annual probability of occurrence (i.e. a 1 in 2 year storm event).

7.4.20 Thames Water sewer records (appended to the Drainage Strategy reports included at Appendix 7.2 and 7.3) show an existing public surface water sewer running along Gavray Drive parallel to the southern boundary of the Application Site. The sewer is shown to discharge to a separate 1125mm diameter public surface water sewer running along Charbridge Lane and continuing along Wretchwick Way to the east and south-east of the Application Site respectively.

Foul Water Drainage

7.4.21 The Application Site is currently undeveloped, and consequently there is no foul water generated within the Application Site as at March 2021.

7.4.22 Thames Water sewer records (appended to the Drainage Strategy reports included at Appendix 7.2 and 7.3) show an existing 225mm diameter public foul water sewer running along Gavray Drive parallel to the southern boundary of the Application Site. The sewer is shown to discharge to a Thames Water foul pumping station located around 270m to the south of the south-eastern corner of the Application Site. The pumping station in turn discharges to Bicester Waste Water Treatment Works (WWTW), located approximately 1.7km to the south-west of the Application Site, via a rising main.

7.4.23 Treated water is discharged from Bicester WWTW to Langford Brook. At the point of discharge, Langford Brook falls within the 'Langford Brook (Bicester to Ray inc. Gagle Brook)' Water Framework Directive catchment.

7.4.24 The Cherwell Water Cycle Study (AECOM, 2017) identifies that Bicester WWTW, under its current operation, would not be able to accommodate the anticipated discharges resulting from new development likely to take place within its catchment up to 2031 (based on that growth projected within The Cherwell Local Plan 2011 - 2031 (Cherwell District Council, 2016), which includes the Proposed Development, in line with its consented discharge volume and quality restrictions.

Surface Water Quality

7.4.25 The water quality of the catchments relevant to this study are as follows (based on classifications awarded in 2019, which constitutes the most-recent data available):

- 'Langford Brook (source to downstream A41)' Water Framework Directive catchment (within which the western and central portions of the Application Site are located):
  - Overall classification: Moderate.
  - Ecological classification: Moderate.
  - Chemical classification: Fail.
  - Reasons for status: principally polluted surface water run-off from agricultural land.
- 'Summerstown Ditch and Launton and Cutters Brook' Water Framework Directive catchment (within which the eastern portion of the Application Site are located):
  - Overall classification: Bad.
  - Ecological classification: Bad.
  - Chemical classification: Fail.
  - Reasons for status: sewage discharge and polluted surface water run-off from agricultural land.
- 'Langford Brook (Bicester to Ray inc. Gagle Brook)' Water Framework Directive catchment (to which Bicester WWTW discharges treated water):
  - Overall classification: Poor.
  - Ecological classification: Poor.
  - Chemical classification: Fail.
  - Reasons for status: sewage discharge (specifically from Bicester WWTW) and polluted surface water run-off from agricultural land.

7.4.26 No statutory designated ecological sites are located within the Study Area.

7.4.27 The Gavray Drive Meadows Local Wildlife Site (non-statutory designation of a site of local ecological importance) is however located within the Application Site.

7.4.28 Two Site of Special Scientific Interest (SSSI), considered to be of national importance, are located within the Langford Brook catchment downstream of Bicester WWTW: Wendlebury Meads and Mansmoor Closes SSSI located approximately 3.6km downstream of Bicester WWTW; and, Otmoor SSSI located around 6.2km downstream of Bicester WWTW.

7.4.29 No currently active surface water abstractions are recorded within/within 250m of the Study Area.

The Projected Future Baseline

7.4.30 Certain baseline conditions within the Study Area, principally topography, hydrology and hydrogeology, are unlikely to alter in the future in the scenario that the Proposed Development was not constructed and operational.

7.4.31 Conversely, the flood risk posed to the Application Site, and the potential surface water run-off rate and volume from the Application Site, could increase in the future as a result of the predicted effect of climate change, regardless of whether the Proposed Development was constructed and operational.

7.4.32 Climate change is integral to the assessment of potential effects and mitigation design in relation to water resources, and therefore the assessment and resulting design of any necessary mitigation measures as part of this Chapter takes into account the anticipated increase in river flows and the potentially larger, more intense and more frequent storms that are predicted.

7.4.33 This Chapter adopts the latest EA climate change guidance which requires the adoption of climate change allowances on a catchment basis, and subject to the 'flood risk vulnerability' and the design life of a proposed development.

7.4.34 The projected future baseline condition of foul water drainage and surface water quality is difficult to quantify in the scenario that the Proposed Development was not constructed and operational, on the basis that such receptors could be altered in the future by external factors currently unknown. Such factors include area-wide interventions/improvement works by relevant bodies (such as Thames Water and the EA); implementation of more or less stringent legislation and guidance; updated technology allowing for improved water treatment; and/or, significant pollution incidents.

7.5 POTENTIAL EFFECTS

Embedded Mitigation

7.5.1 The following outlines the 'embedded mitigation' measures integrated into the design of the Proposed Development and therefore taken into account within the assessment of potential effects (such measures differ from any 'additional mitigation' measures recommended as a result of any adverse significant effects identified through undertaking the ES):

- Flood Risk - the layout of the Proposed Development avoids, as far as possible, those areas of the Application Site assessed to be at risk of flooding from Langford Brook. The proposed layout also provides in excess of an 8.0m stand-off of new development to the top-of-bank of the Brook.

  In addition, where ground levels are proposed to be raised within the floodplain of Langford Brook, a scheme of floodplain compensation is to be undertaken as part of the Proposed Development. Such works comprise the lowering of ground levels elsewhere within the Application Site to provide an equal volume of floodplain storage to that lost as a result of the proposed ground raising.

  The Flood Risk Assessment report (included at Appendix 7.1) provides full details of the flood risk mitigation measures integrated into the design of the Proposed Development.
- Surface Water Drainage - a surface water drainage system will be constructed as part of the Proposed Development. The proposed system entails the discharge of surface water run-off from the Application Site to Langford Brook (for the western portion of the Application Site) and the existing Thames Water public surface water sewer system (for the eastern portion of the Application Site). The peak surface water discharge will be restricted to pre-development run-off rate, with on-site attenuation storage designed to accommodate up to and including the 1 in 100 year storm event, plus a 40% additional allowance for climate change. The Drainage Strategy reports (included at Appendix 7.2 and 7.3) provide full details of the surface water drainage system proposed.
- Foul Water Drainage - a foul water drainage system will be constructed as part of the Proposed Development. The proposed system provides for the discharge of foul water from the Application Site to the existing Thames Water public foul water sewer system along Gavray Drive, parallel to the southern boundary of the Application Site. The Drainage Strategy reports (included at Appendix 7.2 and 7.3) provide full details of the foul water drainage system proposed.
- Surface Water Quality - a surface water drainage system will be constructed as part of the Proposed Development. The proposed system will incorporate water quality treatment chains through implementation of SuDS based mitigation methods in series, resulting in high levels of water treatment and quality at discharge. Such methods include: the use of permeable paving for non-adopted hardstanding areas;

attenuation basins; and, swales. In addition, the system will include catch pits and trapped gullies. The Drainage Strategy reports (included at Appendix 7.2 and 7.3) provide full details of the surface water drainage system proposed.

Construction Stage

Flood Risk

7.5.2 Construction activities, such as ground raising, the placement of temporary structures and/or material stockpiles, and the construction of permanent structures, within the floodplain of Langford Brook, have the potential to result in a loss of floodplain storage and/or the impedance of overland flood flow routes, resulting in the potential increased risk of flooding within the Application Site and Study Area.

7.5.3 The 'embedded mitigation' (in the form of the proposed layout which largely locates the Proposed Development outside those areas of the Application Site assessed to be at risk of flooding from Langford Brook, and the proposed floodplain compensation scheme) however will reduce the likelihood and mitigate the adverse effects posed by ground raising and the construction of permanent structures, within the floodplain of Langford Brook.

7.5.4 There does however remain the potential for temporary structures and/or material stockpiles, associated with construction activities, to be inadvertently located within the floodplain of Langford Brook, which has the potential to increase the risk of flooding within the Application Site and Study Area.

7.5.5 On this basis, whilst the Application Site and downstream catchment is already assessed to be partly at risk of flooding, the construction of the Proposed Development could result in the alteration of the characteristics of such flooding, in terms of frequency, extent, depth or duration of flooding. The effect of the construction of the Proposed Development on flood risk is therefore assessed to be of 'moderate' magnitude, with flood risk considered to be a receptor of 'high' sensitivity (noting that the Application Site and downstream catchment is partly designated as Flood Zone 3), and therefore an adverse 'major' effect is anticipated, on a medium-term basis and temporary in nature, and on a local scale.

Surface Water Drainage

7.5.6 The following construction activities could potentially pose capacity / flood risk issues within the Application Site and Study Area:

- The movement of plant and enabling ground works (i.e. stripped vegetation) could alter the infiltration characteristics of the ground and thereby increase the rate and volume of surface water run-off from the Application Site.

- The discharge of groundwater from any necessary dewatering of excavations (considered likely given the identified relatively shallow groundwater level within the Application Site) could increase the rate and volume of water run-off from the Application Site.
- The construction of buildings, highways and other hard surfaces could increase the rate and volume of surface water run-off from the Application Site, if unmitigated.

7.5.7 Given the topography of the Application Site, any additional flows generated will be directed overland with the prevailing topography, and ultimately discharge to either the 'Summerstown Ditch and Launton and Cutters Brook' catchment (with respect rainfall within the eastern portion of the Application Site), or Langford Brook (with respect rainfall within the central and western portions of the Application Site), which could therefore increase flood risk downstream within either catchment.

7.5.8 Given the above, whilst the Application Site and downstream catchment is already assessed to be partly at risk of flooding, the construction of the Proposed Development could alter the characteristics of such flooding (in terms of frequency, extent, depth or duration of flooding) downstream of the Application Site as a result of increased surface water run-off from the Application Site. The effect of the construction of the Proposed Development on surface water drainage is therefore assessed to be of 'moderate' magnitude, with surface water drainage considered to be a receptor of 'medium' sensitivity (noting that the downstream catchment is designated as Flood Zone 3 and therefore indicative of there being 'limited' capacity), and therefore an adverse 'moderate' effect is anticipated, on a medium-term basis and temporary in nature, and on a local scale.

Foul Water Drainage

7.5.9 Significant volumes of foul water are unlikely to be generated during the construction of the Proposed Development, with any welfare facilities likely to be of a temporary nature with foul water removed from the Application Site for disposal, initially via tanker and then via the new foul drainage system to be installed as part of the Proposed Development (the 'embedded mitigation'). Construction activities will therefore not adversely affect capacity within the receiving foul water network.

7.5.10 The construction of the Proposed Development is consequently assessed to have a 'negligible' magnitude effect on foul water drainage, which is a receptor of 'medium' sensitivity (noting that the receiving drainage system has sufficient, but 'limited', capacity in the baseline situation), and therefore the effect is anticipated to be of 'negligible' significance.

Water Quality

7.5.11 The following construction activities could potentially alter water quality within the Application Site and Study Area:

- Surface water run-off from construction plant movement and enabling ground works areas could result in the mobilisation and generation of contaminated run-off, comprising soil, sediment, and/or other construction materials.
- The accidental spillage of fuels or other contaminating substances could cause polluted run-off.
- The discharge of groundwater from any necessary dewatering of excavations could be contaminated with soil, sediment, and/or other construction materials.
- Whilst no significant contamination issues with respect to human health and controlled water have been identified at the Application Site, the historic agricultural use of the Application Site indicates that the soil may be rich in nutrients such as phosphorus and nitrogen. Construction plant movement, enabling ground works, and groundwater dewatering activities could therefore mobilise any 'residual' organic pollutants.

7.5.12 Given the topography of the Application Site, any contaminated run-off and flows generated will be directed overland with the prevailing topography, and ultimately discharge to either the 'Summerstown Ditch and Launton and Cutters Brook' catchment (with respect run-off within the eastern portion of the Application Site), or Langford Brook (with respect run-off within the central and western portions of the Application Site), which could therefore adversely affect water quality within either catchment, and potentially result in the eutrophication of the receiving watercourses through mobilisation of an 'residual' organic pollutants.

7.5.13 Water quality within the perched groundwater Secondary A Aquifers underlying the Application Site could also be adversely affected.

7.5.14 On the basis of the above, the construction of the Proposed Development could alter the chemical composition of the receiving watercourses and underlying aquifers, thereby adversely affecting the water quality, ecological and chemical status of such waterbodies. The effect of the construction of the Proposed Development on water quality is therefore assessed to be of 'moderate' magnitude, with surface water quality considered to be a receptor of 'medium' sensitivity (noting that the downstream catchment is partly classified as having a 'moderate' overall water quality classification), and therefore an adverse 'moderate' effect is anticipated, on a medium-term basis and temporary in nature, and on a local scale.

Post-Completion Stage

Flood Risk

7.5.15 The Proposed Development will comprise the raising of ground levels and potential placement of permanent structures within the floodplain of Langford Brook, which has the potential to result in a loss of floodplain storage and/or the impedance of overland flood flow routes, resulting in the potential increased risk of flooding within the Application Site and Study Area.

7.5.16 The 'embedded mitigation' (in the form of the proposed layout which largely locates the Proposed Development outside those areas of the Application Site assessed to be at risk of flooding from Langford Brook, and the proposed floodplain compensation scheme) however will reduce the likelihood and mitigate the adverse effects posed by ground raising and the placement of permanent structures, within the floodplain of Langford Brook.

7.5.17 Flood risk modelling of the Application Site 'post-development', i.e. with the ground raising and floodplain compensation works complete, demonstrates that there is no adverse effect on flood risk within the Study Area such that the frequency, extent, depth or duration of flooding is not increased from the baseline condition, and indeed potential flood depths are shown to marginally decrease immediately upstream of the Application Site.

7.5.18 Whilst potential flood depths are shown to increase by up to around 0.08m in the 1 in 100 year + 35% flood event within the Application Site, such flooding is shown to be constrained to that portion of the Application Site currently at risk of flooding in the baseline situation which is to be retained as an ecological area as part of the Proposed Development. The Flood Risk Assessment report (included at Appendix 7.1) provides full details of the 'post-development' flood risk modelling undertaken.

7.5.19 The increased flood risk posed to the ecological area is confirmed as posing no adverse effect on the functioning of that area and as being of no 'significance'.

7.5.20 On this basis, no potential effects that could demonstrably alter the flood risk posed to the Application Site or Study Area have been identified, and therefore the operation of the Proposed Development is assessed to have an effect of 'negligible' magnitude on flood risk, which is a receptor of 'high' sensitivity (noting that the Application Site and downstream catchment is partly designated as Flood Zone 3), and therefore an adverse 'minor' effect is anticipated, on a long-term basis and permanent in nature, and on a local scale.

Surface Water Drainage

7.5.21 The operation of the Proposed Development will result in currently undeveloped permeable land being developed with the construction of buildings, highways and other hard surfaces. Accordingly, this could increase the rate and volume of surface water run-off from the Application Site, if unmitigated.

7.5.22 Given the topography of the Application Site, any additional flows generated will be directed overland with the prevailing topography, and ultimately discharge to either the 'Summerstown Ditch and Launton and Cutters Brook' catchment (with respect rainfall within the eastern portion of the Application Site), or Langford Brook (with respect rainfall within the central and western portions of the Application Site), which could therefore increase flood risk downstream within either catchment.

7.5.23 The 'embedded mitigation', in the form of the proposed surface water drainage system to be installed as part of the Proposed Development, will however intercept, manage and release rainfall run-off from the Application Site at a controlled rate, to ensure post-development peak run-off rates are not increased compared to the baseline situation and hence that additional flows are not discharged to the downstream catchments.

7.5.24 The operation of the Proposed Development is consequently assessed to have an effect of 'negligible' magnitude on surface water drainage, which is a receptor of 'medium' sensitivity (noting that the downstream catchment is designated as Flood Zone 3 and therefore indicative of there being 'limited' capacity), and therefore the effect is anticipated to be of 'negligible' significance.

Foul Water Drainage

7.5.25 The operation of the Proposed Development will result in the generation of foul water within the Application Site.

7.5.26 The new foul drainage system to be installed as part of the Proposed Development ('embedded mitigation' measure) is intended to manage foul water generated within the Application Site and discharge flows to the Thames Water sewer network.

7.5.27 Thames Water's Bicester WWTW (to which foul water from the Application Site would ultimately be discharged), has however been identified to have insufficient capacity to receive and treat the anticipated discharges resulting from new development likely to take place within its catchment, which includes the Proposed Development, in line with its consented discharge volume and quality restrictions, without adversely affecting water

quality within the receiving catchment (the 'Langford Brook (Bicester to Ray inc. Gagle Brook)' catchment).

7.5.28 The Cherwell Water Cycle Study (AECOM, 2017) identifies that the discharge of additional treated water from the WWTW could reduce the Water Framework Directive classification of the catchment. The Study does however conclude that "it is unlikely that the planned increase in growth within the catchment of Bicester WWTW will have a significant detrimental effect on hydrologically sensitive statutory designated sites", specifically the Wendlebury Meads and Mansmoor Closes SSSI located approximately 3.6km downstream of Bicester WWTW; and, Otmoor SSSI located around 6.2km downstream of Bicester WWTW.

7.5.29 On the basis of the above, the construction of the Proposed Development (when considered in isolation) could adversely alter the available capacity of the receiving drainage system, which in turn could adversely alter the chemical composition of the receiving watercourse, thereby adversely affecting the water quality, ecological and chemical status of the waterbody. The effect of the construction of the Proposed Development on foul water drainage is therefore assessed to be of 'moderate' magnitude, with foul water drainage considered to be a receptor of 'medium' sensitivity (noting that the receiving drainage system has 'limited' capacity in the baseline situation), and therefore an adverse 'moderate' effect is anticipated, on a long-term basis and permanent in nature, and on a borough scale.

Water Quality

7.5.30 The following operations could potentially alter water quality within the Application Site and Study Area (including the Gavray Drive Meadows Local Wildlife Site):

- Surface water run-off from highways and other hard surfaces could result in the generation of contaminated run-off, comprising soil, sediment, salt or other particles.
- The accidental spillage of fuels or other contaminating substances could cause polluted run-off.

7.5.31 Given the topography of the Application Site, any contaminated run-off and flows generated will be directed overland with the prevailing topography, and ultimately discharge to either the 'Summerstown Ditch and Launton and Cutters Brook' catchment (with respect run-off within the eastern portion of the Application Site), or Langford Brook (with respect run-off within the central and western portions of the Application Site), which could therefore adversely affect water quality within either catchment.

7.5.32 Water quality within the perched groundwater Secondary A Aquifers underlying the Application Site could also be adversely affected.

7.5.33 The 'embedded mitigation' measure, in the form of the proposed surface water drainage system to be installed as part of the Proposed Development, will include the use of SuDS features, catch pits, and trapped gullies, prior to water being discharged to the downstream catchment. Such measures will remove hydrocarbon pollutants and suspended solids (via settlement), and thereby ensure a high-quality discharge from the Application Site to the downstream catchment.

7.5.34 On this basis, the operation of the Proposed Development is assessed to have an effect of 'negligible' magnitude on surface water quality, which is a receptor of 'medium' sensitivity (noting that the downstream catchment is partly classified as having a 'moderate' overall water quality classification), and therefore the effect is anticipated to be of 'negligible' significance.

7.6 MITIGATION MEASURES

7.6.1 Additional mitigation, compensation and enhancement measures are required in situations where, despite 'embedded mitigation', an adverse 'significant' effect has still been identified.

7.6.2 On the basis of the assessment of potential effects of the construction and operation of the Proposed Development, the following additional mitigation measures are recommended. It is anticipated that such measures will be secured by way of an appropriately worded planning condition or obligation imposed under the planning permission for the Application Site.

Construction Stage

Construction Environmental Management Plan (CEMP)

7.6.3 In order to mitigate the potential adverse effects identified in relation to flood risk, surface water drainage and surface water quality during the construction of the Proposed Development, it is recommended that a Construction Environmental Management Plan (CEMP) be prepared and put in place during the entirety of the construction stage to ensure appropriate management and operational systems are in position to minimise the potential adverse effects identified.

7.6.4 Measures recommended to be undertaken and included in the CEMP include those outlined within the following guidance documents:

- Pollution Prevention Guidelines 1: Understanding Your Environmental Responsibilities - Good Environmental Practices (EA, 2013).
- Pollution Prevention Guidelines 5: Works and Maintenance In or Near Water (EA, 2007).
- Pollution Prevention Guidelines 6: Working at Construction and Demolition Sites (EA, 2012).
- Pollution Prevention Guidelines 8: Safe Storage and Disposal of Used Oils (EA, 2004).
- Pollution Prevention Guidelines 21: Incident Response Planning (EA, 2009).
- Pollution Prevention Guidelines 22: Incident Response Dealing with Spills (EA, 2011).

7.6.5 Whilst withdrawn, and in the absence of replacement guidance, the above documents are still considered relevant and appropriate for reference, and include measures intended to ensure construction activities do not result in the temporary: loss of floodplain storage; increase in the rate and volume of surface water run-off from the Application Site; and/or, generation, mobilisation and transportation of contaminated / polluted run-off.

7.6.6 Specific measures recommended to be included in the CEMP comprise the following:

- Minimisation of the extent of bare soils and establishment of vegetation as soon as practicable.
- Provision of temporary surface water drainage systems including settlement lagoons/tanks, designed to accommodate and provide a degree of treatment and attenuation of surface water run-off and groundwater (from any necessary dewatering of excavations), generated from within the construction area. The guidance recommends that construction stage drainage infrastructure should be separated from permanent drainage system (the 'embedded mitigation'), with the permanent attenuation basins planted and established prior to connection of the new drainage system to ensure that the facilities are not contaminated with the construction surface water run-off.
- Haul roads and material storage areas located outside the Langford Brook floodplain.
- Oil/fuel compounds bunded, and positioned outside the Langford Brook floodplain, with emergency spill kits available.
- Topsoil stockpiles located outside the Langford Brook floodplain, and not left exposed.
- 'Silt curtains' positioned parallel to the banks of Langford Brook.
- Designated compounds provided for the storage of potential contaminants.

Environmental Permits

7.6.7 The 'Main River' designation of Langford Brook requires that temporary construction activities and permanent structures proposed in, over, under or within 8.0m of the top-of-bank of Langford Brook seek prior approval in the form of a 'Flood Risk Activities Environmental Permit' from the EA. The requirement for such a Permit is intended to ensure that: appropriate inspection and maintenance access to the watercourse is retained; the integrity of the watercourse channel is not compromised; and, flood and pollution risks are minimised.

Bicester WWTW Upgrade

7.6.8 The Cherwell Water Cycle Study (AECOM, 2017) states that for Bicester WWTW "to accept, treat and discharge the expected volume of wastewater as a result of growth proposed [within the catchment area of the WWTW] … a new discharge permit will be required". In addition, the Study also notes that "tighter quality conditions would be required for any new discharge permit to meet the water quality objectives [i.e. ensure the Water Framework Directive classification of the 'Langford Brook (Bicester to Ray inc. Gagle Brook)' catchment (to which Bicester WWTW discharges treated water) is not reduced compared to the baseline situation]" and in turn "treatment process upgrades required".

7.6.9 It is highlighted that the Study recommends the above requirements on the basis of all anticipated new development within the catchment area of Bicester WWTW up until 2031, which whilst including the Proposed Development, does not consider the Application Site in isolation. As part of on-going consultations with Thames Water, a 'pre-planning enquiry' will therefore be submitted to Thames Water so as to ascertain network and WWTW capacity at the present time, and thereby confirm whether the WWTW can accommodate the anticipated foul water discharge from the Application Site in its current status, or whether the discharge from the Proposed Development would exceed the capacity threshold of the WWTW. In this eventuality, any off-site reinforcement works (including the potential need for a new discharge permit for the WWTW and/or treatment process upgrades) will be identified by Thames Water, and any such works commenced and completed prior to full occupation of the Proposed Development.

Post-Completion Stage

Drainage System Maintenance

7.6.10 So as to ensure the proposed surface and foul water drainage systems ('embedded mitigation') operate as intended and thereby reduce the likelihood of such systems failing, it is recommended that an appropriate maintenance strategy and programme is put in place for the entirety of the Proposed Development's post-completion stage.

7.7 RESIDUAL EFFECTS

7.7.1 Based on the additional mitigation, compensation and enhancement measures recommended, the potential effects identified pre-mitigation are all concluded to be retained / reduced to a status of posing 'very little change' from the baseline condition, and effectively presenting no demonstrable effect. Accordingly, all residual water resource environmental effects are concluded to have a 'negligible' magnitude of effect, and therefore not be considered 'significant'.

Summary of Effects

7.7.2 The effects identified are summarised in Table 7.4.

Table 7.4: Summary of Effects

Potential Effect	Significance (Pre-Mitigation)	Mitigation Measure	Significance of Residual Effect
Construction Stage			
Flood Risk	**'Major' adverse**	A CEMP to be prepared and put in place during the construction stage, in order to establish management and operational systems so as to minimise the potential effects posed to flood risk during construction. Any temporary construction activities and/or permanent structures proposed in, over, under or within 8.0m of the top-of-bank of Langford Brook, to seek prior approval through a 'Flood Risk Activities Environmental Permit', to ensure, amongst other requirements, that flood risks are minimised as a result of proposed works/structures.	**'Minor' adverse**
Surface Water Drainage	**'Moderate' adverse**	A CEMP to be prepared and put in place during the construction stage, in order to establish management and operational systems so as to ensure surface water run-off is appropriately managed during construction.	**'Negligible'**

Foul Water Drainage	**'Negligible'**	-	**'Negligible'**
Surface Water Quality	**'Moderate' adverse**	A CEMP to be prepared and put in place during the construction stage, in order to establish management and operational systems so as to minimise the potential effects posed to surface water quality during construction. Any temporary construction activities and/or permanent structures proposed in, over, under or within 8.0m of the top-of-bank of Langford Brook, to seek prior approval through a 'Flood Risk Activities Environmental Permit', to ensure, amongst other requirements, that pollution risks are minimised as a result of proposed works/structures.	**'Negligible'**
Post-Completion Stage			
Flood Risk	**'Minor' adverse**	-	**'Minor' adverse**
Surface Water Drainage	**'Negligible'**	An appropriate maintenance strategy and programme to be put in place for the entirety of the Proposed Development's post-completion stage so as to ensure the proposed surface water drainage system operates as intended and thereby reduces the likelihood of the system failing.	**'Negligible'**
Foul Water Drainage	**'Moderate' adverse**	Any necessary off-site reinforcement works to the downstream foul water sewer network and WWTW (including the potential need for a new discharge permit for the WWTW and/or treatment process upgrades) will be identified by Thames Water, and any such works commenced and completed prior to full occupation of the Proposed Development. An appropriate maintenance strategy and programme to be put in place for the entirety of the Proposed Development's	**'Negligible'**

		post-completion stage so as to ensure the proposed foul water drainage system operates as intended and thereby reduces the likelihood of the system failing.	
Surface Water Quality	**'Negligible'**	An appropriate maintenance strategy and programme to be put in place for the entirety of the Proposed Development's post-completion stage so as to ensure the proposed surface water drainage system operates as intended and thereby reduces the likelihood of the system failing.	**'Negligible'**

7.8 CUMULATIVE EFFECTS

7.8.1 This Chapter identifies that the Proposed Development is unlikely to pose any 'significant' adverse effects to the water resource receptors assessed. Consequently, on the basis that the cumulative effect sites adopt similar 'embedded mitigation' and 'additional mitigation' to the Proposed Development (which is considered likely on the basis that such measures are standard requirements for all new major developments under current planning policy / legislation and industry guidance), the cumulative inter-project effects on the water resource receptors assessed is considered to remain of no 'significance'.

7.8.2 In response to the specific request of the EA in their consultation response to the Scoping Opinion request for the Proposed Development (ref. 20/02469/SCOP, dated 11 November 2020), the 'East West Rail' improvement scheme between Bicester and Bedford has been included within the cumulative effect analysis. The 'Water Quality and Flood Risk' section of the ES prepared for the scheme concludes that the residual effects of the proposed scheme on the hydrology, flood risk, water quality, and water resource receptors assessed are either 'minor' or 'negligible', and therefore considered to be of no 'significance'. The cumulative inter-project effects of the Proposed Development, in combination with the cumulative effect sites and including the 'East West Rail' improvement scheme between Bicester and Bedford, on the water resource receptors assessed is therefore considered to remain of no 'significance'.

7.8.3 It is also noted that the cumulative effect of increases in foul water drainage as a result of the Proposed Development in conjunction with other new development within the catchment area of Bicester WWTW is to be managed by the expansion and improvement of the WWTW, or by other means to be agreed with Thames Water following the Planning Application consultation stage. The measures implemented will ensure that the cumulative effect on area-wide foul water treatment is addressed to an acceptable level. With such measures in place, it is anticipated that the cumulative effect of the Proposed Development on foul water drainage will be of no 'significance'.

7.8.4 On the basis that no 'significant' adverse residual effects on the water resource receptors assessed have been identified as resulting from the Proposed Development, intra-project effects have been discounted from further assessment, i.e. as no 'significant' adverse residual effects have been identified, the cumulative effect on receptors such as human health and ecology will not be altered from that determined separately by other topics/Chapters.