Luton Rising
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November 2023

London Luton Airport Expansion

Planning Inspectorate Scheme Ref: TR020001

Volume 5 Environmental Statement and Related Documents

5.02 Appendix 20.2 Water Framework Directive Compliance Assessment

Application Document Ref: TR020001/APP/5.02

APFP Regulation: 5(2)(a)

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

London Luton Airport Expansion Development Consent Order 202x

5.02 ENVIRONMENTAL STATEMENT APPENDIX 20.2 WATER FRAMEWORK DIRECTIVE COMPLIANCE ASSESSMENT

Regulation number:	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference:	TR020001
Document Reference:	TR020001/APP/5.02
Author:	Luton Rising

Version	Date	Status of Version
Issue 01	February 2023	Application issue
Revision 01	November 2023	Additional Submission - Deadline 4

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1 INTRODUCTION

1.1.1 Luton Rising (a trading name of London Luton Airport Limited) (hereafter referred to as the 'Applicant') is submitting an application for development consent for the proposed increase in the capacity of London Luton Airport ('the airport') from 18 mppa to 32 million passengers per annum (mppa) (hereafter referred to as the 'Proposed Development').

1.1.2 This document reports on the compliance of the Proposed Development in accordance with the Water Framework Directive (WFD) (Standards and Classification) Directions (England and Wales) 2015 (Ref. 1), the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref. 2) and the Groundwater (Water Framework Directive) England Direction 2016 (Ref. 3)[1]. It provides evidence to support the conclusion on impacts and effects documented in **Chapter 20** Water Resources and Flood Risk in the Environmental Statement (ES) **[TR02000/APP/5.01]**.

1.1.3 This WFD assessment has been completed based on the consideration of the baseline conditions of the relevant surface water bodies and groundwater body located within the study area for the Proposed Development (refer to **section 3.1.3**). It has been completed based on the latest design information and incorporates consideration of any mitigation measures identified in relation to surface water and groundwater receptors and the drainage strategy for the Proposed Development as described in the Drainage Design Statement provided as **Appendix 20.4** of the ES **[TR020001/APP/5.02].**

1.1.4 The Proposed Development has been considered in combination with other projects, as described in further detail in the Cumulative Effects Assessment provided in **Chapter 21** of the ES **[TR020001/APP/5.01].**

[1] National legislation that transposes the EU Water Framework Directive (WFD) 2000/60/EC.

2 OVERVIEW OF NATIONAL WFD LEGISLATION

2.1 Aims

2.1.1 The Water Framework Directive (WFD) (Standards and Classification) Directions (England and Wales) 2015 (Ref. 1), Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref. 2) and the Groundwater (Water Framework Directive) England Direction 2016 (Ref. 3) outline objectives set to protect and enhance the quality of the water environment across England and Wales. Despite the UK's departure from the EU, the WFD remains relevant as it has been incorporated into domestic law through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref. 2). This legislation outlines the requirement for a holistic approach to the sustainable management of water considering the interactions between surface water, groundwater and water-dependent ecosystems.

2.1.2 Under national legislation, 'water bodies' are the basic management units and are defined as all or part of a river system or aquifer. These water bodies form part of larger River Basin Districts (RBD), for which River Basin Management Plans (RBMPs) are reviewed and revised periodically by the Environment Agency (the 'appropriate agency' for RBDs located wholly in England) and environmental objectives are set. The RBMPs are produced every six years, in accordance with the river basin management planning cycle. The plans were first published in 2009 and last updated in February 2016. Updated plans are anticipated to be published in late 2022/early 2023 and any changes considered during detailed design and construction.

2.1.3 The national legislation requires the appropriate agency (Environment Agency) to undertake a classification of the current condition or 'status or potential' of surface water and groundwater bodies and to set a series of objectives for maintaining or improving conditions so that water bodies maintain or reach 'good status or potential'. The current classification and objectives for water bodies in England are available online on the Catchment Data Explorer (Ref. 4).

2.2 Requirements for new developments

2.2.1 To ensure compliance with the national legislation on WFD waterbodies, decision makers must consider whether proposals for new developments have the potential to:

a. cause a deterioration of a water body from its current status or potential;
b. prevent future attainment of good status or potential where not already achieved;
c. impact on protected or priority species and habitats; and/or
d. provide opportunities to improve the water environment.

2.2.2 If a new development is shown to result in a deterioration in the status of a WFD waterbody (as defined by national legislation), or prevents future attainment of good status or potential, then a Regulation 19 non-compliance assessment

(previously an Article 4.7 derogation) will need to be prepared. This entails documenting the reasons why compliance cannot be achieved taking account of the technical and financial constraints of achieving compliance.

2.3 Determination of status of WFD waterbodies

2.3.1 Surface water bodies and groundwater bodies are defined within national legislation on WFD waterbodies (Ref. 1, Ref. 2 and Ref. 3).

2.3.2 There are three types of surface water body: natural water bodies, heavily modified water bodies (HMWB) and artificial water bodies (AWB). Groundwater bodies are not subdivided based on the level of development undertaken within an area.

2.3.3 The overall status of natural surface water bodies is determined on the basis of their ecological status and chemical status. The overall status of HMWBs and AWBs is classified based on their ecological potential and chemical status. The overall status of groundwater bodies is determined based on their quantitative status and chemical status. **Table 2.1** provides a definition of each of the WFD status classes based on the Thames River Basin District: River Basin Management Plan (Ref. 5).

Table 2.1 Definition of status in the WFD as defined in the Thames River Basin District: River Basin Management Plan

Classification descriptors	Description
High	• Status achieved where the quality elements of the water body correspond to conditions undisturbed by anthropogenic activities. • No restrictions on the beneficial uses of the water body. • No impacts on amenity, wildlife or fisheries.
Good	• Slight change from natural conditions as a result of human activity. Protects all but the most sensitive wildlife. • No restrictions on the beneficial uses of the water body. • No impact on amenity of fisheries.
Moderate	• Moderate change from natural conditions as a result of human activity. • Some restriction on the beneficial uses of the water body. • No impact on amenity. Some impact on wildlife and fisheries.
Poor	• Major change from natural conditions as a result of human activity. • Some restriction on the beneficial uses of the water body. • Some impact on amenity. Moderate impact on wildlife and fisheries.
Bad	• Severe change from natural conditions as a result of human activity. • Significant restriction on the beneficial uses of the water body. • Major impact on amenity. Major impact on wildlife and fisheries with many species not present.

2.4 Surface water body status

2.4.1 Chemical status of surface water bodies is determined based on data collected on site to measure the concentrations of a range of individual substances and groups of substances associated with water quality. The measured concentration of each substance is then compared against the expected concentration if the water body was in a natural state, taking account of the overall conditions in that water body if the catchment was not developed. The classification for each substance is then combined to derive an overall chemical status applying the same status classification.

2.4.2 Ecological status is determined using a similar principle although it is indicator species that are monitored and examined in terms of the departure from natural conditions and expressed using the same 'status' classification descriptors high, good, moderate, poor and bad.

2.4.3 Natural hydromorphological features are considered in terms of ecological status and potential (for HMWB) as hydromorphological variation across and along a watercourse channel is the factor that provides the opportunity for aquatic and marginal habitat variation.

2.5 Groundwater body status

2.5.1 Chemical status for groundwater bodies is determined based on the levels of hazardous substances and pollutants discharged to the groundwater body.

2.5.2 Quantitative status for groundwater bodies is determined based on the degree to which a groundwater body is affected by direct and indirect abstraction.

2.5.3 For groundwater bodies, the overall classification is determined based on the worst case classification from both the chemical and quantitative status.

3 SCOPE OF THE WFD COMPLIANCE ASSESSMENT

3.1.1 The spatial scope of the assessment includes all WFD surface water and groundwater bodies designated under national legislation and located within the study area for the Proposed Development as described in **Chapter 20** Water Resources and Flood Risk of the ES **[TR02000/APP/5.01]**. WFD surface water and groundwater bodies are shown on **Figure 20.4** of the ES **[TR020001/APP/5.03]**.

3.1.2 To capture all receptors with a defined hydraulic connection to the Proposed Development, the study area has been defined as encompassing all water resources receptors located within 1km of the Main Application Site (as defined in **Chapter 2** Site and Surrounding of the ES **[TR020001/APP/5.01],** and shown on **Figure 2.2, Figure 20.1 and Figure 20.2** of the ES **[TR020001/APP/5.03]**). Where it has been identified that there is the potential for hydraulic connection at greater distance, the study area has been extended beyond 1km. The study area encompasses three WFD surface water bodies (shown on **Figure 20.4** of the ES **[TR020001/APP/5.03]**) and a WFD groundwater body, located within the Thames River Basin District. This WFD assessment summarises the assessment methodology and results with respect to achieving compliance with WFD objectives.

3.1.3 The study area of 1km from the Main Application Site has been extended in certain areas to include the following receptors:

a. Flood risk receptors located within 100m of the Off-site Highway Interventions in Hitchin as these are located more than 1km from the Main Application Site. There is one WFD waterbody that has the potential to be affected by off-site works in Hitchin, the River Hiz.

b. Downstream surface water and flood risk receptors identified as in hydraulic connectivity with the underlying aquifer that are located more than 1km from the Main Application Site such as the River Mimram.

3.1.4 The temporal scope is defined, in line with **Chapter 20** Water Resource and Flood Risk of the ES **[TR02000/APP/5.01]**, as:

a. Temporary effects are considered as those impacts that occur over a three year timescale (or less). Temporary effects are considered reversible as the implementation of mitigation measures would fully mitigate the adverse effect on the receptor.

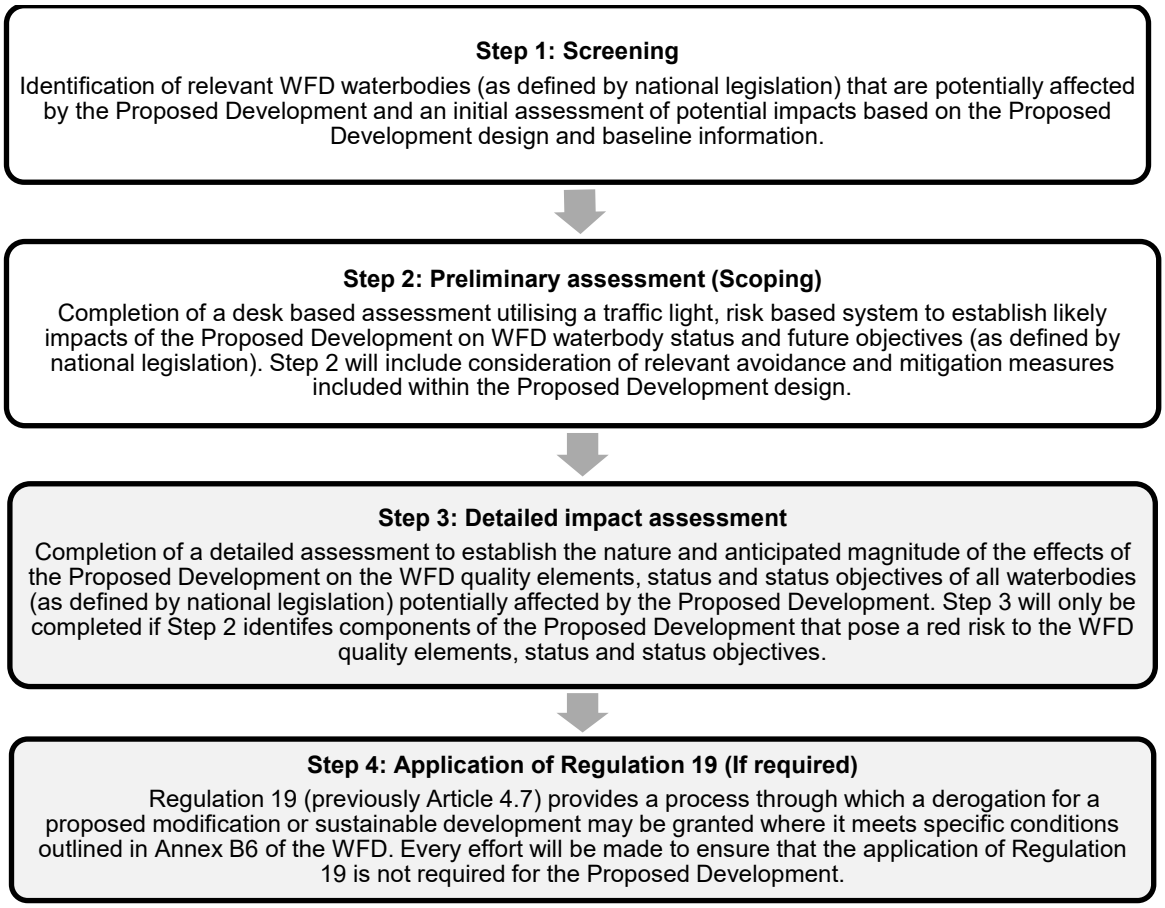
b. Permanent effects are considered to occur over a timescale greater than three years, being more than half of a WFD cycle (six years) and are considered to be irreversible where the implementation of mitigation measures can only reduce the adverse effect on the receptor.

3.1.5 The scope of the WFD compliance assessment, as described above, has been agreed with the Environment Agency in a stakeholder consultation meeting on 1 August 2018 (See **Section 20.4** of **Chapter 20** Water Resources and Flood Risk of the ES **[TR02000/APP/5.01]** for further details).

4 WFD COMPLIANCE ASSESSMENT METHODOLOGY

4.1 Overview

4.1.1 The WFD Compliance Assessment for the Proposed Development has been undertaken as a staged process as outlined in **Inset 1**.



Inset 1: Staged WFD Compliance Assessment Process

4.2 Baseline methodology (Step 1)

4.2.1 The sources used in the desk-based assessment completed as part of this WFD Compliance Assessment include:

a. Environment Agency Catchment Data Explorer (Ref. 4);

b. Thames River Basin District: River basin management plan (Ref. 5); and

c. Luton Airport Expansion Project Hydrogeological Characterisation Report (**Appendix 20.3** of the ES **[TR020001/APP/5.02]**).

4.3 Assessment of compliance (Steps 2 and 3)

4.3.1 The assessment of compliance for the purpose of Step 2 (Preliminary assessment (Scoping)) has been completed based on a risk based, traffic light methodology to determine the impact of different elements of the Proposed Development on WFD status and future objectives as agreed with the

Environment Agency. The assessment has considered impact, after taking into consideration mitigation measures, and as such can be considered residual effects. The assessment methodology has been applied as shown **Table 4.1**. If the Proposed Development was identified as having a medium adverse/beneficial or a high adverse/beneficial impact on the WFD body at Step 2 it has been screened in for further assessment at Step 3 to quantify the impact identified.

Table 4.1 Assessment compliance methodology

Magnitude of impact on WFD waterbody	Criteria
High adverse	Adverse impact of a sufficient scale to impact on status class and/or the future objective as a waterbody scale.
Medium adverse	Localised adverse impact which, when balanced against embedded mitigation, is insufficient to affect status class and/or the future objective at a waterbody scale.
Low adverse	No measurable adverse impact on status class and/or the future objective at a waterbody scale.
Low beneficial	No measurable beneficial impact on status class and/or the future objective at a waterbody scale.
Medium beneficial	Localised beneficial impact which, when balanced against embedded mitigation, is insufficient to affect status class and/or the future objective at a waterbody scale.
High beneficial	Beneficial impact of a sufficient scale to impact on status class and/or the future objective as a waterbody scale.

4.4 Application of Regulation 19 Non-Compliance (Article 4.7 Derogation) (Step 4)

4.4.1 Step 4 is undertaken, as part of the WFD compliance assessment, if after the detailed assessment has been completed (Step 3) it is found that there is a potential deterioration in status of any of the water bodies that is not possible to mitigate. If this occurs, it would be necessary to present the technical reasons to support an application of Regulation 19 Non-Compliance.

5 ASSUMPTIONS AND LIMITATIONS

5.1.1 The WFD Compliance Assessment provided in this report is based on the collation and evaluation of available documentation provided in relation to the WFD waterbodies by a number of stakeholders, including the Environment Agency and the British Geological Society (BGS), and the information provided and referenced in **Chapter 20** Water Resources and Flood Risk of the ES **[TR02000/APP/5.01]** and **Appendix 20.3** Hydrogeological Characterisation Report **[TR02000/APP/5.02]**. Data collection methods are summarised in **Chapter 20** Water Resources and Flood Risk of the ES **[TR02000/APP/5.01]** and **Appendix 20.3** Hydrogeological Characterisation Report **[TR02000/APP/5.02].**

5.1.2 In preparing this assessment, a number of assumptions have been made; these include:

a. Information provided by third parties, including publicly available information and databases, are correct and complete at the time of publication.

b. Any information provided based on surveys and ground investigations that have been completed to inform the ES are assumed to accurately represent baseline conditions.

c. The drainage systems included in the Proposed Development would be maintained according to the appropriate requirements as agreed with the relevant stakeholder organisations and permitting conditions.

d. Engagement with stakeholders on the drainage systems and management measures required in relation to construction and operational activities would be maintained throughout the construction and operational phases.

e. Initial Highways England Water Risk Assessment Tool (HEWRAT) assessments have been undertaken for the Off-site Highway Interventions, which concludes that additional treatment measures will need to be implemented in the detailed design (to be undertaken post-DCO) to pass the HEWRAT assessment. It is assumed that the detailed designs for the highway interventions (to be agreed with the EA and local authorities) will include the relevant measures to pass the HEWRAT assessment.

5.1.3 It is recognised that there will be data gaps and limitations in the designs and baseline data when undertaking the WFD assessment. The WFD assessment has been prepared cognisant of specific data gaps with key assumptions highlighted above.

6 BASELINE CONDITIONS

6.1.1 This section provides a description of the existing WFD surface water and groundwater bodies located in the study area for this assessment. WFD surface water and groundwater bodies are shown on **Figure 20.4** of the ES **[TR020001/APP/5.03]**.

6.1.2 The ecological status and objectives are split into five classes; 'high', 'good', 'moderate', 'poor' and 'bad'. The chemical status is split into two classes; 'good' and 'failing to achieve good'.

6.2 Surface water

River Lee: Lee (from Luton to Hoo Lakes)

6.2.1 The River Lee (or Lea)[2] is located approximately 450m to the south west of the Main Application Site. It is a major tributary of the River Thames and generally flows within an open channel in a south easterly direction. The proposed Off-site Highway Interventions at the A1081 New Airport Way / B653 / Gipsy Lane and the Windmill Road / Manor Road / St Mary's Road / Crawley Green Road gyratory are located on culverted sections of the river.

6.2.2 The River Lee is designated as part of the Lee (from Luton to Luton Hoo Lakes) waterbody (GB106038033391) which is part of the Lee Upper management catchment and is included within the Thames RBD.

6.2.3 The Lee (from Luton to Luton Hoo Lakes) has been designated as a HMWB under national legislation. This designation indicates that the waterbody has been heavily managed and modified by human activity.

6.2.4 The baseline description of the River Lee outlined in the Hydrogeological Characterisation Report (**Appendix 20.3** of the ES **[TR02000/APP/5.02]**) has also indicated that the River Lee is a chalk stream. Chalk streams have unique ecological characteristics and the potential for continuity with the chalk aquifer.

6.2.5 In the 2019 WFD classification Cycle 2 (Ref. 4), the Lee (from Luton to Luton Hoo Lakes) waterbody was classified as achieving a Bad overall WFD status, Bad ecological status and a Fail in chemical status. The Lee (from Luton to Luton Hoo Lakes) currently has an objective to achieve an overall status of Good by 2027.

6.2.6 The Lee (from Luton to Luton Hoo Lakes) is also located in a nitrate vulnerable zone (NVZ) which indicates elevated nitrate concentrations in groundwater and river waterbodies. Major sources of nitrate are fertilisers (associated with agricultural practices), atmospheric decomposition (from fossil fuel combustion and ammonia emissions from farming), leaking water mains and sewage effluent (Ref. 6).

[2] This waterbody is often referred to as the River Lea but in line with **Chapter 20** of the ES **[TR02000/APP/5.01]** it will be referred to as the River Lee in this document.

6.2.7 The 2019 Cycle 2 status classification data for the waterbody are provided in **Table 6.1**.

Table 6.1 Lee (from Luton to Luton Hoo Lakes) - 2019 Cycle 2 status and objectives

Status element	Status (2019)	Status objective
Overall status	**Bad**	**Good by 2027**
Ecological status	Bad	Good by 2027
Supporting elements (Surface water)	Moderate	Good by 2027
Biological quality elements	**Bad**	**Good by 2027**
Fish	Bad	Good by 2027
Invertebrates	Poor	Good by 2027
Hydromorphological supporting elements	**Supports good**	**Supports good by 2015 (Achieved)**
Hydrological regime	Does not support good	Supports good by 2027
Physio-chemical quality elements	**Moderate**	**Good by 2027**
Ammonia	Good	Good by 2015 (Achieved)
Dissolved oxygen	Bad	Good by 2027
pH	High	Good by 2015 (Achieved)
Phosphate	Good	Good by 2015 (Achieved)
Temperature	High	High by 2015 (Achieved)
Specific pollutants status	High	High by 2015 (Achieved)
Chemical	**Fail**	**Good by 2015 (Achieved in 2016, failed in 2019)**
Priority substance status	Good	Good by 2015 (Achieved)
Priority hazardous substance status	Fail	Good by 2015 (Achieved in 2016, failed in 2019)

6.2.8 The reasons documented for status objectives being extended to 2027 are due to being disproportionately expensive and disproportionate burdens.

6.2.9 The reasons provided for not being able to achieve an overall Good status in previous cycles have related to sewage discharge from the water industry, urbanisation, groundwater abstraction, transport drainage and physical modifications associated with flood protection structures.

6.2.10 The water body is currently achieving a Bad ecological status due to:

a. presence of invasive non-native invertebrate species;

b. pressures on invertebrates posed by the presence of dissolved oxygen and ammonia related to intermittent sewage discharges from the water industry; and

c. pressure on fish posed by the presence of nutrients and phosphates.

6.2.11 The water body has achieved a Fail in chemical status primarily attributed to a failure to achieve the appropriate thresholds in relation to priority hazardous substances polybrominated diphenyl ethers (PBDE) and perfluoro octane sulphonate (PFOS). The specific source of these substances has not been determined by the Environment Agency but has been associated with the surrounding urban developments (Ref.5). The use of Sustainable Drainage Systems (SuDS) and rebuild of combined sewer overflows have been identified by the Environment Agency as potential mitigation measures to address these pressures (Ref.5).

River Mimram: Mimram (Whitwell to Codicote Bottom)

6.2.12 The River Mimram is located approximately 3.5km to the east of the boundary of the Main Application Site. The River Mimram flows within an open channel in a southerly direction. The River Mimram is not directly affected by the Proposed Development but has been scoped into the assessment due to its interaction with the chalk aquifer underlying the Main Application Site. The River Mimram is also identified as a chalk stream (Ref.7).

6.2.13 The River Mimram is designated as part of the Mimram (Whitwell to Codicote Bottom) waterbody (GB106038033460). As per the Lee (from Luton to Luton Hoo Lakes) waterbody, the Mimram (Whitwell to Codicote Bottom) waterbody is also part of the Lee Upper Management Catchment and sits within the Thames RBD. The Mimram (Whitwell to Codicote Bottom) has not been designated as artificial or heavily modified.

6.2.14 In the 2019 WFD classification Cycle 2 (Ref.5), the Mimram (Whitwell to Codicote Bottom) waterbody was classified as achieving a Moderate overall WFD status, Moderate ecological status and a Fail in chemical status.

6.2.15 The Environment Agency have identified that due to an unfavourable balance of costs and benefits the Mimram (Whitwell to Codicote Bottom) has been assigned an objective of Moderate overall classification which it achieved in 2015 and maintained in 2019. However, it is noted that the overarching objective of the WFD is to achieve Good status for all designated waterbodies and this has been considered in the completion of this WFD Compliance Assessment.

6.2.16 The 2019 Cycle 2 status classification data (Ref.5) for the waterbody are provided in **Table 6.2**.

Table 6.2 Mimram (Whitwell to Codicote Bottom) - 2019 Cycle 2 classification and objectives

Status element	Status (2019)	Status objective
Overall status	**Moderate**	**Moderate by 2015 (achieved)**
Ecological status	Moderate	Moderate by 2015 (achieved)
Biological quality elements	**Bad**	**Good by 2027**
Macrophytes and Phytobenthos combined	Moderate	Good by 2027
Fish	Good	Good by 2015 (Achieved)
Invertebrates	High	Good by 2015 (Achieved)
Hydromorphological supporting elements	**Supports good**	**Supports good by 2015 (Achieved)**
Hydrological regime	Does not support good	Supports good by 2027
Morphology	Supports good	No objective
Physio-chemical quality elements	**Moderate**	**Good by 2027**
Ammonia	High	Good by 2015 (Achieved)
Dissolved oxygen	High	Good by 2015 (Achieved)
pH	High	Good by 2015 (Achieved)
Phosphate	Poor	Moderate by 2015 (Achieved in 2016, failed in 2019) Good by 2027
Temperature	High	Good by 2015 (Achieved)
Specific pollutants status	High	No objective
Chemical	**Fail**	**Good by 2015 (Achieved in 2016, failed in 2019)**
Priority substance status	Good	Good by 2015 (Achieved)
Priority hazardous substance status	Fail	Good by 2015 (Achieved in 2014, failed in 2019)

6.2.17 The reasons documented for status objectives being either extended to 2027, or set as Moderate by 2015 are due to being disproportionately expensive, disproportionate burdens or an unfavourable balance of costs and benefits.

6.2.18 The Environment Agency have identified that the biological status and macrophytes and phytobenthos quality element are likely to not have achieved their objectives due to pressures associated with nutrients and phosphate contaminating the River Mimram. Specific mitigation measures have been identified in relation to the treatment of phosphorous at sewage treatment works to address this pressure.

6.2.19 The failure in the priority hazardous substance quality element has been attributed by the Environment Agency to issues associated with the discharge of Polybrominated diphenyl ethers (PBDE) to the waterbody (Ref.5). A specific source of this contaminant has not been identified but the Environment Agency has associated this with water industry processes (Ref.5).

6.2.20 Groundwater abstractions have also been identified as posing a potential threat to the hydrological regime, macrophytes and phytobenthos and fish quality elements of this water body.

River Hiz: Hiz (through Hitchin)

6.2.21 The River Hiz is an ordinary watercourse located approximately 7km to the east of the boundary of the Main Application Site and approximately 500m from the Off-site Highway Interventions along with the A602 within Hitchin (as described under Work No. 6e in **Chapter 4** of the ES **[TR02000/APP/5.01]**). The River Hiz is a tributary of the River Great Ouse. The source of the River Hiz is understood to be the underlying chalk aquifer but it is not designated as a chalk stream.

6.2.22 The River Hiz is designated under national legislation as part of the Hiz (through Hitchin) waterbody (GB105033037680). As with the Lee (from Luton to Luton Hoo Lakes) waterbody and the Mimram (Whitwell to Codicote Bottom), the Hiz (through Hitchin) waterbody is also part of the Lee Upper Management Catchment and sits within the Thames RBD. The Hiz (through Hitchin) is designated as a HMWB.

6.2.23 In the 2019 WFD classification Cycle 2 (Ref.5), the Hiz (through Hitchin) waterbody was classified as achieving a Moderate overall WFD status, Moderate ecological status and a Fail in chemical status.

6.2.24 The Environment Agency has identified a target of Good overall WFD waterbody status in 2027 for the Hiz (through Hitchin). The 2019 Cycle 2 status classification data (Ref.5) for the waterbody are provided in **Table 6.3**.

Table 6.3 Hiz (through Hitchin) - 2019 Cycle 2 classification and objectives

Status element	Status (2019)	Status objective
Overall status	**Moderate**	**Good by 2027**
Ecological status	Moderate	Good by 2027
Biological quality elements	**Bad**	**Bad by 2015 (Achieved)**
Macrophytes and Phytobenthos combined	High	Good by 2015 (Achieved)
Fish	Bad	Poor by 2015 (Achieved in 2016, Failed in 2019)
Invertebrates	Poor	Bad by 2015 (Achieved in 2016, Improved to Poor Status in 2019)

Status element	Status (2019)	Status objective
Hydromorphological supporting elements	**Supports good**	**Not assessed (no objective set)**
Hydrological regime	Does not support good	Not assessed (no objective set)
Physio-chemical quality elements	**High**	**Good by 2015 (Achieved)**
Ammonia	High	Good by 2015 (Achieved)
Dissolved oxygen	High	Good by 2015 (Achieved)
pH	High	Good by 2015 (Achieved)
Phosphate	High	Good by 2015 (Achieved)
Temperature	High	Good by 2015 (Achieved)
Specific pollutants status	High	Not assessed (no objective)
Chemical	**Fail**	**Good by 2015 (Achieved in 2016, failed in 2019)**
Priority substance status	Good	Good by 2015 (Achieved)
Priority hazardous substance status	Fail	No objective set.

6.2.25 The reasons documented for status objectives being either extended to 2027, or set as Bad or Poor by 2015 are due to being disproportionately expensive, disproportionate burdens or good status being prevented by Artificial/Heavily Modified Water Body (A/HMWB) designated use (e.g. action to get biological element to good would have significant adverse impact on use).

6.2.26 The Environment Agency have identified that the invertebrate and fish quality elements are likely to not have achieved good status due to pressures associated with transport drainage, North American signal crayfish (as an invasive non-native species), urban development and physical modifications affecting the continuity of habitats for fish species. The Environment Agency have identified the need for a mitigation measures assessment for these impacts but no further information has been provided detailing the specific nature of the mitigation measures.

6.3 Groundwater

Upper Lee Chalk

6.3.1 The Principal Aquifer underlying the Proposed Development is designated under the WFD as the Upper Lee Chalk (GB40601G602900) groundwater body. The Upper Lee Chalk groundwater body is located within the Lee Upper GW operational catchment which sits within the Thames Groundwater management catchment which in turn is within the Thames RBD. The Upper Lee Chalk groundwater body also lies within a drinking water protected and safeguarded area, and in a NVZ.

6.3.2 The Hydrogeological Characterisation Report (**Appendix 20.3** of the ES **[TR02000/APP/5.02]**) provides a detailed hydrogeological baseline of the Proposed Development study area. This indicates that there is a groundwater divide in the Upper Lee Chalk within the study area. The location of this groundwater divide indicates that the existing airport infrastructure is located within the River Lee catchment, whereas the area of the Proposed Development to the east of the existing airport is located within the River Mimram catchment.

6.3.3 In the 2019 Cycle 2 classification (Ref.5), the overall status of the Upper Lee Chalk water body was classified as Poor on the basis that the quantitative status and chemical status have been identified as Poor.

6.3.4 The Environment Agency has indicated that an overall water body objective of Poor in 2015 was designated due to an unfavourable balance of costs and benefits (Ref.5).

6.3.5 However, it is noted that the overarching objective for all waterbodies assigned under the national legislation for the WFD waterbodies is to achieve Good status and this has been considered in the completion of this WFD Compliance Assessment.

6.3.6 The 2016 Cycle 2 status classification data for the waterbody are provided in **Table 6.4**.

Table 6.4 Upper Lee Chalk - 2019 Cycle 2 classification and objectives

Status element	Status (2019)	Status objective
Overall status	**Poor**	**Poor by 2015 (Achieved)**
Quantitative status	**Poor**	**Poor by 2015 (Achieved)**
Quantitative saline intrusion	Good	Good by 2015 (Achieved)
Quantitative water balance	Poor	Poor by 2015 (Achieved)
Quantitative Groundwater Dependent Terrestrial Ecosystems (GWDTEs)	Good	Good by 2015 (Achieved)
Quantitative dependent surface water body status	Poor	Poor by 2015 (Achieved)
Chemical status	**Poor**	**Good by 2027**
Chemical drinking water protected area	Poor	Good by 2027
General chemical test	Poor	Good by 2027
Chemical GWDTEs	Good	Good by 2015 (Achieved)
Chemical dependent surface water body status	Good	Good by 2015 (Achieved)
Chemical saline intrusion	Good	Good by 2015 (Achieved)

6.3.7 The quantitative water balance and quantitative dependent surface water body quality elements have been classified as Poor due to pressures associated with

the abstraction of water from groundwater by the water industry and to provide public water supplies.

6.3.8 The classification of the chemical status of the waterbody as Poor has been attributed by the Environment Agency to the following pressures:

a. contamination associated with urban development and transport assets;
b. poor nutrient management in agricultural and rural land management practices; and
c. contamination associated with manufacturing and industrial practices.

6.3.9 The Environment Agency have proposed the following mitigation measures to address these pressures:

a. improved chemical storage and utilisation practices;
b. remediation of contaminated land and groundwater;
c. assessment and re-design of local sewerage systems and upgrades to an existing private sewage treatment works in the catchment; and
d. implementation of catchment sensitive farming practices.

7 ASSESSMENT

7.1 Step 1: Screening

River Lee: Lee (from Luton to Luton Hoo Lakes)

Construction

Main Application Site

7.1.1 Construction activities completed during assessment Phases 1, 2a and 2b of the Proposed Development in the Main Application Site have the potential to impact the quality of the underlying aquifer. As the River Lee is a chalk stream and interacts with the underlying aquifer it would potentially be indirectly affected by any changes to the underlying aquifer. Therefore, the assessment of the potential impact of construction activities on the River Lee is screened in for further assessment at Step 2.

Off-site works

7.1.2 Construction activities associated with the Off-site Highway Interventions at A1081 New Airport Way / B653 / Gipsy Lane and the Windmill Rd / Manor Rd / St. Mary's Rd / Crawley Green Rd (as described in **Chapter 4** of the ES **[TR020001/APP/5.01]**) have the potential to affect the River Lee by adversely altering the water quality. The existing highways drainage can act as a pathway for construction pollution which may discharge into the waterbody. The assessment of the potential impact of construction activities associated with the Off-site Highway Interventions is therefore screened in for further assessment at Step 2.

Operation

Main Application Site

7.1.3 In assessment Phase 1 of the Proposed Development, surface water discharge from the new Car Park P7 (as shown in the Overview Layout plan for 21.5 mppa as provided in the Drainage Design Statement (**Appendix 20.4** of the ES **[TR020001/APP/5.02]**) and an area to the north of the runway (which currently discharges to the central soakaway) would discharge to the Thames Water surface water sewerage network which ultimately discharges to ground.

7.1.4 For the main Phase 2 works, there are two drainage options. A preferred option where foul water from T2 and contaminated surface water is discharged to the Thames Water foul network, and a reserve option where foul water and contaminated surface water is treated on site and then discharged to ground, via infiltration tanks.

7.1.5 During assessment Phases 2a and 2b, for the reserve option the quality of the underlying aquifer may be impacted during operation due to the discharge of surface water runoff and treated foul water to ground via infiltration tanks and permeable paving. As the River Lee is a chalk stream and interacts with the underlying aquifer, it has the potential to be indirectly impacted by any changes

to groundwater quality. For the preferred option, foul water and/or contaminated surface water would be discharged to the Thames Water foul network where it will ultimately be treated at East Hyde Sewage Treatment Works and discharged to the River Lee. Active monitoring and discharge control will be implemented to ensure no discharge to the Thames Water foul network of attenuated contaminated surface water from Tank 1 during high flow conditions, i.e. when identified existing Combined Sewer Overflow's (CSO´s) on the drainage route are in operation.

7.1.6 Therefore, the assessment of the potential impact of the operational activities in the Main Application Site for assessment Phases 1, 2a and 2b on the Lee (Luton to Luton Hoo Lakes) waterbody is screened in for further assessment at Step 2.

Off-site works

7.1.7 The proposed Off-site Highway Interventions in assessment Phase 2a at the A1081 New Airport Way / B653 / Gipsy Lane and the Windmill Rd / Manor Rd / St. Mary's Rd / Crawley Green Rd (as described in **Chapter 4** of the ES **[TR020001/APP/5.01]**) are located on culverted sections of the River Lee. Runoff from the Off-Site Car Parks (P1 and P2) is assumed to discharge to the River Lee during assessment Phases 1, 2a and 2b.

7.1.8 Therefore, the Lee (Luton to Luton Hoo Lakes) waterbody has the potential to be affected by the works associated with the off-site works and is screened in for further assessment in Step 2.

River Mimram

Construction

Main Application Site

7.1.9 Construction activities completed during assessment Phases 1, 2a and 2b in the Main Application Site have the potential to impact the quality of the underlying aquifer. As the River Mimram is a chalk stream and interacts with the underlying aquifer it would potentially be indirectly affected by any changes to the underlying aquifer. Therefore, the assessment of the potential impact of construction activities on the Mimram (Whitwell to Codicote Bottom) WFD waterbody is screened in for further assessment in Step 2.

Off-site works

7.1.10 The works associated with all of the proposed Off-site Highway Interventions have not been identified as having any direct effects on the River Mimram and would not involve any works that would directly interact with the underlying aquifer which could result in indirect effects on the River Mimram. Therefore, the assessment of the potential impact of off-site works on the Mimram (Whitwell to Codicote Bottom) WFD waterbody is screened out for further assessment in Step 2.

Operation

Main Application Site

7.1.11 There would be no direct impacts on the Mimram (Whitwell to Codicote Bottom) as a result of the Proposed Development due to the distance between the works and the actual watercourse.

7.1.12 During assessment Phases 2a and 2b, the quality of the underlying aquifer may be impacted during operation due to the discharge of potentially contaminated surface water runoff and foul water to ground via infiltration tanks and permeable paving. As the River Mimram is a chalk stream and interacts with the underlying aquifer, it has the potential to be indirectly impacted by any changes to groundwater quality.

7.1.13 Therefore, the assessment of the potential indirect impact of the assessment Phase 2a and 2b works only on the Mimram (Whitwell to Codicote Bottom) waterbody is screened in for further assessment in Step 2.

Off-site works

7.1.14 There would be no direct or indirect impacts on the Mimram (Whitwell to Codicote Bottom) as a result of the Proposed Development due to the distance between the works and the actual watercourse. Therefore, the assessment of the potential impact of off-site works on the Mimram (Whitwell to Codicote Bottom) WFD waterbody during operation is screened out for further assessment in Step 2.

River Hiz: Hiz (through Hitchin)

Construction

Main Application Site

7.1.15 The River Hiz is located approximately 7km to the east of the boundary of the Main Application Site and there are no construction activities due to be completed during Phases 1, 2a and 2b of the Proposed Development that have the potential to impact the Hiz (through Hitchin) WFD waterbody. The potential impact of construction activities on the River Hiz is screened out for further assessment at Step 2.

Off-site works

7.1.16 Construction activities associated with the off-site highway interventions in assessment Phases 2a and 2b at A505 Moormead Hill / B655 Pirton Rd / Upper Tilehouse Street, A602 Park Way / A505 Upper Tilehouse Street, and A602 Park Way / Stevenage Road (as described in **Chapter 4** of the ES **[TR020001/APP/5.01]**) have the potential to affect the River Hiz as a result of changes in water quality associated with highway drainage which may discharge into the waterbody. The assessment of the potential impact of construction activities associated with the off-site highway interventions is therefore screened in for further assessment at Step 2.

Operation

Main Application Site

7.1.17 The River Hiz is located approximately 7km to the east of the boundary of the Main Application Site and there are no operational activities due to be completed during assessment Phases 1, 2a and 2b of the Proposed Development that have the potential to impact the Hiz (through Hitchin) WFD waterbody. The potential impact of construction activities on the River Hiz is screened out for further assessment at Step 2.

Off-site works

7.1.18 The A505 Moormead Hill / B655 Pirton Rd / Upper Tilehouse Street, A602 Park Way / A505 Upper Tilehouse Street, and A602 Park Way / Stevenage Road (as described in **Chapter 4** of the ES **[TR020001/APP/5.01]**) Off-site Highway Interventions proposed in assessment Phases 2a and 2b are located approximately 500m from an open section of the River Hiz. Therefore, the Hiz (through Hitchin) waterbody has the potential to be affected by the works associated with the off-site works and is screened in for further assessment in Step 2.

Upper Lee Chalk

Construction

Main Application Site

7.1.19 The quality of the underlying aquifer may be impacted during the construction of the Proposed Development due to an increase in pollutant and sediment loading in runoff across the Main Application Site associated with construction activities. Excavation and piling works in assessment Phases 2a and 2b also have the potential to mobilise contaminants across the Main Application Site that could discharge to the underlying aquifer.

7.1.20 The remediation works in assessment Phases 2a provide an opportunity to remove potential sources of contaminants that could be harmful to the underlying aquifer across the Main Application Site.

7.1.21 The assessment of the potential impact of construction activities on the Upper Lee Chalk WFD waterbody is therefore screened in for further assessment in Step 2.

Off-site works

7.1.22 The works associated with all of the proposed Off-site Highway Interventions would not involve any construction works that would directly interact with the underlying aquifer. However, there is potential for contaminated runoff during construction to discharge into gully drains and soak away to groundwater.

7.1.23 Therefore, there is the potential for the Upper Lee chalk waterbody to be indirectly affected by the works associated with the proposed Off-site Highway Interventions and is screened in for further assessment in Step 2.

Operation

Main Application Site

7.1.24 In assessment Phase 1, there is the potential for an increase in pollutant loading in the runoff discharged from the Main Application Site to ground via the existing central soakaway (as shown in the Drainage Design Statement, **Appendix 20.4** of the ES **[TR020001/APP/5.02]**). This has the potential to impact the quality of the underlying aquifer.

7.1.25 In assessment Phases 2a and 2b, surface water runoff from across the Main Application Site would be discharged to ground via infiltration tanks and permeable paving for new car parks. In addition, treated contaminated surface water and treated foul water may also be discharged to ground if the reserve drainage design option is implemented. This has the potential to impact the quality of the underlying aquifer.

7.1.26 Therefore, the assessment of the potential impacts of the Main Application Site on the Upper Lee Chalk WFD waterbody is screened in for further assessment in Step 2.

Off-site works

7.1.27 The works associated with all of the proposed Off-site Highway Interventions would not involve any construction works that would directly interact with the underlying aquifer. However, there is potential for contaminated runoff from the highways affected to discharge into gully drains and soak away to groundwater. The assessment of potential impacts of the off-site works on the Upper Lee Chalk WFD waterbody is therefore screened in for further assessment in Step 2.

Step 1: Screening summary

Table 7.1 Step 1 screening summary

WFD Waterbody	Screened in for preliminary impact assessment? (Y/N)
River Lee: Lee (from Luton to Luton Hoo Lakes)	
Construction	Y (Main Application Site and off-site works)
Operation	Y (Main Application Site and off-site works)
River Mimram: Mimram (Whitwell to Codicote Bottom)	
Construction	Y (Main Application Site only) N (off-site works)
Operation	Y (Main Application Site only) N (off-site works)
River Hiz: Hiz (through Hitchin)	
Construction	N (Main Application Site) Y (off-site works only)
Operation	N (Main Application Site) Y (off-site works only)

WFD Waterbody	Screened in for preliminary impact assessment? (Y/N)
Upper Lee Chalk	
Construction	Y (Main Application Site and off-site works)
Operation	Y (Main Application Site and off-site works)

7.2 Step 2: Preliminary assessment (Scoping)

River Lee: Lee (From Luton to Luton Hoo Lakes)

Construction

Main Application Site and off-site works

7.2.1 The Code of Construction Practice (CoCP) provided as **Appendix 4.2** of the ES **[TR020001/APP/5.02]** outlines the requirements for lead contractors to prepare a Construction Surface Water Management Strategy (CSWMS) as part of their Environmental Management System (EMS) to protect the quality of surface and groundwater resources during construction.

7.2.2 The CSWMS will include, but is not limited to, the following:

a. identification of water resources within the area including those identified in **Section 20.7** of the ES **[TR020001/APP/5.01]** (including source protection zones) which could be affected during the construction works;

b. identification of sources of potential pollution (identified on relevant drawings);

c. development of plans that reduce the risk of potentially polluting material leaving the site in an uncontrolled manner as far as reasonably practical, and is to cross reference the Pollution Incident Control Plan (refer to **Section 6.3** of **Appendix 4.2** of the ES **[TR020001/APP/5.02]**);

d. compliance with the British Standard BS 6031 Code of Practice for earthworks (Ref. 8) regarding the general control of site drainage;

e. precautions to be taken to prevent damage to services and control pollution during service diversions, excavation ground penetration and tunnelling;

f. precautions to be taken when working adjacent to watercourses where appropriate, to manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column; and

g. consideration of good practice guidance, including (but not limited to):

i. The Design Manual for Roads and Bridges (DMRB) LA113: Road drainage and the water environment (Ref. 9);
ii. The SuDS Manual (C753) (Ref. 10);
iii. Control of water pollution from construction sites: Guidance for consultants and contractors (C532), (Ref. 11); and

iv. The Environment Agency's PPGs[3] (Ref. 12), including but not limited to:
    i. PPG1: General Guide to Prevention of Pollution; and
    ii. PPG5: Works and maintenance in or near water.

7.2.3 The CoCP also requires the lead contractor to adhere to the Environment Agency's Groundwater protection guides (previously GP3) (Ref. 13).

7.2.4 The following guidance would also be followed during construction to ensure a good practice approach to managing potential impacts on surface water and groundwater quality:

a. The Environment Agency Guidance on pollution prevention:
    i. Prevention of pollution for businesses (Ref. 14);
    ii. Reporting an environmental incident (Ref. 15);
    iii. Getting permission to discharge to surface or groundwater (Ref. 16);
    iv. Storage of oil (Ref. 17);
    v. Oil storage regulations (Ref. 18);
    vi. Discharging sewage with no mains drainage (Ref. 19);
    vii. Works on or near water (Ref. 20); and
    viii. Manage water on land (Ref. 21).

7.2.5 The implementation of these measures during construction would reduce the risk of having a measurable adverse impact on the WFD status of the Lee (from Luton to Hoo Lakes) and enable the achievement of the future objective defined for the waterbody during construction. Therefore, with the pollution prevention measures implemented, the construction of the Proposed Development in assessment Phases 1, 2a and 2b would result in a **low adverse impact** on the Lee (from Luton to Hoo Lakes) WFD waterbody. The low adverse impact (the lowest magnitude from the agreed assessment methodology) in this instance means *'No measurable adverse impact on status class and/or the future objective at a waterbody scale'*. As such there would be no deterioration of the water body.

Operation

Main Application Site

7.2.6 In assessment Phase 1 of the Proposed Development (currently programmed to be constructed from 2025 to 2027, with increase in passenger capacity from 18 to 21.5 mppa), the drainage strategy aims to primarily utilise existing infrastructure with water efficiency measures and rainwater harvesting implemented to mitigate the increase in water demand from additional passengers.

[3] It is recognised that the Environment Agency archived the PPGs in 2015 and now references the guidance available on the Gov.uk website. However, the view of the Future LuToN project team is that the PPGs still provide useful environmental good practice guidance that should be referenced in the CoCP.

7.2.7 In assessment Phases 2a and 2b, water efficiency measures and reuse of surface water for non-potable water requirements would prevent an increase in abstraction from the public water supply network during operation.

7.2.8 Discharge to the central soakaway would decrease overall during assessment Phase 1 based on the following (net decrease of discharge catchment area by 34,950m^2):

a. roof rainwater harvesting would reduce the discharge catchment area by 14,600 m^2;

b. the discharge catchment area of the existing long stay car park (Zone G – P5) would be reduced by 64,600 m^2; and

c. the discharge catchment area of the proposed aprons would increase by 44,250m^2.

7.2.9 Discharge to the northern soakaway or Thames Water operated soakaway asset (outside the existing airport footprint) would increase during assessment Phase 1 based on the following (net increase of 11,500m^2):

a. roof rainwater harvesting would reduce the discharge catchment area by 57,000m^2;

b. additional car park area (Zone F - P7) which would increase discharge to the northern soakaway covers a total area of 68,500m^2.

7.2.10 Overall, the discharge to ground during assessment Phase 1 would not increase due to operational activities.

7.2.11 The reduction in rainwater infiltration and increase in apron runoff has the potential to adversely impact the discharge quality at the soakaway locations. To mitigate quality impacts, a series of in-line treatment operations are proposed together with live monitoring (with contaminated water diverted to Thames Water (TW) foul network).

7.2.12 Full retention separators would be implemented for all runoff from aprons, taxiways and the runway, prior to discharge to the surface water network. Bypass separators would be utilised in areas for short term parking or roadways. Permeable paving is proposed in the areas of the long term car parks, which would include a bio-membrane that would treat fuel and oil leaks, and include storage in the paving build up.

7.2.13 Live monitoring of contaminants during Phase 1 is proposed to mitigate quality impacts on the central soakaway and divert contaminated flow to the TW foul network when detected. Detection levels are to be confirmed through discussions with relevant stakeholders during the environmental permitting process, with the relevant monitoring equipment installed and maintained as required.

7.2.14 The main drainage infrastructure would be installed in assessment Phase 2a of the Proposed Development (assessment Phase 2 currently programmed to be constructed from 2033 to 2041, with increase in passenger capacity from 21.5 to 32 mppa by 2043). This would include the installation of the new water

treatment plant (WTP), attenuation tanks and underground infiltration tanks for the Proposed Development as shown in the Overview Layout plans for 27 mppa and 32 mppa provided in the Drainage Design Statement (**Appendix 20.4** of the ES **[TR020001/APP/5.02]**).

7.2.15 The drainage strategy for assessment Phases 2a and 2b is summarised below:

a. Landside surface water runoff – Runoff from the new terminal building and car parks would be directed into an attenuation tank prior to the 'untreated' infiltration tank or permeable paving. Any contamination would pass through a passive treatment train before entering the attenuation tank prior to infiltration. Permeable paving is proposed to treat any leaks and spills on the car parks through a series of filter beds before infiltrating.

b. Airside surface water runoff – Runoff would also be directed towards the infiltration tank documented above, however the water quality would be continuously monitored and diverted to a storage tank for treatment at the proposed WTP (reserve option) or for discharge to Thames Water (preferred option) when de-icing trigger levels are reached. If the reserve option is implemented, the water would subsequently discharge to the treated effluent infiltration tank.

c. T2 waste water – It is intended that all foul water from the terminal is discharged to the Thames Water network (preferred option). A reserve option includes the treatment of the foul water at the WTP. Treated foul water would then be channelled to the treated effluent infiltration tank.

7.2.16 The location of the infiltration tanks, WTP and attenuation tanks are summarised in the Drainage Design Statement, together with further description of the treatment processes to be implemented at the WTP (**Appendix 20.4** of the ES **[TR020001/APP/5.02]**).

7.2.17 The drainage system for the fire training ground would be self-contained. Surface water runoff would discharge to soakaway unless real time monitoring determines the presence of contaminants. During fire training activities, surface water runoff would be diverted to a holding tank and would not drain to ground under any circumstances. Effluent generated from fire activities (containing foam and hydrocarbon breakdown constituents) would be directed into the existing public foul sewerage system (subject to the necessary consents) or tankered away for appropriate treatment.

7.2.18 The storage tanks at the new fuel storage facility would be surrounded by a bund. Surface water would drain through petrol interceptors with sensors to measure water quality. If contamination trigger levels are exceeded, the water would be diverted away from the infiltration tank and towards the WTP or Thames Water network. Following treatment, it would then be discharged to the treated infiltration tank or Thames Water network. If a substantial leak occurred from the tanks, then the drainage would close completely and the fuel spill would be tankered off-site for treatment.

7.2.19 The installation of the drainage infrastructure would enable the appropriate treatment of surface water (and foul water for the reserve option) prior to

discharge to the underlying aquifer (i.e. the proposed discharges would be non-polluting). On the basis that the system is appropriately implemented and maintained, this would result in no measurable indirect impacts of the water quality of the River Lee in assessment Phases 2a and 2b.

7.2.20 On the basis of the preliminary assessment with mitigation implemented to prevent discharge of contaminated water to ground and control peak discharge, there would be no measurable impacts on the WFD status of the Lee (from Luton to Luton Hoo Lakes) and the achievement of the future objective defined for the waterbody during operation. Therefore, the operation of the Proposed Development in assessment Phases 1, 2a and 2b would result in a **low adverse impact** on the Lee (from Luton to Luton Hoo Lakes) WFD waterbody. The low adverse impact (the lowest magnitude from the agreed assessment methodology) in this instance means *'No measurable adverse impact on status class and/or the future objective at a waterbody scale'*. As such there would be no deterioration of the water body.

Off-site works

7.2.21 The proposed Off-site Highway Interventions in assessment Phase 2a at the A1081 New Airport Way / B653 / Gipsy Lane and the Windmill Rd / Manor Rd / St. Mary's Rd / Crawley Green Rd (as described in **Chapter 4** of the ES **[TR020001/APP/5.01]**) are located on culverted sections of the River Lee in assessment Phase 2a.

7.2.22 The drainage design for the Off-site Highway Interventions would be developed during detailed design prior to construction in accordance with contemporary standards of sustainable drainage design which will ensure drainage run-off is treated to an acceptable level. The design principles to be adhered to are outlined in the Design Principles [**TR020001/APP/7.09**] which is a live document through the examination process. This design would provide improvements required to mitigate any potential changes to water quality as a result of the Off-site Highway Interventions. Therefore, the operation of the off-site works would result in a **low adverse impact** on the Lee (from Luton to Luton Hoo Lakes). The low adverse impact (the lowest magnitude from the agreed assessment methodology) in this instance means *'No measurable adverse impact on status class and/or the future objective at a waterbody scale'*. As such there would be no deterioration of the water body.

River Mimram: Mimram (Whitwell to Codicote Bottom)

Construction

Main Application Site

7.2.23 As outlined in paragraphs **7.2.1-7.2.4**, the CoCP and CSWMS would include measures and reference to appropriate guidance to minimise the risk of adverse impacts on surface water quality and the underlying aquifer.

7.2.24 The processing and treatment of a portion of the former landfill waste prior to reuse in assessment Phase 2a would provide the opportunity to remove potential sources of contaminants. This would result in a low beneficial impact

on the underlying aquifer. As the historic landfill is located within the Mimram groundwater catchment, this would lead to an indirect beneficial effect on the River Mimram.

7.2.25 The implementation of the CoCP would reduce the risk of having a measurable adverse impact on the WFD status of the River Mimram, whilst the processing and treatment of the former landfill waste during construction would result in a locally beneficial impact to the aquifer. Overall the effect of the Proposed Development on the River Mimram is considered **low adverse**. This is a precautionary assessment balancing the low beneficial effect of removing potentially polluting matter contained within the existing land fill and the low adverse effect of potential pollution during construction. The low adverse impact (the lowest magnitude from the agreed assessment methodology) in this instance means *'No measurable impact on status class and/or the future objective at a waterbody scale'*. As such there would be no deterioration of the water body.

Operation

Main Application Site

7.2.26 The drainage design strategy is described in detail in the Drainage Design Statement (**Appendix 20.4** of the ES **[TR020001/APP/5.02]**).

7.2.27 The installation of the main drainage infrastructure and associated embedded mitigation measures during assessment Phase 2a as described in paragraphs **7.2.14-7.2.19** would reduce the risk of there being a measurable indirect impacts on the water quality of the River Mimram in assessment Phases 2a and 2b as a result of changes to the groundwater quality in the underlying aquifer.

7.2.28 In assessment Phases 2a and 2b, a capping layer would be provided for the extent of the historic landfill affected by operational activities to minimise surface water infiltration into the underlying waste and prevent generation of future landfill leachate. The majority of the capping layer would be installed during assessment Phase 2a. The implementation of the capping layer on the landfill would result in a beneficial impact on the quality of the underlying aquifer. As the historic landfill is located within the Mimram groundwater catchment, this would lead to an indirect beneficial effect on the River Mimram.

7.2.29 Overall the effect of the Proposed Development on the River Mimram is considered **low adverse.** This is a precautionary assessment balancing the **low beneficial** effect of removing potentially polluting matter contained within the existing land fill and the **low adverse** effect of infiltrating treated effluent into the aquifer which is continuity with the River Mimram. This is on the basis that the water quality of the discharges from the proposed soakaways has been sufficiently treated as to not affect the groundwater body chemistry. The low adverse impact (the lowest magnitude from the agreed assessment methodology) in this instance means *'No measurable adverse impact on status class and/or the future objective at a waterbody scale'*. As such there would be no improvement of the water body.

River Hiz: Hiz (through Hitchin)

Construction

Off-site works

7.2.30 As outlined in paragraphs **7.2.1-7.2.4**, the CoCP and CSWMS would include measures and reference to appropriate guidance to ensure a **low adverse impact** on the Hiz (through Hitchin) during construction. This would be achieved through preventing potentially polluting matter from reaching the River Hiz. The low adverse impact (the lowest magnitude from the agreed assessment methodology) in this instance means *'No measurable adverse impact on status class and/or the future objective at a waterbody scale'*. As such there would be no deterioration of the water body.

Operation

Off-site works

7.2.31 The Off-site Highway Interventions at A505 Moormead Hill / B655 Pirton Rd / Upper Tilehouse Street, A602 Park Way / A505 Upper Tilehouse Street, and A602 Park Way / Stevenage Road (as described in **Chapter 4** of the ES **[TR020001/APP/5.01]**) are located approximately 500m from the open channel of the River Hiz.

7.2.32 The drainage design for the Off-site Highway Interventions would be developed during detailed design prior to construction in accordance with contemporary standards of sustainable drainage design which will ensure drainage run-off is treated to an acceptable level. The design principles to be adhered to are outlined in the Design Principles [**TR020001/APP/7.09**] which is a live document through the examination process. This would provide improvements required to mitigate any potential changes to water quality as a result of the Off-site Highway Interventions. Therefore, the operation of the off-site works would result in a **low adverse** impact on the Hiz (through Hitchin). The low adverse impact (the lowest magnitude from the agreed assessment methodology) in this instance means *'No measurable adverse impact on status class and/or the future objective at a waterbody scale'*. As such there would be no deterioration of the water body.

Upper Lee Chalk

Construction

Main Application Site and off-site works

7.2.33 The CoCP provided in **Appendix 4.2** of the ES **[TR020001/APP/5.02]** outlines the requirements for lead contractors to implement measures to avoid adverse impacts on the underlying aquifer during construction works. Key measures, in addition to those identified previously, include:

a. groundwater monitoring and analysis in accordance with the requirements of the groundwater monitoring plan to be prepared by the lead contractor and agreed with the Environment Agency, prior to, during

and after construction. This is likely to be a continuation/development of the on-going monitoring programme but will include increased frequency of monitoring. Details of the monitoring programme carried out up to the submission of the application for development consent are provided in **Appendix 17.7** of the ES **[TR020001/APP/5.02]**;

b. adoption of measures to prevent groundwater contamination detailed in a Foundation Works Risk Assessment (FWRA) (**Appendix 17.6** of the ES **[TR020001/APP/5.02]**);

c. installation of leachate sumps within the former landfill. A figure showing the general arrangement of sumps has been included in the Outline Remediation Strategy (for former Eaton Green Landfill Site) (**Appendix 17.5** of the ES **[TR020001/APP/5.02]**). The final locations and design would be agreed with the Environment Agency. Sumps to be monitored during construction with periodic removal of leachate for on-site treatment and disposal to sewer or removal to offsite waste treatment facility;

d. excavation completed in defined stages with contained remediation compounds, water treatment facilities and with additional licences/permits secured such as discharge consent to sewer and mobile treatment licence;

e. groundwater remediation, if identified as being necessary by monitoring results, remediation measures would be described in the groundwater monitoring plan;

f. consultation with the relevant local authorities and the Environment Agency regarding control or protection measures to be implemented to deal with identified risks, including: monitoring plans, appropriate techniques for excavating/handling contaminated material and the control of contaminants and discharges in their in situ or mobilised form, for solids, liquids, gas and leachate;

g. identification and decommissioning of existing preferential pathways i.e. services/service trenches (e.g. Thames Valley Drain) affected during construction;

h. lining of drainage trenches and buried services with bedding media to inhibit the mobilisation of contaminated groundwater or lateral migration through granular backfill;

i. verification testing of remediated ground or groundwater and preparation of verification reports; and

j. post-remediation permit to work system to protect remediated areas.

7.2.34 The guidance outlined in paragraphs **7.2.1-7.2.4** would also be applied to manage potential impacts on groundwater quality.

7.2.35 The processing and treatment of the former landfill waste prior to reuse in assessment Phase 2a would provide the opportunity to remove potential sources of contaminants, this would result in a beneficial impact on the underlying aquifer.

7.2.36 The implementation of the CoCP (**Appendix 4.2** of the ES **[TR020001/APP/5.02]**) would reduce the risk of having a measurable adverse impact on the WFD status of the Upper Lee Chalk, whilst the processing and treatment of the former landfill waste during construction would result in a locally beneficial impact to the aquifer. Overall the effect of the Proposed Development on the Upper Lee Chalk is considered **low adverse**. This is a precautionary assessment balancing the low beneficial effect of removing potentially polluting matter contained within the existing land fill and the low adverse effect of potential pollution during construction. The low adverse impact (the lowest magnitude from the agreed assessment methodology) in this instance means *'No measurable impact on status class and/or the future objective at a waterbody scale'*. As such there would be no deterioration of the water body.

Operation

Main Application Site and off-site works

7.2.37 The drainage design strategy is described in detail in the Drainage Design Statement (**Appendix 20.4** of the ES **[TR020001/APP/5.02]**).

7.2.38 In assessment Phase 1 of the Proposed Development (currently programmed to be constructed from 2025 to 2027, with increase in passenger capacity from 18 to 21.5 mppa), the drainage strategy aims to primarily utilise existing infrastructure with water efficiency measures and rainwater harvesting implemented to mitigate the increase in water demand from additional passengers.

7.2.39 In assessment Phases 2a and 2b, water efficiency measures and reuse of surface water for non-potable water requirements would prevent an increase in abstraction from the public water supply network during operation.

7.2.40 Discharge to the central soakaway would decrease overall during assessment Phase 1 based on the following (net decrease of discharge catchment area by 34,950m^2):

a. roof rainwater harvesting would reduce the discharge catchment area by 14,600 m^2;

b. the discharge catchment area of the existing long stay car park (Zone G – P5) would be reduced by 64,600 m^2; and

c. the discharge catchment area of the proposed aprons would increase by 44,250m^2.

7.2.41 Discharge to the northern soakaway or Thames Water operated soakaway asset (outside the existing airport footprint) would increase during assessment Phase 1 based on the following (net increase of 11,500m^2):

a. roof rainwater harvesting would reduce the discharge catchment area by 57,000m^2;

b. additional car park area (Zone F - P7) which would increase discharge to the northern soakaway covers a total area of 68,500m^2.

7.2.42 Overall, the discharge to ground during assessment Phase 1 would not increase due to operational activities.

7.2.43 The reduction in rainwater infiltration and increase in apron runoff has the potential to adversely impact the discharge quality at the soakaway locations. To mitigate quality impacts, a series of in-line treatment operations are proposed together with live monitoring (with contaminated water diverted to Thames Water (TW) foul network).

7.2.44 Full retention separators would be implemented for all runoff from aprons, taxiways and the runway, prior to discharge to the surface water network. Bypass separators would be utilised in areas for short term parking or roadways. Permeable paving is proposed in the areas of the long term car parks, which would include a bio-membrane that would treat fuel and oil leaks, and include storage in the paving build up.

7.2.45 Live monitoring of contaminants is proposed to mitigate quality impacts on the central soakaway and divert contaminated flow to the TW foul network when detected during Phase 1. Detection levels are to be confirmed through discussions with relevant stakeholders during the environmental permitting process, with the relevant monitoring equipment installed and maintained as required. These measures would reduce the risk of there being a measurable impact on the water quality of the Upper Lee Chalk in assessment Phase 1 (low adverse impact).

7.2.46 The installation of the main drainage infrastructure and water treatment plant during assessment Phase 2a as described in **paragraphs 7.2.14-7.2.19** would reduce the risk of there being a measurable impact on the water quality of the Upper Lee Chalk in assessment Phases 2a and 2b (low adverse impact).

7.2.47 In assessment Phases 2a and 2b, a capping layer would be provided for the extent of the historic landfill affected by the operation activities to minimise surface water infiltration into the underlying waste and prevent generation of future landfill leachate. The implementation of the capping layer on the landfill would result in a beneficial impact on the quality of the underlying aquifer. The majority of the capping layer would be implemented in assessment Phase 2a.

7.2.48 Overall the effect of the Proposed Development on the underlying aquifer is considered **low adverse.** This is a precautionary assessment balancing the **low beneficial** effect of removing potentially polluting matter contained within the existing land fill and the **low adverse** effect of infiltrating treated effluent into the aquifer. This is on the basis that the water quality of the discharges from the proposed soakaways has been sufficiently treated as to not affect the groundwater body chemistry. The low adverse impact (the lowest magnitude from the agreed assessment methodology) in this instance means *'No measurable adverse impact on status class and/or the future objective at a waterbody scale'*. As such there would be no improvement of the water body.

Off-site works

7.2.49 The drainage design for the Off-site Highway Interventions would be developed during detailed design prior to construction in accordance with contemporary

standards of sustainable drainage design which will ensure drainage run-off is treated to an acceptable level. The design principles to be adhered to are outlined in the Design Principles [**TR020001/APP/7.09**] which is a live document through the examination process. This would provide improvements required to mitigate any potential changes to water quality as a result of the Off-site Highway Interventions that could result in a measurable impact on the WFD waterbody status and the achievement of future objectives set at a waterbody scale. Therefore, the operation of the off-site works would result in a **low adverse impact** on the Upper Lee Chalk. The low adverse impact (the lowest magnitude from the agreed assessment methodology) in this instance means *'No measurable adverse impact on status class and/or the future objective at a waterbody scale'*. As such there would be no deterioration of the water body.

Step 2: Preliminary Assessment Summary

Table 7.2 Step 2: Preliminary Assessment Summary

WFD Waterbody	Preliminary assessment outcome	Screened in for detailed impact assessment? (Y/N)
River Lee: Lee (from Luton to Luton Hoo Lakes)		
Construction	Low adverse impact	N (Main Application Site and off-site works)
Operation	Low adverse impact	N (Main Application Site and off-site works)
River Mimram: Mimram (Whitwell to Codicote Bottom)		
Construction	Low adverse impact	N (Main Application Site only)[4]
Operation	Low adverse impact	N (Main Application Site only)
River Hiz: Hiz (through Hitchin)		
Construction	Low adverse impact	N (Off-site works only)[5]
Operation	Low adverse impact	N (Off-site works only)
Upper Lee Chalk		
Construction	Low adverse impact	N (Main Application Site and off-site works)
Operation	Low adverse impact	N (Main Application Site and off-site works)

7.2.50 In line with the assessment methodology outlined in **paragraph 4.3.1**, if the Proposed Development is identified as having a medium adverse/beneficial or high adverse/beneficial impact on a WFD waterbody at Step 2 then it would be screened in for detailed impact assessment at Step 3.

[4] Off-site works screened out in Step 1
[5] Main Application Site screened out in Step 1

7.2.51 As no construction or operation activities are considered to have a moderate or high impact, a detailed impact assessment (Step 3) will not be required for any of the WFD waterbodies.

8 CONCLUSIONS

8.1.1 Based on the WFD assessment, the development will not have a significant adverse affect at the waterbody scale, and subsequently there will be no deterioration in status.

8.1.2 This is based on the principle that the drainage design is sufficiently robust that the water quality of the discharges from the proposed soakaways is appropriately treated as to not impact the groundwater body chemistry, and the water efficiency measures (as outlined in **Appendix 20.5** Water Cycle Strategy **[TR02000/APP/5.02]**) negate additional water requirements in the longer term which could further stress the aquifer.

8.1.3 The drainage design for the Off-site Highway Interventions would be developed during detailed design prior to construction in accordance with contemporary standards of sustainable drainage design which will ensure drainage run-off is treated to an acceptable level. The design principles to be adhered to are outlined in the Design Principles [**TR020001/APP/7.09**] which is a live document through the examination process.

GLOSSARY AND ABBREVIATIONS

Term	Definition
AWB	Artificial Water Bodies
BGS	British Geological Society
CIRIA	Construction Industry Research and Information Association
CoCP	Code of Construction Practice
CSO	Combined Sewer Overflow
CSWMS	Construction Surface Water Management Strategy
DCO	Development Consent Order
DDS	Drainage Design Strategy
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EMS	Environmental Management System
ES	Environmental Statement
EU	European Union
FWRA	Foundation Works Risk Assessment
HEWRAT	Highways England Water Risk Assessment Tool
HWMB	Heavily Modified Water Bodies
PBDE	Polybrominated diphenyl ethers
PEIR	Preliminary Environmental Information Report
PFOS	Perfluoro octane sulphonate
Principal aquifer	Layers of rock or drift deposits that have high fracture permeability and/or high intergranular meaning that they usually provide a high level of water storage and transmission.
RBD	River Basin District
RBMP	River Basin Management Plan
SuDS	Sustainable Drainage Systems
TW	Thames Water
WFD	Water Framework Directive
WTP	Water Treatment Plant

REFERENCES

Ref 1 Secretary of State (2015) Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015
Ref 2 Secretary of State (2017) Water Environment (WFD) (England and Wales) Regulation
Ref 3 Department for Environment, Food and Rural Affairs (2016) Groundwater (Water Framework Directive) England Direction 2016
Ref 4 Environment Agency (2022) *Catchment Data Explorer* [online] [Accessed 20th October 2022]
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