Fens Reservoir

Environmental Impact Assessment Scoping Report Volume 1

October 2024

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1 Introduction

1.1 Background

1.1.1 Anglian Water Services Limited (hereafter referred to as 'Anglian Water') is working in partnership with Cambridge Water Limited (hereafter referred to as 'Cambridge Water') as the joint 'Promoters' for the proposed Fens Reservoir. Together the Promoters have commissioned this Environmental Impact Assessment (EIA) Scoping Report in accordance with Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (hereafter referred to as the 'EIA Regulations'). It is submitted on behalf of the Promoters to request a Scoping Opinion for the Fens Reservoir and associated water infrastructure (hereafter referred to as the 'Proposed Development').

1.1.2 An application for a Development Consent Order (DCO) will be submitted to the Planning Inspectorate, on behalf of the Secretary of State for Environment, Food and Rural Affairs ('the Secretary of State'), for the Proposed Development. Anglian Water will be the sole 'Applicant' for development consent, working on behalf of Cambridge Water.

1.1.3 The East of England is one of the fastest-growing regions in the country and is severely water-stressed. The Promoters have both published Water Resources Management Plans (WRMPs) which focus on actions required between 2025 – 2050. Both the Anglian Water WRMP (hereafter referred to as WRMP24) (Anglian Water, 2024) and the Cambridge Water revised draft WRMP (Cambridge Water, 2023) identified the need for a new Strategic Resource Option in the form of a storage reservoir in the Cambridgeshire Fens, referred to as the 'Fens Reservoir', to secure clean water supplies to customers, and to protect the environment from the effects of climate change. This need aligns with the strategy outlined in the Regional Water Resources Plan for Eastern England (Water Resources East, 2023).

1.1.4 The opinion of the Secretary of State is being sought specifically on:

- The environmental topics that should be included in the EIA.
- The likely significant effects resulting from the relevant components of the Proposed Development.
- Those effects not likely to be significant that do not need to be considered further.
- The approach to setting the study areas for each environmental aspect.
- The data that has been gathered (and will be gathered).
- The assessment methods that will be used to determine likely significant effects.
- The approach to determining the environmental measures that could be incorporated into the Proposed Development to avoid, prevent, reduce or, if necessary, offset significant effects.

Overview of Proposed Development

1.1.5 The Proposed Development involves the construction, commissioning and operation of a new reservoir with an approximate capacity of 55 million cubic metres (Mm^3), together with the associated water infrastructure required to transport water to the reservoir, treat it and facilitate the supply of potable water to Anglian Water and Cambridge Water customers. For the purposes of this EIA Scoping Report and the assessments set out within it, the term 'associated water infrastructure' refers to the upstream abstraction infrastructure, pumping stations and transfer routes, water treatment works, downstream pumping stations, pipelines and service reservoirs.

1.1.6 The Proposed Development is anticipated to involve the construction, commissioning and operation of the following:

- Water storage reservoir with an approximate capacity of $55Mm^3$ and a useable volume of $50Mm^3$, including embankments and infrastructure required for the operation of the reservoir.
- Water abstraction infrastructure.
- Infrastructure required to transfer water to the reservoir, and from the reservoir to supply potable water to the water supply network for Anglian Water and Cambridge Water customers. This includes pipelines, pumping stations, service reservoirs and other infrastructure required where water is transferred via existing open channels.
- Water treatment infrastructure, including inter-catchment treatment measures.
- Renewable energy infrastructure.
- Recreational provision including visitor centre(s) and car parking.
- Access elements including improvements to existing roads, new and existing Public Rights of Way, vehicular access and pathways.
- Utility diversions and connections.
- Ecological, landscape and environmental mitigation and associated water management infrastructure. These works would also include enhancements related to Biodiversity Net Gain.
- Infrastructure required for the operation and maintenance of the operational features listed above, including car parking, storage and associated buildings.
- Temporary construction works including, but not limited to compounds, construction working areas, soil and materials storage, access roads and temporary haul routes and other enabling works.

1.1.7 A detailed description of the Proposed Development is provided in Chapter 2 of this EIA Scoping Report.

1.2 Purpose of this EIA Scoping Report

1.2.1 An application for a DCO will be submitted to the Planning Inspectorate, acting on behalf of the Secretary of State, for the Proposed Development. The Planning Inspectorate will examine the DCO application and will make a recommendation to the Secretary of State on whether development consent for the Proposed Development should be granted or refused. The application for development consent, will be accompanied by an Environmental Statement (ES), prepared in accordance with the EIA Regulations. This will present the significant environmental effects that are likely to occur during the construction and operation of the Proposed Development and any proposals to avoid, reduce, mitigate or offset for these effects. The Secretary of State will consider this information when determining whether development consent should be granted.

1.2.2 The purpose of this EIA Scoping Report is to present the proposed scope of the EIA that would be presented within the ES and to support the request for a written Scoping Opinion, administered by the Planning Inspectorate on behalf of the Secretary of State. A Scoping Opinion is a written statement setting out the Planning Inspectorate's opinion as to the scope and level of detail of the information to be provided in an ES.

1.2.3 This EIA Scoping Report has been produced in accordance with the requirements of the EIA Regulations, having regard to relevant Planning Inspectorate Advice Notes as detailed within Chapter 4: Legislation, planning policy and guidance of this EIA Scoping Report. The Planning Inspectorate published new and updated advice notes in September 2024, some of which are relevant to EIA Scoping. Due to the timing of the publications, the revised advice presented in these notes has not been explicitly reflected in the contents of this EIA Scoping Report. These advice notes, and any subsequent relevant publications from the Planning Inspectorate will be reflected in future environmental assessment of the Proposed Development, as presented in the Preliminary Environmental Information Report and ES.

1.2.4 The EIA Regulations set out the requirements for an applicant which proposes to request a scoping opinion from the Planning Inspectorate. Table 1-1 provides the location of where the information required by the EIA Regulations when requesting a scoping opinion is set out within this EIA Scoping Report.

Table 1-1: Requirement in Regulation 10, paragraph 3 of the EIA Regulations

Requirement in the EIA Regulations	Location within the EIA Scoping Report
(a) a plan sufficient to identify the land;	Figure 2.1.
(b) a description of the proposed development including its location and technical capacity;	Chapter 2: Project description.
(c) an explanation of the likely significant effects of the development on the environment; and,	Section 8 of the aspect chapters.

Requirement in the EIA Regulations	Location within the EIA Scoping Report
(d) such other information or representations as the person making the request may wish to provide or make.	Further information about the scoping process can be found in Chapter 6: EIA approach and methodology.

1.2.5 Further detail is set out in Chapter 4: Legislation, planning policy and guidance of this EIA Scoping Report. Chapter 6: EIA approach and methodology, Section 6.2 provides additional information as to how this EIA Scoping Report meets the requirements of the EIA Regulations.

1.2.6 This EIA Scoping Report sets out the proposed scope of the EIA, including a description of the aspects which will be considered ('scoped in') in the forthcoming ES. It also describes those aspects or matters which are proposed by the Applicant to be 'scoped out' of the EIA process and provides justification as to why the Proposed Development would not be likely to give rise to significant environmental effects on these aspects (aligned with the justification requirements set out separately in paragraph 5.11 of Advice Note Seven (Planning Inspectorate, 2020a)). The Promoters have submitted the EIA Scoping Report at a time when it is considered the Proposed Development has been sufficiently developed such that the primary potential likely significant effects can be identified at this early stage, albeit there is still work to be undertaken on the design development (as set out in Chapter 2: Project description) to confirm various aspects of the Proposed Development.

1.2.7 The EIA Scoping Report describes the methodology of the desk-based technical studies and preliminary field surveys that have been or will be undertaken to inform the assessment and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Proposed Development.

1.2.8 The Promoters have recently undertaken a second round of consultation ('Phase two consultation' which commenced in May 2024) on the emerging design of the Proposed Development. The emerging design includes some optionality. Where there is optionality, the scope of the assessment which will be undertaken for these options is presented clearly in this EIA Scoping Report to aid the Planning Inspectorate and consultation bodies in providing detailed comments. The Promoters are still reviewing feedback from Phase two consultation. The feedback is not included within this EIA Scoping Report due to timescales and because the matters within the Phase two consultation were not related to the scope of EIA, methodology or data collection. Phase two consultation feedback and the resulting design development will be given due consideration in future EIA documentation including the ES. Given the scale of the Proposed Development, a Scoping Opinion is sought at a time when comments on the data collection and methodology can be taken into account so that the Applicant can proceed with confidence on the approach taken within the EIA and avoid abortive work.

1.3 Structure of this EIA Scoping Report

1.3.1 This EIA Scoping Report is provided in three volumes:

- Main report.
- Figures (divided into eight parts).
- Appendices (divided into three parts).

1.3.2 The remainder of this document, is structured as follows, with the aspect chapters ordered with similar aspects close together so that it is easier for the reader to read between similar or linked likely significant effects:

- Chapter 2 – Project description.
- Chapter 3 – Consideration of alternatives.
- Chapter 4 – Legislation, planning policy and guidance.
- Chapter 5 – Consultation and engagement.
- Chapter 6 – EIA approach and methodology.
- Chapter 7 – Landscape and visual.
- Chapter 8 – Terrestrial biodiversity.
- Chapter 9 – Aquatic biodiversity.
- Chapter 10 – Water resources and flood risk.
- Chapter 11 – Historic environment.
- Chapter 12 – Geology, soils, agriculture and land quality.
- Chapter 13 – Material assets and waste management.
- Chapter 14 – Traffic and transport.
- Chapter 15 – Air quality.
- Chapter 16 – Carbon and greenhouse gases.
- Chapter 17 – Climate resilience.
- Chapter 18 – Noise and vibration.
- Chapter 19 – Public access and amenity.
- Chapter 20 – Socio-economics and community.
- Chapter 21 – Human health.
- Chapter 22 – Major accidents and disasters.
- Chapter 23 – Cumulative effects.

- Chapter 24 – Summary.

1.3.3 Chapters 7 to 23 (the 'aspect' chapters) provide an explanation of the potential likely significant effects of the Proposed Development for each of the environmental aspects, in order to identify the aspects and matters to be scoped in or scoped out of further assessment. All chapters will follow this structure; however, where an aspect's approach deviates from this, then this will be clearly explained within the chapter:

- Introduction, including what the aspect chapter covers and links to other chapters or documents.
- Legislation and policy requirements.
- Stakeholder engagement.
- The proposed study area for the assessment.
- Baseline conditions, including data collected to date from desk studies, surveys, and baseline monitoring and a description of the future baseline.
- The proposed approach to design, mitigation and enhancement measures.
- Potential likely significant effects that may arise from the construction and operation of the Proposed Development.
- The proposed scope of assessments and methodologies to be used for the matters scoped into the assessments to be presented in the forthcoming ES.
- Relevant assumptions and limitations identified at this stage in the development of the proposals.

1.3.4 Each aspect chapter identifies the aspects or matters associated with the aspect that are to be scoped into the EIA and the methods that will be used to assess impacts and to determine the significance of effects. Each aspect chapter will also describe the aspects or matters that are proposed to be scoped out of the EIA and provides a justification for this.

1.3.5 The Planning Inspectorate's Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements (Planning Inspectorate, 2020a) provides advice on the information that should be provided in the EIA Scoping Report. Table 1-2 lists the suggested information requirements noted in Advice Note Seven and identifies where these requirements are addressed in this EIA Scoping Report.

Table 1-2: Recommendations of Advice Note Seven

Advice Note requirement	Location within the EIA Scoping Report
The Proposed Development	
An explanation of the approach to addressing uncertainty where it remains in relation to elements of the Proposed Development, e.g. design parameters.	Chapter 2: Project description, Chapter 6: EIA approach and methodology and Chapters 7–23 as appropriate.
Referenced plans presented at an appropriate scale to convey clearly the information and all known features associated with the Proposed Development.	Attached Figures.
EIA approach and topic areas	
An outline of the reasonable alternatives considered and the reasons for selecting the preferred option.	Chapter 3: Consideration of alternatives.
A summary table depicting each of the aspects and matters that are requested to be scoped out, allowing for quick identification of issues.	Chapters 7–23 aspect chapters as appropriate and Chapter 24: Summary.
A detailed description of the aspects and matters proposed to be scoped out of further assessment with justification provided.	Chapters 7–23, with a summary provided in Chapter 24: Summary.
Results of desktop and baseline studies where available and where relevant to the decision to scope in or out aspects or matters.	Chapters 7–23.
Aspects and matters to be scoped in: the report should include details of the methods to be used to assess impacts and to determine significance of effect, e.g. criteria for determining sensitivity and magnitude.	The general EIA methodology is outlined in Chapter 6: EIA approach and methodology. Chapters 7–23 describe aspect-specific methodology and the aspects and matters to be scoped in, with a summary provided in Chapter 24: Summary.
Any avoidance or mitigation measures proposed, how they may be secured and the anticipated residual effects.	Chapters 7–23 aspect chapters as appropriate.
Information sources	
References to any guidance and best practice to be relied upon.	Appendix 4.1: Legislation, planning policy and guidance summary.
Evidence of agreements reached with consultation bodies (for example the statutory nature conservation bodies or local authorities).	A summary of relevant consultation with statutory bodies has been included in Chapter 5: Consultation and engagement, and Chapters 7–23 aspect chapters.
An outline of the structure of the proposed ES.	Chapter 6: EIA approach and methodology.

2 Project description

2.1 Introduction

2.1.1 This chapter provides a description of the Fens Reservoir and associated water infrastructure, also referred to as the 'Proposed Development', which has informed this EIA Scoping Report. It provides information on the emerging design for the new reservoir and the associated water infrastructure, together with information on what is proposed within each of the component parts of the Proposed Development, and how it is anticipated that these would be constructed (including commissioning), operated and maintained.

2.1.2 The information provided in this chapter reflects the current understanding of the Proposed Development and has informed the proposed scope of the environmental assessments set out within the aspect chapters (Chapters 7 to 23) of this EIA Scoping Report.

2.1.3 The Proposed Development described in this EIA Scoping Report is based on the information presented at Phase two consultation. However, some additional information not included as part of Phase two consultation has been incorporated as part of the Proposed Development description. This is to allow for effective scoping of the environmental assessments to take place now, to meet programme requirements. However, given the stage the project is at, this additional information draws on general methodologies and approaches. Importantly, it does not (due to programme constraints) have regard to feedback received as part of Phase two consultation. However, it is important to note that the final details of these matters are being developed and will naturally (as with all elements of the Proposed Development) have regard to feedback received as part of Phase two consultation, as well as through the Scoping process. The more developed proposals will then be subject to the future environmental assessments and consultations the Applicant will be undertaking to inform the application for development consent.

2.1.4 The description of the Proposed Development presented in this chapter adopts a parameter-based approach to address uncertainty in the current proposals, allow flexibility and reflect likely design refinement. Allowing a consideration for uncertainty enables the development of the proposals to respond to risks, such as unknown ground conditions and design risks. A parameter-based approach ensures that the maximum extent of the Proposed Development is considered in order to assess a realistic worse-case scenario. At this Scoping stage, the spatial parameters are defined as the polygons and corridors forming the Scoping boundary within which infrastructure may be located. The Scoping boundary is shown on Figure 2.1 and described in Section 2.3.

Chapter structure

2.1.5 This chapter is structured as follows:

- Section 2.2: Overview of the Proposed Development – provides an introduction to the Proposed Development. This includes the need case, how water would be abstracted, stored, treated and transferred into public supply and an outline of the component parts of the Proposed Development.
- Section 2.3: Site and surroundings – provides a description of the Scoping boundary, associated operational zones and the surrounding environment.
- Section 2.4: Ongoing development of proposals – provides a brief description of the design development process, including key considerations that have influenced the design of the Proposed Development to date and the need for flexibility at this stage to allow future design development.
- Section 2.5: The Proposed Development – provides a description of the Proposed Development divided into four operational zones and a summary of the environmental mitigation that has been embedded into the emerging design. For each of the operational zones, a description of the infrastructure proposed is provided.
- Section 2.6: Construction description – provides a description of the construction phases as currently envisaged and provides a description of the activities that are anticipated to be involved in the construction and commissioning of the Proposed Development.
- Section 2.7: Operational phase – provides a description of the operational phase of the Proposed Development. This includes a summary of maintenance activities required to deliver effective operation of the Proposed Development.
- Section 2.8: Decommissioning – provides information on the scoping out of decommissioning.

2.2 Overview of the Proposed Development

The need for the Proposed Development

2.2.1 In accordance with the Water Industry Act 1991, and subsequent legislation, all water companies have a statutory obligation to prepare and maintain Water Resources Management Plans (WRMP). These plans set out how companies will manage demand and develop water resources where necessary, so as to be able to meet their water supply obligations. WRMPs look ahead for at least the next 25 years and are comprehensively revised within five years. It is through the process of preparing, consulting on, and finalising the publication of these WRMPs that decisions are made on what additional water resources infrastructure is needed. WRMPs are informed by regional and multi-regional water resources plans as part of a collaborative, larger-scale approach to meeting long-term water resources challenges.

2.2.2 The Water Resources Management Plan (WRMP24) prepared by Anglian Water in 2024 (Anglian Water, 2024) and the revised draft WRMP prepared by Cambridge

Water (Cambridge Water, 2023) set out that a new storage reservoir in Cambridgeshire, referred to as the Fens Reservoir, has been identified as one of several nationally strategic resource options required to address deficits in future public water supply. The reservoir, promoted by Anglian Water and Cambridge Water (together the 'Project Promoters'), is being progressed through the fast-tracked delivery framework overseen by the Regulators' Alliance for Progressing Infrastructure Development (RAPID) and will be a Nationally Significant Infrastructure Project seeking consent through the development consent regime.

2.2.3 The WRMP24 and revised draft WRMP also identified the possible sources of water supply for the proposed reservoir and the proposed connection points into Anglian Water and Cambridge Water's existing supply networks.

2.2.4 The reservoir will provide safe, clean, resilient drinking water for future generations and allow Anglian Water and Cambridge Water to reduce or cease abstractions to the environment that may be detrimental, as well as enhancing the region's drought resilience.

How water would be provided for supply

2.2.5 The Proposed Development comprises a new non-impounding reservoir in the Fens, located approximately 2.2km north of Chatteris, east of Doddington and approximately 7km south of March, in the administrative area of Fenland District Council. A non-impounding reservoir is defined as a reservoir that does not obstruct the flow of a river and is normally filled by pumping water into it. The Proposed Development also includes the associated water infrastructure required to transfer, treat and store water for public use. The location of the proposed reservoir and the associated water infrastructure is shown in Figure 2.1.

2.2.6 The provision of water into supply can be summarised by the following simplified steps:

- Water abstracted from the identified sources. These sources are existing watercourses from which available water would be abstracted, under relevant authorisation, for onward transfer to the reservoir.
- Water transferred to the reservoir. Water would be transferred by the following mechanisms, or a combination of these:
  - Where the source watercourse is adjacent to the reservoir, water would be abstracted and transferred directly to the reservoir. The source is the Middle Level system watercourses including the Forty Foot Drain and the Sixteen Foot Drain.
  - Where the source watercourse is more distant from the reservoir, water would be transferred into other watercourses which extend towards the reservoir. These open channel transfers would increase the volume of water available in the Middle Level system adjacent to the reservoir. Water would then be abstracted and transferred directly to the reservoir from either the Forty Foot Drain or the Sixteen Foot Drain.
  - Transfer of water from a source watercourse to the reservoir via a new pipeline.

- Water stored in the reservoir until needed.
- Water abstracted from the reservoir and treated to potable quality.
- Treated water transferred via a new pipeline to connection points with the existing supply system.

2.2.7 The infrastructure related to these steps and required as part of the Proposed Development is outlined below and explained in greater detail in Section 2.5.

Outline of the Proposed Development

2.2.8 Image 2.1, presented at Phase two consultation between May and August 2024, is a simplified diagram showing the components of the Proposed Development. Figure 2.2 shows the locations of these component parts.

2.2.9 The main components of the Proposed Development are the reservoir itself and the associated water infrastructure, which comprises the water sources and transfer infrastructure, water treatment works and water supply infrastructure, as shown in Image 2.1.

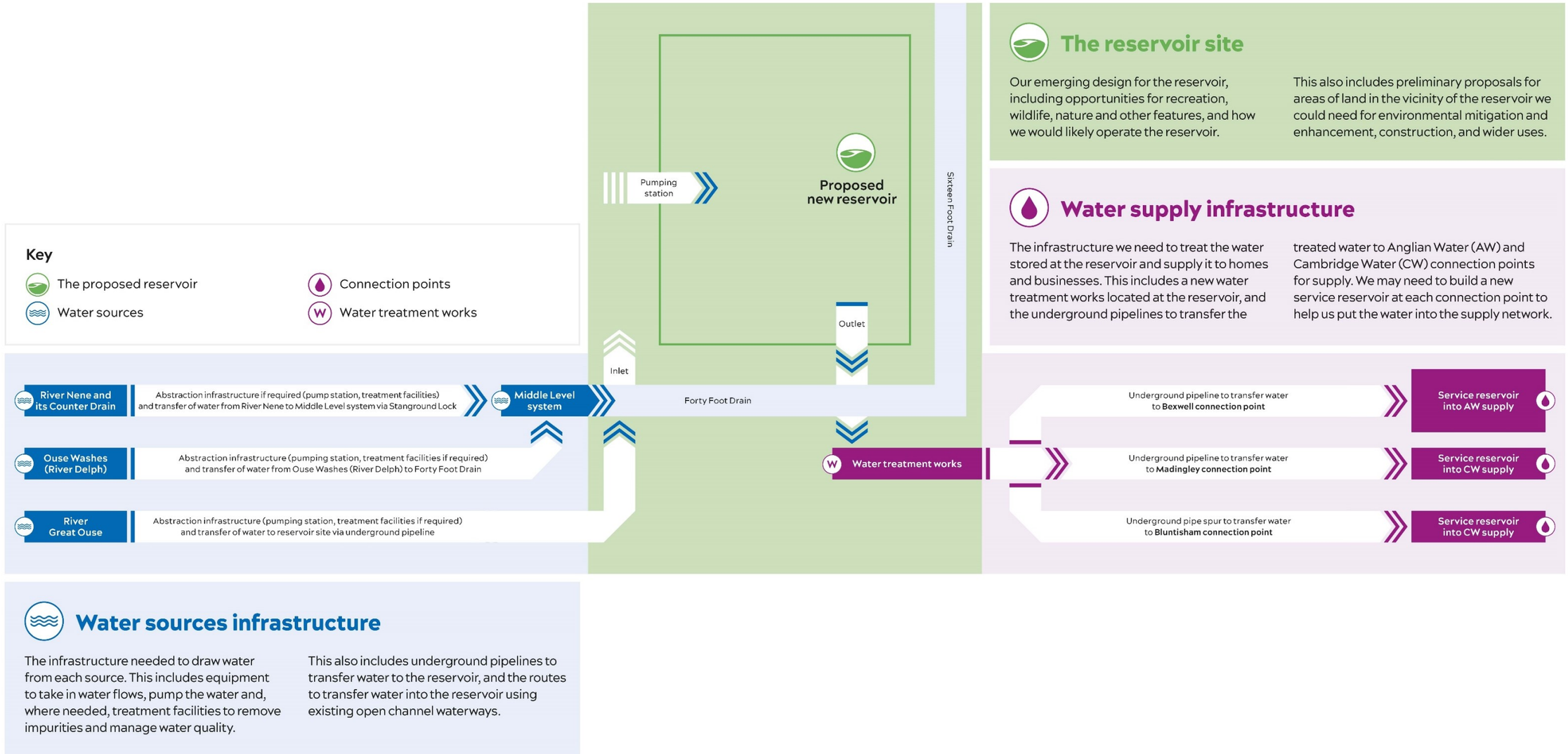

Image 2.1: Diagram showing component parts of the Proposed Development, published at Phase two consultation in summer 2024

Proposed reservoir

2.2.10 The proposed reservoir would be formed by embankments to provide a storage capacity of approximately 55Mm^3. This storage capacity would provide a useable volume of 50Mm^3 in order to meet public water supply requirements, as set out in the WRMP24 and revised draft WRMP (Anglian Water, 2024; Cambridge Water, 2023). The emerging design includes proposals for use of areas of land surrounding the reservoir for recreation, environmental mitigation and habitat creation.

Associated water infrastructure

2.2.11 The Proposed Development also includes the associated water infrastructure required to transfer available water from watercourses to the reservoir for storage, treat it ready for public supply, transfer the treated water and store it locally before supplying it to homes and businesses. The associated water infrastructure comprises the following infrastructure, as shown in Image 2.1.

Water sources infrastructure

2.2.12 Upstream infrastructure would be required to abstract raw water and transfer it from the identified sources to the proposed reservoir. The water sources infrastructure that would be required includes, but is not limited to, water abstraction infrastructure, pumping stations, inter-catchment treatment measures and raw water transfers (through open channels, pipelines, or combinations of these). The maximum capacity of these transfers ranges from 50 megalitres per day (Ml/d) to 700Ml/d depending on the source.

2.2.13 The watercourses which are proposed as the sources of water supply (described further in Section 2.5) are as follows:

- The Middle Level system, which would provide the primary source of water via the Sixteen Foot Drain or the Forty Foot Drain adjacent to the reservoir site, when water is available. If required, due to water level constraints, water would be transferred to the Middle Level system from the other available sources described below.
- The Ouse Washes (River Delph), which is located in close proximity to the reservoir and is regularly flooded with water diverted from the River Great Ouse at Earith. This potential source option involves a proposed transfer from the River Delph at or near Welches Dam, and improvements to the Forty Foot Drain to transfer water into the Middle Level system.
- The River Great Ouse (Earith) source is an alternative to the Ouse Washes (River Delph) source and would transfer water via pipeline to the Middle Level system.
- The River Nene would provide a source into the Middle Level system via the existing channel connection at Stanground Lock. To compensate for water transferred from the River Nene at this location, water would be transferred from the Counter Drain (Nene) into the River Nene upstream of the Dog-in-a-Doublet sluice.

Water treatment works

2.2.14 Water treatment works infrastructure would be required to treat water from the reservoir to reach potable water quality. The water treatment works would comprise a facility to screen, filter and treat the water prior to its transfer to the existing supply network. It is expected that the water treatment works would supply up to 88.8Ml/d of potable water.

Water supply infrastructure

2.2.15 Water supply infrastructure would be required to transfer treated water to the connection points into the existing Anglian Water and Cambridge Water supply network. This infrastructure would include, but is not limited to, underground pipelines and service reservoirs to provide water storage at the connection points. The Proposed Development does not include improvement or upgrade to the existing supply network, except as part of facilitating the connection.

Other associated proposals

2.2.16 There are other associated proposals which would be required to facilitate the construction, commissioning and operation of the Proposed Development. These are not specific to the components of the Proposed Development described above and include construction areas, access routes, highways work, utilities connections and mitigation measures including habitat creation and recreation proposals. The emerging proposals are described in greater detail in Sections 2.5, 2.6 and 2.7 of this chapter.

2.3 Site and surroundings

Scoping boundary

2.3.1 The Scoping boundary is shown in Figure 2.1 and is defined as the area of land anticipated at this Scoping stage to be required for the construction, commissioning, operation, and maintenance of the Proposed Development, including land required for permanent and temporary purposes. This boundary has been defined using the currently available information, as set out in this Project description chapter, and incorporates polygons and corridors to represent the extent of land required for the various components of the Proposed Development. The extent of land required permanently and temporarily will be refined as the proposals are developed.

2.3.2 Where there remain options within the proposals (for example, the sources from which water would be abstracted), the Scoping boundary has been defined to include all land required for these alternative options.

2.3.3 The land included in the corridor and polygons has been identified to allow flexibility in the ongoing design development process and enable assessment of a reasonable worst case. The Scoping boundary will be refined for the Preliminary Environmental Information Report, and Development Consent Order (DCO) application, taking consideration of options development, environmental constraints and opportunities, feasibility of operation and construction,

consultation feedback and stakeholder engagement, and other relevant requirements.

2.3.4 The Scoping boundary includes land (including where rights over land may be required) that is currently anticipated could be permanently required for the following operational features. In some cases, and with the relevant access agreements in place, land could be returned to landowners, following completion of construction.

- Water storage reservoir, including embankments and infrastructure required for the operation of the reservoir.
- Water abstraction infrastructure.
- Transfer pipelines, pumping infrastructure and new and upgraded infrastructure associated with the proposed use of existing watercourses for open channel transfers.
- Water treatment infrastructure including inter-catchment treatment measures.
- Renewable energy infrastructure.
- Recreational provision including visitor centre(s) and car parking.
- Access elements including improvements to existing roads, new and existing Public Rights of Way (PRoWs), vehicular access and pathways.
- Utility diversions and connections.
- Ecological, landscape and environmental mitigation, habitat creation and associated water management infrastructure.
- Infrastructure required for the operation and maintenance of the operational features listed above, including car parking, storage and associated buildings.

2.3.5 The Scoping boundary also incorporates land temporarily required for construction and commissioning activities. Construction activities for the reservoir and associated water infrastructure that would require temporary use of land, include the following:

- Construction site compounds, potentially including construction worker accommodation.
- Working areas, including storage and laydown areas.
- Soil and materials storage, including spoil won from the excavations to form the embankments, and imported aggregates.
- Access roads and temporary haul routes.
- Utilities diversions.
- Other enabling works and temporary works as described in Section 2.6.

2.3.6 The Proposed Development outlined in Section 2.2 includes proposals for the transfer of water from upstream sources using existing open channels/ watercourses. Infrastructure required to facilitate these transfers is included as part of the Proposed Development. Where no new infrastructure or land would be required and no works are proposed to these channels, they do not fall within the Scoping boundary. The existing watercourses which connect the abstraction points with the reservoir are shown on Figure 2.2. Although outside the Scoping boundary, these watercourses, for example the Middle Level system, may be included within the study area for some aspects. This is explained in the relevant aspect chapter (Chapters 7 to 23) of this EIA Scoping Report.

Operational zones

2.3.7 For the purposes of this EIA Scoping Report, the Proposed Development has been divided into four operational zones to ease interpretation of the proposals and assist in the consideration of impacts associated with the component parts of the Proposed Development. These components are as described in Section 2.2. The four operational zones referred to throughout this EIA Scoping Report are presented in Figure 2.1 and the proposals within each area are summarised below. Greater detail on each operational zone is presented in Section 2.5.

1. Sources of supply and upstream water transfers

2.3.8 This operational zone covers the water sources infrastructure required to abstract raw water and transfer it from the identified sources of water supply to the proposed reservoir. It includes the polygons and corridors within which the water abstraction infrastructure, inter-catchment treatment, modifications to existing channels and the proposed pipelines would be located.

2. Reservoir site

2.3.9 This operational zone covers the proposed reservoir, associated mitigation, habitat creation and recreational areas, and the surrounding areas required to construct and operate these. It is proposed that the new non-impounding reservoir would have a storage capacity of approximately 55Mm^3. This storage capacity would provide a useable volume of 50Mm^3 in order to meet public water supply requirements, as set out in the WRMP24 and revised draft WRMP (Anglian Water, 2024; Cambridge Water, 2023).

3. Water treatment works

2.3.10 This operational zone covers the polygon within which the water treatment works would be located. This infrastructure is required to treat water from the reservoir prior to its transfer to the existing supply network. It is expected that the water treatment works will supply up to 88.8Ml/d (megalitres per day) of potable water.

4. Downstream treated water transfers

2.3.11 The downstream infrastructure operational zone covers the infrastructure required to transfer treated water to the existing supply network. This includes, but is not limited to, the corridors identified for construction and operation of treated water pipelines and polygons for service reservoirs.

Geographical location

2.3.12 The Proposed Development would be located in the Cambridgeshire Fens – part of the shallow basin bordered by Lincoln, Peterborough, Huntingdon, Cambridge, Downham Market and King's Lynn. Figure 2.1 shows the location of the Proposed Development within Cambridgeshire.

2.3.13 Image 2.2 presents a schematic showing the location of the key elements of the Proposed Development in the local context. Figure 2.1 presents a map view of the Proposed Development and the operational zones. The polygons and corridors which comprise the Scoping boundary are shown on Figure 2.2.

2.3.14 A detailed description of the baseline environment relevant to each aspect is provided within each aspect chapter (Chapters 7 to 23) of this EIA Scoping Report.

The proposed reservoir

2.3.15 The proposed reservoir would be located approximately 30km to the north of the city of Cambridge, in the Fenland District Council area. The proposed reservoir would be sited approximately 7km south of March and approximately 2.2km north of Chatteris, near to the settlements of Doddington, Wimblington and Manea.

2.3.16 The majority of the area is rural in character and largely used for agriculture and associated industries. Two large drainage channels form the southern and eastern boundaries of the proposed reservoir site. These linear watercourses are the Forty Foot Drain and the Sixteen Foot Drain which form part of the Middle Level system, providing navigable access between the River Great Ouse and River Nene.

2.3.17 The western boundary of the reservoir site is formed by the A141 road which links to the A1 and A14 to the south-west and the A47 to the north-east, giving the proposed reservoir site and surrounding area east–west and north–south road connectivity. The Ely to Peterborough railway line runs approximately 4km north of the proposed reservoir site. March and Manea railway stations are located within 8km of the proposed reservoir site.

Associated water infrastructure

2.3.18 The associated water infrastructure extends from the proposed reservoir site, where the water treatment works would be located, towards the more urban areas of Peterborough, Cambridge and Downham Market.

2.3.19 Associated water infrastructure for the sources of supply is proposed to be located either near to Welches Dam pumping station at the Ouse Washes (River Delph) or at Earith (River Great Ouse), plus at Stanground in Peterborough (River Nene) and potentially adjacent to the River Nene's Counter Drain, if required. The proposed pipeline transfer routes extend northwards from Earith to the proposed reservoir and would cross the A142. The source of supply from the Middle Level system directly into the reservoir is discussed in this EIA Scoping Report as part of the reservoir site, rather than as part of the associated water infrastructure.

2.3.20 Associated water infrastructure for the downstream transfer of treated water is proposed to be located at Bluntisham to the west of Earith, Bexwell north-east of

Downham Market and Madingley north-west of Cambridge, with transfer routes connecting to the proposed reservoir. The polygons for the proposed pipeline transfer routes extend north-east from the reservoir site towards Downham Market and south-west from the reservoir to Bluntisham and south to Madingley. The proposed pipelines would cross the A142, A14, A428, A1123, A1122 and the March to Ely and Ely to King's Lynn railway lines.

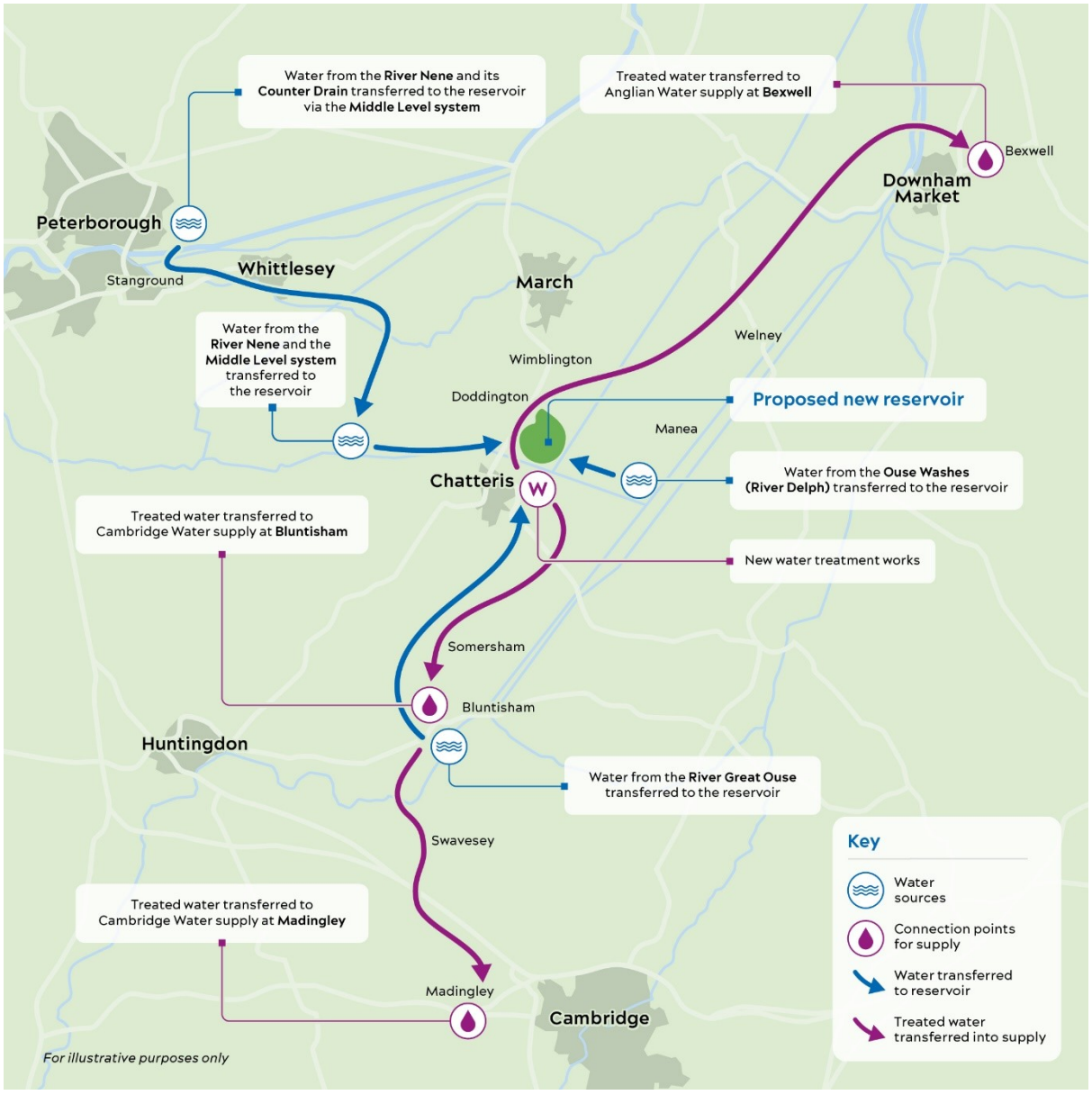

Image 2.2: Indicative schematic of the Proposed Development

2.4 Ongoing development of proposals

Design development process

2.4.1 The ongoing development of the Proposed Development to date has reflected the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) requirement for good design through the deployment of a structured design process informed by environmental constraints and relevant design principles at each stage. As the site selection and ongoing development of the proposals has progressed, the project has moved from using generic design principles such as the Design Principles for National Infrastructure of climate, people, places and value (National Infrastructure Commission, 2020), to sector-specific principles derived from that foundation, such as the All Company Working Group Design Principles (All Company Working Group, 2023). As the design development process has progressed, bespoke site and solution-specific principles have informed a more detailed understanding of environmental context and technical constraints. These bespoke design principles will continue to develop throughout ongoing design refinement.

2.4.2 Feedback received from the consultation with land and property owners, communities and stakeholders has informed, and will continue to inform, the ongoing refinement of the proposals for the Proposed Development. The consultation and engagement undertaken to date is described in Chapter 5: Consultation and engagement.

2.4.3 Effective design is an iterative process informed by the EIA process, as required by the NPS for Water Resources Infrastructure (Defra, 2023). The environmental, masterplanning and engineering designs are being developed concurrently, with close collaboration between the design and environmental disciplines as part of the iterative design process. This design development process includes the identification and refinement of methodologies and procedures for the construction and operational phases.

2.4.4 As part of the EIA and iterative design, the Applicant would actively seek to avoid, reduce, mitigate or offset significant adverse environmental effects on environmental receptors, and would seek beneficial effects. All the considerations set out in these paragraphs are reflected in the project-specific design principles for the Proposed Development, which will continue to be developed and refined as the design, EIA and other processes progress.

2.4.5 Information regarding the consideration of alternatives as part of the iterative design process undertaken to date is provided in Chapter 3: Consideration of alternatives.

2.4.6 The design development process will continue up to and beyond the submission of the DCO application. An outline design will be developed to inform the DCO application documents and this would be used to reflect a reasonable worst case, to ensure the likely significant environmental effects of the proposals are adequately reported in the Environmental Statement. Design development

processes would continue after submission of the DCO application to refine the proposals and identify a detailed design for the construction and operation phases, within the parameters assessed and set by the DCO. Design development would be informed by assessments, investigations and relevant work undertaken up to and beyond the DCO application.

Flexibility in design

2.4.7 Advice Note Nine: Rochdale Envelope (Planning Inspectorate, 2018) states it is for the Applicant to choose whether there is a need to incorporate flexibility (and how much) into applications to address uncertainty. At this relatively early stage in the design process, there is inevitably uncertainty and therefore flexibility in proposals is required at this Scoping stage. This flexible approach also allows for consultee feedback to be considered as the Proposed Development is refined further.

2.4.8 The description of the Proposed Development adopts a spatial parameters approach to allow reasonable flexibility and reflect likely design refinement. This ensures that the maximum extent of the Proposed Development as described in this chapter is considered in order to assess a reasonable worst-case scenario. Within these parameters, infrastructure may be located anywhere within the corridors and polygons which make up the Scoping boundary. This approach is described further in Chapter 6: EIA approach and methodology, under the temporal and spatial scope heading.

2.4.9 Flexibility is also required where elements of the Proposed Development are still to be finalised in terms of choice of technology and where one of several different design options is yet to be selected. In order to ensure that this uncertainty can be appropriately assessed in the EIA process, the Proposed Development is described reflecting the ongoing refinement, and this information has been used to inform the scope of the EIA at this stage.

2.4.10 Flexibility in terms of maximum parameters is likely to be retained throughout the EIA and presented in the DCO submission. Order Limits will be defined within the application for development consent, which will encompass the land required temporarily to build the Proposed Development and permanently during the operation phase. Limits of Deviation will also be identified, which represent the maximum locational flexibility for permanent infrastructure. The Limits of Deviation allow for adjustment to the final positioning of features of the Proposed Development to avoid localised constraints or unknown or unforeseeable issues that may arise during detailed design or construction.

2.4.11 In addition, there have been a number of assumptions made around the design of the Proposed Development in order to inform the assessment of likely significant effects within the EIA Scoping Report. These are described in the relevant following sections.

2.4.12 Should there be changes to the Proposed Development which introduce new components into the design, then the Applicant will review these changes in relation to the scope of assessments and proposed methodologies presented in this EIA Scoping Report. There will be engagement with relevant organisations, including statutory environmental bodies, relevant local authorities and other stakeholders as appropriate, related to any changes to the approach for the assessments.

2.5 The Proposed Development

Introduction

2.5.1 This section provides a description of the infrastructure proposed within each of the four operational zones of the Proposed Development to provide an understanding of the proposed infrastructure and associated activities that are to be assessed. It also includes a summary of the environmental mitigation proposed to be embedded into the Proposed Development at this stage to avoid, reduce, mitigate and offset adverse environmental effects.

2.5.2 Image 2.3 provides an indicative schematic of the how the Proposed Development would function.

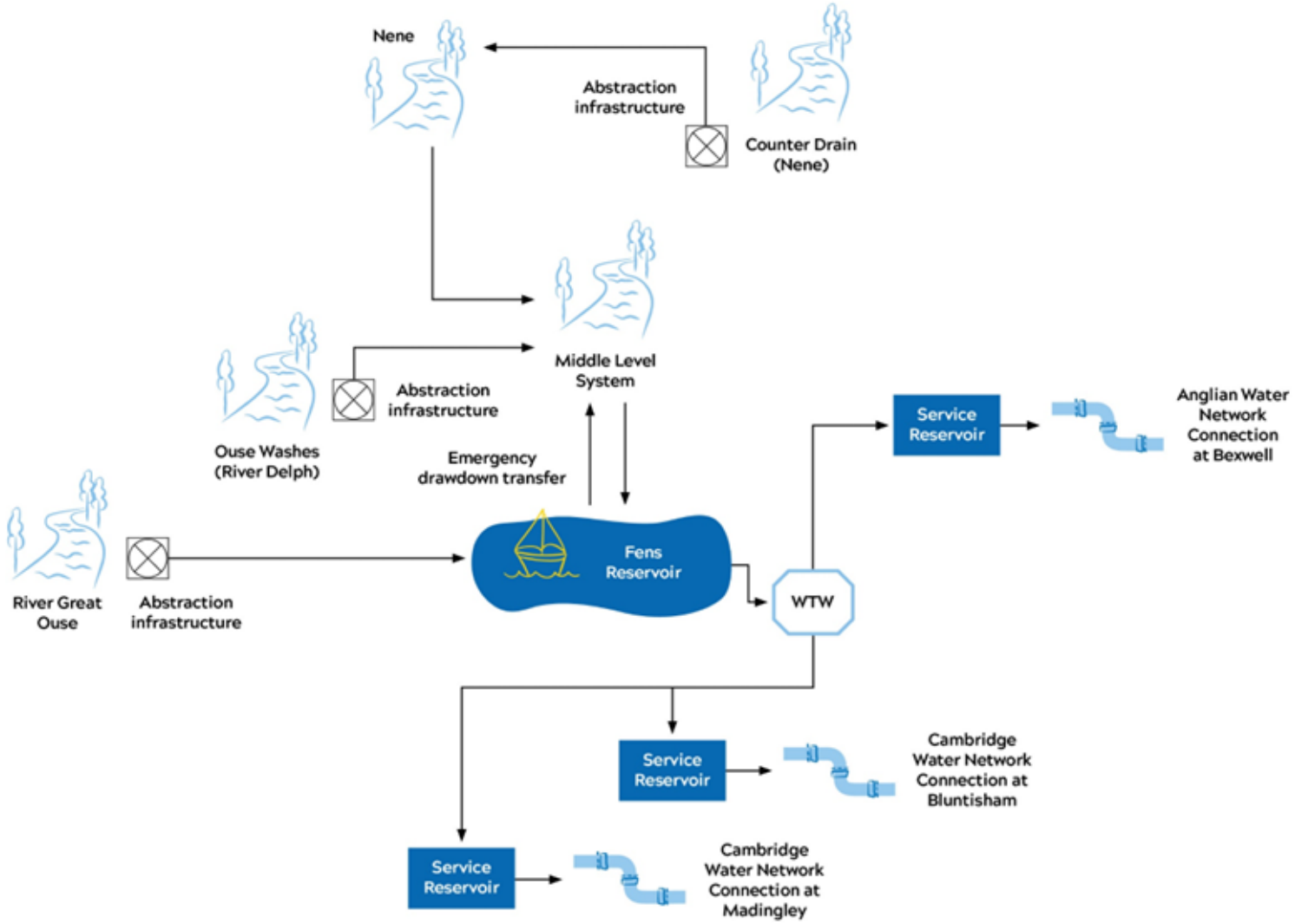

Image 2.3: Indicative schematic showing features of the Proposed Development

Sources of supply and upstream raw water transfers

Outline of proposals

2.5.3 To achieve the required reservoir yield, as set out in the WRMP24 and revised draft WRMP (Anglian Water 2024; Cambridge Water 2023) it is necessary to abstract and transfer water from three sources as shown in Image 2.3. The Proposed Development comprises authorised abstraction of raw (untreated) water from:

- The Middle Level system.
- One of either the Ouse Washes (River Delph) or the River Great Ouse. For the purposes of this EIA Scoping Report, both alternative sources are considered and the Scoping boundary includes the land required for both sources.
- The River Nene supported by its Counter Drain.

2.5.4 The Middle Level system would be the primary source of water for the reservoir. When there is water available in the system that could be used for public supply, it would be transferred into the reservoir from the Forty Foot Drain, or Sixteen Foot Drain by a pumping station located at the reservoir site.

2.5.5 When there is not enough water available in the Middle Level system, water would be abstracted from either the Ouse Washes (River Delph) or the River Great Ouse. Taking water from the Ouse Washes would involve building infrastructure near Welches Dam pumping station to abstract water from the Ouse Washes (River Delph) and pump it to the Forty Foot Drain. A section of the Forty Foot Drain would be refurbished to carry the water into the reservoir from a point north of Welches Dam Lock. The Ouse Washes abstraction point would be located approximately 5.2km from the proposed reservoir site, close to the existing Welches Dam pumping station.

2.5.6 An alternative to the Ouse Washes abstraction would be abstracting water from the River Great Ouse at Earith. This would require pumping water northwards to the reservoir through a new underground pipeline, which would pass east of Chatteris. The abstraction point at Earith would be located approximately 14.6km from the proposed reservoir site.

2.5.7 The third source would be used when more water is needed than is available from the closer sources. This source is the River Nene supported by flows from its Counter Drain. Modifications to the existing Stanground Lock structure would allow water to divert from the River Nene into the Middle Level system. Infrastructure would be constructed to abstract the water from the Counter Drain (Nene), treat it and pump it into the River Nene to balance the flow in the River Nene. From Stanground Lock, water would flow into the Middle Level system before being abstracted for transfer to the reservoir. The Counter Drain (Nene) abstraction point would be located approximately 16.9km from the proposed reservoir on the northern bank of the watercourse.

2.5.8 New infrastructure would be required to abstract and transfer raw water from these sources to the proposed reservoir. This includes abstraction infrastructure to draw water from the source when there is available supply, equipment to take in the flows of water, infrastructure to pump the water and, where required, treatment facilities to remove impurities and manage water quality (i.e. intakes, pumping stations and inter-catchment water treatment measures).

2.5.9 The proposals also include a network of raw water transfer routes, designed to transfer the water to the reservoir via a combination of underground pipelines and existing open channels. The transferred water from the pipelines or open channels would be pumped into the reservoir for storage.

2.5.10 The Scoping boundary currently identified for the water abstraction, treatment and transfer is larger than would be required for the operation of the Proposed Development. As discussed in Section 2.3, at this time a corridor and polygons have been identified within which the infrastructure would be located and operated, including sufficient allowance for construction and commissioning phases. Where there remain options within the design proposals, for example the alternative sources from the Ouse Washes (River Delph) and the River Great Ouse, the corridors and polygons cover the extent of land currently anticipated to be required for all alternative proposals.

2.5.11 For the purposes of this EIA Scoping Report, the areas of land falling within the Scoping boundary identified in Figure 2.1 have been considered for the assessment of the associated water infrastructure required to deliver the Proposed Development in the 'sources of supply and upstream water transfers' zone. Further detail on the component parts of this associated water infrastructure is provided below, based on the design information currently available.

Abstraction

2.5.12 Water would be abstracted from the proposed sources when available, typically during the winter months. It is anticipated that for the majority of the year, transfers to the proposed reservoir would not take place. The proposed reservoir has a capacity of 55Mm^3, which would provide a useable volume of 50Mm^3 and is considered sufficient to store water for the delivery of potable water to the downstream network throughout the year, meeting the needs of the WRMP24 (Anglian Water, 2024) and revised draft WRMP (Cambridge Water, 2023).

2.5.13 Abstraction infrastructure would include river intakes, water pumping stations and treatment works depending on the particular water source.

River intakes and pumping stations

2.5.14 Water would be abstracted from the watercourses via an intake structure built into the watercourse bank. It is anticipated that each of the intake structures would be constructed from reinforced concrete and would include screens and grit chambers to remove debris. Chemical dosing is likely to be required at each intake for biofouling control and would incorporate an above-ground kiosk and chemical storage tank. Mechanical and electrical equipment would also be enclosed in kiosks

or secured by fencing. The permanent works are expected to also include installation of an electrical power supply.

2.5.15 Pumping stations would be required at the water intakes to lift the water either into the transfer route or into a treatment works if the water requires treatment before being transferred towards the reservoir. The design of the pumping stations will be confirmed at future design stages; however, the final footprint of the site will be identified in response to site-specific conditions and design requirements whilst reducing land usage where possible.

Middle Level system source

2.5.16 The abstraction from the Middle Level system would be from the Forty Foot Drain or Sixteen Foot Drain for transfer to the reservoir. Further details are provided under the 'Reservoir site' subheading in Section 2.5 of this chapter.

Ouse Washes (River Delph) source

2.5.17 Water would be abstracted from the Ouse Washes (River Delph) close to the existing Welches Dam pumping station via a new intake structure located either in the Middle Level Barrier Bank, or in the Ouse Washes. Construction of this intake may require temporary works affecting flows of the River Delph, earth banks to maintain the integrity of the Middle Level Barrier Bank during construction, and sheet piling to the banks of the River Delph and the Counter Drain (Ouse). A pumping station would be required to transfer the water and may need to be located in the Middle Level Barrier Bank. It is anticipated that the pumping station and intake would be located within a compound which would include a pump house building, an access road, external laydown areas, and electrical transformers and generators. The likely size of the compound is currently unknown and will be identified as the design development process progresses.

River Great Ouse at Earith source

2.5.18 The abstraction point from the River Great Ouse would be located in the watercourse bank near Earith, south of Bluntisham within an enclosed compound. A gravity pipeline, anticipated to be approximately 750m long, would connect the intake structure to the proposed new pumping station located to the north towards Bluntisham.

2.5.19 The River Great Ouse pumping station would be located within a separate compound currently expected to have a footprint of approximately 150m x 140m. The compound would include a pumping station building which is currently expected to have a footprint of approximately 25m x 70m and an approximate height of 10m. At this stage, the pumping station compound is expected to include, as a minimum, an internal road, laydown area, abstraction well, surface water attenuation basin, transformers and generators.

2.5.20 A new access road would connect the pumping station compound to the nearest road and continue towards the river abstraction compound. The final alignment and connectivity of the road to the public highway is still to be confirmed.

River Nene and its Counter Drain source

2.5.21 Abstraction from the Counter Drain (Nene) would be located along North Bank, north-east of Stanground in Peterborough. There are currently two possible locations: one near Fengate, close to Flag Fen Water Recycling Centre (operated by Anglian Water) and the other further east, near Levitt's Drove, close to the Dog-in-a-Doublet sluice. The abstraction infrastructure and pumping station would be located within a compound, which would include a gravity pipeline which would connect the intake structure to the proposed new pumping station located to the north. The compound is expected to include, as a minimum, a laydown area, abstraction well, surface water attenuation basin, transformers and generators.

2.5.22 A pipe bridge would convey the pumped water over the Counter Drain (Nene) towards the River Nene, and connect into a discharge structure on the bank of the River Nene allowing the water to discharge into the River Nene. A vehicle bridge over the Counter Drain (Nene) could also be required to provide maintenance access to the pipe bridge from the pumping station compound. The pumping station compound is currently expected to have a footprint of approximately 120m x 90m.

2.5.23 A new access road would connect the pumping station compound to the nearest suitable road. The final alignment and connectivity of the road to the public highway is still to be confirmed.

Inter-catchment water treatment

2.5.24 Treatment works may be needed in some cases to achieve the required water quality when moving water between river catchments in order to meet Water Framework Directive (WFD) standards and/or to remove any Invasive Non-Native Species (INNS) present. These inter-catchment treatment measures could comprise buildings and associated structures at or near the intakes and pumping stations.

2.5.25 Legislation relating to INNS, including the Wildlife and Countryside Act 1981 (as amended) and the Invasive Non-Native Species (Amendment etc.) (EU Exit) Regulations 2019, imposes a duty to prevent the transfer of any INNS species, regardless of whether they are present during construction or introduced later to the source watercourse. The proposed treatment strategy is currently still in development but would likely include physical barriers (for example intake screening), operational asset maintenance (biofouling treatment of pipelines and infrastructure) and best practice biosecurity activities at the reservoir sites. The need for additional INNS management will be discussed with environmental regulators and statutory nature conservation bodies.

2.5.26 The WFD requires that transfers of water do not cause either a deterioration in the receiving watercourse or prevent the receiving watercourse from achieving good chemical status at a future date. The WFD chemical status covers a number of priority substances and includes a subset that are characterised as ubiquitous, persistent, bioaccumulative and toxic. The requirement for, and nature of, inter-catchment treatment at each abstraction has not yet been confirmed. The inter-

catchment treatment would typically treat some or all of the following types of pollutants, as required:

- Nutrients such as ammonia and phosphate that arise from agriculture and treated effluent (can also manifest as a Biological Oxygen Demand).
- Heavy metals.
- Micropollutants such as fuels, pesticides and industrial chemicals such as perfluorooctanesulfonic acid, known as PFOS.

2.5.27 Inter-catchment treatment proposals will be developed working with the relevant stakeholders and statutory bodies. As a precautionary approach, it is currently assumed that treatment is required at all abstraction locations where there is not already a connection between water bodies, and the land required is reflected in the polygons identified to form the Scoping boundary. There is currently no proposed inter-catchment treatment between the River Nene and the Middle Level system at Stanground Lock as there is already a connection between these water bodies and it is assumed that this would not be required.

2.5.28 Treatment processes will scale according to the treatment requirements, affecting the footprint and equipment size. A new access road would connect the inter-catchment treatment plant compound to the nearest suitable road. Depending on location, this access could be combined with access to abstraction and/or transfer infrastructure. The final alignment and connectivity of the road to the public highway will be identified as the design development process progresses.

Raw water transfer routes

2.5.29 As outlined above, the upstream transfer routes to the proposed reservoir currently include a combination of underground pipelines and existing open channels.

Middle Level system source

2.5.30 Water from the Middle Level system would be abstracted from the Forty Foot or Sixteen Foot Drains and transferred to the reservoir via a channel, wetlands and a pumping station. Further information is provided under the 'Reservoir site' subheading in Section 2.5 of this chapter.

Ouse Washes raw water transfer

2.5.31 Water from the Ouse Washes abstraction from the River Delph would be transferred by pipeline from the proposed pumping station at the Ouse Washes into the Forty Foot Drain immediately downstream of Welches Lock. This pipeline would include a pipe crossing of the Counter Drain (Ouse) watercourse, using trenchless techniques to go underneath, or a pipe bridge to go over. It is currently anticipated that the steel pipeline would be approximately 1km in length and 1,600mm in diameter. Where installed via open cut techniques, the pipeline would typically be installed with a minimum of 1.2m cover from the top of pipe to ground level, and at a maximum depth of 6m.

2.5.32 The pipeline would feature associated air valves, washouts and personnel access points along its route to provide a means of accessing the inside of the pipeline for maintenance purposes. The number and position of valves will be developed as the proposals are refined.

2.5.33 Water abstracted from the Ouse Washes (River Delph) and transferred along the Ouse Washes (River Delph) pipeline would be discharged into the Forty Foot Drain via a new outfall structure. The concrete outfall structure would be built into the watercourse bank, and would comprise an energy dissipation chamber that would reduce the velocity of the water discharging from the pipeline, allowing it to pass into the watercourse at a controlled rate and preventing damage to the riverbank. Vehicular access to the outfall would be via a new access track connecting to the public highway.

2.5.34 The Forty Foot Drain at this location between Welches Dam Lock and Horseway Lock is currently dried out and would be refurbished to enable the transfer of water into the Middle Level system. The proposals for the refurbishment are currently still in development but are anticipated to include clearing and relining the existing channel, improvements to Horseway Lock and provision of access for maintenance.

River Great Ouse raw water pipeline and outfall

2.5.35 The River Great Ouse to the proposed reservoir pipeline would transfer water from the River Great Ouse pumping station at Earith into the Forty Foot Drain, immediately adjacent to the proposed reservoir. The final discharge location is to be confirmed as the design is refined. It is currently anticipated that the steel pipeline would be approximately 20km in length and 1,500mm in diameter. Where installed via open cut techniques, the pipeline would typically be installed with a minimum of 1.2m cover from the top of pipe to ground level, and at a maximum depth of 6m.

2.5.36 The pipeline would feature associated air valves, washouts and personnel access points along its route to provide a means of accessing the inside of the pipeline for maintenance purposes. The number and position of valves will be developed as the proposals are refined.

2.5.37 The proposed pipeline corridor runs northwards to the west of Somersham, travelling alongside Chatteris Road. The corridor then runs to the east of Chatteris before reaching the reservoir.

2.5.38 The water would be transferred via pipeline and discharged into the Forty Foot Drain, via a new outfall structure. The outfall structure is expected to be constructed from reinforced concrete and could include an energy dissipation chamber that would reduce the velocity of the water discharging from the pipeline. Vehicular access to the outfall would be via a new access track that would connect to the public highway.

River Nene raw water transfer via open channel

2.5.39 The water would be transferred from the River Nene abstraction to the Middle Level system via the River Nene and through Stanground Lock. To facilitate the

transfer of water from the River Nene into the Middle Level system, a new bypass culvert at the existing Stanground Lock would be required. The culvert is indicatively sized at 3m wide and would require modification of the existing channel banks in the vicinity of the lock structure. A sluice gate, including relevant control equipment, on the upstream end of the culvert would manage flows during periods of water transfer.

Reservoir site

Outline of proposals

2.5.40 The proposed reservoir is a 'non-impounding reservoir' with no natural catchment providing runoff rainfall flow. The inflows to be considered are therefore the rainfall directly on the reservoir area and the water pumped into the reservoir from the upstream water sources. It is proposed that the reservoir would have a storage capacity of approximately 55Mm^3 which would be designed to provide a usable volume of 50Mm^3 to supply up to 88.8Ml/d.

2.5.41 Water from the Middle Level system would be abstracted from the Forty Foot or Sixteen Foot Drains and transferred towards the reservoir, where it would be stored.

2.5.42 Water would leave the main reservoir via an outlet tower for transfer to the water treatment works. This would be via pipeline under the embankment through a single outlet tunnel.

2.5.43 In addition to the infrastructure required to operate the reservoir, the Proposed Development incorporates recreational facilities at the reservoir site for public use. Refer to the section titled 'Recreational use proposals' later in Section 2.5 for further information.

2.5.44 The land permanently required for the construction and operation of the Proposed Development within the reservoir site will be subject to refinement as the design development process progresses.

2.5.45 For the purposes of this EIA Scoping Report, the land identified within the Scoping boundary and shown in Figure 2.1 has been considered for the assessment of the Proposed Development in the reservoir site. Further detail on the component parts of this infrastructure is provided below based on the design information currently available.

2.5.46 The following sections provide a high level description of the current reservoir proposals.

Reservoir infrastructure

Inlet to the reservoir

2.5.47 It is anticipated that water would be abstracted from the Forty Foot Drain or Sixteen Foot Drain via a flow control structure. From here it is currently proposed that the water would then flow through a sequence of wetlands before reaching the inlet pumping station, where it would be pumped into channels connecting to a

tiered wetland forming part of the central peninsula within the reservoir. From the lowest of the tiered wetlands, a culvert would transfer the water into the reservoir.

Reservoir water bodies

2.5.48 The emerging design shows that the total operational volume of the reservoir would comprise a consistent level water body (lagoon) and the main body of the reservoir as illustrated in Image 2.4. Water levels within the main body of the reservoir would vary throughout the year depending on availability of water from the sources and demands on water supply. The water level is expected to reduce from May onwards, before returning to higher levels over winter, if there is available supply.

2.5.49 The emerging design shows that the two water bodies would be separated by a central peninsula, which would include a series of tiered wetlands. The water level in the consistent level lagoon would remain largely unchanged, to provide easy access to water for recreation. This weir would maintain the water level in the lagoon and release water into the main part of the reservoir. The water would pass into the main reservoir via a weir, located at the south-east corner of the consistent level lagoon.

2.5.50 The reservoir has been designed so that in extreme drought situations, the consistent level lagoon could be emptied into the main body of the reservoir to provide the full operational volume, as required.

Image 2.4: Indicative illustration of the emerging design for the reservoir site

Reservoir and embankments

2.5.51 The proposed reservoir comprises all the infrastructure required to contain the water body and control the water safely. The embankment (or dam) to contain the

water would be constructed from clay and would be compacted in layers to enhance stability. The embankment would be built on top of, and keyed into, the clay bedrock to create a continuous low-permeability barrier against the flow of water.

2.5.52 At the Scoping stage, the provisional dimensions of the reservoir are approximately 3.1km from north to south and 2.6km from east to west, with a water surface area of approximately 5km^2.

2.5.53 The embankment crest is estimated to be between 10m and 15m Above Ordnance Datum. The approximate relative embankment heights are currently anticipated as a maximum of 16m and a minimum of 2m above existing ground levels; however, these heights may be subject to change as the design development process progresses. The total perimeter length of the crest is approximately 8km.

2.5.54 The emerging design for the reservoir embankment currently proposes an 8m wide crest to allow for a mid-crest access, with a safety zone on either side. The proposed width of the embankment crest will be subject to ongoing design development work, including ground investigations.

2.5.55 The emerging design includes proposed maintenance vehicle access around the reservoir, which would also provide a combined footpath and cycleway.

2.5.56 The structural element of the embankment is currently assumed to have a slope of 1:6.5 (ratio vertical: horizontal), although this could change as geotechnical investigations and analysis is progressed. The internal shoulder of the embankment would generally be constant, except where there are specific features (for example a beach, or wetland). The external shoulders would be 1:6.5 at their steepest, with many locations slackened to incorporate landscape design and for visitor access.

2.5.57 The key features of the embankment are illustrated in Image 2.5 and include:

- The embankment core – a dense, low permeability core zone, to control seepage out of the reservoir.
- The filter drain – to pick up the low amount of seepage and take it away.
- The structural fill shoulders – which hold up the core and filter against the water pressure.

2.5.58 The structural shoulders would be covered by the landscape fill shoulder on the outside of the embankment to protect the structural shoulders from plant roots, and provide variation in the shape, both of which are intended to mitigate the visual impact of the embankment. There would be discrete sections where the landscape shoulder is not installed to allow the reservoir safety teams to monitor the behaviour of the core and structural shoulders to identify any early signs of problems and address them appropriately. The whole embankment would have engineering instrumentation to enable monitoring of performance from a safety perspective, including (but not limited to) settlement, lateral movement, pore water pressure, and seepage.

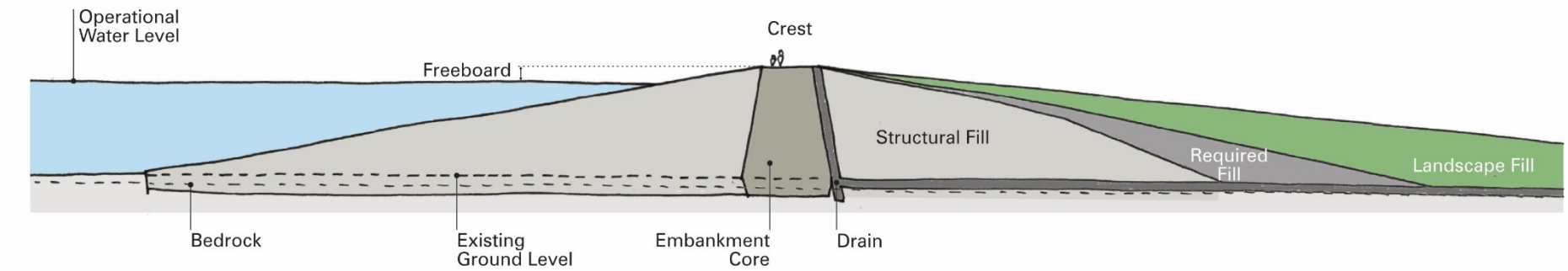

Image 2.5: Typical embankment cross-section

2.5.59 The emerging design shows that the gradients of the external shoulder of the embankment would vary. The steepest sections would be discrete sections where no landscape shoulder is installed. The embankment gradients will be defined as the design progresses, seeking to integrate the embankment within the surrounding environment and reflecting the landscape design proposals. The creation of gentle slopes would allow planting on the embankment slopes without impacting the integral clay core.

2.5.60 The internal face of the reservoir would be protected from wave erosion. The default method would be a layer of large stone 'rip-rap' comprising granite or similar hard rock of a typical size of approximately 350mm diameter, and an approximately 750mm deep layer. Consideration will be given to alternative methods as part of the ongoing design development process.

2.5.61 Internal embankments would be constructed within the reservoir to create the consistent level lagoon and the central peninsula with the associated wetlands.

2.5.62 Landscaping fill material is expected to be used around the main structural embankment to add features including new landforms that can provide areas of shelter from prevailing winds and accommodate planting and wetlands. These features could be external or internal to the crest and will be refined as the design development process progresses.

2.5.63 It is anticipated that borrow pits would be used for sourcing the main structural and landscaping materials. These would be located within the footprint of the reservoir forming the reservoir bowl.

2.5.64 The internal drainage system within the embankment is proposed to be formed of the following key components:

- Chimney drain – located between the embankment core and the structural shoulder.
- Horizontal composite blanket – under the structural shoulder.
- Finger drains – to convey drainage flow to the toe of the embankment.
- Perimeter drains – to collect water from the finger drains.
- Weirs – to measure the flows from the finger drains to monitor the magnitude and change in seepage rate for dam safety, located at intervals around the perimeter of the embankment.

2.5.65 Ground investigations undertaken to date have indicated there are peat deposits within the reservoir site. Further analysis is needed to determine whether the peat deposits would be present in the areas identified for the reservoir water bodies, embankments and/or other parts of the reservoir site. The further analysis would identify which peat deposits would be excavated, stored and relocated on-site, and which would remain *in situ* as part of the proposals. Relocation of peat may form part of habitat creation proposals.

Outlet

2.5.66 The emerging design shows an outlet tower would be located at the southern end of the reservoir to abstract water, which would then be piped to the water treatment works where it would be treated for public supply. The diameter of the outlet tower has not been determined; however, it is anticipated that this could be approximately 20m in diameter.

2.5.67 It is anticipated that the outlet tower would have a supply pipe, with three offtakes to draw off water at different levels in the reservoir and transfer water out of the reservoir. The supply pipe passes from the outlet tower under the embankment through a culvert to the water treatment works.

2.5.68 The tower and culvert would also hold the scour pipe(s) that could convey much larger flows of water safely under the embankment.

2.5.69 The supply pipe intakes would include screens to prevent debris entering the supply pipe. The tower would also include a large screen to prevent public access to the intakes, at such a distance as to prevent swimmers and boats becoming stuck on the screen when water is being drawn into the intakes or scour pipe.

2.5.70 Image 2.6 provides an example of the external appearance of a typical outlet tower.

Image 2.6: Example of an outlet tower

Emergency drawdown

2.5.71 Emergency drawdown is a capability to lower, in a controlled manner, the reservoir's water level quickly to ensure reservoir safety in the event of a problem occurring which threatens the structural performance of the embankment. Emergency drawdown capability is required to reduce the load on the

embankment, avoiding or reducing the risk and impact from the highly unlikely event of a failure.

2.5.72 The details of the emergency drawdown proposals are still in development; however, it is anticipated that the emergency drawdown infrastructure would consist of an outlet test pond and two large diameter pipes, currently calculated to be approximately 2.2m internal diameter. The pipes would convey water from the reservoir outlet to a location in the bottom outlet test pond where it is currently assumed that they would turn to point vertically within a concrete block. Under the current design, the water would well up out of the pipes (in a mushroom shape) around 1.8m high when the pipes are in full flow to fill up the test pond.

2.5.73 The emergency drawdown infrastructure would require regular testing and the outlet test pond would be sufficiently sized to contain the volume of water used as part of testing the emergency drawdown valves and pipe. The water released during testing would be pumped back to the reservoir after the test. In the highly unlikely event of an emergency, the emergency drawdown pond would fill with water, which would then spill over a weir into the Forty Foot Drain, flowing through the Middle Level system and onwards to the sea.

2.5.74 Further information on the testing and the operation of the emergency drawdown procedure in the unlikely event of an emergency is provided in Section 2.7.

Spillway

2.5.75 As a further measure to mitigate any risk to the integrity of the embankment, a spillway adjacent to the outlet tunnel has been incorporated into the emerging design to prevent the very unlikely risk of uncontrolled overtopping. The spillway is a lowered section of embankment crest and defines the top water level of the reservoir; any water above this level would flow out of the reservoir via the spillway. When the reservoir is full, for a few months of the year, small waves (and ripples) would pass a small amount of water down the spillway, or possibly via a longitudinal drain in the crest at the spillway into the bottom outlet test pond. This water would be returned to the reservoir.

2.5.76 The water level of the reservoir would be constantly monitored, and trigger levels set to provide warning of increased water levels. In the event of high water levels being monitored, inlet pumps would automatically shut off to stop water from discharging into the reservoir. As the reservoir is non-impounding and there is no flood catchment, the only rainfall that would fill the reservoir is that which falls on the reservoir surface. However, in the event of a very significant rainfall event, and the unlikely event of the inlet pumps continuing to operate with the reservoir water level above the alarm levels, the spillway would discharge the excess water into the outlet test pond. From the outlet test pond, the water would be returned to the reservoir, or if it exceeds the volume of the outlet test pond, discharged into the Forty Foot Drain. It is considered highly unlikely for this to occur and would require multiple equipment and operational failures in combination with a significant rainfall event.

2.5.77 The surface of the spillway would be designed to be able to tolerate high volume water flows. This could be achieved through a reinforced surfacing. This would be identified through the ongoing design development process.

Buildings and structures

2.5.78 A control structure is proposed on the northern embankment of the Forty Foot Drain (near to the A141) to regulate flow between the Forty Foot Drain and the inlet channel on the west side of the main reservoir. Alternatively, there would be a control structure on the western embankment of the Sixteen Foot Drain. The location, type of control structure and the associated design requirements to facilitate this, including power and access, are still to be determined by the ongoing design development process.

2.5.79 A buried pumping station is proposed to the west of the main reservoir, to pump the water to the inlet channel. The location of this building is currently not confirmed. In addition, it is anticipated that there may also be a requirement for further pumping stations around the reservoir to provide water to various habitat creation areas. The number, size and locations of these are to be defined as the design development process progresses.

2.5.80 In addition, it is anticipated that there will also be a requirement for further pumping stations within the reservoir site, to evacuate water from the site (both rainfall and seepage flows). Currently, all rainfall in the locality is evacuated by the existing Curf and Wimblington Combined Internal Drainage Board pumping stations; predominantly Benson's pumping station, and also Curf pumping station. The emerging design proposes that the water would either be returned to the reservoir or, if required, into wetland areas to maintain the habitat. The number, size and locations of these pumping stations are to be defined as the design development process progresses.

2.5.81 Other buildings may also be required, associated with the operation and maintenance of reservoir infrastructure and the recreational use proposals. These may include offices and facilities for operational staff, equipment maintenance sheds and storage buildings. The number, size and locations of these are to be defined as the design development process progresses.

Access

2.5.82 The following section provides a high level summary of the current proposals for access to the reservoir site.

Roads access and alterations to existing highway network

2.5.83 The emerging design proposes that road access from the A141 Isle of Ely Way to the reservoir site would be enabled by the creation of a new junction with the A141 for the main visitor entrance. This junction would also provide for some operational vehicle access to the reservoir site. The layout of this junction will be developed as the design development process progresses and will consider provision of walking, cycling and horse-riding (WCH) crossing facilities.

2.5.84 A secondary access option for operational vehicles and additional recreational visitors is currently proposed on the A142. This development of the design for this junction also includes consideration of provision of WCH crossing facilities. Additional operational access points on B1093 Manea Road and Sixteen Foot Bank are currently proposed for operational vehicle usage only. The specific details of each of these junctions will be developed as the design development process progresses.

2.5.85 A third visitor access is proposed to the north-eastern side of the reservoir site from the B1098. Details of these accesses to the reservoir site will be identified as the design development process progresses.

Public Right of Way/permissive path access

2.5.86 It is currently anticipated that there would be improvements to the network of PRoWs, including those that link to the A141, A142, B1098 and Sixteen Foot Bank, which would require crossing points to be created. The detail of these crossing points will be developed as the design development process progresses.

Recreational access

2.5.87 The emerging design incorporates footpaths and shared pathways across the reservoir site, including a combined route around the entire crest of the proposed reservoir for WCH.

2.5.88 The recreation proposals currently include a variety of long and short, surfaced and unsurfaced walks and trails around the site providing opportunities for WCH. Associated facilities, for example cycle storage, hire, equestrian mounting blocks and seating, are currently under consideration and could be provided to maximise the accessibility use of these routes.

2.5.89 In addition to new routes proposed within the reservoir site, new and improved WCH routes are included in the emerging design with a view to providing recreational access between the reservoir site and local communities. These could include provision of new and improved routes from March, Chatteris and Wimblington/Doddington. These are all subject to further investigation, including through engagement with local authorities and affected landowners.

Water treatment works

Outline of proposals

2.5.90 The water treatment works are proposed to be located to the south of the reservoir, north of Chatteris and adjacent to the A142 Isle of Ely Way. At present a polygon has been identified within which the water treatment works would be located. Further design development work is required to identify the final positioning, size and layout of the water treatment works; however, it is anticipated that the operational site area would be approximately 10 hectares.

2.5.91 As described above, raw water would be abstracted from the proposed sources and stored in the proposed reservoir until it is to be treated for public consumption. Based on the available information on water quality, it is anticipated that a

conventional water treatment comprising screening, treatment, filtration and disinfection would be required.

2.5.92 Raw water from the reservoir would be transferred by pipeline to the water treatment works. The water would be treated using processes which may include:

- Passing through screens to remove large material such as debris and algae.
- Injection with ozone to remove contaminants.
- Passing through clarifiers to remove solid particles as sludge.
- Filtering through sand and other media to trap suspended solids.
- Filtering through granular activated carbon (GAC) where contaminants are adsorbed into the carbon.
- Removal of nitrates through chemical processes.

2.5.93 An intermediate pumping station is required as part of the water treatment to move water between the various treatment phases. The pumping station building is currently anticipated to have a footprint of approximately 20m x 15m and an approximate height of 4m.

2.5.94 It is currently anticipated that a wastewater pipeline would transfer wastewater from the treatment processes for off-site treatment at Chatteris Water Recycling Centre (WRC), which is located within the Scoping boundary.

2.5.95 A start up to waste (SUTW) process would also be included in the water treatment works to enable non-compliant treated water to be returned via an ancillary pipeline to the Middle Level system.

2.5.96 With the aspiration of future-proofing against water quality challenges, handling contaminants of emerging concern, and process technology advancement among other drivers, the ultimate process configuration to be adopted for the proposed reservoir water treatment works will be refined as the design development process progresses.

2.5.97 For the purposes of the EIA Scoping Report, the broad areas of land identified in Figure 2.1 have been considered for the assessment of the associated water infrastructure required to deliver the Proposed Development in the water treatment works zone. Further detail on the component parts of this associated water infrastructure is provided below based on the design information currently available. The proposals for this will continue to develop and be refined based on further assessment work and consultation feedback received.

2.5.98 Image 2.7 provides an example of the external appearance of a building as part of a water treatment works.

Image 2.7: Example of a water treatment works building

Water treatment infrastructure

2.5.99 The following sections provide a high level description of the water treatment works proposals.

Low-lift pumping and intake structure

2.5.100 Water would be conveyed from the reservoir outlet tunnel to the water treatment works via a raw water pipeline. It is currently anticipated that this would pass under the Forty Foot Drain.

2.5.101 A low-lift pumping station within the water treatment works would lift water from the raw water pipeline to an intake structure at the head of the treatment works. This structure would include screening facilities to prevent the transfer of large material such as debris and algae into the water treatment works.

Buildings and structures

2.5.102 The primary water treatment process units would be housed in one or more buildings. The number and size of the building(s) is still to be confirmed, although it is anticipated the tallest building could be up to 23.5m in height. Enclosing the equipment within a building provides physical security against contamination and helps prevent biological growth in the water by eliminating sunlight. Inter-stage pumping stations may be required to move water through the water treatment process.

2.5.103 Other buildings that would be located within the water treatment works site could include an administration building which provides laboratory facilities and offices with associated welfare facilities for employees; a building for the electrical switchroom and the high lift pumping station. The proposed high lift pumping station is described further in Section 2.5 under the heading 'Downstream treated water transfers'.

Ancillary pipelines and infrastructure

2.5.104 Two ancillary pipelines located within the Scoping boundary would be required from the water treatment works to convey foul wastewater to the WRC and to convey treated but non-compliant water back to the Middle Level system from the SUTW process.

2.5.105 It is currently anticipated that a small diameter (approximately 300mm) pipeline would connect the water treatment works to Chatteris WRC, which is located in the Scoping boundary. The pipeline would convey combined brine and foul wastewater from the water treatment works to the WRC for independent treatment.

2.5.106 A balance tank would receive clean but non-compliant SUTW water following shutdown or restart of the water treatment works. The balance tank would contain facilities for dechlorination of the non-compliant water. A pipeline of approximately 900mm diameter would connect the balance tank to the Middle Level system, conveying the SUTW water from the water treatment works for discharge to the Middle Level system. This pipeline would be located within the Scoping boundary and would also convey water from overflows within the water treatment works and treated water storage tank, and water from any drain down of the treated water storage tank, to the Middle Level system. All water discharged would be treated but would be dechlorinated before discharge.

2.5.107 The pipeline transferring the SUTW water would discharge into the Middle Level system via a new reinforced concrete outfall structure. The outfall structure would include facilities for the dissipation of energy of outfall flows. If required, depending on the location of the outfall structure, bed protection would be provided to prevent scour.

2.5.108 The aforementioned pipelines would feature associated valves, washouts and personnel access points along their routes to provide a means of accessing the pipelines for maintenance purposes. The number and position of valves will be identified as the design development process progresses.

Storage reservoir

2.5.109 The water treatment works site would include storage for treated water at a service reservoir comprising a large enclosed concrete tank. This would be located at the downstream end of the water treatment works site and within the polygon identified for the water treatment works. It is anticipated that this would be a dual-compartment structure surrounded by grassed earth embankments. The tank roof would be covered with gravel to facilitate drainage and to maintain a uniform temperature of the water stored within.

Access

2.5.110 The emerging design proposals include a new permanent road connection to the A142 which would provide access from the existing road network to the water treatment works site. This access road would be combined for part of its length with the proposed access to the recreational areas of the reservoir site. A secondary road would be provided for emergency access in the event that the main access is blocked.

2.5.111 Internal roads, turning and hardstanding areas would be provided within the water treatment works site to facilitate safe movement and materials handling. Allocated car parking would be provided for both visitors and operatives. Designated parking would also be provided for Heavy Goods Vehicles (HGVs) bringing in materials for use in the water treatment works and removing waste.

Other design elements

2.5.112 Other elements that are expected to be incorporated into the proposals for the water treatment works include offices and welfare facilities, internal access roads and car parking as identified above, plus associated security features such as closed-circuit television (CCTV), lighting, fencing, and landscaping and planting.

Downstream treated water transfers

Outline of proposals

2.5.113 Once treated, the water would be transferred via pipeline from the water treatment works into the existing clean water supply system. Two pipelines are proposed. One would transfer water from the water treatment works to Anglian Water customers, connecting to the existing water supply system at Bexwell, north-east of Downham Market. The second pipeline would provide clean water for Cambridge Water customers, connecting to the existing system at Madingley, north-west of Cambridge and Bluntisham, west of Earith.

2.5.114 New infrastructure would be required to transfer the treated water, including pumping stations, underground pipelines and service reservoirs to store the water before it is transferred into the clean water supply system.

2.5.115 The Scoping boundary currently identified for the downstream water transfers is larger than would be required for the operation of the Proposed Development. At this time a corridor and polygons have been identified within which the infrastructure would be located and operated, including sufficient allowance for construction and commissioning phases.

2.5.116 For the purposes of this EIA Scoping Report, the areas of land falling within the Scoping boundary identified in Figure 2.1 have been considered for the assessment of the associated water infrastructure required to deliver the Proposed Development in the downstream treated water transfers zone. Further detail on the component parts of this associated water infrastructure is provided below based on the design information currently available.

Pumping station

2.5.117 A high lift treated water pumping station would be located inside the water treatment works compound and would transfer water from the treated water storage tanks along the transfer pipelines. The pumping station building would have an indicative footprint anticipated to be around 20m x 15m and be approximately 4m high.

Downstream transfer routes

2.5.118 As outlined above, the downstream transfer routes are proposed as underground pipelines, to be located within the broad corridors shown in Figure 2.1. The pipelines are anticipated to be steel and approximately 900mm in diameter.

2.5.119 Each of the proposed pipelines would include the following features. The number, location and size of these features has not been confirmed and these will be identified as the design development process progresses.

- Air valves located at high points along the pipeline within a buried chamber, that would partially extend up above ground level.
- Washout valves located at low spots along the pipeline to allow the pipeline to be drained. The valves would be located within buried chambers.
- Line valves to allow for sections of the pipeline to be isolated. Whilst the valves would be buried below ground, the associated control kiosks would sit above ground. The valves would be strategically located close to existing public roads, such that the control kiosks can be readily accessed. Depending on the system hydraulics, line valves may also require an air valve or washout on either side of the valve, creating an array of covers at these locations.
- Personnel access points provide a means of accessing the inside of the pipeline for infrequent cleaning/maintenance purposes. The access point would be buried with only a marker post visible from the surface. In the event that access is needed, an excavation would be required to locate the fitting below. It is anticipated that in many cases personnel access points would be integrated into the design of air valves, thus reducing the number of individual access points required.

Reservoir to Bexwell transfer

2.5.120 The pipeline transferring water from the water treatment works to the service reservoir at Bexwell is anticipated to be approximately 30km long. The proposed pipeline corridor runs in a north-easterly direction from the reservoir site, passing between Christchurch and Welney. The corridor then crosses the A1122 just south of Nordelph before continuing in a north-easterly direction towards Downham Market to connect to the proposed new service reservoir at Bexwell.

Reservoir to Madingley via Bluntisham transfer

2.5.121 The pipeline transferring water from the water treatment works to the service reservoir at Madingley is anticipated to be approximately 45km long. The proposed pipeline corridor runs in a south-westerly direction from the reservoir, west of Somersham. From there it runs south towards Elsworth and then in a south-easterly direction to the existing Cambridge Water connection point at Madingley.

2.5.122 The connection to the clean water system at Bluntisham would require a short pipeline that would spur off from the Madingley pipeline corridor to the south of Somersham, and running along the northern side of The Heath towards Bluntisham. At the spur location, several valves would be required in order to control the flow of water between the two pipelines. These valves would be located in buried chambers but may require above-ground electrical kiosks. The Bluntisham spur pipeline is anticipated to be approximately 1.3km long.

Service reservoirs

2.5.123 A new service reservoir is proposed at each of the locations where the downstream transfer pipeline connects to the existing clean water system. Service reservoirs are tank-like reservoirs (approximately 200m by 200m) for storing treated drinking water ensuring treated water is available to flow into the clean water system when needed. These reservoirs are fully enclosed and typically partially buried concrete tanks with grassed earth embankments and planting to minimise visual impacts. The tops of the tanks are anticipated to sit up to 8m above ground level; however, final heights will be confirmed as the design development process progresses. A circular access road around each of the tanks would be incorporated into the design, along with a surface water attenuation basin. It is anticipated that parking, fencing, security features and landscaping would be included as part of the proposals.

2.5.124 Each of the three service reservoirs would require a control building to house electrical/mechanical equipment used to control the water within the tank and to allow for potential water quality dosing and booster pumping. These buildings have been indicatively sized at 30m x 15m at this stage in the design development process.

2.5.125 The service reservoirs and all supporting infrastructure would be located within the polygons shown in Figure 2.1. The design of the service reservoirs, buildings and the equipment will be refined as the design development process progresses.

Bexwell service reservoir

2.5.126 The Bexwell service reservoir site would be located close to the existing Bexwell service reservoir on the opposite (eastern) side of the A10 highway. The site is anticipated to include a 50Ml storage tank to supply sufficient water for 24 hours of demand at peak flow (50Ml/d). Access to the Bexwell service reservoir would be identified in liaison with the local highway authority and could be via a new road directly off the A10.

Madingley service reservoir

2.5.127 The Madingley service reservoir would be located east of Coton, adjacent to Long Road. This is near to an existing Cambridge Water service reservoir, allowing connection to the existing infrastructure. The site is anticipated to include a 37.5Ml storage tank to supply sufficient water for 18 hours of peak demand (50Ml/d). Access to the Madingley service reservoir is not currently confirmed, although it is anticipated that an access route to the existing service reservoir could be used.

Bluntisham service reservoir

2.5.128 The Bluntisham service reservoir would be located to the north-west of Bluntisham by Wood End, near to the existing Bluntisham service reservoir and within the polygon forming the Scoping boundary. The site is anticipated to include a 37.5Ml storage tank to supply sufficient water for 18 hours of peak demand (50Ml/d). Access to the Bluntisham service reservoir would be via the access track serving the existing Bluntisham service reservoir.

Other design elements

2.5.129 It is anticipated that the following other design elements are likely to be required to facilitate the operation of the Proposed Development. The details of these will be identified as the design process progresses. Some of these other design elements could extend beyond the existing Scoping boundary. Once additional information is available, further engagement would be undertaken with relevant statutory bodies and stakeholders to determine the appropriate approach to the environmental assessment of these proposals.

- New access points and tracks to connect the reservoir and associated water infrastructure with the existing road network, and parking to enable operational and maintenance access to the Proposed Development.
- Highway improvements to facilitate access to the proposed reservoir and associated water infrastructure for both construction and operation.
- Security fencing, CCTV and other security measures including lighting related to operational compounds at the reservoir and associated water infrastructure sites. Road and area lighting would be provided at some locations to improve safety for operational staff and visitors.
- Utility works including diversions and installations to provide power for operational infrastructure at the reservoir and as part of the associated water infrastructure. This could include network upgrades to support increased demand.
- Installation of new, and relocation of existing, surface water drainage at the reservoir and associated water infrastructure sites.
- Opportunities are currently being considered to include renewable energy sources such as wind turbines and/or solar panels within the reservoir site. The detail of these proposals is still to be developed, including identification of locations and the type and quantity of renewable energy sources proposed.

Further information on renewables is provided in the embedded mitigation section below.

- Storage areas at the reservoir and associated water infrastructure sites associated with the operation and maintenance of the Proposed Development.
- Reinstatement planting and environmental mitigation and compensation throughout the Scoping boundary, where required.

Embedded mitigation

2.5.130 The current proposals include a number of embedded mitigation measures to avoid or reduce adverse effects. At this stage in the design development process, these predominantly relate to the emerging design of the reservoir site. Embedded mitigation for the whole of the Proposed Development will be further identified and refined as the design development and EIA process progresses. A summary of the current provision within the Proposed Development is provided below.

Habitat creation

2.5.131 The emerging design for the reservoir site includes areas of land for embedded environmental mitigation, for example, new areas of wetland and wet grassland are proposed around and within the reservoir site to mitigate for the loss of ditch habitat and provide biodiversity net gain. These would be located mainly to the east and south of the reservoir where they would be more remote from the proposed recreation areas of the western edge and provide the best connectivity with the Swan and Goose Functionally Linked Land and the Forty Foot and Sixteen Foot Drains. The design of wetlands may be developed to accommodate translocated peat receptor sites and nature-based water treatment processes. Further details on the nature and scale of these areas will be provided as the design development process progresses.

2.5.132 Further areas could also be provided to accommodate the aspirations for operationally net zero carbon emissions and possible peat receptor sites and/or water treatment wetlands to the south of the Forty Foot Drain.

2.5.133 The proposals would also seek to include further features that provide biodiversity and wider environmental net gain.

Landscape earthworks

2.5.134 The profiles of the embankments forming the emerging design for the reservoir would be varied so that interest and planting could be provided on both outer and inner faces. The landscape shoulder on the outside of the embankments would be designed to protect the structural elements from plant roots, and provide variation in the shape, both of which would mitigate the visual impact of the embankment.

2.5.135 The emerging design has also considered opportunities for multi-purpose landscape earthworks around the reservoir to provide screening, bunding, viewing and inclusive access. The earthworks designs would be shaped to link the reservoir embankments into their location as well as providing interest and shelter for habitats and people.

Tree planting

2.5.136 It is anticipated that tree planting would be provided and would predominantly be located where it could provide visual screening of the recreational facilities and potentially reduce visual impacts on sensitive receptors. The emerging design also proposes that further pockets of tree planting could be provided on the higher ground around the reservoir perimeter to improve microclimate and provide shelter.

Flood mitigation

2.5.137 The emerging design for the Proposed Development includes the provision of a flood mitigation bund at the north of the reservoir. In the event of a flood defence breach along either the Forty Foot Drain or Sixteen Foot Drain within the reservoir site area, the bund would be intended to prevent flows travelling north towards Wimblington; without the reservoir in place these floodwaters may have sat within the reservoir footprint. The Flood Risk Assessment and modelling to be undertaken as part of the development of the proposals will draw conclusions on the need for mitigation if a flood defence breach were to occur elsewhere.

Renewable energy generation

2.5.138 It is anticipated at this stage of the design development process that renewable power generation would be included as part of the Proposed Development. This would be included to support Anglian Water's aim to reach net zero greenhouse gas emissions in operation by 2030. In line with the requirements in the NPS for Water Resources Infrastructure (Defra, 2023), to identify mitigation measures through use of renewable energy sources, renewable energy generation proposals would be integrated into the layout of the Proposed Development to offset electrical power required from the national grid and provide low carbon electricity.

2.5.139 The amount, type and design of the renewable energy generation to be installed is still in development. It is currently envisaged that it could include solar and/or wind power generation within the reservoir site. Further work is required to develop the proposals, including consideration of the feasibility, space within the reservoir site, potential for environmental effects and the ongoing evolution of energy generation and energy storage technologies. Therefore, an assessment has not been undertaken regarding renewable sources of energy within this EIA Scoping Report. Once more information is available, further engagement would be undertaken with relevant statutory bodies and stakeholders to determine the appropriate approach to the environmental assessment of these proposals.

Recreational use proposals

2.5.140 In addition to the infrastructure required to operate the reservoir, the emerging design for the Proposed Development incorporates recreational facilities for the public to use. These will include recreational facilities provided as part of the Proposed Development and consented via the DCO (e*mbedded* recreational facilities). The Proposed Development may also facilitate further recreational uses, which may be consented, funded and delivered separately from the Proposed Development at a later date (*additional* recreational facilities). Where information

on the proposals for additional recreational facilities is available, for example as part of a planning application, the combined effects alongside the Proposed Development would be considered as part of the cumulative effects assessment, to be presented in the ES as part of the DCO application. This is discussed in Chapter 23: Cumulative effects.

2.5.141 It is currently envisaged that the majority of the embedded recreational use proposals would be located at a primary visitor hub, located to the north-western corner of the proposed reservoir within the emerging design. Secondary and tertiary hubs are currently proposed to be located to the south and north-east of the proposed reservoir respectively. Proposals for recreational facilities currently include a visitor hub, a lagoon suitable for watersports, greenspaces and recreational routes for walkers, cyclists and horse riders.

2.5.142 Vehicle access to the proposed primary hub is anticipated to be via the A141 Isle of Ely Way, together with WCH connections across the A141 and into Doddington. All user access (vehicles and WCH) to the secondary hub would be along a new road that would connect to the A142, and which would provide access to the water treatment works. The ongoing design development process is considering further cycling-focused access points. Proposals for access to the recreational areas will be developed in liaison with the relevant highway authorities.

2.6 Construction description

Introduction

2.6.1 This section of the chapter provides an overview of the construction programme and the key activities that are anticipated to be involved in the construction of the Proposed Development.

Construction overview and phasing

2.6.2 It is anticipated that construction activities may start within one year of the grant of the development consent, should this be granted. Some enabling works may start more quickly after the granting of the consent. The anticipated durations and phasing of construction activities will be identified as the details of the Proposed Development are further defined. The construction phase would include a period of progressive testing and commissioning, after which, the Proposed Development would be fully operational with water from the reservoir available for the public supply once sufficient fill levels have been reached.

2.6.3 Construction of the Proposed Development has been divided into the indicative phases listed below. Image 2.8 presents the indicative phases of the construction programme, starting from the grant of the DCO to the completion of the commissioning phase, when the reservoir would be operational and treated water enters supply. Overall, it is anticipated that the time between these two dates could be up to nine years; however, some activities, such as reinstatement and landscaping, may continue beyond the start of operation of the reservoir.

- Enabling works would be undertaken in preparation for construction and are anticipated to include (but are not limited to) setting up of construction compounds, construction of a trial embankment, utility connections for services and early stages of environmental mitigation.
- Main works would be the largest duration activity including the construction of the reservoir, associated water infrastructure, environmental mitigation and the associated temporary works.
- Reinstatement and landscaping.
- Testing and commissioning of the reservoir and associated water infrastructure prior to operation of the Proposed Development. This activity is considered to be part of the construction phase, for the purposes of the EIA assessments.

2.6.4 These phases do not necessarily run sequentially, and different locations within the boundary of the Proposed Development would be at different phases of the construction process depending on the durations required to complete the works. Multiple phases could also take place at the same time, for example reinstatement and planting could be carried out while the infrastructure is being tested and commissioned. The timings of phases will be developed as the proposals are refined.

2.6.5 Further information on the activities to be undertaken within each of these phases of the Proposed Development is provided subsequently in this chapter.

2.6.6 Prior to the start of all phases of construction activities, the appropriate consents will need to be in place. These consents would include protected species licensing, assent for works in Sites of Special Scientific Interest and discharge of any relevant requirements put in place as part of the granting of the development consent.

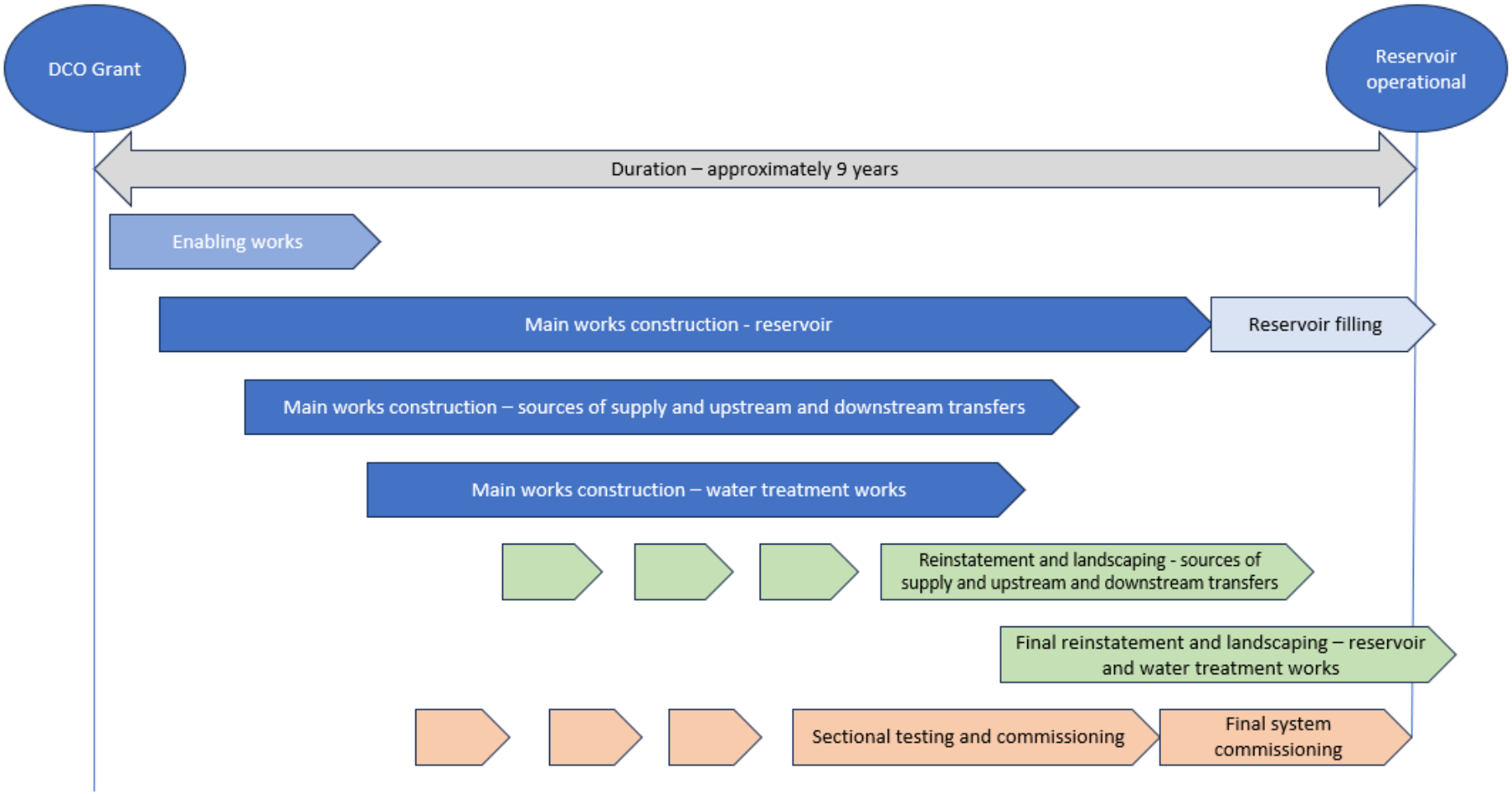

Image 2.8: Indicative phasing of construction

Enabling works

2.6.7 The enabling works phase is currently programmed to commence shortly following the grant of the development consent, should this be granted. Activities started as enabling works would continue, following the commencement of main works construction as part of the delivery of the Proposed Development.

2.6.8 The enabling works activities have been identified as those which may be (and are appropriate to be) carried out early in the construction programme once appropriate consents and approvals are in place but without the discharge of the full set of requirements or obtaining the full set of consents required prior to the main works starting. These activities and the locations where they can be undertaken will be defined in the DCO application, and it is anticipated that only these activities can take place prior to the start of main works (or 'commencement' as would be defined in the DCO).

2.6.9 At this stage of the design development process, the enabling works are anticipated to include, but not to be limited to, the following activities:

- Provision of site accesses to construction working areas, including haul route construction and highway diversions.
- Utility diversions and connections for services at the construction compounds. Overhead lines that would be made redundant as part of the Proposed Development would be decommissioned and removed in a staged approach, taking into account the timing of property acquisitions and other onsite activities in the area.
- Establishment of construction compounds, worker accommodation and storage areas, including site clearance, surface preparation, installation of temporary buildings, security fencing, lighting and CCTV installation.
- Construction of the trial embankment.
- Establishment of construction working areas, including locations where material handling would be facilitated.
- Demolition of structures and properties.
- Site clearance and installation or relocation of water management/land drainage features.
- Environmental mitigation works, such as habitat creation and archaeological investigations.

Main works

2.6.10 The main works are the consented construction works (not including the enabling works) required to deliver the Proposed Development across the four defined zones. The main works would take place once the necessary consents have been obtained and DCO requirements relevant to the works have been discharged. As indicated in Image 2.8, it is anticipated that the main works could be divided into phases related to the operational zones. The obtaining of consents and discharging

of DCO requirements may take place on different timescales for each main works phase. Activities within each main works phase are anticipated to include the following:

- Construction of structures and buildings, as relevant to each main works phase, including but not limited to water treatment facilities, pumping stations, service reservoirs, bridges, culverts, inlets and headwalls.
- Installation of pipelines and associated valves and access points.
- Highway works including construction of new junctions, access tracks and connections to the existing road network.
- Use of construction compounds, including workforce accommodation (if required).
- Installation of utilities connections.

2.6.11 In addition, it is likely the main works at the reservoir site would include the following activities:

- Reservoir construction, including bulk earthworks, structures and reservoir filling.
- Construction of renewable energy generation infrastructure.
- Construction of recreational facilities, including visitor buildings and parking.
- Construction and establishment of environmental mitigation, such as screening and habitat creation.

Reinstatement and landscaping

2.6.12 The reinstatement phase would commence after the construction works in each location have been completed. Reinstatement could take place whilst construction is still ongoing in other locations to facilitate the establishment of vegetation as early as possible in the construction programme.

2.6.13 Reinstatement would include the removal of all temporary works, for example temporary fencing, haul routes and stockpiles. For the land areas used in a temporary capacity only (for example working areas used as part of pipeline installation), excess material would be removed, and the site would be reinstated. For the water transfer pipelines, there would be specific items such as fencing and hedgerows which would need to be reinstated after the completion of the works in the area. All temporary working areas would be reinstated to the condition they were in prior to construction of the Proposed Development, or to a condition as agreed with the relevant landowner.

Testing and commissioning

2.6.14 Testing and commissioning are the processes used to ensure that the new infrastructure safely and effectively performs the functions for which it has been designed. Testing and commissioning of the reservoir, water treatment works, and associated water infrastructure would be undertaken once relevant construction activities are completed. The detail of these activities is currently still in

development. This would be followed by commissioning of the whole of the Proposed Development to ensure effective functioning as a system.

Construction transport

Transport strategy

2.6.15 The construction of the Proposed Development would require the movement of materials, plant and the construction workforce to and from the construction sites. As discussed in Chapter 3: Consideration of alternatives, a screening process is being followed to select the preferred options for construction transport to the reservoir site. At the time of writing, this screening process is still ongoing and therefore this EIA Scoping Report assumes use of the range of construction transport methods being considered, such as roads, rail, ports and inland waterways.

2.6.16 Further work is required to develop the proposals for construction transport, including consideration of whether works would be required outside the Scoping boundary to construct new, or improve existing facilities, such as rail sidings, ports or jetties. Therefore, an assessment has not been undertaken regarding any changes to transport infrastructure outside of the Scoping boundary. Once more information is available, further engagement would be undertaken with relevant statutory bodies and stakeholders to determine the appropriate approach to the environmental assessment of these proposals.

2.6.17 The construction transport methods under consideration are as follows:

- Transport by road – This would include use of HGVs to move construction plant and materials such as aggregates, to and from the site. Cars and light goods vehicles would also be used to transport smaller deliveries and the construction workforce. It is anticipated that vehicle access would be via A-roads, avoiding use of local roads wherever reasonably practicable.
- Rail options – Materials brought by rail to a suitable location (not yet identified) close to the construction site would then be moved to the construction working areas by road transport, use of internal haul routes, by conveyor belt, or a combination of these. It is likely that rail options would also need to include some road transport, for the construction workforce and other movements to and from site.
- Port and inland waterway option – This would involve transportation via barge along the existing navigable watercourses to access a suitable location not yet identified, close to the site. As with the rail options, it is anticipated that there would be a need for further transport from the barge unloading location to site, via relevant means. It is likely that there would also need to be some road transport, for the construction workforce and other movements to and from site.

2.6.18 Construction transport proposals for access to the associated water infrastructure construction sites are still in development. The relevant modes of transport and the associated routes and access points would be selected using a similar screening

process to that used for the reservoir site. When considering the likely significant effects, the EIA Scoping Report has assumed that road, rail and barge options could be used for delivering materials. Materials movements by rail or barge would likely be to a suitable location (to be determined) with onward movement to the construction working area by road.

Existing highway and WCH routes

2.6.19 The main access road to the reservoir site would be the A141 to the west of the proposed reservoir. It is anticipated that a new permanent site access point would need to be constructed off the Isle of Ely Way (A141) as part of the construction of the reservoir. Further permanent site access would be constructed to provide operation and maintenance access to the water treatment works. The connections of the new access points on the local road network will require a detailed intersection design and are likely to be constructed as part of enabling works to enable safe HGV access to the site during main works.

2.6.20 Access routes to the construction working areas for the sources of supply, upstream water transfer and treated water transfer infrastructure have not yet been identified. It is currently anticipated that A-roads would be used, avoiding use of local roads wherever reasonably practicable. Access routes and the construction activities to facilitate these will be identified as the design development process progresses.

2.6.21 Some of the existing surfaces of roads used to access the construction sites are likely to be in a poor condition so may require rehabilitation works prior to works commencing. Appropriate surveys and engagement with relevant highways authorities would take place where resurfacing or rehabilitation works are required. An assessment has not been undertaken regarding any changes to transport infrastructure that could be required outside of the Scoping boundary. Once more information is available, further engagement would be undertaken with relevant statutory bodies and stakeholders to determine the appropriate approach to the environmental assessment of these proposals. These highway improvement works are anticipated to occur as part of enabling works to enable safe HGV access to the site during main works.

2.6.22 During construction, it is anticipated that traffic management would be required on the local road network, particularly where roads are located within or adjacent to the construction site. This could include temporary closure and diversions, use of traffic lights or speed restrictions. The locations and duration of these is still to be determined and the proposals will be developed in liaison with the relevant highway authorities.

2.6.23 It is anticipated that some existing PRoWs would be affected by the construction of the Proposed Development. Permanent and temporary closures and diversions would be required, together with the creation of new and upgraded routes. Effects on PRoWs will be identified as the design development process progresses. This will be discussed with relevant stakeholders, and consulted on at relevant points as the proposals are developed. Details of effects on PRoWs and proposed mitigation

measures will be provided in the Preliminary Environmental Information Report and application for development consent.

Internal temporary haul routes

2.6.24 Temporary haul routes will be constructed within all construction sites to facilitate construction vehicle movements within the sites and to connect with the road network where required. These temporary haul roads would be removed upon completion of works within that section and the land reinstated to the condition it was in prior to the start of construction, or to a condition as agreed with the relevant landowner. Some haul routes may be retained permanently where they form part of the proposals for access and recreation activities.

2.6.25 It is anticipated that a number of temporary haul routes would be constructed within the working area of the reservoir site to reduce the amount of construction traffic using the local road network. It is assumed that the internal haul routes would be constructed in sections until there is a linked running road around both the outside perimeter and inside face of the embankment footprint.

2.6.26 For the transfer pipelines, the haul roads would be constructed for the length of the section of pipe being constructed to allow access from the road network alongside the pipeline. Wherever possible, an access would be provided from the road network at intermediate locations, to further facilitate vehicular movements. It is likely that the section of haul road would remain *in situ* post completion of the main works construction phase to facilitate access for commissioning.

2.6.27 Based on available geotechnical information, it is considered unlikely that the existing ground conditions would have a good bearing capacity, and therefore it is assumed that after an initial topsoil strip, the haul route design would incorporate ground strengthening measures to help distribute the loading of heavy construction vehicles and protect the subsoil.

Construction activities

2.6.28 The following sections provide additional information on construction activities undertaken during the enabling and main works phases for all zones of the Proposed Development. It is anticipated that industry standard construction methods and practices would be implemented throughout all stages of construction.

Site clearance and topsoil strip

2.6.29 One of the first activities for each construction activity would be the removal of vegetation from within the relevant working areas. This would be scheduled to avoid the bird breeding season and other seasonal ecological constraints where practicable. Tree surveys undertaken as part of the development of the proposals would confirm the locations of trees which would require removal or root protection as part of the site clearance.

2.6.30 The majority of working areas would require topsoil removal in advance of setting up compounds, haul routes and undertaking the main construction works. Topsoil would be carefully excavated and stored separately to any subsoil that needs

stripping. Soil would be stored in close proximity to the source site, where practicable, to facilitate ease of reinstatement and landscaping following construction.

Construction compound establishment and operation

2.6.31 One or more main site compounds would be required and these are anticipated to include the construction offices, welfare facilities, material and equipment storage, parking for workers and refuelling facilities for plant. It is anticipated that each main site compound would be connected to mains power, water, and sewer networks, via temporary connections. This could be optimised so that the temporary connections are located in a position which could be used for future permanent buildings on-site, such as the visitors' centre for the reservoir. Main site compounds are currently anticipated across the four defined zones of the Proposed Development.

2.6.32 Due to the scale and geographical spread of the Proposed Development, numerous smaller satellite site compounds would also be required during construction to provide workers with access to welfare facilities and to optimise productivity through local storage of materials and equipment. The locations and sizes of the satellite compound areas would depend on the activities that they are supporting. It is assumed that the satellite compounds may be powered with generators and use water supplied by tankers. Further information will be made available as the design development process progresses.

Demolition of structures and properties

2.6.33 Subject to development consent, the Proposed Development would result in a need for the demolition and removal of a number of existing structures and properties. Existing properties located within the proposed reservoir bowl, and under the embankment footprint, would require complete removal. The specific number of structures and properties requiring demolition will be confirmed as the design of the Proposed Development is further refined. There may be additional structures and properties located within the Scoping boundary that could also require demolition and removal depending on the final footprint of the Proposed Development.

2.6.34 It is anticipated that structures could be demolished and removed while other enabling works are being undertaken. Once the structure has been demolished, the waste would be sorted prior to removal off-site to an appropriate waste facility.

Earthworks

2.6.35 One of the main construction activities for the reservoir would be the earthworks to create the reservoir bowl and its embankments. Once the topsoil has been stripped, excavators and bulldozers would be used to create the main landform. The reservoir embankment would mostly be constructed from clay material sourced from the reservoir site to form the structural component of the embankment, with additional aggregate materials which must be imported. It is estimated that approximately 80–90% of the required natural materials would be site won. Imported aggregates would include specialised materials required to

create the core of the reservoir embankments, reservoir linings and finishes to the inner and outer embankment slopes.

2.6.36 The embankment edges would be constructed from superficial fill material and subsoils excavated from the site with the aim of achieving a materials cut and fill balance and to reduce the number of construction vehicles on the local road network transporting material to and from the site. For the purposes of the assessment of likely significant effects in the EIA Scoping Report, it is assumed that a cut and fill balance can be achieved on the reservoir site. This assumption will be verified by further ground investigation and design work, and any changes to the scoping approach presented in this document will be agreed with the relevant bodies prior to the preparation of the ES.

2.6.37 The excavation of the clay material would require the establishment of borrow pits, in selected areas within the reservoir footprint, from where the clay would be excavated and removed. Layers of topsoil, subsoil and superficial fill materials would be removed in separate layers to expose the structural clay material for use.

2.6.38 The clay material would be transported to the embankment site using internal haul routes, and would be placed and compacted in layers to build up the embankment footprint. The emerging design includes imported aggregate material to be placed in a layer beneath the external shoulder of the embankment to create a blanket drain, and connected to an inclined aggregate section on the downstream side of the core, which forms a chimney drain. Once these features have been installed, the structural clay material would continue to be placed around them, in compacted layers. Once the embankment has been constructed to full height, the imported rip-rap material would be placed on the inside face of the embankment and the topsoil would be reinstated on the outside face of the embankment.

2.6.39 A trial embankment is proposed as part of the enabling works phase to confirm the proposed design for the embankment is suitable for the ground conditions on-site. The trial embankment would be constructed within the reservoir site and would be around 200m long and approximately 60% of the proposed height for the reservoir embankment. The trial would include excavation of a borrow pit to provide suitable material for the trial embankment. The trial embankment would remain in place for approximately 12 months, after which it would be carefully deconstructed in layers to understand the effectiveness of the design.

2.6.40 Ground investigations undertaken have identified the presence of peat deposits within the reservoir site. The methodologies for handling, relocating and/or preserving peat material onsite are still in development. These methodologies will be developed following advice from technical specialists and relevant stakeholders as the proposals are developed.

2.6.41 Other earthworks activities would include the construction of the outlet test pond near the reservoir outlet tunnel. The pond would be built from clay material won from the excavation of the site. There may also be a need to refurbish existing drainage channels, for example the Forty Foot Drain between Welches Dam Lock and Horseway Lock. The channel works would require either the use of a geosynthetic clay liner, puddle clay material or equivalent for use as the lining

material. Excess material may need to be removed if it is deemed unsuitable, and to provide the required invert and shape of the channel for the design.

Buildings and structures

2.6.42 The structures identified in the design would require construction as part of the Proposed Development. These would include but are not limited to the proposed pumping stations, water treatment works, service reservoirs, outlet infrastructure and other concrete structures including headwalls and retaining walls. The design of these features is still being undertaken.

2.6.43 It is anticipated that foundations for structures would incorporate pad foundations (within open or supported excavations) and/or piled foundations (constructed by bored piling) dependent on the ground conditions at the specific locations.

2.6.44 The structures themselves would generally be constructed by traditional reinforced concrete cast *in situ* techniques with some precast concrete elements delivered and assembled on-site.

2.6.45 The construction of any buildings would follow traditional construction techniques and may incorporate concrete or steel frames, brick or blockwork and steel-clad warehouse type structures. Construction of inlet and outlet structures would require cofferdams to be constructed within existing watercourses with associated narrowing or diversions of the channels being anticipated.

Transfer pipelines

2.6.46 It is currently anticipated that most of the pipelines would be installed using open cut techniques. This would involve excavation and separate storage of the topsoil, prior to excavating the pipeline trench within the subsoil. It is likely that imported aggregate would be required to create a layer of bedding at the base of the trench, on which the pipe would be placed. Once the pipe is in place, and jointed, the backfill material would be placed around and on top and compacted before reinstating the topsoil up to surface level.

2.6.47 Depending on the pipe material and diameter, the jointing methodology will vary. For a steel pipe, the joints would need to be welded. For smaller pipes, some welding can usually occur outside of the trench. For larger or heavier weight pipes, all welding is more likely to take place within the trench.

2.6.48 The typical working width of the pipeline corridor during construction would need to accommodate a haul road, the excavated trench width, space to string and weld pipes outside the trench, and areas for stockpiling excavated material. There would be additional areas required along the alignment for material stockpiles, pipe storage, site compound facilities, sediment ponds and washout bays.

2.6.49 Trenchless techniques would need to be used at locations where an open cut method would cause significant disruption to an existing feature or service, for example main roads, railways, main rivers, major utilities or sensitive areas. In such cases, the pipe would be installed using a method that avoids disturbance to the overlying features. There are a number of different trenchless methods available depending on the local ground conditions and design. Each option would require a launch and retrieval pit to be constructed at either end of the crossing. A drilling or

boring method of pipe installation would then be used to connect the two pits to avoid disturbing features above. The pits would then be backfilled up to surface level.

Utility works

2.6.50 Utility works including diversion, protections and the provision of power, water and telecommunication connections could be required to facilitate the delivery of the Proposed Development. This could include utilities located both below ground (e.g. buried pipes and cable) and above the ground (e.g. overhead power lines). Redundant utility assets within the footprint of the Proposed Development would also require removal.

2.6.51 All required diversions and connections would be assessed as part of the EIA for the Proposed Development; however, the construction activities may be undertaken either by the contractors for the Proposed Development, or by the service providers using permitted powers in advance of construction. It is also recognised that some utility system alterations maybe required outside of the extents of the working areas and these would be undertaken by the providers using their powers.

Water management

2.6.52 Construction of the Proposed Development could require the temporary diversion of existing ditches, and in some cases a permanent alteration to the existing drainage network. Works to the drainage network are likely to require a staged approach to manage water levels and surface water runoff during construction. Dewatering and surface water management would be required to divert water away from working areas and to avoid the temporary works having a detrimental flooding impact to the surrounding areas. This is likely to require the creation of new drainage ditches, some of which would drain to desilting basins at low points within the site. These ponds would capture the water, allowing the sediment to settle, before the water is discharged into nearby drains.

2.6.53 Additional testing and processing of the water is likely to be required, to avoid the risk that construction site contaminants, such as hydrocarbons or high nutrient levels, are not pumped directly into the drains.

2.6.54 Some of the associated water infrastructure would require construction work to occur within flood zone areas. Construction planning activities will need to consider the temporary storage and stockpiling of materials, emergency spillage procedures and dewatering strategies to prevent and minimise environmental harm.

2.6.55 The raw water transfer component of the Proposed Development would require the construction of intake structures and pumping stations within or adjacent to existing waterways. These elements would require the construction of temporary cofferdams which may partially or fully disrupt the flow of the waterways in which they are located.

2.6.56 There may be a need for bypass culverts or pipes to be constructed within existing watercourses. These would require a trench to be excavated along the culvert alignment. The culverts or pipes may be constructed from plastic or pre-cast concrete, and would be lifted and placed within the trench and jointed together in

sections. Installation of the culverts and pipes may require the installation of a temporary cofferdam or equivalent within the watercourse channel, so that the working area is dry during construction.

2.6.57 At the time of preparing this EIA Scoping Report, temporary construction works proposals are being developed to avoid changes in flood risk for appropriate flow conditions during the relevant construction period. Where this cannot be fully avoided, appropriate flood risk mitigation measures and water level management for the catchment would be integrated into the temporary construction works design. The flood risk assessment being prepared alongside the EIA will further inform the design and requirements for further flood mitigation measures.

Materials and waste management

2.6.58 The Applicant is designing the Proposed Development to align with good practice methods of material and waste management, and with the waste hierarchy. Large proportions of material are being sourced from within the Scoping boundary and it is anticipated that all of the structural clay material for the embankment would be sourced from the reservoir site. This would require the creation of borrow pits to source material and reusing spoil generated from excavations for the landscaped side slopes of the reservoir embankment. Seeking a cut and fill balance on-site would reduce the number of vehicle movements to and from the site during construction.

2.6.59 Additional materials would need to be imported to the site to meet certain design criteria. For example, aggregate materials would be needed for the temporary haul routes and hardstanding areas, and clay material or geosynthetic clay liner would need to be imported for the channel relining works.

2.6.60 It is anticipated that aggregate material used for the construction of the temporary haul routes and hardstanding would be removed and either reused on another site or recycled at a suitable waste facility. It is anticipated that most material excavated from the associated works would be reused to backfill trenches. In some cases, for example if the material was contaminated or if surplus materials have to be excavated, it would be taken off-site and disposed of at a suitable waste facility.

Workforce

2.6.61 The Proposed Development is located within a rural setting with a limited number of potential construction workers living nearby. Therefore, it is anticipated that most of the construction workers would be brought to the construction site from beyond what is considered the 'local' area. This would likely require provision of temporary accommodation and other facilities to house the workforce. It is currently assumed that this accommodation would primarily be provided at the reservoir site during the main works construction phase, but alternative locations may be suitable. Where available, the workforce may also make use of other accommodation such as hotels and bed-and-breakfasts located near to construction working areas, for example close to the associated water infrastructure. The accommodation proposals will be identified as further assessments are undertaken as part of the refinement of the Proposed

Development. It is assumed that the temporary accommodation would be removed at the end of construction, and areas reinstated.

Working hours and seasons

2.6.62 It is anticipated that the majority of construction activities would be undertaken during the day, Monday to Saturday, when there is sufficient light for safe working and to avoid disturbance to local residents. This could, however, be subject to change as the programme for the construction phase is developed, and could include certain activities that once started would need to continue until a point when they could be safely stopped. There may also be activities where third parties request works to be undertaken outside of 'normal' working hours, such as works that may affect the road network, railway services or utility connections. For the purpose of scoping it is assumed that some activities could need to take place in the evenings, nights or at weekends.

2.6.63 Good practice measures and essential mitigation identified during the EIA would be implemented throughout the construction of the Proposed Development to avoid and reduce adverse effects on the environment and surrounding communities. It is anticipated that the working hours would be defined within the DCO construction management documents along with any restrictions on what activities can take place outside of normal working hours to limit the disturbance during construction.

2.6.64 The main earthworks season is considered to be between March and October, and the construction schedule for the reservoir aims to avoid earthworks occurring in the winter months (November to February) when the soil could be excessively wet or frozen. Utilisation of winter working is possible if weather conditions allow and this would be to the benefit of the overall schedule. Aggregate delivery and other minor work may also occur across this winter period subject to suitable soil handling conditions being present on-site.

Testing and commissioning

2.6.65 The details of the testing and commissioning phase are currently still in development; however, it is anticipated that these activities would take place as each component is individually completed. Commissioning of the whole system would be undertaken before the Proposed Development becomes fully operational.

2.6.66 It is anticipated that testing and commissioning would include, but not be limited to, the following activities, undertaken in suitable order:

- Cleaning and disinfection of infrastructure used for treated potable water.
- Flushing of pipework.
- Testing of infrastructure and equipment, such as leakage testing and pressure testing.
- Testing that equipment has been correctly installed and works as required, producing the anticipated output.
- Testing of operational and emergency procedures.

2.6.67 It is anticipated that commissioning of the new infrastructure and assets would begin with dry commissioning in the absence of water, followed by wet commissioning. Appropriate consents would be in place and relevant control measures put in place to manage any discharge of water used in the wet commissioning processes.

2.6.68 Commissioning of some components of the reservoir infrastructure may require the reservoir to be filled to a suitable level before this can be completed, for example infrastructure related to outlets and drawdown.

2.6.69 The detailed testing and commissioning process will be identified as the design development process progresses.

2.7 Operational phase

Introduction

2.7.1 This section provides a description of the activities that would be undertaken following the commissioning of the Proposed Development as part of the operation of the Proposed Development. This includes a summary of monitoring and maintenance activities required to provide safe and effective operation of the Proposed Development.

Operation and maintenance

2.7.2 The Proposed Development would be operated and maintained in accordance with relevant consents and permits obtained in advance of the start of the operational phase. Operational phase activities include those that would take place continuously, or on a more infrequent basis during the operation of the Proposed Development.

2.7.3 At the current stage in the design development process, the operational requirements and the frequency of inspections and maintenance activities are still to be identified. Further information will be made available as the design development process progresses. It is assumed that standard good practice methods would apply for all operation and maintenance activities.

2.7.4 Relevant documents will be produced to set out the measures and standards of work to be applied during the operational phase. These documents would include measures to be applied to monitor, manage and control potential adverse environmental effects associated with operation and maintenance activities.

Sources of supply and upstream water transfers

2.7.5 It is currently anticipated that there would be regular visits to maintain and repair the infrastructure associated with the sources of supply and upstream transfers. It is anticipated that infrastructure would be installed with relevant monitoring equipment to advise operational staff in the event of a problem.

River intakes

2.7.6 The river intakes would operate under appropriate conditions and in accordance with relevant consents to abstract water from the source watercourses. When

water is abstracted via the river intakes, debris would collect on the intake screens. These would require periodic clearing, and a backflush of water to remove this debris. It is currently anticipated that the abstraction infrastructure would be visited approximately once or twice a week to undertake this activity. The removed debris would be stored in skips located near the intakes. The skips would be emptied when required, using HGVs to take the waste to a suitable disposal location.

Pipelines

2.7.7 The raw water pipelines are not anticipated to require significant maintenance and would not be visited regularly. When inspections or maintenance are required, line and washout valves along the length would provide access. Line valves would allow sections of the pipe to be isolated. Washout valves would allow the pipe to be drained, with water from the washouts being discharged via temporary pipework to the nearest drainage network, or watercourse, in accordance with the relevant consents. Strategic valves may require a permanent gravity pipeline and outfall structure to facilitate the removal of larger volumes of water. The locations of valves and the frequency of inspections are to be defined as the design development process progresses.

2.7.8 Buried personnel access points would provide a means of accessing the inside of the pipeline for infrequent cleaning/maintenance purposes. It is anticipated that in some cases personnel access points could be integrated into the design of the air valves, to reduce the number of individual access points required.

Pumping stations

2.7.9 Pumping stations used to transfer water between watercourses as part of the open channel transfers would have similar operational and maintenance requirements to the river intakes described above, with regular clearing of screens, and removal and disposal of debris.

Inter-catchment treatment

2.7.10 The operation of the inter-catchment treatment would be primarily an automated process with limited requirement for site staff. It is anticipated that the inter-catchment treatment infrastructure could require daily visits to site as part of its maintenance. Maintenance activities would include clearing screens and filters. There would be regular visits to site by vehicles including HGVs removing waste material and removing GAC for regeneration offsite.

Reservoir site

2.7.11 The reservoir site would be operational 24 hours a day, 365 days a year. It has been assumed that there would be approximately 15 members of operational staff on-site during normal office hours, including administration staff, technical staff and operators. Operational activities would include regular inspections and monitoring of structural integrity of the reservoir and investigation of any problems. Additional staff would be required for maintenance activities to repair features to make sure the reservoir continues to operate as designed.

2.7.12 There would also be testing of the bottom outlet valve and pipework, every 6 to 12 months, where the water would be discharged into the outlet valve test pond.

From the test pond it is envisaged that after each test, a small pump would return the water released during the test back into the main reservoir.

2.7.13 The operation of the facilities to be provided as part of the recreational use of the reservoir site is currently undefined; however, it is intended that the nature of recreational spaces provided would facilitate access to the public in certain areas, for example along WCH routes. At the time of preparing this EIA Scoping Report, the anticipated operational workforce for the recreational facilities, and the number of visitors, is undefined. This will be developed as the design development process progresses.

Water treatment works

2.7.14 The water treatment works would operate 24 hours per day abstracting water from the reservoir for treatment and transfer into the clean water system. The operation of the water treatment works would generate sludge and other waste products from the treatment process.

2.7.15 Wastewater from the treatment processes would be combined with foul wastewater from welfare facilities on the site and pumped via a wastewater pipeline off-site for treatment at a suitable WRC. It is currently anticipated that this would be the facility at Chatteris, which falls within the Scoping boundary.

2.7.16 Solid waste products, which would include debris removed by the fine screens and dewatered sludge solids, would be periodically removed from site by skip to landfill. Filtration media that have been exhausted, such as GAC, would be periodically removed and tankered off-site for treatment and reactivation at a specialist processing installation and returned to site for continued use.

2.7.17 Sludge from the water treatment process would be stored on-site within a designated storage unit. The condensed sludge would be periodically collected by vehicles and transported off-site for handling, processing and resource recovery.

2.7.18 Periodic maintenance would be required to clean screens and filters associated with the water treatment process. This may involve transportation of filtration media off-site.

2.7.19 The water treatment processes could require the use of chemicals for treatment, some of which would be potentially hazardous. The chemicals would be stored under appropriate conditions with relevant monitoring and alarms in place to identify the unlikely event of spillage. The types and quantities of chemicals and the storage and emergency response procedures will be identified as the design development process progresses.

Downstream treated water transfers

2.7.20 The downstream treated water pipelines would have similar operational requirements as outlined for the sources of supply and upstream water transfers above. All potable water would be dechlorinated prior to discharge to the environment.

2.7.21 It is anticipated that service reservoirs would only require infrequent visits from site staff, as rarely as once per month, relying on automatic operation and monitoring processes. Service reservoirs may be drained for inspections approximately once

every 10 years. It is not anticipated that these inspections would require discharge of water into the environment.

Emergencies

2.7.22 Monitoring and surveillance equipment would be included as part of the Proposed Development to identify emergency situations and warn site operatives. The overall system from source, via storage and treatment, to supply would be designed with redundancy in the system to ensure supply of clean water would not be affected in the event of an emergency. Back-up pumps would be included, in the event of a pump failure, and emergency generators in the event of a power cut. The service reservoirs would be sized to make an appropriate volume available in the unlikely event that supply is disrupted further upstream in the system.

2.7.23 Chemical storage procedures would be put in place in accordance with the relevant legislative and good practice requirements, for example the Control of Major Accident Hazards Regulations 2015.

Reservoir risk

2.7.24 The Proposed Development is being designed and will be operated in line with legislative requirements set out in the Construction (Design and Management) Regulations 2015 and the Reservoirs Act 1975. The Reservoirs Act sets out the requirements for design, construction, and long-term surveillance and monitoring to ensure the structural integrity of reservoirs. The design is also being developed to be resilient to anticipated future climate events, such as the potential for sea level rise or more extreme weather events.

2.7.25 The Reservoirs Act 1975, as amended by the Flood and Water Management Act 2010, also requires a detailed assessment of the downstream impacts of any flood defence breach prior to construction of the reservoir. Furthermore, reservoir undertakers have a duty to prepare a flood plan for reservoirs as per Section 12A of the Reservoirs Act 1975 and the Flood Plan (Reservoirs Emergency Planning) Direction 2021. Further information is provided in Chapter 22, Section 22.7.

2.7.26 While the structural failure of a reservoir is a highly unlikely event, a clear plan for managing emergency situations is a legal requirement associated with operating reservoirs. The proposals for the operation of the reservoir include remote and staff-based monitoring and surveillance, to check for any defects or faults so that these can be repaired quickly. There is also a requirement to be able to lower (in a controlled way) the reservoir's water level quickly in the event of an emergency (drawdown) to avoid a failure of the reservoir and its associated embankments. The ability to drawdown the water in the event of an emergency would reduce the load on the embankment structure, reduce the likelihood of failure and, in the worst outcome, reduce the impacts downstream in the event of failure. The infrastructure required to draw down the reservoir has been incorporated into the proposed design.

2.7.27 In the case of an emergency drawdown event, the water would pass through two large diameter scour pipes, preliminarily calculated to be 2.2m internal diameter, within a culvert under the embankment. The pipes would travel from the reservoir outlet, at the end of the culvert, to a location in the bottom outlet test pond where

it is currently assumed they would turn to point vertically within a concrete block. Under the current design, the water would well up out of the pipes (in a mushroom shape) around 1.8m high when the pipes are in full flow, discharging into the outlet valve test pond.

2.7.28 The outlet test pond would be sufficiently sized to contain the water volume from the regular testing of the emergency drawdown valves and pipes, with the water released during testing being pumped back to the reservoir after the test.

2.7.29 In the highly unlikely event of an emergency, the outlet test pond would fill and water would then spill over a weir into the Forty Foot Drain, flowing through the Middle Level system and onwards to the sea. The details of the emergency drawdown proposals are still in development and will be refined as the design process progresses.

High water levels

2.7.30 High water levels in the reservoir would be managed through appropriate monitoring and the use of the spillway. The normal operational water level in the reservoir would be set at a level below the top water level, which is defined by the overflow level. The water level would be constantly monitored, and trigger levels set to provide warning of increased water levels. There would be a direct link between the water level monitoring and the inlet pumping arrangements such that a high alarm level would automatically shut off the pumps to stop water from discharging into the reservoir. It is intended that the pumps would be set to fail safe so that if there was an equipment failure, the pumps would automatically stop. As the reservoir would be non-impounding and so have no catchment, the only rainfall that would fill the reservoir is that which falls on the reservoir surface.

2.7.31 Even with the probable maximum flood, the water level is unlikely to reach a level at which operation of the spillway would be required. However, in the event of a very significant rainfall event, and the unlikely event of the inlet pumps continuing to operate with the reservoir water level above the alarm levels, the spillway would discharge the excess water into the outlet test pond. From the outlet test pond, the water would be returned to the reservoir, or if it exceeds the volume of the outlet test pond, discharged into the Forty Foot Drain. It is considered highly unlikely for this to occur and would require multiple equipment and operational failures in combination with a significant flooding event.

2.8 Decommissioning

2.8.1 As set out further within Chapter 6: EIA approach and methodology, there are no plans to decommission the Proposed Development. The overall design life of the Proposed Development is currently at least 150 years, assuming ongoing maintenance and replacement of the component parts with shorter timescales. If the Applicant determines that it will no longer require all or part of the Proposed Development, the Applicant will consider and implement an appropriate decommissioning strategy taking into account good industry practice, its obligations to landowners under the relevant agreements and all relevant statutory requirements.

3 Consideration of alternatives

3.1 Introduction

Structure of this chapter

3.1.1 This chapter outlines the reasonable alternatives that have been considered during the development of the Proposed Development. This chapter starts with an overview of the outcomes of the relevant Water Resources Management Plan (WRMP), which identified the need for the Proposed Development against reasonable alternative demand-side and supply-side options. It then describes the options appraisal process that has been used and describes the options considered to date for both the reservoir location and the associated water infrastructure. It should be noted that design development is an ongoing process.

Policy

3.1.2 Chapter 4: Legislation, planning policy and guidance of this EIA Scoping Report sets out the overarching policy relevant to the Proposed Development, comprising the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023), which has been considered during the options appraisal. Paragraph 3.5.1 of the NPS states that '*the Environmental Impact Assessment Regulations requires projects with significant environmental effects to include a description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the significant effects of the project on the environment*'.

3.1.3 In addition, paragraph 3.5.2 of the NPS for Water Resources Infrastructure (Defra, 2023) states that '*Information from the water resources management plan options appraisal process (and associated statutory assessments) will be relevant to demonstrate how alternative options have been considered.*' This is detailed in Section 3.2 of this chapter.

3.2 Water resources management plan

3.2.1 The Anglian Water WRMP 2024 (WRMP24) (Anglian Water, 2024), and Cambridge Water revised draft WRMP (Cambridge Water, 2023), sets out how the Promoters propose to maintain a sustainable and secure supply of drinking water for their customers over the period of 2025 to 2050. The WRMP24 and revised draft WRMP identified a new storage reservoir in Cambridgeshire as one of several nationally strategic resource options required to address future deficits in public water supply.

3.2.2 The need for the reservoir, and its size – 55Mm^3, with a useable volume of 50Mm^3 – was determined through regional and company planning processes. This included a multi-objective decision-making process undertaken by Water Resources East, with supply-side options tested against differing hydrological, demand and

environmental scenarios. This is outlined in the Regional Water Resources Plan for Eastern England (Water Resources East, 2023). The Fens Reservoir was determined to be a 'low regret' regional option through this process. An independent national model, the Water Resources of England and Wales resources model, also confirmed the need for and value of the reservoir, and that a reservoir would be resilient against uncertainty in supply and demand over the long term.

3.2.3 As part of the WRMP24 and revised draft WRMP (Anglian Water, 2024; Cambridge Water, 2023), an options appraisal was undertaken. This comprised the following stages:

- Unconstrained options and coarse screening – a list of all technically feasible demand-side and supply-side options that could be reasonably used in the WRMP were identified. These options were then tested against coarse screening criteria that included an initial assessment to identify environmental risks and constraints. This utilised the Environment Agency's Catchment Abstraction Management Strategies. Coarse screening reduced the number of options considered from 1,529 unconstrained options to 307 options to progress to the next stage.
- Feasible screening – feasibility studies were undertaken on the options to check their technical feasibility and potential environmental impacts. Fine screening was then undertaken on this list of options to produce a constrained list to take forward to modelling. Supply-side options taken forward to the constrained list included, but were not limited to, aquifer storage recovery, backwash recovery, desalination, drought permits, groundwater sources, new reservoir, new surface water sources and water reuse.

3.2.4 Modelling undertaken for the WRMP24 and revised draft WRMP (Anglian Water, 2024; Cambridge Water, 2023) confirmed the need for the reservoir under different planning scenarios. The reservoir also satisfied more objectives on the best value planning framework than feasible alternatives, such as desalination or water reuse. The modelling also confirmed that a reservoir with 50Mm^3 of usable water was the required size. The WRMP24 and revised draft WRMP confirmed the need for the reservoir based on the appraisal work described in Section 3.4 to identify the best performing site location and five possible sources of supply.

3.3 Approach to options appraisal for the Proposed Development

3.3.1 A four-stage site selection process was used to identify and assess potential suitable locations for the new reservoir based upon a broad range of community, environmental, economic and other technical criteria (constraints and opportunities). After the reservoir location was identified, the same process was applied to consider options for the associated infrastructure. The four-stage site selection process is as follows and was called Stages 1–4 for the reservoir appraisal and Stages A–D for the associated water infrastructure:

- Stage 1 or A – Initial screening: a broad study area is defined to identify areas which would be technically feasible for siting the reservoir and associated infrastructure.
- Stage 2 or B – Coarse screening: polygons are delineated within the broad study area to identify constraints such as geotechnical risks and major utilities infrastructure, and evaluate environmental, social and technical constraints, in order to identify a longlist of preferred site areas or locations.
- Stage 3 or C – Fine screening: earthworks, whole life carbon and cost estimates are assessed in each site area or associated infrastructure component. The relative constraints and benefits in terms of environmental, planning, social and transport appraisal criteria were evaluated, cost thresholds (from regional supply-demand modelling) applied, and site alternatives considered in light of the sequential approach to flood risk. This led to the identification of a short-list of more preferred site or component alternatives.
- Stage 4 or D – Preferred site or whole scheme associated water infrastructure options appraisal: the remaining site alternatives were assessed against a range of evaluation criteria drawing on information from the Stage C assessments. The best performing polygon is identified to progress for development as part of the Proposed Development.

3.3.2 National legislative and planning policy, in particular the NPS for Water Resources Infrastructure (Defra, 2023), has been a fundamental consideration in the appraisal process, alongside inputs from technical specialists and feedback from stakeholders, including the relevant planning authorities and statutory environmental bodies.

3.3.3 The emerging design of the proposed reservoir has evolved through an iterative process of option testing, and has also taken into account feedback from the Independent Design Review Panel commissioned by the Promoters to provide professional peer review of the design proposals.

3.3.4 The Fens Reservoir Site Selection Report (Anglian Water and Cambridge Water, 2022a) provides further information on the options appraisal process for the reservoir location. This was made available at the Phase one public consultation which took place from October to December 2022. The ongoing design development has taken account of feedback to this consultation. The Fens Reservoir Associated Water Infrastructure Options Appraisal Report (Anglian Water and Cambridge Water, 2024) provides further information on the options appraisal process for the associated water infrastructure. This was made available at the Phase two public consultation which took place from May to August 2024. Feedback from this consultation will be taken into account as the design for the Proposed Development is further progressed.

3.4 Reservoir location

Introduction

3.4.1 As set out under Section 3.3, a four-stage site selection process was used to identify and assess potential suitable locations for the new reservoir based upon a broad range of community, environmental, economic and other technical criteria (constraints and opportunities).

3.4.2 Summaries of the key considerations and assessment results at each stage are provided in the following sub-sections. For full details refer to the Fens Reservoir Site Selection Report (Anglian Water and Cambridge Water, 2022a).

Stage 1 – Initial screening

3.4.3 Key considerations in the initial screening appraisal included the:

- Suitability of the underlying geology for a reservoir.
- Presence of sites designated for nature conservation and/or heritage value.
- Presence of existing strategic transport infrastructure.
- Presence of large areas of existing development, such as settlements.
- Proximity to available abstraction sources and the associated carbon impacts of pumping water long distances.

3.4.4 The constraints investigated through initial screening were combined and a broad study area of approximately 1,000km^2 was delineated in Cambridgeshire that avoided geologically unfavourable areas. The presence of developed land use was also avoided where practicable.

Stage 2 – Coarse screening

3.4.5 The next step involved identifying polygons of land that could accommodate the embankments and stored water forming a strategic reservoir. These polygons were required to have a minimum land area of 5km^2 based on preliminary design requirements related to the need to accommodate a reservoir that could store a useable volume of 50Mm^3 of water. The polygons were delineated, using geospatial data and mapping software, to avoid the most sensitive environmental areas and developed land use. Where possible, boundaries were drawn along existing features in the landscape including roads, railway lines and statutory Main Rivers. This process identified 81 polygons.

3.4.6 The polygons were then screened using a three-step evaluation process, which involved a detailed review of geological constraints, analysis of major existing utilities, and strategic analysis of performance against environmental, planning, community and technical constraints.

3.4.7 Following this analysis, the 16 polygons which presented the lowest level of risk to project delivery, based on professional judgement, were taken forward for Stage 3 – Fine screening.

Stage 3 – Fine screening

3.4.8 Fine screening incorporated technical appraisals and stakeholder engagement, and application of a sequential, risk-based assessment of flood risk to support and inform decision-making on the remaining 16 polygons for progression to preferred site selection.

3.4.9 Polygons were ranked from best performing to least performing against the Stage 3 criteria, which included community constraints (such as flood risk, land grade and soils, property and business, and traffic and transport), environmental constraints (such as historic environment, carbon, landscape character and visual amenity, water quality, and biodiversity and nature conservation), planning constraints, and potential benefits (such as habitat creation, reducing flood risk, and socio-economic and community benefits).

3.4.10 Four polygons (A, B, C and D) were considered to have a manageable level of residual flood risk, in addition to performing well against the other constraints listed above, making them reasonable viable alternatives for progression to the short-list. Residual flood risk would then be considered alongside other impacts and benefits at Stage 4 – Preferred site selection.

Stage 4 – Preferred site selection

3.4.11 The final stage of the site selection process involved a comparative review of the four short-listed polygons (A, B, C and D) based on desk-based technical appraisals and stakeholder workshops to establish the most suitable area of land for development of a reservoir. The four short-listed polygons were (see Figure 3.1 for the locations of the short-listed polygons):

- Polygon A: Located approximately 2.2km directly west of the city of Ely in East Cambridgeshire District, in an area that comprises open farmland with many arable fields of varying size, defined by ditches and hedges with occasional trees. Land use included a mix of residential properties, businesses and agricultural holdings.
- Polygon B: Located approximately 2km east of the village of Littleport in East Cambridgeshire District, and approximately 9.6km north-east of Ely. Situated within an area of flat open countryside, comprised of open farmland with mainly arable fields of varying size, defined by ditches with occasional trees and linear woodland. Land use included a mix of residential properties, businesses and agricultural holdings.
- Polygon C: Located approximately 2.2km north of the town of Chatteris and south of March in Fenland District, in an area comprised of arable fields of varying sizes, interspersed with drainage ditches. Land use included a mix of residential properties, businesses and agricultural holdings.
- Polygon D: Located approximately 6.5km north of the town of Littleport and approximately 7.3km south of Downham Market within King's Lynn and West Norfolk Borough. Situated within an area comprised of open farmland with mainly arable fields of varying size defined by ditches. There is negligible tree

cover or hedgerows within the polygon. Land use included a mix of residential properties, businesses and agricultural holdings.

3.4.12 Overall, polygon C was considered to perform best when considered against a broad range of selection criteria. Polygon C was therefore selected as the preferred site for the new strategic reservoir. The appraisal found the following advantages that polygon C offers compared with the other short-listed polygons:

- It offered the lowest ground condition risk and best opportunity for the reuse of superficial material.
- It would result in the loss of the smallest area of high quality (excellent) agricultural land and would affect the fewest number of agricultural holdings.
- It would avoid the loss of sites designated for nature conservation.
- It would not impact on designated landscapes or protected views.
- It had the potential to provide opportunities such as socio-economic benefits at a local level.

3.5 Associated water infrastructure

Introduction

3.5.1 Following selection of the best performing reservoir location, a comprehensive options appraisal process has been undertaken to identify the preferred options, including locations and initial broad corridors, for the associated water infrastructure. This options appraisal process was used to refine the high-level proposals and identify preferred options from the sources of supply to the proposed reservoir, and from the reservoir to network connection points defined in the WRMP24 and revised draft WRMP (Anglian Water, 2024; Cambridge Water, 2023).

3.5.2 A similar four-stage options appraisal process was used to identify and assess potential options based upon a broad range of engineering, environmental, land use and planning criteria. The process categorised each of the associated water infrastructure into individual components, namely abstraction infrastructure, transfers, inter-catchment treatment between open channel transfers, water treatment works and service reservoirs, for consideration before combining these into elements. The best performing elements were combined into whole scheme options and compared to identify an overall option for the associated water infrastructure.

3.5.3 For full details refer to the Fens Reservoir Associated Water Infrastructure Options Appraisal Report (Anglian Water and Cambridge Water, 2024).

Sources of supply

3.5.4 The WRMP24 and revised draft WRMP (Anglian Water, 2024; Cambridge Water, 2023) identified five possible sources of supply to fill the Fens Reservoir:

- The Middle Level system.

- The River Nene (Stanground).
- The River Great Ouse (Earith).
- The Counter Drain (Nene).
- The Ouse Washes (River Delph).

3.5.5 In response to stakeholder requests to consider additional potential sources of supply, a sources of supply assessment was conducted that used the Environment Agency's Abstraction Licensing Strategies to identify a long list of sources within a 50km radius of the proposed reservoir location. The 50km radius was considered a practical limit based on professional judgement due to the complexity, cost and carbon emissions which increase significantly the further the water needs to be transferred from source to reservoir.

3.5.6 Ten potential water sources, which included the five identified in the WRMP documents, were identified and tested in a staged process to identify a combination of potential preferred water sources. The assessment identified that the preferred combination of sources of supply was as follows:

- Middle Level system.
- Ouse Washes (River Delph) or the River Great Ouse at Earith.
- River Nene and its Counter Drain.

Network connection points

3.5.7 The required connections of the downstream water transfers into Anglian Water's and Cambridge Water's existing supply networks were considered and identified in the WRMP24 and revised draft WRMP (Anglian Water, 2024; Cambridge Water, 2023) and form the end points for the downstream associated water infrastructure. The WRMPs identify the following connection points:

- Bexwell near Downham Market (Anglian Water).
- Bluntisham near St Ives, and west of Earith (Cambridge Water).
- Madingley near Cambridge (Cambridge Water).

Upstream transfer corridors and abstraction locations

Stage A – Initial screening

3.5.8 At Stage A, the broad area within which the abstraction infrastructure and transfer corridors could be feasibly sited was identified.

3.5.9 At Stage A it was determined that the source of supply from the Middle Level system would not need to be included in the options appraisal process. The Sixteen Foot Drain and the Forty Foot Drain are part of the Middle Level system and are immediately adjacent to the Fens Reservoir site. It was assumed that no infrastructure is required for using the Middle Level system as a source, other than the final pumping station at the reservoir, as the water would be abstracted from the Sixteen Foot Drain or the Forty Foot Drain. The same quantity of water would

be available for abstraction from either the Sixteen Foot Drain or the Forty Foot Drain and therefore the location of the final pumping station would be identified as part of the reservoir masterplanning rather than the options appraisal process.

3.5.10 The search areas identified for abstraction infrastructure considered that intakes and raw water pumping stations would need to be sited close to the source water body in order to facilitate the abstraction of water.

3.5.11 Water transfer route options included consideration of existing open channels, pipelines and a combination of the two along with abstraction infrastructure locations. Engineering, environmental, planning, and social and community constraints criteria were then applied to identify exclusion areas where existing constraints (e.g. built-up areas) would prevent the placement of infrastructure within that area.

3.5.12 Search areas for inter-catchment treatment were identified considering that these should preferably be located close to the source and preferably within the same source catchment so that operational discharges from the treatment works would remain within the source catchment. This would reduce the risk of introducing invasive species or poorer quality water into a different catchment, as well as reducing the risk of invasive non-native species impacting the operability of the associated water infrastructure.

3.5.13 The initial screening took into account factors such as environmental impact, carbon emissions, resource use and cost factors for both the construction and operational phases of delivery.

Stage B – Coarse screening

3.5.14 At Stage B, the component options were identified within the search areas identified at Stage A. These comprised 32 potential corridors and 46 potential abstraction infrastructure locations. These were appraised to identify the least constrained options, which included consideration of whether options were likely to avoid or minimise effects, where practicable, to internationally or nationally designated habitats sites and designated heritage assets, such as scheduled monuments.

3.5.15 The appraisal also considered other factors such as length of route (as shorter routes, would have lower carbon emissions and lower cost), disturbance to existing land use, and number of crossings (crossings increase the technical complexity of the design).

3.5.16 At the end of Stage B, 17 upstream water transfers and nine abstraction infrastructure locations were progressed to Stage C (see Figure 3.2 for the locations of the options progressed to Stage C).

Stage C – Fine screening

3.5.17 At Stage C, the options from Stage B were refined and assessed against more detailed criteria. The best performing component options were combined into elements, and reassessed to ensure that when combined, these remained as the best performing. Where more than one best performing option was identified for an element, comparisons between these were also undertaken. This identified that

the following options, as shown on Figures 3.4 and 3.5, would be taken forward to Stage D – Preferred whole scheme options.

- Middle Level system (as confirmed at Stage A).
- River Great Ouse at Earith to Fens Reservoir or Ouse Washes (River Delph) to Fens Reservoir.
- River Nene and its Counter Drain to Middle Level system.

Water treatment works and downstream transfer

Stage A – Initial screening

3.5.18 At Stage A, broad search areas were identified within which the water treatment works, downstream transfers and service reservoirs for each of the confirmed connection points could be feasibly sited. The search areas for the downstream transfer corridors were defined in the same way as the upstream transfer corridors. The search area for the downstream potable water treatment works was defined by the common search area between the downstream transfer corridors. The search areas for the service reservoirs was focused around the connection points into the existing supply network identified in the WRMP documents. These locations were near to the existing service reservoirs at Bexwell, Bluntisham and Madingley, as the new and existing service reservoirs need to be close as they would be required to work together hydraulically.

Stage B – Coarse screening

3.5.19 At Stage B, potential downstream transfer corridors were identified, along with potential locations for the water treatment works and service reservoirs. The appraisal identified 17 pipeline corridors, 11 potential locations for the water treatment works and 24 potential locations for service reservoirs. These options were screened to identify potential constraints that may affect the feasibility of implementing an option compared to the alternative options available.

3.5.20 At the end of Stage B, five pipeline corridors, two water treatment works polygons and 10 service reservoir polygons were progressed to Stage C.

Stage C – Fine screening

3.5.21 At Stage C, the options were refined and assessed against more detailed criteria, and the best performing component options were combined into elements (see Figure 3.3 for the locations of the options progressed to Stage C). Stage C identified two preferred downstream element corridors and polygons, which were taken forward to Stage D, comprising a corridor to Bexwell to connect into the Anglian Water network and a corridor to Madingley via Bluntisham to connect into the Cambridge Water network, as shown on Figures 3.4 and 3.5.

Emergency drawdown disposal route

3.5.22 An options appraisal process was followed to consider the disposal routes for flows from an emergency drawdown event. This included identifying the broad search areas (Stage A) and defining the preferred discharge flow route at Stage B. No further refinement of the emergency flow route was required at Stage C.

3.5.23 The purpose of the disposal route for flows from the reservoir in an emergency drawdown event is to allow the water level in the reservoir to be lowered in a controlled way. By identifying disposal routes for flows in the event of an emergency the risk of a catastrophic flood arising from the very unlikely circumstances of infrastructure failure is reduced. Such an emergency situation is very unlikely to occur over the lifetime of the reservoir, but as part of designing the reservoir the ability to draw it down must be included within the design, and consent secured for the safe disposal of water should it be required.

3.5.24 The options appraisal process has identified the preferred discharge channel route for flows in an emergency drawdown event. Managed watercourses that flow from the reservoir site towards the sea (which is a permanent disposal receptor) are preferred for disposal of drawdown flows.

3.5.25 The preferred option was identified as discharge to St Germans Pond in the Middle Level system (with an outfall into either the Sixteen Foot Drain or Forty Foot Drain) with discharge via St Germans pumping station, as it does not have any additional direct impacts on the internationally designated sites. The option makes use of existing infrastructure, including St Germans pumping station which has a capacity greater than the maximum flows that would be released from the reservoir in the very unlikely scenario of an emergency drawdown event.

Stage D – Preferred whole scheme options

3.5.26 The preferred components identified through the Stage C appraisal work were combined to form two whole scheme options at Stage D: whole scheme option A and whole scheme option B. The main difference between the two whole scheme options was the source of supply and the means of transferring water to the reservoir site.

3.5.27 Both whole scheme options would use water from the Middle Level system and the River Nene and its Counter Drain as two of the sources. For the third source of supply, whole scheme option A would use water from the Ouse Washes (River Delph) whereas whole scheme option B would use water from the River Great Ouse at Earith. Image 3.1 shows the different elements of the two whole scheme options. The two whole scheme options are shown on Figure 3.4 (option A) and Figure 3.5 (option B).

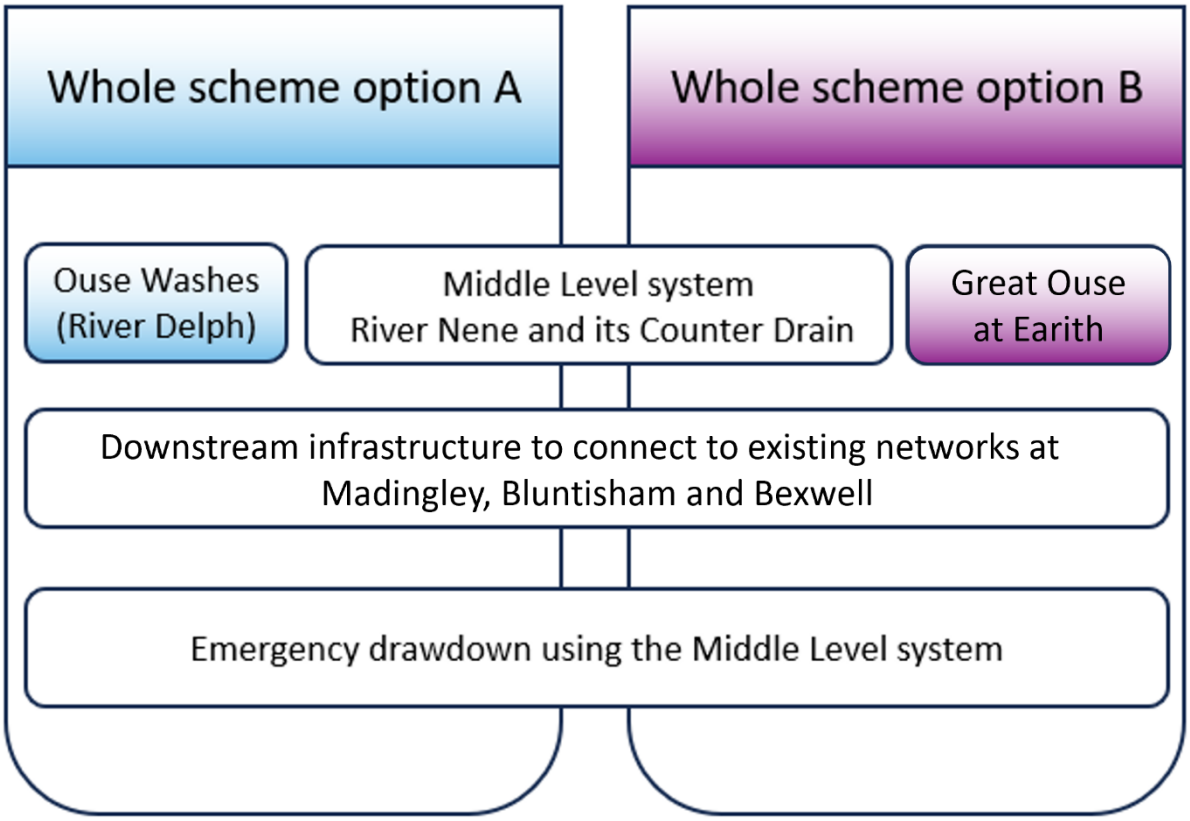

Image 3.1: The two whole scheme options

3.5.28 Whole scheme option A was considered to perform better than whole scheme option B when considered against the broad range of assessment criteria. Whole scheme option A was assessed to offer the following advantages based on the information available at this point in the process:

- It would provide a greater reservoir yield at lower whole life cost and carbon emissions.
- It could maximise wider system benefits associated with the use of open channels, including reinstating historic landscapes, reinstating navigational routes and improved flood storage capacity, particularly through the relining and rewetting of the Forty Foot Drain.
- It could provide opportunities to enhance local flood risk management in the Ouse Washes designated sites through increased water storage or adapting operational aspects of the infrastructure during critical flood risk periods.
- It would likely result in lower level of impact on the value of designated heritage assets in the villages of Bluntisham and Earith.
- It would shorten the period of disturbance to land use and ownership, including functional land, along the proposed pipeline corridors during construction, as construction would only be required for the downstream pipeline.

3.5.29 Whole scheme option A would result in the loss of habitat within the Ouse Washes Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar site and associated functionally linked land owing to the need for abstraction. However, it also has the potential to benefit the designated sites by helping to achieve target water levels, particularly in the transition from winter to summer levels. Whole scheme option A would also provide a greater reservoir yield and have lower costs than whole scheme option B.

3.5.30 Whole scheme option B would result in a greater amount of habitat loss within the functionally linked land, but less habitat within the Ouse Washes SAC, SPA and Ramsar site itself. However, this would offer much less benefit in terms of management of the water levels.

3.5.31 Taking the above into consideration, whole scheme option A is the preferred option at this stage. However, further assessment and engagement is required before a final determination is reached in terms of which option to progress with. In the meantime, the EIA Scoping Report considers the likely significant effects related to both options.

3.5.32 There are currently two siting options for abstraction from the Counter Drain (Nene) and the associated treatment, pumping station and discharge pipework/structures into the River Nene. These are: a parcel of land near Fengate directly adjacent to Anglian Water's existing Flag Fen Water Recycling Centre; and an area of land further east, near Levitt's Drove and directly north-west of Dog-in-a-Doublet Lock. This EIA Scoping Report considers the likely significant effects related to both options.

4 Legislation, planning policy and guidance

4.1 Introduction

4.1.1 This chapter sets out a summary of the key planning and environmental legislation and policy relevant to the Proposed Development. It is supported by Appendix 4.1: Legislation, planning policy and guidance summary, which provides a summary of the key legislation and planning policy relevant to the EIA as a whole and also aspect-specific legislation, planning policy and guidance.

4.1.2 Should any revisions or changes occur in environmental legislation such as for example, the EIA Regulations, these will be accounted for in the Preliminary Environmental Information Report and/or ES, as appropriate. Should there be any revisions to planning or environmental policy, advice notes or other guidance relied upon in the EIA and issued between scoping and reporting of the EIA, they will also be adopted, as necessary.

4.2 Legislation

Planning Act 2008

4.2.1 The Planning Act 2008 (as amended) (PA 2008) created a new development consent regime for major infrastructure projects in the fields of energy, transport, water, wastewater and waste. Under this regime, applicants apply for a Development Consent Order (DCO) to be granted by the Secretary of State following a recommendation made by an Examining Authority appointed by the Planning Inspectorate on behalf of the Secretary of State. The examination, reporting and determination of an application is subject to statutory timetables that are designed to allow a more streamlined decision-making process.

4.2.2 As the Proposed Development would have a capacity of over 30Mm^3, it is of the scale of project that would qualify as a Nationally Significant Infrastructure Project (NSIP) under section 14(1)(m) and section 27 (Dams and reservoirs) of the PA 2008 that would need to be consented by a DCO.

4.2.3 DCO applications are examined by an Examining Authority appointed by the Planning Inspectorate, which will make a recommendation to the Secretary of State for the Department for Environment, Food and Rural Affairs (Defra) who will determine whether to grant consent.

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

4.2.4 Developments that fall within the PA 2008 are subject to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations'). In particular, the Proposed Development would be considered a Schedule 1 Development as it falls within paragraph 15, Schedule 1: '*Dams and*

other installations designed for the holding back or permanent storage of water, where a new or additional amount of water held back or stored exceeds 10 Mm^3'. Schedule 1 developments are EIA Developments. An application for an order granting development consent for EIA Development must be accompanied by an ES.

4.2.5 Regulation 5(2) of the EIA Regulations states that the EIA must '*identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors–*

- *population and human health;*
- *biodiversity, with particular reference to species and habitats protected under Directive 92/43/EEC and 2009/147/EC;*
- *land, soil, water, air and climate;*
- *material assets, cultural heritage and landscape; and,*
- *the interaction between the factors referred to in sub-paragraphs (a) to (d).*'

4.2.6 The approach to these aspects is considered within Chapters 7 to 21 of this EIA Scoping Report.

4.2.7 In addition, Regulation 5(4) of the EIA Regulations states that the EIA should include, where relevant, '*the expected significant effects arising from the vulnerability of the proposed development to major accidents or disasters that are relevant to that development*'. The approach to this is set out within Chapter 22: Major accidents and disasters of this EIA Scoping Report.

4.2.8 Schedule 4, paragraph (5)(e) of the EIA Regulations states that a description should be included of the significant effects arising from '*the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources*'. The approach to meeting this requirement is set out within Chapter 23: Cumulative effects of this EIA Scoping Report.

4.2.9 Regulation 32 of the EIA Regulations sets out the requirements for developments that are likely to have significant effects on the environment in another European Economic Area State. No transboundary effects have been identified for the Proposed Development and the information supporting this assessment can be found in Appendix 4.2: Transboundary effects supporting information of this EIA Scoping Report.

Reservoirs Act 1975

4.2.10 The scope and purpose of the Reservoirs Act 1975 (as amended) (the Reservoirs Act) is to manage and prevent the escape of water from 'large raised reservoirs' or other artificially maintained lakes or lochs. A reservoir is considered 'large' and within the scope of the Reservoirs Act if it contains more than 10,000m^3 of water

above the natural level of the surrounding land (s.A1(3) Reservoirs Act). The proposed reservoir would hold up to 55Mm^3 of water and therefore would be within the scope and requirements of the Reservoirs Act. Other water bodies associated with the Proposed Development may also fall within the scope of the Reservoirs Act, for example the service reservoirs.

4.2.11 The Reservoirs Act manages the risk of water escape from large reservoirs through a series of mechanisms which provide third party validation and management of the design, construction, operation, maintenance and emergency management of such reservoirs. This ensures that the owners and operators of reservoirs are appropriately held to a high standard of safety and if necessary, can be compelled to undertake measures by the Environment Agency to address any issues of safety.

4.2.12 The Reservoirs Act is relevant to the EIA Scoping process because the Applicant considers that, given the Reservoirs Act provides a detailed, multi-layered legal framework for the oversight (and where necessary external control) of the design and operation of the proposed reservoir in respect of flood risk, the flood risk arising from the potential escape of water from the reservoir should be scoped out of the EIA for the DCO application. The flood risk arising from the potential escape of water from a reservoir is comprehensively managed and regulated by the Reservoirs Act, to the extent that it is so unlikely to occur it does not meet the likely significant effect threshold for the purpose of an EIA.

4.2.13 The National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) also explicitly discusses the management of safety concerns for reservoirs. This acknowledges the role that the Reservoirs Act takes in managing safety concerns for reservoirs, noting that reservoirs covered by the NPS for Water Resources Infrastructure will also be subject to the requirements under the Reservoirs Act.

4.2.14 However, it is acknowledged that the NPS for Water Resources Infrastructure also refers to the requirement to consider the implication of major accidents or disasters under the EIA Regulations. Chapter 22: Major accidents and disasters sets out the scope of the assessment of environmental effects associated with the implementation of emergency procedures related to flood risk from the reservoir.

4.3 Planning policy

National policy

National Policy Statements

4.3.1 The PA 2008 makes provision for the designation of NPSs, which are produced by government and set out the national policy against which NSIP proposals will be assessed by the Planning Inspectorate and determined by the relevant Secretary of State. The suite of NPSs integrate the UK government's objectives for infrastructure capacity and development with its wider economic, environmental and social policy objectives, including climate change goals and targets, in order to deliver sustainable development.

4.3.2 Section 104 of the PA 2008 outlines the importance of NPSs to the decision-making process when applications for development consent are under consideration. Section 104(2) states: '*In deciding the application, the [Secretary of State] must have regard to—*

- *any national policy statement which has effect in relation to development of the description to which the application relates (a "relevant national policy statement") …*
- *any other matters which the [Secretary of State] thinks are both important and relevant to [the Secretary of State's] decision.*'

4.3.3 The NPS for Water Resources Infrastructure (Defra, 2023) was published in April 2023, and sets out the need and government's policies for, development of NSIPs for water resources in England. This states in paragraph 1.1.2 that '*the National Policy Statement will be used as the primary basis for examination by the Examining Authority. It will also be used for making decisions by the Secretary of State in considering development consent applications for water resources infrastructure, that qualify as nationally significant infrastructure projects, as defined in sections 27, 28 and 28A of the Planning Act*.'

4.3.4 The approach to EIA set out in this EIA Scoping Report incorporates the requirements of the relevant NPS in terms of the scope of the assessment of effects and mitigation. Where relevant, the provisions of the relevant NPS are cited within each environmental aspect of this EIA Scoping Report.

National Planning Policy Framework

4.3.5 The National Planning Policy Framework (NPPF) was first published in March 2012 by the Ministry of Housing, Communities and Local Government (MHCLG) and last revised by the Department for Housing, Levelling Up and Communities in December 2023.

4.3.6 Paragraph 5 of the NPPF identifies that it does not contain specific policies for NSIPs. While the NPS for Water Resources Infrastructure (Defra, 2023) remains the prime decision-making document, where the NPS does not provide guidance, each aspect chapter will consider whether there is important and relevant guidance in the NPPF that may require consideration by the decision-making authority.

4.3.7 The MHCLG undertook a consultation between 30 July and 24 September 2024 on a proposed approach to revising aspects of the NPPF and other planning reform; a revised draft NPPF has not yet been published following close of the consultation, and has therefore not been accounted for in this EIA Scoping Report. Should the timing of publication of an updated NPPF be appropriate, this will be reflected in future environmental assessment of the Proposed Development, as presented in the Preliminary Environmental Information Report and ES.

Planning practice guidance

4.3.8 The NPS for Water Resources Infrastructure (Defra, 2023) is the prime decision-making document relevant to the Proposed Development; however, the government's Planning Practice Guidance web-based resource also provides

relevant and important guidance. This was launched in March 2014 and is updated by the MHCLG as necessary. It consists of a number of separate documents (with different dates) that provide guidance across different topics, including EIA, flood risk, historic environment and natural environment. The Planning Practice Guidance has been considered where relevant and is referenced in this EIA Scoping Report where applicable and a list of such documents can be found in Appendix 4.1: Legislation, planning policy and guidance summary.

Local policy

4.3.9 Local Plans do not set the starting policy for NSIPs. Local development plans often set or identify policy designations such as Green Belt, heritage and nature conservation, which are important in considering the potential local impacts and assessment of the NSIP, but the starting principle and determining policy is set out by the government in the relevant NPS. Appendix 4.1: Legislation, planning policy and guidance summary contains a summary of the key local planning policy documents which will be considered during the EIA process.

4.4 Guidance and advice

4.4.1 Appendix 4.1: Legislation, planning policy and guidance summary provides a list of other planning and environmental guidance and advice relevant to each aspect assessment, including the advice notes produced by the Planning Inspectorate.

4.4.2 The Planning Inspectorate advice notes include the following, which are relevant to EIA:

- Advice Note Three: EIA Notification and consultation (Planning Inspectorate, 2024a).
- Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements (Planning Inspectorate, 2020a).
- Advice Note Nine: Rochdale Envelope (Planning Inspectorate, 2018).
- Advice Note Twelve: Transboundary impacts and process (Planning Inspectorate, 2020b).
- Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects (Planning Inspectorate, 2019).

4.4.3 Other advice notes relate to particular environmental aspects and these are referred to elsewhere in this EIA Scoping Report. The Planning Inspectorate published new and updated advice notes in September 2024, some of which are relevant to EIA Scoping. Due to the timing of the publications, the revised advice presented in these notes has not been explicitly reflected in the contents of this EIA Scoping Report. These advice notes, and any subsequent relevant publications from the Planning Inspectorate will be reflected in future environmental assessment of

the Proposed Development, as presented in the Preliminary Environmental Information Report and ES.

4.4.4 The approach to the Proposed Development design will be guided by good design principles, including the National Infrastructure Commission's (2024) Project Level Design Principles. The ES and application for development consent will set out how the design of the Proposed Development has responded to these design principles.

4.5 Other regulatory context

4.5.1 This EIA Scoping Report has been developed in parallel with other regulatory processes, such as the Habitats Regulations Assessment. Further details can be found in Section 6.5 of this EIA Scoping Report.

5 Consultation and engagement

5.1 Introduction

5.1.1 This chapter sets out the approach to consultation and engagement with statutory authorities and other relevant stakeholders primarily in relation to EIA Scoping. Consultation is a formal process seeking formal feedback on the Proposed Development, whereas engagement is a more informal provision of information and informal discussion. A summary of consultation and engagement already undertaken is outlined with respect to potential environmental effects of the Proposed Development and assessment methods, whilst further detail is provided in each aspect chapter (Chapters 7 to 23).

5.1.2 Consultation and engagement is an ongoing process, which enables good design and mitigation measures to be incorporated into the Proposed Development, thereby limiting adverse effects and enhancing environmental benefits. This chapter focuses on the consultation and engagement specifically relevant to the environmental impact assessment.

5.1.3 The Proposed Development has a wide range of stakeholders (including landowners, statutory consultees, non-governmental organisations, local communities and specialist interest groups) with differing interests that will require varied levels of engagement. Specific engagement activities have therefore been focused to meet the needs of particular individuals and groups.

5.2 Consultation

5.2.1 Consultation on the Proposed Development has taken place as part of the Regulators' Alliance for Progressing Infrastructure Development (RAPID) gated report submissions to Ofwat, the Environment Agency and the Drinking Water Inspectorate. Consultation and engagement with a range of stakeholders and the public has been carried out since RAPID Gate 1 (Anglian Water and Cambridge Water, 2021) and RAPID Gate 2 (Anglian Water and Cambridge Water, 2022b). The Proposed Development is currently approaching RAPID Gate 3.

5.2.2 A programme of consultation and engagement in accordance with the relevant requirements of the Planning Act 2008 (as amended) (PA 2008)) and associated advice and guidance and EIA Regulations (2017) commenced with a Phase one non-statutory consultation from 12 October 2022 to 21 December 2022. Phase two non-statutory consultation took place from 30 May 2024 to 9 August 2024. The feedback from this non-statutory consultation has been used, and will continue to inform the emerging design of the reservoir and preferred corridors and areas for associated water infrastructure. As set out in the Planning Inspectorate's Advice Note: Advice on the Consultation Report (Planning Inspectorate, 2024b) non-statutory consultation can be undertaken in advance of subsequent statutory consultation, as is the case for the Proposed Development.

5.2.3 The Promoters have also sought input from a range of stakeholders on the Proposed Development through an ongoing series of Technical Working Groups and bilateral meetings, including but not limited to the following:

- National bodies such as Natural England, the Environment Agency and Historic England, to discuss proposed methodology and scope of the assessment.
- The relevant planning authorities, to keep informed of their own proposals for the region, and seek their opinion on how the proposed reservoir could minimise potential impacts, and maximise potential social and economic benefits.
- Existing water-focused groups including Internal Drainage Boards (IDB), Water Resources East and the Fens Water Partnership, of which Anglian Water and Cambridge Water are members.
- Agriculture groups to hear their views on the importance of water to agriculture as a key industry for the local economy and potential impacts on agricultural land.
- Local landowners and residents who are directly affected by the proposals.
- Non-statutory consultation events (Phase one and Phase two consultation) which has included members of the public and local communities.

Consultation undertaken to date

Phase one consultation (2022)

Overview

5.2.4 The Phase one consultation was undertaken over a 10 week period between 12 October 2022 and 21 December 2022. The Promoters sought feedback on the area identified for the proposed reservoir and embankments, the initial wider area of land preliminarily identified as potentially where supporting infrastructure could be located (as well as being utilised during construction), and an early high level concept design for the proposed reservoir. The Promoters also encouraged feedback on the approach to consultation and methods used to engage, as well as other factors that stakeholders thought were relevant to the development of the proposals.

5.2.5 The consultation materials were made available on the Promoters' consultation webpage. The Promoters also held four face-to-face community events in village halls/community centres in the consultation zone of the proposed reservoir site. This included Chatteris, Doddington, Manea and Wimblington. There was also a community webinar hosted on the Promoters' consultation webpage, and hard copy materials were made available at access points at five community venues throughout the consultation period.

5.2.6 Stakeholders were encouraged to submit feedback using the online feedback form on the Applicant's consultation webpage, the freepost hard copy versions of the feedback forms available at the face-to-face consultation events, or via email, phone call or letter.

Feedback

5.2.7 Following the close of the Phase one consultation, the Promoters published the Phase One Consultation Feedback Summary (Anglian Water and Cambridge Water, 2023), which contains a summary of the feedback and how this was to be taken forward.

5.2.8 With regard to environmental matters, key feedback and concerns included:

- Impacts on existing wildlife and habitats, particularly wading birds around the Ouse Washes nature reserve.
- Ensuring that existing habitats, such as the Ouse Washes, are not affected through use of the emergency drawdown.
- Considering Biodiversity Net Gain and how this will be introduced.
- Providing information and analysis of carbon impacts, including future carbon savings.
- Using peatland as a carbon saving feature, as well as replacing any peat that is impacted during construction.
- Potential impacts of the reservoir for those who are living or working within the project area, particularly the Royal Society for the Protection of Cruelty to Animals centre and also potential benefits for communities who will be most affected.
- Whether farming land had been considered during site selection.
- Flooding impacts and assurance that the reservoir would not make flooding worse, or put the surrounding communities and properties at risk of flooding.
- The importance of the reservoir being accessible from local towns and communities, particularly Chatteris and across the A141, and to be accessible for those with disabilities.
- Concerns regarding the potential impacts of construction on the local area, including noise, dust and construction traffic around Chatteris, Doddington and Wimblington.

Phase two consultation (2024)

5.2.9 The Phase two consultation was undertaken over a 10 week period between 30 May 2024 and 9 August 2024. The Promoters sought feedback on: the emerging design for the reservoir (main site), which shows opportunities for recreation, wildlife, nature and other features; areas identified (on an early-stage basis) for temporary and/or permanent land use for environmental mitigation and enhancement and/or construction; and the preferred corridors and land areas where associated water infrastructure could be located, namely that needed to draw water from sources and transfer it to the reservoir and that needed to treat the water stored at the reservoir, and transfer it for supply to homes and businesses.

5.2.10 The consultation materials were made available on the Promoters' consultation webpage. The Promoters held 11 face-to-face community events in village halls and community centres around the site of the proposed reservoir (Chatteris, Doddington, Wimblington, Manea) as well as in communities where the associated water infrastructure is proposed. Two community webinars were hosted on the Promoters' consultation webpage, and hard copy materials were made available at access points at community venues.

5.2.11 Stakeholders were encouraged to submit feedback using the online feedback form on the Promoters' consultation webpage, the freepost hard copy versions of the feedback forms available at the face-to-face consultation events, or via email, phone call or letter.

5.2.12 The Promoters are still reviewing the feedback received during the Phase two consultation and a Phase Two Consultation Feedback Summary will be published in due course. It is not anticipated that feedback received during the Phase two consultation would significantly change the conclusions of this EIA Scoping Report, which has allowed for a flexible approach, on aspects and matters scoped into the assessment and the associated assessment methodologies. Further information on the inclusion of flexibility and the application of the Rochdale Envelope approach is provided in Chapter 6: Environmental Impact Assessment approach and methodology.

5.2.13 The ongoing design development process will take into account the feedback from Phase two consultation, and subsequent consultations. Throughout this process, ongoing engagement with relevant statutory bodies and stakeholders will continue, and will include relevant discussion on the appropriate approach to the environmental assessment of the Proposed Development.

Scoping consultation

5.2.14 This EIA Scoping Report has been produced to document the proposed scope of the environmental impact assessment, including a description of the aspects and matters to be included in the ES. The EIA Scoping Report has been issued to the Planning Inspectorate, on behalf of the Secretary of State as a formal scoping request from the Promoters under Regulation 10 of the EIA Regulations.

5.2.15 The Planning Inspectorate, on behalf of the Secretary of State, will formally consult with consultation bodies including prescribed consultation bodies such as Natural England, the Environment Agency and Historic England, relevant statutory undertakers, local authorities (under sections 42(1)(b) and 43 of the PA 2008, and non-prescribed consultation bodies.

5.2.16 The Planning Inspectorate, on behalf of the Secretary of State, will adopt a Scoping Opinion. The Applicant's ES will document how the Applicant has considered and addressed, in the EIA, the comments received through the Scoping Opinion.

5.2.17 Paragraph 5.8 of the Planning Inspectorate's Advice Note Seven (Planning Inspectorate, 2020a) states that '*prior to submitting a scoping request, Applicants may choose to undertake their own non-statutory consultation with the consultation bodies, or others*'. The advice note goes on to state the following:

'*This might allow for refinement of options prior to making a formal request. For example, Applicants may choose to consult on preferred sites or solutions. The Planning Inspectorate recommends that any non-statutory consultation is undertaken in advance of the formal process to avoid any overlap with the Planning Inspectorate's statutory scoping consultation process. Applicants should therefore carefully consider the timing and nature of any non-statutory consultation exercise to ensure that there is no confusion with the statutory scoping consultation process that the Planning Inspectorate initiates once it receives a scoping request*'.

5.2.18 The Promoters have chosen to submit the EIA Scoping Report following the Phase two non-statutory consultation, using the same design information presented at that consultation to provide consistency between the relevant documents. Whilst additional design and construction information, based on indicative and largely general approaches and methodologies has been considered as part of scoping the EIA, and is presented in Chapter 2: Project description, the proposals for the Proposed Development have not matured from those presented at the Phase two consultation.

5.2.19 The maturity of the design presented at Phase two consultation is considered to be sufficient for scoping the likely significant effects of the Proposed Development. Given the critical need for the Proposed Development, as set out in the relevant Water Resources Management Plan documents, and scale of the Proposed Development, a Scoping Opinion is sought at a time when comments on the data collection and methodology can be taken into account so that the Applicant can proceed with confidence on the approach taken within the EIA and avoid abortive work. This is the same approach that has been undertaken on other Development Consent Order (DCO) projects including Heathrow Expansion and Bramford to Twinstead Reinforcement.

Statutory consultation

5.2.20 The DCO process has several statutory requirements regarding consultation. These requirements stipulate that certain stakeholder groups and the community must be consulted as part of the pre-application process, as set out in sections 42, 47 and 48 of the PA 2008 and Regulation 13 of the EIA Regulations. Further requirements set out how the Proposed Development must be publicised, and specific documents produced, including a Preliminary Environmental Information Report (PEIR) and a Consultation Report. Statutory consultation will be undertaken in accordance with these requirements and a PEIR made available at that time.

5.2.21 The Applicant's ES will summarise how environmental feedback received during the statutory consultation has been considered during the development of the EIA.

5.3 Engagement

5.3.1 In addition to the formal consultation stages noted in Section 5.2, the Promoters have undertaken regular engagement with key stakeholders in relation to the development of the EIA. This has included Technical Working Groups (TWG) that have engaged on the following EIA aspects:

- Biodiversity.
- Land use, quality, soils and agriculture, waste and materials.
- Landscape and visual.
- Noise, air quality and health.
- Socio-economics, community access and amenity, equalities, and health.
- Traffic and transport.
- Water resources.

5.3.2 TWG attendees included representatives from statutory environmental stakeholders, local authorities, and relevant community and interest groups. Attendees were identified considering the anticipated engagement requirements for each of the aspects, as part of EIA and design development processes.

5.3.3 An initial cross-aspect TWG meeting was held in July 2023, with further meetings in November 2023, April to June 2024 and September 2024. The purpose of these TWGs was as set out below:

- July 2023 – to provide an introduction to the project and to set out the engagement plan for technical stakeholders.
- November 2023 – to share an update on the project, gain feedback on study areas, baseline data collection gathered to date, and the planned course of action.
- April to June 2024 – update on associated water infrastructure options appraisal, introduction to Phase two consultation, introduction to EIA scoping methodologies.
- September 2024 – high level update on project progress, feedback on the processing of Phase two consultation responses and an introduction to future engagement processes.

5.3.4 Monthly TWG meetings have been held at the request of historic environment stakeholders covering the issues identified above, and the requirements for and scope of surveys and site investigations. Further TWG meetings have also been held with stakeholders covering masterplanning, habitat design and Habitats Regulations Assessment.

5.3.5 The Fens Community Liaison Group, made up of organisations representing the community in the local area of the site of the reservoir (including parish councils, ward councillors, community groups and recreation groups) has been informed about the EIA and has provided feedback into the masterplanning work as well as providing feedback on the health impact assessment that forms part of the EIA.

5.3.6 The TWG meetings have focused on the reservoir site; however, meetings commenced with relevant local authority stakeholders regarding the associated water infrastructure, once the options appraisal process (discussed in Chapter 3:

Consideration of alternatives) reached an appropriate point and locations were identified. The first of these meetings, the Local Authority Associated Infrastructure Forum (LAAIF), was held on 15 May 2024 and provided an introduction to the Proposed Development and specifically the associated infrastructure proposals. The LAAIF meeting also discussed the approach to EIA scoping. A further LAAIF meeting was held on 1 October 2024 to present a high level update on project progress and feedback on the processing of Phase two consultation responses.

5.3.7 Bilateral meetings have also been held, as and when required, in relation to specific topic matters, for example with Natural England regarding the scope of protected species licensing. Where applicable, further details can be found within the stakeholder engagement section of each of the aspect chapters.

5.3.8 Regular ongoing engagement has been established with the Environment Agency National Appraisal Unit as part of its role supporting the RAPID gated process and the developing strategic resource options. This support from the National Appraisal Unit has included provision of national guidance/policy positions and consistent national approaches, setting out environmental expectations for each gate and support in developing RAPID gated submission documents.

5.3.9 Where not already covered by the engagement processes discussed above, the Promoters will continue to hold regular meetings with relevant organisations as part of refining the proposals for the Proposed Development. Relevant topics for discussion could include design proposals, construction activities, proposed mitigation and the results of the EIA.

6 Environmental Impact Assessment approach and methodology

6.1 Introduction

6.1.1 This chapter outlines the purpose of the EIA process and explains the methodology that will be followed for the EIA for the Proposed Development. It also briefly outlines the relationship with other assessments that will also need to be undertaken for the Proposed Development. The focus of the EIA methodology is ensuring a robust and proportionate approach to the assessment of likely significant environmental effects as a result of the Proposed Development.

6.2 EIA requirements

6.2.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations') sets out the requirements for the preparation of an EIA for Nationally Significant Infrastructure Projects (NSIPs) where they are likely to have significant effects on the environment. Further information on the legislation and policy context for EIA and the Proposed Development is provided in Chapter 4: Legislation, planning policy and guidance.

6.2.2 Three main EIA documents are produced as part of the NSIP pre-application and application process:

- Scoping Report (this document).
- Preliminary Environmental Information Report (PEIR).
- Environmental Statement (ES).

6.2.3 The aim of EIA is to protect and enhance the environment by ensuring that the decision maker, when deciding whether to grant permission for a project, which is likely to have significant effects on the environment, does so in the full knowledge of the likely significant environmental effects, and takes this into account in the decision-making process. In general terms, the main stages of the EIA are as follows:

- Screening – determine if the Proposed Development meets the threshold of EIA owing to the nature and/or scale of the development or its location in a sensitive area. This stage is not required for the Proposed Development, as a reservoir is listed in Schedule 1 of the EIA Regulations and is therefore considered an EIA Development for which an EIA is required.
- Scoping – identify significant issues and determine the scope of the EIA.
- Methodology – define methodologies using aspect-specific guidance and best practice techniques.

- Data review – collate baseline data, undertake baseline surveys and monitoring to confirm the existing environmental conditions.
- Consultation and engagement – seek feedback from consultees, including the public, in relation to key environmental issues, proposed methodology and design approaches. This is an ongoing activity throughout the pre-application process and includes feedback on the PEIR during the statutory consultation prior to application.
- Assessment and iteration – assess likely significant effects of the Proposed Development, evaluate alternatives, provide feedback to design team on adverse impacts, identify and incorporate mitigation (where required), and assess effects of mitigated development.
- Preparation of the ES. Schedule 4 of the EIA Regulations sets out the information that needs to be included within an ES.

6.2.4 Additionally, during the EIA process opportunities to deliver enhancements will be explored in consultation with appropriate stakeholders.

EIA Scoping

6.2.5 As set out in Chapter 1, the EIA Scoping Report sets out the early identification of likely significant effects from the Proposed Development and matters that are proposed to be scoped out of further assessments (scope). It also presents the data collected and the proposed assessment methodology, and approach that will be used during the EIA. The EIA Scoping Report is issued to the Planning Inspectorate, who will consult with statutory bodies for comment on the scope and methodology proposed and will provide a Scoping Opinion on behalf of the Secretary of State.

6.2.6 Receiving the Scoping Opinion will give the Applicant confidence that the baseline data/information and the EIA methodologies being proposed are considered appropriate. If the proposed approaches are not agreed within the Scoping Opinion then this gives the Applicant a chance to change, adapt or justify the approaches as necessary. Therefore, receiving a Scoping Opinion reduces the risk of undertaking unnecessary data collection, monitoring or modelling as the scope of data collection is confirmed, and as stakeholders will have had chance to comment on the approach taken before the assessment is advanced too far.

Preliminary Environmental Information Report

6.2.7 Between production of this EIA Scoping Report and the submission of the ES with the application for development consent, the PEIR will be produced. The PEIR sets out the information that '*is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development (and of any associated development)*' as set out in Regulation 12(2) of the EIA Regulations. The PEIR is used by consultees to inform their consultation responses during the statutory consultation.

6.2.8 Pre-application stage guidance for NSIPs published by the Department for Levelling Up, Housing and Communities on 30 April 2024 states that:

'*…the applicant is required by Regulation 12 of the EIA Regulations 2017 to publish sufficient Preliminary Environmental Information (PEI) to enable consultees to develop an informed view of the likely significant environmental effects of the proposed development. The information required will be different for different types and sizes of projects and it may also vary depending on the audience of a particular consultation… There is no prescribed format for PEI. However, depending on the availability of material, applicants are encouraged to prepare this as an early draft of the Environmental Statement and include it as such as part of the statutory consultation…*'.

Environmental Statement

6.2.9 The ES presents the results of the EIA undertaken for the Proposed Development. It identifies the likely significant effects that would result if the Proposed Development were implemented, and identifies mitigation to avoid or reduce likely significant effects. The ES is submitted as part of the application for development consent and will be examined by the Examining Authority and be taken into account by the Secretary of State during the decision-making process.

Competence

6.2.10 Regulation 14(4) of the EIA Regulations requires projects to demonstrate that the EIA has been undertaken by competent experts. In accordance with this, a Statement of Competence will be included within the ES for the Proposed Development, outlining the relevant expertise or qualifications of the competent experts involved in the preparation of the ES.

6.2.11 This EIA Scoping Report has been prepared by competent experts from a range of consultants with expertise in undertaking complex and challenging EIAs on behalf of the Applicant. This EIA Scoping Report was prepared by consultants all of whom are corporate members of the Institute of Environmental Management and Assessment (IEMA) and hold the EIA Quality Mark. The Quality Mark allows organisations that lead the coordination of statutory EIAs in the UK to make a commitment to excellence in their EIA activities and have this commitment independently reviewed.

6.3 Environmental assessment methodology

6.3.1 The following sections of this chapter set out further detail on key elements of the assessment methodology that will be applied in the EIA. The methodology set out in this chapter provides an overview of the generalised approach and principles behind the assessment of impacts and likely significant effects. Specific guidance on impact assessment has developed for many environmental aspects, which can vary from the generalised approach set out in this chapter. Consequently, each chapter sets out the aspect- and matter-specific methodologies to impact assessment that will be adopted in the EIA. Any deviations from this generalised approach will be

described and justified in the relevant aspect chapters. Known assumptions, limitations and uncertainties are provided in each individual aspect chapter (Chapters 7 to 23).

Baseline conditions

Existing baseline conditions

6.3.2 Environmental baseline data to inform this EIA Scoping Report has been obtained through both desktop studies and site surveys, with specific details presented in the relevant aspect chapter.

6.3.3 Further studies, field surveys and continued stakeholder engagement will refine the maturity of the baseline environmental resource reported in the PEIR and ES. Baseline conditions denote the importance, value or sensitivity of a particular receptor or resource.

Future baseline condition

6.3.4 The future baseline conditions used for assessment purposes are the predicted future conditions that would exist in the absence of the Proposed Development either:

- At the time that construction is expected to start, for impacts arising from construction.
- At the time that the Proposed Development is expected to become operational, for impacts arising from its operation.
- The design year, 15 years after water enters supply, or as identified within the aspect chapters.

6.3.5 Further details can be found in the section below on 'Temporal scope'. The future baseline is considered in each of the aspect chapters.

Future climate

6.3.6 The aspect assessments will also consider how the assessment conclusions presented may be altered under a future climate scenario. Following the aspect assessments of the significance of effects, a climate assessment will be carried out to determine whether those effects will be exacerbated, reduced, or unaffected under a future climate setting. This assessment will be based on the knowledge of the changes that are anticipated to occur in the region due to climate change, based on aspect-specific guidance on local regional trends, plus climate projections data and topic-specific risks noted within the Independent Assessment of UK Climate Risk (Climate Change Committee, 2021) and relevant topic-specific climate risk guidance documents.

6.3.7 Where impacts on environmental and community receptors may be exacerbated or reduced, the assessment will highlight whether this changes the level of significance of the effect. Where an impact becomes significant that was not significant under the present-day climate, this will be considered within the design and aspect mitigation and outlined in the aspect chapter. Where levels of uncertainty over the changes to the local environmental due to climate change

mean that specific measures cannot be incorporated into the design pre-application, mitigation would be developed to monitor and respond to the effects of the Proposed Development on receptors and this will be incorporated into operational phase management plans such as the landscape and ecology management plans.

Study areas

6.3.8 The aspect study areas have been based on the Scoping boundary, as discussed in Chapter 2: Project description and shown on Figure 2.1. The Scoping boundary is the area within which it is anticipated at this stage that all project components would likely be situated, including temporary haul roads, compounds and working areas and the permanent components of the reservoir itself and the associated water infrastructure.

6.3.9 The land included in the Scoping boundary has been identified allowing for flexibility in the ongoing design development process and to enable assessment of a reasonable worst case. The Scoping boundary will be refined for the ES and DCO application, taking consideration of options development, environmental constraints and opportunities, feasibility of operation and construction, consultation feedback and stakeholder engagement, and other relevant requirements. The study areas will be adjusted to align with refinements to the Scoping boundary.

6.3.10 Various study areas have been used to assess the impact on environmental receptors following aspect-specific guidance. Specific study areas are outlined in the individual aspect chapters, including where different matters within an aspect may have individual study areas. These are based on the area over which likely significant effects would be anticipated to occur and therefore could extend beyond the Scoping boundary.

Temporal and spatial scope

Temporal scope

6.3.11 The EIA will predict the changes (effects) to the current and future baseline during the construction and operational phases of the Proposed Development. The general approach is summarised below and any variations from this are discussed in the relevant aspect chapter:

- Baseline year: the baseline is the reference level of the environmental conditions without implementation of the Proposed Development, against which the potential effects of the Proposed Development are assessed. The baseline year is 2025, when the majority of baseline surveys are to take place. For certain aspects the baseline environment is expected to change over time, and for these aspects this change has been predicted to enable robust identification of the effects of the Proposed Development against a future baseline.
- Construction phase: the construction phase relates to the period of time when all activities associated with construction, including testing and commissioning,

of the reservoir and the associated development such as the water treatment works, service reservoirs and the transfers would be undertaken. It also includes all of the temporary works such as access tracks, haul roads, construction compounds and work activities. Construction is anticipated to extend approximately nine years from the DCO grant, should it be granted, until water enters supply. Construction activities on-site are anticipated to start within approximately one year of the DCO grant. The anticipated dates for the start and end of the construction phase will be set out in the PEIR.

- Operational phase: the operational phase relates to the period of time following the end of construction when the Proposed Development would be operational and providing water to supply. The operational phase considers the first year of operation and the design year is 15 years after water enters supply, or as identified within the aspect chapters.

6.3.12 In addition, the environmental assessment uses defined temporal scales to characterise the duration of potential effects. For the purposes of assessment, the following definitions are applied unless otherwise defined in the specific aspect chapter. These definitions are based on professional judgement and considered to be relevant to the size and potential effects of the Proposed Development.

- Short term: This is assumed to cover effects up to two years.
- Medium term: This is assumed to cover effects from two to five years.
- Long term: This is assumed to cover effects from five to fifteen years.
- Permanent: This is assumed to cover effects that would extend beyond fifteen years.

6.3.13 The temporal nature of effects could extend beyond the phase in which the effects occur. For example, effects as a result of vegetation clearance during construction may be felt for a number of years after construction has been completed, before any replanted habitats have matured. For the purposes of the EIA, the effects are described under the phase within which the impact first arises (i.e. in the above example, vegetation loss assessed within the construction phase).

Decommissioning

6.3.14 There are no plans to decommission the Proposed Development. If the Applicant determines that it will no longer require all or part of the Proposed Development, it will consider and implement an appropriate decommissioning strategy taking into account good industry practice, its obligations to landowners under the relevant agreements and all relevant statutory requirements. The environmental effects associated with decommissioning are likely to be similar to those associated with construction, subject to any changes to the baseline environment in the intervening period.

6.3.15 At the time that decommissioning would take place, the regulatory framework, good working practices and the baseline are all likely to have altered. Therefore, it is not possible to assess the probable future effects at the present time. The Applicant therefore proposes that decommissioning is scoped out of the EIA.

Spatial scope

6.3.16 The maximum area of land anticipated at this stage to be required for the construction, operation and maintenance of the Proposed Development, including land required for permanent and temporary purposes, is denoted by the Scoping boundary shown on Figure 2.1. This boundary may be subject to change as the design of the Proposed Development is refined, but it shows the currently envisaged maximum extent of temporary and permanent land required. The land required for the Proposed Development will be refined as design work progresses, considering environmental and technical factors, and consultation responses.

6.3.17 When considering the geographical scope of the assessment, consideration has been given to the distance over which an impact is likely to occur. The study area is defined in each of the aspect chapters and varies between aspects depending on the nature of the effects. It may also vary within an aspect chapter between the construction and operational phases. For example, for cultural heritage direct physical impacts may only occur within the construction footprint; however, operational effects on setting could occur over a long distance.

Assessment of effects

General approach

6.3.18 In accordance with the EIA Regulations, the assessments undertaken will identify the likely significant environmental effects (both adverse and beneficial) arising from the proposed construction and operational phases of the Proposed Development. This assessment will be presented in an ES and will also be supported by a narrative to explain the rationale for the significance of effect.

6.3.19 In general, the EIA will follow a receptor-based assessment approach. Receptors are those aspects of the environment which may be sensitive to change as a result of the Proposed Development. When deciding on which aspects to include within this EIA Scoping Report, consideration has been given to Regulation 5(2) and Schedule 4, paragraph 4 of the EIA Regulations.

6.3.20 The recent Supreme Court judgment on the Finch case (Finch v Surrey County Council [2024] UKSC 20) has been considered in the preparation of this EIA Scoping Report and the proposed scope and methodology for each aspect, with particular attention to potential upstream and downstream direct and indirect effects where practicable and appropriate. In this context, the terms ‘upstream’ and ‘downstream’ refer respectively to effects arising from activities that are required to facilitate the Proposed Development and activities that are consequential to it (i.e. inputs to and outputs from the Proposed Development). In this EIA Scoping Report, certain aspects, such as water resources and flood risk, and aquatic ecology consider downstream impacts from a water flow perspective, for example, impacts from changes to water levels in upstream and downstream catchments. However, here, upstream and downstream effects are referred to in the general sense.

6.3.21 The assessment of the significance of effects for the majority of aspects will be based on a three-step process, as set out in the following paragraphs. The assessment criteria set out below are adapted from the Design Manual for Roads and Bridges (DMRB) LA 104 – Environmental Assessment and Monitoring (Highways

England, 2020). Whilst the DMRB was initially established for assessment of roads and bridges, it is considered as good practice guidance for EIA and is used and adapted as appropriate, for the assessment of other types of major developments.

Determining significance of effects

6.3.22 The first step assigns sensitivity or inherent value to a receptor. The value or sensitivity of a receptor is generally defined as a function of a number of factors such as rarity, fragility, replaceability and importance of the resource, and is generally determined in a geographical context. The sensitivity is also a function of the capacity of the resource/receptor to accommodate changes or recover.

6.3.23 Table 6-1 provides broad definitions of sensitivity or value. The aspect chapters of this EIA Scoping Report provide further detail on what represents the value/sensitivity for individual aspects, drawing on aspect-specific guidance as appropriate.

Table 6-1: Value and sensitivity criteria

Value/sensitivity	General criteria
Very high	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale and limited potential for substitution.
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

6.3.24 The second step of the assessment is to determine the likely magnitude of the potential impact. Magnitude of impact is defined as the overall level of change in the environment and includes matters such as the extent over which that impact occurs, duration, likelihood, frequency and reversibility. For the purposes of the Proposed Development, magnitude is categorised as either large, medium, small, negligible or no change, unless stated otherwise within the aspect chapter.

6.3.25 Table 6-2 presents generalised magnitude of impact criteria. Each aspect chapter defines the magnitude criteria specific to that aspect, where scoped into the assessment.

Table 6-2: Magnitude of impact criteria

Magnitude	General criteria
Large	Adverse: Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial: Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Medium	Adverse: Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Beneficial: Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.

Magnitude	General criteria
Small	Adverse: Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial: Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse: Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial: Very minor benefit to or positive addition of one or more characteristics, features or elements.
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

6.3.26 The third step in the process involves identifying the likely significance of effect, which is a function of the sensitivity or value of the receptor and the magnitude of the potential impact on it. To aid transparency in the assessment process, the matrix shown in Image 6.1 will be used as the basis for assigning significance to an effect. It uses merging bands to reflect the role of professional judgement when allocating significance. As illustrated, a high sensitivity receptor subject to a large magnitude of change would experience a major significance effect, and a low sensitivity receptor subject to a small magnitude of change would experience a minor or neutral significance effect.

6.3.27 In order to provide a consistent approach to expressing the outcomes of each of the aspect assessments undertaken, a series of generic significance criteria descriptors have been developed in the form of a significance matrix as shown in Image 6.1 and Table 6-3. Effects can be positive, negative or neutral. For each effect, this combines the magnitude of impact with the value and sensitivity of the resource/receptor affected by the impact(s) to determine the level of significance.

6.3.28 Where necessary, the evaluation of effects is informed by professional judgement to reach a balanced conclusion on the ultimate significance of each effect. This is particularly the case for certain aspects where there may not be clear boundaries between the sensitivity or magnitude of effect, meaning that aspect-specific guidance and professional judgement is needed to provide clarity on the resulting significance of effect. Explanatory text will be provided to explain how professional judgement, where used, has determined the significance of effect assigned.

6.3.29 A significant effect in the context of the EIA Regulations 2017 is taken to be a moderate or greater adverse or beneficial significance. Effects of minor or neutral significance are not considered to be significant effects on the environment but are used to acknowledge that there may be some differences from the baseline conditions.

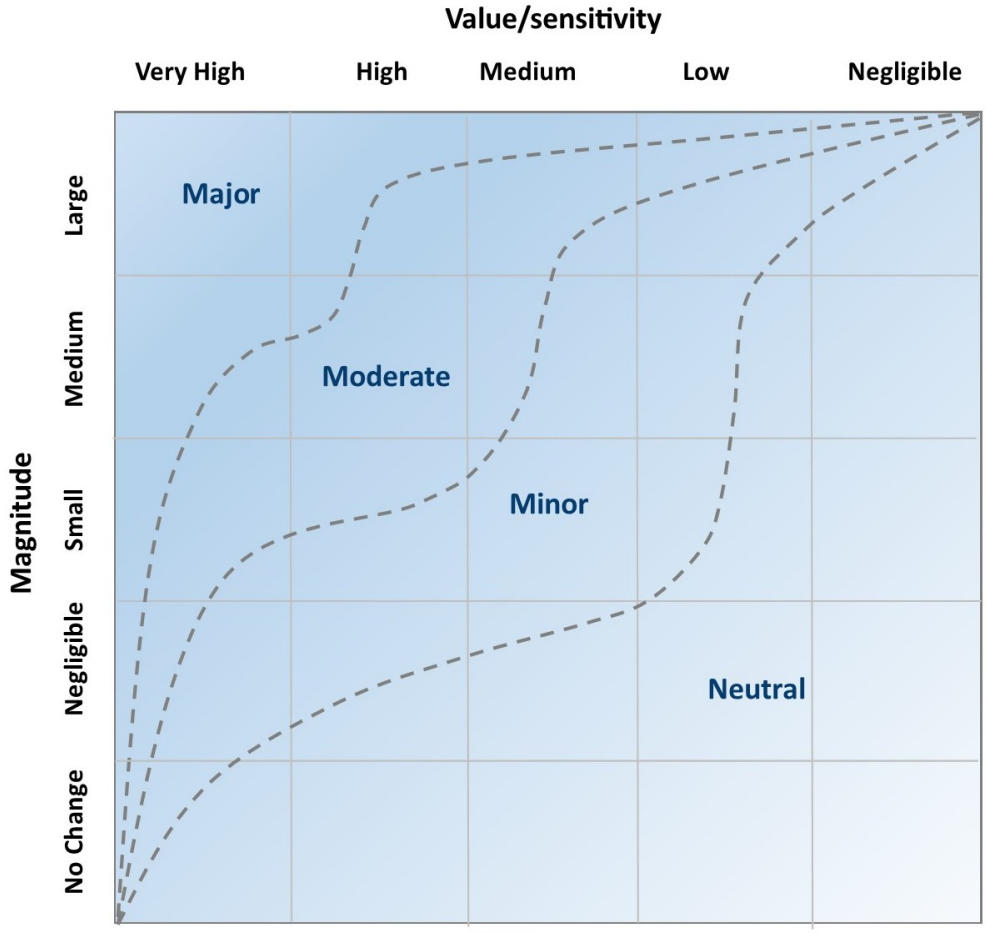

Image 6.1: Significance matrix

Table 6-3: Descriptions of significance ratings

Level of significance	Typical description of effect
Major	Effects at this level are likely to be material in the decision-making process.
Moderate	Effects at this level can be considered to be material in the decision-making process.
Minor	Effects at this level are not material in the decision-making process.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

6.3.30 Aspects will use the generic significance criteria set out in this section unless otherwise specified in their aspect chapter, for example, if there is aspect-specific guidance that specify significance criteria to be used, which are different to those shown in Table 6-3.

The Rochdale Envelope approach

6.3.31 The Planning Inspectorate's (2018) Advice Note Nine: Rochdale Envelope provides guidance regarding the degree of flexibility that may be considered appropriate

within an application for development consent under the Planning Act 2008 (as amended). Advice Note Nine acknowledges that there may be parameters of a proposed development's design that are not yet fixed and, therefore, it may be necessary for the ES to assess likely worst-case variations to ensure that the likely significant environmental effects of the Proposed Development have been assessed.

6.3.32 This approach reflects the need for the Proposed Development design to evolve over time, following the established principle set out in the case of R v Rochdale Metropolitan Borough Council ex p Milne (2000) and R v Rochdale Metropolitan Borough Council ex p Tew (1999) which set out that while it is not necessary or possible in every case to specify the precise details of development, the information contained in the ES should be sufficient to fully assess the Proposed Development's effect on the environment and establish clearly defined worst-case parameters for the assessment.

6.3.33 The 'Rochdale Envelope' approach is an accepted approach employed where the nature of the proposed development means that there is some uncertainty in the design of the proposed development (for instance the precise dimensions of structures) when the application for development consent is submitted, and flexibility is sought to address uncertainty.

6.3.34 The project information that forms the basis of the design used within the EIA Scoping Report considers the polygons and corridors defined in Chapter 2: Project description and shown on Figure 2.1, identifying the spatial extents for the reservoir site and associated water infrastructure. Figure 2.1 shows a 'worst-case' scenario in terms of the extent of the Scoping boundary, to accommodate permanent infrastructure and temporary working areas required to construct the Proposed Development.

6.3.35 The National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) supports the use of a Rochdale Envelope approach. Paragraph 3.2.9 states '*where some details are still to be finalised, the Environmental Statement should, to the best of the applicant's knowledge, assess the likely worst-case environmental, social and economic effects of the proposed development to ensure that the impacts of the project, as it may be constructed, have been properly assessed.*'

6.3.36 This EIA Scoping Report is based on an early design of the Proposed Development. Whilst design development for some components of the Proposed Development is further progressed, for example the reservoir site, all information presented in Chapter 2: Project description is currently illustrative and subject to design development and further refinement. This design development will reflect the feasibility of operation and construction proposals, consultation and engagement feedback, and survey and assessment conclusions. Flexibility has been incorporated at this Scoping stage, and will be included for the DCO application, to allow for refinement of the proposed design whilst providing a level of information sufficient to enable the likely significant effects on the environment to be assessed and potential mitigation measures to be identified.

6.3.37 The scope of each aspect's assessment at this stage assumes a realistic worst-case in terms of the potential effects on the relevant receptor or resource. Where optionality remains, for example the sources of supply to the reservoir, this has been made clear and the scope of the assessment at this stage takes account of all options being taken forward.

6.3.38 The approach to setting the study area, data gathering and methodologies for assessment of likely significant effects described in this EIA Scoping Report, is considered applicable regardless of further design refinement within the identified Scoping boundary. As such it is considered appropriate to seek a Scoping Opinion at this stage to inform the PEIR for the Proposed Development. Throughout the pre-application stages and design development process, ongoing engagement with relevant statutory bodies and stakeholders will include relevant discussion on the appropriate approach to the environmental assessment of the Proposed Development.

6.3.39 At future stages of the EIA process, including the preparation of the PEIR and ES, it is expected that the design of the Proposed Development will have been refined and a preferred option will have been selected. The PEIR and ES, will include a narrative setting out the changes to the Proposed Development and where and how uncertainty at previous stages has been resolved.

6.3.40 Where design elements of the Proposed Development are still to be determined, the ES will explain fully how flexibility of design has been sought in the application for development consent, why it is required and how it has been taken into account in the aspect assessments.

Design, mitigation and monitoring

6.3.41 After initial consideration of the potential effects of the Proposed Development and their potential significance, consideration will be given to how likely significant effects could be avoided, reduced or offset. This is referred to as mitigation.

6.3.42 Mitigation measures should be considered as a hierarchy. First, mitigation measures to avoid significant adverse effects should be considered and, if it is not possible to avoid significant adverse effects, then measures to reduce these effects should be considered.

6.3.43 The IEMA has produced guidance (IEMA, 2015 and IEMA, 2016) which describes three different types of mitigation that are typically used in EIA. The approach outlined in the IEMA guidance is designed to streamline the EIA and to make the process proportionate and focused on the likely significant effects material to decision-making. The EIA for the Proposed Development has adopted a similar approach to the assessment, with the following terminology:

- Embedded mitigation measures (described as primary or inherent in IEMA (2016)) – measures that form part of the design of the Proposed Development, developed through the iterative design process. An example of this would be reducing the height of a building to reduce its impact, or routing a pipeline to avoid the loss of an important ecological habitat.

- Essential mitigation measures (described as secondary or foreseeable in IEMA (2016)) – any additional project-specific measures needed to avoid, reduce or offset potential impacts that could otherwise result in effects considered significant in the context of the EIA Regulations. Essential mitigation would be identified by environmental aspect specialists to offset or reduce likely significant effects. An example of essential mitigation would be additional planting required to filter and soften views of the Proposed Development.
- Good-practice measures (described as tertiary or inexorable in IEMA (2016)) – standard approaches and actions commonly used on infrastructure projects to avoid or reduce environmental impacts, and typically applicable across the whole project. An example of good practice would be turning off machinery when not in use.

6.3.44 In accordance with guidance from IEMA (2016) on proportionate assessment, embedded and good practice mitigation measures will be taken into account prior to the assessment of environmental effects. Essential mitigation measures will then be identified to mitigate significant adverse effects identified through the assessment.

6.3.45 Where it is not possible to avoid or reduce an adverse effect through embedded mitigation, then essential mitigation will be considered, for example the provision of replacement habitat on-site to replace that lost to the Proposed Development.

6.3.46 Where it is not possible to replace a loss, provision of an alternative may be the next best approach, for example contributing to habitat creation or management regimes in a location outside of the Proposed Development boundary.

6.3.47 Enhancement measures may be incorporated into the Proposed Development. Enhancement measures are considered to be entirely outwith any mitigation and offset measures required to avoid or reduce any adverse effects of the Proposed Development. Enhancements will not be considered as part of the assessment of likely significant effects, but would be included in reporting on Environmental Net Gain as part of the DCO application. Further details will be provided in the PEIR as the design of the Proposed Development is refined.

6.3.48 Documents presenting and tracking mitigation commitments will be produced, setting out the proposed measures and standards of work that would be applied throughout the design development, construction and operational phases. This will ensure embedded mitigation measures are incorporated and good practice and essential mitigation is included in the planning, monitoring, management and control of relevant activities. Mitigation measures identified at this Scoping stage are identified in the relevant aspect chapters (Chapters 7 to 23).

Residual effects

6.3.49 Residual effects are those effects that are predicted to remain after all mitigation measures (embedded, essential and good practice) have been implemented. These will be described at the end of each aspect chapter within the ES.

Cumulative effects

6.3.50 The Proposed Development could result in cumulative effects both between different aspects (intra-project cumulative effects) or between the Proposed Development and other proposed developments in the area (inter-project cumulative effects). These will be considered as part of the PEIR and ES. The cumulative effects chapter of the ES will not assign a category of significance to effects and will instead conclude whether a cumulative effect is likely to be significant or not. Further details can be found in Chapter 23: Cumulative effects.

Monitoring

6.3.51 The EIA Regulations introduced a requirement on the Secretary of State to consider whether it would be appropriate to impose monitoring of any significant adverse effects on the environment from a project. The ES will set out clear and proportionate commitments for monitoring, where required, during construction or operation, along with a timescale for implementation and identification of the party who would be responsible for the monitoring, together with an outline of the remedial actions to be undertaken should results be adverse.

Transboundary effects

6.3.52 Under Regulation 32 of the EIA Regulations, the Secretary of State must notify and exchange information with European Economic Area (EEA) States if they are of the view that the Proposed Development is likely to have significant effects on the environment in these states.

6.3.53 As set out in the Planning Inspectorate's (2020b) Advice Note Twelve: Transboundary Impacts and Processes, the role of the Planning Inspectorate, where an NSIP has been identified as an EIA Development, includes the screening for likely significant effects on the environment of another EEA State. Screening may take place at any time when new relevant information becomes available. Where a likely significant effect on the environment of any other EEA State(s) is identified, the role of the Planning Inspectorate includes the identification of EEA State(s) to be notified, notification of these states, consultation with EEA States, and notification to the EEA State(s) of the outcome of the application for development consent.

6.3.54 Advice Note Twelve (Planning Inspectorate, 2020b) makes clear that the decision as to whether or not a development will have a transboundary effect will be based upon the information provided by the Applicant, and states that information about the potential for transboundary effects should be provided as part of scoping. A transboundary effects screening matrix dealing with the potential effects of the Proposed Development on other EEA States to facilitate the Secretary of State's consideration under Regulation 32 of the EIA Regulations can be found in Appendix 4.2: Transboundary effects supporting information, of this EIA Scoping Report.

6.3.55 The transboundary effects screening process confirms that there is not anticipated to be potential for significant effects on the environment of any EEA States, as there is no pathway for effects to occur outside the UK. As such, the Applicant therefore proposes that transboundary effects are scoped out of the EIA.

6.4 Structure of the Environmental Statement

6.4.1 Advice Note Seven (Planning Inspectorate, 2020a) advises applicants that the EIA Scoping Report should provide an outline structure of what the ES will contain. The structure of the ES will broadly follow the same order of chapters that are presented in this EIA Scoping Report, acknowledging that changes may need to be made to address the comments made in the Scoping Opinion or the refinement of the Proposed Development. As set out in Table 6-4, the ES is anticipated to comprise four volumes.

Table 6-4: Indicative ES structure

Volume	Content
Volume 1 – Non-technical Summary	
Non-technical summary	A summary of the contents of the ES in non-technical language.
Volume 2 – Main assessment report	
Chapter 1 – Introduction	An introduction to the Proposed Development and the purpose and structure of the ES.
Chapter 2 – Project description	A description of the Proposed Development including permanent features and associated temporary works. It describes the general characteristics of the Proposed Development and outlines areas of uncertainty in relation to design parameters.
Chapter 3 – Consideration of alternatives	An outline of the reasonable alternatives considered during the design development of the Proposed Development and the reasons for selecting the proposed design and indicative alignment.
Chapter 4 – Legislation, planning policy and guidance	A review of the legislation and policy relevant to the Proposed Development.
Chapter 5 – Consultation and engagement	A summary of the consultation and engagement that has been undertaken and how it has influenced the Proposed Development design.
Chapter 6 – EIA approach and methodology	A description of the overall EIA methodology to be used, including temporal durations and approach to mitigation.
Chapters 7–22 – Aspect chapters	A separate chapter for each aspect, including a summary of the policy and legislative requirements, baseline environment, assessment methodology, proposed mitigation, potential impacts and likely significant effects to arise from the Proposed Development.
Chapter 23 – Cumulative effects	A description of the cumulative effects assessment, including potential significant effects from intra-project and inter-project cumulative effects.
Chapter 24 – Summary	A summary of the findings of the EIA and any residual significant effects identified.
Volume 3 – Figures	
Volume 4 – Appendices	

6.5 Relationship with other regimes

6.5.1 The ES will be prepared taking into account other relevant environmental assessment regimes with a view to avoiding duplication of assessment. The other assessments are described below.

Habitats Regulations Assessment

6.5.2 Habitats Regulations Assessment (HRA) is required for plans and projects likely to have a significant effect on a European or internationally important site for nature conservation. A HRA will be included as a supporting document within the application for development consent and will be referred to within the relevant ES Chapter for biodiversity.

Flood risk assessment

6.5.3 Paragraph 4.7.4 of the NPS for Water Resources Infrastructure (Defra, 2023) states applications should be accompanied by a Flood Risk Assessment (FRA) for infrastructure projects which are located in Flood Zones 2 and 3 (medium and high probability of river and sea flooding), and in Flood Zone 1 (low probability of river and sea flooding) for projects of one hectare or greater (or where strategic flood risk assessments identify land as being at increased flood risk in future), or projects that may be subject to other sources of flooding (local watercourses, surface water, groundwater, canals or reservoirs), or where the Environment Agency has notified the relevant planning authority that there are critical drainage problems.

6.5.4 An FRA will be undertaken and reported within a standalone report as part of the application for development consent. Where there are likely significant effects in relation to flood risk, these will be reported within the ES Chapter for water resources and flood risk.

Water Framework Directive Assessment

6.5.5 The impact of the Proposed Development on the Water Framework Directive (WFD) is considered under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (WER). The impacts to the WER objectives are to be assessed in line with the Planning Inspectorate's (2017) Advice Note Eighteen: The Water Framework Directive. A standalone WFD compliance assessment will be submitted as part of the application for development consent. The WFD scoping is provided in Appendix 10.1 of this EIA Scoping Report, as it contains relevant baseline information supporting Chapter 10: Water resources and flood risk.

Transport Assessment

6.5.6 A Transport Assessment will be included as a supporting document within the application for development consent, and will set out the methodology for calculating transport movements and assignment of traffic onto the highway network. The Transport Assessment will be referred to within the traffic and

transport chapter of the ES, as well as within other EIA chapters that use traffic data for their assessments, such as air quality and noise and vibration assessments.

Equalities Impact Assessment

6.5.7 Potential impacts on equality arising from the Proposed Development will be considered in a separate Equalities Impact Assessment (EqIA), which will be submitted as part of the application for development consent.

Environmental Net Gain

6.5.8 An assessment of how the Proposed Development will deliver wider Environmental Net Gain opportunities will be included in a separate document submitted with the application for development consent. Environmental Net Gain will include Biodiversity Net Gain and other wider benefits to the environment, including improvements to natural capital. This is in line with paragraph 3.4.3 of the NPS for Water Resources Infrastructure (Defra, 2023) for water resources infrastructure which states, '*applications for development consent should be accompanied by a statement demonstrating how opportunities for delivering wider environmental net gains have been considered, and where appropriate, incorporated into the design (including any relevant operational aspects) of the project*.'

6.6 Assumptions and limitations

6.6.1 There is still remaining optionality and uncertainty around the design of the Proposed Development at the EIA Scoping stage and some uncertainty may remain through to the application for development consent through the use of the Rochdale Envelope and the use of limits of deviation. The overarching assumptions identified at the EIA Scoping stage are set out within Chapter 2: Project description. In addition, each of the aspect chapters summarise the aspect-specific assumptions and limitations of their respective assessments at the time of preparing this EIA Scoping Report.

6.6.2 The Scoping boundary currently identified for the associated water infrastructure is currently larger than would be required for the operation of the Proposed Development. At this time 'corridors' and 'polygons' have been identified within which the component parts of the Proposed Development would be located and operated, including sufficient allowance for construction and commissioning phases. This approach allows the specific locations of infrastructure to be sited taking consideration of options development, environmental constraints and opportunities, feasibility of operation and construction, consultation feedback and stakeholder engagement, and other relevant requirements. Where there remain options within the design proposals, the corridors and polygons cover the extent of land currently anticipated to be required for these alternative proposals. This approach allows flexibility for the ongoing design development process and enables assessment of a reasonable worst case.

6.6.3 It is anticipated at this stage of design development that renewable power generation would be included as part of the Proposed Development. The amount, type and design of the renewable energy generation to be installed is still in development. It is currently envisaged that it could include solar and/or wind power generation within the reservoir site. Further work is required to develop the proposals, including consideration of the feasibility, space within the reservoir site, potential for environmental effects and the ongoing evolution of energy generation and energy storage technologies. Therefore, an assessment has not been undertaken regarding renewable sources of energy within the EIA Scoping Report. Once more information is available, further engagement would be undertaken with relevant statutory bodies and stakeholders to determine the appropriate approach to the environmental assessment of these proposals.

6.6.4 Further work is required to develop the proposals for construction transport, including whether works would be required outside of the Scoping boundary to construct new, or improve existing facilities, such as rail sidings, ports or jetties. Therefore, an assessment has not been undertaken regarding any changes to transport infrastructure outside of the Scoping boundary. Once more information is available, further engagement would be undertaken with relevant statutory bodies and stakeholders to determine the appropriate approach to the environmental assessment of these proposals.

6.6.5 In line with the EIA legislation and guidance, the key changes in the design that have occurred since the publication of this document will be set out in each future document, namely the PEIR and ES, along with a narrative setting out any new elements of the Proposed Development that have been scoped in and any new elements of the Proposed Development that have been scoped out of the assessment. Similarly, a narrative will be provided around whether any elements scoped in at this stage will have been scoped out of assessment by that time. This will be dependent on the nature and spatial extents of refinements to the Proposed Development, that have taken place at that time.

7 Landscape and visual

7.1 Introduction

7.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to the Landscape and Visual Impact Assessment (LVIA). The chapter should be read in conjunction with the description of the Proposed Development, as presented in Chapter 2: Project description.

7.1.2 For the aspect of the LVIA, the matters are:

- Landscape character.
- Visual amenity.

7.1.3 This chapter has links with other chapters, including Chapter 8: Terrestrial biodiversity, Chapter 11: Historic environment, and Chapter 18: Noise and vibration. These chapters provide further detail on some features and impact pathways that are addressed in this chapter.

7.2 Legislation, policy and guidance requirements

7.2.1 Legislation, policy and guidance, which has informed the scope of the assessment presented within this chapter, is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

7.2.2 Table 7-1 identifies the relevant policy in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) and the National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities (DLUHC), 2023) for LVIA.

Table 7-1: UK policy relevant to the LVIA

Relevant UK policy	Relevance to assessment
NPS for Water Resources Infrastructure (Defra, 2023)	The policies relevant to the LVIA are captured within Section 4.9 Landscape and visual impacts. These include the following paragraphs: Paragraph 4.9.1, '*Landscape and visual effects also include tranquillity effects, which would affect people's enjoyment of the natural environment and recreational facilities. In this context, references to landscape should be taken as covering waterscape, seascape and townscape, where appropriate*.' Paragraph 4.9.2, '*the applicant should undertake an assessment of any likely significant landscape and visual impacts and describe these in the Environmental Statement, including cumulative impacts... The landscape and visual assessment should include reference to any landscape character assessment or the National Character Area Profiles and associated studies as a means of assessing landscape impacts relevant to the proposed development. In addition, the applicant's assessment should take*

Relevant UK policy	Relevance to assessment
	account of any relevant policies based on these assessments in local development documents.' Paragraph 4.9.3, '*the applicant's assessment should include any significant effects during construction of the development and/or the significant effects of the completed development and its operation on landscape components and landscape character, including historic characterisation*.' Paragraph 4.9.4, '*the assessment should include the visibility and conspicuousness of the development during construction, and the presence and operation of the development and potential impacts on views and visual amenity. This should include any noise and light pollution effects, including on local amenity, tranquillity and nature conservation*.' Paragraph 4.9.8, '*adverse landscape and visual effects may be minimised through appropriate siting of infrastructure, design (including choice of materials), and landscaping schemes, depending on the size and type of proposed project. Materials and designs for infrastructure should always be given careful consideration (see section 3.6 on Criteria for 'good design' for water resources infrastructure)*.' Paragraph 4.9.15, '*outside nationally designated areas, there are local landscapes and townscapes that are highly valued locally and may be protected by local designation. Where a local development document in England has policies based on landscape character assessment, these should be given particular consideration*.' Paragraph 4.9.17, '*the Secretary of State will judge whether the visual effects on sensitive receptors, such as local residents, and other receptors, such as visitors to the local area, outweigh the benefits of the development*.' Paragraph 4.10.11, '*Existing trees and woodlands should be retained where possible. The applicant should assess the impacts on, and loss of, all trees and woodlands within the project boundary and develop mitigation measures to minimise adverse impacts and any risk of net deforestation as a result of the scheme. Mitigation may include use of buffers to enhance resilience, improvements to connectivity, and improved woodland management. Where woodland loss is unavoidable, compensation schemes should be required and the long-term management and maintenance of newly planted trees should be secured*.'
NPPF (DLUHC, 2023)	The NPPF includes Chapter 12: Achieving well-designed and beautiful places, Chapter 13: Protecting Green Belt land, and Chapter 15: Conserving and enhancing the natural environment, which are relevant to landscape and visual matters. These chapters seek to encourage good design, protect and enhance valued landscapes, and recognise the character of the countryside and openness of the Green Belt.

7.3 Stakeholder engagement

7.3.1 In preparing this EIA Scoping Report, there have been engagement and discussions with a number of stakeholders including the relevant planning authorities.

7.3.2 The dialogue with stakeholders will continue throughout the pre-application period as part of the EIA process. A summary of the engagement undertaken so far is presented in Table 7-2, along with proposed future engagement.

Table 7-2: Engagement with stakeholders

Stakeholder	Engagement undertaken to date	Proposed future engagement
Fenland District Council, Environment Agency, Historic England	**November 2023** – Technical Working Group Approach to LVIA, the study area, the methodology. Adequacy of baseline information discussed, and missing data requested. Arboriculture surveys and scope and methodology for the Arboricultural Impact Assessment. Ancient woodland, ancient and veteran tree methodology raised. Request for Fenland District Council Tree Officer contacts, and landscape character digital data from planning authorities.	There is future engagement proposed with Fenland District Council, Environment Agency and Historic England.
Cambridgeshire County Council, Fenland District Council, Natural England, Environment Agency, Canal and Rivers Trust, Historic England	**April 2024** – TWG – Overview of approach to LVIA and an introduction to associated water infrastructure and pipelines. Adequacy of baseline information discussed. Study area extents for all matters were presented. Approach reasoning for receptors scoped in and scoped out. Arboriculture surveys and scope and methodology for the Arboricultural Impact Assessment – surveys to commence May/June. Approach accepted and no comments to vary approach.	There is proposed further engagement with Cambridgeshire County Council, Fenland District Council, Natural England, Environment Agency, Canal and Rivers Trust, Historic England and Fenland District Council landscape consultants when appointed.
Huntingdonshire District Council, Peterborough City Council, Cambridgeshire County Council, South Cambridgeshire District	**May 2024** – Local Authority Associated Infrastructure Forum (LAAIF) meeting covering scoping methodologies of the technical areas covering LVIA and arboricultural surveys and impact	Further meetings are planned for this forum, with dates to be confirmed.

Stakeholder	Engagement undertaken to date	Proposed future engagement
Council, Norfolk County Council, Fenland District Council	assessment for the associated water infrastructure. Baseline information was covered at a higher level and the approach for which receptors will be scoped in and scoped out.	

7.3.3 It is proposed that engagement will be undertaken with the landscape officers at the relevant planning authorities to discuss the approach to the assessment of effects on LVIA, and the selection of representative viewpoints for the reservoir site and associated water infrastructure.

7.4 Study area

7.4.1 The study area for landscape and visual has been defined based on the identified Scoping boundary and the available information for the Proposed Development. This includes the information on construction and operational phases as described in Chapter 2: Project description. The identified study area is considered to be sufficiently broad to allow for the ongoing refinement of the Proposed Development; however, if required this will be expanded to ensure there is appropriate coverage of all potential significant environmental effects. The study area is illustrated on Figure 7.2.

7.4.2 The Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3) (Landscape Institute and Institute of Environmental Management and Assessment (IEMA), 2013) provides guidance for the identification of the study area. Paragraph 5.2 of GLVIA3 states the following:

'[T]he assessment area should include the site itself and the full extent of the wider landscape around it which the proposed development may influence in a significant manner. This will usually be based on the extent of Landscape Character Areas likely to be significantly affected either directly or indirectly. However, it may also be based on the extent of the area from which the development is potentially visible, defined as the Zone of Theoretical Visibility, or a combination of the two.'

7.4.3 GLVIA3 advocates a proportionate approach to the LVIA process, with emphasis placed on the potential for significant effects.

7.4.4 The extent of the study area for the Proposed Development has been determined through desktop study, site visits and an initial Zone of Theoretical Visibility (ZTV) map for the reservoir site. The initial ZTV was based on a 'bare earth' scenario to illustrate the worst-case theoretical extent of possible visibility and does not take account of potential screening by vegetation or buildings.

7.4.5 Once the Proposed Development has been refined, including the location of the water transfers;, ZTV maps will be developed as part of the LVIA for the above ground infrastructure of the Proposed Development, incorporating buildings from

OS MasterMap and woodland blocks from the National Forest Inventory Woodland Map (Forest Research, 2020). There will be additional screening features present in the landscape such as new buildings, hedgerows and individual trees that will not have been modelled. Therefore, the ZTVs will not be precise and are only an indication of the area within which visual effects may occur. The ZTV maps will be modelled using the same methodology as used for the initial ZTV map. Refer to Appendix 7.1: Scoping landscape and visual methodology.

7.4.6 The study area has been developed recognising the four operational zones listed below, and as described in Chapter 2: Project description.

- Sources of supply and upstream water transfers.
- Reservoir site.
- Water treatment works.
- Downstream treated water transfers.

7.4.7 The study areas for the scoping assessment include the following:

- Sources of supply and upstream water transfers:
  - 2km for the pipelines and open channel components of the transfers.
  - 3km for above ground components of the transfers, namely, service reservoirs, pumping stations and inter-catchment water treatment.
- Reservoir site and water treatment works:
  - 10km preliminary study area.
  - 5km detailed study area.
- Downstream treated water transfers:
  - 2km for the pipelines and open channel components of the transfers.
  - 3km for above ground components of the transfers, namely, service reservoirs, pumping stations and inter-catchment water treatment.

7.4.8 The study area for the reservoir site initially covered a radius of up to 10km from the Scoping boundary and the ZTV map has been developed accordingly. This study area is described as the overarching study area and the ZTV demonstrates that theoretical visibility extends beyond this distance. However, with reference to the ZTV and initial site surveys, it is considered that the influence of the Proposed Development where there is the potential for significant effects, does not extend to 10km due to the nature of the Proposed Development, topography, and intervening vegetation and buildings.

7.4.9 Therefore, the LVIA for the reservoir site will focus on a detailed study area extending to 5km from the Scoping boundary. This has been determined through desk-based study, including a review of the ZTV, interrogation of topographic mapping, the determination of the extents of settlement areas and nature of

intervening vegetation, and site survey work. The study area has also taken into account the lack of permanent tall structures within the Proposed Development.

7.4.10 Where applicable, longer distance views beyond 5km have also been considered at notable locations where the Proposed Development could influence views.

7.4.11 The preliminary study area for the sources of supply and upstream water transfers and the downstream water transfers have been determined through desk-based study, interrogation of topographic mapping, determining the extents of settlement areas and nature of intervening vegetation, and site survey work. The preliminary overarching study area will be reviewed and the detailed study area will be determined once the Scoping boundary has been further refined.

7.4.12 ZTV maps have been used to inform the selection of a range of preliminary representative viewpoints. Because ZTV is theoretical, the extent of actual visibility has been assessed in the field from publicly accessible locations. GLVIA advocates a proportionate approach to LVIA, with the emphasis placed on the need to focus on the potential for significant effects. The aim is not to identify every possible view available, but to identify a representative range of viewpoints that typify the views experienced by people living, working in or visiting the area. The range of preliminary representative viewpoints is considered proportionate to the size and scale of the Proposed Development. Landmarks located outside the study area, such as Ely Cathedral and Great St Mary's The University Church, Cambridge have not been included as preliminary representative viewpoints at this stage, as due to distance from the Proposed Development they are unlikely to experience a significant effect. This type of representative viewpoint will be kept under review as the project develops.

7.4.13 Preliminary representative viewpoints, which form the basis for the visual assessment, are listed within Appendix 7.5: Scoping representative viewpoint tables. The relevant statutory consultees will be engaged with regarding the viewpoints. The locations of the viewpoints are shown on Figure 7.3. Photography to illustrate the landscape and visual context within the study area is presented in Appendix 7.3: Scoping reservoir site panoramas, and Appendix 7.4: Scoping sources of supply and upstream water transfers and downstream treated water transfers panoramas.

7.4.14 A series of verified photomontages will be developed for the proposed reservoir site to accompany the LVIA. Photomontage locations will be selected that represent the visual change from a range of receptor types and view locations. The selection of photomontage locations will be agreed through consultation with relevant planning authorities. Photography and photomontages will be in accordance with the Visual Representation of Development Proposals Technical Guidance Note 06/19 (Landscape Institute, 2019).

7.5 Baseline data collection

7.5.1 The baseline conditions for the LVIA presented in Section 7.6 represent a review of the currently available data. The data collated to date were obtained via desk

studies and field surveys. Data collection to inform the baseline of the assessment is ongoing. The data described below provide a robust context for the scoping of the assessments.

Desk studies

7.5.2 The baseline conditions have been established through a review of existing desktop studies. The following sources have been used to inform the baseline:

- Statutory landscape designations (National Parks, National Landscapes) (Natural England, 2024a).
- Non-statutory designations identified from the local development plans:
  - Fenland Local Plan 2014 (Fenland District Council, 2014).
  - Fenland District Council Emerging Local Plan 2021 – 2040 (Fenland District Council 2022).
  - Huntingdonshire's Local Plan to 2036 (Huntingdonshire District Council, 2019).
  - East Cambridgeshire District Council Local Plan 2015 (as amended 2023) (East Cambridgeshire District Council, 2011).
  - South Cambridgeshire Local Plan 2018 (South Cambridgeshire District Council, 2018).
  - King's Lynn & West Norfolk Borough Council Local Development Framework Core Strategy (Borough Council of King's Lynn & West Norfolk, 2011).
  - Peterborough Local Plan 2016 to 2036 (Peterborough City Council, 2019).
- National Character Area Profiles (Natural England, 2024b).
- Fenland Wind Turbine Study (Fenland District Council, 2009).
- Ouse Washes Landscape Character Assessment (Ouse Washes Landscape Partnership Scheme, 2013).
- Huntingdonshire Landscape and Townscape Supplementary Planning Document 2022, Landscape and Townscape Assessment (Huntingdonshire District Council, 2022).
- Peterborough Landscape Strategy, Landscape Character Assessment for Peterborough City Council (Peterborough City Council, 2007).
- King's Lynn and West Norfolk Borough Landscape Character Assessment (Borough Council of King's Lynn & West Norfolk, 2007).
- Greater Cambridgeshire Landscape Character Assessment (Greater Cambridge Shared Partnership, 2021).
- Cambridgeshire Landscape Guidelines (Cambridgeshire County Council, 1991).

- Cambridgeshire Green Infrastructure Strategy 2011 (Cambridgeshire Green Infrastructure Forum, 2011).
- Fens for the Future Vision and A Strategic Plan for Fenland: A Proposal for an Enhanced Ecological Network Final Report (Fens for the Future Partnership Steering Group, 2012).
- MAGIC website (Defra, 2024).
- Tranquillity Map: England. National map with 2001 regional boundaries (Campaign to Protect Rural England, 2007).
- National Cycle Network mapping (Sustrans, 2024).
- Aerial photography (Google Earth and Bing Maps, 2024).

Field surveys

7.5.3 Site visits were carried out by a Chartered Landscape Architect in April 2023, July 2023 and March 2024 for the reservoir site and water treatment works, and in June 2024 for the sources of supply and upstream water transfers and the downstream treated water transfers. The objectives of the site visits were to become familiar with the study areas for the Proposed Development and to inform the location of preliminary representative viewpoints.

7.5.4 Site visits comprised a landscape and visual baseline survey during the winter for the reservoir site, and initial familiarisation summer surveys for the sources of supply and upstream water transfers and downstream treated water transfers. Survey notes and photographs taken on site have recorded the existing landscape and visual baseline and will be used to inform the assessment in the LVIA.

7.5.5 Views that will form the focus of the visual impact assessment comprise those from residential properties, communities, footpaths and other recreational routes, the road network, and public green spaces within the defined study areas. The locations of the viewpoints are described in Section 7.6, and it is anticipated that they will be agreed with relevant planning authority landscape officers prior to the assessment.

7.6 Baseline conditions

7.6.1 The baseline conditions for landscape and visual are described below for the four zones within the Scoping boundary (defined in Section 2.2 of Chapter 2). The baseline conditions are as established from the data collection described in Section 7.5.

Baseline relevant to all zones

7.6.2 The baseline for the reservoir site captures the water treatment works and components of the upstream and downstream water transfers that fall within the reservoir site Scoping boundary.

7.6.3 The baseline for the sources of supply and upstream water transfers overlaps with the baseline for the downstream water transfers between Chatteris and Bluntisham, and is therefore included in the baseline for both of the transfer zones. This will be reviewed for the assessment once the phasing of the transfers has been confirmed.

Landscape designations

7.6.4 There are no National Parks or National Landscapes within the study areas.

7.6.5 None of the study areas have been identified as being of 'special' landscape value in the local plans for the Borough Council of King's Lynn & West Norfolk, East Cambridgeshire District Council, Fenland District Council, Huntingdonshire District Council and South Cambridgeshire District Council. Areas of landscape value identified in the Peterborough Local Plan are identified in the description of baseline for sources of supply and upstream water transfers provided below.

Cultural heritage designations

7.6.6 Cultural heritage historic sites, buildings, and features contribute to the unique character of an area, reflecting its past and societal development. Historic sites also contribute to the sense of place and an identity that residents and visitors can connect with. These features also add to the value attributed to landscape character and to the pleasantness of people's views.

7.6.7 There is a close inter-relationship with the assessment of impact to heritage assets. The impacts to the setting of heritage assets will be addressed in the historic environment assessment in Chapter 11: Historic environment. The assessment of impacts to the visual amenity of users of those heritage assets, for example, visitors to a publicly accessible scheduled monument, will be included in the LVIA.

Biodiversity designations

7.6.8 Ecological designations help identify and protect areas that support diverse ecosystems and habitats. These designations ensure the conservation of rare or endangered species, contributing to the overall health and resilience of the landscape. Habitats add to the diversity of landscape character, the recreational opportunities, the rural remoteness and the tranquillity of a landscape. The impacts to the visual amenity of users of publicly accessible ecological assets will be considered in the LVIA. For biodiversity designations, reference should be made to Chapter 8: Terrestrial biodiversity.

Public Rights of Way

7.6.9 Recreational value is a key criterion for determining landscape value to inform the assessment of the sensitivity of landscape receptors. The recreational value of the landscape is demonstrated by the extent to which the experience of the landscape makes an important contribution to recreational use and enjoyment of the area. This may be indicated by the extent of Public Rights of Way (PRoWs) and recreational routes including promoted routes and footpaths, cycleways and bridleways.

7.6.10 The assessment of visual amenity deals with the change in views experienced by people and the overall pleasantness or character of views, and considers any

change in views due to the Proposed Development experienced by people using PRoWs.

7.6.11 An overview of the landscape and visual context of the PRoW network is summarised in this chapter in the baseline for each zone. The location of PRoWs within the study area is shown on Figure 7.3.

7.6.12 For the potential effects that may result from the disturbance of users of PRoWs, cycle routes, outside recreational facilities, access land and public open spaces, reference should be made to Chapter 19: Public access and amenity.

Landscape character

7.6.13 The National Character Areas (NCAs) cover all study areas and describe the broad landscape context. NCAs are shown on Figure 7.1.

7.6.14 The reservoir site study area lies within NCA 46, The Fens. The majority of the study area for the sources of supply and upstream water transfers lies within NCA 46, The Fens. To the south and west near Somersham, and to the east of Peterborough's settlement edge, the study area also falls within NCA 88 Bedfordshire and Cambridgeshire Claylands.

7.6.15 For the downstream treated water transfers to the south, the study area (shown in Figure 7.1) also lies within NCA 88 Bedfordshire and Cambridgeshire Claylands, and to the far north at Downham Market, NCA 76 North West Norfolk.

7.6.16 The NCAs located within the study area are described as follows:

- NCA 46 The Fens. This is described as an expansive, flat, open, low-lying wetland landscape influenced by the Wash estuary, which offers extensive vistas to level horizons and huge skies throughout, providing a sense of rural remoteness and tranquillity.
- NCA 88 Bedfordshire and Cambridgeshire Claylands. This is described as a gently undulating, lowland plateau divided by shallow river valleys that gradually widen as they approach The Fens NCA in the east.
- NCA 76 North West Norfolk. The area is described as an open, rolling arable landscape, accentuated by the large geometric field pattern of the 18th century and offering frequent long views.

7.6.17 Due to their broad geographical coverage, the effects of the NCAs will not be considered as part of the LVIA. Other local district/city council assessments which are more related to the scale and extent of landscape will be assessed in the LVIA; these are as follows and are described in the baseline for each zone. There is no Norfolk County Council assessment, and The Cambridgeshire Landscape Guidelines (Cambridgeshire County Council, 1991) has been superseded by more recent district/city council assessments. Where there is no district council assessment coverage to the east of the Ouse Washes near Ely, the Cambridgeshire Landscape Guidelines will be used as part of the LVIA and the affected character areas within the guidelines will be reviewed and updated.

- King's Lynn and West Norfolk Borough Landscape Character Assessment (Borough Council of King's Lynn & West Norfolk, 2007).
- Fenland Wind Turbine Study (Fenland District Council, 2009).
- Ouse Washes Landscape Character Assessment (Ouse Washes Landscape Partnership Scheme, 2013).
- Huntingdonshire Landscape and Townscape Supplementary Planning Document (Huntingdonshire District Council, 2022).
- Landscape Character Assessment for Peterborough City Council (Peterborough City Council, 2007).
- Greater Cambridgeshire Landscape Character Assessment (Greater Cambridge Shared Partnership, 2021).
- The Cambridgeshire Landscape Guidelines (Cambridgeshire County Council, 1991).

Perceptual qualities

7.6.18 CPRE, the countryside charity has undertaken a study of tranquillity in England and has mapped and published the results (Campaign to Protect Rural England, 2007). The Tranquillity Map for England (ibid.) identifies tranquillity zones based on sources of noise and visual intrusion and the zones over which intrusion may be felt. Within the study areas, the settlements of Peterborough, Downham Market, Salters Lode, Nordelph, Christchurch, March, Wimblington, Doddington, Chatteris, Manea, Somersham, Colne, Pidley, Bluntisham, Earith, St Ives, Needingworth, Holywell, Over, Swavesey, Fen Drayton, Connington, Boxworth, Elsworth, Knapwell, Bar Hill, Dry Drayton, Hardwick and Coton are indicated to be among the least tranquil areas.

7.6.19 The road network around the study areas includes the A10 (Lynn Road), A14 (Huntingdon Road), A141 (Isle of Ely Way), A142 (Ireton's Way), A428 (St Neots Road) and the A605 Kings (Delph/Peterborough Road). Development along these routes and other main roads are also indicated to be areas disturbed by noise and visual intrusion in the tranquillity mapping (Campaign to Protect Rural England, 2007), whilst the remaining rural areas away from these influences are indicated to be more tranquil. However, even in rural areas tranquillity levels are influenced by noise and visual intrusion.

7.6.20 The CPRE mapping of England's light pollution and dark skies illustrates the influence of light pollution on the night skies within the study area (Campaign to Protect Rural England, 2007). The brightest areas within the study area are Peterborough, Downham Market, St Ives and March, Smaller villages including Bluntisham, Doddington, Manea, Needingworth, Somersham, Swavesey, Manea, Wimblington have lower levels of radiance.

7.6.21 Beyond the settlements, the night skies within the more rural part of the study areas are darker.

Baseline for sources of supply and upstream water transfers

7.6.22 The sources of supply and upstream water transfers comprise the following elements:

- Middle Level to proposed reservoir.
- Ouse Washes (River Delph) to Fens Reservoir.
- River Great Ouse at Earith to Fens Reservoir.
- River Nene and its Counter Drain to Fens Reservoir.

Designations

7.6.23 The key designations and features relevant to landscape and visual effects are summarised for each element of the sources of supply and upstream water transfers, and are illustrated on Figure 7.2.

Ouse Washes (River Delph) to Fens Reservoir

7.6.24 There is one area of Registered Common Land within the study area: Coveney Common Wash, which lies approximately 850m to the south-east of the Scoping boundary.

River Great Ouse at Earith to Fens Reservoir

7.6.25 There are 10 areas of Registered Common Land within the study area, located approximately 1km to the north-east of the Scoping boundary. These include Long Fen Drove (part), Trundles Lane (Horse and Pony (H&P)), The Island (H&P), New Lode (H&P), Chapel Pond (H&P), Woodlands/Crown Footpath (H&P), Bridge End Green (H&P), Wash Drove (H&P), Footpath on West side of 'The Chestnuts' (H&P), and Footpath next to Garage (H&P).

River Nene and its Counter Drain to Fens Reservoir

7.6.26 There are six areas of Registered Common Land located within the study area. These are:

- Long Drove.
- Land adjacent to Thorney Road and Little Bridge (five areas).
- Drove running East from the Thorney Road.
- Drove running East at the North end of West Delph County Wildlife Site.
- Drove adjoining Morton's Leam (two areas).
- Common Drove.

7.6.27 The areas extend along the south side of the River Nene and the B1040 Thorney Road near to Morton's Leam, and are located within approximately 200m to 1km to the south of the Scoping boundary.

7.6.28 The Nene Valley has been identified in the Peterborough Local Plan as an area of high amenity, landscape, ecological and heritage value, and forms part of the Nene Valley Nature Improvement Area. The area extends along the River Nene and crosses the Scoping boundary to the east of Peterborough.

Ancient woodlands, ancient and veteran trees, and Tree Preservation Orders

7.6.29 There are no areas of ancient woodland within the study area. Information on veteran trees and Tree Preservation Orders (TPOs) is unavailable at the time of reporting. Veteran trees and TPOs will be included in the LVIA in the future assessment.

Landscape character

7.6.30 National and local landscape character assessments are illustrated on Figure 7.1. The existing local landscape character of the study area is summarised within this section.

7.6.31 The study area extends over five local authority areas. These are:

- Fenland District Council.
- Huntingdonshire District Council.
- Peterborough City Council.
- East Cambridgeshire District Council.
- South Cambridgeshire District Council.

7.6.32 The majority of the study area lies within the administrative areas of Fenland District Council, Huntingdonshire District Council and Peterborough City Council.

7.6.33 The Fenland Wind Turbine Study (Fenland District Council, 2009) comprises a framework of Landscape Character Types (LCTs) and their component Landscape Character Areas (LCAs). There are three LCTs and four LCAs within the study area. These are as follows:

- Drained Fenland LCT, The Fens LCA.
- Clay Fen Island LCT, Chatteris Clay Island LCA.
- Clay Fen Island LCT, March Clay Island LCA.
- Extracted Clay Fen Island LCT, Whittlesey Island LCA.

7.6.34 The Huntingdonshire Landscape and Townscape Supplementary Planning Document 2022 (Huntingdonshire District Council, 2022) comprises nine LCAs. There are four LCAs within the study area as follows:

- The Fens.
- Fens Margin.
- Central Claylands.
- Great Ouse Valley.

7.6.35 Peterborough Landscape Strategy, Landscape Character Assessment for Peterborough City Council (Peterborough City Council, 2007) covers the study area to the east of Peterborough. The study area lies within the LCA 4 Peterborough Fens and LCA 5 Peterborough Fen Fringe. The LCAs are sub-divided into Landscape Character Sub Areas, of which there are five within the study area, as follows:

- 4a Bedford North Level.
- 4b Thorney Island.
- 4c Nene Washes.
- 4d Horsey Toll.
- 5b Eye Fen Fringe.

7.6.36 Cambridgeshire Landscape Guidelines (Cambridgeshire County Council, 1991) covers the study area within East Cambridgeshire to the east of the Ouse Washes and Welches Dam. There is one LCA within the study area: LCA 8: Fenlands.

7.6.37 The Greater Cambridgeshire Landscape Character Assessment (Greater Cambridge Shared Partnership, 2021) covers the outer areas of the study area to the south, within South Cambridgeshire. There are four LCTs and five LCAs within the study area as follows:

- 1 The Fens LCT, 1A Ouse Floodplain Fens LCA.
- 2 Fen Edge Claylands LCT, 2A Longstanton Fen Edge Claylands LCA.
- 3 Lowland Farmland LCT, 3B Bourn Tributaries Lowland Farmlands LCA.
- 4 Wooded Claylands LCT, 4A Croxton to Conington Wooded Claylands LCA.
- 4 Wooded Claylands LCT, 4B Lolworth to Longstowe Wooded Claylands LCA.

7.6.38 Ouse Washes Landscape Character Assessment (Ouse Washes Landscape Partnership Scheme, 2013) covers part of Fenland District Council, East Cambridgeshire District Council and South Cambridgeshire District Council. The landscape character assessment for Ouse Washes covers the eastern extent of the study area adjacent to the Ouse Washes. There are four LCAs within the study area as follows:

- Manea Fen to Longwood Fen.
- Ouse Washes.
- Pymoor.
- Fen Isles.

7.6.39 The above assessments will be used to inform the analysis of the landscape character across the study area. As part of the LVIA, further surveys will be undertaken to verify the characteristics described within the assessments.

7.6.40 The Ouse Washes Landscape Character Assessment overlaps Fenland District Council, East Cambridgeshire District Council and South Cambridgeshire District Council's landscape character assessments along the Ouse Washes corridor. As part of the LVIA, the district council local character areas will be reviewed and updated to take account of this assessment.

Landscape context

7.6.41 The study area for the sources of supply and upstream water transfers, extends to the east of Peterborough along the River Nene towards the settlement of

Whittlesey, and south-west from the settlements of Doddington and Chatteris to the settlements of Somersham and Bluntisham located to the north of the River Great Ouse.

7.6.42 The landscape within the study area to the east of Peterborough and from the reservoir site to the north of Somersham is generally flat and low-lying with a distinctive fen and 'Fen Isle' topography. Elevations infrequently exceed the 10m contour height, and typically vary by little more than one or two metres over long distances. Around the settlements of Somersham and Colne, a low-lying 'fen margin' landscape forms a transition between the fens to the north and east and gently undulating farmland of the central claylands (10m – 50m Above Ordnance Datum (AOD)) to the south and west. To the south-east of Bluntisham and Earith, the flat, low-lying, broad shallow valley of the River Great Ouse flows generally west to east.

7.6.43 Within the fenland and fen margin landscape, rivers generally have artificially canalised alignments and are predominantly bounded by high banks to contain the watercourse from the lower adjacent fields. The River Nene, River Delph, New Bedford River, Counter Drain (Ouse), King's Dyke, Back River, Morton's Leam, Counter Drain (Nene) and Forty Foot Drain are notable landscape features cutting across the fen. The Nene Washes and Ouse Washes areas are unique corridors of washland that form part of the study area to the east of Peterborough and to the east of Chatteris at Purls Bridge. The broad, meandering channel of the River Great Ouse and associated wetland forms a distinctive feature within the landscape to the south of Bluntisham and Earith.

7.6.44 Landcover is predominantly agricultural farmland. The fenland landscape to the south of Doddington and Chatteris comprises intensively farmed geometric arable fields. A large- to medium-sized rectilinear field structure is divided by a predominantly geometric pattern of artificial drainage ditches. Drains, drove tracks and roads follow straight linear alignments.

7.6.45 To the east of Peterborough and within the fen margin around the settlements of Somersham and Colne, smaller, irregular shaped arable and pastoral fields are divided by hedgerows with trees common along older lanes. To the south-west, beyond the fen margin, gently undulating arable and pastoral farmland has a large-scale field pattern with few hedgerows and hedgerow trees, giving rise to a predominantly open landscape.

7.6.46 A more diverse field pattern comprising smaller paddocks, pastures and orchards surround villages contrasting with the large scale, flat arable fields on the surrounding fen and the relatively open, undulating farmland further south. The shallow valley of the River Great Ouse contains a mix of land uses, including extensive hay meadows, fisheries, nature reserves, marinas and settlements. Gravel extraction and brick works have led to extensive areas of open water, creating fisheries, nature reserves and leisure opportunities close to the River Great Ouse and the River Nene.

7.6.47 Woodland cover is relatively sparse, most notable areas being along Peterborough's settlement edge, within Northey Park and King's Dyke Nature

Reserve to the east of Peterborough, and Lakeside Lodge Golf and Country Club to the west of Somersham. Woodland, hedgerows and groups of trees extend around villages, farmsteads and along historic tracks, watercourses and main roads. Isolated properties are often surrounded by wind breaks including numerous conifers.

7.6.48 Peterborough is the largest settlement within the study area. Beyond the city, the study area is largely unsettled farmland with isolated villages and scattered properties. Smaller settlements close to the Scoping boundary include Whittlesey, Manea, Chatteris, Pidley, Somersham, Colne, Bluntisham and Earith. Within the fenland landscape, settlements and isolated farmsteads are mostly located on the modestly elevated 'Fen Isles' and low sinuous roddon (infilled ancient watercourses within the fens). Further south, settlements comprise regularly spaced, nucleated villages, some with historic cores.

7.6.49 Linear transport corridors include the Peterborough to Ely railway, A141 Isle of Ely Way, A142 Ireton's Way, A1123 Station Road, A1139 Frank Perkins Pathway, A605 Peterborough Road, as well as a network of minor roads. The study area is crossed by many roads, few of which are major transport routes.

7.6.50 The landscape is heavily influenced by human activity in the form of the pattern of artificial drainage ditches, embanked rivers, the River Delph and the River Nene which form notable vertical and linear components within the fen and fen edge landscape. There are extensive areas of sand and gravel extraction adjacent to the River Great Ouse, Nene Washes and Block Fen, and a large-scale brick works adjacent to the Nene Washes. The extensive Eastern Industries industrial estate at Fengate, extends along the eastern edge of Peterborough predominantly screened by woodland planting. To the south-east of the industrial estate, adjacent to the River Nene, Flag Fen water recycling centre is predominantly enclosed by woodland planting.

7.6.51 Much of the landscape is largely unsettled and rural in character, and provides a recreation resource with a PRoW network that includes the Greenwich Meridian Trail, Rothschild Way, Pathfinder Long Distance Walk, Ouse Valley Way, Nene Way and Hereward Way long distance paths, National Cycle Route (NCR) 21 and 63, and The Green Wheel Outer Route. Flag Fen Museum and Flag Fen Archaeological Park visitor attractions and scheduled monument are located to the east of Peterborough's settlement edge.

Visibility and potential visual receptors

7.6.52 Views within the study area would generally be gained from public highways, PRoWs, navigable watercourses, settlements, dispersed properties, farmsteads and employment areas. Views experienced are typically across a rural landscape.

7.6.53 There are no protected views identified in the relevant local plans. Within the Bluntisham Conservation Area Character Statement (Huntingdonshire District Council, 1999), it is noted that the setting to Bluntisham House is important to the character of the Conservation Area and should be protected. No principal views or vistas into and out of the Chatteris, Earith, Bluntisham, and Whittlesey

Conservation Areas are noted in the Conservation Area appraisals that would be affected by the Proposed Development.

7.6.54 Views within the study area are also obtained by residents located within and around the settlements of Manea, Chatteris, Whittlesey, Somersham, Colne, Pidley and Bluntisham. Linear developments along roads, such as Dog-in-a-Doublet and Pidley, also afford views of the local landscape. Residents are also found at the many dispersed properties and farmsteads. Views experienced are typically over agricultural land.

7.6.55 The PRoW network includes several footpaths and byways, and the Greenwich Meridian Trail, Rothschild Way, Pathfinder Long Distance Walk, Ouse Valley Way, Nene Way and Hereward Way long distance paths. Views from the PRoW network are variable depending on the local landscape and elevation. Close to settlements, views are restricted or filtered by trees and roadside vegetation. Away from the settlements, the views are more long-range and expansive across the study area. The settlements on the 'Fen Isles' and tree belts along the settlement edges of Peterborough, Somersham and Bluntisham provide a strong backdrop to local views. Views from Flag Fen Museum and Flag Fen Archaeological Park are filtered and screened by the visitor attraction's perimeter tree belts. Views from navigable watercourses such as the River Great Ouse, King's Dyke and River Nene are variable depending on the amount of riverside vegetation and are typically over agricultural land.

7.6.56 Transport receptors within the area include users of A142 Ireton's Way, A1123 Station Road, A1139 Frank Perkins Pathway, A605 Peterborough Road, B1050 Chatteris Road, B1089 Pidley Hill, B1086 St Ives Road and the Peterborough to Ely railway. Views from these roads and the railway are variable depending on the elevation and amount of road and rail side vegetation. Users of the local road network, including A142 Ireton's Way and B1050 Chatteris Road, experience some open expansive views across the flat fenland landscape from certain sections.

7.6.57 Employment areas comprise storage and agricultural packing plants visible on the Chatteris settlement edge, and the expansive Eastern Industries industrial estate located on the east side of Peterborough. Views from these locations tend to be restricted by large warehouses within the areas and roadside and perimeter woodland planting.

7.6.58 For much of the study area the skyline is simple and uninterrupted. There are, however, existing wind turbines at Ranson Moor, Tick Fen, and Glass Moor, as well as pylons, brickworks chimneys, overhead wires and wood pole lines in some locations forming vertical features on the skyline.

7.6.59 Potential visual receptors within the study area include:

- Residents within the settlements of Peterborough, Whittlesey, Manea, Chatteris, Somersham, Colne, Pidley, Bluntisham and Earith.
- Residents in farms and individual properties within the rural areas.

- Walkers on long distance paths, the local PRoW network, cyclists and equestrians on the local cycle routes and bridleways.
- Visitors to historic buildings, such as Parish Church of St Peter and St Paul, Chatteris; Parish Church of St Mary, Bluntisham; Church of St John the Baptist, Somersham; Church of St Mary, Whittlesey; and within Conservation areas.
- Visitors to Flag Fen Museum and Flag Fen Archaeological Park.
- Visitors to public open spaces, e.g. green corridors, outdoor sports areas, religious grounds and cemeteries, playing fields.
- Visitors to private open spaces, including school playing fields and allotments.
- Users of navigable waterways, including the River Great Ouse, King's Dyke and the River Nene.
- People at their places of work, such as within nearby schools and businesses located within the study area.
- Drivers and passengers on the road network, including the A142 Ireton's Way, A1123 Station Road, A1139 Frank Perkins Pathway, A605 Kings Delph/Peterborough Road, B1050 Chatteris Road, B1089 Pidley Hill, B1086 St Ives Road and the Peterborough to Ely railway and surrounding local road network.

Representative viewpoints

7.6.60 A number of preliminary representative viewpoints have been selected to represent the receptor groups. The location of representative viewpoints will be reviewed and updated once the extent of the pipeline corridor and above ground structures within the Scoping boundary has been refined. Representative viewpoints will be agreed with the relevant statutory consultees. The locations of the representative viewpoints are shown on Figure 7.3 and presented in Appendix 7.5.

7.6.61 Photography of a selection of preliminary representative viewpoints is presented in Appendix 7.5 to illustrate the study area for the upstream transfers.

Baseline for the reservoir site and water treatment works

Designations

7.6.62 The key designations and features relevant to potential landscape and visual effects are summarised below for the reservoir site and illustrated on Figure 7.2.

7.6.63 There are five areas of Registered Common Land within the study area, which are illustrated on Figure 7.2. These comprise the following:

- Coveney Common Wash, approximately 870m to the south-east of the Proposed Development.
- Land in the parish of Doddington, approximately 1.4km from the Proposed Development.

- Droveways in the parish of Sutton, approximately 4.1km to the south of the Proposed Development.
- Land in the parish of Coveney, approximately, 4.2km to south-east of the Proposed Development.
- Land in the parish of Downham, approximately, 4.4km to the south-east of the Proposed Development.

7.6.64 There are no areas of 'special landscape value' within the study area.

Ancient woodlands, ancient and veteran trees, and Tree Preservation Orders

7.6.65 There are no areas of ancient woodland within the study area. Information on veteran trees and TPOs is unavailable at the time of reporting. Veteran trees and TPOs will be included in the LVIA once this information is available.

Landscape character

7.6.66 National and local landscape character assessments are illustrated on Figure 7.1. The existing local landscape character of the study area is summarised within this section.

7.6.67 The study area extends over four local authority areas: Fenland District Council, East Cambridgeshire District Council, Huntingdonshire District Council and the Borough Council of King's Lynn & West Norfolk. The majority of the study area is within the administrative area of Fenland District Council.

7.6.68 The administrative area of the Borough Council of King's Lynn & West Norfolk is located on the outer edges of the study area as it relates to the reservoir site and water treatment works, and has therefore been scoped out, as it is unlikely to experience any direct or indirect effects as a result of the Proposed Development.

7.6.69 The Fenland Wind Turbine Study (Fenland District Council, 2009) comprises a framework of LCTs and their component LCAs. There are two LCTs and three LCAs within the study area:

- Drained Fenland LCT, The Fens LCA.
- Clay Fen Island LCT, Chatteris Clay Island LCA.
- Clay Fen Island LCT, March Clay Island LCA.

7.6.70 Ouse Washes Landscape Character Assessment (Ouse Washes Landscape Partnership Scheme, 2013) covers part of Fenland District Council and part of East Cambridgeshire District Council. The landscape character assessment for Ouse Washes covers the majority of the eastern extent of the study area. There are six LCAs within the study area as follows:

- Manea Fen to Longwood Fen.
- Old Croft River.
- Ouse Washes.
- Pymoor.

- Fen Isles.
- Meadland to Lower Delphs.

7.6.71 The Huntingdonshire Landscape and Townscape Supplementary Planning Document 2022 (Huntingdonshire District Council, 2022) landscape and townscape assessment comprises nine LCAs. There is one LCA in the study area: The Fens.

7.6.72 The Cambridgeshire Landscape Guidelines (Cambridgeshire County Council, 1991) cover the LCA for East Cambridgeshire District Council. There is one LCA in the study area: Area 8: Fenlands.

7.6.73 The above assessments will be used to inform the analysis of the landscape across the study area. As part of the LVIA, further follow up surveys will be undertaken to verify the characteristics described within the assessments.

7.6.74 The Ouse Washes Landscape Character Assessment overlaps the district council's landscape character assessments along the Ouse Washes corridor. As part of the LVIA, the district council local character areas will be reviewed and updated to take account of this assessment.

Landscape context

7.6.75 The study area extends from March in the north, Ely to the south-east and Somersham and Ramsey to the south-west.

7.6.76 The landscape within the study area is generally flat and low-lying with a distinctive fen and 'Fen Isle' topography. Elevations rarely exceed the 10m contour height, and typically vary by no more than one or two metres over long distances.

7.6.77 The rivers in the area have artificially canalised alignments and are bounded by high banks to contain the watercourse from the lower adjacent fields. Forty Foot Drain, Sixteen Foot Drain and the Ouse Washes are notable landscape features cutting across the fen. The Ouse Washes is a unique corridor of washland that cuts diagonally across the south-east side of the study area. The washlands are a remnant corridor of historic fen pasture retained between the embankments that were constructed along the Counter Drain (Ouse), River Delph and New Bedford River, and includes a redundant lock at Welches Dam.

7.6.78 The area is an intensively farmed fenland landscape. A large to medium-sized rectilinear field structure is divided by a predominantly geometric pattern of artificial drainage ditches. Drains, drove tracks and roads follow straight linear alignments. A more diverse field pattern comprising smaller paddocks, pastures and orchards surround villages, contrasting with the large scale flat arable fields on the surrounding fen.

7.6.79 The fenland landscape is sparsely vegetated with few trees and hedgerows. Hedgerows and groups of trees extend around villages, farmsteads and along historic tracks. Isolated properties are often surrounded by wind breaks including numerous conifers. To the north of Manea, the fields are exceptionally open, with more enclosure to the south on Langwood Fen, where some fields and droveways are enclosed by hedgerows and tree belts. Tree belts extend along Forty Foot Drain

and Purl's Bridge Drove adjacent to Counter Drain (Ouse), and provide a strong backdrop to local views to the east.

7.6.80 The study area is largely a sparsely settled, arable landscape with isolated villages and scattered individual properties. Settlements and isolated farmsteads are mostly located on the modestly elevated 'Fen Isles' and the low sinuous roddon (infilled ancient watercourses within the fens). Elsewhere, villages tend to be dispersed ribbon settlements along the main arterial roads through the settled fens, and scattered farms remain as relics of earlier agricultural settlements.

7.6.81 March is the largest town settlement within the study area, located 3km to the north of the Scoping boundary. Smaller settlements close to the Scoping boundary include Chatteris, Doddington, Wimblington and Manea.

7.6.82 Linear transport corridors include the Peterborough to Ely railway, the A141 Isle of Ely Way, the A142 Ireton's Way, as well as a network of minor roads. The Fens are crossed by many roads, most of which are elevated above surrounding fields, but few of which are major transport routes. The embanked roads form 'causeways' across the flat fen between the Fen Isles.

7.6.83 The landscape is heavily influenced by human activity in the form of the pattern of artificial drainage ditches, embanked rivers, Counter Drain (Ouse), River Delph and New Bedford River, which form notable vertical and linear components within the landscape. There is a large wind farm at Ranson Moor, located approximately 3.3km to the north-west of the Scoping boundary, and a large-scale sand and gravel extraction at Block Fen, located approximately 2km to the south-east of the Scoping boundary. There is a wind turbine along Long Nightlayer's Drove within the Scoping boundary.

7.6.84 Overall, the landscape is largely unsettled in population and rural in character and provides a recreational resource with a PRoW network that includes Greenwich Meridian Trail and Hereward Way long distance paths.

Visibility and potential visual receptors

7.6.85 Views within the study area would generally be obtained from public highways, PRoWs, navigable waterways, settlements, dispersed properties, farmsteads and employment areas. Views experienced are typically across a rural landscape.

7.6.86 There are no protected views identified in the local plans. No principal views or vistas into and out of the Doddington Conservation Area are noted in the Conservation Area appraisal that would be affected by the Proposed Development.

7.6.87 Views within the study area are also obtained by residents located within and around the settlements of Chatteris, Doddington, Wimblington and Manea. Linear developments along roads, such as the Doddington Road and Primrose Hill, also afford views of the local landscape. Residents are also found at the many dispersed properties and farmsteads. Views experienced are typically over agricultural land.

7.6.88 The PRoW network includes several footpaths and byways, the Greenwich Meridian Trail and Hereward Way long distance paths, which all cross the study area. Views from the PRoW network are variable depending on local landscape and

elevation. Views close to settlements are restricted or filtered by trees and roadside vegetation. Away from the settlements, the views are more long-range and expansive across the fenland landscape. The settlements on the 'Fen Isles' and tree belts along the Forty Foot Drain provide a strong backdrop to local views. Views from navigable waterways such as the Counter Drain (Ouse), River Delph, Sixteen Foot Drain and Forty Foot Drain are variable depending on the amount of waterside vegetation, and are typically over agricultural land.

7.6.89 Transport receptors within the area include users of A141 Isle of Ely Way, A142 Ireton's Way and the Peterborough to Ely railway. Views from these roads and the railway are variable depending on the elevation and amount of road and rail side vegetation. Users of the local road network, including B1098 Sixteen Foot Bank and B1098 Manea Road, experience open expansive views across the flat fenland landscape from certain sections.

7.6.90 The Royal Society for the Protection of Birds (RSPB) Reserve at Welches Dam is a focal point for visitors. Employment areas comprise storage and agricultural packing plants visible on the settlement edge at Chatteris, and to the east of Wimblington along the B1093 Manea Road. Views from these locations tend to be restricted by large warehouses within the area and roadside planting associated with the A141 Isle of Ely Way and the A142 Ireton Way.

7.6.91 For much of the Fens, the skyline is simple and uninterrupted. There are, however, existing wind turbines at Coldham, Glass Moor, Ranson Moor and on the northern edge of March, and a wind turbine at Long Nightlayer's Drove, as well as pylons, overhead wires, wood pole lines in some locations forming vertical features on the skyline.

7.6.92 Potential visual receptors within the study area include:

- Residents within the settlements of Wimblington, Doddington, Chatteris and Manea.
- Residents in farms and individual properties within the rural areas.
- Walkers on long distance paths, the local PRoW network, cyclists and equestrians on the local cycle routes and bridleways.
- Visitors to historic buildings such as Chatteris Parish Church of St Peter and St Paul, and within Conservation areas.
- Visitors to scheduled monuments, such as Stonea Camp.
- Visitors to public open spaces, e.g. green corridors, outdoor sports areas, religious grounds and cemeteries, and playing fields.
- Visitors to private open spaces including school playing fields and allotments.
- Users of navigable waterways, including the Counter Drain (Ouse), River Delph, Sixteen Foot Drain and Forty Foot Drain.
- People at their places of work, such as within a nearby school and businesses on the B1093 Manea Road.

- Travellers on the road network, including the A141 Isle of Ely Way, A142 Ireton's Way, B1093 Manea Road, B1098 Sixteen Foot Bank, Peterborough to Ely railway and surrounding local road network.

Representative viewpoints

7.6.93 A number of preliminary representative viewpoints have been selected to represent these receptor groups. Representative viewpoints will be agreed with the relevant statutory consultees. The locations of the representative viewpoints are shown on Figure 7.3 and presented in Appendix 7.5: Scoping representative viewpoint tables.

7.6.94 Photography of a selection of preliminary representative viewpoints to illustrate the study area for the reservoir site is presented in Appendix 7.3: Scoping reservoir site panoramas.

Baseline for downstream treated water transfers

7.6.95 The downstream treated water transfers comprise the following elements:

- Fens Reservoir to Bexwell.
- Fens Reservoir to Madingley, via Bluntisham.

7.6.96 The baseline has been presented for each of these elements.

Designations

7.6.97 The key designations and features relevant to potential landscape and visual effects are summarised for each element of the downstream treated water transfers, and are illustrated on Figure 7.2.

Fens Reservoir to Bexwell

7.6.98 There are two areas of Registered Common Land within the study area; these are named ‘three pieces of common land’, and ‘Whin Common and Sluice Common’.

Fens Reservoir to Madingley, via Bluntisham

7.6.99 Within the study area, there are nine areas of Registered Common Land. These are Long North Fen Drove (part), The Island Horse and Pony (H&P), Chapel Pond (H&P), New Lode, Trundles Lane, Land in Overcote Road (H&P), Holywell Front (H&P), Land between ‘Ferry ‘Boat' Inn, and Flood Bank (H&P).

7.6.100 The study area adjacent to Madingley lies within the Cambridge Green Belt. There are no areas of ‘special landscape value’ within the study areas for Fens Reservoir to Bexwell, or Fens Reservoir to Madingley via Bluntisham.

Ancient woodlands, ancient and veteran trees, and Tree Preservation Orders

7.6.101 Information on veteran trees and TPOs is not available at the time of reporting. This information will be included in the LVIA once it is available.

Fens Reservoir to Bexwell

7.6.102 There are two ancient woodlands within the study area: Spring Wood lies approximately 810m to the north-east of the Scoping boundary and to the east of Stow Bardolph; and Chiswick’s Wood lies 2.4km to the north-east of the Scoping boundary.

Fens Reservoir to Madingley, via Bluntisham

7.6.103 There are 11 ancient woodlands located within the study area close to the settlements of Boxworth, Knapwell and Madingley. These include Overhall Grove, White Grove, Mattendine Spinney, View Spinney and Alice Grove, Brown Leys Grove, L Grove, Farm Close Spinney, Madingley Wood, Knapwell Wood and Elsworth Wood. Boxworth Grove and Lap Close Spinney lie adjacent to the north side of Scoping boundary, to the south of Boxworth.

Landscape character

7.6.104 National and Local landscape character assessments are illustrated on Figure 7.1. The existing local landscape character of the study area is summarised in this section.

7.6.105 The study area extends over four local authority areas: Borough Council of King's Lynn & West Norfolk, Fenland District Council, Huntingdonshire District Council, and South Cambridgeshire District Council.

7.6.106 The King's Lynn and West Norfolk Borough Landscape Character Assessment (Borough Council of King's Lynn & West Norfolk, 2007) covers the northern part of the study area around Downham Market. There are two LCTs and 10 LCAs within the study area:

- H Settlement Farmland with Plantations LCT, H1 Stow Bardolph LCA.
- H Settlement Farmland with Plantations LCT, H2 Fincham LCA.
- H Settlement Farmland with Plantations LCT, H3 Denver LCA.
- H Settlement Farmland with Plantations LCT, H4 Wareham LCA.
- E The Fens LCT, E2 Saddlebow and Wormegay LCA.
- E The Fens LCT, E4 Marshland St. James LCA.
- E The Fens LCT, E5 Downham West LCA.
- E The Fens LCT, E6 Hillgay Fen LCA.
- E The Fens LCT, E7 Welney River LCA.
- E The Fens LCT, E8 Denver Sluice LCA.

7.6.107 The Fenland Wind Turbine Study (Fenland District Council, 2009) comprises a framework of LCTs and their component LCAs. There are two LCTs and three LCAs within the study area:

- LCT Drained Fenland, LCA The Fens.
- LCT Clay Fen Island, LCA Chatteris Clay Island.
- LCT Clay Fen Island, LCA March Clay Island.

7.6.108 The Ouse Washes Landscape Character Assessment (Ouse Washes Landscape Partnership Scheme, 2013) covers part of Fenland District Council, East Cambridgeshire District Council and South Cambridgeshire District Council. The

landscape character assessment for Ouse Washes covers the eastern extent of the study area adjacent to the Ouse Washes. There are three LCAs within the study area:

- Nordelph to 10 Mile Bank.
- Old Croft River.
- Ouse Valley Wetlands.

7.6.109 The Huntingdonshire Landscape and Townscape Supplementary Planning Document 2022 (Huntingdonshire District Council, 2022) comprises nine LCA. There are four LCAs in the study area:

- The Fens.
- Fens Margin.
- Central Claylands.
- Great Ouse Valley.

7.6.110 The Greater Cambridgeshire Landscape Character Assessment (Greater Cambridge Shared Partnership, 2021) covers a framework of LCTs and their component LCAs. There are four LCTs and five LCAs within the study area.

- 1 The Fens LCT, 1A Ouse Floodplain Fens LCA.
- 2 Fen Edge Claylands LCT, 2A Longstanton Fen Edge Claylands LCA.
- 3 Lowland Farmland LCT, 3B Bourn Tributaries Lowland Farmlands LCA.
- 4 Wooded Claylands LCT, 4A Croxton to Conington Wooded Claylands LCA.
- 4 Wooded Claylands LCT, 4B Lolworth to Longstowe Wooded Claylands LCA.

7.6.111 The above assessments will be used to inform the analysis of the landscape across the study area. As part of the LVIA, further follow up surveys will be undertaken to verify the characteristics described within the assessments.

7.6.112 The Ouse Washes Landscape Character Assessment (Ouse Washes Landscape Partnership Scheme, 2013) overlaps the district council's landscape character assessments along the Ouse Washes corridor. As part of the LVIA, the district council local character areas will be reviewed and updated to take account of this assessment.

Landscape context

7.6.113 The study area extends south-west from Downham Market in the north via Chatteris to the settlement of Madingley in the south.

7.6.114 The landscape within the study area to the east of Downham Market has a flat to gently rolling topography lying between 0m – 30m AOD. Further south, between Downham Market and Somersham, the landscape is generally flat and low-lying with a distinctive fen and 'Fen Isle' topography. Elevations rarely pass the 10m

contour height, and typically vary by little more than one or two metres over long distances.

7.6.115 At the settlements of Somersham and Colne, a low-lying 'fen margin' landscape forms a transition between the fens to the north and east and gently undulating farmland of the central claylands to the south and west at 10m – 50m AOD. To the south-east of Bluntisham and Earith, gently undulating farmland descends towards the broad and meandering, shallow valley and fen edge landscape of the River Great Ouse as it flows west to east. Further south, beyond the fen edge, a low-lying gently undulating landscape at 5m – 30m AOD gradually rises southwards to form a gently rolling, elevated lowland clay plateau to the west of Cambridge (40 – 60m AOD).

7.6.116 Within the fens and fen edge, rivers predominantly have artificially canalised alignments and are bounded by high banks to contain the watercourse from the lower adjacent fields. The River Great Ouse, Relief Channel (Ouse), Hundred Foot Drain, New Bedford River, Old Popham's Eau, Forty Foot Drain and Sixteen Foot Drain are distinctive features cutting across the fen landscape. To the south of Bluntisham, the meandering channel of the River Great Ouse flows west to east. Further south, the landscape is dissected by minor streams that generally flow north to south.

7.6.117 Landcover is predominantly agricultural farmland. The area to the north and east of Downham Market comprises a regular network of large to medium-sized geometric arable fields defined by varied field margins, including dykes, hedgerows, tree shelterbelts, woodland and scrubby verges. Further south and west, the fenland landscape comprises intensively farmed arable fields with a large to medium-sized rectilinear field structure divided by a predominantly geometric pattern of artificial drainage ditches. Drains, drove tracks and roads follow straight linear alignments.

7.6.118 Within the fen margin landscape around the settlements of Somersham and Colne and south of the River Great Ouse, smaller, irregular shaped arable and pastoral fields are divided by a mix of distinctive straight historic drainage ditches and droveways, and hedgerows with trees common along older lanes. To the south-west, beyond the fen margin, gently undulating arable and pastoral farmland has a large-scale field pattern with few hedgerows and hedgerow trees giving rise to a predominantly open landscape. To the west of Cambridge, arable fields are generally medium-sized, rectilinear and arranged in an irregular way. Mature, fragmented hedgerows and occasional open ditches provide enclosure.

7.6.119 A more diverse field pattern comprising smaller paddocks, pastures and orchards surround villages contrasting with the large-scale, flat arable fields on the surrounding fen and the relatively open, undulating farmland further south. The shallow valley of the River Great Ouse contains a mix of land uses, including extensive hay meadows, fisheries, nature reserves, marinas and settlements. Gravel extraction has led to extensive areas of open water creating fisheries, nature reserves and leisure opportunities close to the River Great Ouse.

7.6.120 To the north and east of Downham Market, arable fields are interspersed by areas of woodland and tree belts that offer some degree of enclosure. Further south,

within the fenland and to the south of Bluntisham, the landscape is sparsely vegetated with few trees and hedgerows. Hedgerows and groups of trees extend around villages, farmsteads and along historic tracks. Isolated properties are often surrounded by wind breaks including numerous conifers. To the south of the A14 Huntingdon Road, scattered small blocks of woodland are linked by a mature, fragmented hedgerow network. A number of the woodlands contain ancient woodland, including Overhall Grove, Lap Close Spinney, Boxworth Grove, White Grove and Madingley Wood.

7.6.121 A key feature of the landscape to the south of the A14 Huntingdon Road is the repetition of historic parkland features, including tree belts, clumps, woodland and water bodies at Childerley Hall (Grade II* listed Registered Park and Garden) and Madingley Hall (Grade II listed Registered Park and Garden). The formal commemorative landscape of the American Military Cemetery (Grade I listed Registered Park and Garden) also has clumps of trees and individual trees set in woodland in a post-war parkland. Ermine Street (A1303) and Via Devana (A14) Roman Roads are a strong feature, as is the A428, from which largely straight minor roads tend to follow the north–south alignment of the rivers.

7.6.122 Downham Market is the largest settlement within the study area. Beyond the town, the study area is largely unsettled farmland with isolated villages and scattered properties. Smaller settlements close to the Scoping boundary include Salters Lode, Nordelph, Christchurch, Welney, Wimblington, Chatteris, Somersham, Colne, Pidley, Bluntisham, Needingworth, Holywell, Swavesey, Fen Drayton, Connington, Boxworth, Elsworth, Lolworth, Knapwell, Bar Hill, Dry Drayton, Hardwick and Coton.

7.6.123 Within the fenland landscape, settlements and isolated farmsteads are mostly located on the modestly elevated ‘Fen Isles’ and low sinuous roddon banks (infilled ancient watercourses within the fens). Further south, settlements comprise regularly spaced, nucleated villages, some with historic cores. In general, villages tend to be rural in character with edges well defined by mature hedgerows, woodlands and clumps of trees providing visual enclosure.

7.6.124 Linear transport corridors include the Peterborough to Ely railway, King’s Lynn to Ely railway, Cambridgeshire Guided Busway, A10 Downham Wimbotsham Bypass, A1122 Bexwell Road, A1122 Downham Road, A142 Ireton’s Way, A1123 Station Road, A1307 Cambridge Road, A14 Huntingdon Road and A428 St Neots Road, as well as a network of minor roads. The Fens are crossed by many roads, most of which are elevated above surrounding fields, but few of which are major transport routes. To the west of Cambridge, road infrastructure has a presence visually within much of the study area.

7.6.125 The landscape is heavily influenced by human activity in the form of the pattern of artificial drainage ditches, embanked rivers, the River Great Ouse (Tidal), Relief Channel (Ouse), and Hundred Foot Drain/New Bedford River, which form notable vertical and linear components within the fenland and fen edge landscape. There are extensive areas of sand and gravel extraction adjacent to the River Great Ouse.

7.6.126 Overall, the landscape is largely sparsely settled and rural in character and provides a recreation resource with a PRoW network that includes the Fen Rivers Way, Ouse

Valley Way, Hereward Way, Greenwich Meridian Trail, Pathfinder Long Distance Walk, and the Rothchild Way long distance paths. NCR 51 and NCR 11 are located within the study area.

Visibility and potential visual receptors

7.6.127 Views within the study area would generally be obtained from public highways, PRoWs, navigable waterways, settlements, dispersed properties and farmsteads, and employment areas. Views experienced are typically across a rural landscape. There are no protected views identified in the local plans.

7.6.128 Views within the study area are also obtained by residents located within and around the settlements of Downham Market, Christchurch, Wimblington, Chatteris, Somersham, Colne, Pidley, Bluntisham, Needingworth, Holywell, Swavesey, Fen Drayton, Connington, Boxworth, Elsworth, Lolworth, Knapwell, Bar Hill, Dry Drayton, Hardwick and Coton. Linear developments along roads, such as the Salters Lode, Nordelph, and Welney also afford views of the local landscape. Residents are also found at the many dispersed properties and farmsteads. Views experienced are typically over agricultural land. The undulating and rising landform to the west of Cambridge provides localised visual enclosure.

7.6.129 The PRoW network includes several footpaths and byways, with the Fen Rivers Way, Ouse Valley Way, Hereward Way, Greenwich Meridian Trail, Pathfinder Long Distance Walk, and the Rothchild Way long distance paths all crossing the study area. Views from the PRoW network are variable depending on local landscape and elevation. Close to settlements, views are restricted or filtered by trees and roadside vegetation. Away from the settlements, the views are more long-range and expansive across the fenland and fen edge landscape. The settlements on the 'Fen Isles' and tree belts along the Forty Foot Drain provide a strong backdrop to local views. Further south, views are generally long and framed by woodland or clumps of trees. Views from navigable waterways such as the River Great Ouse, Relief Channel (Ouse), River Delph and Hundred Foot Drain are variable depending on the extent of riverside vegetation and are typically over agricultural land.

7.6.130 Transport receptors within the area include users of Cambridgeshire Guided Busway, A10, A1122 Bexwell Road, A1122 Downham Road, A142 Ireton's Way, A1123 Station Road, A1307 Cambridge Road, A14 Huntingdon Road and A428 St Neots Road, Peterborough to Ely railway and Ely to King's Lynn Railway. Views from these roads and railways are variable depending on the amount of rail and roadside vegetation, and often provide open long-distance views. Users of the local road network experience predominantly open expansive views.

7.6.131 The Wildfowl and Wetlands Trust's Welney Wetland Centre, and RSPB reserves at Ouse Fen and Fen Drayton Lakes are a focal point for visitors.

7.6.132 Employment areas comprise Bexwell Business Park and industrial estate, storage and agricultural packing plants visible on Chatteris's settlement edge, Needingworth Industrial Estate, Buckingway Business Park and the Cambridge Services on Junction 24 of the A14. Views from within the industrial estates and business parks tend to be restricted by large warehouses in the area and roadside planting, except for Bexwell Business Park which has more open views to the north.

Views from within the Cambridge Services area are open adjacent to the A14 and restricted by the site's boundary vegetation to the south, east and west.

7.6.133 For much of the Fens, the skyline is simple and uninterrupted. There are, however, existing wind turbines at Ranson Moor and Tick Fen, as well as pylons, overhead wires and wood pole lines in some locations forming vertical features on the skyline.

7.6.134 Potential visual receptors within the study area include the following:

- Residents within the settlements of Downham Market, Salters Lode, Nordelph, Welney, Christchurch, Wimblington, Chatteris, Somersham, Colne, Pidley, Bluntisham, Needingworth, Holywell, Swavesey, Fen Drayton, Connington, Boxworth, Elsworth, Lolworth, Knapwell, Bar Hill, Dry Drayton, Hardwick and Coton.
- Residents in farms and individual properties within the rural areas.
- Walkers on long distance paths, the local PRoW network, cyclists and equestrians on the local cycle routes and bridleways.
- Visitors to historic buildings such as Church of St Peter and St Paul, Chatteris; Parish Church of St Mary, Bluntisham; Church of St John the Baptist, Somersham; St Mary's Church, Bluntisham; The Parish Church of St John the Baptist, Hollywell; St Andrew's Church Swavesey; The Old Manor House, Swavesey; Holy Trinity, Elsworth; Madingley Hall and Stable Courtyard; St Peter's Church, Coton; St Edmund's Church, Downham Market; and Holy Trinity, Stow Bardolph, and within conservation areas.
- Visitors to Childerley Hall Grade II* listed Registered Park and Garden, Madingley Hall Grade II listed Registered Park and Garden, and the American Military Cemetery Grade I listed Registered Park and Garden.
- Visitors to public open spaces, e.g. green corridors, outdoor sports areas, religious grounds and cemeteries, playing fields.
- Visitors to private open spaces including school playing fields and allotments.
- People at their places of work, such as within nearby school and businesses on the periphery of the study area.
- Users of navigable waterways, including the River Great Ouse, Relief Channel (Ouse) Hundred Foot Drain and River Delph.
- Travellers on the road network, including the Cambridgeshire Guided Busway, A10, A1122 Bexwell Road, A1122 Downham Road, A142 Ireton's Way, A1123 Station Road, Road, A1307 Cambridge Road, A14 Huntingdon Road and A428 St Neots Road and surrounding local road network.

Representative viewpoints

7.6.135 A number of preliminary representative viewpoints have been selected to represent these receptor groups. The location of representative viewpoints will be

reviewed and updated once the extent of the pipeline corridor and above ground structures within the Scoping boundary has been further refined. Representative viewpoints will be agreed with the relevant statutory consultees. The locations of the representative viewpoints are shown on Figure 7.3 and presented in Appendix 7.5: Scoping representative viewpoints tables.

7.6.136 Photography of a selection of preliminary representative viewpoints is presented in Appendix 7.4: Scoping sources of supply and upstream water transfers and downstream treated water transfers panoramas, to illustrate the study area for the downstream transfers.

Future baseline

7.6.137 Chapter 23: Cumulative effects, identifies the proposed developments that are anticipated to be constructed prior to the construction of the Proposed Development. As such, these developments would form part of the future baseline for assessment within the EIA. Where this presents landscape and visual receptors, or a change to the current baseline specific to landscape and visual, this will be considered within the EIA.

7.6.138 Climate changes to precipitation patterns and temperatures are likely to create stress or changes to the existing vegetation in the region. This may have the effect of gradually altering the mix of species present within the wider landscape, may include an increase in invasive and non-native species, and may potentially change the start of the spring season and trees coming into leaf and the timing of autumn leaf falls. These changes may both affect the future landscape setting and also the visual effect of vegetation and planting as part of the Proposed Development, including where it is used as part of visual screening.

7.7 Design and mitigation

Design

7.7.1 The design of the Proposed Development to date has taken consideration of environmental constraints and potential environmental effects. The design development process will seek to avoid and reduce potential adverse environmental effects on landscape and visual receptors through good design practice.

7.7.2 As part of the ongoing development of the design, design principles will continue to be identified and refined, and a landscape-led design and mitigation strategy will be developed. This will include embedded mitigation and good environmental design integration; working towards an environmentally sustainable development.

7.7.3 The design and mitigation strategy will aim to connect the reservoir design into the landscape, contribute to the landscape character and identify opportunities for landscape improvements and enhancements, whilst taking account of views and visual amenity of key receptors.

7.7.4 The ongoing development of the design will incorporate embedded mitigation to avoid and reduce potential adverse effects, where feasible.

Mitigation

7.7.5 Documents presenting the approach to mitigation will be produced, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. These measures would be applied to mitigate likely significant effects, including landscape and visual effects.

7.7.6 Landscape and visual amenity considerations will also inform the process for developing construction methods and components, such as those relating to site lighting; hoarding, fences and screening; construction access routes; tree and vegetation removal, retention and protections; handling and storage of soils; siting of compounds; planning of workers accommodation; protection of landscape features; landscape scheme and maintenance thereof; and monitoring of landscape works.

7.7.7 Examples of good practice and essential mitigation relevant to landscape and visual include avoidance or mitigation of impacts through design, and a coordinated approach to deliver multifunctional mitigation.

7.7.8 Proposed landscape and visual mitigation measures will be informed by the assessment process and relevant national and local policy and guidance in relation to matters such as the retention of trees and vegetation, and aspects of design and species selection for landscape proposals. Local policies and design seeking landscape improvement will be considered within mitigation proposals.

7.7.9 Relevant documents will be produced to set out the measures and standards of work to be applied during the operational phase. These would be applied to monitor, manage and control potential adverse environmental effects associated with operation and maintenance activities.

7.8 Proposed scope of assessments

Likely significant effects requiring assessment (scoped in)

7.8.1 The following section sets out the aspect-specific potential effects for the LVIA. The likely significant effects requiring assessment are presented in Table 7-3. Where potential effects may be specific to one or more zones of the Proposed Development and the relevant study area, this is identified in Table 7-3 (see Chapter 2: Project description, for further discussion of zones).

7.8.2 To avoid repetition, the LCAs that could be directly or indirectly affected by the Proposed Development are listed here.

- King's Lynn and West Norfolk Borough Landscape Character Assessment (Borough Council of King's Lynn & West Norfolk, 2007):
  - H Settlement Farmland with Plantations LCT, H1 Stow Bardolph LCA.

- The Fenland Wind Turbine Study (Fenland District Council, 2009):
  - Drained Fenland, The Fens LCA.
  - Clay Fen Island LCT, Chatteris Clay Island LCA.
  - Clay Fen Island LCT, March Clay Island LCA.
- Ouse Washes Landscape Character Assessment (Ouse Washes Landscape Partnership Scheme, 2013):
  - Manea Fen to Longwood Fen.
  - Ouse Valley Wetlands.
- Huntingdonshire Landscape and Townscape Supplementary Planning Document 2022 Landscape and Townscape Assessment (Huntingdonshire District Council, 2022):
  - Central Claylands.
  - Great Ouse Valley.
- Peterborough Landscape Strategy, Landscape Character Assessment for Peterborough City Council (Peterborough City Council, 2007):
  - Area 4a Bedford North Level.
  - Area 4c Nene Washes.
  - Area 4d Horsey Toll.
- Greater Cambridgeshire Landscape Character Assessment (Greater Cambridge Shared Partnership, 2021):
  - 4 Wooded Claylands LCT4B Lolworth to Longstowe Wooded Claylands LCA.

Table 7-3: Likely significant landscape and visual effects

Activity	Effect	Receptor	Zone
Construction			
All construction activities including enabling works, site clearance, setting up of compounds, demolition of buildings, vegetation removal, excavation and earthworks, the presence of compounds and laydown areas, and construction of haul roads works to the	Direct loss of landscape features, including trees and woodland within the ancient woodland buffer zones and trees identified at risk from the Arboricultural Impact Assessment, from construction activities including large-scale changes to the rural area.	LCA: Directly and indirectly affected character areas are listed above.	All zones

Activity	Effect	Receptor	Zone
affected existing road network.			
Construction activities described above and traffic (including within site and on the local road network).	Visual effects visible from viewpoints include all construction activities, additional traffic on local road network, changes to road layouts and boundary treatments, for example loss of hedgerows, noise disruption and potential reduction in tranquillity.	Visual receptors using the local road network and PRoWs and residential receptors identified in Section 7.6 and Appendix 7.5.	All zones
Lighting from construction-related activity, including vehicle lights.	The effects of lighting on the night-time environment of residents.	Residential receptors identified in Section 7.6 and Appendix 7.5 who are within 500m of the Scoping boundary.	All zones
Installation/diversion of utilities and services.	Widespread but discreet changes resulting in changes in landscape character and visual amenity.	LCA: Directly and indirectly affected character areas are listed above. Visual receptors identified in Section 7.6 and Appendix 7.5.	All zones
Operation			
Operation of the reservoir including recreational use. Operation of water treatment/inter-catchment water treatment/pumping stations/service reservoirs (including operation of water treatment works and water abstraction, pipelines and open channels).	Permanent physical changes to landscape character including changes to topography, land use, vegetation cover, footpaths/PRoWs and roads and the presence of above ground infrastructure, visitor centre and car parks.	LCA: Directly and indirectly affected character areas are listed above.	All zones, in particular the reservoir

Activity	Effect	Receptor	Zone
Operation of the reservoir including recreational use. Operation of water treatment/inter-catchment water treatment/pumping stations/service reservoirs (including operation of water treatment works and water abstraction, pipelines and open channels).	Permanent changes to visual amenity from establishment of new vegetation, new reservoir and infrastructure in views. Changes to visual amenity for PRoWs and road users from changes to footpaths and local road network. Visual change resulting from visitors to the recreational facilities and operational staff to the Proposed Development.	Visual receptors: identified in Section 7.6 and Appendix 7.5.	All zones, in particular the reservoir
Lighting from operational activities, including vehicle lights.	The effects of lighting on the night-time environment of residents.	Residential receptors identified in Section 7.6 and Appendix 7.5 who are within 500m of the Scoping boundary.	All zones, in particular the reservoir. To be determined by permanent lighting requirement.
Management of habitat creation (e.g. wetlands, lagoons).	Physical changes that are likely to alter landscape character and visual amenity including changes to vegetation cover.	LCA: Directly affected character areas are listed above. The visual receptors are identified in Section 7.6 and Appendix 7.5.	All zones

Effects not requiring assessment (scoped out)

7.8.3 The effects proposed to be scoped out of the LVIA are detailed in Table 7-4.

Table 7-4: Potential effects to be scoped out of the LVIA

Activity	Effect	Receptor	Justification for scoping out	Zone
Construction				
Temporary (construction) impacts on landscape character	Effects on landscape character assessed at a regional scale	NCA	NCAs have a broad geographical coverage. Local level landscape character assessments are more related to the scale and extent of the landscape character in the assessment area. Therefore, an assessment of the district council/city council landscape character areas (LCA) will be undertaken.	All zones
Temporary (construction) impacts on landscape character	Indirect distant effects on landscape character	LCA located on the periphery of the study area	A significant effect is unlikely to occur towards the periphery of the study area. The LCA would not be directly affected by the Proposed Development and indirect effects would be barely perceptible due to distance from the Proposed Development.	All zones
Temporary (construction) lighting	Effects on night sky	Dark skies	The study area is not located within a Dark Sky Reserve.	All zones
Temporary (construction) lighting	The effects of lighting on the night-time environment	Residential receptors beyond 500m of the Scoping boundary and all other receptors identified in Section 7.6 and Appendix 7.5	Residents beyond 500m are less likely to be affected due to distance, intervening features and the existing lit environment. Other visual receptors are less effected at night or will be undertaking activities that are lit.	All zones

Activity	Effect	Receptor	Justification for scoping out	Zone
Operation				
Permanent (operational) impacts on landscape character	Effects on landscape character assessed at a regional scale	NCA	NCAs have a broad geographical coverage. Local level landscape character assessments are more related to the scale and extent of the landscape character in the assessment area. Therefore, an assessment of the LCA will be undertaken.	All zones
Permanent (operational) impacts on landscape character	Indirect distant effects on landscape character	LCA located on the periphery of the study area	A significant effect is unlikely to occur towards the periphery of the study area. The LCA would not be directly affected by the Proposed Development and indirect effects would be barely perceptible due to distance from the Proposed Development.	All zones
Permanent (operational) lighting	Effects on night sky	Dark skies	The study area is not located within a Dark Sky Reserve.	All zones
Permanent (operational) lighting	The effects of lighting on the night-time environment	Residential receptors beyond 500m of the Scoping boundary and all other receptors identified in Section 7.6 and Appendix 7.5	Residents beyond 500m are less likely to be affected due to distance, intervening features and the existing lit environment. Other visual receptors are less effected at night or will be undertaking activities that are lit.	All zones

7.9 Assessment methodology

7.9.1 The study area set out in Section 7.4 will be kept under review as the design and consultation processes progress, and the Proposed Development is refined.

Therefore, the study area may evolve as appropriate. The evolution of the study area will be clearly communicated in the ES and discussed with relevant consultees.

7.9.2 The proposals, described in Chapter 2: Project description, will also evolve and be further developed as the design process progresses. Whilst the methodologies that are set out within this chapter are not anticipated to change, the scope of assessment will be kept under review as design progresses.

Additional baseline information required

7.9.3 The next steps will be to gather updated baseline data, including summer and winter field surveys, and to develop project information including the ZTV for all zones in order to complete the LVIA.

Assessment years

7.9.4 The overall approach to determining the assessment years that will be used for the EIA is provided in Chapter 6: EIA approach and methodology. However, the assessment years presented in this chapter have been determined for the purposes of the LVIA specifically. The assessment of magnitude of potential landscape and visual effects will consider impacts at the following timeframes following guidance in GLVIA3:

- Construction Phase: Considers construction activities, temporary works (including compounds) and construction traffic during the construction period. Assessments for each landscape and representative visual receptor will be made at a time during construction when impacts are likely to be most significant for the individual receptor.

7.9.5 Following guidance in GLVIA3, the anticipated magnitude of effects shall be reported in year one (opening year) and year 15 (design year), including summer and winter for potential landscape effects and visual effects:

- Winter year one of operation: Considers impacts on a winter's day during year one following completion of all construction, when planted mitigation would not yet have taken effect. Both the completed development and operational activities would be considered.
- Summer year 15 of operation: Considers the impacts on a summer's day in the 15th year after opening, when the planting mitigation is in full leaf and considered to be effective. Both the completed development and operational activities would be considered.

Construction assessment methodology

7.9.6 The assessment methodology for the LVIA will follow guidance in GLVIA3. This promotes LVIA that is proportional to the nature and scale of the proposals, and the likely landscape and visual effects. Refer to Appendix 7.1: Scoping landscape and visual methodology. In addition, the assessment will be conducted with regard to the following guidance:

- An Approach to Landscape Character Assessment (Natural England, 2014).

- Design Manual for Roads and Bridges LA 107 Landscape and Visual Effects (Highways England, 2020).
- Landscape Institute Technical Guidance Note 06/19: Visual Representation of Development Proposals (LI TGN 06/19) (Landscape Institute, 2019).

7.9.7 The changes to constituent landscape features and elements/components of the LCAs, such as trees, woods, hedgerows, hedgerow tree, landform, field pattern and heritage assets, will be considered in combination as part of the effects on landscape character and not as individual receptors. This proportionate approach is in line with GLVIA3.

7.9.8 In line with GLVIA3 guidance, the LVIA will provide a proportionate assessment, with the assessment of potential visual effects based on representative viewpoints. Therefore, the LVIA will not identify effects on every individual receptor. However, the number and locations of representative viewpoints will be proportional to the scope for the LVIA. The assessment of impacts on landscape components, such as trees and woodland, and perceptual and aesthetic aspects will be considered within the assessment of impacts on landscape character.

7.9.9 Following guidance in GLVIA3, the anticipated magnitude of effect and significance of effect will be assessed, taking into consideration the proposed mitigation. This will include assessment of both adverse and beneficial effects.

7.9.10 The project description identified under Chapter 2: Project description, will be used to inform the assessment.

7.9.11 The BS 5837:2012 Trees in Relation to Design, Demolition and Construction – Recommendations (British Standards Institution, 2012) sets out the need to assess the potential effects of a development on trees. Impacts on trees would be informed by an arboricultural impact assessment.

7.9.12 A targeted approach to the arboricultural impact assessment would be undertaken in order to record information about ancient, notable, veteran and TPO trees within the study area (Scoping boundary plus a 15m buffer to account for root zones). Agreement has been sought on the overarching methodology and targeted approach to the arboricultural impact assessment through consultation with relevant planning authorities, and further discussions will be undertaken.

7.9.13 The draft arboricultural survey strategy is presented in Appendix 7.2: Scoping arboriculture methodology. By providing tree constraints information, the results of the arboricultural survey would be used along with other baseline data to inform the design and the LVIA.

Operational assessment methodology

7.9.14 The assessment methodology for the operational phase is the same as the methodology described for the construction phase above.

Significance of effects

7.9.15 The significance of effects will be determined as set out in Appendix 7.1: Scoping landscape and visual methodology, by combining judgements on the sensitivity of landscape receptors and visual receptors with the magnitude. Image 6.1 in Chapter 6: EIA approach and methodology, will be used to assist professional judgement when determining the potential significance of landscape and visual effects.

7.10 Assessment assumptions and limitations

7.10.1 The following assumptions and limitations have been identified in relation to this EIA Scoping Report:

- The Scoping boundary for the Proposed Development is indicative. Therefore, further work will be required to fully define the extent of the visual assessment and to confirm the representative receptors.
- Access to receptors and viewpoints to be assessed will be restricted to publicly assessable areas. Descriptions of baseline views and the assessment of changes to views from private and inaccessible viewpoints, including upper story views from properties, will therefore be made using professional judgement based on an assessment from a nearby representative viewpoint (e.g. adjoining PRoW or highway).
- Visual effects tend to diminish with distance. Where a receptor, such as the user of a PRoW, could view the Proposed Development from a range of distances, the assessment of potential visual effects likely to be experienced is generally based on the worst-case situation. In most cases, subject to other factors such as the presence of screening elements; this is likely to occur when the receptor is at the nearest point to the Proposed Development.
- The screening or filtering effect of existing vegetation outside the Scoping boundary will be taken into account within the assessment in its current condition. Growth or other changes to this vegetation would potentially affect impacts caused by the Proposed Development, but the management and retention of such vegetation is outside the control of the Applicant.

8 Terrestrial biodiversity

8.1 Introduction

8.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to terrestrial biodiversity. This is referred to throughout the chapter as the Ecological Impact Assessment (EcIA). The chapter should be read in conjunction with the description of the project as presented in Chapter 2: Project description.

8.1.2 For the aspect of terrestrial biodiversity, the matters (i.e. ecological features) are:

- Statutory and non-statutory designated nature conservation sites.
- Habitats.
- Protected and notable species.
- Invasive non-native species (INNS).

8.1.3 The approach to the assessment is based on guidance provided in the Guidelines for Ecological Impact Assessment in the UK and Ireland. Version 1.2 Updated April 2022 (Chartered Institute of Ecology and Environmental Management (CIEEM), 2018).

8.1.4 This chapter considers the terrestrial environment, with the aquatic environment covered separately in Chapter 9: Aquatic biodiversity.

8.1.5 This chapter has links with other chapters, including Chapter 7: Landscape and visual effects, Chapter 9: Aquatic biodiversity, Chapter 10: Water resources and flood risk, Chapter 15: Air quality, and Chapter 18: Noise and vibration. These chapters provide further detail on some features and impact pathways that are addressed in this chapter.

8.1.6 In addition to the Development Consent Order (DCO) other consenting requirements that are likely to be needed for the Proposed Development are:

- Protected species mitigation licences.
- Site of Special Scientific Interest (SSSI) assent.
- Habitats Regulations Assessment (HRA).
- Environmental permit for treatment and/or disposal of invasive non-native plant material.

8.2 Legislation, policy and guidance requirements

8.2.1 Legislation, policy and guidance which has informed the scope of the assessment presented within this chapter, is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

8.2.2 Table 8-1 identifies the relevant policy in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) and the National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities (DLUHC), 2023) for terrestrial biodiversity.

8.2.3 Given the landscape scale of the Proposed Development, consideration will be given to emerging Local Nature Recovery Strategies, which, as a requirement of the Environment Act 2021, should be in place across the whole of England by March 2025. Their aim is to set out how best to deliver nature recovery across England. This will help local authorities incorporate nature recovery objectives to target action for Biodiversity Net Gain (BNG) and other delivery levers and funding sources. The interim Nature Recovery Network for Fenland has been prepared by the Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire (Baker, 2023). The Cambridgeshire and Peterborough Local Nature Recovery Strategy (Cambridgeshire County Council, 2024) and Norfolk Local Nature Recovery Strategy (Norfolk County Council, 2024) are being developed.

Table 8-1: UK policy relevant to terrestrial biodiversity

Relevant UK policy	Relevance to assessment
NPS for Water Resources Infrastructure (Defra, 2023)	Section 4.3 of the NPS sets out the main policies relevant to biodiversity and nature conservation. Paragraph 4.3.1 states that, *'government policy for the natural environment is set out in the Environmental Improvement Plan. The Plan sets out the vision for enhancing biodiversity, by supporting healthy well-functioning ecosystems and establishing more coherent ecological networks that are more resilient to current and future pressures*'. Paragraph 4.3.5 states that, *'the applicant should ensure that the Environmental Statement clearly sets out any likely significant effects on internationally, nationally and locally designated sites of ecological or geological conservation importance (including those outside England) on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity. The assessment should consider the full range of potential impacts on ecosystems including habitats, protected species or species identified as being of principal importance for the conservation of biodiversity.'* Paragraph 4.3.11 states that, *'development should avoid significant harm to biodiversity and geological conservation interests and provide net gains for biodiversity*'.
NPPF (DLUHC, 2023)	Section 15 of the NPPF sets out the overarching planning policies in relation to conserving and enhancing the natural environment. Paragraph 180 states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains where possible. This includes protecting and enhancing sites of biodiversity value, commensurate with their statutory status and identified quality, together with priority habitats and priority species.

8.3 Stakeholder engagement

8.3.1 In preparing this EIA Scoping Report there has been engagement and discussions with a number of stakeholders. This engagement has principally related to the following:

- Obtaining baseline information and initial engagement about the Proposed Development.
- Agreeing survey methodologies.
- Discussing the approach to protected species licensing.
- Discussing habitat creation and BNG.

8.3.2 The dialogue with stakeholders will continue throughout the pre-application period as part of the EIA process. A summary of the engagement undertaken so far is presented in Table 8-2, along with proposed future engagement.

Table 8-2: Engagement with stakeholders

Stakeholder	Engagement undertaken to date	Proposed future engagement
Natural England and Environment Agency	**27 April 2023** – meeting to discuss proposed ecology survey methodology for the reservoir site. Scope of ecological field survey work for baseline data gathering to cover the varied requirements of HRA, EcIA, BNG and species licensing.	Ongoing engagement as required.
	27 June 2023 – meeting to discuss the watercourse BNG approach. Discussion about indicative baseline lengths for each watercourse type, impacts and indicative creation and/or enhancement requirements to achieve the statutory minimum of 10% BNG. Outlined challenges and constraints in achieving target (especially for agricultural drainage ditches) and proposals to deviate from metric methodology.	
	07 November 2023 – meeting to discuss the proposed ecology survey methodology for the reservoir site. Review of feedback sheet following issue of survey methodology report to resolve/agree on methods and approaches to ecology survey methods.	
	24 January 2024 – meeting to discuss the District Level Licensing approach for great crested newts, including the advantages and disadvantages of District Level Licensing and scope of associated field surveys.	

Stakeholder	Engagement undertaken to date	Proposed future engagement
	29 January 2024 – meeting to discuss badger survey, mitigation and licensing approach ahead of bait marking surveys at reservoir site.	
	21 August 2024 – meeting to discuss the revised ecology survey methodology for the reservoir site plus associated water infrastructure and transfers (Appendix 8.1: Ecology survey methodology).	
	4 September 2024 – meeting to discuss the proposed approach to water vole and otter survey methodology, survey results and water vole mitigation.	
Royal Society for the Protection of Birds (RSPB)	**28 July 2023** – data request for bird records for the reservoir site.	Additional records to be requested for associated water infrastructure and transfer routes.
Environment Agency Cambridgeshire County Council Natural England Fenland Council Wildfowl and Wetlands Trust (WWT) Middle Level Commissioners Angling Trust RSPB	**30 November 2023** – a Technical Working Group (TWG) for biodiversity. The purpose of the TWG was to provide an introduction to the reservoir site and to discuss and gain feedback on study areas, baseline data collections gathered so far and planned approach to future data collection.	Further TWG as required.
	23 April 2024 – a TWG for biodiversity. The purpose of the TWG was to present the proposed methodology for EIA scoping and BNG, and to discuss ongoing and proposed ecological surveys and sharing of ecological data with stakeholders.	
Natural England Environment Agency RSPB Cambridgeshire County Council WWT Natural Cambridgeshire Fenland District Council	**8 December 2023** – a TWG for the habitat design. The purpose of the TWG was to provide an introduction to the Proposed Development and to share approach and gain feedback on habitat design/creation proposals.	Further TWG as required.
	5 June 2024 – a TWG for the habitat design. The purpose of the TWG was to provide an update on habitat design principles, BNG, protected species and habitat design, and to share knowledge and expertise and present illustrative emerging designs.	

Stakeholder	Engagement undertaken to date	Proposed future engagement
Cambridgeshire Mammal Group	**18 March 2024** – data request for otter and water vole records and to inform them of the Proposed Development.	None.
Natural England	**3 May 2024** – meeting to discuss the species licensing approach, including an overview of impacts of the Proposed Development, species requiring licensing and proposed approach.	Species-specific licensing meetings to discuss survey results so far and likely mitigation and compensation approaches.
	15 May 2024 – Great Fen (including Holme Fen and Woodwalton Fen) site walkover. Discussion about the lessons learnt and management of the site which could be applied to habitat design and management of the Proposed Development.	Engagement throughout the design process to utilise Natural England local experience and expertise regarding design of wetland habitat.
	4 June 2024 – meeting to discuss badger survey, mitigation and licensing approach, including the findings of the bait marking surveys, potential mitigation options and conflicts with other protected species and habitat mitigation.	Ongoing engagement as required.
RSPB	**14 – 15 May 2024** – Ouse Fen, Ouse Washes and Nene Washes site walkover. Discussion about the lessons learnt and management of these sites which could be applied to habitat design and management of the reservoirs.	Engagement throughout the design process to utilise RSPB local experience and expertise regarding design of wetland habitat.
Huntingdonshire District Council Peterborough City Council Cambridgeshire County Council South Cambridgeshire District Council Norfolk County Council Fenland District Council	**15 May 2024** – Local Authority Associated Infrastructure Forum (LAAIF). The purpose of the meeting was to provide an overview of the Proposed Development and EIA scoping methodologies, introduce the biodiversity team, and summarise key elements (EcIA, HRA, BNG and habitat design and legislative compliance for protected species).	Further LAAIF as required.

Stakeholder	Engagement undertaken to date	Proposed future engagement
WWT and the Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire	**16 May 2024** – Grafham Water site visit. Discussion about the lessons learnt and management of the site which can apply to habitat design/management.	Engagement throughout the design process to utilise local experience and expertise regarding design of wetland habitat.
Cambridgeshire and Peterborough Amphibian and Reptile Group	**16 May 2024** – data request to obtain species records and to inform them of the Proposed Development. Confirmation all records are shared with Cambridgeshire and Peterborough Environmental Records Centre (CPERC).	None.
Cambridgeshire Bat Group	**16 May 2024** – data request to obtain species records and to inform them of the Proposed Development. No response gained at the time of authoring the EIA Scoping Report.	None.
Middle Level Commissioners	**21 May 2024** – meeting to discuss Middle Level Commissioners operations and biodiversity initiatives plus opportunities to exchange survey data.	Ongoing engagement as required.
Cambridgeshire Bird Club	**22 May 2024** – data request to obtain species records and to inform them of the Proposed Development. The club confirmed all their records are provided to CPERC.	None.
Cambridgeshire Badger Group and Norfolk Badger Trust	**13 June 2024** – data request to obtain species records and to inform them of the Proposed Development. No response gained at the time of authoring the EIA Scoping Report.	None.
Norfolk County Bird Recorder	**14 June 2024** – data request to obtain species records and to inform them of the Proposed Development. The Recorder confirmed that all records up to and including 2021 have been sent to Norfolk Biodiversity Information Service.	None.

8.3.3 It is proposed that engagement will be undertaken with the following additional stakeholders during the pre-application period:

- Other local wildlife groups and individuals that might hold data for protected and/or other notable species.

- Other organisations and landowners where there may be opportunities to deliver biodiversity enhancements.

8.3.4 Stakeholder engagement specifically relating to the HRA is also being undertaken. This is not included in Table 8-2 as it will be reported in the HRA Evidence Plan.

8.4 Study area

8.4.1 The study area for terrestrial biodiversity has been defined based on the Scoping boundary (see Figure 2.1) and the available information for the Proposed Development. This includes the information on construction and operational phases as described in Chapter 2: Project description. The identified study area is considered to be sufficiently broad to allow for the ongoing refinement of the Proposed Development; however, if through the iterative design process it becomes necessary to expand the study area then the assessment of potential significant ecological effects will be extended accordingly.

8.4.2 The study area has been developed recognising the four operational zones listed below, and as described in Chapter 2: Project description:

- Sources of supply and upstream water transfers.
- Reservoir site.
- Water treatment works.
- Downstream treated water transfers.

8.4.3 The study areas for different features are informed by the Zone of Influence (ZoI), which is the spatial scale at which ecological features could be affected as a result of the Proposed Development and associated activities. CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018) recommend that all ecological features that occur within a ZoI for a project are investigated. Areas within the ZoI may include:

- Areas directly within the Scoping boundary which could be affected by land take and access.
- Areas beyond the Scoping boundary where impacts could occur.

8.4.4 The ZoI is likely to extend beyond the Scoping boundary, for example where there are ecological or hydrological links beyond the Scoping boundary, and will vary for different ecological features depending on their sensitivity to environmental change.

8.4.5 For all ecological features the study area extends beyond any likely ZoI to provide contextual information on local status based on desk study records.

8.4.6 The upstream transfer known as the Middle Level to proposed reservoir covers the network of watercourses comprising the Middle Level system. The Middle Level system is not within the Scoping boundary as no works are proposed. However, the Middle Level system is considered within this assessment as there could be impacts

on ecological features. The study area defined for the Middle Level system is smaller than that for the four zones within the Scoping boundary because there are no works or land acquisition proposed within the footprint. The main watercourses that comprise the footprint of the Middle Level system are shown on Figure 8.1.

8.4.7 The study areas are defined in Table 8-3.

Table 8-3: Summary of study areas

Ecological feature	Study area for the four zones within the Scoping boundary	Study area for Middle Level to proposed reservoir
Statutory designated sites of international/European importance, including Ramsar sites, Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).	The whole of the water catchment where any activity lies within or from which water will be abstracted or discharged.	The whole of the water catchment from which water will be abstracted or discharged.
Statutory designated sites of national importance, including SSSIs and National Nature Reserves (NNRs).	Within 2km from the Scoping boundary, unless hydrologically linked, or if in the Impact Risk Zone (IRZ) when the study area will extend to the ZoI.	Within 50m from the footprint, unless hydrologically linked.
Statutory designated sites of county importance (Local Nature Reserves (LNRs)).	Within 2km from the Scoping boundary.	Within 50m from the footprint.
Non-statutory designated sites of county or local nature conservation importance including County Wildlife Sites (CWSs), Local Wildlife Sites (LWSs), Wildlife Trust Reserves (WTRs), other nature reserves (e.g. RSPB) and Protected Road Verges (PRVs).	Within 2km from the Scoping boundary.	Within 50m from the footprint.
Ancient woodland, ancient and veteran trees.	Within 2km from the Scoping boundary.	Within 50m from the footprint.
Habitats of principal importance (HPIs) and notable plant species.	Within 250m from the Scoping boundary.	Within 50m from the footprint.
Bats	Within 6km from the Scoping boundary.	Within 50m from the footprint.
Badger	Within 2km from the Scoping boundary.	Within 50m from the footprint.

Ecological feature	Study area for the four zones within the Scoping boundary	Study area for Middle Level to proposed reservoir
Birds, terrestrial invertebrates, reptiles and other notable animal species.	Within 2km from the Scoping boundary.	Within 50m from the footprint.
Great crested newt	Within 1km from the Scoping boundary.	Within 50m from the footprint.
Hazel dormouse	Within 2km from the Scoping boundary.	Within 50m from the footprint.
Water vole	Reservoir site: within 10km from the Scoping boundary due to large-scale works and potential habitat loss. Transfers and associated water infrastructure: within 2km from the Scoping boundary as scale of works and habitat loss less than the reservoir site.	Within 50m from the footprint.
Otter	Reservoir site: within 10km from the Scoping boundary due to large-scale works and habitat loss. Transfers and associated water infrastructure: within 2km from the Scoping boundary as scale of works and habitat loss less than the reservoir site.	Within 50m from the footprint.
INNS	Within 2km from Scoping boundary for animal species. Within the Scoping boundary for plant species.	Within 50m from the footprint.

8.4.8 The field survey areas for the reservoir site are defined in Table 8-4 and have been agreed with Natural England through consultation regarding Appendix 8.1: Ecology survey methodology. The survey extents for the associated water infrastructure and transfers are yet to be agreed for the species surveys; however, it is assumed these will be the same as the reservoir site for all habitat surveys.

Table 8-4: Summary of field survey areas for reservoir site

Ecological feature	Survey areas
Habitats	Statutory designated sites (Ramsar, SAC, SPA, SSSI, NNR and LNR) and non-statutory designated sites (CWS, LWS and WTR) within the Scoping boundary. Any other nature conservation sites within a 100m buffer where desk study information may not be available. HPIs (or potential HPIs) with hydrological connection to the Proposed Development including wetlands and Ground Water Dependent Terrestrial Ecosystems (GWDTEs) within a 250m buffer. Woodland and ponds (without hydrological connectivity) within a 50m buffer. Other HPIs and veteran trees within a 30m radius. Non-HPI requiring condition assessment, notable species and INNS within the Scoping boundary. Modular River Physical (MoRPh) habitat survey within the Scoping boundary.
Badger	Within 500m from the Scoping boundary.
Bats	Roost surveys within 50m from the Scoping boundary. Static detector surveys and radiotracking within the Scoping boundary.
Birds	Breeding bird surveys within the Scoping boundary. Non-breeding bird surveys up to 500m from the Scoping boundary to cover potentially suitable fields which do not fall within the Functionally Linked Land of the Ouse Washes SPA (which itself is surveyed annually by the RSPB).
Great crested newt	Within 250m from the Scoping boundary.
Otter	Within 200m from the Scoping boundary.
Water vole	No field sign surveys. Presence is assumed in all suitable watercourses within the Scoping boundary, due to the abundance of desk study records and evidence of water vole recorded during other surveys. Full surveys will be undertaken in 2027 to calculate relative population size and to inform the full licence application.

8.4.9 No field surveys are planned for reptiles or other notable species, as it is considered that sufficient information will be available from the desk study to inform the likelihood of impacts. The need for terrestrial invertebrate surveys will be informed by the habitat baseline surveys and the review of existing records.

8.4.10 The need for hazel dormouse (*Muscardinus avellanarius*) field surveys will be informed by a review of existing records.

8.5 Baseline data collection

8.5.1 Baseline conditions are described in Section 8.6 and present a review of the existing available data. To date, data has been obtained via desk studies and habitat and species field surveys. This task is ongoing. The data described provides a robust context for the scoping of the assessments.

Desk studies

8.5.2 The desk study has collected information on the following:

- Statutory designated sites (Ramsar, SAC, SPA, SSSI, NNR and LNR).
- SSSI IRZs.
- Non-statutory designated sites (CWS, LWS, PRV and WTR).
- Protected and priority habitats and species.

8.5.3 The desk study has drawn on the following sources:

- Aerial photography and Ordnance Survey maps (Google Earth, 2024; Google Maps, 2024; Defra, 2024a).
- Ancient Tree Inventory open data (The Woodland Trust, 2024).
- Ancient woodland open data (Natural England, 2024a).
- Catchment Data Explorer (Environment Agency, 2024).
- Curf Fen water vole (*Arvicola amphibius*) monitoring undertaken by the Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire: The Water Voles in the Middle Level. A Repeat Survey of Curf Fen and Ransonmoor (The Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire, 2016).
- Granted European Protected Species (EPS) licences (Defra, 2024a).
- Great crested newt (GCN) (*Triturus cristatus*) class survey licence returns (England) (Natural England, 2024b).
- GCN environmental deoxyribonucleic acid (eDNA) habitat suitability index pond surveys for District Level Licensing 2017, 2018 and 2019 (Natural England, 2024c).
- GWDTE open data for SSSIs (Environment Agency, 2023).
- Important Invertebrate Areas (Buglife, 2024).
- International and national statutory designated sites (Ramsar, SAC, SPA, SSSI and NNR) (Natural England, 2023a).
- Non-statutory designated sites and species records received in April 2023 from:
  - CPERC.

  - Norfolk Biodiversity Information Service (NBIS).
- Priority habitat open data (Natural England, 2024d).
- Species records received from Botanical Society of Britain and Ireland (BSBI) (BSBI, 2023a).
- SSSI IRZ open data (Natural England, 2023b).
- Supplementary information on statutory designated site citations collated from Natural England (Natural England, 2024e).

8.5.4 Statutory and non-statutory designated sites were grouped into broad distance categories from the Scoping boundary as follows:

- 0m (within).
- 1m–30m.
- 31m–100m.
- 101m–250m.
- 251m–2000m.
- Within the operational water catchment (>2km) (Environment Agency, 2024) (only applies to Ramsar, SAC, SPA, and SSSI).

Field surveys

8.5.5 Field surveys commenced at the reservoir site in 2023 and are ongoing. Details of the survey methodologies that have been agreed with Natural England through consultation detailed in Table 8-2 are provided in Appendix 8.1: Ecology survey methodology.

8.5.6 Results of the field surveys undertaken at the reservoir site are summarised in Section 8.6 for the reservoir site zone.

8.5.7 The survey methodologies for the sources of supply and upstream water transfers zone, water treatment works zone, and downstream treated water transfers zone will use best practice methods in specific guidance, for example, Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2023), and will be agreed with Natural England. Field surveys for the sources of supply and upstream water transfers zone, water treatment works zone, and downstream treated water transfers zone started in September 2024.

8.6 Baseline conditions

8.6.1 The baseline conditions for terrestrial biodiversity are described for the study areas (defined in Section 8.4). These have been established from the data collection described in Section 8.5.

8.6.2 The sources of supply and upstream water transfers zone is split into those elements which are included within the Scoping boundary as they involve

engineering works, and the upstream transfer, from Middle Level to proposed reservoir, which is outside the Scoping boundary as no engineering works are required but is included in the assessment because impacts could still occur (as detailed in Section 8.4).

8.6.3 There is an overlap between the sources of supply and upstream water transfers zone and the downstream treated water transfers zone to the south of the proposed reservoir. There is also an overlap between the reservoir site zone and the water treatment works zone. Therefore, there will be some duplication in these baseline sections where ecological features fall within both zones.

8.6.4 The field surveys at the reservoir site are well underway and habitat surveys are complete. Therefore, for the EIA Scoping Report, habitat field survey data is used to inform the reservoir site baseline. The baseline for all other zones is based on desk study data only.

Baseline relevant to all zones

Statutory designated sites

8.6.5 The statutory designated sites within the study area of all zones of the Scoping boundary, as well as the transfer from Middle Level to proposed reservoir are listed in Table 8-5. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions and shown on Figure 8.1. Table 8-5 shows the distance from each zone and, where relevant, identifies the source of supply or transfer route.

Table 8-5: Statutory designated sites within all study zones of the Proposed Development

	Distance from Scoping boundary			
Site (for reasons for designation refer to Appendix 8.2)	**Sources of supply and upstream water transfers zone**	**Reservoir site zone**	**Water treatment works zone**	**Downstream treated water transfers zone**
Ouse Washes SSSI	Within Ouse Washes (River Delph).	>2km Within the Old Bedford and South Level and Cut-off Channel operational water catchments.	>2km Within the Old Bedford and South Level and Cut-off Channel operational water catchments.	251m–2000m
Ouse Washes SAC	Within Ouse Washes (River Delph).	>2km Within the Old Bedford operational water catchment.	>2km Within the Old Bedford operational water catchment.	251m–2000m

	Distance from Scoping boundary			
Site (for reasons for designation refer to Appendix 8.2)	**Sources of supply and upstream water transfers zone**	**Reservoir site zone**	**Water treatment works zone**	**Downstream treated water transfers zone**
Ouse Washes Ramsar	Within Ouse Washes (River Delph).	>2km Within the Old Bedford and South Level and Cut-off Channel operational water catchments.	>2km Within the Old Bedford and South Level and Cut-off Channel operational water catchments.	251m–2000m
Ouse Washes SPA	Within Ouse Washes (River Delph).	>2km Within the Old Bedford and South Level and Cut-off Channel operational water catchments.	>2km Within the Old Bedford and South Level and Cut-off Channel operational water catchments.	251m–2000m
Nene Washes SSSI	Within the River Nene and its Counter Drain.	>2km Within the Middle Nene and Lower Nene operational water catchments.	>2km Within the Middle Nene and Lower Nene operational water catchments.	>2km Within the Middle Nene and Lower Nene operational water catchments.
Nene Washes SAC	1m–30m	>2km Within the Lower Nene operational water catchment.	>2km Within the Lower Nene operational water catchment.	>2km Within the Lower Nene operational water catchment.
Nene Washes Ramsar	Within the River Nene and its Counter Drain.	>2km Within the Middle Nene and Lower Nene operational water catchments.	>2km Within the Middle Nene and Lower Nene operational water catchments.	>2km Within the Middle Nene and Lower Nene operational water catchments.
Nene Washes SPA	Within the River Nene and its Counter Drain.	>2km Within the Middle Nene	>2km Within the Middle Nene	>2km Within the Middle Nene

	Distance from Scoping boundary			
Site (for reasons for designation refer to Appendix 8.2)	**Sources of supply and upstream water transfers zone**	**Reservoir site zone**	**Water treatment works zone**	**Downstream treated water transfers zone**
		and Lower Nene operational water catchments.	and Lower Nene operational water catchments.	and Lower Nene operational water catchments.
The Wash SSSI	>2km Within The Wash Inner and the Great Ouse operational water catchments.	>2km Within The Wash Inner and the Great Ouse operational water catchments.	>2km Within The Wash Inner and the Great Ouse operational water catchments.	>2km Within The Wash Inner and the Great Ouse operational water catchments.
The Wash and North Norfolk Coast SAC	>2km Within The Wash Inner and the Great Ouse operational water catchments.	>2km Within The Wash Inner and the Great Ouse operational water catchments.	>2km Within The Wash Inner and the Great Ouse operational water catchments.	>2km Within The Wash Inner and the Great Ouse operational water catchments.
The Wash Ramsar	>2km Within The Wash Inner and the Great Ouse operational water catchments.	>2km Within The Wash Inner and the Great Ouse operational water catchments.	>2km Within The Wash Inner and the Great Ouse operational water catchments.	>2km Within The Wash Inner and the Great Ouse operational water catchments.
The Wash SPA	>2km Within The Wash Inner and the Great Ouse operational water catchments.	>2km Within The Wash Inner and the Great Ouse operational water catchments.	>2km Within The Wash Inner and the Great Ouse operational water catchments.	>2km Within The Wash Inner and the Great Ouse operational water catchments.
Berry Fen SSSI	251m–2000m	N/A	N/A	251m–2000m
Bassenhally Pit SSSI	251m–2000m	N/A	N/A	N/A

	Distance from Scoping boundary			
Site (for reasons for designation refer to Appendix 8.2)	**Sources of supply and upstream water transfers zone**	**Reservoir site zone**	**Water treatment works zone**	**Downstream treated water transfers zone**
Somersham LNR	251m–2000m	N/A	N/A	251m–2000m
Woodwalton Fen SSSI*	1m–30m	N/A	N/A	N/A
Woodwalton Fen NNR*	1m–30m	N/A	N/A	N/A
Woodwalton Fen Ramsar*	1m–30m	N/A	N/A	N/A
Fenland SAC (Woodwalton Fen component site)*	1m–30m	N/A	N/A	N/A
Ring's End LNR*	1m–30m	N/A	N/A	N/A
The Boardwalks LNR*	1m–30m	N/A	N/A	N/A
Holme Fen SSSI*	251m–2000m	N/A	N/A	N/A
Holme Fen NNR*	251m–2000m	N/A	N/A	N/A
Upwood Meadows SSSI*	251m–2000	N/A	N/A	N/A
Upwood Meadows NNR*	251m–2000m	N/A	N/A	N/A
Overhall Grove SSSI	N/A	N/A	N/A	101m–250m
Mare Fen LNR	N/A	N/A	N/A	101m–250m
Madingley Wood SSSI	N/A	N/A	N/A	251m–2000m

*Notes: * distance relates only to Middle Level to proposed reservoir upstream transfer route, where no infrastructure or other construction activities are proposed and refers to the distance from the Middle Level system watercourses rather than the Scoping boundary.*

Non-statutory designated sites

8.6.6 Non-statutory designated sites are listed in Table 8-6. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions and shown on Figure 8.2. Table 8-6 shows the distance from each zone, and where relevant identifies the source of supply or transfer routes.

Table 8-6: Non-statutory designated sites within all study zones of the Proposed Development

Distance from Scoping boundary				
Site (for reasons for designation refer to Appendix 8.2)	**Sources of supply and upstream water transfers zone**	**Reservoir site zone**	**Water treatment works zone**	**Downstream treated water transfers zone**
Ouse Fen RSPB Reserve	Within Ouse Washes (River Delph).	N/A	N/A	251m–2000m
Ouse Washes RSPB Reserve	Within Ouse Washes (River Delph).	N/A	N/A	251m–2000m
Ouse Washes WTR	Within Ouse Washes (River Delph).	N/A	N/A	N/A
Stanground Wash WTR	Within River Nene and its Counter Drain.	N/A	N/A	N/A
River Great Ouse CWS	Within River Great Ouse at Earith.	N/A	N/A	Within Madingley, via Bluntisham transfer route.
Forty Foot Drain (East) CWS	Within Ouse Washes (River Delph).	0m	251m–2000m	251m–2000m
Sutton & Mepal Pumping Station Drains CWS	Within Ouse Washes (River Delph).	N/A	N/A	Within Madingley, via Bluntisham transfer route.
Nene Washes RSPB Reserve	Within River Nene and its Counter Drain.	N/A	N/A	N/A
Dog-in-a-Doublet Drain CWS	1m–30m	N/A	N/A	N/A
St Ives – March Disused Railway (The Parks South) CWS	1m–30m	N/A	N/A	1m–30m
Orchard Bungalow, Somersham CWS	1m–30m	N/A	N/A	1m–30m
Lawn Orchard CWS	1m–30m	N/A	N/A	1m–30m
Heath Fruit Farm CWS	101m–250m	N/A	N/A	Within Madingley via Bluntisham transfer route.

Distance from Scoping boundary				
Site (for reasons for designation refer to Appendix 8.2)	**Sources of supply and upstream water transfers zone**	**Reservoir site zone**	**Water treatment works zone**	**Downstream treated water transfers zone**
Adderley and Storey's Bar Road Drains CWS	101m–250m	N/A	N/A	N/A
Cat's Water Drain CWS	101m–250m	N/A	N/A	N/A
Fletton Lake CWS	251m–2000m	N/A	N/A	N/A
Stanground Newt Ponds CWS	251m–2000m	N/A	N/A	N/A
Stanground Newt Ponds WTR	251m–2000m	N/A	N/A	N/A
St Ives – March Disused Railway (The Parks North) CWS	251m–2000m	N/A	N/A	251m–2000m
Block Fen Gravel Pits CWS	251m–2000m	N/A	N/A	251m–2000m
Pit Southeast of Bassenhally Pit CWS	251m–2000	N/A	N/A	N/A
Nene Washes Counter Drain (West) CWS	251m–2000m	N/A	N/A	N/A
St Ives – March Disused Railway (Somersham) CWS	251m–2000m	N/A	N/A	251m–2000m
Nene Valley Railway CWS	1m–30m* 251m–2000m	N/A	N/A	N/A
Northey Gravel Pit CWS	251m–2000m	N/A	N/A	N/A
Thorney Dike CWS	251m–2000	N/A	N/A	N/A
Common Wash CWS	251m–2000m	N/A	N/A	N/A
Mepal Gravel Pits CWS	251m–2000m	N/A	N/A	251m–2000m
Wash Road Pollard Willows CWS	251m–2000m	N/A	N/A	N/A
Langwood Hill Pit CWS	251m–2000	251m–2000m	251m–2000m	251m–2000m
Kings Dyke Nature Reserve CWS	251m–2000m	N/A	N/A	N/A
Byall Den Pumping Station CWS	251m–2000m	N/A	N/A	N/A
Great Fen WTR*	0m	N/A	N/A	N/A

Distance from Scoping boundary				
Site (for reasons for designation refer to Appendix 8.2)	**Sources of supply and upstream water transfers zone**	**Reservoir site zone**	**Water treatment works zone**	**Downstream treated water transfers zone**
Whitemoor Pit and Nature Reserve CWS*	0m	N/A	N/A	N/A
Well Creek LWS*	0m	N/A	N/A	0m
Conington Fen Drains CWS*	1m–30m	N/A	N/A	N/A
Middle Level Main Drain LWS*	1m–30m	N/A	N/A	N/A
Graysmoor Pit CWS*	1m–30m	N/A	N/A	N/A
Northey Gravel Pit CWS*	1m–30m	N/A	N/A	N/A
The Boardwalks CWS*	1m–30m*	N/A	N/A	N/A
Wimblington Common Gravel Pits CWS	N/A	0m	N/A	101m–250m
Fen Drayton Lakes RSPB Reserve	N/A	N/A	N/A	Within Madingley, via Bluntisham transfer route.
Madingley Slip Road RSV CWS	N/A	N/A	N/A	Within Madingley via Bluntisham transfer route.
Swavesey Meadows CWS	N/A	N/A	N/A	Within Madingley via Bluntisham transfer route.
Middle Fen CWS	N/A	N/A	N/A	Within Madingley via Bluntisham transfer route.
Fen Drayton Gravel Pits CWS	Not identified within this zone.	N/A	N/A	Within Madingley via Bluntisham transfer route.
Oak Wood LWS	N/A	N/A	N/A	31m–100m
Boxworth PRV	N/A	N/A	N/A	101m–250m
Overhall Grove WTR	N/A	N/A	N/A	101m–250m
Mare Fen CWS	N/A	N/A	N/A	101m–250m

Distance from Scoping boundary				
Site (for reasons for designation refer to Appendix 8.2)	**Sources of supply and upstream water transfers zone**	**Reservoir site zone**	**Water treatment works zone**	**Downstream treated water transfers zone**
Holywell Front Pollard Willows CWS	N/A	N/A	N/A	251m–2000m
Meadow Lane Gravel Pits CWS	N/A	N/A	N/A	251m–2000m
Pound Lane Orchard, Colne CWS	N/A	N/A	N/A	251m–2000
Brockley End Meadow CWS	N/A	N/A	N/A	251m–2000m
Knapwell PRV	N/A	N/A	N/A	251m–2000m
Knapwell RSV CWS	N/A	N/A	N/A	251m–2000m
The Pound CWS	N/A	N/A	N/A	251m–2000m
The Willows LWS	N/A	N/A	N/A	251m–2000m
Thorn Plantation LWS	N/A	N/A	N/A	251m–2000m
Brick Kiln Plantations LWS	N/A	N/A	N/A	251m–2000m
Osier Holt LWS	N/A	N/A	N/A	251m–2000m
South of Thorpeland LWS	N/A	N/A	N/A	251m–2000m
Bedlam Hill Pit CWS	N/A	N/A	N/A	251m–2000m
Church Close LWS	N/A	N/A	N/A	251m–2000m
South-west of Manor Farm LWS	N/A	N/A	N/A	251m–2000m
Spring Wood LWS	N/A	N/A	N/A	251m–2000m

*Notes: * distance relates only to Middle Level to proposed reservoir upstream transfer route, where no infrastructure or other construction activities are proposed and refers to the distance from the Middle Level system watercourses rather than the Scoping boundary.*

Baseline for sources of supply and upstream water transfers

Statutory designated sites

8.6.7 Statutory designated sites in the sources of supply and upstream water transfers zone are listed in Table 8-5 and shown on Figure 8.1. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

8.6.8 This zone of the Scoping boundary is within a number of SSSI IRZs for types of development proposals which could have adverse impacts on the SSSI and therefore the EcIA will consider the relevant IRZs. Natural England developed IRZ, a Geographical Information System (GIS) tool (Natural England, 2023b), to make a rapid assessment of the potential risks posed by development proposals to SSSIs and those SAC, SPA or Ramsar sites that they underpin. They define zones around each site which reflect the sensitivities of the features for which the site is notified

and indicate the types of development proposal which could potentially have adverse impacts and need further consideration.

Non-statutory designated sites

8.6.9 Non-statutory designated sites in the sources of supply and upstream water transfers zone are listed in Table 8-6 and shown on Figure 8.2. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

Habitats

Ancient woodland and veteran trees

8.6.10 There is one area of plantation ancient woodland within 2km (Natural England, 2024a). Figure 8.3 presents the location of ancient woodland.

8.6.11 There are no records of veteran trees within 2km.

Ground Water Dependent Terrestrial Ecosystems

8.6.12 There are three SSSIs within 2km that support GWDTEs (Environment Agency, 2023). These are:

- Ouse Washes SSSI within the Scoping boundary relating to the Ouse Washes (River Delph) to proposed reservoir element of the Proposed Development.
- Nene Washes SSSI within the Scoping boundary relating to the River Nene and its Counter Drain to proposed reservoir element of the Proposed Development.
- Bassenhally Pit SSSI, located approximately 1,395m from the Scoping boundary.

8.6.13 Bassenhally Pit is not included in Chapter 10: Water resources and flood risk because the SSSI is located outside the study area established in Chapter 10: Water resources and flood risk (500m beyond the Scoping boundary).

Habitats of Principal Importance

8.6.14 The following HPIs have been recorded within and up to 250m from the Scoping boundary (Natural England, 2024d):

- Coastal and floodplain grazing marsh.
- Deciduous woodland.
- Good quality semi-improved grassland.
- Lowland fens.
- Mudflats.
- No main habitat but additional habitats present.
- Traditional orchard.

Notable vascular plant species

8.6.15 There are 165 records of 32 notable plant species within the study area. Of these, 111 are within the Scoping boundary.

Invasive non-native plant species

8.6.16 There are 10 records of four INNS within the Scoping boundary. The most commonly recorded species are butterfly bush (*Buddleja davidii*) and Nuttall's waterweed (*Elodea nuttallii*) with three and five records respectively.

Species

Badger

8.6.17 There are records of badger (*Meles meles*). The closest record is a latrine that is approximately 140m from the Scoping boundary.

Bats

8.6.18 Twelve EPS licence applications for destruction of bat resting places/breeding sites were identified within the study area. Species which were licensed were common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*) and brown long-eared bat (*Plecotus auritus*).

8.6.19 Desk studies identified the following bat species within the study area, with records of bat activity and bat roosts:

- Barbastelle (*Barbastella barbastellus*).
- Brown long-eared bat.
- Common pipistrelle.
- Daubenton's bat (*Myotis daubentonii*).
- Leisler's bat (*Nyctalus leisleri*).
- Nathusius's pipistrelle (*Pipistrellus nathusii*).
- Natterer's bat (*Myotis nattereri*).
- Noctule (*Nyctalus noctula*).
- Pipistrelle (unknown sp.) (*Pipistrellus sp.*).
- Serotine (*Eptesicus serotinus*).
- Soprano pipistrelle.
- Unknown bat species.
- Whiskered bat (*Myotis mystacinus*).

Birds

8.6.20 There are 2,816 records of bird within the study area, including 43 species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) (WCA), 29 species of principal importance (SPI), 33 Red listed species and 25 Amber listed species in The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain (Stanbury *et al.*, 2021).

Great crested newt

8.6.21 There are 37 records of GCN within the study area, with two records within the Scoping boundary itself. There are no records of EPS licence applications for GCN within the study area.

8.6.22 Stanground Newt Ponds CWS and Stanground Newt Ponds WTR lie approximately 1.2km and 1.3km from the Scoping boundary respectively. Both sites are designated for their GCN populations.

8.6.23 One EPS licence application for damage or destruction of a GCN resting place was identified within the study area and there are eight GCN class survey licence returns noting presence of GCN (Natural England, 2024b). There are records that eDNA surveys have been undertaken within the study area but none of these surveys provided positive results (Natural England, 2024c).

Hazel dormouse

8.6.24 There are no records of dormice and no records of EPS licence applications for dormice within the study area.

Riparian mammals

8.6.25 There are no statutory or non-statutory designated sites within the study area that have otter (*Lutra lutra*) or water vole as a reason for their designation.

8.6.26 There are 15 records of otter and 22 records of water vole within the study area, including four records of otter within the Scoping boundary. There are no records of EPS licence applications for otter within the study area.

8.6.27 Water vole monitoring surveys undertaken at Curf Fen and Ransonmoor by the Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire show good populations of water vole present between 2005 and 2015, with occupancy up to 90% across the survey area in some years (The Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire, 2016). The Curf Fen survey area lies adjacent to the Scoping boundary, west of the Sixteen Foot Bank. The Ransonmoor survey area lies approximately 4.4km north-west of the Scoping boundary at its closest point.

Reptiles

8.6.28 There are 33 records of common lizard (*Zootoca vivipara*) and 21 records of grass snake (*Natrix natrix*) within the study area.

Terrestrial invertebrates

8.6.29 The desk study has identified a range of beetle, true bug, true fly, moth, caddis fly, hymenopteran and butterfly species within the study area, 42 of which are SPI. Seven species are within the Scoping boundary, of which white-letter hairstreak (*Satyrium w-album*) is a SPI.

8.6.30 The Scoping boundary is within a Buglife Important Invertebrate Area in two locations: near Bluntisham and to the east of Welches Dam. These areas are home to nationally or internationally significant invertebrate populations and their habitats.

Other notable species

Brown hare

8.6.31 There are records of brown hare (*Lepus europaeus*) within the study area, including some within the Scoping boundary.

Hedgehog

8.6.32 There are records of hedgehog (*Erinaceus europaeus*) within the study area.

Toad

8.6.33 There are records of toad (*Bufo bufo*) within the study area.

Invasive non-native animal species

8.6.34 There are records of mink (*Neovison vison*) within the study area, including some within the Scoping boundary.

Middle Level to proposed reservoir transfer

Statutory designated sites

8.6.35 Statutory designated sites in the Middle Level to proposed reservoir transfer study area are provided in Table 8-5 and shown on Figure 8.1. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

8.6.36 The study area falls within a number of SSSI IRZs (Natural England, 2023b) for types of development proposals which could have adverse impacts on the SSSI and therefore the EcIA will consider the relevant IRZs.

Non-statutory designated sites

8.6.37 Non-statutory designated sites in the Middle Level to proposed reservoir transfer study area are provided in Table 8-6 and shown on Figure 8.2. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

Habitats

Ancient woodland and veteran trees

8.6.38 There are no records of ancient woodland or veteran trees within the study area.

Ground Water Dependent Terrestrial Ecosystems

8.6.39 There are three SSSIs which support GWDTEs within the study area (Environment Agency, 2023):

- Nene Washes SSSI is within the watercourse footprint.
- Woodwalton Fen SSSI is immediately adjacent to the watercourse footprint.
- Ouse Washes SSSI is 10m from the Middle Level watercourses.

Habitats of Principal Importance

8.6.40 The following HPIs are recorded within the study area (Natural England, 2024d). Those marked with '*' are within the watercourse footprint:

- Coastal and floodplain grazing marsh.

- Deciduous woodland.
- Lowland calcareous grassland.
- Lowland fens.
- Mudflats*.
- No main habitat but additional habitats present.
- Purple moor grass and rush pastures.
- Traditional orchard.

Notable vascular plant species

8.6.41 There are 274 records of 26 notable plant species within the study area. Of these, 227 are within the watercourse footprint.

Invasive non-native plant species

8.6.42 There are 59 records of 10 INNS within the watercourse footprint. The most commonly recorded species are butterfly bush and Nuttall's waterweed with 20 and 13 records respectively.

Species

Badger

8.6.43 The desk study identified records of badger within the study area.

Bats

8.6.44 No EPS licence applications were identified within the study area. Desk studies identified the following bat species, with records of bat activity and bat roosts:

- Brown long-eared bat.
- Common pipistrelle.
- Daubenton's bat.
- Myotis (unknown sp.) (*Myotis sp.*).
- Noctule.
- Pipistrelle (unknown sp.) (*Pipistrellus sp.*).
- Soprano pipistrelle.

Birds

8.6.45 There are 238 records of bird within the study area, including 24 species listed on Schedule 1 of the WCA, 26 SPI, 25 Red listed species and 17 Amber listed species (Stanbury *et al.*, 2021).

Great crested newt

8.6.46 There is one record of GCN within the study area which was from within the watercourse footprint itself.

8.6.47 There are no records of EPS licence applications for GCN within the study area and one GCN class survey licence return which identifies presence of GCN (Natural England, 2024b). No water body eDNA data is held within the study area (Natural England, 2024c).

8.6.48 GCN is listed as a feature of Woodwalton Fen NNR, which is adjacent to the watercourse footprint.

Hazel dormouse

8.6.49 There are no records of dormice and no records of EPS licence applications for dormice within the study area.

Riparian mammals

8.6.50 There are 53 records of otter and 27 records of water vole within the study area, including 50 records of otter and 21 records of water vole within the footprint itself. There are no records of EPS licence applications for otter within the study area.

8.6.51 Water vole monitoring surveys undertaken by the Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire lie adjacent to the watercourse footprint near Swingbrow and north-east of Benwick. Surveys show good populations of water vole present between 2005 and 2015, with occupancy up to 90% across the survey area in some years (The Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire, 2016).

Reptiles

8.6.52 There are six records of common lizard and eight records of grass snake within the study area, all of which are within the watercourse footprint.

Terrestrial invertebrates

8.6.53 The desk study has identified a range of beetle, Hymenoptera, true bug, true fly, caddisfly, moth and butterfly species within the study area, 36 of which are SPI. There are 37 species within the footprint, of which 27 are SPI.

8.6.54 The footprint does not lie within a Buglife Important Invertebrate Area.

Other notable species

Brown hare

8.6.55 There are 17 records of brown hare within the study area, with some records within the watercourse footprint.

Hedgehog

8.6.56 There are three records of hedgehog within the study area, with some records within the watercourse footprint.

Toad

8.6.57 There are seven records of toad within the study area, with six records within the watercourse footprint.

Invasive non-native animal species

8.6.58 There are 23 records of mink within the study area, including records within the watercourse footprint.

Baseline for the reservoir site

Statutory designated sites

8.6.59 Statutory designated sites in the reservoir site zone are provided in Table 8-5 and shown on Figure 8.1. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

8.6.60 This zone of the Scoping boundary falls within a number of SSSI IRZs (Natural England, 2023b) for types of development proposals which could have adverse impacts on the SSSI and therefore the EcIA will consider the relevant IRZs.

Non-statutory designated sites

8.6.61 Non-statutory designated sites in the reservoir site zone are provided in Table 8-6 and shown on Figure 8.2. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

Habitats

Ancient woodland and veteran trees

8.6.62 There are no areas of ancient woodland within 2km.

8.6.63 Four trees with potential veteran features were identified in the study area: two common ash (*Fraxinus excelsior*) and two white willow (*Salix alba*).

Ground Water Dependent Terrestrial Ecosystems

8.6.64 No GWDTEs were identified during the desk study based on GWDTE open data (Environment Agency, 2023).

8.6.65 Reedbed and other wetlands identified during field survey are potentially GWDTEs with a low dependence on groundwater.

UKHab survey

8.6.66 Over 80% of the study area comprises cropland with the remaining habitats made up of grassland (10%); urban and wetland habitats (both less than 2.5%); and scrub, lakes, sparsely vegetated land and woodland and forest (covering less than 1% each). Further details are shown in Table 8-7 and mapped in Figure 8.4.

Table 8-7: Percentage area of habitats recorded in the reservoir site zone Scoping boundary

UKHab category	Habitat defined as a HPI?	Area present within the reservoir site (ha)	% cover of the reservoir site
c1 Arable and horticulture	No	308.9	24
c1a Arable field margins	Yes	5.1	0.4
c1a5 Arable field margins tussocky	Yes	0.7	0.1
c1b Temporary grass and clover leys	No	59.7	4.7

UKHab category	Habitat defined as a HPI?	Area present within the reservoir site (ha)	% cover of the reservoir site
c1c Cereal crops	No	471.0	37.1
c1c5 Winter stubble	No	26.0	2.1
c1c6 Arable fields with wild bird mix	No	3.3	0.3
c1c7 Other cereal crops	No	26.0	2.0
c1d Non-cereal crops	No	152.7	12.0
c1d8 Other non-cereal crops	No	6.1	0.5
f2a Lowland fens	No	0.1	<0.1
f2d Aquatic marginal vegetation	No	8.3	0.7
f2e Reedbeds	Yes	<0.1	<0.1
f2f Other wetlands	No	1.0	0.1
g Grassland	No	27.3	2.2
g Grassland with secondary code traditional orchard	Yes	<0.1	<0.1
g3 Neutral grassland	No	0.6	<0.1
g3c Other neutral grassland	No	31.7	2.5
g3c5 *Arrhenatherum* grassland	No	35.1	2.8
g4 Modified grassland	No	35.4	2.8
h3 Dense scrub	No	<0.1	<0.1
h3d Bramble scrub	No	0.6	<0.1
h3h Mixed scrub	No	0.6	<0.1
r1 Standing open water (excluding watercourses)	No	0.1	<0.1
r1a Eutrophic standing waters	No	0.5	<0.1
r1a6 Other eutrophic standing waters	No	1.0	0.1
u1 Built-up areas and gardens	No	1.6	0.1
u1b Developed land; Sealed surface	No	6.4	0.5
u1b5 Buildings	No	2.5	0.2
u1b6 Other developed land	No	4.0	0.3
u1c Artificial unvegetated – unsealed surface	No	0.2	<0.1

UKHab category	Habitat defined as a HPI?	Area present within the reservoir site (ha)	% cover of the reservoir site
u1d Suburban mosaic of developed and natural surface	No	<0.1	<0.1
u1e Built linear features	No	11.2	0.9
u1f Sparsely vegetated urban land	No	0.4	<0.1
w Woodland and forest	No	1.2	0.1
w1g Other broadleaved woodland	No	3.7	0.3
w1h5 Other woodland; mixed; mainly broadleaved	No	0.6	<0.1

8.6.67 A total of 288 ditch or canal watercourses (72.7km), seven rivers and streams (5.9km), 41 native hedgerows (6.7km), three non-native hedgerows (0.1km) and 11 line of trees (0.7km) have been identified through desk study or on site. This is shown in Table 8-8.

Table 8-8: Linear habitats recorded in the reservoir site zone Scoping boundary

UKHab category	Habitat defined as a HPI?	Length present within the reservoir site (km)
h2a5 Species-rich native hedgerow	Yes	0.9
h2a6 Other native hedgerows	Yes	5.8
h2b Non-native ornamental hedgerows	No	0.1
w Line of trees (linear secondary code 16)	No	0.7
r Rivers and lakes	No	0.1
r1 Standing open water and canals (watercourses)	No	72.7
r2 Rivers and streams	No	5.9

Habitats of Principal Importance

8.6.68 HPIs comprised 6.1ha (38 locations) of arable field margins, one reedbed, one traditional orchard and 41 native hedgerows.

8.6.69 Lowland fen and coastal and floodplain grazing marsh were identified within the Scoping boundary during the desk study (Natural England, 2024d). However, during surveys, the lowland fen was found to be woodland with pockets of scrub grassland and reedbed. Coastal and floodplain grazing marsh identified in the desk study was surveyed as grassland but without features indicating floodplain grazing marsh. Deciduous woodland, lowland fen and no main habitat but additional habitats present (reedbed, lowland fen) lie within 250m of the Scoping boundary.

Notable vascular plant species

8.6.70 Records of 39 notable species, from either CPERC or field survey, overlap the Scoping boundary. Of the species recorded, 12 are nationally notable. Field surveys recorded 27 notable species within the Scoping boundary. Species and their status are shown in Table 8-9.

8.6.71 Several notable plant species were found surrounding an artificial pond used for irrigation purposes, including frogbit (*Hydrocharis morsus-ranae*), golden dock (*Rumex maritimus*) and trifid bur-marigold (*Bidens tripartita*). The remaining records of notable plant species were generally found along roadside verges or watercourses.

Table 8-9: Notable plant species recorded within the reservoir site zone Scoping boundary

Scientific name	Common name	Identified on desk study?	No. of field survey records	Status
Alisma lanceolatum	Narrow-leaved water plantain	Yes	0	4: Declining in England; 5
Alisma plantago-aquatica	Water plantain	No	35	4: Declining
Artemisia absinthium	Wormwood	Yes	0	4: Endangered
Bidens tripartita	Trifid bur-marigold	No	1	4: Vulnerable
Butomus umbellatus	Flowering rush	No	1	4: Vulnerable
Carex acutiformis	Lesser pond-sedge	No	3	4: Vulnerable
Centaurea cyanus	Cornflower	No	1	3; 4: Vulnerable
Chara hispida	Bristly stonewort	No	6	4: Vulnerable
Chenopodium hybridum	Maple-leaved goosefoot	No	1	4: Declining in England
Cichorium intybus	Chicory	No	5	2: Vulnerable; 4: Largely introduced but vulnerable in England
Diplotaxis muralis	Annual wall-rocket	Yes	0	4: Vulnerable
Eleocharis acicularis	Needle spike-rush	Yes	0	2: Near threatened; 4: Vulnerable; 5
Equisetum fluviatile	Water horsetail	Yes	0	4: Vulnerable
Erysimum cheiranthoides	Treacle mustard	Yes	0	2: Near threatened, 4: Vulnerable

Scientific name	Common name	Identified on desk study?	No. of field survey records	Status
Filago vulgaris	Common cudweed	No	1	1: Near threatened; 2: Near threatened
Galium saxatile	Heath bedstraw	No	1	4: Rare
Hottonia palustris	Water violet	Yes	1	1: Vulnerable; 2: Vulnerable; 4: Vulnerable; 5
Hydrocharis morsus-ranae	Frogbit	Yes	6	1: Vulnerable; 2: Vulnerable; 4: No status; 5
Hypochaeris glabra	Smooth cat's ear	No	1	1: Vulnerable; 2: Vulnerable; 4: Scarce
Juncus conglomeratus	Compact rush	No	1	4: Declining
Lepidium campestre	Field pepperwort	Yes	1	2: Near threatened; 4:Vulnerable
Lepidium ruderale	Narrow-leaved pepperwort	Yes	0	4: Declining in England
Lysimachia vulgaris	Yellow loosestrife	No	13	4: Declining
Lotus pedunculatus	Greater bird's-foot-trefoil	Yes	0	4: Vulnerable
Myosotis discolor	Changing forget-me-not	No	1	4: Endangered
Myriophyllum spicatum	Spiked water milfoil	Yes	7	4: Vulnerable
Myriophyllum verticillatum	Whorl-leaf watermilfoil	No	5	1: Vulnerable, 2: Near threatened; 4: No status; 5
Nymphoides peltata	Fringed water-lily	Yes	0	4:Vulnerable; 5
Onobrychis viciifolia	Sainfoin	No	2	1: Vulnerable, 2: Vulnerable; 4: Many introductions
Ononis spinosa	Spiny restharrow	Yes	0	2: Near threatened; 4: Vulnerable; 5
Polypogon monspeliensis	Annual beard grass	No	2	4: No status

Scientific name	Common name	Identified on desk study?	No. of field survey records	Status
Potamogeton lucens	Shining pondweed	Yes	5	4: Vulnerable; 5
Potamogeton perfoliatus	Perfoliate pondweed	No	2	4: Vulnerable
Potamogeton pusillus	Lesser pondweed	No	8	4: Vulnerable
Rumex maritimus	Golden dock	No	2	4: Vulnerable
Sonchus palustris	Marsh sow-thistle	Yes	0	4: Endangered; 5
Thalictrum flavum	Meadow rue	Yes	5	4: Vulnerable; 5

Notes:
Key for status: 1: The Vascular Plant Red Data List for Great Britain. Species Status No.7 (Cheffings et al., 2005); 2: A Vascular Plant Red List for England (Stroh et al., 2014); 3: List of habitats and species of principal importance in England (Defra and Natural England, 2022); 4: Cambridgeshire (v.c.29) Rare Plant Register (BSBI, 2019); 5: Cambridgeshire and Peterborough Additional Species of Interest (Cambridgeshire and Peterborough Biodiversity Group, 2021)

Invasive non-native plant species

8.6.72 Records for 37 plant INNS were recorded in tetrads and monads overlapping the Scoping boundary. Four INNS, all listed on the WCA Schedule 9, were recorded during surveys. Species are shown in Table 8-10. The table also notes whether species are England Biodiversity Indicators (EBIs), are on the Register of Plants of Conservation Concern (Cambridgeshire) (RPCCC) (BSBI, 2023b), or are listed on the European Union Invasive Alien Species (EU IAS) list of species of concern – An introduction to the invasive species of union concern (European Union, 2022).

8.6.73 The EBI 'Pressure from Invasives' indicator list – England Biodiversity Indicators 2023 (Harrower *et al.*, 2023) comprises non-native species designated through modelling and expert opinion as having negative or strongly negative ecological effects on UK biodiversity. Changes in the distribution of species on the EBI 'Pressure from Invasives' indicator list is used to assess progress against targets set out in UK national biodiversity strategies.

8.6.74 The RPCCC has three threat levels:

- Threat level 1 – plant is currently being removed from County or City Wildlife Sites and has significant impact.
- Threat level 2 – plant is either being removed from sites but has low impact or is not being removed but has significant potential impact.
- Threat level 3 – plant to watch for, or plant showing significant increase over the last decade.

Table 8-10: INNS recorded in the reservoir site zone Scoping boundary

Scientific name	Common name	Identified on desk study?	No. of field survey records	References
Acer platanoides	Norway maple	Yes	0	RPCCC 2
Alchemilla mollis	Garden lady's-mantle	Yes	0	RPCCC 2; EBI
Alnus cordata	Italian alder	Yes	0	RPCCC 2
Alnus incana	Grey alder	Yes	0	RPCCC 2
Anisantha diandra	Great brome	Yes	0	EBI
Arum maculatum × italicum	Lords-and-ladies hybrid	Yes	0	RPCCC 2
Arum italicum	Italian lords and ladies	Yes	0	RPCCC 2
Buddleja davidii	Butterfly-bush	Yes	0	RPCCC 1; EBI
Cornus sericea	Red-osier dogwood	Yes	0	EBI
Cotoneaster horizontalis agg.	Wall cotoneaster	Yes	1	WCA Schedule 9; RPCCC 2; EBI
Cotoneaster lacteus	Late cotoneaster	Yes	0	RPCCC 2
Crassula helmsii	New Zealand pygmyweed	No	1	WCA Schedule 9
Crocosmia × crocosmiiflora	Montbretia	Yes	0	WCA Schedule 9; EBI
Elodea canadensis	Canadian waterweed	Yes	0	WCA Schedule 9; EBI
Elodea nuttallii	Nuttall's waterweed	Yes	2	WCA Schedule 9; EBI; EU IAS
Fallopia baldschuanica	Russian-vine	Yes	0	RPCCC 2 EBI
Fallopia convolvulus	Black bindweed	Yes	0	EBI
Fallopia japonica	Japanese knotweed	Yes	0	WCA Schedule 9; RPCCC 3 EBI
Hyacinthoides × massartiana	Hybrid bluebell	Yes	0	EBI
Lemna minuta	Least duckweed	Yes	0	EBI
Lepidium draba	Hoary cress	Yes	0	RPCCC 1
Lonicera nitida	Wilson's honeysuckle	Yes	0	Potential INNS
Mahonia aquifolium	Oregon-grape	Yes	0	RPCCC 2
Medicago arabica	Spotted medick	Yes	0	RPCCC 3

Scientific name	Common name	Identified on desk study?	No. of field survey records	References
Pentaglottis sempervirens	Green alkanet	Yes	0	RPCCC 1
Pinus nigra	Black pine	Yes	0	EBI
Prunus laurocerasus	Cherry laurel	Yes	0	EBI
Prunus lusitanica	Portuguese laurel	Yes	0	EBI
Quercus cerris	Turkey oak	Yes	0	EBI
Quercus ilex	Evergreen oak	Yes	0	EBI
Robinia pseudoacacia	False acacia	Yes	0	EBI
Rosa rugosa	Japanese rose	Yes	5	WCA Schedule 9
Rubus armeniacus	Giant blackberry	Yes	0	RPCCC 1
Senecio inaequidens	Narrow-leaved ragwort	Yes	0	RPCCC 3
Symphoricarpos albus	Snowberry	Yes	0	EBI
Symphytum × uplandicum	Russian comfrey	Yes	0	RPCCC 2
Symphytum orientale	White comfrey	Yes	0	RPCCC 3
Verbena bonariensis	Argentinian vervain	Yes	0	RPCCC 3
Vinca major	Greater periwinkle	Yes	0	Potential INNS

Species

Badger

8.6.75 The desk study identified records of badger within the study area.

Bats

8.6.76 Two EPS licence applications for destruction of common pipistrelle resting places were identified within the study area. Desk studies identified the following bat species within the study area, with records of bat activity and bat roosts:

- Brown long-eared bat.
- Common pipistrelle.
- Daubenton's bat.
- Nathusius's pipistrelle.
- Natterer's bat.
- Noctule.

- Pipistrelle (unknown sp.).
- Soprano pipistrelle.
- Unknown bat species.

Birds

8.6.77 There are 42 records of bird within the study area, including five species listed on Schedule 1 of the WCA, 13 SPI, 11 Red listed species and four Amber listed species (Stanbury *et al.*, 2021).

Great crested newt

8.6.78 There are 27 records of GCN within the study area, with one record within the Scoping boundary.

8.6.79 One EPS licence application for destruction of a GCN resting place was identified within the study area and there are 47 GCN class survey licence returns noting presence of GCN (Natural England, 2024b). Two ponds were identified as supporting GCN eDNA within the study area (Natural England, 2024c).

Hazel dormouse

8.6.80 There are no records of dormice and no records of EPS licence applications for dormice within the study area.

Riparian mammals

8.6.81 There are no statutory or non-statutory designated sites within the study area that have otter or water vole as a reason for their designation.

8.6.82 There are five records of otter and 293 records of water vole within the study area, including 121 records of water vole within the Scoping boundary. There are no records of EPS licence applications for otter within the study area.

8.6.83 Water vole monitoring surveys undertaken at Curf Fen and Ransonmoor by the Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire show good populations of water vole present between 2005 and 2015, with occupancy up to 90% across the survey area in some years (The Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire, 2016). The Curf Fen survey area intersects with the Scoping boundary; the Ransonmoor survey area lies approximately 650m west of the Scoping boundary at its closest point.

Reptiles

8.6.84 There are three records of common lizard and two records of grass snake within the study area.

Terrestrial invertebrates

8.6.85 The desk study identified three records of invertebrates within the study area. These comprise white ermine (*Spilosoma lubricipeda*) and goat moth (*Cossus cossus*) which are SPI and musk beetle (*Aromia moschata*) which is a notable species.

8.6.86 The Scoping boundary does not lie within a Buglife Important Invertebrate Area.

Other notable species

Brown hare

8.6.87 There is one record of brown hare within the study area.

Hedgehog

8.6.88 There are three records of hedgehog within the study area.

Toad

8.6.89 There is one record of toad within the study area.

Invasive non-native animal species

8.6.90 There are records of mink within the study area, including some within the Scoping boundary.

Baseline for the water treatment works

Statutory designated sites

8.6.91 Statutory designated sites in the water treatment works zone are provided in Table 8-5 and shown on Figure 8.1. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

8.6.92 A number of SSSI IRZs have been identified but none of the sensitivities listed are a concern for the Proposed Development.

Non-statutory designated sites

8.6.93 Non-statutory designated sites in the water treatment works zone are provided in Table 8-6 and shown on Figure 8.2. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

Habitats

Ancient woodland and veteran trees

8.6.94 There are no records of ancient woodland or veteran trees within the study area.

Ground Water Dependent Terrestrial Ecosystems

8.6.95 There are no recorded GWDTEs within the study area based on GWDTE open data (Environment Agency, 2023).

Habitats of Principal Importance

8.6.96 Deciduous woodland is the only HPI recorded within the study area; however, it is not within the Scoping boundary (Natural England, 2024d).

Notable vascular plant species

8.6.97 There are two records of *Calystegia sepium subsp. roseata* within the study area and no notable plant species records within the Scoping boundary.

Invasive non-native plant species

8.6.98 There is one record of butterfly bush within the Scoping boundary.

Species

Badger

8.6.99 The desk study identified records of badger within the study area.

Bats

8.6.100 Two EPS licence applications for destruction of common pipistrelle resting places were identified within the study area. Desk studies identified the following bat species in the study area, with records of bat activity and bat roosts:

- Brown long-eared bat.
- Common pipistrelle.
- Nathusius' pipistrelle.
- Natterer's bat.
- Noctule.
- Pipistrelle (unknown sp.).
- Soprano pipistrelle.
- Unknown bat species.

Birds

8.6.101 There are 25 records of bird within the study area, including five species listed on Schedule 1 of the WCA, 10 SPI, eight Red listed species and four Amber listed species (Stanbury *et al.*, 2021).

Great crested newt

8.6.102 There are 27 records of GCN within the study area with the closest record approximately 50m from the Scoping boundary.

8.6.103 There are no records of EPS licence applications for GCN within the study area and there is one GCN class survey licence return noting presence of GCN (Natural England, 2024b). No water body eDNA data is held within the study area (Natural England, 2024c).

Hazel dormouse

8.6.104 There are no records of dormice and no records of EPS licence applications for dormice within the study area.

Riparian mammals

8.6.105 There are no statutory or non-statutory designated sites within the study area that have otter or water vole as a reason for their designation.

8.6.106 There is a single record of otter and 43 records of water vole within the study area. The closest record lies <300m from the Scoping boundary. There are no records of EPS licence applications for otter within the study area.

8.6.107 Water vole monitoring surveys undertaken at Curf Fen and Ransonmoor by the Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire show good populations of water vole present between 2005 and 2015, with occupancy up to 90% across the survey area in some years (The Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire, 2016). The Curf Fen survey area lies approximately 625m south-east of the Scoping boundary; the Ransonmoor survey

area lies approximately 4.6km north-west of the Scoping boundary at its closest point.

Reptiles

8.6.108 There are three records of common lizard and two records of grass snake within the study area.

Terrestrial invertebrates

8.6.109 The desk study identified two records of moth within the study area. These comprise white ermine and goat moth, which are both SPI.

Other notable species

Hedgehog

8.6.110 There is one record of hedgehog within the study area.

Invasive non-native animal species

8.6.111 There are three records of mink within the study area.

Baseline for downstream treated water transfers

Statutory designated sites

8.6.112 Statutory designated sites in the downstream treated water transfers zone are provided in Table 8-5 and shown on Figure 8.1. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

8.6.113 This zone of the Scoping boundary falls within a number of SSSI IRZs (Natural England, 2023b) for types of development proposals which could have adverse impacts on the SSSI and therefore the EcIA will consider the relevant IRZs.

Non-statutory designated sites

8.6.114 Non-statutory designated sites in the downstream treated water transfers zone are provided in Table 8-6 and shown on Figure 8.2. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

Habitats

Ancient woodland and veteran trees

8.6.115 There are eleven areas of ancient woodland within 2km of the Scoping boundary for the downstream treated water transfers zone (Defra, 2024a). Figure 8.3 displays the locations of ancient woodland.

8.6.116 There are no records of veteran trees within the study area.

Ground Water Dependent Terrestrial Ecosystems

8.6.117 There are no recorded GWDTEs within the study area based on GWDTE open data (Environment Agency, 2023).

Habitats of Principal Importance

8.6.118 The following HPI are recorded within 250m of the study area. Those marked with '*' are habitat types within the Scoping boundary:

- Coastal and floodplain grazing marsh*.

- Deciduous woodland*.
- Good quality semi-improved grassland*.
- Lowland fens*.
- Lowland meadows.
- Mudflats*.
- No main habitat but additional habitats present*.
- Traditional orchard*.

Notable vascular plant species

8.6.119 There are 161 records of 25 notable plant species within the study area. Of these, 95 are within the Scoping boundary.

Invasive non-native plant species

8.6.120 There are 45 records of 11 INNS within the Scoping boundary. The most recorded species are butterfly bush and Nuttall's waterweed with 14 and 10 records respectively.

Species

Badger

8.6.121 There are 41 records of badger within the study area with 14 records within the Scoping boundary.

Bats

8.6.122 There is functionally linked habitat within the study area associated with Eversden and Wimpole Woods SAC. Thirty-nine EPS licence applications relating to bats were identified within the study area. Species licensed comprise soprano pipistrelle, common pipistrelle, brown long-eared bat, barbastelle, whiskered, Brandt's bat, Natterer's bat and Daubenton's bat.

8.6.123 Desk studies identified the following bat species in the study area, with records of bat activity and bat roosts:

- Barbastelle.
- Brown long-eared bat.
- Common pipistrelle.
- Daubenton's bat.
- Leisler's bat.
- Long-eared bat (unknown sp.).
- Myotis (unknown sp.).
- Nathusius' pipistrelle.
- Natterer's bat.

- Noctule.
- Pipistrelle (unknown sp.).
- Soprano pipistrelle.
- Serotine.
- Unknown bat species.
- Whiskered bat.
- Whiskered/Brandt's bat.

Birds

8.6.124 There are 3,043 records of bird within the study area, including 44 species listed on Schedule 1 of the WCA, 32 SPI, 35 Red listed species and 23 Amber listed species (Stanbury *et al.*, 2021).

Great crested newt

8.6.125 There are 68 records of GCN within the study area with three records within the Scoping boundary.

8.6.126 Two EPS licence application for destruction of a GCN resting place were identified within the study area and there are 48 GCN class survey licence returns noting presence of GCN (Natural England, 2024b). There are records that eDNA surveys have been undertaken within the study area; two provided positive results (Natural England, 2024c).

Hazel dormouse

8.6.127 There are no records of dormice and no records of EPS licence applications for dormice within the study area.

Riparian mammals

8.6.128 There are no statutory or non-statutory designated sites within the study area that have otter or water vole as a reason for their designation.

8.6.129 There are 20 records of otter and 100 records of water vole within the study area, including one record of otter and two records of water vole within the Scoping boundary. There are no records of EPS licence applications for otter within the study area.

8.6.130 Water vole monitoring surveys undertaken at Curf Fen and Ransonmoor by the Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire show good populations of water vole present between 2005 and 2015, with occupancy up to 90% across the survey area in some years (The Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire, 2016). The Curf Fen survey area lies approximately 950m south of the Scoping boundary; the Ransonmoor survey area lies approximately 1.6km west of the Scoping boundary at its closest point.

Reptiles

8.6.131 There are nine records of common lizard and 28 records of grass snake within the study area.

Terrestrial invertebrates

8.6.132 The desk study identified a range of beetle, true bug, moth, butterfly and hymenopteran species within the study area, 55 of which are SPI. Four species are within the Scoping boundary, of which wall (*Lasiommata megera*) (a butterfly) is a SPI.

8.6.133 The Scoping boundary is within a Buglife Important Invertebrate Area, north-east of Fen Drayton. These areas are home to nationally or internationally significant invertebrate populations and their habitats.

Other notable species

Brown hare

8.6.134 There are 57 records of brown hare within the study area, including some within the Scoping boundary.

Toad

8.6.135 There are 13 records of toad within the study area.

Harvest mouse

8.6.136 There is a single record of harvest mouse (*Micromys minutus*) within the study area.

Polecat

8.6.137 There are six records of polecat (*Mustela putorius*) within the study area.

Invasive non-native animal species

8.6.138 There are records of mink within the study area.

Future baseline

8.6.139 Future baseline considerations for terrestrial biodiversity will include factors such as climate change, changes in land/agricultural management and future development. These may result in impacts such as habitat loss, fragmentation, changes in botanical species composition of habitats and the local distribution of faunal species.

8.6.140 Land within the study areas is predominantly agricultural. The ecological conditions are unlikely to change significantly in the short-term as current agricultural practices are likely to be maintained. For example, arable land would likely be used for growing crops or used as ley-grassland and grassland would likely continue to be used for grazing livestock and production of silage or hay.

8.6.141 Hedgerows, woodland and trees are likely to be retained by landowners, although may be subject to routine management activities. Changes in land use can affect the habitats present. For example, a lowering of intensity in the farming regime could encourage more diverse habitats to establish. This is increasingly likely where landowners engage in agri-environmental schemes. However, unpredictable changes in the biodiversity value or spatial extent of semi-natural habitat are unlikely to occur.

8.6.142 Watercourses are also likely to be retained by landowners and may be subject to routine management activities.

8.6.143 Climate change is expected to alter terrestrial biodiversity in the wider landscape. Projected increases in seasonal temperatures may lead to fewer cold winters, accelerated vegetation growth rates and earlier spring seasons. This shift could disrupt plant and pollinator lifecycles, negatively impacting pollination processes. Similarly, increasing average seasonal summer temperatures and increasing peak temperatures may have an effect on species with different tolerances to heat, potentially changing the native and invasive species present in the study area.

8.6.144 Drier summers and drought conditions, especially in combination with increasing summer temperatures, may cause vegetation dieback and increase wildfire risks, while also rendering trees more vulnerable to pests and pathogens, with resultant effects such as crown dieback in woodlands. Conversely, wetter winters and more intense rainfall events could result in waterlogged ground, which, combined with warmer winters, may create conditions favourable for the proliferation of pests, diseases, and fungi like ash dieback. These changes are likely to alter local habitats of importance, and may change the effects of the Proposed Development on habitats over time and their ability to adapt. Further details can be found in Chapter 17: Climate resilience of this EIA Scoping Report.

8.6.145 Chapter 23: Cumulative effects will identify the proposed developments that are anticipated to be constructed prior to the construction of the Proposed Development. As such, these developments would form part of the future baseline for assessment within the EIA. Where this presents a change to the current baseline specific to terrestrial biodiversity, this will be considered within the EIA.

8.7 Design and mitigation

Design

8.7.1 The design of the Proposed Development to date has taken into consideration the environmental constraints and likely significant environmental effects. The design development process will seek to avoid and reduce likely significant adverse environmental effects on terrestrial biodiversity, primarily by routing the Proposed Development to avoid sensitive ecological features as far as practicable, such as statutory and non-statutory sites, ancient woodland and HPIs.

8.7.2 The ongoing development of the design will incorporate embedded mitigation to avoid and reduce likely significant adverse effects, where feasible.

8.7.3 The design development process will include consideration of enhancement measures to improve the surrounding environment. Potential enhancements relevant to terrestrial biodiversity that have been identified to date include the landscape masterplanning proposals which aim to provide a minimum 10% BNG requirement. The proposals will also take into consideration emerging Local Nature Recovery Strategies so that enhancements align with the strategy objectives.

8.7.4 BNG will be quantified using the Defra Statutory Biodiversity Metric Calculation Tool (Defra, 2024b) and it is anticipated that BNG may be reported outside of the ES within the application for development consent to provide transparency from any necessary mitigation identified in relation to likely significant effects to terrestrial biodiversity.

Mitigation

8.7.5 Documents presenting the approach to mitigation will be produced, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. These measures would be applied to mitigate likely significant effects, including those on terrestrial biodiversity. Biodiversity considerations will also inform the process for developing construction methods and components, such as those relating to avoiding and reducing vegetation removal and seeking to avoid more sensitive areas to limit the amount of habitat affected.

8.7.6 Ecological advice will inform scheme design on an iterative basis guiding the avoidance of potential adverse impacts on ecological features wherever possible. The protection and retention of habitats will be integral to the design, which will seek to avoid or reduce potential adverse impacts to ecological features through careful siting and design.

8.7.7 Examples of good practice and essential mitigation relevant to terrestrial biodiversity include:

- Adherence to guidance for pollution prevention to avoid potential adverse impacts to the water quality of watercourses and water bodies.
- Landscape planting to reduce potential lighting impacts and further planting to provide a range of habitats to benefit local fauna. Appropriate landscape and habitat creation and management including provisions for dense/tall vegetation to screen adjacent sensitive areas from operational lighting.
- Adherence to British Standard (BS) 5837:2012: Trees in relation to design, demolition and construction (British Standards Institution, 2012) to avoid/reduce potential adverse effects on retained trees and hedgerows.
- Where there is a risk of animal entrapment, a means of escape would be installed into all excavations left open overnight.
- Timing of works to avoid sensitive periods, e.g. the hibernation period for amphibians and reptiles. Where practicable, vegetation with the potential to support breeding birds will not be removed during the breeding bird season (February to August inclusive). If any works become necessary during the breeding bird season, works will be supervised by an Ecological Clerk of Works who would advise on specific protection measures.
- Supervision of works to identify and avoid sensitive habitats (e.g. ponds and woodlands which may support protected species).

- Management of noise and vibration through methods such as: the selection and use of low noise and vibration machinery, avoidance of operations likely to cause significant disturbance during the most sensitive periods, bunding or screening of noisy activities.
- Identifying measures to control the spread of invasive species.
- Lighting layout and specification designed in accordance with current good practice to avoid and reduce potential adverse impacts of light spill.

8.7.8 Relevant documents will be produced to set out the measures and standards of work to be applied during the operational phase. These would be applied to monitor, manage and control likely significant adverse environmental effects associated with operation and maintenance activities.

8.7.9 Where impacts to European Protected Species, water voles and badgers are unavoidable a mitigation licence from Natural England will be sought. A project licence approach will be taken to capture impacts to all species and appropriate mitigation and compensation across the site.

8.8 Proposed scope of assessments

Likely significant effects requiring assessment (scoped in)

8.8.1 The likely significant effects on terrestrial biodiversity requiring assessment are presented in Table 8-11. Where potential effects may be specific to one or more zones of the Proposed Development and the relevant study area, this is identified in Table 8-11 (see Chapter 2: Project description, for further discussion of zones).

Table 8-11: Likely significant terrestrial biodiversity effects

Activity	Effect	Ecological feature	Zone
Construction			
All construction activities including enabling works, construction of structures/buildings, excavation and earthworks, demolition of structures/buildings, installation of pipelines and installation/diversion of utilities and services.	Loss of habitat (including through soil compaction).	Terrestrial habitats. Terrestrial flora. Features (habitats, flora) of designated sites.	All zones.
All construction activities including enabling works, construction of structures/buildings,	Degradation of habitat (including through soil compaction).	Terrestrial habitats. Terrestrial flora. Features (habitats, flora or fauna) of designated sites.	All zones and Middle Level to proposed reservoir transfer.

Activity	Effect	Ecological feature	Zone
excavation and earthworks, demolition of structures/buildings, installation of pipelines and installation/diversion of utilities and services.			
All construction activities including enabling works, construction of structures/buildings, excavation and earthworks, demolition of structures/buildings, installation of pipelines and installation/diversion of utilities and services.	Deposition of dust on vegetation, with potential for effects on plant physiological processes and possible changes in plant community composition.	Terrestrial habitats. Associated flora and fauna. Features (habitats, flora or fauna) of designated sites.	All zones and Middle Level to proposed reservoir transfer.
All construction activities including enabling works, construction of structures/buildings, excavation and earthworks, demolition of structures/buildings, installation of pipelines and installation/diversion of utilities and services.	Reduction in the availability of foraging and commuting habitat and resting or breeding sites.	Terrestrial fauna. Features (fauna) of designated sites.	All zones and Middle Level to proposed reservoir transfer.
All construction activities including enabling works, construction of structures/buildings, excavation and earthworks, demolition of structures/buildings, installation of pipelines and installation/diversion of utilities and services.	Killing or injury through the removal of occupied resting or breeding sites. Killing or injury through road traffic collisions.	Terrestrial fauna. Features (fauna) of designated sites.	All zones.
All construction activities including enabling works,	Severance of habitats resulting in	Terrestrial habitats. Terrestrial flora and fauna.	All zones.

Activity	Effect	Ecological feature	Zone
construction of structures/buildings, excavation and earthworks, installation of pipelines and installation/diversion of utilities and services.	fragmentation and loss of ecological connectivity.	Features (habitats, flora or fauna) of designated sites.	
All construction activities and associated construction traffic including enabling works, construction of structures/buildings, excavation and earthworks, demolition of structures/buildings, installation of pipelines and installation/diversion of utilities and services.	Disturbance – noise and vibration.	Terrestrial fauna. Features (fauna) of designated sites.	All zones and Middle Level to proposed reservoir transfer.
All construction activities and associated construction traffic including enabling works, construction of structures/buildings, excavation and earthworks, demolition of structures/buildings, installation of pipelines and installation/diversion of utilities and services.	Disturbance – lighting.	Bats. Badger. Birds. Great crested newt. Otter. Terrestrial invertebrates. Hedgehog. Features (fauna) of designated sites.	All zones and Middle Level to proposed reservoir transfer.
All construction activities and associated construction traffic including enabling works, construction of structures/buildings, excavation and earthworks, demolition of structures/buildings,	Disturbance – human presence.	Terrestrial fauna. Features (fauna) of designated sites.	All zones and Middle Level to proposed reservoir transfer.

Activity	Effect	Ecological feature	Zone
installation of pipelines and installation/diversion of utilities and services.			
All construction activities including enabling works, construction of structures/buildings, excavation and earthworks, installation of pipelines and installation/diversion of utilities and services.	Introduction and/or spread of invasive species.	Terrestrial habitats. Terrestrial flora and fauna. Features (habitats, flora or fauna) of designated sites.	All zones and Middle Level to proposed reservoir transfer.
All construction activities including enabling works, construction of structures/buildings, excavation and earthworks, installation of pipelines and installation/diversion of utilities and services.	Change in surface water quality/quantity, including salinity.	Terrestrial habitats. Terrestrial flora and fauna. Features (habitats or flora) of designated sites.	All zones and Middle Level to proposed reservoir transfer.
All construction activities including enabling works, construction of structures/buildings, excavation and earthworks, installation of pipelines and installation/diversion of utilities and services.	Change in groundwater quality/quantity.	Terrestrial habitats. Terrestrial flora and fauna. Features (habitats or flora) of designated sites.	All zones and Middle Level to proposed reservoir transfer.
All construction activities and associated construction traffic including enabling works, construction of structures/buildings, excavation and earthworks, demolition	Air pollution from vehicle emissions resulting in nutrient enrichment and/or acidification of habitats, leading to possible changes in plant community composition. Dust from vehicle movements with	Terrestrial habitats. Associated flora and fauna. Features (habitats, flora or fauna) of designated sites.	All zones and Middle Level to proposed reservoir transfer.

Activity	Effect	Ecological feature	Zone
of structures/buildings, installation of pipelines and installation/diversion of utilities and services.	potential for effects on plant physiological processes and possible changes in plant community composition.		
Landscaping and reinstatement.	Increase in biodiversity value through creation and management of suitable habitats.	Terrestrial habitats. Associated flora and fauna.	All zones and Middle Level to proposed reservoir transfer.
Operation			
Operation of reservoir.	The water body provides additional foraging habitat and resting or breeding sites.	Birds. Bats. Otter. Water vole. Toad.	Reservoir site.
Operation of the reservoir, water treatment and inter-catchment treatment works and transfers via pipeline.	Disturbance and displacement of fauna sensitive to lighting resulting in indirect loss of foraging and commuting habitat or resting or breeding sites.	Bats. Badger. Birds. Great crested newt. Otter. Terrestrial invertebrates.	All zones and Middle Level to proposed reservoir transfer.
Operation of the reservoir, water treatment and inter-catchment treatment works and transfers via pipeline.	Change in water chemistry and water regime.	Terrestrial habitats. Terrestrial flora and fauna. Features (habitats, flora or fauna) of designated sites.	All zones and Middle Level to proposed reservoir transfer.
Operation of the reservoir, water treatment and inter-catchment treatment works and transfers via pipeline.	Change in surface water quality/quantity, including salinity.	Terrestrial habitats. Terrestrial flora and fauna. Features (habitats, flora or fauna) of designated sites.	All zones and Middle Level to proposed reservoir transfer.
Operational traffic movements.	Air pollution from maintenance traffic vehicle emissions resulting in nutrient enrichment and/or acidification of habitats, leading to possible changes in plant community composition. Dust from vehicle movements with	Terrestrial habitats. Associated flora and fauna. Features (habitats, flora or fauna) of designated sites.	All zones and Middle Level to proposed reservoir transfer.

Activity	Effect	Ecological feature	Zone
	potential for effects on plant physiological processes and possible changes in plant community composition.		
Operational traffic movements.	Potential killing or injury of fauna through road traffic collisions.	Terrestrial fauna. Features (fauna) of designated sites.	All zones.
Operational traffic movements.	Disturbance – noise, vibration, lighting, human presence.	Terrestrial flora and fauna. Features (flora or of designated sites.	All zones and Middle Level to proposed reservoir transfer.
Recreational use of the reservoir site.	Species disturbance – noise from plant such as heating and ventilation units at the visitor hub.	Birds. Bats. Riparian mammals.	Reservoir site.
Recreational use of the reservoir site.	Species disturbance – human presence (visual and noise).	Terrestrial fauna	Reservoir site.
Recreational use of the reservoir site.	Introduction and/or spread of invasive species.	Terrestrial habitats. Terrestrial flora and fauna. Features of designated sites.	Reservoir site.
Management of habitat creation.	Increase in biodiversity value through management of habitats created.	Terrestrial habitats. Associated flora and fauna.	All zones and Middle Level to proposed reservoir transfer.
Abstraction of water from Middle Level system, Ouse Washes or River Great Ouse and Counter Drain (Nene) and operation of open channel transfers.	Change in water chemistry and water regime.	Terrestrial habitats. Terrestrial flora and fauna. Features (habitats, flora or fauna) of designated sites.	Sources of supply and upstream water transfers.
Abstraction of water from Middle Level system, Ouse Washes or River Great Ouse and Counter Drain (Nene) and operation of open channel transfers.	Change in surface water quality/quantity, including salinity.	Terrestrial habitats. Terrestrial flora and fauna. Features (habitats, flora or fauna) of designated sites.	Sources of supply and upstream water transfers.

Activity	Effect	Ecological feature	Zone
Abstraction of water from Middle Level system, Ouse Washes or River Great Ouse and Counter Drain (Nene) and operation of open channel transfers.	Change in groundwater quality/quantity.	Terrestrial habitats. Terrestrial flora and fauna. Features (habitats, flora or fauna) of designated sites.	Sources of supply and upstream water transfers.

Effects not requiring assessment (scoped out)

8.8.2 In accordance with Design Manual for Roads and Bridges LA 105 (Highways England, 2019) all designated sites, ancient woodland and veteran trees within 200m of the affected road network (ARN) will be scoped in. Those sites not within 200m of the ARN will be scoped out.

8.8.3 The effects proposed to be scoped out of the terrestrial biodiversity assessment are detailed in Table 8-12.

Table 8-12: Potential effects to be scoped out of the terrestrial biodiversity assessment

Activity	Effect	Ecological Feature	Justification for scoping out	Zone
Construction				
All construction activities including enabling works, construction of structures/ buildings, excavation and earthworks, demolition of structures/ buildings, installation of pipelines and installation diversion of utilities and services.	All adverse effects on dormouse.	Dormice.	No records of dormouse within 2km of the Scoping boundary for all zones. This is scoped out of the ES as there is no impact pathway.	All zones and Middle Level to proposed reservoir transfer.
All construction activities including enabling works, construction of structures/ buildings, excavation and earthworks, demolition of structures/ buildings, installation of pipelines and installation/ diversion of utilities and services.	Loss of habitat (including through soil compaction) within the Middle Level to proposed reservoir transfer.	Terrestrial habitats. Terrestrial flora. Features (habitats, flora) of designated sites.	No construction is proposed within the Middle Level to proposed reservoir transfer and as a result, no direct impacts such as loss of habitat will occur. This is scoped out of the ES as there is no impact pathway.	Middle Level to proposed reservoir transfer.
All construction activities and associated construction traffic including enabling works, construction of structures/ buildings, excavation and earthworks, demolition of structures/ buildings, installation of pipelines and installation/ diversion of utilities and services.	Killing or injury through the removal of occupied resting or breeding sites within the Middle Level to proposed reservoir transfer.	Terrestrial fauna. Features (fauna) of designated sites.	No construction is proposed within the Middle Level to proposed reservoir transfer and as a result, no direct impacts such as killing or injury of fauna will occur. This is scoped out of the ES as there is no impact pathway.	Middle Level to proposed reservoir transfer.
All construction activities including enabling works,	Severance of habitats resulting in	Terrestrial habitats.	No construction is proposed within the Middle Level to	Middle Level to proposed

Activity	Effect	Ecological Feature	Justification for scoping out	Zone
construction of structures/ buildings, excavation and earthworks, demolition of structures/ buildings, installation of pipelines and installation diversion of utilities and services.	fragmentation and loss of ecological connectivity within the Middle Level to proposed reservoir transfer.	Terrestrial flora and fauna. Features (habitats, flora or fauna) of designated sites.	proposed reservoir transfer and as a result, no direct impacts such as habitat severance or fragmentation will occur. This is scoped out of the ES as there is no impact pathway.	reservoir transfer.
Operation				
All operation activities.	All adverse effects on dormouse.	Dormice.	No records of dormouse within 2km of the Scoping boundary for all zones. This is scoped out of the ES as there is no impact pathway.	All zones and Middle Level to proposed reservoir transfer.
Operation of the reservoir, water treatment and inter-catchment treatment works and transfers via pipeline.	Disturbance and displacement of fauna resulting in indirect loss of foraging and commuting habitat or resting or breeding sites.	Reptiles. Water vole. Other notable species (brown hare, toad, harvest mouse, polecat).	These species are not particularly susceptible to lighting disturbance. Operational disturbance is not anticipated to significantly impair normal activity patterns. As a result, effects have been scoped out as the scale of impact is unlikely to be significant and also there are unlikely to be cumulative effects.	All zones.
Operation of reservoir, water treatment works, transfers via pipeline (including inter-catchment treatment pumping stations and service reservoirs)	Mortality and injury of species.	Badger. Bats. Birds. Great crested newt. Riparian mammals. Reptiles.	There would be no risk of mortality and injury during operation of the pipeline and so this impact pathway would be scoped out of the ES.	All zones and Middle Level to proposed reservoir transfer.

Activity	Effect	Ecological Feature	Justification for scoping out	Zone
and operation of open channel transfers.		Terrestrial invertebrates. Other notable species (brown hare, toad, hedgehog, harvest mouse, polecat).	Mortality could arise through collision with operational vehicle movements/machinery related to the reservoir, pumping stations and service reservoirs. This would be particularly relevant for notable species that are active during the daytime, for example brown hare. However, the likelihood of this is considered to be negligible and the likelihood that significant effects could arise from this specific pathway (either alone or cumulatively with other sources) is so low that a specific assessment is not proposed.	
Operation of transfers via pipeline (including pumping stations and service reservoirs).	Habitat loss/ modification.	Terrestrial habitats. Terrestrial flora and fauna. Features (habitats, flora or fauna) of designated sites.	There will be no habitat loss or modification during routine operation of the pipeline. As such, significant effects could not arise, and so operational habitat changes are scoped out of the ES.	Sources of supply and upstream water transfers, and downstream treated water transfers.
Recreational use of the reservoir site.	Species disturbance – noise from plant such as heating and ventilation units at the visitor hub.	Badger. Great crested newt. Reptiles. Terrestrial invertebrates.	Species are not particularly susceptible to noise disturbance. Operational disturbance is not anticipated to significantly impair normal activity patterns.	Reservoir site.

Activity	Effect	Ecological Feature	Justification for scoping out	Zone
		Other notable species (brown hare, toad, hedgehog, harvest mouse, polecat).	As a result, effects have been scoped out as the scale of impact is unlikely to be significant and also there are unlikely to be cumulative effects.	
Management of habitat creation (e.g. wetlands, lagoons, etc.).	Disturbance – noise, vibration, visual stimuli from the use of plant and machinery used to maintain the new habitats.	Terrestrial fauna.	Noise and vibration sources involved in these activities will be similar to the agricultural noise and vibration sources already prevalent in the area. Therefore, the likelihood that significant effects could arise from this specific pathway (either alone or cumulatively with other sources) is so low that a specific assessment is not proposed.	All zones and Middle Level to proposed reservoir transfer.
Operation of open channel transfers.	Disturbance – noise, vibration.	Terrestrial fauna.	No noise or vibration sources have been identified that are likely to have significant effects therefore this is scoped out.	Sources of supply and upstream water transfers.
Operation of the reservoir, recreational use of the reservoir site, abstraction of water from Middle Level system, Ouse Washes or River Great Ouse and Counter Drain (Nene), inter-catchment treatment and	Disturbance – vibration.	Terrestrial fauna.	It is assumed that any plant capable of generating vibration will be mounted appropriately with suitable isolation. Any vibration transmitted into the ground is likely to be negligible. As a result, effects have been	All zones.

Activity	Effect	Ecological Feature	Justification for scoping out	Zone
operation of transfers via pipeline.			scoped out as the scale of impact is unlikely to be significant and also there are unlikely to be cumulative effects.	
Operation of transfers via pipeline.	Disturbance – noise, vibration from operation of the pipeline.	Terrestrial fauna.	The valves are unlikely to generate sufficient noise to be perceptible at local receptors. This has been scoped out as the scale of impact is unlikely to be significant.	Sources of supply and upstream water transfers, and downstream treated water transfers.
Operation of transfers via pipeline and inter-catchment treatment.	Disturbance – noise, vibration from transformers and emergency generators.	Terrestrial fauna.	The transformers at the new associated water infrastructure are likely to result in negligible noise effects at all off-site receptors, based upon observations from existing pumping stations. Emergency generators will only be tested for around 30 minutes once a month during daytime hours and only used in an emergency to ensure water supplies are maintained during any power outage. This has been scoped out as the scale of impact is unlikely to be significant.	Sources of supply and upstream water transfers, water treatment works and downstream treated water transfers.

Activity	Effect	Ecological Feature	Justification for scoping out	Zone
Abstraction of water from Middle Level system, Ouse Washes or River Great Ouse and Counter Drain (Nene) and operation of open channel and pipeline transfers.	Introduction and/or spread of invasive species.	Terrestrial habitats. Terrestrial flora and fauna. Features (habitats, flora or fauna) of designated sites.	Inter-catchment treatment plants will be constructed and in operation at locations of water abstraction and therefore prevent the spread of INNS. As a result, this has been scoped out as there is no impact pathway.	Sources of supply and upstream water transfers, and downstream treated water transfers.

8.9 Assessment methodology

8.9.1 The study area set out in Section 8.4 will be kept under review as the design and consultation processes progress, and the Proposed Development is refined. Therefore, the study area may evolve as appropriate. The evolution of the study area will be clearly communicated in the ES and discussed with relevant consultees.

8.9.2 The proposals, described in Chapter 2: Project description, will also evolve and be further developed as the design process progresses. Whilst the methodologies that are set out within this chapter are not anticipated to change, the scope of assessment will be kept under review as design progresses.

Additional baseline information required

8.9.3 Species records for the sources of supply and upstream water transfers zone, water treatment works zone, and downstream treated water transfers zone will be requested from relevant local and national groups and Data Reports commissioned from the British Trust for Ornithology.

8.9.4 Field surveys for species at the reservoir site are ongoing and the survey methodologies are described in Appendix 8.1.

8.9.5 The following field surveys will be undertaken for the sources of supply and upstream water transfers zone, water treatment works zone, and downstream treated water transfers zone in 2024 and 2025:

- Badger.
- Bat roosts and static detectors.
- Breeding and non-breeding birds.
- GCN (habitat suitability index of suitable water bodies, eDNA and population estimates where necessary).
- Habitats: UKHab, National Vegetation Classification, hedgerows, condition assessment and River Condition Assessment (MoRPh).
- Otter.
- Water vole.

Assessment years

8.9.6 Assessment years are the same as set out in Chapter 6: EIA approach and methodology.

Construction assessment methodology

8.9.7 The EcIA will be undertaken following the methodology detailed in the CIEEM guidelines (CIEEM, 2018).

8.9.8 The impact assessment process involves:

- Determination of importance of ecological features.
- Identifying and characterising impacts and their effects.
- Incorporating measures to avoid and mitigate negative impacts and effects.
- Assessing the significance of any residual effects after mitigation.
- Identifying appropriate compensation measures to offset any significant residual effects.
- Identifying opportunities for ecological enhancement.

8.9.9 Due to the nature of the Proposed Development in terms of its size and geographic extent, the impact assessment will be split down into the four operational zones described in Chapter 2: Project description. It is anticipated that the nature of some of the impacts for the reservoir site will be different to the water transfers and associated water infrastructure. An overall impact assessment will then be made in relation to each specific matter of the Proposed Development.

Terminology

8.9.10 The term 'ecological feature' is used throughout the EcIA to cover habitats, species and ecosystems that may be affected by the Proposed Development. The term 'impact' is defined as actions resulting in changes to an ecological feature (this can be positive, neutral or negative). For example, the construction activities of a development removing a hedgerow. The term 'effect' is defined as the outcome to an ecological feature from an impact. For example, the effects on a dormouse population from loss of a hedgerow.

Determination of importance of ecological features

8.9.11 Determining the importance of ecological features relies heavily on professional judgement and includes consideration of factors such as size, conservation status and quality, as well as the policy and legal significance. Importance is measured against published selection criteria where available and with reference to published lists.

8.9.12 According to the CIEEM guidelines (CIEEM, 2018), ecological features might also be important because they play a key functional role in the landscape as 'stepping stones' for migratory species to move during their annual migration cycle, as well as for species to move between sites, to disperse populations to new locations, to forage, or move in response to climate change.

8.9.13 The following characteristics contribute to the importance of ecological features:

- Naturalness.
- Animal or plant species, sub-species or varieties that are rare or uncommon, either internationally, nationally or more locally, including those that may be seasonally transient.

- Ecosystems and their component parts, which provide the habitats required by important species, populations and/or assemblages.
- Endemic species or locally distinct sub-populations of a species.
- Habitats that are rare or uncommon.
- Habitats that are effectively irreplaceable.
- Habitat diversity.
- Size of habitat or species population.
- Habitat connectivity and/or synergistic associations.
- Habitats and species in decline.
- Rich assemblages of plants and animals.
- Large populations of species or concentrations of species considered uncommon or threatened in a wider context.
- Plant communities (and their associated animals) that are considered to be typical of valued natural/semi-natural vegetation types, including examples of naturally species-poor communities.
- Species on the edge of range, particularly where their distribution is changing as a result of global trends and climate change.

8.9.14 It should be noted that some species are subject to legal protection that varies through the year, e.g. birds have special protection during the breeding season, or that does not relate to conservation status, e.g. badgers are protected primarily on animal welfare grounds. Where protected species are present and there is potential for a breach of legislation, those features should be considered as 'important' features. INNS, e.g. animals and plant species listed under Schedule 9 of the WCA, will also be considered to ensure that land-use changes do not result in a contravention of legislation.

8.9.15 The CIEEM guidelines recommend that the importance of each ecological feature is described in terms of its geographic frame of reference. Consideration of impacts at all scales is important, and essential if objectives for no net loss of biodiversity and maintenance of healthy ecosystems are to be achieved. The following definitions will be used for geographic frame of reference for the value of ecological features that may be affected by the Proposed Development:

- International. For example, SAC, SPA and Ramsar sites.
- National. For example, SSSI.
- Regional. For example, habitats or species populations considered to be important in East Anglia.
- County. For example, LWS and CWS.

- Local. For example, habitats or species populations considered to be important within the relevant planning authority area.

8.9.16 It is anticipated that due to the size and geographic extent of the Proposed Development, there will be differences in importance of ecological features between the various components of the Proposed Development. For example, there is likely to be landscape-scale variability in GCN populations due to the distribution of ponds and habitat suitability.

Characterisation of ecological impacts

8.9.17 The following characteristics will be used when describing ecological impacts and effects:

- Direct, indirect and cumulative nature of impacts.
- Positive or negative.
- Extent.
- Magnitude.
- Duration (short-term, long-term, temporary or permanent).
- Frequency and timing.
- Reversibility.

Operational assessment methodology

8.9.18 The assessment methodology for the operational phase is the same as the methodology described for the construction phase above.

Significance of effects

8.9.19 According to the CIEEM guidelines (CIEEM, 2018) '*for the purpose of EcIA 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' … or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wider range of scales from international to local. A significant effect is an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project.*'

8.9.20 The geographic scale of significance of an effect may not be the same as the geographic context in which the feature is considered important. For example, an effect on a species which is on a national list of species of principal importance for biodiversity may not have a significant effect on its national population. Effects can be considered significant at all scales from international to local, as identified above.

Habitats Regulations Assessment

8.9.21 A report to inform the HRA will be produced, as required by the Conservation of Habitats and Species Regulations 2017 (as amended) for plans and projects likely to have a significant effect on a European or internationally important site for nature conservation either alone or in-combination with other plans or projects. If likely significant effects cannot be avoided, an appropriate assessment will be required to determine whether the Proposed Development may have an adverse effect on the integrity of the site.

8.9.22 The report to inform the HRA will be included within the application for development consent as the 'HRA Report' and referred to within the relevant ES chapter for terrestrial biodiversity.

8.10 Assessment assumptions and limitations

8.10.1 The following assumptions and limitations have been noted during the scoping stage:

- Where feasible, nationally recognised standard survey methodologies have been adopted to reduce limitations for ecological evaluation and impact assessment.
- Baseline ecological desk and field survey commenced in 2023. The baseline data provided is up to date at the time of reporting (June 2024). Ongoing field and desk studies may highlight other ecological features with the potential to be significantly affected which have not been identified or considered significant at the scoping stage.
- The absence of a species record in desk study data does not necessarily reflect an absence of that species from the same area. Similarly, the distribution of species records may reflect survey effort rather than an accurate distribution of that species. This potential limitation will be addressed through the field surveys.
- Specific limitations relevant to each type of field survey will be reported in baseline reports once surveys are complete.
- Desk study records were returned as high and low resolution data. High resolution records were those with grid references of 100m or greater precision, compared with the low-resolution records with grid references of 1km or lesser precision. This reduced the accuracy of distances from the Proposed Development to key ecological features, particularly with regards to the low resolution data.
- The ARN associated with the construction and operation of the Proposed Development is unknown at present and study areas may increase once the ARN is defined.

9 Aquatic biodiversity

9.1 Introduction

9.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to aquatic biodiversity. The chapter should be read in conjunction with the description of the project, as presented in Chapter 2: Project description.

9.1.2 For the aspect of aquatic biodiversity, the matters (i.e. ecological features) of interest are as follows:

- Statutory and non-statutory designated nature conservation sites.
- Habitats.
- Protected and notable species.
- Invasive non-native species (INNS).

9.1.3 The approach to the assessment is based on guidance provided in the Guidelines for Ecological Impact Assessment in the UK and Ireland (Chartered Institute of Ecology and Environmental Management (CIEEM)), 2018.

9.1.4 This chapter considers the aquatic environment, with the terrestrial environment covered separately in Chapter 8: Terrestrial biodiversity.

9.1.5 This chapter has links with other chapters, including Chapter 7: Landscape and visual effects; Chapter 10: Water resources and flood risk; Chapter 15: Air quality; and Chapter 18: Noise and vibration. These chapters provide further detail on some features and impact pathways that are addressed in this chapter.

9.1.6 In addition to the Development Consent Order (DCO), other consenting requirements that are likely to be needed for the Proposed Development are:

- Protected species mitigation licences.
- Site of Special Scientific Interest (SSSI) assent.
- Habitats Regulations Assessment (HRA).
- Environmental permit for treatment and/or disposal of invasive non-native plant material.

9.2 Legislation, policy and guidance requirements

9.2.1 Legislation, policy and guidance which has informed the scope of the assessment presented within this chapter, is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

9.2.2 Table 9-1 identifies the relevant policy in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural

Affairs (Defra), 2023) and the National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities (DLUHC), 2023) for aquatic biodiversity.

9.2.3 Given the landscape scale of the Proposed Development, consideration will be given to emerging Local Nature Recovery Strategies, which, as a requirement of the Environment Act 2021, should be in place across the whole of England by March 2025. Their aim is to set out how best to deliver nature recovery across England. This will help relevant planning authorities to incorporate nature recovery objectives to target action for Biodiversity Net Gain (BNG), and other delivery levers and funding sources. The interim Nature Recovery Network for Fenland has been prepared by the Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire (Baker, 2023). The Cambridgeshire and Peterborough Local Nature Recovery Strategy (Cambridgeshire County Council, 2024) and Norfolk Local Nature Recovery Strategy (Norfolk County Council, 2024) are being developed.

Table 9-1: UK policy relevant to aquatic biodiversity

Relevant UK policy	Relevance to assessment
NPS for Water Resources Infrastructure (Defra, 2023)	Section 4.3 of the NPS sets out the main policies relevant to biodiversity and nature conservation. Paragraph 4.3.1 states that, '*government policy for the natural environment is set out in the Environmental Improvement Plan. The Plan sets out the vision for enhancing biodiversity, by supporting healthy well-functioning ecosystems and establishing more coherent ecological networks that are more resilient to current and future pressures*.' Paragraph 4.3.5 states that, '[…] *the applicant should ensure that the Environmental Statement clearly sets out any likely significant effects on internationally, nationally and locally designated sites of ecological or geological conservation importance (including those outside England) on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity. The assessment should consider the full range of potential impacts on ecosystems including habitats, protected species or species identified as being of principal importance to biodiversity and nature conservation.*' Paragraph 4.3.11 states that, '[…] *development should avoid significant harm to biodiversity and geological conservation interests and provide net gains for biodiversity*'.

Relevant UK policy	Relevance to assessment
NPPF (DLUHC, 2023)	Section 15 of the NPPF sets out the Government's over-arching planning policies in relation to conserving and enhancing the natural environment. Paragraph 180 states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains where possible. This includes protecting and enhancing sites of biodiversity value, commensurate with their statutory status and identified quality, together with priority habitats and priority species.
The UK Marine Policy Statement (Defra, 2020)	This policy sets out the framework for undertaking decisions which affect the marine environment. Section 2.6.4 sets out the policy with respect to ecological and chemical water quality resources.

9.3 Stakeholder engagement

9.3.1 In preparing this EIA Scoping Report, there have been discussions and engagement with several stakeholders. This engagement has related to the following:

- Obtaining baseline information and initial engagement about the Proposed Development.
- Agreeing survey methodologies.
- Discussing habitat creation and BNG.

9.3.2 Dialogue with stakeholders will continue throughout the pre-application period as part of the EIA process. A summary of the engagement undertaken so far is presented in Table 9-2, along with proposed future engagement.

Table 9-2: Engagement with stakeholders

Stakeholder	Engagement undertaken to date	Proposed future engagement
Natural England and Environment Agency	**27 April 2023** – Meeting to discuss proposed ecology survey methodology for reservoir site. Scope of ecological field survey work for baseline data gathering to cover the varied requirements of HRA, Ecological Impact Assessment (EcIA), BNG and species licensing.	Ongoing engagement as required.
	27 June 2023 – Meeting to discuss watercourse BNG approach. Discussion about indicative baseline lengths for each watercourse type, impacts, and	

Stakeholder	Engagement undertaken to date	Proposed future engagement
	indicative creation and/or enhancement requirements to achieve minimum 10% BNG. Outlined challenges and constraints in achieving target (especially for agricultural drainage ditches) and proposals to deviate from metric methodology.	
	07 November 2023 – Review of feedback following issue of survey methodology to resolve/agree on methods and approaches to ecology survey.	
Environment Agency; Cambridgeshire County Council; Lincolnshire County Council; Natural England; Fenland Council; Black Sluice Internal Drainage Board (IDB); Wildfowl and Wetlands Trust (WWT); Lincolnshire Wildlife Trust; and Middle Level Commissioners	**30 November 2023** – a Technical Working Group (TWG) for biodiversity. The purpose of the TWG was to introduce the Proposed Development and to discuss and gain feedback on study areas, baseline data gathered so far, and planned approach to future data collection.	Further TWG engagement as required.
	23 April 2024 – A TWG for biodiversity. The purpose of this TWG was to present the proposed methodology for EIA Scoping and BNG, and to discuss ongoing and proposed ecological surveys and sharing of ecological data with stakeholders.	
Natural England; Environment Agency; North Kesteven District Council; RSPB; Cambridgeshire County Council; Black Sluice Internal Drainage Board (IDB); WWT; Lincolnshire County Council; Lincolnshire Wildlife Trust; Natural Cambridgeshire;	**08 December 2023** – A TWG for Habitat Design. The purpose of the TWG was to introduce the Proposed Development and to share approach and gain feedback on habitat design/creation proposals.	
	05 June 2024 – A TWG for Habitat Design. The purpose of this TWG was to provide an update on habitat design principles, BNG, protected species and habitat design, share knowledge and expertise, and present illustrative emerging designs.	

Stakeholder	Engagement undertaken to date	Proposed future engagement
Fenland District Council; and East Mercia Rivers Trust		
Royal Society for the Protection of Birds (RSPB)	**14 – 15 May 2024** – Ouse Fen, Ouse Washes and Nene Washes site walkover. Discussion about the lessons learnt and management of these sites, which could be applied to habitat design and management of the reservoirs.	Engagement throughout the design process to utilise RSPB local experience and expertise regarding design of wetland habitat.
Natural England	**15 May 2024** – Great Fen (including Holme Fen and Woodwalton Fen) site walkover. Discussion about the lessons learnt and management of the site, which could be applied to habitat design and management of the new reservoirs.	Engagement throughout the design process to utilise Natural England local experience and expertise regarding design of wetland habitat.
Huntingdonshire District Council; Peterborough City Council; Cambridgeshire County Council; South Cambridgeshire District Council; Norfolk County Council; and Fenland District Council	**15 May 2024** – Local Authority Associated Infrastructure Forum (LAAIF). The LAAIF meeting covered an overview of the Proposed Development, EIA scoping methodologies, an introduction to the biodiversity team, and summary of key elements (EcIA, HRA, BNG and habitat design and legislative compliance for protected species).	Further LAAIF as required.
WWT and The Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire (WTBCN)	**16 May 2024** – Grafham Water site visit. Discussion about the lessons learnt and management of the site which can apply to reservoir habitat design/management.	Engagement throughout the design process to utilise local experience and expertise regarding

Stakeholder	Engagement undertaken to date	Proposed future engagement
		design of wetland habitat.
Middle Level Commissioners	**21 May 2024** – meeting to discuss Middle Level Commissioners operations and biodiversity initiatives plus opportunities to exchange survey data.	Ongoing engagement as required.
Marine Management Organisation	No engagement undertaken to date.	Engagement required when clarity on estuarine/marine impacts understood.

9.3.3 Engagement will be undertaken with the following additional stakeholders during the pre-application period:

- Other local wildlife groups and individuals that might hold data for protected and/or other notable species.
- Other organisations and landowners where there may be opportunities to deliver biodiversity enhancements.

9.3.4 Stakeholder engagement specifically relating to the HRA is also being undertaken. This is not included in Table 9-2 as it will be reported in the HRA Evidence Plan.

9.4 Study area

9.4.1 The study area for aquatic biodiversity has been defined based on the Scoping boundary and the available information for the Proposed Development. This includes the information on construction and operational phases, as described in Chapter 2: Project description. The identified study area is considered to be sufficiently broad to allow for the ongoing refinement of the Proposed Development; however, if through the iterative design process it becomes necessary to expand the study area, then the assessment of potential significant ecological effects will be extended accordingly.

9.4.2 The study areas for different features are defined by the Zone of Influence (ZoI), which is the spatial scale at which aquatic ecological features could be potentially affected as a result of the Proposed Development and associated activities. CIEEM guidance (2018) recommends that all aquatic ecological features that occur within a ZoI for a project are investigated. Areas within the ZoI may include:

- Areas directly within the Scoping boundary which could be affected by land access or other challenges.
- Areas beyond the Scoping boundary where impacts could occur.

9.4.3 The ZoI is likely to extend beyond the Scoping boundary, for example, where there are ecological or hydrological links beyond the Scoping boundary, and will vary for different ecological features depending on their sensitivity to environmental change.

9.4.4 For all ecological features, the study area extends beyond any likely ZoI to provide contextual information on local status based on desk study records.

9.4.5 The upstream transfer, known as the Middle Level to proposed reservoir, covers the network of watercourses comprising the Middle Level system. The Middle Level system is not within the Scoping boundary, but it is considered within this assessment as there could be impacts on ecological features. The study area defined for this element is smaller than that for the four zones within the Scoping boundary because there are no works or land acquisition proposed within the footprint. The main watercourses that comprise the footprint of the Middle Level system are shown on Figure 8.1 within Chapter 8: Terrestrial biodiversity.

9.4.6 The study areas are defined in Table 9-3.

Table 9-3: Summary of study areas

Ecological feature	Study area for four zones within the Scoping boundary	Study area for Middle Level to the proposed reservoir transfer
Statutory designated sites of international/European importance, including Ramsar sites, Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)	The whole of the water catchment where any activity lies within or from which water will be abstracted or discharged.	The whole of the water catchment from which water will be abstracted or discharged.
Statutory designated sites of national importance, including Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs)	Within 2km from the Scoping boundary, unless hydrologically linked, or if in the Impact Risk Zone (IRZ) when the study area will increase to the potential ZoI.	Within 50m from the footprint, unless hydrologically linked.
Statutory designated sites of county importance (Local Nature Reserves (LNRs))	LNR within 2km of the Scoping boundary.	Within 50m from the footprint.
Non-statutory designated sites of county or local nature conservation importance, including County Wildlife Sites (CWS), and Wildlife Trust Reserves (WTR)	Within 2km from the Scoping boundary.	Within 50m from the footprint.
Fish	Within 10km from the Scoping boundary.	Within 50m from the footprint.

Ecological feature	Study area for four zones within the Scoping boundary	Study area for Middle Level to the proposed reservoir transfer
Aquatic invertebrates	Within 2km from the Scoping boundary.	Within 50m from the footprint.
Macrophytes	Within 2km from the Scoping boundary.	Within 50m from the footprint.
INNS	Within 2km from the Scoping boundary for animal species. Within the footprint of the Scoping boundary for plant species.	Within 50m from the footprint.

9.4.7 The field survey areas for the reservoir site are defined in Table 9-4 and have been agreed with Natural England through consultation regarding Appendix 8.1: Ecology survey methodology. The survey extents for the associated water infrastructure and transfers are yet to be agreed for the species surveys; however, it is assumed these will be the same as the reservoir site for all habitat surveys.

Table 9-4: Summary of field survey areas for reservoir site

Ecological feature	Survey areas
Habitats	Statutory designated sites (Ramsar, SAC, SPA, SSSI, NNR and LNR) and non-statutory designated sites (CWS and WTR) within the Scoping boundary. Other nature conservation sites within a 100m buffer. Habitats of Principal Importance (HPI) (or potential HPI) with a hydrological connection to the Proposed Development within a 250m buffer. Ponds (under 2ha, without hydrological connectivity) within a 50m buffer. Modular River Physical (MoRPh) habitat survey within the Scoping boundary.
Fish	Habitat suitability assessment of fish habitat across all water features in the Scoping boundary. Targeted electric fishing/fyke/environmental DNA (eDNA)/trawl surveys of water features within the Scoping boundary.
Aquatic invertebrates	Standard invertebrate kick sampling/Buglife ditch sampling/airlift surveys of water features within the Scoping boundary.
Macrophytes	Standard Water Framework Directive (WFD) macrophyte surveys/Buglife ditch sampling of water features within the Scoping boundary.

9.5 Baseline data collection

9.5.1 The baseline conditions for the aquatic biodiversity study areas, as defined in Section 9.4, are presented in Section 9.6 and represent a review of the currently available data. The data collated to date was obtained via desk studies, and habitat and species field surveys. Data collection to inform the baseline of the assessment is ongoing. The data described below provide a robust context for the scoping of the assessments.

Desk studies

9.5.2 The desk study has collected information on the following:

- Non-statutory designated sites (Local Wildlife Sites and County Wildlife Sites).
- Protected and priority habitats and species.
- SSSI Impact Risk Zones (IRZs).
- Statutory designated sites (Ramsar, SAC, SPA, SSSI, NNR and LNR).

9.5.3 The desk study has drawn on the following sources:

- Aerial photography and Ordnance Survey maps.
- Environment Agency Catchment Data Explorer (Environment Agency, 2023).
- Environment Agency Ecology and Fish Data Explorer (Environment Agency, 2024).
- Important invertebrate areas (Buglife, n.d.).
- International and national statutory designated sites (Ramsar, SAC, SPA, SSSI and NNR) (Natural England, 2023a).
- National Biodiversity Network (NBN) Atlas (available under OGL, CCO or CC-BY licences).
- Non-statutory designated sites and species records received in April 2023 via Anglian Water's Service Level Agreement:
  - Cambridgeshire & Peterborough Environmental Records Centre (CPERC).
  - Herts Environmental Records Centre (HERC).
  - Norfolk Biodiversity Information Service (NBIS).
  - Northamptonshire Biodiversity Records Centre (NBRC).
- Open-source information available online regarding fish species (e.g. Angling Trust, Rivers Trusts), and.
- SSSI IRZ open data (Natural England, 2023b).

9.5.4 For statutory and non-designated sites, the following buffers were used to categorise the distance of the sites from the Scoping boundary:

- 0m (within).
- 1m – 30m.
- 31m – 100m.
- 101m – 250m.
- 251m – 2,000m.
- Within the operational water catchment (>2km) (only applies to Ramsar, SAC, SPA, and SSSI).

Field surveys

9.5.5 Field surveys commenced at the reservoir site in 2023 and are ongoing. Details of the survey methodologies that have been agreed with Natural England are provided in Appendix 8.1: Ecology survey methodology.

9.5.6 Results of the field surveys undertaken at the reservoir site are summarised in the baseline for the reservoir site section of this chapter.

9.5.7 The survey methodologies for the associated water infrastructure and transfers will use best practice methods and be similar to those for the reservoir site. Field surveys for the associated water infrastructure and transfers started in August 2024.

9.6 Baseline conditions

9.6.1 The baseline conditions for aquatic biodiversity are described below for the study area (defined in Section 9.4). These have been established from the data collection described in Section 9.5.

9.6.2 The sources of supply and upstream water transfers zone are split into those elements, which are included within the Scoping boundary as they involve engineering works. The Middle Level to the proposed reservoir upstream water transfer is outside the Scoping boundary, as no engineering works are required.

9.6.3 There is an overlap between the sources of supply and upstream water transfers zone and the downstream treated water transfer zone to the south of the proposed reservoir. There is also an overlap between the reservoir site zone and the water treatment works zone. Therefore, there will be some duplication in these baseline sections where ecological features fall within both zones.

9.6.4 The field surveys at the reservoir site are well underway and habitat surveys are complete; therefore, for the EIA Scoping Report field survey data is used to inform the reservoir site baseline. The baseline for all other zones is based on desk study data only.

Baseline relevant to all zones

Statutory designated sites

9.6.5 The statutory designated sites within the study area of all zones of the Scoping boundary, as well as the transfer from the Middle Level to the proposed reservoir, are listed in Table 9-5. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions, and shown on Figure 8.1. Table 9-5 shows the distance from each zone, and where relevant, identifies the source of supply or transfer route. A full list of statutory designated sites is listed in Table 8-5 of Chapter 8: Terrestrial biodiversity.

Table 9-5: Statutory designated sites (aquatic receptors) within all study zones of Proposed Development

Distance from Scoping boundary				
Site (for reasons for designation see Appendix 8.2)	**Sources of supply and upstream water transfers zone**	**Reservoir site zone**	**Water treatment works zone**	**Downstream treated water transfers zone**
Ouse Washes SSSI	Within the Ouse Washes (River Delph).	>2km Within the Old Bedford and South Level and Cut-off Channel operational water catchments.	>2km Within the Old Bedford and South Level and Cut-off Channel operational water catchments.	251m – 2,000m
Ouse Washes SAC	Within the Ouse Washes (River Delph) to proposed reservoir transfer.	>2km Within the Old Bedford operational water catchment.	>2km Within the Old Bedford operational water catchment.	251m – 2,000m
Ouse Washes Ramsar	Within the Ouse Washes (River Delph).	>2km Within the Old Bedford and South Level and Cut-off Channel operational water catchments.	>2km Within the Old Bedford and South Level and Cut-off Channel operational water catchments.	251m – 2,000m
Ouse Washes SPA	Within the Ouse Washes.	>2km Within the Old Bedford and South Level and Cut-off Channel operational water catchments.	>2km Within the Old Bedford and South Level and Cut-off Channel operational water catchments.	251m – 2,000m

Distance from Scoping boundary				
Site (for reasons for designation see Appendix 8.2)	**Sources of supply and upstream water transfers zone**	**Reservoir site zone**	**Water treatment works zone**	**Downstream treated water transfers zone**
Nene Washes SSSI	Within the River Nene and its Counter Drain.	>2km Within the Middle Nene and Lower Nene operational water catchments.	>2km Within the Middle Nene and Lower Nene operational water catchments.	>2km Within the Middle Nene and Lower Nene operational water catchments.
Nene Washes SAC	Within the River Nene and its Counter Drain.	>2km Within the Lower Nene operational water catchment.	>2km Within the Lower Nene operational water catchment.	>2km Within the Lower Nene operational water catchment.
Nene Washes Ramsar	Within the River Nene and its Counter Drain.	>2km Within the Middle Nene and Lower Nene operational water catchments.	>2km Within the Middle Nene and Lower Nene operational water catchments.	>2km Within the Middle Nene and Lower Nene operational water catchments.
Nene Washes SPA	Within the River Nene and its Counter Drain.	>2km Within the Middle Nene and Lower Nene operational water catchments.	>2km Within the Middle Nene and Lower Nene operational water catchments.	>2km Within the Middle Nene and Lower Nene operational water catchments.
The Wash SSSI	Within the water catchment (>2km).	>2km Within The Wash Inner and the River Great Ouse operational water catchments.	>2km Within The Wash Inner and the River Great Ouse operational water catchments.	>2km Within The Wash Inner and the River Great Ouse operational water catchments.
The Wash and North Norfolk Coast SAC	Within the water catchment (>2km).	>2km Within The Wash Inner and the River Great Ouse	>2km Within The Wash Inner and the River Great Ouse	>2km Within The Wash Inner and the River Great Ouse

Distance from Scoping boundary				
Site (for reasons for designation see Appendix 8.2)	**Sources of supply and upstream water transfers zone**	**Reservoir site zone**	**Water treatment works zone**	**Downstream treated water transfers zone**
		operational water catchments.	operational water catchments.	operational water catchments.
The Wash Ramsar	Within the water catchment (>2km).	>2km Within The Wash Inner and the River Great Ouse operational water catchments.	>2km Within The Wash Inner and the River Great Ouse operational water catchments.	>2km Within The Wash Inner and the River Great Ouse operational water catchments.

Non-statutory designated sites

9.6.6 Non-statutory sites within the study areas of the Scoping boundary are listed in Table 9-6. Site descriptions and reasons for designation are given in Appendix 8.2 and shown on Figure 8.2. Table 9-6 shows the distance from each zone, and where relevant, identifies the source of supply or transfer route. A full list of non-statutory designated sites is listed in Table 8-6 of the Terrestrial biodiversity chapter.

Table 9-6: Non-statutory designated sites (with aquatic receptors) within all study zones of the Proposed Development

Distance from Scoping boundary				
Site (for reasons for designation see Appendix 8.2)	**Sources of supply and upstream water transfers zone**	**Reservoir site zone**	**Water treatment works zone**	**Downstream treated water transfers zone**
Ouse Washes WTR	Within Ouse Washes (River Delph).	N/A	N/A	N/A
Stanground Wash WTR	Within River Nene and its Counter Drain.	N/A	N/A	N/A
River Great Ouse CWS	Within the River Great Ouse at Earith.	N/A	N/A	Intersects with the proposed reservoir to Madingley, via Bluntisham element.
Forty Foot Drain (East) CWS	Within Ouse Washes (River Delph).	Intersects	251m – 2,000m	251m – 2,000m

Distance from Scoping boundary				
Site (for reasons for designation see Appendix 8.2)	**Sources of supply and upstream water transfers zone**	**Reservoir site zone**	**Water treatment works zone**	**Downstream treated water transfers zone**
Sutton & Mepal Pumping Station Drains CWS	Within Ouse Washes (River Delph).	N/A	N/A	Intersects with the proposed reservoir to Madingley, via Bluntisham element.
Dog-in-a-Doublet Drain CWS	1m – 30m	N/A	N/A	N/A
Adderley and Storey's Bar Road Drains CWS	101m – 250m	N/A	N/A	N/A
Cat's Water Drain CWS	101m – 250m	N/A	N/A	N/A
Fletton Lake CWS	251m – 2,000m	N/A	N/A	N/A
Stanground Newt Ponds CWS	251m – 2,000m	N/A	N/A	N/A
Stanground Newt Ponds WTR	251m – 2,000m	N/A	N/A	N/A
St Ives – March Disused Railway (The Parks North) CWS	251m – 2,000m	N/A	N/A	Not identified within this zone.
Block Fen Gravel Pits CWS	251m – 2,000m	N/A	N/A	251m – 2,000m
Nene Washes Counter Drain (West) CWS	251m – 2,000m	N/A	N/A	N/A
Wimblington Common Gravel Pits CWS	N/A	0m	N/A	101m – 250m
Middle Fen CWS	N/A	N/A	N/A	Within Madingley via Bluntisham transfer route.

Baseline for sources of supply and upstream water transfers

Statutory designated sites

9.6.7 Statutory designated sites in the sources of supply and upstream water transfers zone are listed in Table 9-5 and shown on Figure 8.1. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

9.6.8 This zone of the Scoping boundary is within a number of SSSI IRZs with relevant sensitivities (Natural England, 2023b) comprising any discharge of water or liquid

waste that is discharged to ground (i.e. to seep away) or to surface water, such as a beck or stream.

Non-statutory designated sites

9.6.9 Non-statutory designated sites in the sources of supply and upstream water transfers zone are listed in Table 9-6 and shown on Figure 8.2. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

Habitats

Habitats of Principal Importance

9.6.10 The following aquatic HPI are recorded within and up to 2km from the Scoping boundary (Natural England, 2024):

- Coastal and floodplain grazing marsh.
- Lowland fens.
- Mudflats.
- No main habitat but additional habitats present.

Freshwater habitats

9.6.11 Watercourses identified as sources of supply and/or upstream water transfers are all Main River bodies, classified under the Water Framework Directive (WFD). A broad range of aquatic habitats are within 2km from the Scoping boundary. Further assessment of specific habitat types is programmed for 2025.

Fish

9.6.12 Desk study records from the Environment Agency Ecology and Fish Data Explorer (Environment Agency, 2024), indicates water bodies within the study area are dominated by cyprinid fish species.

9.6.13 The following protected fish species have been identified within the Scoping boundary. The catchments are known to provide suitable supporting habitat for spined loach (*Cobitis taenia*), with records confirming their presence in the Old Bedford River/River Delph, Counter Drain, Sixteen Foot Drain and Cranbrook Drain. Other notable fish species recorded in the study area include European eel (*Anguilla anguilla*), bullhead (*Cottus gobio*) and brown trout (*Salmo trutta*).

9.6.14 To complete the baseline and inform impact assessment, targeted fish surveys of sources of supply and upstream water transfers will be undertaken in 2025.

Aquatic invertebrates

9.6.15 Several species of notable aquatic invertebrates were identified from the Environment Agency Ecology and Fish Data Explorer (Environment Agency, 2024). The variable damselfly (*Coenagrion pulchellum*) was recorded on the Old Bedford River/River Delph, and the scarce chaser dragonfly (*Libellula fulva*) (RDB3 rare) have been recorded on both the Counter Drain and the Old Bedford River/River Delph. In addition, the water beetle (*Berosus luridus*) (RDB3 rare) has been recorded in

several watercourses, including the Forty Foot drain, whilst the cranefly (*Nephrotoma crocata crocata*) has been recorded in the Hundred Foot Drain.

9.6.16 To complete the baseline and inform impact assessment, targeted macroinvertebrate surveys of sources of supply and upstream water transfer will be undertaken in 2025.

Macrophytes

9.6.17 Several notable plant species associated with flood embankments and dyke habitats have been recorded throughout the study area, including European frogbit (*Hydrocharis morsus-ranae*), which has been recorded on Old Bedford River/River Delph, Sixteen Foot Drain and Forty Foot Drain. Pondweeds (*Potamogeton praelongus*) and (*Potamogeton friesii*) were also recorded on the Counter Drain and Sixteen Foot Drain.

9.6.18 To complete the baseline and inform impact assessment, targeted macrophyte surveys will be undertaken in 2025.

Invasive non-native animal species

9.6.19 Assessment is ongoing to understand the Invasive Non-Native Species (INNS) baseline related to the operational transfer of raw water.

Middle Level to proposed reservoir transfer

Statutory designated sites

9.6.20 Statutory designated sites are provided in Table 9-5 and shown on Figure 8.1. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

Non-statutory designated sites

9.6.21 Non-statutory designated sites are provided in Table 9-6 and shown on Figure 8.2. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

Habitats

Habitats of Principal Importance

9.6.22 The following HPI are recorded within the study area. Those marked with '*' are within the Scoping boundary:

- Coastal and floodplain grazing marsh*.
- Lowland fens*.
- Mudflats*.
- No main habitat but additional habitats present.

Baseline for the reservoir site

Statutory designated sites

9.6.23 Statutory designated sites are provided in Table 9-5 and shown on Figure 8.1. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

9.6.24 The study area falls within a number of SSSI IRZs with relevant sensitivities (Natural England, 2023b), comprising any discharge of water or liquid waste that is discharged to ground (i.e. to seep away) or to surface water, such as a beck or stream.

Non-statutory designated sites

9.6.25 Non-statutory sites located within the study area for the reservoir site zone of the Scoping boundary are provided in Table 9-6 and shown on Figure 8.2. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

Habitats

9.6.26 Over 80% of the reservoir site zone comprises cropland with the remaining UKHab Level 2 habitats made up of grassland (10%); urban and wetland habitats (both less than 2.5%); and scrub, lakes, sparsely vegetated land, and woodland and forest (covering less than 1% each). Further details are shown in Table 9-7 and mapped in Figure 8.4.

Table 9-7: Percentage area of aquatic habitats recorded in the reservoir site of the Scoping boundary

UKHab category	Habitat defined as an HPI?	Area present within the reservoir site (ha)	% cover of the reservoir site
f2a Lowland fens	No	0.1	<0.1
f2d Aquatic marginal vegetation	No	8.3	0.7
f2e Reedbeds	Yes	<0.1	<0.1
f2f Other wetlands	No	1.0	0.1
r1 Standing open water (excluding watercourses)	No	0.1	<0.1
r1a Eutrophic standing waters	No	0.5	<0.1
r1a6 Other eutrophic standing waters	No	1.0	0.1

9.6.27 A total of 288 ditch or canal watercourses (72.7km) and seven r2 Rivers and streams (5.9km), have been identified through desk study and field survey, excluding those scoped out on site. This is shown in Table 9-8.

Table 9-8: Linear aquatic habitats recorded in the reservoir site zone of the Scoping boundary

UKHab category	Habitat defined as an HPI?	Length present within the reservoir site (km)
r Rivers and lakes	No	0.1
r1 Standing open water and canals (watercourses)	No	72.7
r2 Rivers and streams	No	5.9

Habitats of Principal Importance

9.6.28 Lowland fen and coastal and floodplain grazing marsh were identified within the Scoping boundary during the desk study. However, during the field surveys, the lowland fen was found to be woodland with pockets of scrub grassland and reedbed. Coastal and floodplain grazing marsh identified in the desk study was surveyed as grassland without features, indicating floodplain grazing marsh.

Species

Fish

9.6.29 Habitat scoping was undertaken for all drains and rivers within the study area in 2023. Fish habitat suitability assessment has been completed in 2024 on nine Main River and 15 ditch sites. Surveys indicate a range of habitat types. Generally, the larger Main Rivers are suitable for a range of cyprinid species. The majority of smaller drains do not hold sufficient water to support important fish populations, but may be suitable for three-spined stickleback (*Gasterosteus aculeatus*).

9.6.30 There are historic records of cyprinid species from the Sixteen Foot and Forty Foot Drains bordering the reservoir site within the study area. Incidental records of fish from aquatic invertebrate sampling in 2024 indicate the presence of spined loach and three-spined stickleback, both reported infrequently from the Sixteen Foot and Forty Foot Drains.

9.6.31 Further surveys of the unnamed field drains within the reservoir site are proposed for September 2024. Additional surveys will be undertaken to understand the distribution of spined loach in water features connected to the Sixteen Foot and Forty Foot Drains.

Aquatic invertebrates

9.6.32 Environment Agency data is available for the Sixteen Foot and Forty Foot Drain surrounding the reservoir study area. Three invasive species have been reported (Table 9-10). Five species of conservation interest are reported from Environment Agency data: swan mussel (*Anodonta cygnea*); beetles (*Hygrotus versicolor* and Be*rosus luridus*); snail (*Stagnicola paulstris/fuscus/corvus*); and pea mussel (*Pisidium henslowanum*).

9.6.33 Surveys of the Sixteen and Forty Foot Drains bordering the reservoir and riverine features, such as substrate and flow characteristics within the reservoir site undertaken in 2023 and 2024, indicate an invertebrate community typical of highly modified water bodies, historically managed for navigation and agricultural drainage. No species of conservation interest have been identified from these surveys.

9.6.34 Further surveys of the unnamed field drains within the Scoping boundary of the reservoir site are proposed for Autumn 2024.

Macrophytes

9.6.35 The Environmental Records Centre data and field survey identified 14 notable aquatic species from the reservoir site zone of the Scoping boundary. Species and their status are shown in Table 9-9.

9.6.36 Further surveys of the unnamed drains crossing the reservoir site are proposed for Autumn 2024.

Table 9-9: Notable plant species recorded within the reservoir site Scoping boundary

Scientific name	Common name	Identified on desk study?	No. of field survey records	A Vascular Plant Red list for England (Stroh et al, 2014)	NERC Act 2006 – Section 41*	RPCC Cambridgeshire (v.c.29)**	CPASI***
Alisma lanceolatum	Narrow-leaved water plantain	Yes	0	No	No	Yes Declining in England	Yes
Alisma plantago-aquatica	Water plantain	No	35	No	No	Yes Declining	No
Butomus umbellatus	Flowering rush	No	1	No	No	Yes Vulnerable	No
Carex acutiformis	Lesser pond-sedge	No	3	No	No	Yes Vulnerable	No
Eleocharis acicularis	Needle spike-rush	Yes	0	Yes Near threatened	No	Yes Vulnerable	Yes
Equisetum fluviatile	Water horsetail	Yes	0	No	No	Yes Vulnerable	No
Hydrocharis morsus-ranae	Frogbit	Yes	6	Yes Vulnerable	No	Yes No status	Yes
Juncus conglomeratus	Compact rush	No	1	No	No	Yes Declining	No
Myriophyllum spicatum	Spiked water milfoil	Yes	7	No	No	Yes Vulnerable	No
Myriophyllum verticillatum	Whorl-leaf watermilfoil	No	5	Yes Near threatened	No	Yes No status	Yes
Nymphoides peltata	Fringed waterlily	Yes	0	No	No	Yes Vulnerable	Yes

Scientific name	Common name	Identified on desk study?	No. of field survey records	A Vascular Plant Red list for England (Stroh et al, 2014)	NERC Act 2006 – Section 41*	RPCC Cambridgeshire (v.c.29)**	CPASI***
Potamogeton lucens	Shining pondweed	Yes	5	No	No	Yes Vulnerable	Yes
Potamogeton perfoliatus	Perfoliate pondweed	No	2	No	No	Yes Vulnerable	No
Potamogeton pusillus	Lesser pondweed	No	8	No	No	Yes Vulnerable	No

Invasive Non-Native Species

9.6.37 Seven INNS were recorded during desk and field surveys. Species are shown in Table 9-10. The table also notes whether species are England Biodiversity Indicators (EBI) on the Register of Plants of Conservation Concern (RPCC) (Cambridgeshire) (BSBI, 2019), or classified under UK Technical Advisory Group (UKTAG). UKTAG classification denotes the potential of impact from INNS on native habitats and biota.

Table 9-10: Invasive non-native species recorded in the reservoir site Scoping boundary

Scientific name	Common name	Identified in desk study?	No. of field survey records	Wildlife and Countryside Act Schedule 9	Other lists
Elodea canadensis	Canadian waterweed	Yes	0	Yes	EBI UKTAG High
Elodea nuttallii	Nuttall's waterweed	Yes	2	Yes	EBI UKTAG High
Fallopia japonica	Japanese knotweed	Yes	0	Yes	RPCCC 3 EBI
Lemna minuta	Least duckweed	Yes	0	No	EBI UKTAG Unknown
Potamopygrus antipodarium	New Zealand snail	Yes	0	No	UKTAG Moderate
Cragonyx psuedogracilis/ floridanus	Shrimp	Yes	0	No	UKTAG Low
Dressenia polymorpha	Zebra mussel	No	4	Yes	UKTAG High

Baseline for the water treatment works

Statutory designated sites

9.6.38 Statutory designated sites are provided in Table 9-5 and shown on Figure 8.1. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

Non-statutory designated sites

9.6.39 Non-statutory designated sites are provided in Table 9-6 and shown on Figure 8.2. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

Habitats

Habitats of Principal Importance

9.6.40 There are no recorded aquatic HPI within the study area.

Species

Fish

9.6.41 There are no records of fish within the study area. A fish habitat assessment has been undertaken in 2024 of unnamed drains to the north of the proposed water treatment works. Fish habitat data is not available at the time of writing this EIA Scoping Report. Surveys of the water treatment works are proposed for 2025.

Aquatic invertebrates

9.6.42 There are no records of aquatic invertebrate monitoring sites within the study area. Surveys of the water treatment works are proposed for 2025.

Macrophytes

9.6.43 There are no records of macrophytes monitoring sites within the study area. Surveys of the water treatment works are proposed for 2025.

Invasive Non-Native Species

9.6.44 There are no records of INNS within the study area. Surveys of the water treatment works are proposed for 2025.

Baseline for downstream treated water transfers

Statutory designated sites

9.6.45 Statutory designated sites in the downstream treated water transfers zone of the Scoping boundary are provided in Table 9-5 and shown on Figure 8.1. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

Non-statutory designated sites

9.6.46 Non-statutory designated sites within the study area for the downstream transfers zone of the Scoping boundary are provided in Table 8-6 and shown on Figure 8.2. Site descriptions and reasons for designation are presented in Appendix 8.2: Designated site descriptions.

Habitats

Habitats of Principal Importance

9.6.47 The following aquatic HPI are recorded within 250m of the study area. Those marked with '*' are habitat types within the Scoping boundary:

- Coastal and floodplain grazing marsh*.
- Lowland fens*.
- Lowland meadows.
- Mudflats*.

- No main habitat but additional habitats present*.

Species

Fish

9.6.48 There are no records of fish monitoring sites within the study area. Surveys of the downstream water transfers are proposed for 2025.

Aquatic invertebrates

9.6.49 There are no records of aquatic invertebrate monitoring sites within the study area. Surveys of the downstream water transfers are proposed for 2025.

Macrophytes

9.6.50 There are no records of macrophytes monitoring sites within the study area. Surveys of the downstream water transfers are proposed for 2025.

Invasive Non-Native Species

9.6.51 There are no records of INNS within the study area. Surveys of the downstream water transfers are proposed for 2025.

Future baseline

9.6.52 Future baseline for aquatic biodiversity will include impacts from factors, such as climate change, changes in land/agricultural management and future developments. These may result in habitat loss, fragmentation, changes in botanical species, composition of habitats, and the local distribution of faunal species.

9.6.53 Watercourses within the study area are predominantly historically modified for drainage and navigation. As such, watercourses are likely to be retained by landowners in their current state and may be subject to routine management activities.

9.6.54 Long-term impacts from climate change could affect the species composition and types of habitat in and around the study area, and therefore types and diversity of fauna. Species could be affected by the change in temperatures, making it harder for them to adapt; this could lead to the dominance of certain species, for example, some INNS could be favoured by climate change.

9.6.55 Climate change is expected to have wide-ranging impacts on aquatic freshwater ecology. Temperature increases in rivers and water bodies may lead to higher biomass and altered water quality in watercourses, potentially changing the potential effects of the Proposed Development on aquatic ecosystems. These warmer conditions could also foster the spread of invasive species and cause shifts in fish populations, as species respond to higher water temperatures. During drier summers and drought periods, wetland habitats may experience reduced water levels, stressing aquatic flora and fauna. Hotter, drier summers may increase the risk of low-dissolved oxygen and fish deaths. Conversely, wetter winters and more intense rainfall events could result in severe floods, potentially uprooting emergent vegetation and damaging fish spawning grounds through increased flows and

settling of suspended solids from more turbid waters. Further details can be found in Chapter 17: Climate resilience, of this EIA Scoping Report.

9.6.56 Chapter 23: Cumulative effects, will identify the proposed developments that are anticipated to be constructed prior to the construction of the Proposed Development. As such, these developments would form part of the future baseline for assessment within the EIA. Where this presents a change to the current baseline specific to aquatic biodiversity, this will be considered within the EIA.

9.7 Design and mitigation

Design

9.7.1 The design of the Proposed Development to date has taken consideration of environmental constraints and potential environmental effects. The design development process has sought to avoid and reduce potential adverse environmental effects on aquatic biodiversity, primarily through routing the Proposed Development to avoid sensitive ecological features as far as practicable, such as statutory and non-statutory sites and HPI.

9.7.2 The ongoing development of the design will incorporate embedded mitigation to avoid and reduce potential adverse effects, where feasible.

9.7.3 The design development process will include consideration of enhancement measures to improve the surrounding environment. Potential enhancements relevant to aquatic biodiversity that have been identified to date include the landscape masterplanning proposals, which aim to provide 10% BNG. The proposals will also take into consideration emerging Local Nature Recovery Strategies (LNRS) so that enhancements will align with the strategy objectives.

9.7.4 BNG will be quantified using the Defra Statutory Biodiversity Metric Calculation Tool (Defra, 2024), and it is anticipated that BNG may be reported outside of the ES within the application for development consent, to provide transparency from any necessary mitigation identified in relation to likely significant effects to aquatic biodiversity.

Mitigation

9.7.5 Documents presenting the approach to mitigation will be produced, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. These measures would be applied to mitigate likely adverse significant effects, including aquatic biodiversity effects. Biodiversity considerations will also inform the process for developing construction methods and components, such as those relating to avoiding and reducing vegetation removal, and seeking to avoid more sensitive areas to limit the amount of habitat affected.

9.7.6 Ecological advice will inform the Proposed Developments design on an iterative basis, guiding the avoidance of potential impacts on ecological features wherever

possible. The protection and retention of habitats will be integral to the design, which will avoid or reduce potential adverse impacts to ecological features through careful siting and design.

9.7.7 Examples of good practice and essential mitigation relevant to aquatic biodiversity which could be incorporated include:

- Adherence to guidance for pollution prevention to avoid potential adverse impacts to the water quality of watercourses and water bodies.
- Landscape planting to reduce potential adverse noise and lighting impacts, and further planting to provide a range of habitats to benefit local fauna. Appropriate landscape and habitat creation and management, including provisions for dense/tall vegetation to screen adjacent sensitive areas from operational noise and lighting.
- Timing of works to avoid sensitive periods, e.g., the migratory and spawning period for fish. If any works become necessary during the fish spawning season, works will be agreed with the Environment Agency.
- Supervision of works to identify and avoid sensitive habitats (e.g., ponds and woodlands which may support protected species).
- Management of noise and vibration through methods, such as the selection and use of low noise and vibration machinery, avoidance of operations likely to cause disturbance during the most sensitive periods, and bunding or screening of noisy activities.
- Translocation of certain species where avoidance is not possible.
- To control the spread of invasive species, a Biosecurity Method Statement will be produced and implemented.
- Lighting layout and specification designed in accordance with current good practice to reduce potential adverse impacts of light spill.

9.7.8 Relevant documents will be produced to set out the measures and standards of work to be applied during the operational phase. These would be applied to monitor, manage and control potential adverse environmental effects associated with operation and maintenance activities.

9.8 Proposed scope of assessments

Likely significant effects requiring assessment (scoped in)

9.8.1 The likely significant effects on aquatic biodiversity requiring assessment are presented in Table 9-11. Where potential effects may be specific to one or more zones of the Proposed Development and the relevant study area, this is identified in Table 9-11 (see Chapter 2: Project description, for further discussion of zones).

Table 9-11: Likely significant aquatic biodiversity effects

Activity	Effect	Ecological feature	Zone
Construction			
Construction transportation (including within site and on the road network, includes potential rail, barge options)	Deposition of nitrogen and sulphur from vehicle emissions and dust from vehicle movements resulting in enrichment and/or acidification of HPIs, including those contained within statutory designated sites, leading to alteration of vegetation communities through changes in baseline conditions and the species they support.	Aquatic habitats. Aquatic flora and fauna. Features of sites designated for nature importance.	All zones: within and outside of the Scoping boundary.
	Disturbance – noise, vibration, lighting, human presence.	Aquatic fauna. Features of sites designated for nature importance.	
All construction activities	Degradation and/or loss of habitat (including through soil compaction).	Aquatic habitats. Aquatic flora and fauna. Features of sites designated for nature importance.	All zones: within and outside of the Scoping boundary.
	Reduction in the availability of foraging and commuting habitat, and resting or breeding sites.	Aquatic fauna. Features of sites designated for nature importance.	
	Killing or injury of fauna through the removal of occupied resting or breeding sites.	Aquatic flora and fauna. Features of sites designated for nature importance.	
	Loss of ecological connectivity through severance of habitats	Aquatic flora and fauna.	

Activity	Effect	Ecological feature	Zone
	resulting in fragmentation.	Features of sites designated for nature importance.	
	Deposition of dust resulting in enrichment of sensitive HPIs, including those within statutory designated sites, leading to alteration of flora through changes in baseline conditions and the species they support.	Aquatic habitats. Associated flora and fauna. Features of sites designated for nature importance.	
	Introduction and/or spread of invasive species.	Aquatic habitats. Aquatic flora and fauna. Features of sites designated for nature importance.	
	Disturbance – noise, vibration, lighting, human presence.	Aquatic fauna. Features of sites designated for nature importance.	
	Change in surface water quality/quantity, including salinity.	Aquatic habitats. Aquatic flora and fauna. Features of sites designated for nature importance.	
Landscaping and reinstatement	Positive increase in biodiversity value through creation and management of suitable habitats.	Aquatic habitats. Associated flora and fauna.	All zones.
Operation			
Operation of reservoir (including embankments,	Reservoir provides additional foraging and commuting habitat, and	Aquatic flora and fauna.	Reservoir site.

Activity	Effect	Ecological feature	Zone
buildings and access points)	resting or breeding sites.		
Operation of the reservoir, water treatment and inter-catchment treatment works and transfers via pipeline	Disturbance and displacement of fauna sensitive to lighting, resulting in indirect loss of foraging and commuting habitat, or resting or breeding sites.	Fish.	All zones.
	Habitat loss resulting from maintenance activities (for example dredging) or outfall works.	Aquatic flora and fauna.	All zones.
	Change in water quality arising from transfers (open or piped).	Aquatic flora and fauna.	All zones.
	Habitat loss and competition from INNS introduced from transfers and recreational use of assets.	Aquatic habitats. Associated flora and fauna.	All zones.
	Modification to flow regime and water depth.	Aquatic habitats. Associated flora and fauna.	All zones.
Operation of open water transfers	Modification to flow regime and water depth.	Aquatic habitats. Associated flora and fauna.	Sources of supply and upstream transfers.
Operational traffic movements (e.g. on the road network including staff and recreation visitors)	Deposition of nitrogen from vehicle emissions resulting in enrichment and/or acidification of HPIs, including those contained within statutory designated sites, leading to alteration of vegetation communities through changes in baseline conditions and the species they support.	Aquatic habitats. Associated flora. Features of sites designated for nature importance.	All zones: within and outside of the Scoping boundary.

Activity	Effect	Ecological feature	Zone
Management of habitat creation (e.g. wetland, lagoons, etc.)	Positive increase in biodiversity value through management of habitats created.	Aquatic habitats. Aquatic flora and fauna.	All zones.
Abstraction of water from Middle Level System, Ouse Washes or River Great Ouse and Counter Drain (Nene)	Change in water chemistry and water regime.	Aquatic habitats. Aquatic flora and fauna.	Sources of supply and upstream transfers.
	Change in surface water quality/quantity, including salinity.	Aquatic habitats. Aquatic flora and fauna. Features of sites designated for nature importance.	

Effects not requiring assessment (scoped out)

9.8.2 The effects proposed to be scoped out of the aquatic biodiversity assessment are detailed in Table 9-12.

Table 9-12: Potential effects to be scoped out of the aquatic biodiversity assessment

Activity	Effect	Ecological feature	Justification for scoping out	Zone
Construction				
No construction activities have been scoped out of the assessment.				
Operation				
Operation of open channel transfers	Mortality and injury of species.	Aquatic habitat. Fish. Aquatic invertebrate. Macrophytes.	The increased movement of water during open channel transfers will not result in mortality and injury to features so this impact pathway would be scoped out of the ES.	Sources of supply and upstream transfers.

Activity	Effect	Ecological feature	Justification for scoping out	Zone
Operation of open channel transfers	Disturbance – noise, vibration, visual stimuli.	Aquatic habitat. Fish. Aquatic invertebrate. Macrophytes.	There will be no changes to noise, vibration or visual stimuli during the operational phase. As such, significant effects could not arise, and so operational disturbance is scoped out of the EIA.	Sources of supply and upstream transfers.
Operation of open channel transfers	Loss of ecological connectivity through severance of habitats resulting in fragmentation.	Aquatic habitat. Fish. Aquatic invertebrate. Macrophytes.	There will be no changes to ecological connectivity during the operational phase. As such, significant effects could not arise, and so operational disturbance is scoped out of the EIA.	Sources of supply and upstream transfers.

9.9 Assessment methodology

9.9.1 The study area set out in Section 9.4 will be kept under review as the design and consultation processes progress, and the Proposed Development is refined. Therefore, the study area may evolve as appropriate. The evolution of the study area will be clearly communicated in the ES and Preliminary Environmental Information Report (PEIR), and discussed with relevant consultees.

9.9.2 The proposals, described in Chapter 2: Project description, will also evolve and be further developed as the design process progresses. Whilst the methodologies that are set out within this chapter are not anticipated to change, the scope of assessment will be kept under review as design progresses.

Additional baseline information required

9.9.3 Further species records will be collected from Natural England, local species groups and Middle Level Commissioners.

9.9.4 Field surveys for species at the reservoir site are ongoing and the survey methodologies are described in Appendix 8.1: Ecology survey methodology.

9.9.5 The following surveys will be undertaken for the associated water infrastructure and transfers in 2024 and 2025:

- Fish.
- Macroinvertebrates.
- Macrophytes.
- Modular River Survey.

Assessment years

9.9.6 Assessment years are the same as set out in Chapter 6: EIA approach and methodology.

Construction assessment methodology

9.9.7 The Ecological Impact Assessment (EcIA) will be undertaken following the methodology detailed in CIEEM guidelines (CIEEM, 2018).

9.9.8 The impact assessment process involves:

- Determining the importance of ecological features.
- Identifying and characterising impacts and their effects.
- Incorporating measures to avoid and mitigate negative impacts and effects.
- Assessing the significance of any residual effects after mitigation.
- Identifying appropriate compensation measures to offset significant residual effects.
- Identifying opportunities for ecological enhancement.

9.9.9 Due to the nature of the Proposed Development in terms of its size and geographic extent, the impact assessment will be split down into the four operational zones described in Chapter 2: Project description. It is anticipated that the nature of some of the impacts for the reservoir site will be different to the water transfers and associated water infrastructure. An overall impact assessment will then be made of the Proposed Development as a whole.

Terminology

9.9.10 The term ‘ecological feature’ is used throughout the EcIA to cover habitats, species and ecosystems that may be affected by the Proposed Development. The term ‘impact’ is defined as actions resulting in changes to an ecological feature (this can be positive, neutral or negative). For example, the construction activities of a development removing a drain. The term ‘effect’ is defined as the outcome to an ecological feature from an impact, for example, the effects on a fish population from loss of a drain.

Determination of importance of ecological features

9.9.11 Determining the importance of ecological features relies heavily on professional judgement and includes consideration of factors such as size, conservation status and quality, as well as the policy and legal significance. Importance is measured against published selection criteria where available, and with reference to published lists.

9.9.12 According to CIEEM (2018), ecological features might also be important because they play a key functional role in the landscape as 'stepping stones' for migratory species to move during their annual migration cycle, as well as for species to move between sites, to disperse populations to new locations, to forage, or move in response to climate change.

9.9.13 The following characteristics contribute to the importance of ecological features:

- Naturalness.
- Animal or plant species, sub-species or varieties that are rare or uncommon, either internationally, nationally or more locally, including those that may be seasonally transient.
- Ecosystems and their component parts, which provide the habitats required by important species, populations and/or assemblages.
- Endemic species or locally distinct sub-populations of a species.
- Habitats that are rare or uncommon.
- Habitats that are effectively irreplaceable.
- Habitat diversity.
- Size of habitat or species population.
- Habitat connectivity and/or synergistic associations.
- Habitats and species in decline.
- Rich assemblages of plants and animals.
- Large populations of species or concentrations of species considered uncommon or threatened in a wider context.
- Plant communities (and their associated animals) that are considered to be typical of valued natural/semi-natural vegetation types, including examples of naturally species-poor communities.
- Species on the edge of range, particularly where their distribution is changing as a result of global trends and climate change.

9.9.14 Where protected species are present and there is potential for a breach of legislation, those features should be considered as 'important' features. Legally controlled species, for example, animals and plant species listed under Schedule 9

of the Wildlife and Countryside Act 1981 (as amended), will also be considered to ensure that land use changes do not result in a contravention of legislation.

9.9.15 The CIEEM guidelines recommend that the importance of each ecological feature is described in terms of its geographic frame of reference. Consideration of impacts at all scales is important, and essential if objectives for no net loss of biodiversity and maintenance of healthy ecosystems are to be achieved. The following definitions will be used for geographic frame of reference for the value of ecological features that may be affected by the Proposed Development:

- International e.g. SAC, SPA and Ramsar.
- National e.g. SSSI.
- Regional e.g. habitats or species populations considered to be important in East Anglia.
- County e.g. LWS and CWS.
- Local e.g. habitats or species populations considered to be important within the relevant planning authority area.

9.9.16 It is anticipated that due to the size and geographic extent of the Proposed Development, there will be differences in the importance of ecological features between the various components of the Proposed Development. For example, there is likely to be landscape-scale variability in fish populations due to the distribution of suitable water features and habitat suitability.

Characterisation of ecological impacts

9.9.17 The following characteristics will be used when describing ecological impacts and effects:

- Direct, indirect and cumulative nature of impacts.
- Positive or negative.
- Extent.
- Magnitude.
- Duration (short-term, long-term, temporary or permanent).
- Frequency and timing.
- Reversibility.

Operational assessment methodology

9.9.18 The assessment methodology for the operational phase is the same as the methodology described for the construction phase above.

Significance of effects

9.9.19 According to the CIEEM guidelines (CIEEM, 2018), '*for the purpose of EcIA 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' … or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wider range of scales from international to local. A significant effect is an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project.*'

9.9.20 The geographic scale of significance of an effect may not be the same as the geographic context in which the feature is considered important. For example, an effect on a species which is on a national list of species of principal importance for biodiversity may not have a significant effect on its national population. Effects can be considered significant at a wide range of scales from international to local.

Habitats Regulations Assessment

9.9.21 A report to inform the HRA will be provided as required by the Conservation of Habitats and Species Regulations 2017 (as amended), for plans and projects likely to have a significant effect on a European or internationally-important site for nature conservation, either alone or in combination with other plans or projects. If likely significant effects cannot be avoided, an appropriate assessment will be required to determine whether the Proposed Development may have an adverse effect on the integrity of the site.

9.9.22 The report to inform the HRA will be included within the DCO application, and referred to within the relevant ES Chapter for Biodiversity.

Water Framework Directive

9.9.23 A Compliance Assessment will be undertaken to assess the potential for the Proposed Development to result in the deterioration of current ecological status, or prevent water bodies from attaining good ecological status (or potential for highly modified water bodies).

9.9.24 Aquatic biodiversity forms important quality elements of the WFD assessment, under the Water (Water Framework Directive) Regulations 2017, and data will be collected to support this assessment.

9.9.25 The WFD Compliance assessment will be included within the DCO application, and referred to within the relevant ES Chapter for Biodiversity.

9.10 Assessment assumptions and limitations

9.10.1 The following assumptions and limitations have been noted during scoping:

- Where feasible, nationally recognised standard survey methodologies have been adopted to reduce limitations for ecological evaluation and impact assessment.
- Baseline ecological desk and field survey commenced in 2023. The baseline data provided are up to date at the time of authoring this report (June 2024). The ongoing field and desk studies may highlight other ecological features with the potential to be significantly affected, which have not been identified or considered significant at the scoping stage.
- The absence of a species record in desk study data does not necessarily reflect an absence of that species from the same area. Similarly, the distribution of species records may reflect survey effort rather than an accurate distribution of that species. This potential limitation will be addressed through the field surveys.
- Specific limitations relevant to each type of field survey will be reported in baseline reports once surveys are complete.
- Desk study records were returned as high- and low-resolution data. High-resolution records were those with grid references of 100m or greater precision, compared with the low-resolution records with grid references of 1km or lesser precision. This reduced the accuracy of distances from the Proposed Development to key ecological features, particularly with regards to the low-resolution data.
- The affected road network associated with the construction and operation of the Proposed Development is unknown at present, and study areas may increase once the affected road network is defined.

10 Water resources and flood risk

10.1 Introduction

10.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to water resources and flood risk. The chapter should be read in conjunction with the description of the proposed reservoir and associated infrastructure, also referred to as the Proposed Development, as presented in Chapter 2: Project description.

10.1.2 For water resources and flood risk, the key receptors are:

- Surface water features, such as natural water bodies including Main Rivers (including tidal rivers), streams (ordinary watercourses) and lakes; artificial water bodies such as canals, ditches and reservoirs. Main Rivers are larger rivers and streams which are maintained and managed by the Environment Agency. Other rivers are called 'ordinary watercourses' and are maintained and managed by the Lead Local Flood Authorities (usually county councils, unitary councils, district councils or internal drainage boards (IDB)).
- Groundwater features, such as aquifers, springs, groundwater-dependent terrestrial ecosystems and abstractions, with associated Source Protection Zones (SPZ).
- Flooding to receptors such as people and properties from tidal, rivers, surface water, groundwater, drainage, canals and existing reservoirs.

10.1.3 Compliance with the requirement of The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, hereafter referred to as the WFD regulations, is also being considered. The WFD scoping is presented in Appendix 10.1 of this EIA Scoping Report. The WFD assessment will be submitted as part of the application for development consent.

10.1.4 Potential significant impacts on the water resources which support water dependent features, including those within designated nature conservation sites, are discussed in this chapter. However, the assessment of effects on these sites as a result of potential changes to water resources is discussed in Chapter 9: Aquatic biodiversity.

10.1.5 Potential impacts on groundwater levels which support or maintain scheduled monuments and other historic environments are discussed in this chapter. However, the assessment of effects on these sites as a result of potential changes to water resources, is discussed in Chapter 11: Historic environment.

10.1.6 A separate Flood Risk Assessment (FRA) will be carried out to identify the impact of the Proposed Development on flood risk. The FRA will be undertaken in line with the requirements of the National Policy Statement (NPS) and National Planning Policy Framework (NPPF). The assessment will follow the Environment Agency's

guidance, which includes allowances for the potential effects of future climate change. The results and conclusions from the FRA will be summarised in the Environmental Statement (ES). The assessment of the potential effects of the Proposed Development on major accidents and disasters, both man-made and natural hazards – including the management of the reservoir to avoid embankment breach/flood, is discussed in Chapter 22: Major accidents and disasters.

10.2 Legislation, policy and guidance requirements

10.2.1 Legislation, policy and guidance which has informed the scope of the assessment presented within this chapter, is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

10.2.2 Table 10-1 identifies the relevant policy in the NPS for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) and the NPPF (Department for Levelling Up, Housing and Communities (DLUHC), 2023) for water resources and flood risk.

Table 10-1: UK policy relevant to water resources and flood risk

Relevant UK policy	Relevance to assessment
NPS for Water Resources Infrastructure (Defra, 2023)	The NPS for Water Resources Infrastructure sets out '*the important part water resources nationally significant infrastructure projects contribute to providing a safe and resilient national water supply'. However, these developments can also have an adverse effect on the local water environment. Therefore, the NPS sets out that the 'environmental objectives for water bodies are set out in River Basin Management Plans and are legally binding*.' Section 4.7 sets out the main policies relevant to flood risk. This section provides that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk of flooding, whether existing or future. Where development is necessary, it should be made safe without increasing flood risk elsewhere. The layout of the development should apply the sequential test as part of site selection, and if required, the exception test, ensuring higher vulnerability receptors are located in areas of lower flood risk. Where necessary, mitigation measures should be developed to ensure the development is safe from flooding and will not increase flood risk elsewhere for the lifetime of the development, taking into account climate change. Section 4.15 sets out the main policies relevant to water quality and resources. This section sets out the requirement to consider potential effects on groundwater, inland surface water, transitional waters (estuaries), bathing and coastal waters. Section 4.15 also sets out the requirement to carry out a WFD assessment.

Relevant UK policy	Relevance to assessment
NPPF (DLUHC, 2023)	Section 14 of the NPPF sets out the policy on meeting the challenge of climate change, flooding and coastal change. It sets out the need to apply a sequential, risk-based approach to the location of development, taking into account all sources of flood risk and the current and future impacts of climate change, so as to avoid, where possible, flood risk to people and property. Section 15 sets out the policy around conserving and enhancing the natural environment. This includes preventing developments from contributing to unacceptable levels of water pollution, and where possible, helping to improve water quality.
The UK Marine Policy Statement (Defra, 2020)	This policy sets out the framework for undertaking decisions which affect the marine environment. Section 2.6.4 sets out the policy with respect to water quality and states that developments must seek to ensure no deterioration to WFD status or prevent compliance with WFD objectives. The policy also sets out the requirements to assess potential impacts of changes in water quality on designated bathing water and shellfish waters. Section 2.6.8 sets out the need to consider the implications of developments on flood risk, including activities such as dredging. Developments must be resilient to risks of coastal change, flooding and have no unacceptable impact on coastal change (including sediment movement).

10.3 Stakeholder engagement

10.3.1 In preparing this chapter of the EIA Scoping Report, there have been discussions and engagement with stakeholders. This engagement has principally related to the following:

- Obtaining baseline information for key datasets, such as water quality monitoring data or hydrological (flow) data, in addition to local knowledge of site conditions.
- Agreeing an approach to the assessment of significance. For example, meetings with the Environment Agency have been undertaken on the overarching flood risk principles, and on the sequential test approach.
- Agreeing future scenarios and assumptions associated with Flood Risk Assessment (FRA) to support the application for development consent.
- Agreeing the scope of future baseline studies to ascertain requirements for further data collection, including what additional studies are required, the methodology for how the data is collected, and the time period for supplementary data collection.

10.3.2 The dialogue with stakeholders will continue throughout the pre-application period as part of the EIA process. A summary of the engagement undertaken so far is presented in Table 10-2, along with proposed future engagement.

Table 10-2: Engagement with stakeholders

Stakeholder	Engagement undertaken to date	Proposed future engagement
Environment Agency	**Flood risk** **5 July 2023** – meeting to discuss the approach to FRA, overarching principles and key assumptions. **31 July 2023, 27 September 2023, 4 December 2023 and 29 April 2024** – meetings to discuss the future flood defence scenarios. **18 October 2023** – meeting to discuss sequential test approach. **8 April 2024** – meeting to discuss FRA scope.	Ongoing engagement on a regular basis to agree future baseline scenarios, model approach, application of sequential test (and, if required, exception test) and modelling outcomes.
	WFD **18 October 2023** – meeting to discuss planned evidence collection planning for the reservoir study area. **29 April 2024** – meeting to discuss water body boundaries for the existing dry section of the Forty Foot Drain and the Back River, and relevant baseline to be used for WFD. **14 May 2024** – meeting to discuss the proposed WFD mitigation strategy.	Update to evidence collection planning for the Proposed Development. Discussions on potential changes to water quality from transfers.
	Water quality **17 July 2024** – meeting to discuss the potential locations for the River Great Ouse and River Nene abstractions, and associated upstream water transfers to the reservoir via the Middle Level.	Discussions to agree assessment approach for permitting. Discussions on potential changes to water quality from upstream transfers.
Environment Agency and Natural England	**2 August 2023** – meeting to introduce the potential locations for the Counter Drain (Nene) abstraction. **7 August 2023** – meeting to introduce the potential locations for the River Great Ouse abstraction. **24 November 2023** – meeting to discuss the scope of works for the assessment	Ongoing discussions on progress on a regular basis, and inclusion of the Marine Management Organisation.

Stakeholder	Engagement undertaken to date	Proposed future engagement
	of impacts of abstraction on flows and levels. **23 January 2024** – meeting to discuss abstraction licensing arrangements with regards to flows and water levels. Discussions also included how the other schemes (e.g., Minworth, Grand Union Canal) could impact licensing arrangements. **28 February 2024, 24 April 2024, 17 May 2024, 19 July 2024** – meetings discussing the operations of the lower Nene abstractions and licensing of the Counter Drain (Nene) abstraction, including how the abstraction should be transferred to the Middle Level.	
Middle Level Commissioners	**12 October 2023** – meeting to discuss a new channel from Stanground to Forty Foot Drain, covering proposed bank raising and flood risk implication. **7 December 2023** – meeting to discuss long-term governance of the proposed reservoir and reservoir design, and integration into the landscape.	Ongoing engagement on progress on a regular basis.
Environment Agency, Natural England, Internal Drainage Board (IDB), Local authorities, Canal & Rivers Trust and Inland Waterways Association	**9 November 2023** – Technical Working Group (TWG) meeting to set out the assessment and design related to water resources and flood risk, including study areas, data collection and proposed surveys. **1 May 2024** – TWG meeting to provide an update on options appraisal for the associated water infrastructure and set out water resources, and flood risk scoping methodology.	Ongoing engagement on progress on a regular basis.
Borough Council of King's Lynn & West Norfolk, Norfolk County Council, Greater Cambridgeshire Partnership, Cambridgeshire County Council,	**15 May 2024** – Local Authorities associated infrastructure forum (LAAIF) meeting to provide an update on development of the associated water infrastructure, and set out water resources and flood risk scoping methodology.	Ongoing engagement on progress on a regular basis.

Stakeholder	Engagement undertaken to date	Proposed future engagement
Huntingdonshire District Council, Fenland District Council, South Cambridgeshire District Council and Peterborough City Council		

10.4 Study area

10.4.1 The study area for water resources and flood risk has been defined based on the identified Scoping boundary and information for the Proposed Development. This includes the information on construction and operational phases as described in Chapter 2: Project description. The identified study area is considered to be sufficiently broad to allow for the ongoing refinement of the Proposed Development. However, if required, this will be expanded to ensure there is appropriate coverage of all potential significant environmental effects.

10.4.2 The study area has been developed recognising the four operational zones listed below, and as described in Chapter 2: Project description.

- Sources of supply and upstream water transfers.
- Reservoir site.
- Water treatment works.
- Downstream treated water transfers.

10.4.3 Due to the proximity of the two zones and the consistency of the baseline conditions, the reservoir site and water treatment works zones are discussed throughout this chapter as one zone for water resources. For flood risk, the study area has not been defined recognising the four operational zones identified in Chapter 2: Project description, as the baseline conditions are presented at a broader regional and local level.

10.4.4 The study areas for the scoping assessment have been defined based on professional judgement and understanding of impact pathways. These are shown in Figure 10.1: Water resources and flood risk study area, and include the following:

- The study area for the surface water assessment of the reservoir site, water treatment works, and downstream treated water transfers is a 250m buffer from the Scoping boundary. This study area has been extended to a 1km buffer from the Scoping boundary for the sources of supply and upstream water transfers, and inter-catchment treatment works due to the potential changes in river flows, so that impacts along the wider hydrological pathways can be identified. The upstream transfers will occur via the Middle Level managed

watercourses. While the Middle Level catchment is not within the Scoping boundary, it is considered within the surface water assessment.

- The study area for the groundwater assessment in all zones is a 500m buffer around the Scoping boundary. This 500m buffer has been informed by the design of the Proposed Development and geological setting. However, a 5km buffer zone has been considered for the screening of groundwater abstraction sources, as groundwater abstractions can have a large capture area, and this ensures any potential impact to these abstractions is identified.
- The FRA will assess flood risk in the River Nene, River Great Ouse and Middle Level system across four flood models to their outfall into The Wash or associated tidal channel. The extent of the flood models covering the hydrological catchments of these rivers defines the study area for flood risk. Figure 10.1: Water resources and flood risk study area outlines the associated channels and flood model extents considered for the sources of supply and upstream water transfers, reservoir site and water treatment works. The FRA also covers at least 70 ordinary watercourse crossings for the downstream treated water transfers which do not have existing flood models. In this case, the pipeline corridor, as identified by the Scoping boundary, has been used to define the study area. The study area for groundwater flood risk within the FRA is as specified for the groundwater assessment above.

10.5 Baseline data collection

10.5.1 The baseline conditions for water resources and flood risk presented in Section 10.6, represent a review of existing available data. Data were collated via desk studies and field surveys. Data collection to inform the baseline of the assessment is ongoing. The data described below provide a robust context for the scoping of the assessments. The WFD scoping baseline is presented in Appendix 10.1 of this EIA Scoping Report.

Desk studies

10.5.2 The baseline data outlined in Table 10-3 was reviewed as part of the desk study exercise to inform the baseline condition assessment.

Table 10-3: Baseline data reviewed

Datasets to review	Source
Surface water features	
Statutory Main River map	Environment Agency (2024e)
Detailed river network	UK Centre for Ecology and Hydrology (2012)
Topographical mapping	Ordnance Survey (2024)
Surface water levels and/or flow data	Environment Agency (2024d), Anglian Water and IDB (2024#)
Water quality monitoring data	Environment Agency (2024c) and Anglian Water (2024)

Datasets to review	Source
Mapping and details of drainage networks	Middle Level Commissioners (2024)
Modular River Physical (MoRPh) surveys	Project specific
Abstractions and discharges	
Surface water licences and unlicensed private abstractions*	Environment Agency (licensed) (2024#) and Local Authority (unlicensed) (2024#)
Groundwater licences and unlicensed private abstractions* for reservoir site and water treatment works	Environment Agency (licensed) (2024#) and Local Authority (unlicensed) (2024#)
Groundwater licences and unlicensed private abstractions* for sources of supply and upstream water transfers and downstream treated water transfers	Environment Agency (licensed) (2024#) and Local Authority (unlicensed) (2024#)
Surface water and groundwater discharge permits	Environment Agency (2024#)
Geology and hydrogeology	
Aquifer extent (vertical and horizontal) and hydraulic parameters	Information held by Environment Agency, Anglian Water, British Geological Survey (BGS) (2023a and 1994), historical ground investigation (GI) reports
Groundwater levels	Environment Agency (2024d), project-specific Ground Investigations
Other data	
Nitrate vulnerable zones, SPZ**, groundwater vulnerability maps	Defra (2024)
Flood risk mapping	Environment Agency (2024a)
Risk of Flooding from Surface Water mapping	Environment Agency (2024a)
Risk from Reservoir flood mapping	Environment Agency (2024a)

Notes:
** Abstraction licences are required for abstractions of greater than 20m^3/d.*
*** Protected areas around groundwater sources used to supply drinking water. These zones are delineated as an indicator of risk from pollution. Works within these zones may require developers or operators to demonstrate that risks are acceptable.*
 # Data requested from source under Freedom of Information Act 2000.

10.5.3 Rainfall, river level and tidal level gauges were reviewed for the most recent storm events between 2020 and 2024, alongside evidence of the historical flood database. Full hydraulic modelling reviews were carried out for the existing flood models across the study area in accordance with the Environment Agency flood modelling standards and suitability for use. The representation and age of survey data used to assess bed and bank levels, flood defence conditions and climate change allowances will be considered to identify key areas for model updates and/or sensitivity testing during the flood risk assessment.

Field surveys

Surface water quality

10.5.4 The Applicant has established a monitoring programme to supplement existing monitoring data and provide a baseline for the watercourses that may be affected by the Proposed Development. These monitoring locations (shown in Figure 10.2: Existing and proposed water quality, flow and level monitoring locations) aim to provide water quality data to support the assessment. Further water quality monitoring will be carried out to supplement this monitoring programme, to provide sufficient data to characterise the baseline water quality of the water bodies potentially affected by the Proposed Development.

Hydromorphology

10.5.5 There is no existing third-party hydromorphology data available for the reservoir and water treatment works study area. Hydromorphology walkovers were undertaken in autumn 2023 and spring 2024 at key locations around the reservoir and water treatment works study area. This activity was completed to inform the baseline for hydromorphological condition of watercourses, to understand potential impacts, and inform potential mitigation. In addition, the results of MoRPh/ditch condition surveys will be used to complement the hydromorphology surveys.

Groundwater

10.5.6 A Phase 1 GI and geoenvironmental investigation of the Proposed Development was undertaken across some of the proposed reservoir and water treatment works zone between July and September 2023 (Geotechnics, 2024). A summary of the GI previously undertaken, is provided in Appendix 10.2: Groundwater baseline.

10.5.7 A groundwater features walkover survey was carried out within the reservoir and water treatment works study area during December 2023. This baseline survey was designed to identify key water features that may be affected by the Proposed Development and assess the status of possible groundwater dependent water bodies, including ponds, ditches and minor streams. A summary of the results from the water features survey is provided in Appendix 10.2: Groundwater baseline.

Flood risk

10.5.8 Bathymetric and cross-sectional surveys have been collected for key channels potentially affected by the upstream water transfers. These were completed in accordance with the Environment Agency National Survey Specifications (Environment Agency, 2021a).

10.5.9 Project-specific survey data were supplemented with the Environment Agency's 2022 bathymetric survey and the operational rules from the draft Ouse Washes (River Delph) water level management plan (WLMP) (Environment Agency, 2023b). This data was used to update the geometry of the models to existing conditions.

10.6 Baseline conditions

10.6.1 The baseline conditions for water resources and flood risk are described below for the four zones within the Scoping boundary (defined in Section 2.3). For flood risk, the baseline is similar across all zones and therefore this is discussed in the baseline relevant to all zones section. For water resources, the baseline varies between the different zones, but the reservoir site zone and the water treatment works zone are very similar, and as such, they have been considered together. The baseline conditions are as established from the data collection described in Section 10.5. The WFD scoping baseline conditions are presented in Appendix 10.1 of this EIA Scoping Report.

Baseline relevant to all zones

Flood risk

10.6.2 The Proposed Development crosses Flood Zones 2 and 3 in multiple locations, as shown on Figure 10.3: Flood Zones 2 & 3 and flood defences. Flood defences are present extensively across the study area (such as along the Forty Foot Drain and the Sixteen Foot Drain) and currently reduce the flood risk in more frequent events. The key types of receptors at risk from flooding include people, properties, agricultural land (including Grade 1 agricultural land), and environmentally-sensitive sites such as Sites of Special Scientific Interest (SSSIs), Special Protected Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar sites including, but not limited to, the Ouse Washes (River Delph) and Nene Washes.

10.6.3 The Middle Level Commissioners, who manage the watercourses across most of the Proposed Development area, have a current asset improvement scheme underway. This scheme will raise river banks and manage bed levels in order to provide protection against flood events up to an annual probability of 1.5% (i.e. a 1 in 66 chance of this event occurring in any particular year as calculated in 2018), known as the standard of protection. The flood risk baseline for the Proposed Development will take into account the changes in river banks and bed levels from this scheme. It is noted that this scheme will deliver this standard of protection up to the year 2050 but it does not take into account allowance for climate change. Therefore, this scheme is expected to provide protection against flood events up to an annual probability of 1.5%; however, this standard of protection is likely to reduce with the impact of climate change in the future baseline (see Future baseline section).

10.6.4 Flooding from Ouse Washes (River Delph) was predicted with an annual probability of flooding of 1% (i.e. there is a 1 in 100 chance of this flood event occurring in any given year) based on the defended flood models prior to the Ouse Washes (River Delph) bank improvement works in 2016. Following the completion of the Middle

Level Barrier Bank improvement works in 2022, the Middle Level Barrier is now predicted to provide protection to an annual probability of flooding of 0.1% event (i.e. there is a 1 in 1000 chance of this flood event occurring in any given year).

10.6.5 The water table in the IDB areas generally remains close to the surface, commonly maintained by the direct rainfall to the lowland IDB catchments. The water table is managed by the IDB pumping regime rather than groundwater inflow from either adjacent upland or regional aquifers, and is inherently considered in the IDB flood mapping. BGS 1:50,000 geological mapping (BGS, 2023), combined with the findings of the ongoing groundwater desk study, were assessed to consider groundwater flood risk outside of the IDB pumped areas.

10.6.6 National mapping of Risk of Flooding from Surface Water (RoFSW) (Environment Agency, 2024a) indicates that the downstream treated water transfer study area crosses over 70 ordinary watercourses in Flood Zone 1.

10.6.7 Nationally available flood risk maps from the Environment Agency on 'Risk of Flooding from Reservoirs' (Environment Agency, 2021a and 2021b) indicate that where the reservoir site and associated infrastructure are within Flood Zone 2, they are also within the flood extent from third-party reservoirs as artificial sources of flooding to the Proposed Development.

10.6.8 The residual risk of failure of the existing flood management assets across the catchments has the potential to increase flood risk to the reservoir main site and associated infrastructure within the areas influenced by the raised flood embankments.

10.6.9 Existing coastal flood defence breach maps (Environment Agency, 2024b) of The Wash coastline indicates that the reservoir site is not at risk from any potential coastal flood defence breaches. Flood defence breaches of the fluvial Ouse Washes Middle Level Barrier Bank could impact the reservoir site but to a lesser extent than any local flood defence breach from the Middle Level system.

Baseline for sources of supply and upstream water transfers

Hydrology

10.6.10 The study area for the sources of supply and upstream water transfers zone crosses the following surface water catchments: Nene (Islip to tidal), Counter Drain (Nene), Middle Level, River Great Ouse (Roxton to Earith) and Old Bedford River/River Delph (including The Hundred Foot Washes). Figure 10.4 illustrates these catchments.

10.6.11 The River Nene flows eastwards through Peterborough to the Dog-in-a-Doublet Sluice, which marks the tidal limit of the river before it ultimately drains to the North Sea beyond Wisbech. Approximately 7.4km upstream of this sluice, the River Nene diverges, with the southern tributary forming the Back River. The Back River flows approximately 1.1km to Stanground Sluice, after which it is known as Morton's Leam. The River Nene and Morton's Leam form the northern and southern boundaries, respectively, of the Nene Washes. Upstream of Stanground

Sluice is Stanground Lock, which provides navigational access into the Middle Level system via King's Dyke.

10.6.12 The Counter Drain (Nene) starts south-east of Peterborough and flows generally eastwards parallel to, and approximately 50m to the north of, the River Nene. The Anglian Water Flag Fen water recycling centre discharges into the Counter Drain (Nene). The Counter Drain (Nene) flows into the tidal River Nene approximately 250m downstream of the Dog-in-a-Doublet sluice.

10.6.13 The River Great Ouse flows in a north-easterly direction from Bedford towards Earith, where flows are conveyed to the North Sea via three main routes:

- South-eastwards via Hermitage Lock to the Old West River/Ely Ouse.
- North-eastwards via Earith Sluice to the Old Bedford River/River Delph.
- North-eastwards via the New Bedford River/Hundred Foot River (tidal limit of the Great Ouse).

10.6.14 The Ouse Washes is a complex, level-controlled system which receives flows from the Old Bedford River/River Delph to the north, and the New Bedford River to the south. The Ouse Washes (River Delph) are 33km long and 1.1km wide (approximately) at the widest point. Flows out of the Ouse Washes from the River Delph are predominantly controlled by Welmore Lake Sluice, at the downstream end of the Ouse Washes.

10.6.15 There are a number of existing gauging stations within this zone: 14 level gauging stations and nine flow gauging stations. Those used to characterise baseline flows and levels (as shown in Figure 10.2: Existing and proposed water quality, flow and level monitoring locations, and labelled by their reference number) include the following:

- Upstream River Nene to the proposed reservoir: Flow gauging at Stanground Ultrasonic (U33060), which monitors flow in the Middle Level (King's Dyke). The gauging station shows that flows from June 1992 to April 2023 varied between 0m^3/s and 2.03m^3/s, with an average of 0.51m^3/s.
- Upstream Ouse Washes (River Delph) to the proposed reservoir: Level gauging at Sutton Gault (E23752), which monitors water levels on the River Delph. The gauge shows water levels between March 1997 and May 2024 ranged between 0.29m and 4.03m, with an average of 1.29m. In addition, gauged level data is also available at Welches Dam (L33814) on the Counter Drain (Ouse)/Old Bedford River, and shows water levels between January 2011 and September 2023 ranged between 0.5m and 1.65m, with an average of 1.21m.
- Proposed pipeline transfer from the River Great Ouse at Earith to the proposed reservoir: The Offord Ultrasonic (U33026) is the closest gauging station to Earith, located approximately 28km upstream on the River Great Ouse. The Offord gauging station shows that flows from May 1997 to May 2024 ranged between 0m^3/s and 176m^3/s, with an average of 14m^3/s.

10.6.16 Proposed abstractions from the three potential sources of supply (River Great Ouse at Earith or Ouse Washes, Counter Drain (Nene) via River Nene, and the Middle Level system) have the potential to impact the hydrological regime of these watercourses. Hydrological modelling is ongoing to improve understanding of the flow and water levels in the existing systems, and how these may be impacted by the abstractions for the Proposed Development. The proposed abstraction regimes will be designed to minimise impacts on watercourses and will be regulated by the Environment Agency through abstraction licensing. Depending on the outcomes of this modelling on the extent of changes in flow/water level, the study area will be reviewed and revised if necessary.

10.6.17 Artificial influences exist across all of the catchments relevant to sources of supply and upstream water transfers zone, from licensed abstractions to discharges. One of the largest contributors is the Flag Fen water recycling centre. This flow is discharged to the Counter Drain (Nene) before it flows into the tidal River Nene.

Surface water quality

10.6.18 Within the surface water catchments covered by the sources of supply and upstream water transfers zone, 88 Environment Agency water quality monitoring sites (data from the Environment Agency, 2024c) were identified. These sites include freshwater river, ad hoc pollution investigation and saline monitoring locations. Of these, 18 sites were identified within a 3km radius of the abstraction, transfer and receiving watercourses (see Figure 10.4: Environment Agency water quality monitoring stations). However, only eight of these monitoring locations have sufficient monthly sampling records for a 12-month period or more between 2018 and 2023, for at least one of the determinands of interest. These determinands include ammoniacal nitrogen, biochemical oxygen demand (BOD), dissolved oxygen (DO), orthophosphate, temperature and pH level.

10.6.19 Anglian Water undertakes extensive monitoring of water quality in the River Great Ouse and River Nene catchments to support existing abstractions and discharges. Since July 2021, water quality data has been collected by the Applicant to build further understanding of baseline conditions within the watercourses that may be affected by the Proposed Development (as illustrated in Figure 10.5: The Applicant's water quality monitoring stations). Monitoring at these locations comprises a range of parameters required for water supply and WFD assessment.

10.6.20 Existing data provide a level of understanding of the baseline conditions, but additional monitoring will be undertaken. A review of the status of monitoring at existing sites will take place to determine a comprehensive and robust understanding of the baseline water quality conditions, and potential impacts from the Proposed Development.

Groundwater

Aquifer bodies

10.6.21 The aquifer categories identified within the study area are summarised in Table 10-4. A description of the aquifer categories is provided in Appendix 10.2: Groundwater baseline.

Table 10-4: Environment Agency-designated aquifer bodies intersecting the sources of supply and upstream water transfers study area

Geological unit	Environment Agency aquifer designation
Superficial geology	
Alluvium (clay, silt, sand and gravel)	Secondary A
Tidal Flat Deposits	Unproductive
Peat	Unproductive
Head	Secondary (Undifferentiated)
River Terrace Deposits (sand and gravel)	Secondary A/Unproductive (at Nene to Counter Drain (Nene) pumping station and pipeline (eastern option, near Levitt's Drove))
March Gravels Member	Secondary A
Oadby Member	Secondary (Undifferentiated)
Glaciofluvial deposits	Secondary A
Bedrock geology	
West Walton and Ampthill Clay Formation	Unproductive
Ampthill Clay Formation	Unproductive
Oxford Clay Formation	Unproductive
Kellaways Sand Member	Secondary A

Notes: Detailed descriptions of the lithology and distribution of these geological units are provided in Appendix 12.1: Geological summary.

10.6.22 The aquifer bodies within the study area are provided in Appendix 10.2: Groundwater baseline. While the Ampthill Clay Formation is designated as Unproductive, groundwater level data from the Proposed Development Phase 1 GI (Geotechnics, 2024) at the proposed transfer from the Ouse Washes (River Delph) to proposed reservoir, suggest that the upper weathered portion of the Ampthill Clay Formation is in hydraulic continuity with overlying superficial deposits, and could potentially form a groundwater flow pathway. Therefore, the upper weathered section of this bedrock will be considered in the groundwater assessment.

Protected areas and abstractions

10.6.23 Groundwater Dependent Terrestrial Ecosystems (GWDTE) and groundwater Nitrate Vulnerable Zones (NVZ) have been identified. The details of these protected areas are summarised in Table 10-5, and are presented in Figure 10.6: Groundwater features. No SPZs are located within the study area.

Table 10-5: Protected areas within the sources of supply and upstream water transfers study area

Designation	Name	Design element
GWDTE	Nene Washes (Whittlesey) (SSSI)	Transfer from River Nene and its Counter Drain to proposed reservoir, associated pumping station and Stanground Lock culvert.
	Ouse Washes (River Depth) (SSSI)	Transfer from Ouse Washes (River Delph) to proposed reservoir and Welches Dam pumping station.
	Woodwalton Fen (SSSI, SAC, Ramsar site)	River Nene to Middle Level open water transfer.
NVZ (groundwater)	Huntingdon River Gravels – NVZ ID. G144	Proposed pipeline transfer from the River Great Ouse at Earith Transfer to proposed reservoir and River Great Ouse pumping station.

10.6.24 Information on licensed groundwater abstractions within a 5km radius of the Scoping boundary has been obtained from the Environment Agency. This identified 59 groundwater abstractions within the 5km radius, which are detailed in Appendix 10.2: Groundwater baseline (and presented in Figure 10.6: Groundwater features). None of these abstractions are located within the Scoping boundary or study area.

10.6.25 No data on unlicensed groundwater abstractions are available at the time of reporting. Data has been requested from the Environment Agency and local authorities to support the future EIA.

Hydraulic properties

10.6.26 A summary of the aquifer permeability test, carried out as part of the Proposed Development Phase 1 GI (Geotechnics, 2024), is provided in Appendix 10.2: Groundwater baseline.

10.6.27 Scoping is currently underway for GI across the sources of supply and upstream water transfers study area. This will include in-situ permeability testing within shallow groundwater monitoring wells.

Groundwater flow and levels

10.6.28 As part of the Phase 1 GI (Geotechnics, 2024), groundwater monitoring has been carried out at four locations along the transfer from the Ouse Washes (River Delph) to proposed reservoir study area. Groundwater level monitoring is ongoing, and a summary of the groundwater level data measured between September 2023 and February 2024 is presented in Appendix 10.2: Groundwater baseline.

10.6.29 Multiple historical phases of GI and groundwater monitoring have taken place at the Flag Fen archaeological site by Anglian Water (Endeavour Drilling, 2023). Groundwater level datasets from these phases of GI were not available at the time of reporting, but will be retrieved from archive for use in the Environmental Statement. A summary of the data available from these investigations is set out in Appendix 10.2: Groundwater baseline.

Groundwater quality

10.6.30 There are no Environment Agency groundwater quality monitoring sites within the study area. The closest monitoring point is located 2.1km west of the proposed pipeline transfer from the River Great Ouse at Earith, and is installed within the River Terrace Deposits (Secondary A aquifer). No groundwater quality data is available from GI locations at the Flag Fen site (Nene to Counter Drain (option near Fengate) pumping station) (Endeavour Drilling, 2023).

Baseline for the reservoir site and water treatment works

Hydrology

10.6.31 The reservoir site and water treatment works zones will be located within the Middle Level system. This system is level managed, with water levels controlled by the Middle Level Commissioners via a network of raised managed drains and pumping stations. Water levels in the low field drains surrounding the reservoir site are controlled by the Curf and Wimblington combined IDB, and the Nightlayers IDB.

10.6.32 The Middle Level system comprises two distinct drainage systems: a field drainage system and a raised managed system. The field drainage system consists of multiple small field drainage ditches and channels which drain the low-lying land within the Middle Level catchment. In various locations across the catchment, the water from these low-level drains is collected and pumped into a series of raised managed watercourses. These managed channels collect water from across the catchment, with water levels in these channels controlled by larger pumping stations which pump excess water out to sea, such as those at St Germans.

10.6.33 Water levels in the raised managed channels are controlled by the pumping stations to within a 0.2m range, in order to maintain the navigability of the system, ensuring sufficient draft for boats while providing sufficient headroom on crossing structures. Many of these channels have multi-directional flow, as water can flow by various routes across the network to St Germans Pumping Station.

10.6.34 Current operation during drier periods, shows that this system of water movement from low field drains to the raised managed drains can be reversed. Water is released from the raised managed system back into the lower-lying channels to provide water for irrigation to local agriculture. In addition, during drier periods, water is manually released from the River Nene at Stanground Lock into the adjacent Middle Level system, via the existing connection to the King's Dyke. This enables water levels to be maintained within the Middle Level system through the summer for environmental, irrigation and navigational purposes. In hot summers, the system would virtually dry out without this water transfer.

10.6.35 In the area immediately surrounding the reservoir Scoping boundary, there are two raised managed watercourses, the Forty Foot Drain to the south and the Sixteen Foot Drain to the east. At present, across the reservoir Scoping boundary there is a patchwork of lower-lying drainage channels, with pumping stations into the Sixteen Foot Drain at locations such as the Bensons Pumping Station.

10.6.36 In addition to the pumping stations, a number of other artificial influences operate in the study area for the reservoir site zone and water treatment works zone, including licensed abstractions and discharges, which can either increase or decrease surface water flows in the system.

Surface water quality

10.6.37 There are no existing Environment Agency or existing Applicant monitoring locations within the study area for the reservoir site zone and water treatment works zone. Therefore, baseline water quality conditions cannot be characterised for this study area until site-specific data has been collected. Environment Agency and Anglian Water monitoring sites were identified outside the Scoping boundary, with nine sites having sufficient data for multiple determinands, including: ammoniacal nitrogen, BOD, DO, orthophosphate, pH, temperature and nitrate. Data from three of the existing Environment Agency sites will be used, in addition to three new monitoring locations, to establish a comprehensive and reliable understanding of the baseline surface water quality within the reservoir study area. High concentrations of orthophosphate (up to 210µg/l), ammoniacal nitrogen (up to 1.4mg/l) and BOD (up to 7.4ATU) are recorded at the three Environment Agency sites, alongside exceedances of some metals (iron and copper). The presence of perfluorooctanesulfonic acid (PFOS) and its derivatives has also been identified across the Middle Level catchment.

10.6.38 The Applicant has established a monitoring programme, in agreement with the Environment Agency, to understand the baseline conditions within watercourses that have the potential to be impacted by the Proposed Development. Those in the sources of supply and upstream water transfers study area are shown in Figure 10.5: The Applicant's water quality monitoring stations, within the water bodies intersected by the upstream infrastructure. These monitoring stations aim to collect water quality data until the completion of the Proposed Development. Determinands monitored at these sites will include: ammoniacal nitrogen, BOD, DO, pH, phosphate and temperature.

10.6.39 In-situ water quality measurements were taken during field surveys in April 2024 for phosphate, pH, temperature and oxidation/reduction potential (redox). A total of 21 watercourses were surveyed across the study area. Results showed phosphate varies significantly across the reservoir study area, ranging from 0mg/l to 2mg/l (ppm), with the highest concentration observed at Nightlayer's pumping station. Minimal variation was seen in pH levels across all 21 sites, with the majority of readings ranging between pH level 5 to 6. Variations were seen in temperature, which is likely due to differences in the watercourse characteristics such as water depth, weather conditions and time of day. Redox was found to be highly variable across all sites, ranging from 23mV to 195mV. It should be noted that this data is based on a single set of measurements at each site, which only represent a moment in time and provide a snapshot of conditions.

10.6.40 The limited data available means a comprehensive assessment of the baseline conditions of surface water quality within the study area cannot be made at the time of reporting. Further data collection is required and is planned to address

gaps. These are pending and scheduled for 2024/2025 and will be discussed in advance with relevant consultees.

Groundwater

Aquifer bodies

10.6.41 The aquifer categories identified within the study area are summarised in Table 10-6. A description of the aquifer categories is provided in Appendix 10.2: Groundwater baseline.

Table 10-6: Environment Agency-designated aquifer bodies within the reservoir site and water treatment works study area

Geological unit	Environment Agency aquifer designation
Superficial geology	
Tidal Flat Deposits	Unproductive
Tidal River or Creek Deposits	Unproductive
Peat	Unproductive
River Terrace Deposits (sand and gravel)	Secondary A
March Gravels Member	Secondary A
Oadby Member	Secondary (Undifferentiated)
Bedrock geology	
Ampthill Clay Formation	Unproductive
West Walton Formation	Unproductive
Oxford Clay Formation	Unproductive

Notes: Detailed descriptions of the lithology and distribution of these geological units are provided in Appendix 12.1: Geological summary.

10.6.42 Whilst the Ampthill Clay Formation is designated as Unproductive, groundwater level data from the Phase 1 GI (Geotechnics, 2024) in the reservoir study area, indicate that the upper weathered portion of the bedrock clay is in hydraulic continuity with overlying superficial deposits, and may form an important groundwater flow pathway.

10.6.43 Due to the significant thickness of confining clay units overlying the limestone bedrock aquifers, it is considered unlikely that there is any connectivity between superficial and bedrock aquifers in the study area.

Protected areas and groundwater abstractions

10.6.44 No GWDTE, SPZ or NVZ (Groundwater) are located within the study area.

10.6.45 Information on licensed and unlicensed groundwater abstractions within a 5km radius of the study area has been obtained from the Environment Agency and local authorities. Abstraction sources and details are provided in Appendix 10.2: Groundwater baseline and shown in Figure 10.6: Groundwater features. This identified 67 groundwater abstractions, none of which are located within the Scoping boundary of the reservoir site and water treatment works. However, three unlicensed groundwater abstractions were identified within the 500m buffer zone of the study area, as summarised in Table 10-7.

Table 10-7: Groundwater abstractions within the reservoir site and water treatment works study area

Well reference	Licence No.	Licence holder details	Distance from Scoping boundary (m)	Notes provided by the Environment Agency
TL 49/02	Not provided	Park House, Wimblington	340	Well disused and sealed in October 1960.
TL 48/08	Not provided	None provided	370	May not have been drilled.
TL 48/06	Not provided	Holly House Farm, Chatteris	500	Three wells.

Hydraulic properties

10.6.46 During the Proposed Development Phase 1 GI (Geotechnics, 2024), in-situ and laboratory permeability testing was undertaken across the study area, to determine hydrogeological parameters for Tidal Flat Deposits at the site. A summary of the aquifer permeability is provided in Appendix 10.2: Groundwater baseline.

Groundwater flow and levels

10.6.47 As part of the Phase 1 GI (Geotechnics, 2024), groundwater monitoring has been carried out at 18 locations within the study area. Groundwater level data from the superficial deposits and upper bedrock show similar trends, suggesting that the strata are in hydraulic continuity. Groundwater levels from the shallow piezometers indicate that shallow groundwater flow directions are influenced by the principal drains within the centre of the study area. This suggests that shallow groundwater within the study area is in hydraulic continuity with these drains.

10.6.48 Groundwater level monitoring is ongoing, and a summary of the groundwater level data measured between September 2023 and February 2024 is presented in Appendix 10.2: Groundwater baseline.

Groundwater quality

10.6.49 There are no Environment Agency groundwater quality monitoring sites within the study area.

10.6.50 As part of the Phase 1 GI (Geotechnics, 2024), 10 groundwater samples have been collected within the study area on one occasion (October 2023): four samples from installations within the superficial deposits, and six samples from installations within the upper bedrock clay. These were analysed for pH level and sulphate along with in-situ recordings of pH level, temperature, electrical conductivity, dissolved oxygen and redox potential.

10.6.51 Additional rounds of groundwater sampling are due to take place during the final three rounds of the Phase 1 GI, as well the Phase 2 GI. All future groundwater samples will undergo laboratory testing in line with the Groundwater Suite outlined in Appendix 10.2: Groundwater baseline.

Baseline for downstream treated water transfers

Hydrology

10.6.52 The Scoping boundary for the downstream treated water transfer from the proposed reservoir to Madingley, via Bluntisham treated water transfer, crosses the Middle Level, Counter Drain (Ouse) (the Counter Drain (Sutton and Mepal IDB) catchment), River Great Ouse, Marley Gap Brook, Swavesey Drain, Fen Drayton Drain, Old West River and Bin Brook.

10.6.53 The Scoping boundary for the downstream treated water transfer from the proposed reservoir to Bexwell crosses the catchments of the Middle Level, Counter Drain (Ouse) (including the catchments of Counter Drain (Manea and Welney IDB) and Counter Drain (Upwell and Outwell IDB)), tidal Great Ouse, Relief Channel, Cut-off Channel and Stringside Stream.

10.6.54 Data available from the Hydrology Data Explorer (Environment Agency, 2024d), the National River Flow Archive, and other sources were assessed to determine the availability of hydrological data in watercourses that are hydrologically relevant to the downstream treated water transfer components. This review identified five water level gauging stations and six flow gauging stations which could be used to support the hydrological assessment of the watercourses.

Surface water quality

10.6.55 Within the catchments potentially impacted by the downstream treated water transfers, 78 Environment Agency water quality monitoring sites (Environment Agency, 2024c) were identified (see Figure 10.4: Environment Agency water quality monitoring stations). Of these, 20 sites were identified as being within a 3km radius of watercourse crossings, or a 5km radius of the proposed service reservoirs. However, only eight of these monitoring locations had adequate monthly sampling for a 12-month period or more between 2018 and 2023, for at least one of the determinands of interest. These determinands include ammonia, BOD, DO, phosphate, temperature, and pH level. Five of the monitoring stations had adequate data for all determinands, with the other three sites only missing BOD.

Groundwater

Aquifer bodies

10.6.56 The aquifer categories have been identified within the study area and are summarised in Table 10-8.

Table 10-8: Environment Agency-designated aquifer bodies within the downstream treated water transfers study area

Geological unit		Environment Agency aquifer designation
Superficial Geology	Alluvium	Secondary A
	Tidal Flat Deposits	Unproductive
	Tidal River or Creek Deposits	Unproductive
	Peat	Unproductive
	Head	Secondary (Undifferentiated)

Geological unit		Environment Agency aquifer designation
	River Terrace Deposits	Secondary A
	March Gravels Member	Secondary A
	Tottenhill Gravel Member	Secondary A
	Oadby Member	Secondary (Undifferentiated)
	Lowestoft Formation	Secondary (Undifferentiated)
	Glaciofluvial Deposits	Secondary A
Bedrock Geology	West Melbury Marly Chalk Formation	Principal
	Gault Formation	Unproductive
	Woburn Sands Formation	Principal
	Carstone Formation	Principal
	Roxham Member	Principal
	Leziate Member	Principal
	Mintlyn Member	Principal
	Kimmeridge Clay Formation	Unproductive
	Ampthill Clay Formation	Unproductive
	Oxford Clay Formation	Unproductive

Notes: Detailed descriptions of the lithology and distribution of these geological units are provided in Appendix 12.1: Geological summary.

10.6.57 Further information on aquifer bodies within the study area is provided in Appendix 10.2: Groundwater baseline.

Protected areas and groundwater abstractions

10.6.58 No SPZ or GWDTE have been identified within the study area. NVZ (as shown in Figure 10.6: Groundwater features) are within the study area and are summarised in Table 10-9.

Table 10-9: Protected areas within the downstream treated water transfers study area

Designation	Name	Element intersected
Groundwater NVZ	Sandringham Sands South	Bexwell service reservoir, proposed reservoir transfer to Bexwell pipeline.
	Huntingdon River Gravels	Bluntisham service reservoir, Bluntisham Spur pipeline, proposed reservoir transfer to Madingley, via Bluntisham pipeline.

10.6.59 Information on licensed groundwater abstractions identified 62 groundwater abstractions within a 5km radius, which are detailed in Appendix 10.2: Groundwater baseline, and presented in Figure 10.6: Groundwater features. Two of these abstractions are located within the study area, adjacent to the proposed reservoir to Madingley pipeline route, and are detailed in Table 10-10.

Table 10-10: Licensed groundwater abstractions within the downstream treated water transfers study area

Name	Licence No.	Primary use	Distance from Scoping boundary (m)
Borehole S of Dry Drayton	6/33/35/*G/0125	Agriculture	155
Well SE of Needingworth	6/33/26/*G/0078	Agriculture	485

10.6.60 No data on unlicensed groundwater abstractions are available at the time of reporting. Data has been requested from the Environment Agency and local authorities, for use in the EIA.

Hydraulic properties

10.6.61 No data on hydraulic properties of the aquifers underlying the study area are available at this stage. This data gap will be addressed during the proposed Phase 2 GI (refer to Section 10.9).

Groundwater flow and levels

10.6.62 Historical GI at Anglian Water sites includes the installation of groundwater level monitoring installations in the vicinity of the proposed reservoir transfer to Bexwell pipeline corridor, and proposed reservoir transfer to Madingley, via Bluntisham pipeline corridor. Groundwater level datasets from these phases of GI have been requested but were not available at the time of reporting. Further details of these GI works are set out in Appendix 10.2: Groundwater baseline.

10.6.63 No groundwater level data is available for the Bexwell service reservoir, Bluntisham service reservoir or Madingley service reservoir study areas at this stage. This data gap will be addressed during the proposed GI (see Section 10.9).

Groundwater quality

10.6.64 There are no Environment Agency groundwater quality monitoring sites within the study area. The closest monitoring point is located approximately 2.2km south of the Bexwell Service Reservoir. Monitoring surveys are proposed as part of the GI to address gaps in groundwater quality screening.

Future baseline

Water resources

10.6.65 Regional water company plans such as the River Basin Management Plans (RBMP) and the Water Resources Management Plans (WRMP) (Anglian Water 2024 and Cambridge Water 2023) set legally binding objectives that underpin water legislation and planning activities. These are updated on a cyclical basis with the RBMP next due in 2025. These updates can result in changes to surface water and groundwater quality and flow objectives over time. This could lead to requirements for increased flow or level, or improved water quality in watercourses or groundwater to support the environment.

10.6.66 The water resources future baseline considerations will include factors such as:

- Climate change: Climate change is expected to impact water resources in the study area. Drier summers and drought conditions may lead to reduced water availability for abstraction. This may be compounded by increased abstraction demand for agricultural irrigation. Additionally, wetter winters and more intense rainfall events could result in greater turbidity and nutrient loads in watercourses due to faster overland and fluvial flows. These climate change impacts may alter the water quality and condition of the water bodies in the study area, and the Proposed Development's potential effects on watercourses involved in abstraction or receiving discharges through flow changes. Further, rising sea levels could exert increased pressure on coastal and fluvial flood defences, the management of tidal water levels and flows, and the salinity of river water at river mouths. The drier summers, wetter winters and more intense rainfall events could also impact on groundwater levels. Further details can be found in Chapter 17: Climate resilience, of this EIA Scoping Report.
- Future developments or changes in agricultural practices or land use changes, which may result in changes in water quality and/or quantity impacts, including contaminants of emerging concern.

Flood risk

10.6.67 The baseline data collated, for all sources of flooding, is broadly representative of conditions between 2013 and 2024. However, the Proposed Development would not become operational until 2036, whereby baseline conditions may have changed especially in regard to sea level rise. Therefore, the relevant climate change allowances will consider a climate change for the beginning of operation and climate change up to 2125, as the current limit of the NPPF guidance on FRA (Environment Agency, 2022). The credible maximum scenario for Nationally Significant Infrastructure Projects (NSIPs) will also be considered into the 2100s to assess the sensitivity of the Proposed Development to any future climate change allowances changes up to the H++ scenario. The H++ scenario is the 'high-end' climate change scenario, which are typically extreme climate change scenarios outside of the 10th to 90th percentile range of climate change projections. Chapter 17: Climate resilience, identifies the climate change allowances applied for the FRA, and how these relate to the climate change allowances used across the Proposed Development.

10.6.68 The Fens 2100+ strategy (Environment Agency, 2023a) is currently being developed to support how the Environment Agency currently deliver flood risk management across the Fens region, and where to invest in the medium to long term to help this landscape adapt to climate change. Therefore, this strategy could affect the flood risk baseline, for all sources of flooding, in the area of the Proposed Development. Key findings from the Fens 2100+ strategy are expected to be available in late 2025.

10.6.69 The Fens 2100+ strategy aims to determine what type of investment is required and where – that does not limit future choices – to help the Fens region adapt to climate change into the future. The Fens 2100+ strategy aims for investment to be

strategic, rather than just continuing to do what has always been done. Therefore, it is assumed that the strategy will include a defended fluvial flood scenario to enable the longevity of the people, environment and economy more widely for the Fens region into the 2100s, but this may differ from the current baseline defended scenario.

10.6.70 Since the results from the Fens 2100+ strategy will not be available until late 2025, during the interim, the Proposed Development must adopt robust assumptions to consider the uncertainty in the future flood management strategy of the study area.

10.6.71 The ongoing hydraulic modelling will assess the various combinations of these assumptions of future flood management conditions to define credible maximum scenario(s) from all sources of flooding, in discussion with the Environment Agency (the lead organisation for the Fens 2100+ study). A comparison to the Fens 2100+ findings will be undertaken if they are available before finalisation of the FRA. Consideration of the residual risk from the failure of these flood defence management assets will be considered separately with climate change projections.

10.6.72 Surface water flooding in the IDB areas could also increase with rainfall variations due to climate change if pumps remain at their current capacity. Any upgrades to IDB pumps could help mitigate this but would put more pressure on the managed watercourses and Main Rivers, increasing the risk of overtopping. Therefore, a worst-case future baseline has been developed to help understand this increase in flood risk in the Proposed Development design.

10.6.73 Chapter 23: Cumulative effects will identify the proposed developments that are anticipated to be constructed prior to the construction of the Proposed Development. As such, these developments would form part of the future baseline for assessment within the EIA. Where this presents water resources or flood risk receptors, or a change to the current baseline specific to water resources and flood risk, this will be considered within the EIA.

10.7 Design and mitigation

Design

10.7.1 The design of the Proposed Development to date has taken consideration of environmental constraints and potential environmental effects. The design development process has sought to avoid and reduce potential adverse environmental effects on water resources and flood risk through good design practice. This is covered in Section 10.8.

10.7.2 The ongoing development of the design will use the findings of the flood modelling to avoid and reduce potential adverse effects, where feasible, and provide appropriate mitigation of the risks which cannot be avoided.

10.7.3 The design development process will include consideration of enhancement measures to improve the surrounding environment. Potential mitigation measures relevant to water resources and flood risk that have been identified to date include:

- The reservoir has been sited to avoid major groundwater aquifers or surface watercourses.
- Pipelines are routed to avoid sensitive surface water and groundwater features, as far as is reasonably practicable.
- Artificial modifications (such as control structures or hard banks) have been avoided in watercourses, as far as reasonably practicable.
- Consideration of where trenchless techniques can be used when crossing Main Rivers or managed raised watercourses to minimise impacts on ecology, flow and water quality.
- Use of open water transfers utilised, where practicable, to maintain water in the environment and create opportunities to improve watercourses.
- Requirement for the Proposed Development design to ensure no increase to flood risk to third parties. Opportunities to lower flood risk will be considered where these could be feasible within the Proposed Development.
- Application of the Sequential approach, and if required the Exception test, from the outset to avoid the location of vulnerable development in areas of flood risk. Where development must be located within the Flood Zone that it is compatible with, then the most vulnerable development is located in the areas of lowest flood risk.
- Seek to avoid impacts on flood risk through reducing the obstruction of water and siting development in the areas of lowest flood risk.
- Seek to avoid intersecting and/or modifying existing watercourses where there is no opportunity for wider environmental or social outcomes.
- Seek to maintain connection to existing discharge points in downstream watercourse or pumps to enable drainage without increasing flood risk.
- Consideration of sustainable drainage systems (SuDS) to manage, attenuate and treat locally generated runoff from the Proposed Development to limit any runoff to greenfield runoff rates. Consideration will also be given to maximise opportunities for rainwater harvesting and re-use on-site, to reduce water use demand and runoff rates.
- Consideration of opportunities that align with other flood risk management schemes and enhance other environmental and social outcomes to deliver co-benefits where appropriate.
- Consideration of nature-based solutions to help slow runoff, hold back peak flows and ensure landscapes are able to absorb the impact of severe storms.

This may be considered instead of, or in conjunction with, more traditional flood risk management engineering methods.

10.7.4 Reservoir safety management in the UK is the process of managing the risk of an uncontrolled release of the contents of a reservoir. The Proposed Development will be subject to the requirement of the Reservoirs Act 1975, as it is a large, raised reservoir, to ensure a safe design and minimise the risk of all credible and significant embankment failure modes. In accordance with the Reservoirs Act 1975, in the event of an emergency, safety infrastructure is included to enable the water level in the reservoir to be lowered quickly, as part to the emergency drawdown process to reduce the risk of any embankment failure.

10.7.5 Chapter 2: Project description, Section 2.5 provides a description of the key features of the proposed reservoir, including the safety features.

Mitigation

10.7.6 Documents presenting the approach to mitigation will be produced, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. These measures would be applied to mitigate likely significant effects, including potential water resources and flood risk effects. Water resources and flood risk considerations will also inform the process for developing construction methods and components, such as those relating to the management of flood risk and the prevention of runoff, as described below.

10.7.7 Examples of good practice and essential mitigation relevant to water resource and flood risk that are likely to be implemented, include:

- Consideration of flood risk mitigation measures in gravity-drained areas includes consideration of flood storage including compensatory storage, diversion or conveyance measures, working with other flood risk management activities provided by other organisations if appropriate.
- Consideration of flood risk mitigation measures in pumped or IDB areas if required including, but not limited to, minimising obstruction of flood water, flood flow diversion to areas of water compatible activities within the boundary of the Proposed Development, flood defence and/or channel improvements, and internal drainage measures. This will include working with other flood risk management activities provided by other organisations, where appropriate.
- Requirement for site runoff, dewatering from excavations and commissioning flows to be intercepted on-site, and ensuring the sediment content is at an acceptably low level when discharged to the drainage system. Prevention of runoff from soil and excavated material stockpiles discharging directly into drainage systems.
- Provision for construction of site drainage which may include ditches and sustainable drainage systems, or equivalent, with appropriately sized treatment facilities, such as settlement or detention basins.

- Prevention of leakage of fuels and oils using adequately sized secure storage, checking and maintaining plant in good condition at all times, and using drip trays and other measures to prevent contamination from plant which is stationary when in use.
- Maintenance of suitable exclusion zones from watercourses and ponds.
- Provision of adequate protection of any monitoring stations or boreholes.
- Incorporation of flood risk management measures within construction management documents.

10.7.8 Relevant documents will be produced to set out the measures and standards of work to be applied during the operational phase. These would be applied to monitor, manage and control potential adverse environmental effects associated with operation and maintenance activities. It should be noted that rainfall that falls on the reservoir will no longer discharge to local watercourses as at present, which would reduce flood risk from this source.

10.7.9 Opportunities for mitigation measures to deliver wider benefits will be explored. This includes mitigation areas around the reservoir and water treatment works in the form of wetland sites, which will deliver a range of wider benefits, including but not limited to, biodiversity enhancement, social and recreational benefits.

10.7.10 Opportunities for an adaptive approach will be considered to phase the delivery of flood mitigation measures over the design life. Such phasing of mitigation measures would enable any future phases to benefit from greener construction techniques and potentially reduce total carbon costs over the design life. This is of particular concern for flood embankments and similar flood mitigation measures that can be phased to adapt to new construction techniques and can be tailored to refined climate change projections over time. These mitigation measures would be recorded in appropriate documents, such as management plans.

10.8 Proposed scope of assessments

Likely significant effects requiring assessment (scoped in)

10.8.1 The following section sets out the aspect-specific potential effects for water resource and flood risk. The likely significant effects requiring assessment are presented in Table 10-11. Where potential effects may be specific to one or more zones of the Proposed Development and the relevant study area, this is identified in Table 10-11 (see Chapter 2: Project description, for further discussion of zones).

10.8.2 Where there are significant impacts on the water resources which support water dependent features, including those within designated nature conservation sites or scheduled monuments, etc., these will be discussed in this chapter. However, the assessment of effects on these sites as a result of potential changes to water resources, are discussed in Chapter 9: Aquatic biodiversity (for nature conservation sites, etc.) or Chapter 11: Historic environment (for scheduled monuments, etc.).

The implications of significant impacts on water resources related to the WFD regulations are presented in Appendix 10.1 of this EIA Scoping Report.

10.8.3 Given the existing regulatory regime under the Reservoir Act 1975, flood risk from reservoir embankment failure has been scoped out (see Chapter 22: Major accidents and disasters).

10.8.4 In the unlikely event that the emergency drawdown procedure is implemented, it could affect the downstream river catchment, potentially causing flooding that may be classified as a major accident or disaster. For this reason, the flooding impacts of emergency drawdown on the downstream river catchment is scoped into the EIA and will be considered in the Flood Risk Assessment (FRA) but reported in Chapter 22: Major accidents and disasters chapter. Therefore, this information is not duplicated in Table 10-11.

Table 10-11: Likely significant effects to water resources and flood risk receptors

Activity	Effect	Receptor	Zone
Construction			
Surface water			
Construction transportation	Changes in flow/level and water quality due to changes in highways drainage or new highways drainage discharges.	Surface watercourses	All zones
Construction of structures/ buildings	Construction of new river intakes and pumping stations leading to changes to channel footprint, flow velocity/level, sedimentation deposition, water quality, hydromorphology.	Counter Drain (Nene), River Nene, River Great Ouse, Ouse Washes, Forty Foot Drain, Middle Level	Sources of supply and upstream water transfer, reservoir site and water treatment works zones
	Changes to channel footprint; shading and hydromorphology leading to changes in river processes and habitats upstream and downstream due to new culverts for new road crossings.	Surface watercourses	All zones
Excavation and earthworks	Changes to water level, channel footprint, sedimentation deposition and hydromorphology leading to changes in river processes and habitats upstream and downstream.	Forty Foot Drain	Sources of supply and upstream water transfer zone

Activity	Effect	Receptor	Zone
	Creation of new habitats due to watercourse relining.		
	New, set back or raised flood embankments to facilitate new open channels and/or the transport strategy leading to changes to channel footprint, flow, sediment deposition and hydromorphology leading to changes in river processes and habitats upstream and downstream. Creation of new habitats.	Middle Level watercourses	Sources of supply and upstream water transfer zone
	Construction of reservoir will lead to loss of channel footprint; changes to flow/level, sediment deposition and hydromorphology leading to changes in river processes and habitats upstream. Creation of new habitats.	Middle Level surface watercourses	Reservoir site and water treatment works zone
Installation of pipelines	Changes in sedimentation deposition and hydromorphology leading to changes in river processes and habitats upstream and downstream, due to watercourse crossings of pipelines (excluding trenchless crossings).	All surface watercourses	All zones
Groundwater			
Construction of structures. Excavation and earthworks and installation of pipelines	Potential for residual contamination (agricultural contamination and contamination from urban areas) within shallow soils to be remobilised into groundwater or other water receptors during dewatering for excavation works.	Superficial aquifers, abstractions within the study area, GWDTE, watercourses, NVZ Bedrock aquifers	All zones
	Temporary reductions in groundwater flows and	Superficial aquifers, abstractions within	All zones

Activity	Effect	Receptor	Zone
	levels in shallow aquifers due to construction dewatering. Potential reduction in baseflow to nearby watercourses.	the study area, watercourses, GWDTE, NVZ Bedrock aquifers, scheduled monuments and archaeological features	
	Construction of trenchless crossings have the potential to form preferential flow pathways for shallow contamination to deeper aquifers, especially if they puncture through lower permeability shallow deposits.	Superficial aquifers, watercourses, Huntington River Gravels NVZ	Sources of supply and upstream water transfers and downstream treated water transfers zones
Flood risk			
Enabling works	Any water stored above existing ground level to manage sediment and water quality in the site runoff could increase risk of flooding to watercourses or adjacent land in the event of overtopping or a flood defence breach of the retaining embankment.	People, property, agricultural land, infrastructure and environmentally designated sites* within the zone of increased flood risk	All zones
	Temporary bridges or culverts crossing watercourses that are required to accommodate haul roads could impact flow conveyance and flood level.	People, property, infrastructure and environmentally designated sites* within the zone of increased flood risk	All zones
	New areas of hardstanding could lead to changes to surface water runoff rate could increase flood risk to existing IDB drains and/or pumps.	Agricultural land, local roads, properties and people in the lowland IDB pumped catchments	Reservoir site and water treatment works zone
Construction of structures/ buildings	Construction of new culverts could lead to changes to floodplain	People, property, agricultural land, infrastructure and	All zones

Activity	Effect	Receptor	Zone
	capacity and flow paths available during floods.	environmentally designated sites* within the zone of increased flood risk	
	Construction of abstraction inlets and discharge outlets structures to existing watercourses using cofferdams or other temporary barrier methods reduces capacity of the existing channel to pass flood flows safely leading to an increase in flood risk upstream.	People, property, infrastructure and environmentally designated sites* within the zone of increased flood risk	Sources of supply and upstream water transfer zone
	Construction of new pumping station and/or treatment works leading to changes to floodplain storage available in any overtopping or flood defence breach of managed watercourses could divert existing overland flow paths to areas that are not currently affected.	People, property, infrastructure and environmentally designated sites* within the zone of increased flood risk	Sources of supply and upstream water transfer zone
	The drainage design of the site would be intended to provide similar pump capacity or storage areas to mitigate any change to the drainage network. However, failure of any hydraulic controls could increase residual risk of flooding.	Agricultural land, local roads, properties and people in the lowland IDB pumped catchments	Reservoir site and water treatment works zone
	Construction on or near a raised flood defence structure to facilitate abstraction or discharge leading to temporary flood defence embankment degradation.	People, property and sensitive habitats* at risk from any degradation of flood defences	Sources of supply and upstream water transfer and reservoir site zones
Excavation and earthworks	Diversion of water to areas not previously at risk of flooding.	People, property, infrastructure and environmentally	All zones

Activity	Effect	Receptor	Zone
		designated sites* within the zone of increased flood risk	
	Probability of existing flood defence breach is likely to reduce with creation or refurbishment of embankments to current standards. However, realignment of banks could alter flow paths and hazard in the unlikely event of a flood defence breach without mitigation.	Agricultural land, local roads, properties and people in the lowland IDB pumped catchments and environmentally designated sites* within the zone of increased flood risk	Sources of supply and upstream water transfer, reservoir site and water treatment works zones
	Temporary stockpiling of material in the floodplain could result in a loss of flood storage and/or divert existing overland flow routes to areas that are not currently affected.	People, property, infrastructure and environmentally designated sites* within the zone of increased flood risk	Reservoir site and water treatment works zone
	The reservoir will capture a proportion of the existing surface water to reduce flood risk downslope. However, the outer edge of the reservoir embankment can cause changes to surface water runoff rate to impact flood risk downslope of the new embankment. Changes to floodplain storage available in any overtopping or flood defence breach of managed watercourses could divert existing overland flow paths to areas that are not currently affected.	Agricultural land, local roads, properties and people in the lowland IDB pumped catchments	Reservoir site and water treatment works zone
	Service reservoir embankments and associated areas of hardstanding could lead to changes in the surface water runoff rate and	People, property, infrastructure and environmentally designated sites* within the zone of increased flood risk	Downstream treated water transfers zones

Activity	Effect	Receptor	Zone
	increase flood risk to existing watercourses. Surface water flow paths captured or diverted.		
Installation of pipelines	Construction of pipelines leading to increases in surface water runoff to existing watercourses which are inundated as a result of the diverted runoff.	People, property, infrastructure and environmentally designated sites* within the zone of increased inundation	Sources of supply and upstream water transfer and downstream treated water transfers zones
	Construction of all pipeline crossings of ordinary watercourses in Flood Zone 1: Temporary stockpiling of material or obstruction of existing flow paths in areas prone to river or surface water flooding could reduce flood storage and/or divert existing surface water runoff to areas that are not currently affected. Increases in flow rates and/or volumes to existing small watercourses which are inundated as a result of having water diverted to manage site runoff during construction.	People, property, infrastructure and environmentally designated sites* within the zone of increased flood risk	Sources of supply and upstream water transfer and downstream treated water transfers zones
	Changes in flood defence embankment integrity and impact on river channel for pipeline crossings within 50m of a Main River or within 20m of the Middle Level Commission-managed raised watercourse.	Channel or formal flood defences. People, property and sensitive habitats at risk in the floodplain	Sources of supply and upstream water transfer and downstream treated water transfer zones
Operation			
Surface water			
Operation of the reservoir	New embanked reservoir will lead to loss of channel footprint; changes to flow/level, sediment	Middle Level	Reservoir site zone

Activity	Effect	Receptor	Zone
	deposition and hydromorphology leading to changes in river processes and habitats upstream. Creation of new habitats.		
Operational traffic movements	Changes in flow/level and water quality due to new highways drainage discharges or increased highways traffic on existing roads.	Surface watercourses	All zones
Inter-catchment treatment	New discharges from inter-catchment treatment works leading to changes in flow/level, sedimentation deposition and water quality.	Surface watercourses	Sources of supply and upstream water transfer zone
Water treatment	New discharges from water treatment works leading to changes in flow/level, sedimentation deposition and water quality.	Surface watercourses	Water treatment works zones
Abstraction of water from Middle Level system, Ouse Washes (River Delph) or River Great Ouse and Counter Drain (Nene)	New abstractions leading to changes to channel footprint; flow velocity and volume; sedimentation deposition, hydromorphology leading to changes in river processes and habitats upstream and downstream and aquatic ecology. Change in water quality due to reduction in dilution for downstream discharges.	Middle Level, River Delph or River Great Ouse, River Nene, Counter Drain (Nene), Nene Washes, Ouse Washes	Sources of supply and upstream water transfer zone
	Changes to water level, channel footprint, sedimentation deposition and hydromorphology leading to changes in river processes and habitats upstream and downstream, due to opening of currently dry section of Forty Foot	Forty Foot Drain	Sources of supply and upstream water transfer zone

Activity	Effect	Receptor	Zone
	Drain. Creation of new habitats.		
Operation of open channel transfers	Changes to channel footprint, flow velocity and volume sedimentation deposition and water quality present in surface water body.	Surface watercourses	Sources of supply and upstream water transfer zone
	Change in water quality due to transfers.	Surface watercourses	Sources of supply and upstream water transfer zone
	New, raised or set back embankments could lead to changes to channel footprint, flow, sediment deposition and hydromorphology leading to changes in river processes and habitats upstream and downstream.	Surface watercourses	Sources of supply and upstream water transfer, reservoir site and water treatment works zones
Operation of transfers via pipeline	Service reservoirs could lead to loss of channel footprint, changes in flow/level, sedimentation deposition and water quality due to new or changes to existing discharges.	Surface watercourses	Downstream treated water transfers zone
Groundwater			
Water treatment/ inter-catchment treatment	Foundations from pumping stations and treatment works impacting on shallow groundwater flows potentially leading to groundwater flooding.	Superficial aquifers, watercourses, Nene Washes Whittlesey (SSSI and GWDTE) and Ouse Washes (River Delph) (SSSI and GWDTE), scheduled monuments and archaeological features	Sources of supply and upstream water transfer zone
Operation of the reservoir	Presence of reservoir and embankments could lead to a reduction in groundwater recharge to shallow aquifers	Superficial aquifers, watercourses, unlicensed groundwater	Reservoir site and water treatment works zone

Activity	Effect	Receptor	Zone
	underlying and adjacent to the reservoir footprint.	abstractions (TL49/02, TL48/08 and TL 48/06), scheduled monuments and archaeological features	
Operation of transfers via pipeline	Foundations for service reservoirs impacting on shallow groundwater resources and flows	Superficial aquifers, bedrock aquifers and watercourses, scheduled monuments and archaeological features	Downstream treated water transfers zone
Flood risk			
Operation of the reservoir	The reservoir will capture a proportion of the existing surface water to reduce flood risk downslope. However, the outer edge of the reservoir embankment can cause changes to surface water runoff rate to impact flood risk downslope of the new embankment. Changes to floodplain storage available in any overtopping or flood defence breach of managed watercourses could divert existing overland flow paths to areas that are not currently affected.	Agricultural land, local roads, properties and people in the lowland IDB pumped catchments	Reservoir site zone
	The drainage design of the site is intended to provide similar pump capacity or storage areas to mitigate any change to the drainage network. However, failure of any hydraulic controls could increase residual risk of flooding.	Agricultural land, local roads, properties and people in the lowland IDB pumped catchments	Reservoir site zone
	Potential localised changes in groundwater flood risk due to presence of reservoir	People, property, infrastructure and environmentally	Reservoir site zone

Activity	Effect	Receptor	Zone
	built into the low permeability bedrock clay, resulting in changes to the shallow hydrogeological regime.	designated sites* within the zone of increased flood risk	
Recreational use of the reservoir site	New areas of hardstanding could lead to changes to surface water runoff rate, which could increase flood risk to existing IDB drains and/or pumps.	Agricultural land, local roads, properties and people in the lowland IDB pumped catchments	Reservoir site and water treatment works zone
Water treatment	Foundations from new pumping stations and treatment works could impact on shallow groundwater flows potentially leading to groundwater flooding.	People and property within the zone of increased flood risk	Water treatment works zone
	Changes to floodplain storage available in any overtopping or flood defence breach of managed watercourses could divert existing overland flow paths to areas that are not currently affected, due to the presence of pumping stations and treatment works.	People, property, infrastructure and environmentally designated sites* within the zone of increased flood risk	Water treatment works zone
Inter-catchment treatment	Foundations from new pumping stations and treatment works could impact on shallow groundwater flows potentially leading to groundwater flooding.	People and property within the zone of increased flood risk	Sources of supply and upstream water transfer zone
	Changes to floodplain storage available in any overtopping or flood defence breach of managed watercourses could divert existing overland flow paths to areas that are not currently affected, due to	People, property, infrastructure and environmentally designated sites* within the zone of increased flood risk	Sources of supply and upstream water transfer zone

Activity	Effect	Receptor	Zone
	the presence of pumping stations and treatment works.		
Management of habitat creation	Changes in drainage and water supply to facilitate wetlands could change raise local water levels above existing ground levels across the IDB catchment. Risk of flooding to watercourses or adjacent land in the event of overtopping or a flood defence breach of the retaining embankment.	Agricultural land, local roads, properties and people in the lowland IDB pumped catchments	Reservoir site and water treatment works zone
Operational traffic movements	Changes to floodplain storage available in any overtopping or flood defence breach of managed watercourses from new culverts could divert existing overland flow paths to areas that are not currently affected.	People, property, infrastructure and environmentally designated sites* within the zone of increased flood risk	All zones
Operation of transfers via pipeline	Diversion of water to areas not previously at risk of flooding from service reservoirs.	People, property, infrastructure and environmentally designated sites* within the zone of increased flood risk	Downstream treated water transfer zone
	Service reservoir embankments and associated areas of hardstanding could lead to changes to surface water runoff rate which could increase flood risk to existing watercourses. Surface water flow paths captured or diverted.	People, property, infrastructure and environmentally designated sites* within the zone of increased flood risk	Downstream treated water transfer zone
	Foundations for service reservoirs impacting on shallow groundwater resources and flows potentially leading to an	People, property, infrastructure and environmentally designated sites* within the zone of increased flood risk	Downstream treated water transfer zone

Activity	Effect	Receptor	Zone
	increased risk of groundwater flooding.		
Operation of open channel transfers	Transfers are not intended to operate when the downstream reach is in flood. However, failure of any hydraulic controls could increase residual risk of flooding.	People, property, infrastructure and environmentally designated sites* within the zone of increased flood risk	Sources of supply and upstream water transfer zone
	Diversion of water to areas not previously at risk of flooding.	People, property, infrastructure and environmentally designated sites* within the zone of increased flood risk	Sources of supply and upstream water transfer zone
	Probability of flood defence breach is likely to reduce with creation or refurbishment of embankments to current standards. However, realignment of banks could alter flow paths and hazard in the unlikely event of a flood defence breach without mitigation.	People, property, infrastructure and environmentally designated sites* within the zone of increased flood risk	Sources of supply and upstream water transfer, reservoir site and water treatment works zones

*Notes: * Environmentally-designated site such as SSSI, SAC, SPA, Ramsar and GWDTE.*

Effects not requiring assessment (scoped out)

10.8.5 The effects proposed to be scoped out of the water resources and flood risk assessment are detailed in Table 10-12.

Table 10-12: Potential effects/features to be scoped out of the water resources and flood risk assessment

Activity/ feature	Effect	Receptor(s)	Justification for scoping out
Features			
Drainage ditches which are dry for some of the year and are dominated by	Water quality, hydromorphology	Ditches	Discounted as watercourses as no hydraulic connectivity nor water habitats

Activity/ feature	Effect	Receptor(s)	Justification for scoping out
terrestrial ecology			
Bedrock aquifers at the proposed reservoir and water treatment works site	All potential effects	Bedrock aquifers, including: • Kellaways Sand Member (Secondary A Aquifer) • Cornbrash Formation (Secondary A Aquifer) • Blisworth Limestone (Principal Aquifer) • Lincolnshire Limestone Formation (Principal Aquifer)	Available GI data show there is 70m (approximately) of low permeability clay formations overlying the bedrock aquifers at the reservoir site. As such, it is considered unlikely for any effects of the construction and operation of the proposed reservoir to extend to these deep aquifers.
Activities			
Surface water and groundwater			
Excavation and earthworks	Contamination and sedimentation from stockpile runoff	Surface watercourses, superficial aquifers, bedrock aquifers and unlicensed groundwater abstractions	Good construction and operational practice (for example, bunded storage areas, spill kits, isolation/treatment ponds for site runoff).
All construction activities	Leaks and spills of potentially contaminative materials used in construction and operation	Surface watercourses, superficial aquifers and bedrock aquifers, watercourses, abstractions, Nene Washes Whittlesey (GWDTE), Ouse Washes (River Delph) (GWDTE), Huntingdon River Gravel NVZ	
All pipeline crossings	Permanent minor changes in flows between	Surface watercourses and groundwater	Implementation of good design practice will mitigate impacts (for

Activity/ feature	Effect	Receptor(s)	Justification for scoping out
	groundwater and surface water to minor ditches, due to the presence of the below ground pipeline		example, materials, size and depths of pipelines and excavations informed based on groundwater risk assessments outcomes).
All pipeline crossings	Permanent minor changes in flows between groundwater and surface water to Main Rivers and smaller watercourses not in a groundwater body, due to the presence of the below ground pipeline	Surface watercourses and groundwater	Pipeline below crossing is at least 1.5m below watercourse bed and the same height is maintained for at least 5m beyond each bank top. Implementation of good design practice will mitigate impacts.
Surface water			
Water treatment	Impact on water quality of discharge of commissioning water into watercourse	Surface watercourses	One-off, short-term impact, water treated to sufficient quality, regulated by discharge consent.
Inter-catchment treatment	Impact on water quality of discharge of commissioning water into watercourse	Surface watercourses	Short-term impact, water treated to sufficient quality, regulated by discharge consent.
All construction activities	Impact on water quality from discharge of dewatering water	Surface watercourses	Short-term impact, water treated to sufficient quality, regulated by discharge consent.
Groundwater			
Installation of pipelines and operation of transfers via pipeline: upstream and downstream treated water	Formation of preferential flow pathway along pipeline routes, facilitating lateral migration of potential contaminants	Superficial aquifers, watercourses, potential groundwater abstractions within study area, Huntingdon River Gravels (groundwater NVZ)	Good construction practice.

Activity/ feature	Effect	Receptor(s)	Justification for scoping out
transfer pipelines			

10.9 Assessment methodology

10.9.1 The study area set out in Section 10.4 will be kept under review as the design and consultation processes progress, and the Proposed Development is refined. Therefore, the study area may evolve as appropriate. The evolution of the study area will be clearly communicated in the ES and discussed with relevant consultees.

10.9.2 The methodology for the WFD compliance scoping is presented in Appendix 10.1: WFD scoping, of this EIA Scoping Report.

10.9.3 The proposals, described in Chapter 2: Project description, will also evolve and be further developed as the design process progresses. Whilst the methodologies that are set out within this chapter are not anticipated to change, the scope of assessment will be kept under review as the design progresses.

Additional baseline information required

Sources of supply and upstream water transfers

10.9.4 At the time of reporting, there are data gaps across the sources of supply and upstream water transfers study area. The following baseline data is therefore required:

- **Ground investigation (GI)**: Scoping is currently underway for a phase of GI across the sources of supply and upstream water transfers study area. This will include installation of groundwater monitoring wells with data loggers targeting shallow groundwater bearing strata, and in-situ permeability testing – most likely falling/rising head testing.
- **Surface water level monitoring:** Where key drainage pathways intersect the Scoping boundary and are not captured by existing Environment Agency or IDB flow/level monitoring locations, additional locations have been proposed. This may be required where potential impacts to shallow groundwater are identified from the Proposed Development, to assess the extent of groundwater/surface water interaction.
- **Water quality monitoring**: Water quality sampling will be undertaken at 14 additional locations within the sources of supply and upstream water transfers study area. These additional sites have been identified to address spatial and temporal gaps in monitoring coverage. Sample analysis will target physico-chemical parameters such as nitrogen, phosphate and BOD, along with specific chemicals.
- **Topographic and channel survey of IDB drains within the abstraction pump areas**: Topographic and in-channel survey of the study area to refine the Middle

Level Commission hydraulic model, drainage strategy and construction phasing. The scope of these surveys will depend on further design information and receipt and review of the latest hydraulic models from the Environment Agency.

- **Flood modelling**: The Lower Great Ouse flood model is due to be updated by the Environment Agency within 2024. The initial findings of the preferred strategy in Fens 2100+ (Environment Agency, 2023a) is due to be released in late 2025. Depending on the outcomes of these two studies, sensitivity testing may be considered to compare to the current flood modelling and mapping results available.

Reservoir and water treatment works

10.9.5 The following are scheduled to take place or are currently ongoing (at the time of reporting), which will provide additional baseline information and help to inform the EIA:

- **Surface water flow monitoring:** Water flow monitoring will be carried out at eight sites around the Scoping boundary for the proposed reservoir in order to capture a range of flow conditions and seasonal variations (as shown in Figure 10.2: Existing and proposed water quality, flow and level monitoring locations). This monitoring will also identify any connectivity with groundwater at key locations.
- **Surface water level monitoring:** Water level monitoring at seven surface water monitoring points across the study area (as shown in Figure 10.2: Existing and proposed water quality, flow and level monitoring locations). These have been sited to allow an investigation of the extent of groundwater/surface water interaction within the study area.
- **Water quality monitoring:** Water quality monitoring will be undertaken at 14 additional locations within the reservoir footprint (as shown in Figure 10.2: Existing and proposed water quality, flow and level monitoring locations). These additional sites have been identified to address spatial and temporal gaps in monitoring coverage.
- **Phase 1 GI monitoring:** Groundwater level monitoring for the Phase 1 GI is ongoing and is due to continue until September 2024. The final four rounds of groundwater monitoring (June to September 2024) will include sampling from 10 installations, with groundwater samples.
- **Phase 2 GI:** Part of this GI has been designed to target superficial deposits where current data gaps have been identified; this will include 22 shallow boreholes installed within the superficial deposits, with laboratory permeability testing.
- **Geological model:** Development of a revised 3-D geological Leapfrog ground model using the Phase 1 GI data.
- **Topographic, structure and channel survey of IDB drains and existing abstraction pump areas:** Topographic and in-channel survey of the study area to

refine the Middle Level Commission hydraulic model, drainage strategy and construction phasing.

- **Design embankment levels for the Middle Level Commission:** Depending on the findings of the Middle Level Commission detailed design of the bank raising and Horsey Toll Weir changes, baseline flood modelling sensitivity testing may be required to compare to the current flood modelling and mapping results available.

Downstream treated water transfers

10.9.6 At the time of reporting, there are data gaps across the downstream treated water transfer study area. The following additional baseline data is required:

- **GI**: Scoping is currently underway for a phase of GI across the downstream treated water transfers study area. This will include installation of groundwater monitoring wells with data loggers targeting shallow groundwater bearing strata, and in-situ permeability testing – most likely falling/rising head testing.
- **Topographic survey of ordinary watercourses within pipeline buffer zones:** Latest river bank and channel survey of all non-Main Rivers intersecting the downstream treated water transfers study area, and sufficient reach upstream and downstream to assess all flood risk impacts during temporary construction works.

Modelling

10.9.7 Modelling investigations are ongoing to gain a better understanding of the potential impact of the Proposed Development. These include:

- **Hydrology**: Hydrological modelling to understand the potential impact of the sources of supply and upstream water transfers on the flows and water levels at key locations, and how these could affect sensitive receptors.
- **Water quality**: Modelling of water quality in the River Nene, Ouse Washes, Middle Level system and proposed transfers from the Counter Drain (Nene), including scenario testing of different transfer regimes and locations.
- **Hydromorphology**: Sediment transport modelling to understand how the abstraction and transfers could potentially impact sedimentation rates and bed levels within the tidal River Great Ouse and tidal River Nene.
- **Salinity modelling**: Modelling of changes in salinity in The Wash. This study expands the extent of an earlier model to include the tidal reaches of the River Great Ouse and River Nene limits. The modelling aims to identify any changes in salinity in The Wash due to the abstractions for the Proposed Development.
- **Flood modelling to quantify flood risk to the Proposed Development**: Quantify flood levels, flows and velocities in the adjacent managed watercourses; and assess any change in flood risk from the Proposed Development. This modelling includes flood defence breach modelling of the Ouse Washes (River Delph) and The Wash coastline.

Assessment years

10.9.8 The assessment years are the same as set out in Chapter 6: EIA approach and methodology, but the flood modelling will also consider first year of operation for the flood risk assessment of works during construction as a precautionary approach to consider changes in river flows, rainfall and sea level rise applicable to this period.

10.9.9 The design life of the reservoir itself is understood to be 100 years; however, the current guidance (Environment Agency, 2022) only provides climate change projections up to the year 2125 and the 2100s for the H++ sea level rise allowances. Therefore, the year 2125 will be used to design the resilience of the Proposed Development and ensure similar or lower flood risk up to, and including, flooding over the design life of the reservoir. The current guidance for the credible maximum scenario for Nationally Significant Infrastructure Projects will be used to assess how sensitive the Proposed Development is to potential changes in the climate for different future scenarios into the 2100s.

10.9.10 Opportunities for an adaptive approach will be considered to phase the delivery between these assessment years to help realise potential benefits in terms of carbon and net present value, as set out in Section 10.7. For water resources, the assessment years are the same as set out in Chapter 6: EIA approach and methodology.

Construction assessment methodology

Surface water

10.9.11 The changes to surface water flow, level and quality will be considered individually and in combination, as part of the potential effects on water resources. The anticipated magnitude of effect and significance of effect will be assessed, taking into consideration the proposed mitigation. The assessment will focus on the potential local scale impacts of the Proposed Development. A WFD assessment will also be carried out to identify any water body scale impacts on the WFD status of all relevant water bodies. Appendix 10.1: WFD scoping, contains further details regarding the WFD assessment.

Groundwater

10.9.12 Results from the Phase 1 GI and proposed Phase 2 GI will be used in the assessment of the hydrogeology of the Proposed Development. The data will be used to estimate the potential radius of influence of construction works on groundwater, and therefore features which could be affected.

10.9.13 The changes to groundwater flow, level and quality will be considered individually and in combination, as part of the potential effects on water resources. The anticipated magnitude of effect and significance of effect will be assessed, taking into consideration the proposed mitigation. The assessment will focus on the potential local scale impacts of the Proposed Development. A WFD assessment will also be carried out to identify any water body scale impacts on the WFD status of

all relevant groundwater bodies. Appendix 10.1: WFD scoping contains further details regarding the WFD assessment.

Flood risk

10.9.14 Main Rivers and key selected ordinary watercourses that are potentially affected by the Proposed Development will be assessed in the flood models provided by the Environment Agency or Middle Level Commission, and updated with the latest information available for bed levels, bank levels and settlement rates. These flood models will be developed to be sufficiently detailed to assess fluvial, tidal, groundwater and surface water/IDB flooding. Figure 10.1: Water resources and flood risk study area summarises the flood models available at the time of reporting.

10.9.15 The ongoing updates to flood modelling are being undertaken in compliance with the River modelling: technical standards and assessment (Defra, 2023) to support the FRA, following the NPPF Guidance for Flood risk and coastal change (last updated 2022) (Defra, 2022).

10.9.16 For the temporary works, the flood modelling will focus on a frequent flood event with climate change to the end of the construction period, as a conservative estimate of the flood risk during this period. It is assumed that a more frequent flood event, such as a flood with an annual probability of 5% with climate change (1 in 20 chance of flood event occurring in any given year), would be appropriate for the development of flood mitigation during construction.

10.9.17 Site-specific drainage strategies will be developed as part of the design to limit runoff to greenfield runoff rates, following good practice in prioritising Sustainable Drainage Systems (SuDS), as set out in the CIRIA SuDS Manual (CIRIA, 2015) and taking into account the local Strategic Flood Risk Assessment (Peterborough City Council and Cambridgeshire County Council, 2021 & JBA, 2018) and IDB requirements.

10.9.18 Groundwater flooding will be assessed through the separate groundwater assessment and reported on in the FRA, produced as part of the application for development consent.

Assessment of value

10.9.19 Table 10-13 provides a summary of the sensitivity of the water receptors under assessment, together with examples of receptors which would be assigned to each level of sensitivity. This is based on the Design Manual for Roads and Bridges (DMRB) LA 113: Road drainage and the water environment, where specific tables offer guidance on roads and bridge elements crossing water environment features that may be relevant to elements of the Proposed Development. These tables are not definitive but serve as a guide for professional judgement that will discussed with the Environment Agency and agreement sought.

Table 10-13: Sensitivity rating

Sensitivity	General criteria	Typical receptors
Very High	Very high importance and rarity, international scale and very limited potential for substitution.	Watercourse having a WFD classification in the River Basin Management Plan (RBMP) and Q^{95} flow* ≥1.0m^3/s, licensed groundwater abstractions for public water supply, groundwater SPZ 1. International designated water dependent habitat.
High	High importance and rarity, national scale and limited potential for substitution.	Watercourse having a WFD classification in the RBMP and with a Q^{95} flow <1.0m^3/s, Principal aquifer, groundwater SPZ 2 or 3, private drinking water supply. National designated water dependent habitat. Essential infrastructure for the operation of the Proposed Development as a Nationally Significant Infrastructure Project, as defined in Annex 3: Flood Vulnerability Classification (2012) in support the NPPF (2023).
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution.	Watercourses not having a WFD classification in the RBMP, Secondary aquifer A, abstraction for industrial or agricultural use. Local wetlands (local wildlife sites). Highly vulnerable activities as defined by Annex 3: Flood Vulnerability Classification (2012) in support the NPPF (2023).
Low	Low or medium importance and rarity, local scale.	Surface water drain, watercourse with Q^{95} flow <0.002m^3/s. Secondary B aquifer. More vulnerable and less vulnerable activities as defined by Annex 3: Flood Vulnerability Classification (2012) in support the NPPF (2023).
Negligible	Very low importance and rarity, local scale.	Drainage ditches or drains which are dry for the majority of the year, unproductive/non aquifer. Water compatible activities as defined by Annex 3: Flood Vulnerability Classification (2012) in support the NPPF (2023).

*Notes: * Q^{95} is the flow exceeded for 95% of the time (i.e. low flow).*

Assessment of magnitude of impact

10.9.20 The impact of the Proposed Development on each receiving water body or receptor (the 'attribute') will be assessed separately for construction and operation. The impacts may be assessed as either adverse or beneficial. Table 10-14 provides examples of the magnitude of impact for water resource features under assessment.

10.9.21 In DMRB LA 113, specific tables offer guidance on water environment features and impact magnitudes. These tables are not definitive but serve as a guide for professional judgment.

10.9.22 The flood risk criteria will be reviewed and agreed with the Environment Agency, considering the impact to and relative flood vulnerability of receptors in the context of the Fens environment. For example, a 10mm or 50mm change of water level within the same flood hazard category (FD2320 Flood risk assessment guidance for new development (Environment Agency, 2008)) for less vulnerable agricultural areas may have a different impact to more vulnerable receptors, such as residential dwellings as set out in Annex 3 flood vulnerability classifications (NPPF, 2023). Given the high level of water level management via pumps and sluices and flat floodplain, Table 10-14 considers both flood level changes with change in flood hazard categories (Environment Agency, 2008) to assess flood risk.

Table 10-14: Magnitude of impact

Magnitude of impact	General criteria	Examples
High	**Adverse:** loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.	Decrease in surface water ecological or chemical quality, or groundwater quantitative and chemical quality. Decrease in qualitative or quantitative WFD status. Increase in flood hazard category (FD2320 Flood risk assessment guidance for new development (Environment Agency, 2008) and/or an increase in flood levels by more than 100mm, or threshold relevant to the flood vulnerability of receptors, for flood events up to and including a 1% chance of event occurring with an allowance for climate change.
	Beneficial: large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.	Increase in surface water ecological or chemical WFD status. Increase in groundwater qualitative or quantitative WFD status. Removal of flood risk.
Medium	**Adverse:** loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.	Measurable decrease in surface water ecological or chemical quality, or flow. Reversible change in yield or groundwater quality in an aquifer but WFD status unchanged. An increase in flood levels by more than 50mm within the same flood hazard category, or threshold relevant to the flood vulnerability of receptors, for floods up to and including a 1%

Magnitude of impact	General criteria	Examples
		chance of event occurring with an allowance for climate change.
	Beneficial: benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.	Measurable increase in surface water quality or yield but not changing WFD status. Measurable increase in groundwater quality or flow in an aquifer benefiting existing users but not changing WFD status. Decrease in flood risk hazard category according to the FD2320 Flood risk assessment guidance for new development (Environment Agency, 2008).
Low	**Adverse:** some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.	Some decrease in surface water ecological or chemical quality, which does not affect existing users or change WFD status. Some decrease in yield or chemical quality in an aquifer, which does not affect existing users or change WFD status. An increase in flood levels by more than 10mm within the same flood hazard category, or threshold relevant to the flood vulnerability of receptors, for floods up to and including a 1% chance of event occurring with an allowance for climate change.
	Beneficial: minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.	Some increase in surface water ecological or chemical quality but which do not affect existing users or change WFD status. Some increase in yield or chemical quality in an aquifer, which does not affect existing users or change WFD status. Some decrease in flood level (>10mm) (for a flood with a 1% chance of event occurring in the 2100s with an allowance for climate change) and remains within a similar flood hazard flood risk hazard category, according to FD2320 Flood risk assessment guidance for new development (Environment Agency, 2008).
Negligible	**Adverse:** very minor loss or detrimental alteration to one or more characteristics, features or elements.	Changes in discharges and water quality in watercourses, or groundwater flow and quality in aquifer, which cannot be measured and produce no change to the attribute integrity.

Magnitude of impact	General criteria	Examples
		Flood levels within 10mm of the baseline flood level and similar flood hazard category, or threshold relevant to the flood vulnerability of receptors, for floods up to and including a 1% chance of event occurring with an allowance for climate change.
	Beneficial: very minor benefit to or positive addition of one or more characteristics, features or elements.	Some increase in surface water ecological or chemical quality but which cannot be measured and produce no change which affects existing users or change WFD status. Some decrease in flood level (<10mm) (for a flood with a 1% chance of occurring in the 2100s with climate change) and remains within a similar flood hazard flood risk hazard category, according to FD2320 Flood risk assessment guidance for new development (Environment Agency, 2008).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.	Where no change in attribute is possible as no pathway exists.

Operational assessment methodology

10.9.23 The assessment methodology for the operational phase is the same as the methodology described for the construction phase for surface water and groundwater.

10.9.24 For flood risk, the operational phase assessment methodology is the same as the methodology described for the construction phase, and focuses on:

- The flood resistance of the Proposed Development during flood events with an annual probability up to and including 1% (or a 1 in 100 chance of an event occurring in any given year), with an allowance for climate change to 2125 as appropriate for the resilience of essential infrastructure.
- Flood resilience for the Proposed Development design up to, and including, a credible maximum climate change scenario for National Significant Infrastructure Projects under the NPPF guidance for FRA: climate change allowances (Environment Agency and Defra, 2022) and flood events with an annual probability of 0.1% (1 in 1000 chance of event occurring in any given year), where not otherwise covered by the credible maximum scenario.

- Flood risk impacts to third parties, and any requirements for flood mitigation, will consider multiple floods with annual probabilities between 50% (a 1 in 2 chance of occurring in any given year) and 1% (a 1 in 100 chance of occurring in any given year) with climate change allowances.

10.9.25 The Environment Agency will be engaged to seek an agreement on the final set of flood scenarios, considering the uncertainty of the changes in flows due to climate change, sea level rise and changes to flood defences in the Fens region.

10.9.26 Residual risk for the final Proposed Development design will be assessed for the failure of flood defences where the Proposed Development encroaches onto the floodplain and modifies storage, or has the capacity to modify pathways in a flood defence breach scenario.

10.9.27 As set out in 10.8.3, the residual risk of reservoir embankment failure would be managed and regulated through the Reservoirs Act 1975.

10.9.28 In the unlikely event of an emergency drawdown, water will be transferred through channels to the sea. The methodology in Chapter 22: Major accidents and disasters, outlines the assessment of such as scenario. The FRA will cross-reference but not duplicate this assessment.

Significance of effects

10.9.29 Significance of potential effects will be determined by cross referencing the ascribed level of value with the magnitude of impact as shown in Image 6.1 in Chapter 6: EIA approach and methodology. A likely significant effect in the context of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017is taken to be a moderate or greater adverse or beneficial significance.

10.9.30 The proposed methodology to assess potential significant effects for water resources and flood risk is a framework based on methods developed in major infrastructure projects. However, the assessment is intended as a guide and a means for comparing differing impacts on water resource receptors of varying sensitivity, rather than providing a complete and definitive list. The assessment will be supplemented and checked using professional judgement and extensive technical experience in water resources and flood risk.

10.9.31 For nature conservation sites, only the impacts in relation to surface water or groundwater resource attributes which support the site will be assessed. These impacts will then be taken forward and assessed in Chapter 9: Aquatic biodiversity.

10.9.32 For scheduled monuments and other historic environments, only the impacts on groundwater attributes will be assessed. These impacts will then be taken forward and assessed in Chapter 11: Historic environment.

10.10 Assessment assumptions and limitations

10.10.1 The following assumptions and limitations relevant to water resources and flood risk have been identified during the preparation of the EIA Scoping Report.

- The defended future baseline is assumed to be established by reasonable worst-case for flood risk scenario(s). This will be established based on sensitivity testing of critical combinations of sustaining the current standard of service for gates and other operable infrastructure, with worst-case settlement rates and the evolving bank raising works by the Middle Level Commissioners. It is assumed these will provide a robust assumption of the evolving Fens 2100+ future strategy scenarios to ensure flood resilience for the Proposed Development whatever the future strategy.
- Floods with an annual probability up to and including 1% (or a 1 in 100 chance of event occurring in any given year) with climate change allowances to 2125 is appropriate to develop design flood levels and flood resistance of vulnerable types of development within the Proposed Development.
- Climate change projections up to 2125 are appropriate for the design life of the reservoir, as the furthest assessment point in latest climate change guidance (Environment Agency, 2022).
- The credible maximum scenario for Nationally Significant Infrastructure Projects (Environment Agency, 2022) will be appropriate to assess how sensitive the Proposed Development is to changes in the climate for different future scenarios. This will help to ensure the Proposed Development can be adapted to large-scale climate change over its lifetime.
- More frequent flood events, such as a flood with an annual probability of 5% (or 1 in 20 chance of event occurring in any year), would be appropriate for the development of flood resilience of temporary works design during construction.
- A range of multiple floods with annual probabilities between 50% (a 1 in 2 chance of event occurring in any given year) and 1% (a 1 in 100 chance of event occurring in any given year) with climate change allowances are suitable to assess and determine flood mitigation needs to third parties.
- Where no groundwater level data is available, it has been conservatively assumed that groundwater levels are at ground surface, until proven otherwise.
- Shallow groundwater impacts (construction and operational) at the reservoir site will not extend past 500m from the Scoping boundary. This is based on the available geological information which does not identify extensive aquifers.
- Dewatering will be required along the entirety of the pipeline trenches during construction; however, it is possible that shallow groundwater is not present at some locations, and for these, dewatering may not be required. This will be verified by GI data.
- Information on groundwater abstractions has been requested from the local councils and the Environment Agency. However, it is possible that un-registered, unlicensed abstractions are present within the study area, and therefore may be under-representing abstractions.

- Information on unlicensed abstractions and discharges in the area of the Proposed Development were not available at the time of reporting. This data has been requested for use in the EIA.

11 Historic environment

11.1 Introduction

11.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to the historic environment. The chapter should be read in conjunction with the description of the project as presented in Chapter 2: Project description.

11.1.2 For the aspect of historic environment, the key receptors are:

- Designated heritage assets.
- Non-designated heritage assets.

11.1.3 Designated heritage assets have a level of significance/heritage value that justifies official designation. Categories of designated heritage assets relevant to the Proposed Development are:

- Scheduled monuments.
- Listed buildings.
- Registered parks and gardens.
- Conservation areas.

11.1.4 World Heritage Sites, registered battlefields and protected wreck sites are designated heritage assets. However, the closest of these assets to the Scoping boundary is 56km away (Battle of Northampton 1460; National Heritage List for England (NHLE) 1000028). Therefore, they are scoped out for further study.

11.1.5 The Government's Historic Environment Planning Practice Guidance defines non-designated heritage assets as buildings, monuments, sites, places, areas or landscapes identified by plan-making bodies as having a degree of significance/heritage value meriting consideration in planning decisions, but which do not meet the criteria for designated heritage assets (Ministry of Housing, Communities and Local Government, 2019, paragraph 039).

11.1.6 Non-designated heritage assets of archaeological interest that are demonstrably of equivalent significance/heritage value to scheduled monuments should be considered subject to the policies for designated heritage assets. The absence of designation for such heritage assets does not indicate lower significance/heritage value.

11.1.7 The value of a heritage asset to this and future generations because of its heritage interest is referred to as its significance within national planning policy and guidance. The interest may be historic, archaeological, architectural or artistic. Significance derives not only from a heritage asset's physical presence, but also from its setting. Setting is the surrounding in which a heritage asset is experienced. To prevent confusion with EIA terminology, the definition of 'heritage value' or

'value' equates to 'significance' and 'importance' as used in national planning policy and guidance.

11.2 Legislation, policy and guidance requirements

11.2.1 Legislation, policy and guidance which has informed the scope of the assessment presented within this chapter is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

11.2.2 Table 11-1 identifies the relevant policy in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) and the National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities (DLUHC), 2023) for the historic environment.

Table 11-1: UK policy relevant to the historic environment

Relevant UK policy	Relevance to assessment
NPS for Water Resources Infrastructure (Defra, 2023)	The policies relevant to the historic environment are contained within Section 4.8 Historic Environment. These include paragraph 4.8.8. which states '*The applicant should provide… a description of the significance of the heritage assets affected by the proposed development, and the contribution of their setting to that significance… Where a site on which development is proposed includes, or has the potential to include, heritage assets with archaeological interest, the applicant should include an appropriate desk-based assessment and, where necessary, an appropriate level of field evaluation. The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage asset affected can be adequately understood from the application and supporting documents.*' Paragraph 4.8.14 also states that '*Where there is a high probability (based on an adequate assessment) that a development site may include, as yet undiscovered heritage assets with archaeological interest, the Secretary of State will consider requirements to ensure appropriate procedures are in place for the identification and treatment of such assets discovered during construction.*'
NPPF (DLUHC, 2023)	Paragraphs 184 – 202 of the NPPF address the conservation and enhancement of the historic environment. Those relevant to the Proposed Development with regard to the historic environment are contained within Section 16: Conserving and enhancing the historic environment.

11.3 Stakeholder engagement

11.3.1 In preparing this chapter of the EIA Scoping Report, there has been engagement and discussion with a number of stakeholders. This engagement has principally related to the following:

- Agreement of methodologies for assessment of built heritage and historic landscape.
- Agreement of the following strategies:
  - Archaeological strategy.
  - Archive and data integration strategy.
  - Archaeological risk mapping strategy.
- Agreement of specifications for the following archaeological investigations:
  - Archaeological monitoring of ground investigations specifications.
  - Geoarchaeological assessment specifications.
  - Non-intrusive field evaluation specifications.
  - Aerial Investigation and Mapping specifications.
  - Archaeological trial trenching specifications.
- Obtaining baseline information.

11.3.2 The engagement with stakeholders will continue throughout the pre-application period as part of the EIA process. A summary of the engagement undertaken so far is presented in Table 11-2, along with proposed future engagement.

Table 11-2: Engagement with stakeholders

Stakeholder	Engagement undertaken to date	Proposed future engagement
Historic England	**24 May 2023** – meeting to present and agree archaeological survey strategy. **8 September 2023** – meeting to present further detail on site selection process, the heritage assessment and decision-making process and how that fed into site selection and balancing with other aspects. **13 September 2023** – inaugural historic environment technical working group (TWG) meeting. Introduced the proposed historic landscape and built heritage methodologies, provided update on archaeological investigations	Continued programme of historic environment technical working groups. Likely topics will include the ongoing survey strategy, updates on the transfers and associated water infrastructure baseline and progress on future EIA inputs.

Stakeholder	Engagement undertaken to date	Proposed future engagement
	and associated water infrastructure option selection and reservoir masterplanning. **11 October 2023** – TWG meeting to present an update on the archaeological survey work, as well an overview of the site selection process (Coarse Screening) for transfers and associated water infrastructure optioneering. **6 December 2023** – TWG meeting to present an overview and update on the site selection process for transfers and associated water infrastructure and overview of heritage decision making so far. **27 March 2024** – TWG meeting on the preferred whole scheme solution and decision-making process for the historic environment. **17 April 2024** – face to face meeting on survey work carried out so far and plans for 2024 and beyond. **13 May 2024** – TWG meeting, introducing the proposed EIA methodology for the historic environment, in preparation for scoping.	
Fenland District Council, Cambridgeshire County Council	**24 May 2023** – meeting to present and agree archaeological survey strategy. **13 September 2023** – inaugural historic environment TWG meeting. Introduced the proposed historic landscape and built heritage methodologies, provided update on archaeological investigations and associated water infrastructure option selection and reservoir masterplanning. **11 October 2023** – TWG meeting to present an update on the archaeological survey work as well as an overview of the site selection process (Coarse Screening) for transfers and associated water infrastructure optioneering. **6 December 2023** – TWG meeting to present an overview and update on the	Continued programme of historic environment technical working groups. Likely topics will include the ongoing survey strategy, updates on the transfers and associated water infrastructure baseline and progress on future EIA inputs.

Stakeholder	Engagement undertaken to date	Proposed future engagement
	site selection process for transfers and associated water infrastructure and overview of heritage decision making so far. **27 March 2024** – TWG meeting on the preferred whole scheme solution and decision-making process for the historic environment. **17 April 2024** – face to face meeting on survey work carried out so far and plans for 2024 and beyond. **13 May 2024** – TWG meeting, introducing the proposed EIA methodology for the historic environment, in preparing for scoping.	
Peterborough City Council, Huntingdonshire District Council, South Cambridgeshire District Council, Borough Council of King's Lynn & West Norfolk, Norfolk County Council	**8 and 9 May 2024** – Introductory meeting for transfers and associated water infrastructure host local authorities providing an overview of the whole scheme solutions, specific sections in relation to the local authority areas and historic environment work undertaken to date. **13 May 2024** – TWG meeting. Introduction to proposed EIA methodology for the historic environment.	Continued programme of historic environment technical working groups. Likely topics will include the ongoing survey strategy, updates on the transfers and associated water infrastructure baseline and progress on future EIA inputs.

11.4 Study area

11.4.1 The study area for the historic environment has been defined based on the identified Scoping boundary and the available information for the Proposed Development. This includes the information on construction and operational phases as described in Chapter 2: Project description. The identified study area is considered to be sufficiently broad to allow for the ongoing refinement of the Proposed Development; however, if required this will be expanded to ensure there is appropriate coverage of all potential significant environmental effects or harm to heritage assets.

11.4.2 The following study areas have been used to guide the historic environment baseline:

- The inner study area – defined as within the Scoping boundary and within 500m of the Scoping boundary.

- The intermediate study area – defined as between 500m and 2km of the Scoping boundary.
- The wider study area – defined as being between 2km and 10km of the Scoping boundary and within the Zone of Theoretical Visibility.

11.4.3 The study areas are considered sufficient to produce a baseline that will allow assessment of potential impacts and harm to the significance/heritage value of heritage assets from the Scoping boundary, including those resulting from changes to the setting of heritage assets. Table 11-3 below sets out in what circumstance each study area has been applied.

Table 11-3: Historic environment study areas

Operational zones	Scoping boundary	Heritage asset designation	
		Non-designated	Designated
Sources of supply and upstream water transfers	Transfers	Inner study area	Inner study area
	Associated water infrastructure	Inner study area	Inner and intermediate study area
Reservoir site	Reservoir/ water treatment works	Inner study area	Inner, intermediate and wider study area
Water treatment works			
Downstream treated water transfers	Transfers	Inner study area	Inner study area
	Associated water infrastructure	Inner study area	Inner and intermediate study area

11.4.4 The study area has not been defined recognising the four operational zones identified in Chapter 2: Project description. The assessment of potential impacts and harm on the value of heritage assets is partly guided on the type of infrastructure proposed. Different impacts are anticipated based on whether infrastructure is below or above ground, particularly with regard to the setting of heritage assets. Therefore the study areas have been defined based on the type of infrastructure proposed.

11.4.5 Assets within the wider study area have informed the baseline, where relevant. These have been subjected to a scoping exercise as part of this report, to determine whether they will be assessed further. This considered the setting of the heritage asset, whether it contributes to the asset's value, and if any elements of that setting may be changed by the Proposed Development. This has utilised the Zone of Theoretical Visibility, to understand the extent of intervisibility, rather than solely due to their distance from the Proposed Development. Where there was no Zone of Theoretical Visibility available, professional judgement has been adopted.

11.4.6 By exception, consideration will be given to assets beyond the study areas listed in Table 11-3 in discussion with relevant bodies, where evidence suggests a potential significant effect could occur as a result of the construction or operation of the Proposed Development.

11.5 Baseline data collection

11.5.1 The baseline conditions for the historic environment presented in Section 11.6 represent a review of the currently available data. The data collated to date was obtained via desk studies and field surveys. Data collection to inform the baseline of the assessment is ongoing. The data described below provides a robust context for the scoping of the assessments.

Desk studies

11.5.2 The following data sources have been consulted to inform the historic environment baseline:

- The National Heritage List for England (NHLE) database (Historic England, 2024a).
- The Peterborough, Cambridgeshire and Norfolk Historic Environment Records (HER) databases (Peterborough City Council 2024; Cambridgeshire County Council 2023; 2024; Norfolk County Council 2023).
- Archaeological excavation and survey records, including Historic England National Record of the Historic Environment Excavation Index for England (Historic England, 2011) and those available on Heritage Gateway (Historic England, 2024b).
- Historic England's Heritage at Risk Registers (Historic England, 2023).
- Relevant online databases including the Defence of Britain database (Council for British Archaeology, 2006), the Rural Settlement of Roman Britain database (Allen *et al.,* 2018) and the Building Stones Database for England (British Geological Survey and Historic England, 2023).
- Archive materials including images and records held by Cambridgeshire County and University of Cambridge Archives.
- Cartographic evidence.
- Aerial photography and satellite imagery.
- LiDAR data held by the Environment Agency.
- National Mapping Programme data held by Historic England.
- Geological mapping and borehole information as held by the British Geological Survey (2024).
- Local, regional and national planning policies in relation to the historic environment including conservation area appraisals and mapping.
- The East of England Research Framework for the Historic Environment (Association of Local Government Archaeological Officers (ALGAO) East of England, 2024).

- Publications, including journal articles.
- Unpublished reports.

Field surveys

11.5.3 The following field surveys have been undertaken at the proposed reservoir and water treatment work sites, as agreed with Historic England and the Cambridgeshire Historic Environment Team. This forms part of a phased approach and further field surveys are planned in the future for all of the operational zones.

- Phase 1 Site walkovers to understand the character of the historic landscape and its value and capacity for change (carried out in May 2023).
- Phase 1 Geoarchaeological monitoring of ground investigations (carried out in August and September 2023 by York Archaeology).
- Phase 1 Site walkover to identify and assess heritage assets, and to undertake setting descriptions and value assessment (carried out in October and November 2023).
- Phase 1 Archaeological geophysical survey (carried out intermittently between November 2023 and February 2024 by Headland Archaeology).

11.5.4 These surveys will be used to inform the baseline and the assessment of impacts and potential effects as part of the environmental assessment process. They will also inform future phases of historic environment survey. At present, no historic environment surveys have been undertaken in relation to the sources of supply and upstream water transfers, or downstream treated water transfers.

11.6 Baseline conditions

11.6.1 The baseline conditions for historic environment are described below for the operational zones and the relevant study areas (defined in Section 11.4). The baseline conditions are as established from the data collection described in Section 11.5.

11.6.2 For a full discussion of the historic environment baseline for the proposed reservoir and water treatment works site, see Appendix 11.1: Historic environment baseline report – reservoir. For a discussion of the historic environment baseline for the sources of supply and upstream transfers and downstream treated water transfers, see Appendix 11.2: Historic environment baseline report – transfers and associated infrastructure.

11.6.3 The upstream transfer route from the River Great Ouse overlaps with the downstream treated water transfer route to the proposed service reservoir in Bluntisham, Huntingdonshire. For the baseline narrative, the part of the Scoping boundary between the Fenland District Boundary and the pumping station to the south of Bluntisham is considered as part of the upstream transfer baseline. The part of the Scoping boundary that diverges at Bluntisham and continues

southwards towards the South Cambridgeshire boundary is considered as part of the downstream treated water transfer baseline.

11.6.4 Within the historic environment reporting, various reference numbers have been used to provide a unique identifier to heritage assets. Heritage assets are considered as receptors for both EIA and in the assessment of harm. For this reason, heritage assets are given a unique identifier prefixed with an acronym for the Proposed Development for example **FR_0001**. The locations of heritage assets are shown on Figure 11.1 for non-designated heritage assets and Figure 11.2 for designated heritage assets. Findspots are also not considered as heritage assets and are therefore omitted from the historic environment gazetteer (see Appendices 11.1 and 11.2), but are discussed in the text to provide context and inform archaeological potential. Where findspots are mentioned, these are referenced by their HER numbers.

Baseline relevant to all zones

Archaeological and historical background summary

11.6.5 Parts of the Scoping boundary are located within the fen region of Cambridgeshire and Norfolk. Fen deposits, which were laid down during the Holocene period, lie within all zones and local authority areas (except for South Cambridgeshire). The Holocene deposits within the Fens have a complex depositional history and there are temporal and geographic variances (see Appendix 11.1 for more detail). This has been influenced by past rises in the sea level, reflected in the deposition of Barroway Drove Beds, as well as localised flooding and a high water table, leading to waterlogging and formation of peat. However, a broad sequence of peat and clay deposition dates from the Mesolithic through to the post-Roman period. This pattern of deposition is fundamental to understanding past land use and settlement patterns.

11.6.6 This pattern of deposition and subsequent drainage has created a flat landscape across a large part of the Scoping boundary. Islands of higher ground composed of clays or sands and gravel are subtly elevated above the former fen landscape. Chatteris in Fenland, for example, sits at around 14m Above Ordnance Datum (AOD). The topographic variance across the Fens sits between 0m and 5m AOD across the Scoping boundary within Peterborough, Fenland and King's Lynn and West Norfolk areas. In King's Lynn and West Norfolk, the topography rises along an outcrop of sandstone bedrock to an elevation of 35m AOD at Downham Market. In Huntingdonshire, the topography rises to the south of the Fens and undulates along an area of glacial till, which reaches c.35m AOD. The topography then drops southwards towards the valley of the River Great Ouse, which sits between 5m and 13m AOD. The river also forms the district boundary with South Cambridgeshire. Across this area, the topography undulates, across an outcrop of bedrock and glacial till in an area known as the Western Plateau which reaches 64m AOD.

11.6.7 The areas with fen deposits and the alluvial deposits laid down by the rivers hold the greatest palaeoenvironmental potential. These deposits have been waterlogged and are likely to have preserved organic remains. Former

palaeochannels are also likely to be preserved within the floodplain of the River Great Ouse and the area is rich in palaeoenvironmental and archaeological evidence (Cambridgeshire County Council, 2014). The River Terrace Deposits around Fenstanton have revealed evidence for megafauna remains (e.g. mammoth and rhinoceros) dating to around 130,000 years ago (MOLA Headland Infrastructure, 2019).

Baseline for sources of supply and upstream transfers

11.6.8 The following historic environment baseline considers those elements of the sources of supply and upstream transfers which fall within the local authority boundary of Peterborough City Council and Huntingdonshire District Council. The baseline for the sources of supply and upstream transfers within the Fenland District Council area is considered within the baseline for the reservoir site and water treatment works (see below).

Designated heritage assets

11.6.9 There are 213 designated assets within the inner and intermediate study areas. These consist of:

- 16 scheduled monuments.
- 23 Grade I listed buildings.
- Nine Grade II* listed buildings.
- 158 Grade II listed buildings.
- One Grade II registered park and garden.
- Six conservation areas.

11.6.10 In addition to the above assets, the following designated heritage assets which lie outside the intermediate study area have been identified as having the potential to be impacted by the Proposed Development in accordance with the methodology discussed in Section 11.4 above:

- Park Conservation Area, Peterborough.
- Somersham Conservation Area.
- Grade II* listed Stanley Farmhouse.

Non-designated heritage assets

11.6.11 There are 85 non-designated heritage assets within the inner study area. Of these, the following assets are located within the Scoping boundary:

- Roman activity, comprising a settlement (FR_1595).
- Post-medieval activity is evidenced by the presence of Turnpike roads (e.g. FR_1891; FR_1930), railway lines (FR_1905), drainage channels and waterways (FR_1874), and a windmill (FR_1691).

- Navigable sections of drainage systems, including Fenland Waterways (FR_1800), King's Delph, Whittlesey (FR_1888) and the former course of the River Nene Navigation (FR_1802) travel through the Scoping boundary.
- Modern remains including Four Second World War pillboxes, including Pillbox Type FW3/24 (FR_2025), a Pillbox near Sluice Bungalow (FR_2023) near Dog-in-a-Doublet and a Second World War bombing decoy (FR_1618).

Archaeological and historical background summary

11.6.12 Evidence for Palaeolithic and Mesolithic activity is limited. Much of the Scoping boundary and study areas would have been dry in the Mesolithic period; however, evidence for activity is largely absent. The rise in sea levels and inundation across the Flag Fen Basin, means that Mesolithic and early Neolithic occupation evidence may be buried beneath later deposits (Knight *et al*., 2024).

11.6.13 Part of the Scoping boundary in Peterborough is located within the Flag Fen Basin, an embayment on the western edge of the Fens where the lower-lying parts flooded from the late Neolithic (Knight *et al*., 2024). As noted in the general fen deposit sequence above, there is potential for preservation of palaeoenvironmental remains. Excavations within the Flag Fen Basin have also revealed exceptional preservation conditions of organic remains, such as wood and textiles. Neolithic evidence is limited although a possible settlement was identified at Storey's Bar Road (c.270m north-west of the inner study area) (Pryor, 2001). In Huntingdonshire, the River Great Ouse is likely to have been an important trade and communication route. Evidence for potential prehistoric archaeological remains of Neolithic date is indicated by findspots around Bluntisham (e.g. Cambridgeshire HER: MCB2177; MCB2249), Barleycroft Farm and revealed through quarrying east of Needingworth and to the south of Bluntisham, across the river (see also downstream transfers baseline).

11.6.14 During the Bronze Age, settlement, field system complexes and burial largely focused on the higher and drier ground as the lower-lying areas became inundated (Knight *et al*., 2024). Within the inner study area, there is an extensive barrow cemetery at Stanground (FR_2068) and three scheduled bowl barrows near Priors Fen and Bank Farms (FR_1006; FR_1007; FR_1008). The wetlands themselves were also a focus for activity, with the c.1km-long trackway at Flag Fen (FR_1009) reflecting this (Kenney, 2005). This formed a vital communication route between the islands of Whittlesey and Peterborough. However, the settlement at Must Farm best demonstrates the symbiotic relationship people had with the wetlands. Excavations here identified a preserved Late Bronze Age settlement, comprising five stilt-raised houses driven into the soft silts of an active watercourse.

11.6.15 By the Iron Age period most of the former watercourses across the Flag Fen Basin had become inactive and were covered by peat (Phillips, 2009; Hall, 1987). Large parts of the wetlands were not suitable for permanent habitation and the water table continued to rise. However, communities adapted and shifted higher up the gravel terraces, living in nucleated settlements and practising a mixed farming regime (Historic England, 2024c). This is seen on the western edge of the

Whittlesey Island, where a scheduled Roman field system and trackway (FR_1001) lies, within the inner study area. The Flag Fen trackway silted over as the water table continued to rise. However, the area was dry enough to become part of the Fen Causeway (FR_1798) Roman road. This served as a major route linking the East Midlands with East Anglia (Hall, 1987).

11.6.16 During the Roman period, the river terraces were favoured for settlements and a number are recorded in the inner study area in Huntingdonshire, including at Bluntisham (FR_1595) and Somersham (FR_1915).

11.6.17 During the early medieval and medieval period, the inner study area remained uninhabitable with settlement continuing on the higher ground. Communities flourished within and around Peterborough, with a monastery established in the city between AD 650 and 850 (Beacon Planning Ltd., 2017). Peterborough was a market town from the mid-12th century and was centred around the cathedral church of St Peter, St Paul and St Andrew (FR_1359) (Beacon Planning Ltd., 2017). Other smaller settlements also flourished on the higher ground at Eye, Thorney and Whittlesey, where evidence of arable farming can also be found (Hall, 1987).

11.6.18 In Huntingdonshire, early medieval activity includes a possible cemetery south of Chatteris (FR_1675). Both Somersham and Bluntisham are recorded in the Domesday Survey (Powell-Smith, 2024). Land in Somersham was acquired by Ely Abbey in AD 991 and in the 12th century the Abbey constructed a moated palace (FR_1011) and deer park, known as Somersham Chase (FR_1920; British History Online, 1932). This deer park is still partially legible in the landscape, where modern roads preserve part of the boundary. St Mary's Church, Bluntisham (FR_1044) was constructed during the 14th century and its edge-of-village location means that its spire is visible in changing views from across the landscape. However, much of the Scoping boundary and inner study area was intensively used for agricultural purposes on the higher ground of the river terraces and the claylands, which abuts the Fens. This is largely evidenced by ridge and furrow which largely survives as cropmarks, and the field patterns of predominantly post-medieval date.

11.6.19 During the post-medieval period, agriculture continued to dominate and the draining of the Fens to the north likely brought a further level of prosperity to Huntingdonshire. The settlements at Bluntisham, Somersham and Earith prospered and many of their buildings are post-medieval in date. Bluntisham has a number of substantial, detached properties, such as the Grade II* listed Bluntisham House (FR_1047) which dates to 1720. The River Great Ouse remained an important communication route which meant that it necessitated a form of defence during the English Civil War. A bulwark, an earthwork fortification, was constructed by Parliamentary forces to the east of Earith, on the eastern edge of the intermediate study area (FR_1012). Small-scale industrial activity is evidenced by windmills, including one within the Scoping boundary (FR_1691), and gravel extraction (FR_1714). Several railway lines were constructed during the 19th century within the inner study area, though none survive today. This includes the March to St Ives line (FR_0252; constructed in 1847), the Ely–St Ives branch line (FR_1905;

constructed in 1878) and a Ramsey–Somersham branch line (FR_1925; constructed 1889). However, these lines closed during the 20th century and were dismantled.

11.6.20 Large parts of the study areas were still wetlands but the creation of Morton's Leam (FR_1898) in 1478 (Gibson and Knight, 2006), represents an early attempt at large scale drainage. Like many areas of the Fens, the wetland landscape was reclaimed for arable practices during the post-medieval period. Much of the historic landscape character is derived from the extensive drainage during the 17th century. This created land for agricultural purposes which was enclosed, although there has been loss of historic boundaries as fields have been enlarged in the 20th century. This meant that many isolated agricultural complexes were established, such as Priors Farmhouse (FR_1349). The critical importance of the drainage channels made them perceived targets during the Second World War, which is reflected in the number of pillboxes (e.g. FR_2023) built.

Baseline for the reservoir site and water treatment works

11.6.21 The following historic environment baseline considers the Scoping boundary for the proposed reservoir, including the water treatment works. It also considers the baseline for the sources of supply and upstream water transfers for the Fenland District Council (see above).

Designated heritage assets

11.6.22 There are no designated heritage assets within the Scoping boundary. There are 143 designated assets within the inner and intermediate study areas. These consist of:

- Five scheduled monuments.
- One Grade I listed building.
- Two Grade II* listed buildings.
- 133 Grade II listed buildings.
- Two conservation areas.

11.6.23 Of those designated assets within the wider study area, eight have been scoped in for further assessment, in accordance with the methodology discussed in Section 11.4 above. These consist of:

- Three Grade I listed buildings:
  - Parish Church of St Leonard, Little Downham (FR_0310).
  - Church of St Martin, Witcham (FR_0331).
  - Church of St Peter-Ad-Vincula, Coveney (FR_0385).
- Three Grade II* listed buildings:
  - Hundred Foot Pumping Station, near Manea (FR_0274).

  - Church of St Mary, Mepal (FR_0326).
  - Barn to the west of Tower Farmhouse, Little Downham (FR_0375).
- Two Grade II listed buildings:
  - Parish Church of St Nicholas, Manea (FR_0140).
  - Stonea Grange Farm, Barn, Wimblington (FR_0146).

Non-designated heritage assets

11.6.24 There are 147 non-designated heritage assets within the inner study area. Of these, the following assets are located within the Scoping boundary:

- Possible Bronze Age funerary remains (FR_0173; FR_0446; FR_0452).
- Possible Iron Age/Roman field systems and enclosures (FR_0253; FR_0438).
- Medieval agricultural features, such as banks (FR_0445), trackways (FR_0455; FR_0472) and possible drains (FR_0473; FR_0482).
- Post-medieval drainage channels, such as Vermuyden's Drain (FR_0255) and associated infrastructure, such as the Horseway Lock (FR_0197), demolished pumps and engine houses (FR_0228).
- A number of existing and demolished, post-medieval farmsteads (e.g. FR_0177; FR_0183; FR_0185).
- A series of undated cropmarks (FR_0180).

Archaeological and historical background summary

11.6.25 The underlying superficial geology within the proposed reservoir is dominated by fen deposits, which are surrounded by areas of subtly higher ground at Doddington, Chatteris and Honey Hill (see baseline relevant to all zones, above).

11.6.26 In the Palaeolithic, people adopted a nomadic lifestyle, hunting animals and gathering natural resources. Evidence for early human activity is reflected in stone handaxes from around Wimblington, March and Chatteris, recovered from gravel deposits. Similar gravel deposits are present near Doddington and Honey Hill.

11.6.27 During the Mesolithic, the lower-lying areas of the Fens became marshy and eventually peat formed (Knight and Brudenell, 2020). The earliest formation of peat generally lies within the deepest parts of the Fens (Waller, 1994). There is no evidence for Mesolithic settlement within the Scoping boundary or inner study area. However, possible settlements have been identified at Manea and Purl's Bridge, within the wider study area.

11.6.28 From the Neolithic period, the nomadic lifestyle was complemented by permanent settlement, domesticated crops, animals and pottery. Axeheads recorded within the inner study area of the Scoping boundary, hint at woodland clearance to create areas for agriculture and settlement. There is possible evidence for burial on Honey Hill, with Neolithic barrows recorded (FR_0470).

11.6.29 Evidence for permanent settlement is still largely absent in the Bronze Age. The majority of evidence for this period is funerary such as the landscape on Honey Hill, immediately east of the Scoping boundary. Settlement and agricultural activity may be present on the lower slopes within the Scoping boundary. This is the case in the Flag Fen Basin, where burials were focused on the highest ground (4m AOD), with settlement along the lower-lying contours (1–3m AOD) (Knight and Brudenell, 2020).

11.6.30 The extent of wetland across the Fens reached its maximum during the Iron Age. Evidence for settlements are sporadic, largely unenclosed, possibly reflecting an element of seasonality to human occupation. During the later Iron Age, there is evidence for larger, nucleated settlements in some parts of the wider study area, such as at Langwood Hill Drove. The hillfort at Stonea Camp (FR_0002) may have acted as a meeting point, but there is little evidence to support permanent occupation here.

11.6.31 The Romans reached the Fens within the first few years of conquest in the AD 40s. High status administrative centres may have been located at Stonea and Langwood Hill Drove. These were complemented by a number of smaller, agricultural settlements. Stonea Grange ceased to function as an administrative centre by the third century AD. Despite limited evidence the area continued to be settled.

11.6.32 After the cessation of direct Roman rule in AD 410 several small tribes may have been present within the Fens, as reflected in those listed in the Tribal Hidage. However, a new regional power centre emerged at Ely, sometime in the 7th century. Ely continued to be the regional centre, despite the later Viking incursions and imposition of Danelaw. Archaeological evidence for occupation and burial still occurs around Chatteris and March.

11.6.33 The medieval period was characterised as a period of growth in the Fens. The 14th century saw economic and population decline. Settlement was nucleated and confined to the fen islands at Doddington and Chatteris. Available dry land was exploited for arable cultivation, and seasonal pasture extended into the fens, which was held in common. A network of artificial watercourses was also vital for drainage, transport and trade. The Bishops of Ely established one of their principal residences at Doddington, with an associated deer park. However, the power of the Bishopric waned during the later part of the period and the residence was sold off by 1600.

11.6.34 During the post-medieval period, the landscape changed significantly, as the fens were drained for arable agriculture. The regularly arranged and straight drains are a distinctive component of the landscape in the Fens. Isolated farmsteads were established across the newly drained areas. The drying out of the peat also resulted in land shrinking, and has meant many historic farm complexes have been lost. The economy was built on the agricultural trade, with Chatteris becoming a market town. It was connected to the railway network in the 19th century.

11.6.35 Agriculture continued to dominate the local economy and during the 20th century, fields were amalgamated following a demand for agricultural produce and increase

in mechanisation. The management of drainage was brought under a new framework, established by the Land Drainage Act of 1930, which established the internal drainage boards. These drains were seen as strategically important during the Second World War and pillboxes were constructed as anti-invasion measures. The former railway between Chatteris and March was converted to a road.

Baseline for downstream treated water transfers

11.6.36 The following historic environment baseline includes the baseline for those elements of the downstream treated water transfers which fall within the local authority boundary of Fenland District Council, Borough Council of King's Lynn & West Norfolk, Huntingdonshire District Council and South Cambridgeshire District Council.

Designated heritage assets

11.6.37 There are 300 designated assets within the inner and intermediate study area. These consist of:

- Eight scheduled monuments.
- Six Grade I listed buildings.
- 20 Grade II* listed buildings.
- 250 Grade II listed buildings.
- One Grade I registered park and garden.
- One Grade II* registered park and garden.
- One Grade II registered park and garden.
- 13 conservation areas.

11.6.38 In addition to the above assets, the following designated heritage asset which lies outside the intermediate study area has been identified as having the potential to be impacted by the Proposed Development in accordance with the methodology discussed in Section 11.4 above:

- Grade II listed Somersham House and Bramston (NHLE: 1163753).

Non-designated heritage assets

11.6.39 There are 416 non-designated heritage assets within the inner study area. Those located within the Scoping boundary include the following:

- Early prehistoric remains include a ring ditch (FR_1932), and Bronze Age barrows (e.g. FR_1509, FR_1912, FR_1914, FR_1928), cropmarks and associated finds (FR_1877); enclosures (FR_1729 and FR_2020), ditches (FR_1786), potential Bronze Age barrows (FR_1740), and possible mounds at Swavesey (FR_1792).
- Iron Age evidence including artefacts and cropmarks at Wimblington (FR_1516) and two enclosures (FR_1818; FR_1862), settlement and agricultural evidence (for example, FR_1940, FR_1952, FR_1965, FR_1970, and FR_1975).

- Roman activity is shown by settlement remains (FR_1477, FR_1827), enclosures and a trackway (FR_1421, FR_1562), a settlement and saltern site (FR_1819), a salt works, canal and field system (FR_1824), settlement and agricultural activity (FR_1795, FR_1736, FR_1721, FR_1952, FR_1973, FR_1946, FR_1948, FR_1961, FR_1966 and FR_2008), and roads (FR_1969, FR_1929 and FR_1910).
- Medieval activity is defined by Well Creek and New Podyke earthworks (FR_1812) and Somersham Palace gardens and deer park (FR_1920); field boundaries (FR_1717, FR_2004, FR_2017, FR_2019 and FR_2022), enclosures (FR_1978 and FR_1963) and two earthwork boundary banks (FR_1981, FR_1774); possible medieval field boundaries.
- Post-medieval remains include former farmsteads (FR_1422 and FR_1442), the site of a barn (FR_1670), evidence of agricultural activity (FR_1768 and FR_1960), the Lamb and Flag beer House (FR_1428) the East Anglian Railway (FR_2074), other railway lines and turnpike roads (FR_0252, FR_1905, FR_1754, FR_1906, FR_1913, FR_1977 and FR_1935), rivers for navigation (FR_1874) and drainage including St John's Eau or Downham Eau (FR_1805).
- Modern activity is attested by Second World War evidence such as Downham Market airfield (FR_1830) and a Second World War bombing decoy (FR_1618).
- Remains of unknown date characterised by earthworks, cropmarks and enclosures (FR_1510, FR_1452, FR_1485, FR_1517, FR_1677, FR_1900, FR_1904, FR_1909, FR_1926, FR_1927, FR_1938).

Archaeological and historical background summary

11.6.40 The Scoping boundary sits within a flat agricultural landscape, between 1–4m AOD and large parts lie within former fen areas, which are largely mapped as tidal flats (see above). Settlements within or in close proximity to the inner study area lie on slightly higher ground when compared to the main fen basin.

11.6.41 There is limited evidence of Palaeolithic and Mesolithic activity within the inner study area and this is restricted to a few isolated findspots. In South Cambridgeshire Palaeolithic finds have been found south of Fenstanton, approximately 2.4km west of the Scoping boundary, within River Terrace deposits (MOLA Headland Infrastructure, 2019). Mesolithic activity has been recorded within the inner study area, north-west of Boxworth (FR_1793) although the material was redeposited (MOLA Headland Infrastructure, 2019).

11.6.42 Sea levels rose during the Neolithic period, inundating the lower-lying areas and depositing layers of silt and clay, which can mask earlier evidence for human activity. Isolated findspots of Neolithic artefacts may reflect activity on areas of higher ground. Sites include Tithe Barn Farm (Atkins, 2011) and Honey Hill (Pryor and Redding, 1999) near Chatteris; Bluntisham (see above) and to the south of Needingworth (Cambridgeshire HER: MCB2292); Wimbotsham and Downham Market; and west of Swavesey (FR_1751). There are also funerary monuments recorded, including barrows such as Gray's Farm (FR_1438, FR_1450 and FR_1509), near Christchurch (FR_1460, FR_1831), north of Manea (FR_1478), and within the

Scoping boundary to the east of Holywell (e.g. FR_1912). Those at Holywell likely form part of a wider prehistoric landscape complex which flanks either side of the River Great Ouse.

11.6.43 Occupation in the Bronze Age continued to be on higher ground. Settlement, burial and agricultural activity dating to the Bronze Age, has been recorded across the inner study area. This activity appears to be localised to areas of higher ground such as the Western Plateau, between the River Great Ouse (see baseline for upstream source of supply) and River Cam valleys. A middle Bronze Age settlement has been excavated to the north-west of Boxworth (FR_1793) (MOLA Headland Infrastructure, 2019). Again, possible barrows are recorded near Swavesey (FR_1792) and Bar Hill (FR_1740). Bar Hill is the focus for field systems (FR_1775) and enclosures (FR_1944).

11.6.44 A high water table persisted into the Iron Age, meaning low-lying areas would have been difficult to settle. Settlements became larger and nucleated, continuing to be focused on the higher and drier ground such as those at Fen Drayton (FR_1940) and Childerley (FR_1952). Larger settlement complexes were connected to the wider landscape via trackways, (i.e. Fen Drayton FR_1946 and FR_1969, MOLA Headland Infrastructure, 2019). Elsewhere, evidence is for a variety of farmsteads where arable and pastoral farming was undertaken, which were both enclosed and unenclosed. Sites were continuously or intermittently occupied from the Bronze Age such as at Tithe Barn Farm, Wimbotsham and Downham Market (FR_1867). Other sites continued to be occupied into the Roman period at Nordelph (FR_1818) and Barleycroft Farm (e.g. Evans and Tabor, 2012).

11.6.45 The water table remained high during the Roman period whilst periodic flooding deposited silts. The evidence suggests the presence of smaller settlements and widespread agricultural activity. Many settlements continued to be occupied, reorganised, and expanded in the Roman period such as near Fen Drayton (FR_1940) and near Lolworth (FR_1950). Other agricultural settlements reflect a densely occupied landscape including one at Comberton (FR_1958). High status houses included a villa near Over (FR_1658). Activity is also recorded during the Roman period within the Scoping boundary, with concentrations to the north of Manea (e.g. FR_1479) and east of Chatteris (e.g. FR_1488).

11.6.46 New roads were constructed. The Via Devana Roman Road (FR_1910) connected Colchester to Chester, along the route now followed by the modern A14, and crosses the Scoping boundary. The Fens Causeway Roman Road (FR_1799) ran from the north and west of England to East Anglia. There is evidence for domestic, agricultural and industrial activity near Nordelph (e.g. FR_1810, FR_1819, FR_1825, FR_1826 and FR_1844) close to the road. One of the major activities was the production of salt, manufactured by the evaporation of brackish water collected from tidal streams. Many of the saltern sites lie on the silt edges of the Fens (Hall and Coles, 1994) such as examples at Christchurch (FR_1525) and Manea (FR_1514).

11.6.47 During the early medieval period, large parts of the Fens would still have been too wet for permanent settlement. Activity is focused again on the higher ground such as near Wimbotsham where a possible settlement and cemetery has been recorded (FR_1849). At Boxworth (FR_1793), there was continuous occupation from the Roman period to the 8th/9th century (MOLA Headland Infrastructure, 2019).

11.6.48 By the medieval period, many settlements within the study area are recorded in the Domesday Survey of 1086, indicating their early medieval foundation. People lived within these settlements and farmed the available higher ground as evidenced by remains of ridge and furrow. Medieval field systems are legible within the existing field pattern and surviving ridge and furrow earthworks, particularly close to existing settlements. The seasonally dry fens were used to put animals to pasture. Medieval drainage and navigation of the fens also occurred. Manorial halls surrounded by moated sites became common from the 12th century such as Wimbotsham (FR_1807; FR_1808), Colne (FR_1013) and Overhall Grove (FR_1003). The Bishops of Ely also established a moated residence near Somersham (FR_1011). Swavesey was the administrative centre of a large estate, with a castle (FR_1004) and priory (FR_1005). Its prosperity was as a trading port with a canal which connected the priory to the River Great Ouse (Cooper and Kenney, 2001).

11.6.49 The draining of the Fens took place in the 17th century and completely transformed the landscape. Drains, channels and drainage pumps (i.e. FR_1532 and FR_1501) were built to facilitate drainage. Several farms, such as the Grade II listed Pages Farmhouse (FR_1090), Cuckoo Pastures Farmhouse (FR_1091) and Lower Farm (FR_1092), were established to take advantage of the newly created, fertile agricultural land. The importance of grain processing is demonstrated by the survival of the Grade II listed windmill (FR_1086) and granary (FR_1087) east of Elsworth. New connections were constructed between existing settlements. This included the Chatteris Ferry to Wisbech Turnpike (FR_0266) and the Somersham Turnpike (FR_1891). Railways were built in the 19th century, including the Ely and Peterborough branch of Great Eastern Railway (FR_1886) and the railway from Ely to King's Lynn (FR_2074). Gravel extraction has been a notable industry in the area around Needingworth (FR_1563, FR_1553, FR_1684) and Fen Drayton (e.g. FR_1785). This was aided by transport routes, such as the St Ives to Cambridge railway.

11.6.50 Two post medieval registered parks and gardens, the Grade II listed Madingley Hall (FR_2072) and the Grade II* listed Childerley Hall (FR_2073) are located within the inner study area. Four conservation areas are also located within the inner study area: these are Madingley (FR_1383), Fen Drayton (FR_1381), Knapwell (FR_1382) and Swavesey (FR_1384). The character of these settlements is rural primarily post-medieval with earlier origins as medieval nucleated or linear villages.

11.6.51 Former medieval and post-medieval fields have been amalgamated in the modern period (Chris Blandford Associates, 2007). During the Second World War defensive structures were constructed to prepare for a possible invasion. The drainage channels were seen as a potential target for any invasion and pillboxes were constructed (e.g. FR_1400, FR_1730) as part of the defence network. Downham

Market hosted an RAF base to the east of the town. Defensive fortifications include a former searchlight battery (FR_1727) located south of Swavesey.

Future baseline

11.6.52 A potential change to the baseline may be presented through climate change, in the absence of the Proposed Development. Drier summers and drought conditions associated with projected climate change may lead to changes in groundwater levels and cause the drying of peat, potentially impacting preserved archaeological finds. Conversely, wetter winters and more intense rainfall events may result in soil saturation, which could damage preserved archaeological finds. This effect could be compounded by the Proposed Development's impacts on groundwater levels, potentially accelerating or altering the rates of peat drying or saturation. This could alter hydrology and groundwater conditions which in turn may affect archaeological preservation environments through drying out of deposits or rapid changes in ground saturation. This could affect archaeological sites which contain organic remains such as wood. Continued erosion of peat due to climate change may also reveal further archaeological sites that have not been previously recorded. Further details can be found in Chapter 17: Climate resilience, of this EIA Scoping Report.

11.6.53 Chapter 23: Cumulative effects will identify the proposed developments that are anticipated to be constructed prior to the construction of the Proposed Development. As such, these developments would form part of the future baseline for assessment within the EIA. Where this presents a change to the current baseline specific to historic environment, this will be considered within the EIA.

11.7 Design and mitigation

Design

11.7.1 The design of the Proposed Development to date has considered environmental constraints and potential environmental effects. The design development process has sought, where practicable, to avoid and reduce potential adverse environmental effects on designated and non-designated heritage through avoidance. Design decisions have also been made to take account of the setting of designated and non-designated heritage assets.

11.7.2 The Proposed Development will continue to consider the setting of heritage assets, and how the design can be changed to avoid or reduce potential adverse impacts on heritage value. The results of the historic environment surveys outlined in Section 11.5 will also be used in order to avoid archaeological remains, where practicable, during the development of the design. Where appropriate, tiered water assessments will also be undertaken to understand any potential changes to the groundwater that may impact on the value of heritage assets. This will allow the design to be developed to avoid or mitigate against any adverse impacts.

11.7.3 The ongoing development of the design will incorporate embedded mitigation to avoid and reduce potential adverse effects, where practicable. The historic

environment will be considered as part of the embedded mitigation so the design of this is appropriate to the setting of heritage assets and responds, where possible, to the historic character of the landscape.

11.7.4 The design development process will include consideration of enhancement measures to improve the surrounding environment. Potential enhancements relevant to the historic environment include revealing or enhancing the value of heritage assets, the adaptation of at-risk heritage assets to provide a sustainable future, the reinvigoration of historic routeways and field boundaries, and the recreation of historic landscapes.

Mitigation

11.7.5 Documents presenting the approach to mitigation will be produced, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. These measures would be applied to mitigate likely significant effects, and where possible non-significant effects, including potential historic environment effects. Historic environment considerations will also inform the process for developing construction methods and components, such as those relating to construction vehicle movement, excavations, earthwork construction, construction of infrastructure, noise and lighting.

11.7.6 Management plans will be developed which will include measures to avoid and reduce potential adverse effects during construction. Such measures may include:

- Using buffer or exclusion zones to demarcate areas of known archaeological and historic interest and/or the setting of heritage assets.
- Noise fencing or directional lighting to avoid and reduce potential adverse effects on the setting of heritage assets.

11.7.7 Where the loss of the whole or part of a heritage asset's value is justified, a mitigation approach will be developed to record and advance understanding of the value of the heritage asset before it is lost (wholly or in part). This will be proportionate to the asset's heritage value and the impact.

11.7.8 Relevant documents will be produced to set out the measures and standards of work to be applied during the operational phase. These would be applied to monitor, manage and control potential adverse environmental effects associated with operation and maintenance activities.

11.8 Proposed scope of assessments

Likely significant effects requiring assessment (scoped in)

11.8.1 The following section sets out the aspect-specific potential effects for the historic environment. The likely significant effects requiring assessment are presented in Table 11-4. Where potential effects may be specific to one or more zones of the

Proposed Development and the relevant study area, this is identified in Table 11-4 (see Chapter 2: Project description, for further discussion of zones).

11.8.2 Assessment of the level of harm to the value of heritage assets is required to align with the policy test set out within the NPS for Water Resources Infrastructure (Defra, 2023). Harm will be assessed in accordance with the approach set out in Section 11.9.

Table 11-4: Likely significant historic environment effects

Activity	Effect	Receptor	Zone
Construction			
All construction activities, in particular excavation and earthworks and installation of pipelines.	Total or partial loss of buried archaeological remains or heritage assets as a result of excavation, alteration or demolition of assets within the working area. Permanent damage to heritage assets through vibration from construction vehicles and machinery. Permanent damage to archaeological remains due to deposit compression from construction vehicles, plant or the presence of embankments.	Designated and non-designated heritage assets	All zones
All construction activities, in particular excavation and earthworks and installation of pipelines.	Permanent and temporary changes to the character of the historic landscape through the introduction of new features or the removal of historic landscape features.	Designated and non-designated heritage assets	All zones
All construction activities.	Temporary changes to the setting of heritage assets resulting from the presence of temporary pollution, noise, light and movement.	Designated and non-designated heritage assets	All zones
All construction activities, in particular excavation and earthworks and installation of pipelines.	Permanent changes to groundwater regimes as a result of excavation or changes to groundwater quality or flows that then cause damage or desiccation of heritage assets.	Designated and non-designated heritage assets	All zones
Permanent presence of	Permanent changes to the setting of heritage assets from	Designated and non-	All zones

Activity	Effect	Receptor	Zone
infrastructure (including proposed reservoir, water treatment works, visitor centre, inter-catchment treatment, pumping stations, intake structures, etc.)	the presence of infrastructure within the landscape. Permanent potential effects on the long-term viability of heritage assets as a result of changes in access or use as a result of the presence of infrastructure.	designated heritage assets	
Operation			
Operation of the proposed reservoir, water treatment and inter-catchment treatment works and transfers via pipeline.	Permanent changes to the setting of heritage assets resulting from lighting or noise from the Proposed Development.	Designated and non-designated heritage assets	All zones
Operational traffic movements and recreational use of the reservoir site	Permanent changes to the setting of heritage assets resulting from increased staff and visitor traffic and resulting noise and movement.	Designated and non-designated heritage assets	All zones
Management of habitat creation	Changes to groundwater regimes affecting below-ground heritage assets through dewatering or overwatering.	Designated and non-designated heritage assets	Reservoir site

Effects not requiring assessment (scoped out)

11.8.3 No World Heritage Sites, registered battlefields or protected wrecks have been identified within the historic environment study areas or within the wider surrounding landscape. Effects to such designated heritage assets will therefore be scoped out of further assessment.

11.9 Assessment methodology

11.9.1 The study areas set out in Section 11.4 will be kept under review as the design and consultation processes progress and the Proposed Development is refined. Therefore, the study area may evolve as appropriate. The evolution of the study area will be clearly communicated in the ES and discussed with relevant consultees.

11.9.2 The proposals, described in Chapter 2: Project description, will also evolve and be further developed as the design process progresses. Whilst the methodologies that

are set out within this chapter are not anticipated to change, the scope of assessment will be kept under review as design progresses.

Additional baseline information required

11.9.3 In addition to field surveys which have been undertaken for the reservoir site to date, further phases of survey are proposed. These will be used to inform the baseline and the assessment of impacts and potential effects as part of the environmental assessment process. They are as follows:

- Further monitoring of ground investigations and purposive geoarchaeological investigations. This will feed into the existing geoarchaeological baseline and deposit modelling.
- Further phases of archaeological geophysical survey.
- Further phases of archaeological trial trenching.
- Tier 1 and 2 water assessments with a likelihood of more detailed assessment targeting specific heritage assets.
- Additional site walkovers to identify and assess heritage assets, and to undertake setting descriptions and value assessment where access was not possible during previous survey phases; and where changes to the Scoping boundary have resulted in additional assets being brought into the study areas.

11.9.4 Additional baseline data will be gathered for the sources of supply and upstream water transfers and downstream treated water transfers, including the following:

- Detailed HER data from the relevant local HER.
- Archaeological excavation and survey records, including Historic England National Record of the Historic Environment Excavation Index for England (Historic England, 2011) (available on Archaeology Data Service) and those available on Heritage Gateway (Historic England, 2024b).
- Historic England's Heritage at Risk Registers (Historic England, 2023).
- Relevant online databases including the Defence of Britain database (Council for British Archaeology, 2006), the Rural Settlement of Roman Britain database (Allen *et al*., 2018) and the Building Stones Database for England (British Geological Survey and Historic England, 2023).
- Archive materials including images and records held by Cambridgeshire County Archives.
- Cartographic evidence.
- Aerial photography and satellite imagery.
- LiDAR data held by the Environment Agency.
- National Mapping Programme data held by Historic England.

- Geological mapping and borehole information as held by the British Geological Survey (2024).
- Local, regional and national planning policies in relation to the historic environment including conservation area appraisals and mapping.
- Grey literature reports (any type of information produced outside of traditional publishing channels, both electronically and in print).
- The East of England Research Framework for the Historic Environment (Association of Local Government Archaeological Officers (ALGAO) East of England, 2024).
- Publications, including journal articles.

11.9.5 The following field surveys will be used to inform the baseline and the assessment of impacts and potential effects for the sources of supply and upstream water transfers and downstream treated water transfers as part of the environmental assessment process. They will also inform further seasons of field survey.

- Geoarchaeological desk-based assessment, deposit modelling, and monitoring of ground investigations.
- Archaeological geophysical survey.
- Site walkover to identify and assess heritage assets, and to undertake setting descriptions and value assessment.
- Site walkovers to understand character of the historic landscape and its value and capacity for change.
- Intrusive archaeological field survey.

11.9.6 The following strategies for the desk-based and field surveys have been shared, discussed and updated where necessary (see Section 11.3, Table 11-2, above) with Historic England, Cambridgeshire County Council, Fenland District Council, Peterborough City Council, Huntingdonshire District Council, South Cambridgeshire District Council, Borough Council of King's Lynn & West Norfolk, and Norfolk County Council:

- Fens and Lincolnshire Reservoirs Archaeological Strategy (Anglian Water and Cambridge Water, 2023a).
- Fens and Lincolnshire Reservoirs Built Heritage Methodology (Anglian Water and Cambridge Water, 2023b).
- Fens and Lincolnshire Reservoirs Historic Landscape Methodology (Anglian Water and Cambridge Water, 2023c).

11.9.7 It is recognised that previously unidentified non-designated heritage assets may be encountered during the course of field surveys and desk-studies. Where assets meet the criteria for consideration as non-designated heritage assets, they will be

included within the historic environment gazetteer and be subject to a full assessment of impacts and potential effects. The evidence which has been used to identify additional non-designated heritage assets will be provided within the historic environment baseline report, or relevant specialist report.

11.9.8 The data related to any newly identified heritage assets will be made available to the relevant local HER and local authority historic environment team for consideration for inclusion within the HER or local list.

Assessment years

11.9.9 The temporal scope for the assessment would be the same as set out in Chapter 6: EIA approach and methodology.

Construction assessment methodology

11.9.10 The historic environment study areas outlined in Section 11.4 will be used for the EIA.

11.9.11 Managing Significance in Decision-Taking in the Historic Environment (GPA2, Historic England, 2015) and The Setting of Heritage Assets (GPA3, Historic England, 2017) will inform the approach to scoping designated heritage assets within the wider study area for further assessment. This will be a two-stage process which will be revisited at each design freeze stage to identify the requirement for the rescoping of any assets.

11.9.12 Stage 1 will form an initial desk-based review. This will identify a heritage asset's potential to form a landmark within the surrounding landscape, the potential for the wider landscape to contribute to the value of the asset, and/or potential for a contextual relationship with land or heritage assets within the Scoping boundary. Where heritage assets demonstrate potential to fulfil these conditions, they will be progressed to Stage 2.

11.9.13 Stage 2 will include enhanced desk-based research and a site visit, with the aim of determining what elements of an asset's setting contribute to its value and the potential for those elements to be altered by the construction of the Proposed Development. Where assets are identified as having the potential to be impacted by the Proposed Development during Stage 2, these assets will be brought forward for assessment of impact and potential effects and harm.

Assessment of heritage value

11.9.14 Both the assessment of potential effects (in EIA terms) and the assessment of harm require an understanding of the heritage value of assets. This assessment will be twofold in nature. The first step will be to understand the nature and extent of heritage value. This will be informed by an understanding of an asset's archaeological, historic, and architectural and artistic interest and, where applicable, communal and group value. In addition, the contribution of setting to heritage value will also be evaluated.

11.9.15 The second step is to establish the level of heritage value. The level of heritage value will be assessed against five value levels: very high, high, medium, low and negligible. Definitions of each of these levels and examples of the types of assets which may be categorised into them are set out in Table 11-5.

11.9.16 Assessment of the level of heritage value has been informed by the designation of an asset. However, the designation of an asset may not determine its value in every instance. For example, non-designated heritage assets may hold equivalent value to designated heritage assets. Assets of archaeological interest that are demonstrably of equivalent value to scheduled monuments will be considered subject to the policies for designated heritage assets, in accordance with paragraph 4.8.5 of the NPS for Water Resources Infrastructure (Defra, 2023). The level of heritage value will be assessed individually and professional judgement will be used to determine the appropriate level of value for each asset.

11.9.17 Setting is not itself a heritage asset, nor a heritage designation, but can contribute to the value of a heritage asset. The assessment of setting will take account of visual experience, as well as a consideration of noises, smells, movement, light and seasonal variations.

11.9.18 The condition of an asset will be considered when assessing its heritage value. The exception is where there is evidence of deliberate neglect of, or damage to, the heritage asset.

Table 11-5: Heritage value criteria

Heritage value	Typical description	Typical criteria
Very High	Very high importance and rarity on an international scale.	Assets that can contribute to acknowledged international research objectives.
High	High importance and rarity, national scale, and limited potential for substitution.	Scheduled monuments, registered battlefields, Grade I, II* and II registered parks and gardens, Grade I, II* and II listed buildings, and conservation areas where the asset and its setting retain substantial archaeological, architectural and artistic, and historic interest which contributes to their value. Non-designated heritage assets which can be shown to have demonstrable national importance. Historic Landscape Character Area (HLCA) of notable interest, high quality and importance, and of demonstrable national importance. Well-preserved HLCA, exhibiting considerable coherence, time depth or other critical factors.
Medium	Medium importance and rarity, regional scale, limited potential for substitution.	Conservation areas, Grade II listed buildings or Grade II registered parks and gardens where the asset and its setting retain good archaeological,

Heritage value	Typical description	Typical criteria
		architectural, artistic and/or historic interest which contributes to their value. Non-designated sites of regional importance identified through research or survey, that can be shown to have important qualities in their fabric or historical association. HLCA of demonstrably regional interest, quality and average survival. Exhibiting some coherence, time depth or other factors contributing to heritage value.
Low	Low importance and rarity, local scale.	Non-designated assets which have local importance with identifiable heritage interests and values. HLCA of demonstrably local interest, quality and average survival. Exhibiting some coherence, time depth or other factors contributing to heritage value.
Negligible	Very low importance and rarity, local scale.	Heritage assets identified as being of little historic, evidential, aesthetic or communal interest; HLCA of little interest, quality and poor survival. Exhibiting limited coherence, time depth or other factors contributing to heritage value.

Source: based on Historic Environment Planning Practice Guidance (Ministry of Housing, Communities and Local Government, 2019), GPA2 (Historic England, 2015) and Design Manual for Roads and Bridges (DMRB) LA 104 Revision 1 (Highways England, 2020)

Assessment of magnitude of impact

11.9.19 Impacts can be direct or indirect, and can be characterised in terms of timing, scale, duration, reversibility and the likelihood of the impact occurring. Impacts can be permanent or temporary and can be beneficial, neutral or adverse. The magnitude of an impact can vary from major to no change as set out in Table 11-6 and can be beneficial or adverse.

Table 11-6: Magnitude of impact and typical descriptions for the historic environment

Magnitude of impact	Typical description	
Large	Adverse	Changes to an asset which result in heritage value being substantially altered or destroyed. Changes to the setting of an asset which have a substantial effect on heritage value or how that value is understood or appreciated.
	Beneficial	Substantial improvement to the heritage value of an asset or how that value is understood or appreciated.

Magnitude of impact	Typical description	
Medium	Adverse	Changes to an asset which have a material effect on heritage value. Changes to the setting of an asset that have a material effect on heritage value or how that value is understood or appreciated.
	Beneficial	Material improvement to the heritage value of an asset or how that value is understood or appreciated.
Small	Adverse	Minor changes to an asset which have a slight effect on heritage value. Changes to the setting of an asset that have a slight effect on heritage value or how that value is understood or appreciated.
	Beneficial	Minor improvement to the heritage value of an asset or how that value is understood or appreciated.
Negligible	Adverse	Very minor changes to an asset which have little effect on heritage value. Changes to the setting of an asset that have little effect on heritage value and no noticeable change in how the heritage value of the asset is understood or appreciated.
	Beneficial	Very minor improvement to the heritage value of an asset or how that value is understood or appreciated.
No change	No loss or alteration to the heritage value of an asset. Changes to setting that do not affect the heritage value of an asset or how that value is understood or appreciated.	

Source: based on Historic Environment Planning Practice Guidance (Ministry of Housing, Communities and Local Government, 2019), GPA2 (Historic England, 2015) and DMRB, LA 104 Revision 1 (Highways England, 2020)

Operational assessment methodology

11.9.20 The assessment methodology for the operational phase is the same as the methodology described for the construction phase above.

11.9.21 The potential activities that will be assessed are outlined in Table 11-4 and mainly relate to noise and lighting during operation of the Proposed Development. The operational assessment does not include the presence of the Proposed Development, including structures, buildings, landscape features and reinstatement. These will be considered during the construction phase.

Significance of effects

11.9.22 Significance of potential effects will be determined by cross-referencing the ascribed level of value with the magnitude of impact as shown in the significance matrix in Table 11-7. A likely significant effect in the context of the Infrastructure

Planning (Environmental Impact Assessment) Regulations 2017 is taken to be a moderate or greater adverse or beneficial effect.

11.9.23 Assessment of the potential significance of effects will take into consideration embedded mitigation associated with the Scoping boundary as it is recognised that some mitigation measures can themselves be a source of impact on heritage assets.

11.9.24 Very large, large and moderate effects will be considered to represent likely significant effects. The assessment of overall effect will be either adverse, neutral or beneficial.

11.9.25 Where Table 11-7 includes two significance categories, professional judgement will be used to determine a single significance category.

Table 11-7: Significance of effect matrix

Magnitude of impact						
Heritage value		**No change**	**Negligible**	**Small**	**Medium**	**Large**
	Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

Source: based on DMRB, LA 104 Revision 1 (Highways England, 2020)

Assessment of harm

11.9.26 The NPS for Water Resources Infrastructure (Defra, 2023) and GPA2 (Historic England, 2015) quantifies the effect of a Scoping boundary on designated heritage assets in terms of harm to the value of heritage assets. Harm can be considered to be broadly equivalent to 'impact', as described above, in that it considers the potential adverse effect of a proposal on heritage value without taking into account the relative importance of the asset. However, harm differs from impact in how the level of harm is quantified. Rather than report an impact ranging from major to no change, level of harm is reported as either no harm, less than substantial harm, substantial harm or total loss. These levels of harm are not directly equivalent to the magnitude of impact, as defined above, and will therefore be reported separately within the ES.

11.9.27 Guidance of how to determine the level of harm for designated heritage assets is contained within the Historic Environment Planning Practice Guidance (Ministry of Housing, Communities and Local Government, 2019) and defined in case law in the 2013 case of Bedford Borough Council v Secretary of State for Communities and

Local Government, Nuon UK Ltd [2013] EWHC 2847 (Admin) (paras 24-25). GPA2 defines substantial harm as a 'high test' (Historic England, 2015).

11.9.28 An overall judgement will be presented on the level of harm for each designated asset which will take account of potential harm arising from both temporary and permanent construction effects and operational effects; this will include consideration of the timing, scale, duration, reversibility and the likelihood of the harm occurring. It is recognised that there will be a broad spectrum of harm that falls within the category of less than substantial harm.

11.9.29 It is considered that the impact assessment methodology set out above will be sufficient for the DCO Applicant to fulfil the requirement within the NPS for Water Resources Infrastructure (Defra, 2023). This will allow the Secretary of State to understand the scale of any harm to non-designated heritage assets in order to make a balanced judgement when determining the application. Therefore, harm assessments will not be undertaken for non-designated heritage assets, except where non-designated heritage assets of archaeological interest have been shown to be of equivalent significance to scheduled monuments.

11.9.30 The assessment of harm will be presented within the ES in a gazetteer format for all designated heritage assets, as well as non-designated ones of archaeological interest which have been shown to be of equivalent significance to scheduled monuments. For ease of comprehension, these assets will be reported on within the overall impact assessment gazetteer. Where assets are subject to a level of harm that forms a material consideration in the planning process, the assessment will be presented upfront in the ES chapter.

11.10 Assessment assumptions and limitations

11.10.1 Key assumptions for the scoping of the historic environment are as follows:

- It is assumed that relevant data will be available from the various archive and record-holding bodies consulted (i.e. HER, Historic England), and records of designated sites (including the National Heritage list for England); and that collections of historic maps and other sources held by external record offices (such as local studies libraries, county and national archives) will be available.
- It is assumed that environmental factors such as noise and visual surroundings will be considered in the context of the way in which those factors contribute to the heritage value of the asset at the time of assessment.
- Paragraph 4.8.3 of the NPS for Water Resources Infrastructure defines heritage assets as those elements of the historic environment identified as having a degree of significance meriting consideration in planning decisions because of their historic interest including buildings, monuments, sites, places, areas or landscapes (Defra, 2023). It is therefore assumed that the location of findspots, as recorded in HER or by the Portable Antiquities Scheme, do not constitute heritage assets in themselves and they will not be included with the gazetteer of heritage assets or assessed for harm/impacts. Findspots may indicate an area's

archaeological potential; this information will be captured within the project archaeological risk mapping. Where archaeological sites are considered to be heritage assets it is assumed that sites have the potential to contain *in situ* remains of archaeological interest.

- Historic landscape features such as ridge and furrow, fields, historic administrative boundaries, historic hedgerows, plantation and woodland will be considered in the context of the contribution such features make to the character and heritage value of the historic landscape as a whole and more specifically their contribution to individual historic landscape zones. Therefore, it is assumed that historic landscape features will not be considered as individual heritage assets unless they have been recognised by designation or are determined via the assessment process to be of demonstrably equivalent heritage value to designated assets.
- In line with Historic Environment Planning Practice Guidance, it is assumed that a substantial majority of buildings have little or no heritage significance and thus do not constitute heritage assets. Only a minority have enough heritage significance to merit identification as non-designated heritage assets (DLUHC and Ministry of Housing, Communities and Local Government, 2019).

11.10.2 Key limitations for the historic environment are as follows:

- Information provided by HERs can be limited due to their dependence on random opportunities for historical and archaeological research, fieldwork, and discovery. Where nothing of historical interest is shown in a particular area, this can be down to a lack of research or investigation, rather than no heritage assets being present.
- Historic maps have limitations as a source as they provide a glimpse of land-use at a specific moment. It is therefore possible that short-term structures or areas of land-use are not shown and therefore not available for assessment.
- Access for historic environment surveys, including walkover, setting and archaeological field surveys, may be limited due to lack of access to land or health and safety measures. Surveys will, therefore, necessarily be constrained to those areas where landowner access is granted and it is safe to undertake survey work.

12 Geology, soils, agriculture and land quality

12.1 Introduction

12.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to geology, soils, agriculture and land quality. The chapter should be read in conjunction with the description of the project as presented in Chapter 2: Project description.

12.1.2 Potential factors for the aspects of soil and agriculture, as well as those for geology and land quality, are described separately.

12.1.3 For the aspects of geology and land quality, the matters (i.e. receptors) are:

- Bedrock and superficial geology, including geological designations and sensitive or valuable non-designated features.
- Aquifers in the bedrock and superficial geology.
- Human health (construction workers, maintenance workers and site end users).
- Surface water.

12.1.4 Impacts of the Proposed Development to human health, considering the wider community, broader health impacts and determinants of health, are assessed in Chapter 21: Human health.

12.1.5 Groundwater and surface water are included as secondary receptors from impacted ground conditions; however, the direct potential impacts of the Proposed Development on surface and groundwater resources are addressed in Chapter 10: Water resources and flood risk.

12.1.6 Material resources, such as mineral safeguarding areas, are addressed in Chapter 13: Material assets and waste management.

12.1.7 For the aspect of soil resources, the assessment will account for the loss of the resource and the loss of soil function (for example, nutrient recycling, water retention, etc). Specifically, the receptors assessed here are:

- Agricultural Land Classification (ALC) for an indication of biomass production.
- Soil type for an indication of resilience of soil to handling and carbon content.

12.1.8 For the aspect of agriculture, the receptors are agricultural land holdings. Although ALC grade contributes to the functioning of an agricultural land holding, ALC grade is assessed in the soil resources section and will therefore not be assessed under agricultural land holdings.

12.2 Legislation, policy and guidance requirements

12.2.1 Legislation, policy and guidance which has informed the scope of the assessment presented within this chapter, is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

12.2.2 Table 12-1 identifies the relevant policy in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) and the National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities (DLUHC), 2023) for geology, soil, agriculture and land quality.

Table 12-1: UK policy relevant to geology, soil resources, agriculture and land quality

Relevant UK policy	Relevance to assessment
NPS for Water Resources Infrastructure (Defra, 2023)	The policies relating to soil are contained within Section 4.10. Paragraph 4.10.14 states that Applicants '*should take into account the economic and other benefits of land. Applicants should seek to minimise impacts on the best and most versatile agricultural land. Where significant development on agricultural land is demonstrated by the applicant to be necessary, applicants should use poorer quality land (grades 3b, 4 and 5) where possible to minimise impacts on soil quality (except where doing so would be inconsistent with other sustainability considerations). Assessments of agricultural land should be supported by relevant survey information to confirm the agricultural land grade. Applicants should also identify any effects on soil quality and show how they would minimise those effects, including by proposing appropriate mitigation measures*.' Paragraph 4.10.5 states '*applicants should ensure that they have considered the risk posed by land contamination. Risks would require consideration in accordance with the contaminated land statutory guidance as a minimum*.'
NPPF (DLUHC, 2023)	Paragraph 180 contains guidance regarding the protection of soils and the wider benefits that these provide from natural capital and ecosystem services, including the economic and other benefits of the best and most versatile agricultural land. Paragraph 190 states that where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

12.3 Stakeholder engagement

12.3.1 In preparing this EIA Scoping Report, there have been discussions and engagement with a number of stakeholders.

12.3.2 The dialogue with stakeholders will continue throughout the pre-application period, as part of the EIA process. A summary of the engagement undertaken so far is presented in Table 12-2, along with proposed future engagement.

Table 12-2: Engagement with stakeholders

Stakeholder	Engagement undertaken to date	Proposed future engagement
Natural England, Fenland District Council (Local planning and land contamination) and Environment Agency	**3 November 2023** – meeting to discuss the option selection process being conducted, and the legislative guidance relevant to the aspects of geology, soil, agriculture and land quality that inform the selection of the optimum associated water infrastructure sites for the reservoir.	A subsequent engagement on 6 June 2024 (described below) was proposed.
Cambridgeshire County Council, Huntingdonshire District Council	**15 May 2024** – Local Authority Associated Infrastructure Forum (LAAIF) introduced the Proposed Development and a summary of the production of the scoping report by each discipline, including key themes, study area and guidance followed.	Further discussions on the outcomes of the assessment and proposed mitigation.
Fenland District Council, Environment Agency, Cambridgeshire County Council, Natural England	**6 June 2024** – meeting to discuss the methodology being used in the geology, soils, agriculture and land quality assessment.	Further discussions on the outcomes of the assessment and proposed mitigation.

12.3.3 It is proposed that engagement will be undertaken with individual farm owners and tenants as part of the assessment to determine any likely significant effects on agricultural businesses from the Proposed Development.

12.4 Study area

12.4.1 The study area for geology, soils, agriculture and land quality has been defined based on the identified Scoping boundary and the available information for the Proposed Development. This includes the information on construction and operational phases as described in Chapter 2: Project description. The identified study area is considered to be sufficiently broad to allow for the ongoing

refinement of the Proposed Development; however, if required, this will be expanded to ensure there is appropriate coverage of all potential significant environmental effects or harm to heritage assets.

12.4.2 For the assessments relating to geology and land quality, a 250m buffer from the Scoping boundary has been used (Figure 12.1, and Figure 12.2). This is extended to 1km when considering groundwater abstractions. This study area has been selected based on professional judgement considering the distance beyond which migration of contamination is likely to be minimal.

12.4.3 The study area for soil resources is considered to be the Scoping boundary, since these receptors are only likely to be impacted where the Proposed Development directly crosses, or interfaces with them. It is reported in hectares with the exception of transfer routes which are reported in kilometres.

12.4.4 The study area for agriculture comprises any agricultural land holdings that are completely or partially located within the Scoping boundary. For holdings partially located within the boundary, the assessment will consider impacts on agricultural activity outside the boundary, such as the severance of a land parcel that lies outside the boundary due to construction activity occurring within the boundary.

12.5 Baseline data collection

12.5.1 The baseline conditions for geology, soil, agriculture and land quality presented in Section 12.6 represent a review of the currently available data. The data collated to date was obtained via desk studies and field surveys. Data collection to inform the baseline of the assessment is ongoing. The data described below provides a robust context for the scoping of the assessments.

12.5.2 The baseline conditions for geology, soil resources, agriculture and land quality have been drawn from publicly-available data, based on the sources of information described below.

Desk studies

12.5.3 A number of readily available resources have been used to inform the baseline information for this chapter. These are summarised as follows.

Geology

12.5.4 The following data sources have been consulted to inform the geology baseline:

- British Geological Survey (BGS) Geological Map Series (BGS, 1980).
- BGS GeoIndex (BGS, 2024a).
- BGS Hydrogeological Maps (BGS, 2024b).
- MAGIC Maps (Defra, 2024).
- BGS Borehole Records (no date).

Soils

12.5.5 The following data sources have been used to inform the soil baseline:

- Provisional ALC Maps (Natural England, 2007).
- Soil Association Mapping (Cranfield University, 2024).
- Soils and their Use in Eastern England (Hodge, 1984).
- Natural England, Guide to Assessing Development Proposals on Agricultural Land (Natural England, 2021).
- Natural England, Agricultural Land Classification: protecting the best and most versatile agricultural land (TIN049) (Natural England, 2012).

Agriculture

12.5.6 Baseline information was collected for farm holdings within the reservoir site through a questionnaire and informal interview with landowners and occupiers in 2022. Information is not currently available for the other zones of the Proposed Development.

Land quality

12.5.7 The following data sources have been consulted to inform the land quality baseline:

- Construction Industry Research and Information Association (CIRIA) C552 Contaminated Land Risk Assessment – A guide to good practice (CIRIA, 2024).
- Contaminated Land Inspection Report (Borough Council of King's Lynn & West Norfolk, 2022).
- Land Contamination Risk Management (LCRM), (Environment Agency, 2024).
- Georeferenced Maps from the National Library of Scotland (2024).
- MAGIC Maps (Defra, 2024).

Field surveys

12.5.8 Ground investigations (GI) have commenced for the reservoir site, which have provided site-specific data to inform the geology and land quality assessments. Further GI will be undertaken prior to application for a Development Consent Order (DCO), including those at the sites of the associated water infrastructure, to inform the designs. This data will also be used to inform the baseline data supporting this chapter in the ES.

12.5.9 An ALC survey commenced in autumn 2023 for the reservoir site and is due to be completed in autumn 2024, at which point the field data will be used to calculate the land grades present and establish the distribution of these across the site. A further ALC survey is programmed to commence in spring 2025 for the associated infrastructure. These surveys will also provide an inventory of the soil resources present to inform soil management planning and mitigation.

12.6 Baseline conditions

12.6.1 The baseline conditions for geology, soil, agriculture and land quality are described below for the study area (defined in Section 12.4). The baseline conditions are as established from the data collection described in Section 12.5. The baseline conditions for agricultural land holdings are currently only reported for the

reservoir site due to the absence of data for the other operational zones but will be fully described in the baseline conditions within the Environmental Statement (ES).

12.6.2 A more detailed geological summary can be found in Appendix 12.1.

Baseline for sources of supply and upstream transfers

Geology

Existing geology

12.6.3 The bedrock geology comprises (in stratigraphical sequence, outcropping from east to west): West Walton Formation, Ampthill Clay Formation, Oxford Clay Formation, Kellaways Sand Member, Kellaways Clay Member, Cornbrash Formation, Blisworth Clay Formation, Blisworth Limestone Formation, Rutland Formation, Lower Lincolnshire Limestone Member, Grantham Formation and the Upper Lias (BGS, 1980). Bedrock geological units mapped on the sites of sources of supply and upstream transfer areas are presented in Figure 12.2.

12.6.4 Superficial deposits are variably present across the area and comprise Alluvium, Nordelph Peat, River Terrace Deposits, Tidal Flat Deposits and/or Oadby Member (Diamicton) (BGS, 1980). Superficial geological units mapped on the sites of sources of supply and upstream transfer areas are presented in Figure 12.1.

12.6.5 No presence of Made Ground is mapped within the Scoping boundary, with the exception of an area around Stanground, east of Peterborough, where there is Made Ground associated with a trainline embankment (BGS, 2024a).

12.6.6 The BGS GeoIndex only maps Made Ground where its thickness is over 2.5m, therefore the presence of Made Ground less than 2.5m cannot be discounted across the area. However, due to the rural nature of the area, it is unlikely that substantial Made Ground will be present (BGS, 2024a).

Hydrogeology

12.6.7 The majority of the superficial deposits underneath the Scoping boundary are classified as unproductive aquifers. There are noted to be higher-sensitivity Secondary A aquifers associated with the March Gravels Member and River Terrace Deposits (Defra, 2024).

12.6.8 The sites of the sources of supply and upstream transfers are generally designated as having unproductive near-surface bedrock strata, with medium-low groundwater vulnerability. Groundwater flow direction is unknown, but it is assumed that there is very little flow in the near-surface bedrock layers due to the presence of clay layers.

12.6.9 At greater depth, the Blisworth Limestone Formation and Cornbrash Formation are regionally hydro-conductive and are confined by rocks in the site area with essentially no groundwater (BGS, 2024b). Deep boreholes in the Ely region are unlikely to find satisfactory supplies of water.

12.6.10 The Blisworth Limestone Formation is designated as a Principal aquifer; the Cornbrash Formation and Kellaways Sand Member as Secondary A aquifers; the

Rutland Formation as a Secondary B aquifer; and the Grantham Formation as a Secondary Undifferentiated aquifer (Defra, 2024).

12.6.11 No groundwater level data is available for the Blisworth Limestone Formation or the Cornbrash Formation at the site in the historical BGS boreholes. The site is not expected to have any artesian water conditions in the deep aquifer. These deeper aquifers are unlikely to affect, or be affected by, the Proposed Development.

12.6.12 There are no recorded source protection zones (SPZs) within the study area.

Geological designations and sensitive/valuable designated features

12.6.13 No geological designations or sensitive valuable designated features of note have currently been identified within 250m distance of the Scoping boundary.

Soils

Soil type

12.6.14 As presented in Figure 12.3, the soils within the Scoping boundary for the sources of supply and upstream transfers include several soil associations as follows (Cranfield University, 2024):

- Downholland 1 – deep stoneless humose clayey soils, calcareous in places and with some peat soils and deep humose calcareous silty soils.
- Peacock – deep humose calcareous clayey and non-calcareous fine loamy soils over clayey soils with some peat soils.
- Adventurers' 1 – dominated by deep peat soils.
- Clayhythe – deep humose fine loamy over sandy, and fine loamy over clayey soils mainly calcareous with some peat soils.
- Midelney – stoneless clayey soils mostly overlying peat.
- Evesham 3 – slowly permeable calcareous clayey, and fine loamy over clayey soils.
- Waterstock – deep permeable mainly fine loamy soils with some deep well drained fine and coarse loamy soils.

Soil carbon

12.6.15 Most of the soils within the Scoping boundary for the upstream infrastructure are expected to contain peat (Cranfield University, 2024).

Agriculture

Agricultural Land Classification

12.6.16 The Scoping boundary for the sources of supply and upstream transfer covers mainly ALC Grade 2 (very good) land. There are areas of ALC Grade 1 (excellent) land to the north-east of Chatteris, and a small area of ALC Grade 3 (good to moderate) land near Bluntisham and Horseway (Natural England, 2007).

12.6.17 Within the Scoping boundary for the sources of supply and upstream transfers there are 80ha of ALC Grade 1 land, 120ha of ALC Grade 2 land and 30ha of ALC Grade 3 land (Natural England, 2007).

12.6.18 The Scoping boundary for the sources of supply and upstream transfer covers a distance of approximately 3km of ALC Grade 1 land, 13km of ALC Grade 2 land and 5km of ALC Grade 3 land (Natural England, 2007).

12.6.19 A summary of the distribution of the ALC grades across all operational zones of the Proposed Development is shown in Figure 12.4.

Agricultural land holdings

12.6.20 No baseline data has currently been collected for agricultural land holdings within the Scoping boundary of the sources of supply and upstream transfers.

Land quality

12.6.21 The Scoping boundary mainly comprises greenfield arable farmland as well as farm buildings (for example, grain stores), pumping station buildings, flood defences and some residences (National Library of Scotland, 2024).

12.6.22 The desk study has identified gaps in the mapping data and as a result, a full record of historical land use is not available. However, much of the Scoping boundary appears to have remained as agricultural farmland, with new farmland buildings being constructed and much of the historically encountered railway being removed with time.

12.6.23 Five historical and active landfill sites have been recorded within 250m of the Scoping boundary. These are described within Chapter 13: Material assets and waste management. Landfills may present a source of leachable contamination which could migrate to the Proposed Development in shallow groundwater.

Contamination assessment

12.6.24 Assessment of contamination for the sources of supply and upstream transfers, and for other zones of the Proposed Development, has been undertaken in accordance with the Land Contamination Risk Management Methodology (LCRM) (Environment Agency, 2024).

12.6.25 For the sources of supply and upstream transfers, potential sources of contamination are the identified historical and active landfill sites. Agricultural land, although a possible source, is not considered to be a probable potential source of land quality risks due to the biodegradation of pesticides and fertilisers over time, and the infrequency of chemical storage areas or likely buried waste, including asbestos.

12.6.26 It is unlikely that the landfill sites, as potential contamination sources, will pose an unacceptable risk to receptors identified in Section 12.1.

12.6.27 While risks from the identified potential contamination sources are expected to be largely insubstantial to the Proposed Development, a ground investigation when undertaken (as highlighted in Section 12.5) in line with BS 10175 (BSI, 2017) will further characterise the site condition and quantify the risk.

Baseline for the reservoir site

Geology

12.6.28 The bedrock geology across the area includes the Ampthill Clay Formation underlain by Oxford Clay Formation (BGS, 1980). Bedrock geologies mapped across the reservoir site are depicted in Figure 12.2.

12.6.29 Superficial deposits are variably present across the area and comprise Tidal Flat Deposits and March Gravels Member (BGS, 2024a). These are depicted in Figure 12.1.

12.6.30 No presence of Made Ground is mapped within the study area. It is worthy of note that the BGS GeoIndex only maps Made Ground where its thickness is over 2.5m, therefore the presence of Made Ground less than 2.5m cannot be discounted across the area. However, due to limited historical infrastructure development associated with the area, it is unlikely that substantial Made Ground will be encountered throughout.

Hydrogeology

12.6.31 The Tidal Flat Deposits underneath the reservoir site are classified as an unproductive aquifer, whilst the River Terrace Deposits in the northern corner are classified as a Secondary A aquifer. A recent borehole survey undertaken as part of the regional calibration ground investigation to the south of the reservoir site, suggests groundwater levels in the shallow superficial materials lie between 1 and 2m below ground level (bgl).

12.6.32 The site is designated as having unproductive bedrock strata with medium-low groundwater vulnerability. Groundwater flow direction is unknown, but it can be anticipated that there is very little flow in the near-surface bedrock layers as they are all clays (Defra, 2024).

12.6.33 At greater depth, the Blisworth Limestone Formation and Cornbrash Formation are identified as regionally hydro-conductive and are confined by rocks in the area with essentially no groundwater, according to the BGS Hydrogeological 1:625,000 map. A deep borehole 5km south of the reservoir site has identified saline water in the Middle-Jurassic deposits (Blisworth Limestone Formation and Cornbrash Formation). However, deep boreholes in the Ely region are unlikely to find satisfactory supplies of water. The Environment Agency designates the Blisworth Limestone Formation as a Principal aquifer; the Cornbrash Formation and Kellaways Sand Member as Secondary A aquifers; the Rutland Formation as a Secondary B aquifer; and the Grantham Formation as a Secondary Undifferentiated aquifer. No groundwater level data is available for the Blisworth Limestone Formation or the Cornbrash Formation at the reservoir site in the historical BGS boreholes. The area is not expected to have any artesian water conditions in the deep aquifer. These deeper aquifers are unlikely to affect, or be affected by, the proposed works (BGS, no date).

12.6.34 There are no recorded SPZs within the study area (Defra, 2024).

Geological designations and sensitive/valuable designated features

12.6.35 The available data does not indicate any geological designations or sensitive valuable designated features of note within the reservoir site (Defra, 2024). Considering this, the construction of the reservoir is unlikely to lead to an impact on any sensitive site.

Soil

Soil type

12.6.36 The soils within the Scoping boundary for the reservoir site include several soil associations as follows (Cranfield University, 2024):

- Downholland 1 – deep stoneless humose clayey soils, calcareous in places and with some peat soils and deep humose calcareous silty soils.
- Peacock – deep humose calcareous clayey and non-calcareous fine loamy soils over clayey soils with some peat soils.
- Clayhythe – deep humose fine loamy soils over sandy and fine loamy soils over clayey soils, mainly calcareous with some peat soils.
- Ireton – permeable humose coarse and fine loamy soils associated with humose calcareous coarse loamy soil over sandy soils.
- Efford 1 – well drained fine loamy soils often over gravel associated with similar permeable soils.

Soil carbon

12.6.37 Most of the soils within the Scoping boundary for the reservoir site are expected to contain peat (Cranfield University, 2024).

Agriculture

Agricultural Land Classification

12.6.38 The Scoping boundary for the reservoir site covers mainly ALC Grade 2 (very good) land with an area of ALC Grade 1 (excellent) land in the centre of the Scoping boundary. There are small areas of ALC Grade 3 (good to moderate) land to the east near Block Fen Drove and Sixteen Foot Bank (Natural England, 2007).

12.6.39 Within the Scoping boundary for the reservoir site there are 110ha of ALC Grade 1 land, 540ha of ALC Grade 2 land and 20ha of ALC Grade 3 land (Natural England, 2007).

Agricultural land holdings

12.6.40 There are over 50 farm businesses with land on the site of the reservoir. They are predominantly arable holdings.

Land quality

Current land use

12.6.41 The reservoir site mainly comprises greenfield arable farmland. There are multiple structures currently within the site boundary which are understood to be farmland infrastructure (for example, grain stores, barns) or residential properties (National

Library of Scotland, 2024). Other land uses within the reservoir site boundary include the North London Skydiving Centre which occupies Chatteris Airfield; and Mount Pleasant Equestrian, and a vehicle repair centre (Heritage 4x4 Limited), both of which are located on the eastern border. Chatteris Airfield does not have substantial hardstanding or concrete runways, and is therefore unlikely to include heavy aircraft traffic.

12.6.42 Within the study area, RSPCA Block Fen Animal Centre can be located at approximately 250m north of the reservoir site.

12.6.43 Topographic mapping indicates that the site slopes from approximately 3Maod in the north of the reservoir site to approximately 1Maod in the south of the site (UK Topographic Map, 2024).

Historical land use

12.6.44 Historical land use mapping review has acknowledged substantial gaps and as a result, a full record cannot be obtained. However, much of the reservoir site area appears to have remained as agricultural farmland, with limited buildings being constructed (National Library of Scotland, 2024). Chatteris Airfield is understood to have been in operation since 1999 (Airfields of Britain Conservation Trust, 2024).

Landfill and waste site records

12.6.45 There are no active or historical landfill sites within 250m of the reservoir site.

Contamination assessment

12.6.46 An identified potential source of contamination is the Chatteris Airfield situated within the reservoir site which is used by relatively small aircraft with grassed runways. No known accidents involving leaking fuel or fire are known to have occurred on the site. Whilst contamination cannot be discounted, it is unlikely to be substantial.

12.6.47 Agricultural land, although a possible source, is not considered to be a probable potential source, due to the biodegradation of pesticides and fertilisers, and infrequency of chemical storage areas or likely buried waste, including asbestos.

12.6.48 Due to the limited anthropogenic land uses subsequently leading to limited potential sources of contamination and the lower permeability of the underlying strata beneath the reservoir site, it is unlikely that there would be substantial contamination that would pose unacceptable risks to receptors identified in Section 12.1.

Baseline for the water treatment works

Geology

Artificial ground

12.6.49 No presence of Made Ground was found within the water treatment works site or the study area (BGS, 2024a). It is worthy of note that the BGS GeoIndex only maps Made Ground where its thickness is over 2.5m, therefore the presence of Made Ground less than 2.5m cannot be discounted across the area. However, due to

limited historical infrastructure development associated with the area, it is unlikely that significant Made Ground will be encountered throughout.

Superficial deposits

12.6.50 Superficial deposits present across the area comprise Tidal Flat Deposits.

Bedrock geology

12.6.51 The bedrock geology across the area comprises Ampthill Clay Formation underlain by Oxford Clay Formation.

Hydrogeology

12.6.52 The majority of the superficial deposits underneath the water treatment works are classified as unproductive aquifers (Defra, 2024).

12.6.53 The site is designated as having unproductive bedrock strata with medium-low groundwater vulnerability. Groundwater flow direction is unknown, but it can be anticipated that there is very little flow in the near-surface bedrock layers as they are all clays.

12.6.54 There are no recorded SPZs within the study area.

Geological designations and sensitive/valuable designated features

12.6.55 The available data does not indicate any geological designations or sensitive valuable designated features of note within the Fens region (Defra, 2024). Considering this, the construction of the water treatment site is unlikely to lead to an impact on any sensitive site within the study area.

Soil type

12.6.56 The soils within the Scoping boundary for the water treatment site include the following two soil associations (Cranfield University, 2024):

- Evesham 3 – slowly permeable calcareous clayey soils and fine loamy over clayey soils.
- Peacock – deep humose calcareous clayey soils and non-calcareous fine loamy over clayey soils with some peat soils.

12.6.57 The soil associations of the sources of supply and infrastructure areas are depicted in Figure 12.3.

Soil carbon

12.6.58 Some of the soils within the Scoping boundary for the water treatment site are expected to contain peat (Cranfield University, 2024).

Agricultural Land Classification

12.6.59 The Scoping boundary for the water treatment site covers mainly ALC Grade 2 (very good) land, with two isolated areas of ALC Grade 1 (excellent) land in the north and south-east of the Scoping boundary (Natural England, 2007).

12.6.60 Within the Scoping boundary for the water treatment site there are 1ha of ALC Grade 1 land, and 50ha of ALC Grade 2 land (Natural England, 2007).

Land Quality

Current land use

12.6.61 The water treatment works, which has a plan area of approximately 45ha, mainly comprises greenfield arable farmland and also covers farmland infrastructure (for example, grain stores) and residences.

Historical land use

12.6.62 Historical land use mapping review has acknowledged substantial gaps and as a result, a full record cannot be obtained. Historically, the water treatment works area has predominantly remained agricultural land with a single farm on site. There is a history of the area being used as a smallpox hospital in the early 1900s (National Library of Scotland, 2024).

Landfill and waste site records

12.6.63 There are no currently used landfills and no records of waste or historic landfills in (or within 250m of) the water treatment area.

Contamination assessment

12.6.64 With no potential source of contamination association with the water treatment works, the Proposed Development is unlikely to pose an unacceptable risk to the receptors in the water treatment site.

Baseline for downstream treated water transfers

Geology

Artificial ground

12.6.65 No presence of Made Ground is mapped within the study area. It is worthy of note that the BGS GeoIndex only maps Made Ground where its thickness is over 2.5m, therefore the presence of Made Ground less than 2.5m cannot be discounted across the area. However, due to limited historical infrastructure development associated with the area, it is unlikely that significant Made Ground will be encountered throughout.

Superficial deposits

12.6.66 Superficial deposits are variably present across the area and comprise Alluvium, Nordelph Peat, River Terrace Deposits, Tidal Flat Deposits, Head, Lowestoft Formation and/or Oadby Member (Diamicton). Mapped superficial units can be found in Figure 12.1.

Bedrock geology

12.6.67 The bedrock geology across the area comprises (in stratigraphical sequence, outcropping from east to west): West Melbury Marly Chalk Formation, Gault Formation, Woburn Sands Formation, Kimmeridge Clay Formation, West Walton Formation, Ampthill Clay Formation, Oxford Clay Formation, Kellaways Sand Member, Kellaways Clay Member, Cornbrash Formation, Blisworth Clay Formation, Blisworth Limestone Formation, Rutland Formation, Lower Lincolnshire Limestone Member, Grantham Formation and the Upper Lias.

Hydrogeology

12.6.68 The superficial deposits encountered across the downstream infrastructure area are mostly classified as unproductive aquifers, although March Gravels and River Terrace Deposits are classified as Secondary A aquifers (Defra, 2024). Groundwater flow direction is unknown, but it can be anticipated that there is little flow in most of the near-surface bedrock layers as they are largely clays.

12.6.69 At greater depth across the Fens Region, the Blisworth Limestone Formation, Cornbrash Formation and Kellaways Sand Member are identified as regionally hydro-conductive, and are confined by rocks in the area with essentially no groundwater, according to the BGS Hydrogeological 1:625,000 map (BGS, 2024b). A deep borehole 5km south of the proposed reservoir site has identified saline water in the Middle-Jurassic deposits (Blisworth Limestone Formation, Cornbrash Formation and Kellaways Sand Member). The Environment Agency designates the Blisworth Limestone Formation as a Principal aquifer; the Cornbrash Formation and Kellaways Sand Member as Secondary A aquifers; the Rutland Formation as a Secondary B aquifer; and the Grantham Formation as a Secondary Undifferentiated aquifer. No groundwater level data is available for the formations across the region in historical BGS boreholes.

12.6.70 A low risk was identified where potential artesian conditions within the Kellaways Sand Member, and subsequent uncontrolled saline water loss, may impact possible groundwater abstractions, surface watercourses and aquifers.

Geological designations and sensitive/valuable designated features

12.6.71 The available data does not indicate any geological designations or sensitive valuable designated features of note within the Fens region (Defra, 2024). Considering this, the construction of downstream infrastructure is unlikely to lead to an impact within the study area.

Soil type

12.6.72 The soils inside the Scoping boundary for the downstream infrastructure include the following soil associations (Cranfield University, 2024):

- Downholland 1 – deep stoneless humose clayey soils, calcareous in places and with some peat soils and deep humose calcareous silty soils.
- Peacock – deep humose calcareous clayey and non-calcareous fine loamy soils over clayey soils with some peat soils.
- Clayhythe – deep humose fine loamy over sandy, and fine loamy over clayey soils, mainly calcareous with some peat soils.
- Adventurers' 1 – dominated by deep peat soils.
- Dowels – dominated by stoneless clayey soils, in places calcareous, often over peat.
- Evesham 3 – slowly permeable calcareous clayey, and fine loamy over clayey soils.

- Cannamore – deep calcareous and non-calcareous fine loamy and clayey soils, with slowly permeable subsoils.
- Hanslope – slowly permeable calcareous clayey soils with some slowly permeable non-calcareous clayey soils.
- Burlingham 1 – deep coarse and fine loamy soils with slowly permeable subsoils.

Soil carbon

12.6.73 Most of the soils within the Scoping boundary for the downstream transfers are expected to contain peat. No peat soils are anticipated inside the Scoping boundary of the service reservoir sites (Cranfield University, 2024).

Agricultural Land Classification

12.6.74 The Scoping boundary for the downstream transfers covers mainly ALC Grade 1 (excellent) land between Barroway Drove and Somersham. To the south, between Christchurch to Hardwick, the Scoping boundary covers ALC Grade 2 (very good) land, ALC Grade 3 (good to moderate) land and ALC Grade 4 (Poor) land. There is also an area of ALC Grade 3 land in the north near Bexwell (Natural England, 2007).

12.6.75 Within the Scoping boundary for the downstream transfers there are 40ha of ALC Grade 2 land and 60ha of ALC Grade 3 land (Natural England, 2007).

12.6.76 The Scoping boundary for the downstream transfers covers a distance of approximately 20km of ALC Grade 1 land and to the south, approximately 40km of ALC Grade 2 land and 20km ALC Grade 3 land (Natural England, 2007).

Land quality

Current land use

12.6.77 Downstream transfers cumulatively have a plan area of approximately 2,840ha mainly comprising greenfield arable farmlands, as well as farm buildings (for example, grain stores) and some residential properties.

Historical land use

12.6.78 Historical land use mapping has acknowledged substantial gaps and as a result, a full record cannot be obtained. However, much of the downstream infrastructure site areas appear to have remained as agricultural farmland, with new farm buildings being constructed and much of the historically encountered railway being removed with time (National Library of Scotland, 2024). Historical land use of note includes the wartime use of current agricultural land north of Bexwell, near Downham Market, as a Royal Air Force (RAF) airfield.

Landfill and waste-related site records

12.6.79 Eight historical and active landfill sites have been recorded within 250m of the downstream infrastructure site areas.

12.6.80 One former refuse tip in the study area near to Downham Market caused a substantial land pollution incident to be attributed to the area in 2009. However, a recent report indicated that while there is evidence of metal/metalloid

contamination, it is not classified as contaminated land (Borough Council of King's Lynn & West Norfolk, 2022).

Contamination assessment

12.6.81 Based on the baseline conditions and the environmental setting, potential contamination sources are the historical airfield site (RAF Downham Market) north of Bexwell, and the identified landfill sites.

12.6.82 Agricultural land, although a possible source, is not considered to be a probable potential source due to the biodegradation of pesticides and fertilisers, and infrequency of chemical storage areas or likely buried waste, including asbestos.

12.6.83 While risks from the identified potential contamination sources are expected to be largely insubstantial to the Proposed Development, a ground investigation (as highlighted in Section 12.5) undertaken in line with BS 10175 (BSI, 2017) should characterise the site condition and quantify the risk.

Future baseline

12.6.84 For the aspect of geology and land quality, the future baseline will remain largely the same in terms of ground conditions. No other works within the Scoping boundary are expected and hence, no additional contamination sources are anticipated.

12.6.85 Climate change is predicted to have an effect on ALC grade; however, the change will vary according to the location of the land and is very challenging to predict. For example, where agricultural land is limited by drought, climate change is likely to reduce the quality of the land as the climate tends towards increased dryness. Drier summers may alter growing seasons, increase risks of crop failure and erosion of good quality soils, and necessitate drought-tolerant crops. Associated changes in groundwater levels and drainage patterns could affect field water levels, while soil moisture deficits may lead to biota loss and soil destabilisation. Conversely, for areas limited by wetness, climate change is likely to increase the quality of the land with reduced overall rainfall. Wetter winters and intense rainfall events could also increase soil erosion and turbidity in watercourses. The Proposed Development may also affect farm access under future flooding conditions by limiting accessibility where some farm access tracks have been removed or relocated. Climate change is also likely to lead to an increase in temperature, which should support greater agricultural productivity.

12.6.86 Climate change has the potential to affect land contamination through various mechanisms. Temperature increases may alter the release of volatile contaminants and influence contaminant behaviour in soils and groundwater. Drier summers could lower groundwater levels, cause vegetation dieback, and increase soil desiccation and wind erosion of contaminated soils. Conversely, wetter winters and intense rainfall may heighten soil scour risks of contaminated soils, increase flood events and raise groundwater tables, potentially leaching contaminants into watercourses and water bodies. The Proposed Development may affect the contaminants in soils and groundwater through changing land use and

groundwater dynamics. Further details can be found in Chapter 17: Climate resilience, of this EIA Scoping Report.

12.6.87 Chapter 23: Cumulative effects, will identify the proposed developments that are anticipated to be constructed prior to the construction of the Proposed Development. As such, these developments would form part of the future baseline for assessment within the EIA. Where this presents new receptors, or a change to the current baseline specific to geology, soils, agriculture and land quality, this will be considered within the EIA.

12.7 Design and mitigation

Design

12.7.1 The design of the Proposed Development to date has considered environmental constraints and potential environmental effects. The potential presence of peat and the provisional ALC grade of the land has been highlighted as a consideration during the design development process to seek to reduce potential adverse environmental effects on soil resources and agriculture.

12.7.2 The ongoing development of the design will incorporate embedded mitigation to avoid and reduce potential adverse effects, where feasible.

12.7.3 The design development process will include consideration of enhancement measures to improve the surrounding environment. Potential enhancements relevant to soil resources that have been identified to date, include reuse of soils in a landscaping plan to enhance soil biodiversity and carbon storage.

Mitigation

12.7.4 Documents presenting the approach to mitigation will be produced, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. These measures would be applied to mitigate likely significant effects, including soils, geology, agriculture and land quality effects.

12.7.5 Examples of good practice and essential mitigation relevant to geology, soils, agriculture and land quality include:

- Avoidance and/or protection of sensitive land use areas, strata or contamination sources and design features including bunding of tanks.
- Reuse of high grade soil and peat from beneath the reservoir or other areas in landscaping to avoid and reduce the loss of soil resources, including functions such as soil biodiversity, ecosystem support and soil carbon storage.
- Potential mitigation or remediation measures for any land contamination.
- A Soil Management Plan (SMP) encompassing good practice measures, such as separate storage of topsoil and subsoil, methods for handling soil, maintenance of soil stockpiles and specifying conditions when soil can be handled.

- Avoidance or minimisation of land parcel severance by locating project components near field boundaries where practicable, and by considering the suitability of the remaining portion for continued agricultural use. Where severance is unavoidable, alternative access routes would be sought.

12.7.6 Relevant documents will be produced to set out the measures and standards of work to be applied during the operational phase. These would be applied to monitor, manage and control potential adverse environmental effects associated with operation and maintenance activities.

12.8 Proposed scope of assessments

Likely significant effects requiring assessment (scoped in)

12.8.1 The following section sets out the aspect-specific potential effects for geology, soils, agriculture and land quality. The likely significant effects requiring assessment are presented in Table 12-3. Where potential effects may be specific to one or more zones of the Proposed Development and the relevant study area, this is identified in Table 12-3 (see Chapter 2: Project description, for further discussion of zones).

12.8.2 While limited potential contamination sources related to the Proposed Development are identified, a detailed ground investigation covering the entirety of the study area is absent. As a result, presence of potential contamination sources cannot be ruled out. The aspect of land quality has therefore been scoped in during the construction stage as a precautionary basis. The benefit of soil storing carbon is considered as part of Chapter 16: Carbon and greenhouse gases.

Table 12-3: Likely significant effects requiring assessment

Activity	Effect	Receptor	Zones
Construction			
All construction activities, in particular excavation and earthworks and installation of pipelines	Excavation and earthworks lead to removal of peat or changes to hydrology that affect the condition of peat.	Peat (and supported habitats)	All zones
All construction activities, in particular excavation and earthworks and installation of pipelines	Excavation and construction activities lead to a deterioration of soil quality and condition.	Soil (and associated land use)	All zones
All construction activities	Reduction in the scale or nature of land use or enterprise leading to a discontinuation of an agricultural activity. Loss of Farm holding, farm buildings, infrastructure or disruption to access to a land	Land use and farm enterprises (including drainage and farm infrastructure)	All zones

Activity	Effect	Receptor	Zones
	parcel that makes agricultural activity less viable.		
All construction activities	Harm to human health or pollution of controlled waters.	Land quality receptors (human health and controlled water receptors)	All zones
Operation			
All operational activities	Permanent loss of soil beneath the footprint of the reservoir and other project components.	Soil (and associated land use)	All zones
Operation of the reservoir and associated water infrastructure	Permanent loss of agricultural land beneath the footprint of the reservoir site, water treatment works, and upstream and downstream water transfer areas. Severance of land parcels. Loss of residual easement rights.	Land use and businesses	All zones

Effects not requiring assessment (scoped out)

12.8.3 The effects proposed to be scoped out of the geology, soils, agriculture and land quality assessment are detailed in Table 12-4.

12.8.4 Table 12-4 proposes scoping out geology as no viable geological receptors associated with the Proposed Development are identified within the Scoping boundary and hence no substantial effects to geology are expected. Therefore, it is considered a proportionate approach to scope out geology from the ES.

Table 12-4: Potential effects to be scoped out of the geology, soils, agriculture and land quality assessment

Activity	Effect	Receptor	Justification for scoping out	Zones
Construction				
All construction activities	Loss or deterioration of a geodiversity or sensitive site.	Geology (designated or sensitive geological sites).	There are no geodiversity sites (comprising geological Sites of Special Scientific Interest (SSSI), or regionally or locally important geological sites or non-designated outcrops/features of interest) within 250m of the Scoping boundary.	All zones

Activity	Effect	Receptor	Justification for scoping out	Zones
All construction activities	Loss or deterioration of soils supporting protected features within a UK-designated or notable ecological site.	Soils supporting protected features within a UK-designated or notable ecological site.	Ecological sites are covered (and scoped in to) Chapter 8: Terrestrial biodiversity.	All zones
Operation				
All operational activities	Loss or deterioration of a geodiversity or sensitive site.	Geology (designated or sensitive geological sites).	Geodiversity has been scoped out of the assessment as no such sites are known to exist within 250m of the scoping boundary.	All zones
All operational activities	Loss or deterioration of soils supporting protected features within a UK-designated or notable ecological site.	Soils supporting protected features within a UK-designated or notable ecological site.	Ecological sites are covered (and scoped into) Chapter 8: Terrestrial biodiversity.	All zones
All operational activities	Harm to human health or pollution of controlled waters.	Land quality receptors (human health and controlled water receptors)	The Proposed Development will include systems in place to prevent any contamination during operation. Any existing contamination will be managed at construction phase to negate any risks from existing contamination impacting human health or the environment during operation.	All zones

12.9 Assessment methodology

12.9.1 The study area set out in Section 12.4 will be kept under review as the design and consultation processes progress, and the Proposed Development is refined. Therefore, the study area may evolve as appropriate. The evolution of the study area will be clearly communicated in the ES and discussed with relevant consultees.

12.9.2 The proposals described in Chapter 2: Project description, will also evolve and be further developed as the design process progresses. Whilst the methodologies that are set out within this chapter are not anticipated to change, the scope of assessment will be kept under review as design progresses.

Additional baseline information required

12.9.3 The intrusive ALC survey and a soil nutrient survey (to be undertaken in autumn 2024), will provide the necessary data to establish the current baseline for soil resources.

12.9.4 A farm business interview will be undertaken with owners of all affected farm holdings within the Scoping boundary to obtain detailed information on aspects such as agricultural land holding size, area of land impacted, agricultural activity and spatial configuration of agricultural activity. The farm business interview will comprise a questionnaire and informal interview with landowners and occupiers.

12.9.5 Further GI, especially at the associated water infrastructure areas will be used to provide more baseline information on land quality. No further baseline information is required for geology.

Assessment years

12.9.6 The temporal scope for the assessment would be the same as set out in Chapter 6: EIA approach and methodology.

Construction assessment methodology

Soils

12.9.7 The assessment will be conducted in accordance with A New Perspective on Land and Soil in Environmental Impact Assessment (Institute of Environmental Management and Assessment (IEMA), 2022). Table 12-5 outlines the criteria used to define the sensitivity of soil receptors and Table 12-6 defines the impact magnitude.

Table 12-5: Soil resources, soil function and agricultural land receptor sensitivity criteria

Receptor sensitivity	Baseline description/condition
Very high	**Soil carbon**: Peat soils. **Agricultural Land**: ALC Grades 1 (excellent) and 2 (very good).
High	**Soil resource**: Soils with high clay and silt fractions (clays, silty clays, sandy clays, heavy silty clay loams and heavy clay loams) and organo-mineral and peaty soils where the Field Capacity Day(s) (FCD) are 150 or greater. Medium-textured soils (silt loams, medium silty clay loams, medium clay loams and sandy clay loams) where the FCDs are 225 or greater. All soils in wetness class (WCV or WCVI). **Soil carbon**: Organo-mineral soils (for example, peaty soils). **Agricultural Land**: ALC Grade 3a (good).
Medium	**Soil resource**: clays, silty clays, sandy clays, heavy silty clay loams, heavy clay loams, silty loams and organo-mineral and peaty soils where the FCDs

Receptor sensitivity	Baseline description/condition
	are fewer than 150. Medium-textured soils (silt loams, medium silty clay loams, medium clay loams and sandy clay loams) where FCDs are fewer than 225. Sands, loamy sands, sandy loams and sandy silt loams where the FCDs are 225 or greater or are in wetness classes WCIII and WCIV. **Soil carbon**: Mineral soils. **Agricultural Land**: ALC Grade 3b (moderate).
Low	**Soil resource**: Soils with a high sand fraction (sands, loamy sands, sandy loams and sandy silt loams) where the FCDs are fewer than 225 and are in wetness classes WCI to WCII. **Soil carbon**: Mineral soils. **Agricultural Land**: ALC Grades 4 (poor quality) and 5 (very poor).
Negligible	As for low sensitivity, but with only indirect, tenuous and unproven links between sources of impact and soil functions.

Source: IEMA, 2022

Table 12-6: Soil resources, soil function and agricultural land impact magnitude criteria

Impact magnitude	Soil resource and function
Major	• Permanent, irreversible loss of one or more soil functions or soil volumes (including permanent sealing or land quality downgrading), over an area of more than 20ha; or loss of soil-related features as set out in Table 12-5 (including potential effects from 'temporary developments'); or • Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of more than 20ha, or gain in soil-related features set out in Table 12-5 (including potential effects from 'temporary developments').
Moderate	• Permanent, irreversible loss of one or more soil functions or soil volumes, over an area of between 5ha – 20ha; or loss of soil-related features set out in Table 12-5 (including potential effects from 'Temporary Developments'); or • Potential for improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of between 5 – 20ha, or gain in soil-related features set out in Table 12-5.
Minor	• Permanent, irreversible loss over less than 5ha or a temporary, reversible loss of one or more soil functions or soil volumes, or temporary, reversible loss of soil-related features set out in Table 12-5; or potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of less than 5ha, or a temporary improvement in one or more soil functions due to remediation or restoration or off-site improvement, or temporary gain in soil-related features set out in Table 12-5 above.
Negligible	• No discernible loss or reduction or improvement of soil functions, or soil volumes that restrict current or proposed land use.

Table 12-7: Agricultural land holding sensitivity criteria

Receptor sensitivity	Baseline description/condition
High	Farm types in which the operation of the enterprise is dependent on the spatial relationship of land to key infrastructure, and where there is a requirement for frequent and regular access between the two, or dependent on the existence of the infrastructure itself, for example: • Dairying, in which milking cows must travel between fields and the parlour at least twice a day. • Irrigated arable cropping and field-scale horticulture, which are dependent on irrigation water supplies. • Intensive livestock or horticultural production that is undertaken primarily within buildings, often in controlled environments.
Medium	Farm types in which there is a degree of flexibility in the normal course of operations, for example: • Combinable arable farms. • Grazing livestock (other than dairying).
Low	Farm types and land uses undertaken on a non-commercial basis. For example, smallholdings where the main source of income is not derived from the agricultural business.

Source: HS2, 2013

Table 12-8: Agricultural land holding magnitude criteria

Impact magnitude	Land required permanently	Land required temporarily	Severance	Infrastructure	Disruption
High	Removal or loss of soil function of >20% of all land farmed.	Removal or loss of soil function of >50% of all land farmed.	No access available to severed land.	Direct loss of farm dwelling, building or structure.	Disruption discontinues land use or enterprise.
Moderate	Removal or loss of soil function of 11% – 20% of all land farmed.	Removal or loss of soil function of 26% – 50% of all land farmed.	Access available to severed land via the public highway.	Loss of or damage to infrastructure affecting land use.	Disruption necessitates change to scale or nature of land use or enterprise.
Minor	Removal or loss of soil function of 5% – 10% of all land farmed.	Removal or loss of soil function of 10% – 25% of all land farmed.	Access available to severed land via private way.	Infrastructure loss/damage does not affect land use.	Disruption does not affect land use or enterprise.

Impact magnitude	Land required permanently	Land required temporarily	Severance	Infrastructure	Disruption
Negligible	Loss of soil function of <5% of all land farmed.	Loss of soil function of <10% of all land farmed.	No new severance.	No impact on farm infrastructure.	No disruption on land use or enterprise.

Source: HS2, 2013

Land Quality

12.9.8 The assessment methodology for land quality will be in accordance with Design Manual for Roads and Bridges (DMRB) LA 109 Geology and Soils (Highways England, 2019). While DMRB is intended for highway projects, it is considered applicable for the Proposed Development. Professional judgement has been used to determine its suitability. The methodology for determining the importance (sensitivity) and magnitude of receptors is outlined in Table 12-9 and Table 12-10 respectively.

Table 12-9: Land quality receptor sensitivity criteria

Receptor sensitivity	Baseline description/condition
Very high	**Human health:** High sensitivity land such as residential developments with gardens or allotments. **Surface water:** Site protected under European Union wildlife legislation; Water Framework Directive (WFD) High status (The Water Environment (Water Framework Directive) (England and Wales) Regulations, 2017)). **Groundwater:** Principal aquifer providing a regionally important resource or source protection zone.
High	**Human health:** High sensitivity land use such as residential developments (no gardens or allotments). **Surface water:** Site protected under UK wildlife legislation; WFD Good status. **Groundwater:** Principal aquifer providing locally important resource.
Medium	**Human health:** Medium sensitivity land use such as public open space. **Surface water:** Site protected under local wildlife legislation, WFD status Moderate. **Groundwater:** Secondary aquifer which provides water for agricultural or industrial use.
Low	**Human health:** Low sensitivity land such as commercial or industrial **Surface water:** WFD Poor status, or water body is not classified under the WFD. **Groundwater:** Secondary aquifer with poor water quality not providing baseflow to rivers; non-aquifer.

Source: DMRB LA 109 Geology and soils (Highways England, 2019)

Table 12-10: Land quality impact magnitude criteria

Magnitude of impact (change)	Typical description
Major adverse	An increase in contamination risk of 4 or 5 risk levels in the risk matrix, for example land that has a very low contamination risk in the baseline becomes a high or very high risk land.
Moderate adverse	An increase in contamination risk of 2 or 3 risk levels, for example land that has a low contamination risk in the baseline becomes a moderate or high risk land.
Minor adverse	An increase in contamination risk of 1 risk level, for example land that has a low contamination risk in the baseline becomes a moderate/low risk land.
Negligible	No change in contaminated land risk.
Minor beneficial effect	A reduction in contamination risk of 1 risk level, for example land that has a moderate/low contamination risk in the baseline becomes a low risk.
Moderate beneficial effect	A reduction in contamination risk of 2 or 3 risk levels for example land having a high contamination risk becomes a moderate/low risk land.
Major beneficial effect	A reduction in contamination risk of 4 or 5 risk levels, for example land that has very high contamination risk in the baseline becomes a low or very low risk land.

Source: DMRB LA 109 Geology and soils (Highways England, 2019).

Operational assessment methodology

12.9.9 The assessment methodology for the operational phase is the same as the methodology described for the construction phase above, apart from the assessment of potential temporary effects which will not be applicable to the operational phase.

Significance of effects

12.9.10 Significance of potential effects will be determined by cross referencing the ascribed level of value with the magnitude of impact as shown in Image 6.1 in Chapter 6: EIA approach and methodology. A likely significant effect in the context of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 is taken to be a moderate or greater adverse or beneficial significance.

12.10 Assessment assumptions and limitations

12.10.1 Key assumptions and limitations for the scoping of the geology, soils, agriculture and land quality are as follows:

- The Envirocheck report used in identifying the baseline conditions, particularly the site history, only covered the reservoir site at the scoping stage.

- Datasets relating to geological and sensitive sites are not publicly available for the entire area covered by the Proposed Development and as such, sites may be present but not considered in this report. Despite this, it is not considered likely that any geologically-sensitive site would be impacted as a result of the development based on the current land use within the Scoping boundary, and therefore the conclusions remain valid.
- Ground investigations are ongoing, therefore there is the potential for the results to identify different ground conditions to the published geological maps, particularly relating to presence and depth of any Made Ground.
- Limited desk-study data for agricultural land and soil resources. Land identified as Grade 3 in provisional ALC mapping is not subdivided into Subgrades 3a and 3b. This represents a key distinction, as Subgrades 1 – 3a are classed as 'best and most versatile' (BMV) land.

13 Material assets and waste management

13.1 Introduction

13.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to material assets and waste management. The chapter should be read in conjunction with the description of the project as presented in Chapter 2: Project description. Information for peat resources and potential sources for contaminated land arisings are provided in Chapter 12: Geology, soils, agriculture and land quality.

13.1.2 Material assets are substances and objects which are used during any stage of a development's lifecycle and include raw materials, such as aggregates; minerals from primary, secondary and recycled sources; and manufactured construction products.

13.1.3 Waste is defined by the European Union (EU) Waste Framework Directive (2008/98/EC) as '*any substance or object which the holder discards or intends or is required to discard*'.

13.1.4 For the aspect of material assets and waste management, the receptors are:

- Material assets: the receptors are quarries and other finite sources of minerals. Use of material assets can adversely affect their availability for use.
- Waste management: the receptors are waste infrastructure and landfill sites. If waste is not managed in accordance with the waste hierarchy, it can cause a reduction in landfill void capacity. Waste, when reused/recycled as materials, can provide potential beneficial effects by reducing the requirements for the use of primary material assets.

13.1.5 This chapter has been prepared in accordance with the Institute of Environmental Management and Assessment (IEMA) Guide to Materials and Waste in EIA (2020).

13.2 Legislation, policy and guidance requirements

13.2.1 Legislation, policy and guidance which has informed the scope of the assessment presented within this chapter is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

13.2.2 Table 13-1 identifies the relevant policy in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) and the National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities (DLUHC), 2023) for material assets and waste.

Table 13-1: UK policy relevant to material assets and waste management

Relevant UK policy	Relevance to assessment
NPS for Water Resources Infrastructure (Defra, 2023)	Section 4.12 sets out the main policies relevant to material assets and waste. Paragraph 4.12.2 states that '*sustainable waste management is implemented through the 'waste hierarchy*". Paragraphs 4.12.4 to 4.12.8 provide guidance with regards to management of hazardous and non-hazardous waste during construction and operation of water resources infrastructure projects. Paragraph 4.10.16 provides information for mineral safeguarding areas (MSA). Paragraph 4.10.28 requires appropriate mitigation measures to safeguard mineral resources.
NPPF (DLUHC, 2023)	The NPPF includes the following chapters relevant to material assets and waste aspects: • Chapter 2: Achieving sustainable development. • Chapter 17: Facilitating the sustainable use of minerals. These chapters include relevant policies to material assets assessment, including the definition of MSA, and the importance of the use of secondary and recycled materials and minerals, to maintain minerals landbanks and to reduce waste generation.

13.3 Stakeholder engagement

13.3.1 In preparing this EIA Scoping Report, there has been engagement and discussions with a number of stakeholders including the relevant planning authorities, as listed in Table 13-2.

13.3.2 The dialogue with stakeholders will continue throughout the pre-application period as part of the EIA process. A summary of the engagement undertaken so far is presented in Table 13-2, along with proposed future engagement. Stakeholder feedback from the engagement undertaken throughout the pre-application period has been limited to date, so it has not been possible to provide an overview at this stage. Details of stakeholder feedback and the formal response to that feedback will be provided at Preliminary Environmental Information Report (PEIR) stage.

Table 13-2: Engagement with stakeholders

Stakeholder	Engagement undertaken to date	Proposed future engagement
Environment Agency, Natural England, Fenland District Council	**3 November 2023** – meeting to discuss materials and waste including the material assets and waste management study area, baseline data collection, suitability of use of site-won	Further discussions scheduled for the next meeting on the development of the Proposed Development, the results of the assessment and proposed mitigation.

Stakeholder	Engagement undertaken to date	Proposed future engagement
	materials and sustainable use of materials.	
Huntingdon District Council, Peterborough City Council, Cambridgeshire County Council, South Cambridgeshire District Council, Norfolk County Council, Fenland District Council	**15 May 2024** – meeting to discuss baseline data and guidance followed for the material assets and waste management assessment and study areas.	Further discussions on an ongoing basis would be undertaken on the development of the Proposed Development, the results of the assessment and proposed mitigation.
Fenland District Council, Environment Agency, Cambridgeshire County Council, Natural England	**6 June 2024** – meeting to discuss relevant industry guidelines for EIA, the baseline, study areas and key environmental considerations.	Further discussions on an ongoing basis would be undertaken on the development of the Proposed Development, the results of the assessment and proposed mitigation.

13.4 Study area

13.4.1 The IEMA Guide to Materials and Waste in EIA (IEMA, 2020) defines two geographically different study areas to examine the use of material assets and the management of waste, referred to as the development and expansive study areas.

13.4.2 The two study areas for material assets and waste management were informed by the identified Scoping boundary and the available information for the Proposed Development. This includes the information on the construction and operational phases as described in Chapter 2: Project description. The identified study areas are considered to be sufficiently broad to allow for the ongoing refinement of the Proposed Development. However, as the Proposed Development is refined, and if required, this will be expanded to ensure there is appropriate coverage of all potential significant environmental effects at the ES stage.

13.4.3 The Scoping boundary constitutes the area within which construction materials would be consumed (used, reused and recycled) and waste would be generated. Therefore, the development study area is an area within 500m from the Scoping boundary, where materials will be consumed, waste will be generated and where potential constraints to MSA may be identified. Potential sources of contaminated land that can give rise to excavated, hazardous waste have been assessed in Chapter 12: Geology, soils, agriculture and land quality. The development study area is presented in Figure 13.1.

13.4.4 The expansive study area focuses on an area that has feasible sources, and availability, of construction materials typically required for the Proposed Development and identifies suitable waste management infrastructure that can accept waste arisings generated by the Proposed Development. This study area is presented in Figure 13.2. For the purpose of assessment, the expansive study area for:

- Material assets focuses primarily on Cambridgeshire County Council, Peterborough City Council and Norfolk County Council and, where required, the East of England region. For the purpose of this assessment, it is assumed that the majority of the material assets are likely to be procured within 50km from the Scoping boundary. This will be confirmed, or refined as necessary, at the ES stage as the design of the Proposed Development progresses.
- Waste generation and management focuses on an area sufficient to identify suitable waste management facilities, including landfills. The search area is based on professional judgement and knowledge of suitable waste management facilities within the region. An initial search range of 10km has been used for waste management facilities and 50km for landfill sites. This aims to support the proximity principle by highlighting appropriate waste management and disposal facilities within a reasonable distance of the Proposed Development. This will be confirmed, or refined as necessary, at the ES stage as the design of the Proposed Development progresses.

13.4.5 The East of England region includes the counties of Bedfordshire, Cambridgeshire, Essex, Hertfordshire, Norfolk and Suffolk.

13.5 Baseline data collection

13.5.1 The baseline conditions for material assets and waste management presented in Section 13.6 represent a review of the current and publicly available data. The data collated to date was sourced through desk studies. Data collection to inform the baseline of the assessment is ongoing. The data described below provides a robust context for the scoping of the assessments.

Desk studies

13.5.2 Information on the demand for key construction materials within the UK, the East of England, Cambridgeshire, Peterborough and Norfolk has been used to provide the baseline for material assets. This information has been determined through a desk-based study using a number of readily available resources, in particular:

- United Kingdom Minerals Yearbook 2022 (British Geological Society (BGS), 2023).
- AMPS 2022 – 10th Annual Mineral Planning Survey Report (Mineral Products Association (MPA), 2022).
- Profile of the UK Mineral Products Industry (MPA, 2023).

- Annual Monitoring Report 2022 (East of England Aggregates Working Party (AWP), 2023).
- Apparent Steel Use (Finished Steel Products) (World Steel Association, 2024).
- Cambridgeshire and Peterborough Minerals and Waste Local Plan 2036 (Cambridgeshire County Council and Peterborough City Council, 2021).
- Cambridgeshire and Peterborough Local Aggregate Assessment (LAA) 2022 (Cambridgeshire County Council and Peterborough City Council, 2023).
- Norfolk Minerals and Waste Development Framework, Core Strategy and Minerals and Waste Development Management Policies Development Plan Document 2010-2026 (Norfolk County Council, 2011).
- Norfolk Minerals and Waste Local Plan – Monitoring Report Mineral Data LAA for calendar year 2022 (Norfolk County Council, 2024).

13.5.3 The most recent information available relating to current waste generation and operational waste facilities in Cambridgeshire, Peterborough, Norfolk and the East of England region has been gathered to provide the baseline for this assessment. Information on current waste arisings, and waste management facilities, has been determined through a desk study, using a number of readily available resources, in particular:

- Waste Data Interrogator 2022 – Waste received Version 3 (Environment Agency, 2024a).
- Waste Data Interrogator 2022 – Waste removed Version 3 (Environment Agency, 2024b).
- Waste Data Interrogator 2022 – Waste summary tables for England Version 3 (Environment Agency, 2024c).
- Remaining landfill capacity 2022 Version 2 (Environment Agency, 2024d).
- Historic landfill sites (Environment Agency, 2024e).
- Permitted waste sites – authorised landfill site boundaries (Environment Agency, 2024f).
- Cambridgeshire and Peterborough Minerals and Waste Local Plan (Cambridgeshire County Council and Peterborough City Council, 2021).
- Norfolk Minerals and Waste Development Framework, Core Strategy and Minerals and Waste Development Management Policies Development Plan Document 2010-2026 (Norfolk County Council, 2011).

13.5.4 No field surveys or site visits are proposed for the assessment of material assets and waste management.

13.6 Baseline conditions

13.6.1 The baseline conditions for material assets and waste management are described below for the study areas (defined in Section 13.4). The baseline conditions are as established from the data collection described in Section 13.5 and further baseline data is presented in Appendix 13.1: Material assets and waste management.

13.6.2 For the use of material assets and for the generation and management of waste, the baseline conditions are applicable to the four zones within the Scoping boundary, as described in Chapter 2: Project description.

Use of material assets

13.6.3 Environmental effects are more likely to arise from those material assets which:

- Are required in large quantities.
- Are primary or virgin materials.
- Have hazardous properties.

13.6.4 The primary material assets that would be required in the largest quantities for the construction of the Proposed Development are aggregates (for example sand, gravel, clay and crushed rocks), aggregate-based materials (such as concrete, concrete products and fill materials) and steel. The construction phase of the Proposed Development is likely to require large quantities of primary raw materials and manufactured construction products for enabling activities (such as setting up compounds and haul roads), excavations, installation of pipelines and the construction of structures and buildings. This is likely to include raw materials, such as aggregates, and minerals from primary, secondary and recycled sources, and manufactured construction products.

13.6.5 It is estimated that approximately two to three million tonnes of aggregates or aggregate-based materials would be required for construction of the Proposed Development and so the baseline study for their availability has been considered in this chapter. Other non-aggregate based materials (such as PVC, timber and geotextiles) are currently not considered in the baseline study as they are unknown for the scoping stage. If, as the design of the Proposed Development is refined, additional materials are identified to be used in large quantities, these would be included in the future stages of the EIA process.

13.6.6 Due to the scale and nature of the Proposed Development and quantity of construction materials required, it is likely that a large proportion would be primary materials. This would include aggregate-based products and manufactured materials, such as steel pipes. However, opportunities to use secondary or recycled sources will be sought as part of the design.

13.6.7 The baseline conditions for the use of material assets identify:

- Regional and/or national availability of aggregates, aggregate-based materials and steel required for the construction and operation of the Proposed

Development, including the proposed reservoir and associated water infrastructure.

- MSA, mineral allocation area (MAA) and minerals sites within or adjacent to the Scoping boundary.

Regional and national availability of materials

13.6.8 Aggregate materials (such as sand, gravel, clay, sandstone and crushed rock) are the main raw material assets used for construction of the reservoir, ancillary infrastructure (for example, access tracks, parking, buildings) and temporary works (such as haul roads). Three main sources to obtain these aggregates are:

- Land-won (often referred to as natural or primary aggregates) – extracted directly from the ground in quarries or pits.
- Marine-dredged – comprise of sand and gravel dredged from the sea floor.
- Secondary/recycled – secondary aggregates are a by-product from mineral operations or industrial processes; recycled aggregates are materials produced by the treatment of construction and demolition waste.

13.6.9 The production of aggregate in the UK and the aggregate sales and reserves within Cambridgeshire and Peterborough, Norfolk and the East of England provides an indication on the availability of aggregates required for the construction work, within all the four zones of the Scoping boundary. The production of aggregate in the UK is presented in Table 13-3.

Table 13-3: UK production (in million tonnes) of materials and minerals/mineral products

Mineral/mineral product	UK production (2021)
Aggregates, of which:	279.8
• Crushed rock.	148.2
• Sand and gravel (land-won).	47.7
• Sand and gravel (marine).	14.3
• Recycled and secondary aggregates.*	69.6
Cementitious products, of which:	11.1
• Cement.	9.0
• Other cementitious materials.	2.1
Ready-mixed concrete	52.7
Concrete products	24.8
Asphalt	28.3
Dimension stone*	1.0
China clay	0.7
Slag	1.4

*Notes: *Data for these minerals are for Great Britain only*
Source: MPA (2023)

13.6.10 Aggregates extracted across the Cambridgeshire and Peterborough region include sand and gravel and limestone (crushed rock) (Cambridgeshire County Council and Peterborough City Council, 2021), while for Norfolk the aggregates extracted are

sand and gravel and Carstone (crushed rock) (Norfolk County Council, 2011). There are 84 mineral working sites for sand and gravel and three mineral working sites for limestone and dolomite, and sandstone, in the East of England region (BGS, 2023).

13.6.11 Table 13-4 provides information for the aggregate sales and reserves within Cambridgeshire, Peterborough, Norfolk and the East of England. The stock of reserves with planning permission is known as the landbank. The NPPF (DLUHC, 2023) requires landbanks to be maintained for all primary aggregate minerals, with a required landbank of at least seven years for sand and gravel and ten years for rocks. The landbank years for sand and gravel and crushed rocks for Cambridgeshire and Peterborough, Norfolk and the East of England are presented in Table 13-4.

Table 13-4: Aggregates sales and reserves (in million tonnes) for Cambridgeshire and Peterborough, Norfolk and the East of England region for the year 2022

County or Region	Aggregate	2022 sales	Average 10-year sales	Permitted reserves	Landbank (years)*
Cambridgeshire and Peterborough	Sand and gravel (land-won)	3.04	2.89	32.39	11.20
	Crushed rock (limestone)	0.06	0.23	2.87	12.30
	Recycled and secondary aggregates	0.46	0.57	NA	NA
Norfolk	Sand and gravel	1.37	1.41	17.95	12.70
	Crushed rock (Carstone)	0.10	0.08	1.42	16.00
	Recycled and secondary aggregates	0.36	0.35	NA	NA
East of England	Sand and gravel (land-won)	11.29	11.43	116.30	10.20
	Crushed rock	0.17	0.31	4.44	14.40
	Recycled and secondary aggregates	2.5	2.06	NA	NA

*Notes: * Landbank is based on 10-year average sales*
Source: Cambridgeshire City Council and Peterborough City Council (2023), East of England AWP (2023), Norfolk County Council (2024)

13.6.12 The total permitted reserves for primary aggregates (including sand and gravel and crushed rock) available in the East of England is approximately 120 million tonnes (Table 13-4). The East of England has sufficient capacity for the provisions of sand and gravel and crushed rock, indicating that aggregates required for the construction of the Proposed Development are available within the region. This also indicates that aggregates would not be required to be sourced from outside the region, where technically appropriate and economically feasible. However,

based on design requirements, scour protection material, if not available regionally, may be required to be sourced outside the region and the expansive study area would be refined as necessary.

13.6.13 Available information, based on similar large-scale projects, has been used to estimate the quantities of bulk aggregate materials that would be required for the construction works. It is considered that the aggregate material required for the construction of the Proposed Development is unlikely to be sourced from site-won materials and would be required to be imported. The East of England has reserves for sand and gravel of approximately 116 million tonnes (Table 13-4). The indicative quantities for bulk aggregate-based materials required for the Proposed Development suggest that, if all aggregates were to be imported, the construction works of the Proposed Development would be likely to consume approximately 1.8% of the sand and gravel availability in the East of England region.

13.6.14 Large quantities of steel pipeline and steel for structural works are expected to be required for the Proposed Development. The total production of crude steel in the UK is available for the years 2019 to 2023, and the apparent use of steel is available for the years 2018 to 2022 (World Steel Association, 2024). These are presented in Table 13-5. The apparent use of steel data indicates that large quantities of steel are available within the UK and, as such, are available for the construction of the Proposed Development.

Table 13-5: UK steel production (in million tonnes) from 2018 to 2023

UK steel production	2018	2019	2020	2021	2022	2023	Average
Apparent steel use (finished steel products)	10.8	10.2	8.4	11.0	9.4	NA	10.0
Total production of crude steel	NA	7.2	7.1	7.2	5.9	5.6	6.6

Source: World Steel Association, 2024

13.6.15 During the operational phase, the Proposed Development is unlikely to require large quantities of material assets and their use is expected to be considerably lower than the construction phase. Material assets required during the operational phase are expected to be mainly related to ongoing maintenance and repair works, which are anticipated to occur infrequently. These maintenance works may require small quantities of aggregates, steel, concrete and other materials consistent with construction works. The water treatment works and inter-catchment treatment facilities are likely to require material assets on an ongoing basis; however, they are not expected to require large quantities. The type and quantities of materials required for the normal operation of the water treatment works and inter-catchment treatment facilities would be provided for at the ES stage.

Mineral reserves

13.6.16 The NPPF (DLUHC, 2023) provides the following definitions in relation to mineral sites:

- MSA – '*an area designated by minerals planning authorities which covers known deposits of minerals which are desired to be kept safeguarded from unnecessary sterilisation by non-mineral development*'.
- Mineral Consultation Area (MCA) – '*a geographical area based on a MSA, where the district or borough council should consult the Mineral Planning Authority for any proposals for non-minerals development*'.

13.6.17 The baseline information regarding the MSA has been collected from the assessment of the relevant Minerals and Waste Local Plans and associated maps and is shown in Figure 13.1. The baseline information has been provided on the MSA that are within 500m of the Scoping boundary for Cambridgeshire and Peterborough. MSA for Norfolk will be confirmed at the ES stage.

13.6.18 Four mineral resources (brick clay, chalk, limestone, and sand and gravel) have been identified for safeguarding for Cambridgeshire and Peterborough (Cambridgeshire City Council and Peterborough City Council, 2021). Norfolk County Council (2011) identifies three mineral resources for safeguarding, comprising of sand and gravel, Carstone and silica sand.

13.6.19 The Scoping boundary is located within brick clay, chalk, and sand and gravel MSA within Cambridgeshire and Peterborough (Cambridgeshire City Council and Peterborough City Council, 2021). The Scoping boundary is located within Carstone and sand and gravel MSA within Norfolk (Norfolk County Council, 2011). The areas of MSA within the Scoping boundary are presented in Figure 13.1.

13.6.20 There are four safeguarding areas, within 500m of the Scoping boundary, that lie within the Cambridgeshire and Peterborough Combined Authority areas, of which two are MAA and two are mineral development areas (MDA). Information for these sites is given in Table 13-6. Information for the safeguarding sites that may lie within 500m of the Scoping boundary of the Norfolk area would be provided at the ES stage. MAA are defined by Cambridgeshire and Peterborough Combined Authorities as '*areas not yet consented but allocated in this plan for the future extraction of mineral*' (Cambridgeshire City Council and Peterborough City Council, 2021).

Table 13-6: Safeguarding sites located within 500m of the Scoping boundary

Site name	Distance to the Scoping boundary (m)	Type of site
Sources of supply area (Peterborough)		
Bradley Fen Pit	360	MDA
Reservoir area (Cambridgeshire)		
Block Fen/Langwood Fen – East	0	MAA
Block Fen/Langwood Fen – West	315	MAA
Downstream transfers area (Cambridgeshire)		
Needingworth	0	MDA

Source: Cambridgeshire County Council and Peterborough City Council (2021)

13.6.21 The baseline information for peat resources is provided, and will be assessed, in Chapter 12: Geology, soils, agriculture and land quality.

Waste generation and management

13.6.22 For waste generation and management, the baseline conditions are applicable to the four zones within the Scoping boundary.

13.6.23 Likely significant environmental effects are most likely to arise from waste which is associated with the large quantities of waste and/or has hazardous properties.

13.6.24 The Proposed Development is likely to generate waste during the construction phase, which could result in the temporary reduction in capacities of waste management infrastructure (from the treatment of waste), or the permanent reduction in landfill capacity (from the disposal of waste). There is the potential for significant, adverse effects on the environment through the generation of waste during the construction and operation of the Proposed Development.

13.6.25 During the construction phase, the Proposed Development is likely to generate large quantities of inert and non-hazardous waste. Small quantities of hazardous waste may also be generated, mainly from site preparation, excavation and demolition works, including site clearance and vegetation removal. Waste from construction activities is likely to be generated from surplus, or unsuitable, site-won materials and materials brought to site, which are not used for their original purpose. Waste types likely to be generated during the construction phase include (but are not limited to):

- Green waste from vegetation clearance.
- Inert waste from demolition and site preparation works.
- Excavated materials (natural and made ground) which may be contaminated (and potentially classified as hazardous) or unsuitable for reuse without treatment.
- Unsegregated, non-hazardous materials, such as timber, signage and mixed materials.
- Surplus materials from site preparation, demolition, excavation and construction.
- Damaged stock or off-cuts.
- Debris, litter and general site rubbish and packaging.
- Site compound waste from canteen, accommodation and welfare areas.

13.6.26 The baseline conditions for waste generation and management identify the local, regional and national availability of waste infrastructure likely to be used by the Proposed Development during the construction and operational phases. The most recent information available relating to current waste generation and operational waste facilities in Cambridgeshire, Norfolk, the East of England region and England has been gathered to provide a baseline for this assessment. Appendix 13.1:

Material assets and waste management provides the baseline data to support this section.

13.6.27 The latest data available from the Environment Agency indicates that the waste facilities in the East of England region received over 29 million tonnes of waste in 2022, while Cambridgeshire and Peterborough received over 6.3 million tonnes of waste and Norfolk received over 3.8 million tonnes of waste, as shown in Table 1-2 of Appendix 13.1: Material assets and waste management. This indicates that the waste management facilities within the East of England have sufficient capacity to manage waste arisings within the region and, thus, are anticipated to be able to manage waste arisings from the construction and operation of the Proposed Development.

13.6.28 Approximately 35 structures have been identified, at this stage, for demolition within the reservoir footprint in order to facilitate the construction and operation of the Proposed Development. Further design work and refinement of the Proposed Development would identify the number of structures to be demolished as part of the final proposals; this would be confirmed at the ES stage. Potential contaminants and hazardous materials (such as asbestos, lead paint and diesel) may be present in the structures that are to be demolished.

13.6.29 Baseline data indicates that in 2022, waste management infrastructure in the East of England received nearly 12.7 million tonnes of inert construction and demolition (C&D) waste (Environment Agency, 2024a). In addition, 2.4 million tonnes of inert C&D waste were removed from the East of England region by the end of 2022 (Environment Agency, 2024b). This indicates the available capacity at present to manage C&D waste within the region from the construction and operation of the Proposed Development and other proposed developments within the region.

13.6.30 Approximately 1.1 million tonnes of inert C&D waste were deposited on land for recovery in 2022 in the East of England region (Environment Agency, 2024a). This indicates that there is potential for C&D waste arisings, from the Proposed Development, to be used for land restoration and recovery operations within the region.

13.6.31 Approximately 0.1 million tonnes of hazardous C&D waste and asbestos were managed in the East of England by the end of 2022, and nearly 0.2 million tonnes were deposited in this region (Environment Agency, 2024c). This indicates the available capacity, at present, to manage hazardous C&D waste arisings, from the Proposed Development and other proposed developments, within the region. Indicative hazardous waste arisings from the construction phase have not been quantified and would be provided for the ES stage. The East of England region does not have any hazardous waste landfills with remaining capacity. Therefore, for a worst-case scenario, all hazardous waste arisings would likely require disposal in other regions as stated in Table 1-4 of Appendix 13.1: Material assets and waste management.

13.6.32 Potential sources for hazardous waste arisings from excavated contaminated land are considered in Chapter 12: Geology, soils, agriculture and land quality. There are 12 historical landfills and one permitted waste site with authorised landfill site

boundaries within 500m of the Scoping boundary (Environment Agency, 2024e and 2024f), which are listed in Table 13-7. Excavations in close proximity to these landfill sites may generate small quantities of hazardous waste that would need to be managed in a hazardous waste facility.

Table 13-7: Historical and permitted waste sites with authorised landfill site boundaries within 500m of the Scoping boundary

Site name	Landfill type	Distance from the Scoping boundary (m)
Historical landfills		
Fengate	Household, commercial, industrial and inert landfill	440
Land of Potters Way	Household, commercial and inert landfill	480
ARC Limited – North Bank	Inert landfill	495
Downham Market	Commercial and industrial landfill	163
Wimblington	Not specified	40
Campole Drove	Household and commercial landfill	195
Junction of Dock Road and Bridge Street	Inert landfill	320
Stonepit	Inert landfill	0
Heath Road	Household landfill	55
Railway Cutting	Household landfill	80
Hale Road	Inert landfill	120
Parsons Drove Landfill	Not specified	125
Permitted landfills		
Park Farm	L05: Inert landfill	45

Source: Environment Agency (2024e and 2024f)

13.6.33 The UK Construction Industry Annual Waste Report 2023 (Qualis Flow Limited, 2023) indicates that 13% of construction materials brought to site are becoming waste without being used. This report also indicates that the breakdown of waste streams from infrastructure projects that are sent to landfill is 95% soils and stones, 4.8% mixed construction materials and 0.2% concrete (Qualis Flow Limited, 2023).

13.6.34 A worst-case scenario has been considered with the available information and without implementing any mitigation measures. The worst-case scenario includes material assets that become waste without being used and where all material identified as waste is sent to landfill. As such, this scenario assumes that 4.8% of bulk aggregate-based materials would become waste (for example, gravel and concrete from temporary haul road and hardstand areas). The potential losses of material assets from the Proposed Development that would be landfilled are estimated to be approximately 103,000 tonnes of bulk aggregate-based materials, and would be classed as inert waste. This would equate to approximately 59,000m^3 of inert waste, when disposed of in landfill, representing the worst-case scenario before any mitigation measures are applied.

13.6.35 The Proposed Development is likely to generate non-hazardous, municipal solid waste (MSW). This would be generated by the staff working across the Proposed Development such as in the site offices, welfare facilities, accommodations and compound areas. A non-exhaustive list of available waste management facilities for recycling and recovery, which manage MSW and C&D waste, either through transfer, treatment, crushing and screening, and storage, within 10km of the Scoping boundary, is given in Table 1-3 of Appendix 13.1: Material assets and waste management. Not all treatment facilities may be suitable for the waste generated by the Proposed Development during the construction and operational phases. The baseline study demonstrates that there are over 70 waste management facilities available within 10km of the Scoping boundary for the management of the MSW and C&D waste that is likely to be generated by the Proposed Development.

13.6.36 By the end of 2022, the East of England region had approximately 102 permitted and authorised landfill sites, of which 61 landfills had remaining capacity (Environment Agency, 2024d). Of these landfill sites, 39 are inert landfills, 18 are non-hazardous landfills and four are non-hazardous landfills with Stable Non-Reactive Hazardous Waste cells.

13.6.37 At the end of 2022, the remaining landfill capacity was estimated to be 31,843,521m^3 for inert landfills, 29,334,576m^3 for non-hazardous landfills and zero available capacity for hazardous landfill within the East of England region (Environment Agency, 2024d). There are landfills located in adjacent regions (East Midlands), as indicated in Table 1-5 of Appendix 13.1: Material assets and waste management. Inert and non-hazardous waste arisings from the Proposed Development, if required, can be landfilled within the East of England. Hazardous waste generated by the Proposed Development would need to be landfilled outside the East of England and, therefore, outside of the expansive study area. This will be subject to refinement to capture the identified hazardous waste landfill sites at a later stage in the environmental assessment process, as stated in Section 13.4.

13.6.38 There are six dedicated waste management areas (WMAs) within 500m of the Scoping boundary, which are referred to as safeguarded sites within the Minerals and Waste Local Plan (Cambridgeshire County Council and Peterborough City Council, 2021). These sites are listed in Table 1-7 of Appendix 13.1: Material assets and waste management.

13.6.39 Waste generation during the operational phase has not yet been quantified at the scoping stage. Based on professional judgement, it is not expected that the Proposed Development would generate large quantities of waste during the operational phase, compared to the construction phase. It is anticipated that waste generated through general maintenance and repair activities would be in small quantities when compared to waste generated from the construction phase and can, therefore, be scoped out of the assessment. These activities include:

- Maintenance and repair activities of the reservoir, recreational activities, water treatment works and inter-catchment treatment infrastructure, and associated water infrastructure related to the transfer of water via pipelines or open channels.

- Recreational facilities, which could include facilities/activities such as (list is not exhaustive): a visitor centre, a beach area, parking areas, sport and adventure areas, campsite areas, and boat use.

13.6.40 Small quantities of waste would be generated on a regular basis from the normal operation and maintenance activities of the water treatment works and inter-catchment treatment facilities. The type and quantities of waste that would be generated by the water treatment works and inter-catchment treatment facilities would be provided at the ES stage.

Future baseline

13.6.41 As described in Chapter 2: Project description, it is anticipated for the construction phase to take approximately nine years from DCO grant to treated water entering supply. For the purpose of this chapter and to establish the future baseline, the following assumptions have been considered. These assumptions will be revised as appropriate for the production of the ES.

- The baseline year: 2022.
- An assumed indicative construction period of nine years.
- Assumed first year of operation will be the year when construction is completed, and the operation commences.

Use of material assets

13.6.42 Baseline information indicates that at the end of 2022, the landbank for sand and gravel for the East of England is in excess of the seven years threshold (Table 13-4), but it may not cover the entire construction period and start of operation. The current landbank for rocks in the East of England is 14.4 years (Table 13-4), indicating its availability for a longer period of time that may cover the construction phase and the first year of operation. The sand and gravel and rocks that may be available beyond its landbank of 10 years is dependent upon the regional sales, availability of the materials in existing quarries and the development of new quarries that may have received planning permission. Hence, projection of the existing data to estimate the future baseline has not been undertaken.

13.6.43 According to MPA (2023, page 23), '*a key factor influencing the future long-term supply of aggregates, and therefore other mineral products manufactured using the aggregates, is the operation of the mineral planning system … A complementary indicator, the replenishment rate of permitted reserves, provides a useful insight into the long-term availability of supply.*' Currently, the replenishment rate in Great Britain for sand and gravel is 63% and 52% for rocks. This replenishment rate for sand and gravel and rocks, based on the baseline year (2022), would be used to project the availability of aggregates for the indicative construction period and operational period.

13.6.44 For establishing the future baseline for steel, an average of the apparent steel use data available for 2018 to 2022 has been considered for its availability for the indicative construction period and operational period.

Waste generation and management

13.6.45 The future baseline for the generation and management of waste arisings from the Proposed Development, has been based on publicly available data from the Environment Agency and for all local authorities within the East of England region. Construction demolition and excavation waste (CDEW) data, and commercial and industrial waste (C&I) data were used to project the total CDEW and C&I waste arisings respectively, and the quantity of waste to be diverted from landfill up to operation.

13.6.46 Industry standards or best practice to estimate the future baseline arisings for CDEW and C&I waste are unavailable. So, the future baseline arisings for CDEW and C&I waste have been based on the future baseline methodology undertaken for route-wide waste and material resources assessment in High Speed Two Phase 2b (High Speed Two Limited, 2022). This is a similar major infrastructure project with significant quantities of excavation and excavated materials that would be surplus to the project. This methodology has been used to estimate the future waste management capacities within the East of England; it has been calculated as the average of annual projections of each year and has been provided for the period of 2029 to 2036, which may cover the construction stage.

13.6.47 Waste management performance is based on data for the baseline year (2022) and the future baseline for each year has been projected within the period 2029 to 2036, that may cover the construction stage. It is shown as an overall diversion from landfill and disposal to landfill, given in Table 2-1 to Table 2-3 and Image 2.1 to Image 2.4 of Appendix 13.1: Material assets and waste management.

13.6.48 The landfill void capacities forecast for the East of England from 2022 to 2036 have been provided and show that the available landfill void space for:

- Inert waste decreases from 47.8 million tonnes to 37.5 million tonnes.
- Non-hazardous waste decreases from 21.5 million tonnes to 11.3 million tonnes.

13.6.49 Future baseline projected until 2036, shows that in the East of England, the unused capacity in incineration increases from 0.76 million tonnes to 0.89 million tonnes and unused capacity for treatment and metal recycling increases from 0.96 million tonnes to 1.11 million tonnes. These waste management trends provide a useful insight on the waste management facilities with capacities that would be available within the region to accommodate waste for the indicative construction period of the Proposed Development and first year of operation.

13.6.50 Chapter 23: Cumulative effects will identify the proposed developments that are anticipated to be constructed prior to the construction of the Proposed Development. As such, these developments would form part of the future baseline for assessment within the EIA. Where this presents a change to the current baseline specific to material assets and waste, this will be considered within the EIA.

13.7 Design and mitigation

Design

13.7.1 The design of the Proposed Development to date, has taken consideration of environmental constraints and potential environmental effects. The design development process has sought to avoid and reduce potential adverse environmental effects on material assets and waste management, where practicable, through collaborative discussions around material use and reusing materials within the design.

13.7.2 The ongoing development of the design will incorporate embedded mitigation to avoid and reduce potential adverse effects, where feasible.

13.7.3 The Applicant aims for the reservoir to have a good design that delivers a positive legacy for surrounding communities and places, in alignment with the NPS for Water Resources Infrastructure (Defra, 2023). As such, the Proposed Development is anticipated to be resource efficient throughout its lifecycle, and promote the re-utilisation of material assets and, therefore, reduction of waste arisings. Good design measures are anticipated to include seeking to:

- Achieve cut and fill balance by reusing excavated materials, with no removal off-site of excess material. Excess material would either be used in landscaping or added to the reservoir bowl.
- Reuse surplus construction materials (especially aggregates) for habitat creation (for example, building hibernaculum).
- Source all non-specialist, bulk earthworks materials for the permanent works (embankment and landscaping) of the reservoir on-site from borrow pits within the footprint of the reservoir, with no need for import.
- Install pipelines using open cut technique, with arisings processed and reused as backfill, where practicable.

Mitigation

13.7.4 Documents presenting the approach to mitigation will be produced for the ES stage, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. These measures would be applied to mitigate likely significant effects, including material assets and waste management effects. Material assets and waste management considerations will also inform the process for developing construction methods and components, such as those relating to resource efficiency and the waste hierarchy principles.

13.7.5 Examples of good practice and essential mitigation relevant to material assets include (but are not limited to):

- All suitable excavated material would be reused in the construction of the Proposed Development, in ecological and in landscaping features along the

Scoping boundary, wherever feasible. This aims to reduce the requirement to import materials for construction and to reduce the need to remove surplus materials from site. This includes the reuse of materials recovered from laying pipelines, for example, as trench backfill.

- Temporary stockpiling of fill materials, prior to incorporating into the Proposed Development, would be reduced where practicable, to prevent double handling and reduce damage and, therefore, waste generation is also reduced. However, where required, materials would be stockpiled in accordance with best practice and managed appropriately, to limit the likelihood of damage or cross-contamination.
- Pre-cast elements would be used (such as pre-cast concrete planks used for top cover slabs), where technically appropriate and economically feasible, to allow efficient use of materials and avoid the generation of waste arisings from off-cuts.

13.7.6 Consideration will be given to the implementation of the waste hierarchy and resource efficiency principles throughout the construction and operational phases. This would aim to reduce disposal and increase elimination, reuse and recycling of waste arisings. Examples of good practice and essential mitigation relevant to waste management include (but are not limited to) the following:

- Reusing excavated soils on-site in the landscaping features of the Proposed Development.
- Chipping green waste on-site for use in the landscaping for the Proposed Development. Where this is not feasible, green waste is likely to be sent to appropriate off-site facilities for composting.
- Recycling of inert materials by crushing, blending and subsequent reuse as an aggregate. This may include the reuse of rocks recovered on the Proposed Development to construct haul roads and recycling of crushed rocks used for access tracks.
- All contaminated/hazardous waste (including soil) would be stored separately to any non-hazardous material to avoid cross-contamination.
- Waste arisings sent off-site for recovery or disposal would only be conveyed by an authorised waste contractor. These waste arisings would be transported from the Proposed Development to an authorised site of recovery/disposal in accordance with regulations and in a manner which would not adversely affect the environment.

13.7.7 Relevant documents will be produced to set out the measures and standards of work to be applied during the operational phase. These would be applied to monitor, manage and control potential adverse environmental effects associated with operation and maintenance activities.

13.8 Proposed scope of assessments

Likely significant effects requiring assessment (scoped in)

13.8.1 The following section sets out the aspect-specific potential effects for material assets and waste management. The likely significant effects requiring assessment are presented in Table 13-8 for material assets and for waste management. Where potential effects may be specific to one or more zones of the Proposed Development and the relevant study area, this is identified in Table 13-8 (see Chapter 2: Project description, for further discussion of zones).

Table 13-8: Likely significant effects for material assets and waste

Activity	Effect	Receptor	Zone
Construction			
All construction activities including enabling works (including setting up of compounds and haul roads), excavation and earthworks, installation of pipelines, installation/diversion of utilities and services, and construction of structures and buildings.	The material assets required are forecast to have issues regarding stock and supply causing scarcity on their availability. Depletion of non-renewable resources that would not be available for future projects.	Quarries and other sources of minerals, and other finite raw material resources.	All zones
	Potential sterilisation of minerals that could be worked in the future.	Mineral resources within the Proposed Development footprint including MSA, MAA, MDAs.	All zones
All construction works including demolition of structures and buildings and excavation and earthworks.	Waste from the Proposed Development is sent to waste management facilities leading to a reduction in waste management capacity.	Waste management facilities such as landfills.	All zones
Operation			
All normal operational activities for water treatment works and inter-catchment treatment facilities.	The material assets required are forecast to have issues regarding stock and supply causing scarcity on their availability. The depletion of non-renewable resources due to non-availability of materials with high proportion of sustainable features.	Quarries and other sources of minerals, and other finite raw material resources.	All zones
	Waste from the Proposed Development is sent to waste management facilities leading to a reduction in waste management capacity.	Waste management facilities such as landfills.	All zones

Effects not requiring assessment (scoped out)

13.8.2 The effects proposed to be scoped out of the material assets and waste management assessment are detailed in Table 13-9.

Table 13-9: Potential effects to be scoped out of the material assets and waste management assessment, applicable to all four zones within the Scoping boundary

Activity	Effect	Receptor	Justification for scoping out
Construction			
No construction activities have been scoped out of the assessment.			
Operation			
All operational and maintenance activities of the reservoir and water transfers.	The material assets required are forecast to have issues regarding stock and supply causing scarcity on their availability. The depletion of non-renewable resources due to non-availability of materials with high proportion of sustainable features.	Quarries and other sources of minerals, and other finite raw material resources.	Limited operational and maintenance material assets usage and waste disposal requirements.
	Waste from the Proposed Development is sent to waste management facilities leading to a reduction in waste management capacity.	Waste management facilities such as landfills.	
All maintenance activities for the water treatment works and inter-catchment treatment facilities.	The material assets required are forecast to have issues regarding stock and supply causing scarcity on their availability. The depletion of non-renewable resources due to non-availability of materials with high proportion of sustainable features.	Quarries and other sources of minerals, and other finite raw material resources.	Limited maintenance material assets usage and waste disposal requirements.
	Waste from the Proposed Development is sent to waste management facilities leading to a reduction in waste management capacity.	Waste management facilities such as landfills.	

13.9 Assessment methodology

13.9.1 The study area set out in Section 13.4 will be kept under review as the design and consultation processes progress, and the Proposed Development is refined. Therefore, the study area may evolve as appropriate. The evolution of the study area will be clearly communicated in the ES and discussed with relevant consultees.

13.9.2 The proposals, described in Chapter 2: Project description, will also evolve and be further developed as the design process progresses. Whilst the methodologies that

are set out within this chapter are not anticipated to change, the scope of assessment will be kept under review as design progresses.

Additional baseline information required

13.9.3 The following baseline information is still pending to be collated:

- MSA, MAA, MDA and peat resources within Norfolk County Council. This information has been requested from the council and would be provided at the EIA stage.
- Details on footprint of MSA underlying the Scoping boundary.

Assessment years

13.9.4 In accordance with Materials and Waste in EIA (IEMA, 2020), the assessment will cover material assets and waste anticipated for the whole construction phase. For the operational phase, the assessment will consider material assets and waste anticipated in the first year of operation for the water treatment works and inter-catchment treatment facilities. This aligns with the Materials and Waste in EIA guide (IEMA, 2020) which indicates that the operational phase should assess one full operational year within the first three years of commissioning.

Construction assessment methodology

13.9.5 In accordance with Materials and Waste in EIA (IEMA, 2020), for the assessment of availability of key construction materials, the region for assessment would be based on the expansive study area. For the material assets, the assessment would consider the following for the construction and operational phases:

- Types and quantities of materials required for construction and operation of the Proposed Development. This includes the materials required for temporary construction activities required during the construction phase.
- Information on materials that contain secondary/recycled content.
- Information on any known sustainability credentials of materials to be consumed.
- The type and volume of materials that would be recovered from off-site sources for use on the Proposed Development.
- The cut and fill balance for the construction phase of the Proposed Development.
- Details of on-site storage and stockpiling arrangements, and any supporting logistical details.
- Types and quantities of excavated materials that would be reused on-site, recycled and disposed of.
- Presence of MSAs and peat resources, and the strategies to deal with these for the construction phase.

13.9.6 Aggregate, aggregate-based materials and steel are the material assets that would be required in the largest quantities for the construction of the Proposed Development. Hence, these would be assessed at the ES stage.

13.9.7 The following approach would be assumed to assess the availability of aggregates and steel for the construction and operational phases of the Proposed Development:

- The assessment of aggregates would be undertaken for Cambridgeshire, Peterborough, Norfolk, and the East of England region, if required.
- The availability of aggregates would be based on the annual sales of the baseline year (2022) until the landbank years for sand and gravel and crushed rock.
- The landbank for sand and gravel is currently 10.2 years and 14.4 years for rocks for the East of England region (Table 13-4). Beyond the landbank years for aggregate, the assessment of the availability of aggregates would be based on Great Britain's replenishment rate for sand and gravel (63%) and crushed rock (52%) (MPA, 2023). This would be applied to the availability of aggregates for the baseline year (2022) for the East of England region.
- For steel, the assessment would be based on an average of the apparent steel use available for 2018 to 2022 (Table 13-5), for the indicative construction period (2029 to 2036) and first year of operation (2036).

13.9.8 Additionally, for waste management the assessment for the effect of magnitude would be based on the landfill void capacity method (IEMA, 2020). This method has been selected because:

- The Proposed Development is a complex development.
- This method is a robust approach based on availability of industry data.
- This method offers a detailed methodology.

13.9.9 For waste management, the assessment would identify the following for the construction and operational phases:

- The amount of waste (by weight) that would be recovered and diverted from landfill either on-site or off-site (for example, for use on other schemes).
- Types and quantities of waste arising from the Proposed Development (including waste arisings from site preparation, demolition and excavation works) requiring disposal to landfill.
- Forecast of non-hazardous, hazardous, and inert waste arisings.
- Surplus materials and waste falling under regulatory controls.
- Details of on-site storage and segregation arrangements for waste and any supporting logistical arrangements prior to reuse, recycling and disposal.
- Waste requiring treatment or disposal off-site.

- Type and quantities of potential arisings from hazardous waste.

Operational assessment methodology

13.9.10 The assessment methodology for the operational phase is the same as the methodology described for the construction phase above.

Significance of effects

13.9.11 The assessment criteria to assess the potential effects on material assets and waste management from the Proposed Development would be in accordance with Materials and Waste in EIA (IEMA, 2020). Significance of effects for sensitivity are outlined in Table 13-10 and for magnitude in Table 13-11. For these tables 'Region' refers to the expansive study area (the East of England region), and 'primary materials' refers to materials that are from a non-renewable source.

Table 13-10: IEMA guidance for sensitivity for material assets and waste management

Significance category	Description
Negligible	For material assets for the key materials required for the construction and/or operation of a development: • '*Are forecast (through trend analysis and other information) to be free from known issues regarding supply and stock; and/or* • *Are available comprising a very high proportion of sustainable features and benefits compared to industry-standard materials. Subject to supporting evidence, sustainable features and benefit could include materials or products that: comprise reuse, secondary or recycled content (including excavated and other arisings), support the drive to a circular economy; or in some other way, to reduce lifetime environmental impacts.*' For waste management across construction and/or operational phases, the baseline/future baseline of regional (or where justified, national) inert, non-hazardous, and hazardous landfill void capacity is expected to '*remain unchanged, or is expected to increase through a committed change in capacity*'.
Low	For material assets for the key materials required for the construction and/or operation of a development: • '*Are forecast (through trend analysis and other information) to be generally free from known issues regarding supply and stock; and/or* • *Are available comprising a high proportion of sustainable features and benefits compared to industry-standard materials.*' For waste management across construction and/or operational phases, the baseline/future baseline of regional (or where justified, national): • Inert and non-hazardous landfill void capacity is expected to '*reduce minimally: by <1% as a result of wastes forecast*'. • Hazardous landfill void capacity is expected to '*reduce minimally: by <0.1% as a result of wastes forecast*'.

Significance category	Description
Medium	For material assets for the key materials required for the construction and/or operation of a development: • *'Are forecast (through trend analysis and other information) to suffer from some potential issues regarding supply and stock; and/or* • *Are available comprising some sustainable features and benefits compared to industry-standard materials.'* For waste management across construction and/or operational phases, the baseline/future baseline of regional (or where justified, national): • Inert and non-hazardous landfill void capacity is expected to '*reduce noticeably: by 1% – 5% as a result of wastes forecast*'. • Hazardous landfill void capacity is expected to '*reduce noticeably: by 0.1% – 0.5% as a result of wastes forecast*'.
High	For material assets for the key materials required for the construction and/or operation of a development: • *'Are forecast (through trend analysis and other information) to suffer from known issues regarding supply and stock; and/or* • *Comprise little or no sustainable features and benefits compared to industry-standard materials.'* For waste management across construction and/or operational phases, the baseline/future baseline of regional (or where justified, national): • Inert and non-hazardous landfill void capacity is expected to '*reduce considerably: by 6% – 10% as a result of wastes forecast*'. • Hazardous landfill void capacity is expected to '*reduce considerably by: 0.5% – 1% as a result of wastes forecast*'.
Very high	For material assets for the key materials required for the construction and/or operation of a development: • *'Are known to be insufficient in terms of production, supply and/or stock; and/or* • *Comprise no sustainable features and benefits compared to industry-standard materials.'* For waste management across construction and/or operational phases, the baseline/future baseline of regional (or where justified, national): • Inert and non-hazardous landfill void capacity is expected to '*reduce very considerably (by >10%); end during construction or operation; is already known to be unavailable; or would require new capacity or infrastructure to be put in place to meet forecast demand*'. • Hazardous landfill void capacity is expected to '*reduce very considerably (by >1%); end during construction or operation; is already known to be unavailable; or would require new capacity or infrastructure to be put in place to meet forecast demand*'.

Source: IEMA (2020).

Table 13-11: IEMA guidance for magnitude for material assets and waste management

Significance category	Description
No change	For material assets: '*no materials required*'. For waste management: based on landfill void capacity for inert, non-hazardous and hazardous waste, '*zero waste generation and disposal from the development*'.
Negligible	For material assets: '*no individual material type is equal to or greater than 1% by volume of the regional (or where justified national) baseline availability*'. For waste management: based on landfill void capacity, the waste generated by the development will reduce: • '*Regional or, where justified, national landfill void capacity baseline* for inert and non-hazardous waste by less than 1%.* • *National landfill void capacity baseline for hazardous waste* by less than 0.1%.*'
Minor	For material assets: • '*one or more materials is between 1% – 5% by volume of the regional (or where justified national) baseline availability; and/or* • *the development has the potential to adversely and substantially (justified using professional judgement, based on the scale and nature of the allocated mineral site being assessed) impact access to one or more allocated mineral site (in their entirety), placing their future use at risk.*' For waste management: based on landfill void capacity, the waste generated by the development will reduce: • '*Regional or, where justified, national landfill void capacity baseline*for inert and non-hazardous waste by 1% – 5%.* • *National landfill void capacity baseline* for hazardous waste by less than 0.1% – 0.5%.*'
Moderate	For material assets: • '*one or more materials is between 6% – 10% by volume of the regional (or where justified national) baseline availability; and/or* • *one allocated mineral site is substantially (justified using professional judgement, based on the scale and nature of the allocated mineral site being assessed) sterilised by the development rendering it inaccessible for future use.*' For waste management: based on landfill void capacity, the waste generated by the development will reduce: • '*Regional or, where justified, national landfill void capacity baseline* for inert and non-hazardous waste by 6% – 10%.* • *National landfill void capacity baseline* for hazardous waste by less than 0.5% – 1%.*'
Major	For material assets: • '*one or more materials is greater than 10% by volume of the regional or where justified, national baseline availability; and/or*

Significance category	Description
	• *more than one allocated mineral site is substantially (justified using professional judgement, based on the scale and nature of the allocated mineral site being assessed) sterilised by the development rendering it inaccessible for future use.'* For waste management: based on landfill void capacity, the waste generated by the development will reduce: • *'Regional or, where justified, national landfill void capacity baseline* for inert and non-hazardous by greater than 10%.* • *National landfill capacity baseline* for hazardous waste by greater than 1%.'*

*Notes: * Forecast as the worst-case scenario, during a defined construction and/or operational phase.*
Source: IEMA (2020).

13.9.12 Significance will be derived using the matrix set out in Image 6.1 in Chapter 6: EIA approach and methodology, supplemented by professional judgement. Likely significant effects in the context of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 will be effects of moderate or greater significance.

13.10 Assessment assumptions and limitations

13.10.1 Baseline information and potential effects identified would be based on publicly available information. The assessment would be based on the design and construction information available at the time of assessment.

13.10.2 The assessment would not consider potential environmental effects associated with the off-site extraction of raw materials used for the off-site manufacture of products. These stages of the products' or materials' lifecycles are outside of the scope of the assessment due to the range of unknown variables associated with the processes involved and are not considered to form part of the Proposed Development. In addition, these would be subject to their own separate consenting and regulatory controls at the place of production.

13.10.3 At this stage, quantities of key construction materials required by the Proposed Development are based on indicative information about material assets forecast for large infrastructure projects of similar type. Therefore, at this stage the potential impacts and environmental effects from material assets and waste management are based mainly on a qualitative assessment and professional judgement. Details of the type and quantities of material assets required for the construction and operational phases of the Proposed Development will be available for the assessment once the design has been further developed.

13.10.4 Information on the permitted capacity of waste management facilities and landfills has been used in the assessment, based on current publicly available data at the time of writing. However, it should be noted that the capacity information obtained from the baseline study does not necessarily mean that the capacity detailed would be available for use by the Proposed Development.

13.10.5 It is also noted that any future changes to the permitted capacity and throughput, of the waste management facilities and landfills, are uncertain. It is also difficult to assess the available capacity due to the commercial sensitivity of existing contracts and the timescales over which waste would be produced. It is likely that additional capacity would become available. However, it is not currently possible to predict the timeframes for when these new waste management facilities would become available and, therefore, how many of these sites would be available to accommodate waste arisings from the Proposed Development. Similarly, it is also possible that some of the existing waste management facilities might close or be unavailable.

13.10.6 Potential adverse environmental effects of land contamination, such as impacts on groundwater and human health, are considered within other EIA Scoping Report chapters. Therefore, this chapter only considers the management of this contaminated land found during construction.

13.10.7 Where waste is described as contaminated (or potentially contaminated), on a precautionary basis, it would be assumed to be hazardous.

13.10.8 Baseline information for MSA and peat resources would be confirmed for the EIA report and would be determined as part of the assessment.

13.10.9 Assessment for material assets required and waste generated from worker accommodation is not included at scoping stage.

14 Traffic and transport

14.1 Introduction

14.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to traffic and transport. The chapter should be read in conjunction with the description of the Proposed Development as presented in Chapter 2: Project description.

14.1.2 The assessment of traffic and transport will cover the construction and operational phase of the Proposed Development and road users, including walkers, cyclists and horse riders, as well as water and rail transportation. The following traffic and transport impacts will be covered based on the Guidelines for the Environmental Assessment of Traffic and Movement (Institute of Environmental Management and Assessment (IEMA), 2023):

- Severance of communities.
- Road vehicle driver and passenger delay.
- Walkers, cyclists and horse riders delay.
- Walking, cycling and horse riding amenity.
- Fear and intimidation on and by road users.
- Road user and pedestrian safety.
- Hazardous/large loads.

14.1.3 For the aspect of traffic and transport the key receptors are:

- Walkers, cyclists and horse riders (including carriage drivers).
- Public Rights of Way (PRoWs) users.
- Motorists and freight vehicles.
- Public transport.
- Emergency services.

14.1.4 Similarly, specific groups and geographic locations can be considered potentially sensitive receptors. These are:

- People at home.
- People at work.
- Sensitive and/or vulnerable groups (including children; youth; elderly; income; persons with disabilities; ethnic and racial minorities; people with social disadvantages; access/geographic factors; and inequalities).

- Locations with concentrations of vulnerable groups (e.g. hospitals, places of worship, schools).
- Retail areas.
- Recreational areas (PRoWs, national trails and other rights of access to land).
- Tourist attractions.
- Collision clusters and routes with road safety concerns.
- Junctions and highway links at (or over) capacity.

14.1.5 This chapter should be read alongside Chapter 19: Public access and amenity, which outlines the scope of the assessment in relation to PRoWs within the Scoping boundary.

14.1.6 A strategy for the transport of construction materials and plant is currently being developed for the Proposed Development that considers the potential use of alternative modes of transport other than road to transport construction materials. The potential for transportation of bulk materials by rail and water is under consideration as well as identifying the preferred route by road if such alternatives are not feasible.

14.1.7 A travel plan for the construction phase will also be developed, promoting sustainable travel choices for workers traveling to/from the Proposed Development. The travel plan will also provide details on car sharing and cycle parking provision, and set out mode shift targets which will be monitored.

14.1.8 An operational transport strategy will also be developed alongside the masterplan, outlining the travel choices and proposed improvements for visitors and staff to reach the Proposed Development in a sustainable manner. This will also provide details on sustainable routes to/from and surrounding the Proposed Development, parking provision, access arrangements, and servicing and maintenance.

14.1.9 As explained in Chapter 6: EIA approach and methodology, there are no plans to decommission the Proposed Development. If, at a future date it is determined that all or part of the Proposed Development is no longer required, an appropriate decommissioning strategy will be put into place taking into account good industry practice, obligations to landowners under the relevant agreements and all relevant statutory requirements.

14.1.10 The ES will be supported by a Transport Assessment which will set out the methodology for calculating transport movements and assignment of traffic onto the highway network as inputs to the traffic and transport chapter and interrelationships with other EIA aspects.

14.2 Legislation, policy and guidance requirements

14.2.1 Legislation, policy and guidance which has informed the scope of the assessment presented within this chapter, is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

14.2.2 Table 14-1 identifies the relevant policy.

Table 14-1: UK legislation, policy and guidance requirements relevant to traffic and transport

Relevant UK policy	Relevance to assessment
National Policy Statement for Water Resources Infrastructure (Department for Environment, Food & Rural Affairs, 2023)	Paragraph 4.14.5 states that '*If a project is likely to have significant transport implications, the applicant's Environmental Statement should include a transport appraisal. The Department for Transport's* [DfT] *Transport Analysis Guidance* [DfT, 2024c] *provides guidance on modelling and assessing the impacts of transport schemes. Appraisals should adopt a vision led approach that seeks to prioritise modal shift to sustainable transport modes and supports transport as a principal mechanism by which to mitigate the impact of the scheme.*' Paragraph 4.14.6 states that '*Applicants should consult National Highways, Network Rail and Highway Authorities as appropriate on the assessment and mitigation.*' Paragraph 4.14.7 states that '*The applicant should prepare a construction management plan for construction stages and a travel plan for the operational stage of the infrastructure. Both should include demand management and monitoring measures to mitigate transport impacts. The applicant should also provide details of proposed measures to improve access by walking, wheeling, cycling, public and shared transport to:* • *reduce the need for parking associated with the proposal* • *contribute to decarbonisation of the transport network* • *reduce the need to travel* • *secure behavioural change and modal shift through an offer of genuine modal choice and to mitigate transport impacts.'* Paragraph 4.14.9 states that '*If additional transport infrastructure is needed or proposed, it should always include good quality walking, wheeling and cycle routes, and associated facilities (changing/storage etc) needed to enhance active transport provision*.' Paragraph 4.14.11 states that '*If a proposed development is likely to have significant transport implications, the applicant's Environmental Statement should also include a transport assessment*.' Paragraph 4.14.12 states that '*Where mitigation is needed, possible demand management measures must be considered. This could include:* • *reduce the need to travel by consolidating trips* • *locate development in areas already accessible by active travel and public transport* • *provide opportunities for shared mobility* • *re-mode by shifting travel to a sustainable mode that is more beneficial to the network*

Relevant UK policy	Relevance to assessment
	• *retime travel outside of the known peak times* • *reroute to use parts of the network that are less busy*'. Paragraph 4.14.15 states that '*Where considerations are between rail, water-borne or road transport, rail and water-borne options are to be preferred over road transport options, where that option is safe and cost-effective.*' Paragraph 4.14.19 states that '*A water resources nationally significant infrastructure project may give rise to substantial impacts on the surrounding transport infrastructure and the Secretary of State should therefore ensure that the applicant has sought to mitigate these impacts, including during the construction phase of the development and by enhancing active, public and shared transport provision and accessibility*.' Paragraph 4.14.22 states that '*The Secretary of State should only consider refusing development highways ground if there would be an unacceptable impact on highway safety, residual cumulative impacts on the road network would be severe, or it does not show how consideration has been given to securing modal shift to more environmentally sustainable transport options, how freight and construction impacts have been minimised and mitigated and the provision of adequate active, public or shared transport access.*'
National Planning Policy Framework (Department for Levelling Up, Housing and Communities, 2023)	Paragraph 108 states that '*Transport issues should be considered from the earliest stages of plan-making and development proposals, so that:* *a) the potential impacts of development on transport networks can be addressed;* *b) opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated;* *c) opportunities to promote walking, cycling and public transport use are identified and pursued;* *d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; and* *e) patterns of movement, streets, parking and other transport considerations are integral to the design of schemes, and contribute to making high quality places.*' Paragraph 115 states that '*Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.*'

Relevant UK policy	Relevance to assessment
	Paragraph 117 states that '*All developments that will generate significant amounts of movement should be required to provide a travel plan, and the application should be supported by a transport statement or transport assessment so that the likely impacts of the proposal can be assessed.*'
Transport Analysis Guidance (DfT, 2024c)	Provides guidance on transport studies and on data collection, analysis and appraisal in line with requirements of the DfT. The Transport Analysis Guidance states that '*projects or studies that require government approval are expected to make use of this guidance in a manner appropriate for that project or study*'.
Guidelines for the Environmental Assessment of Traffic and Movement (IEMA, 2023)	Provides guidance on the environmental assessment of potential traffic and transport effects, receptors and their sensitivity, magnitude of impacts and the relationship between the Transport Assessment and the traffic and transport assessments for EIA. Paragraph 1.22 states that '*It is important that the different purposes of Transport Assessments and traffic and transport assessments for EIA and non-statutory environmental assessments submitted in support of development proposal applications is fully understood by practitioners, as follows:* • *Transport Assessments report the overall transport strategy for development sites to maximise accessibility for non-car modes of transport, but also assess the traffic impact of the proposals based on assessment of conditions on the highway network in peak periods.* • *Traffic and transport assessments for EIA and non-statutory environmental assessments present the impact of traffic and transport on people and the environment – which are initially undertaken with reference to daily traffic flows prior to assessing the time period with the high potential impact (i.e. degree of change from baseline conditions), which may not be the same as the time period with the highest baseline traffic flows.'* Paragraph 1.29 states that '*For projects that constitute EIA development, defining the list of receptors to be included in the environmental assessment, i.e. those which may be sensitive to changes in traffic conditions, should be informed by consultation with the local planning and highway authorities as part of the EIA scoping process.'*
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations)	Outlines the requirement to apply EIA guidance to assessments and to follow the required EIA processes and procedures in application.
The Highways Act 1980	The Act deals with the provision and maintenance of highways, streets and bridges.

Relevant UK policy	Relevance to assessment
Design Manual for Roads and Bridges (National Highways, 2024)	Contains information about current design standards relating to the design, assessment and operation of motorway and all-purpose trunk roads in the United Kingdom.

14.3 Stakeholder engagement

14.3.1 In preparing this chapter of the EIA Scoping Report, there has been engagement and discussions with a number of stakeholders. This engagement has principally related to the following:

- Approach to the assessment methodology.
- Scope of further baseline studies.
- Consideration of alternative transport modes for the Transport Strategy.

14.3.2 The dialogue with stakeholders will continue throughout the pre-application period as part of the EIA process. A summary of the engagement undertaken so far is presented in Table 14-2, along with proposed future engagement.

Table 14-2: Engagement with stakeholders

Stakeholder	Engagement undertaken to date	Proposed future engagement
Cambridgeshire County Council, Cambridgeshire and Peterborough Combined Authority and National Highways	**10 November 2023 and 6 June 2024** – Traffic Technical Working Group meeting to discuss the emerging strategy for transport of construction materials for the reservoir and outline the approach to scoping. **15 May 2024** – Traffic Technical Working Group meeting to outline the associated water infrastructure proposals.	Further discussions to provide progress updates on the transport strategy and agree assessment parameters and assumptions.

14.4 Study area

14.4.1 The study area for traffic and transport has been defined based on the identified Scoping boundary and the available information for the Proposed Development. This includes the information on construction and operational phases as described in Chapter 2: Project description. The identified study area is considered to be sufficiently broad to allow for the ongoing refinement of the Proposed Development; however, if required this will be expanded to ensure there is appropriate coverage of all potential significant environmental effects.

14.4.2 The study area has been developed recognising the four operational zones listed below, and as described in Chapter 2: Project description.

- Sources of supply and upstream water transfers.
- Reservoir site.
- Water treatment works.

- Downstream treated water transfers.

14.4.3 Due to the proximity of the two zones and the consistency of the baseline conditions, the reservoir site and water treatment works zones are discussed throughout this chapter as one zone.

14.4.4 The emerging strategy for transport of construction materials is at present focused on the reservoir site and water treatment works. The study area considered in this EIA Scoping Report for traffic and transport is therefore only relevant to the reservoir site and water treatment works for both construction and operation. As details on associated infrastructure (such as upstream and downstream transfers) are developed, the study area will expand to incorporate all four zones.

14.4.5 The expansion of the study area to incorporate all four zones will apply the same principles, detailed below, which have been used to establish the study area in this EIA Scoping Report, applicable to the reservoir site zone and water treatment works zone.

- Adopt the hierarchy of the road network to assign traffic volumes, starting with the strategic road network and A-road network, to reach the Proposed Development.
- Consider the use of B-roads only where suitable A-roads are not available to reach working areas.
- Avoid the use of local/minor roads wherever possible or keep traffic volumes to a minimum.
- Consider cumulative impacts on the road network from other schemes in the vicinity of the Proposed Development.

14.4.6 The following road links are expected to be included within the study area, representing the key routes for construction and operational traffic, while also including the potential for roads affected by the reservoir that could be diverted as a result of its footprint:

- Strategic road network:
  - The A1 (junction with A141).
  - The A47 (between Peterborough and King's Lynn).
- Local road network:
  - The A141 (between the A1 and the A47).
  - The A142 (between the A141 and the A14).
  - The B1098 (between Chatteris and the A1101).
  - The B1093 (between Whittlesey and Manea).

14.4.7 The study area will include road links that could form potential routes where rail and water may require part of the journey to be undertaken by road. These alternatives to road transport will also be included within the study area as follows:

- Rail network:
  - Passenger railway between Peterborough and Ely.
- Water network:
  - River Great Ouse (between King's Lynn and Salters Lode).
  - Well Creek / Popham's Eau (between Salters Lode and Three Holes).
  - Sixteen Foot Drain (entire length).
  - Old Bedford River (between Salters Lode and Forty Foot Drain).
  - Forty Foot Drain (between A141 and Hundred Foot Washes).

14.4.8 The PRoW network will be assessed in relation to the likely effects from traffic or transport movements and therefore applies to parts of the network that either cross or follow alongside the road, rail or water network outlined above.

14.4.9 The extent of the study area will be discussed and agreed with the relevant highway authorities prior to assessment following the development of the associated water infrastructure, transportation modes, access locations and the anticipated traffic routing, based on links that have the potential to experience a material increase in traffic volumes. Criteria will be discussed and developed in relation to the potential effects arising from the use of rail and water transportation as these are not specifically included in the Guidelines for the Environmental Assessment of Traffic and Movement (IEMA, 2023) but have the potential to affect similar users where they interact with these networks.

14.4.10 It should be noted that the order in which the development and infrastructure are constructed, as well as the location of the construction accesses, would determine how long each route experiences an increase in traffic volumes. Consideration will be given to refining construction activities to reduce traffic impacts where appropriate.

14.5 Baseline data collection

14.5.1 The baseline conditions for traffic and transport presented in Section 14.6 represent a review of the currently available data. The data collated to date was obtained via desk studies and field surveys. Data collection to inform the baseline of the assessment is ongoing. The data described below provides a robust evidence base for the scoping of the assessments.

Desk studies

14.5.2 There are a number of DfT traffic count points across the study area links. This data has been utilised for baseline traffic data where possible, acknowledging that further data will be required for locations pre-2023. The count points have been outlined in Table 143.

Table 14-3: DfT traffic counts (DfT, 2024b)

Count point ID	Road name	Date of collection
38099	A141 Isle of Ely Way	2021
38255	A141 Isle of Ely Way, south of Slade End Roundabout	2019
56666	A141, south of Chatteris	2019
91241	A142	2023
46711	A142	2018
94205	A141, north of March	2023
74047	A47, west of Ring's End	2023
17962	A47, west of Tholomas Drove	2023
81047	A47, south of Walton Highway	2023
81049	A47, south of Tilney All Saints	2023
940954	B1098, south of Manea Road/B1098 junction	2019

14.5.3 Desk studies also included a review of existing transport infrastructure, such as PRoWs, cycle routes and public transport services to establish the baseline of the surrounding transport network.

14.5.4 Furthermore, Personal Injury Collisions data has been reviewed for the most recent five-year period to identify potential collision hotspots that may be sensitive to changes in traffic flows.

Field surveys

14.5.5 Field surveys were undertaken to observe existing traffic conditions and road environment along the road network likely to be used for routing to the reservoir site. This included video surveys of traffic routes and photography collected at selected locations in August 2023.

14.5.6 A programme of baseline data collection has commenced for the Proposed Development study area to determine traffic flows on both highway links and key junctions that would potentially be used by vehicles associated with its construction and operation. As part of the programme, Automatic Traffic Counts and Manual Classified Counts have already been used to collect data in June 2023 as investigative surveys to inform other studies. Further surveys have been undertaken in August and September 2024 to provide extended coverage of the likely road network and to allow seasonality factors to be derived such as school holidays and their impacts on the operation of the Proposed Development and the road network in summer months/tourism season.

14.5.7 It is envisaged that further Automatic Traffic Counts and Manual Classified Counts will be required in spring 2025; however, the exact requirements of these surveys, including locations, will be discussed and agreed with the relevant highway authorities once further information is available.

14.5.8 A baseline data collection programme is also being developed to gather information on the scale of activity on PRoWs that may be impacted by the

Proposed Development during its construction and operational phases. Further details can be found in Chapter 19: Public access and amenity.

14.6 Baseline conditions

14.6.1 The baseline conditions for traffic and transport are described below for the study area (defined in Section 14.4). The baseline conditions are as established from the data collection described in Section 14.5.

14.6.2 The town of Chatteris is located to the south of the site and the villages of Doddington and Wimblington are located to the west and north respectively. The remaining land use surrounding the Proposed Development is generally agricultural fields and the local highway network with a number of other settlements such as Manea, approximately 4km to the east.

14.6.3 DfT traffic counts are available for the main roads in proximity to and within the areas around the Proposed Development. The links expected to comprise the study area are detailed in Table 14-4 along with the baseline condition and anticipated sensitivity of receptors. These include the road itself, the various users of the road (including users of public transport) and PRoW users. Definitions for sensitivity of links are provided in Section 14.9.

Table 14-4: Baseline conditions of links and anticipated sensitivity

Link	**Baseline** condition	**Anticipated** receptor sensitivity
A141 (between the A1 and the A47)	This section of the A141 is part of the local road network, except its junction with the A1 which forms part of the strategic road network, and comprises both dual and single-carriageway sections and is largely rural in nature, although the A141 does bypass built-up urban areas such as March, Chatteris, and Huntingdon, as well as several villages along its length such as Wimblington and Doddington. Several PRoWs (more than ten) cross this section of the A141.	Low/Medium
A142 (between the A141 and the A14)	This section of the A142 is part of the local road network, and is single-carriageway and largely rural in nature, although the A142 does bypass built-up urban areas such as Chatteris, Ely, and Soham as well as several villages along its length such as Mepal, Sutton, and Witchford. Numerous PRoWs (more than 15) cross this section of the A142.	Low/Medium
A47 (between Peterborough and King's Lynn)	This section of the A47 is part of the strategic road network and comprises both dual and single-carriageway sections and is largely rural in nature, although the A47 does bypass built-up areas such as Peterborough, Wisbech, and King's Lynn, as well as several towns/villages such as Thorney, Guyhirn, and Terrington	Low/Medium

Link	Baseline condition	Anticipated receptor sensitivity
	St John. Numerous PRoWs (more than 15) cross this section of the A47.	
B1098 (between Chatteris and the A1101)	This section of the B1098 is part of the local road network and is single-carriageway and rural in nature, with several isolated farms accessed from it. It links the A142 (via Langwood Hill Drove) to Upwell. Notably, approximately 5.5km to the north of the Proposed Development, the B1098 intersects with the Ely–Peterborough railway, comprising both a level crossing and low bridge (max 2.0m clearance). Few PRoWs (less than 10) cross the B1098.	Low/Medium
B1093 (between Whittlesey and Manea)	This section of the B1093 is part of the local road network and is single-carriageway and largely rural in nature, although the B1093 does pass through several small villages such as Wimblington, Doddington, and Benwick, as well as providing access to a number of isolated farms. Notably, to the west of Doddington, Doddington Hospital is accessed from the B1093. Few PRoWs (less than 10) cross the B1093.	Low/Medium

14.6.4 Several PRoWs are also present in the study area which could be impacted by the construction of the reservoir or any highway alterations/diversions that may take place. Further details on PRoWs can be found in Chapter 19: Public access and amenity.

Future forecast baseline

14.6.5 For traffic and transport, the future forecast baseline is anticipated to consider traffic growth in a baseline future year(s) utilising the DfT's Trip End Model Presentation Program (TEMPro).

14.6.6 Other existing and/or approved major developments will be considered and will be agreed with the relevant highway authorities and as outlined in Chapter 23: Cumulative effects. Consideration of other Nationally Significant Infrastructure Projects, other relevant Anglian Water projects and major projects that may be subject to alternative planning routes (e.g. Acts of Parliament) will be included as cumulative development in assessments.

14.6.7 Climate change has the potential to impact traffic and transport. Drier summers combined with wetter winters may increase risk of shrink-swell-related earthworks failure along transport networks, especially local fenland roads that are vulnerable to ground movement and potentially rail embankments. Intense rainfall can also lead to an increased risk of subsidence and slope/embankment failure for road and rail networks, including along river embankments and bridge structures. Hotter summers may also lead to expansion of rails and rail assets, leading to buckling

and/or failure of the rail network. Hotter summers may also increase hazards of overheating of road, rail and public transport users. Wetter winters and intense rainfall events could increase the risk of flooding to the wider road and rail network as well as damage to structures that support these networks. The potential effects of climate change on the local transport infrastructure could compound pressures from the Proposed Development on the interconnected transport networks and transport users. Further details can be found in Chapter 17: Climate resilience of this EIA Scoping Report.

14.6.8 Chapter 23: Cumulative effects will identify the proposed developments that are anticipated to be constructed prior to the construction of the Proposed Development. As such, these developments would form part of the future baseline for assessment within the EIA. Where this presents traffic and transport receptors, or a change to the current baseline specific to traffic and transport, this will be considered within the EIA.

14.7 Design and mitigation

Design

14.7.1 The design of the Proposed Development to date has considered environmental constraints and likely significant environmental effects. The design development process has sought to avoid and reduce potential adverse environmental effects on traffic and transport through the development of the emerging strategy for transport of construction materials which considers transportation modes other than road, and access to the Proposed Development that avoids/reduces construction traffic using local/minor roads and therefore potentially reduces the scale of or need for mitigation which may otherwise be identified.

14.7.2 The ongoing development of the design will incorporate embedded mitigation to avoid and reduce potential adverse effects, where appropriate.

Mitigation

14.7.3 Documents presenting the approach to mitigation will be produced, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control. These measures would be applied to mitigate likely significant effects, including potential traffic and transport effects. The emerging strategy for transport of construction materials would also inform the process for developing construction methods and processes, such as those relating to alternative transportation options.

14.7.4 Examples of good practice and essential mitigation relevant to traffic and transport are anticipated to include the preparation of a Construction Traffic Management Plan which will include details of measures to control (e.g. construction routing, temporary signage, Construction Worker Travel Plan), monitor and enforce construction traffic movements, and provide details of the mechanisms for

managing the design of accesses and off-site highway works to reduce traffic impacts.

14.7.5 Relevant documents will be produced to set out the measures and standards of work to be applied during the operational phase. These would be applied to monitor, manage and control adverse environmental effects associated with operation and maintenance activities based on the anticipated activities within the scope of the Proposed Development. Measures are likely to include improvements to active travel routes and bus services to increase connectivity by sustainable modes and reduce car use, where practicable, through implementation of a visitor travel plan.

14.8 Proposed scope of assessments

Likely significant effects requiring assessment (scoped in)

14.8.1 The following section sets out the aspect-specific effects for traffic and transport. The traffic and transport assessment focuses on the likely significance of effects that the Proposed Development, and associated traffic, could have on the road network and various receptors such as motorists, walkers, cyclists and horse riders.

14.8.2 The assessment of effects for traffic and transport does not include the potential access and amenity effects on PRoWs closures and/or diversions, which can be found in Chapter 19: Public access and amenity. Traffic-related potential effects are also considered in a number of other chapters but are intrinsically linked through the design process to ensure an optimised solution is achieved which avoids, reduces, mitigates and compensates for potential effects, as follows:

- Air quality.
- Noise and vibration.
- Landscape and visual.
- Biodiversity.
- Cultural heritage.
- Climate resilience, adaptation and greenhouse gases.

14.8.3 The likely significant effects requiring assessment are presented in Table 14-5. Where potential effects may be specific to one or more zones of the Proposed Development and the relevant study area, this is identified in Table 14-5 (see Chapter 2: Project description, for further discussion of zones).

14.8.4 In accordance with the Guidelines for the Environmental Assessment of Traffic and Movement produced by the IEMA (IEMA, 2023), the following impacts will be considered in this assessment:

- Severance of communities.
- Road vehicle driver and passenger delay.

- Walkers, cyclists and horse riders delay.
- Walking, cycling and horse riding amenity.
- Fear and intimidation on and by road users.
- Road user and pedestrian safety.
- Hazardous/large loads.

14.8.5 The construction and operational phases of the Proposed Development have the potential to impact sensitive receptors within the study area as a result of increased traffic movements. Appropriate traffic control measures can be effective in avoiding or reducing impacts by traffic generating activities.

14.8.6 Construction transportation is anticipated to include haulage/construction vehicles (Heavy Goods Vehicles – HGVs) and vehicles used for workers' trips to and from the Proposed Development. The feasibility of transportation via trains and barges (where applicable) is being explored by the emerging strategy for transport of construction materials and plant.

14.8.7 The potential impact is expected to be focussed in areas adjacent to access points and nearby on the local highway network. Operational traffic is anticipated to include users/visitors to the reservoir site, as well as staff movements involved in the day-to-day operation and maintenance of the Proposed Development.

14.8.8 An option to provide on-site accommodation for workers on the reservoir site during construction works is also being considered. This has the potential to increase the demand upon local facilities and amenities. However, it would also likely reduce the daily commute for construction workers and associated traffic impact.

Table 14-5: Likely significant traffic and transport effects

Activity	Effect	Receptor	Zone
Construction			
Construction transportation (traffic) and highway works	Severance and delays due to an increase in traffic on the local road network and strategic road network.	Motorists and freight vehicles and emergency services using the highway network. Public transport network immediately surrounding the Proposed Development. Sensitive geographic locations such as people at home/work, sensitive and/or vulnerable groups, locations with concentrations of vulnerable groups (e.g. hospitals, places of worship, schools), retail areas, recreational areas, tourist attractions, collision clusters and	All zones

Activity	Effect	Receptor	Zone
		routes with road safety concerns, and junctions and highway links at (or over) capacity.	
Construction transportation (traffic) and highway works	Risk of increase in accidents and road safety due to an increase in traffic on the local road network and strategic road network.	Motorists and freight vehicles and emergency services using the highway network. Public transport network immediately surrounding the Proposed Development.	All zones
Construction transportation (traffic) and highway works	Impact on amenity, and fear and intimidation on walkers, cyclists and horse riders and local communities due to increased traffic on the local road network.	Walkers, cyclists and horse riders using the local highway and footway network surrounding the Proposed Development. Sensitive geographic locations such as people at home/work, sensitive and/or vulnerable groups, locations with concentrations of vulnerable groups (e.g. hospitals, places of worship, schools), retail areas, recreational areas, tourist attractions, collision clusters and routes with road safety concerns, and junctions and highway links at (or over) capacity.	All zones
Construction transportation (rail and water) and associated infrastructure works	Delays due to an increase in trains or barges through crossings and to passenger rail services through temporary closures during construction of infrastructure.	Rail network between Peterborough and Ely. Motorists and freight vehicles and emergency services using the local highway network. Walkers, cyclists and horse riders using the local highway or PRoW network where it crosses the rail or water network.	All zones
On-site worker accommodation	Demand for local services.	Public transport network immediately surrounding the Proposed Development. Walkers, cyclists and horse riders travelling to and around the Proposed Development. Motorists and freight vehicles	All zones

Activity	Effect	Receptor	Zone
		and emergency services using the local highway network.	
Operation			
Operational vehicle traffic and visitor vehicle traffic	Delays due to an increase in traffic on the local road network and strategic road network.	Motorists and freight vehicles and emergency services using the local highway network. Public transport network immediately surrounding the Proposed Development comprising: • Bus services serving settlements and in proximity to the reservoir site and water treatment works, and operational site accesses. • Bus services in proximity to associated infrastructure and accesses.	All zones
Operational vehicle traffic and visitor vehicle traffic	Risk of increase in accidents and road safety due to an increase in traffic on the local road network and strategic road network.	Motorists and freight vehicles and emergency services using the local highway network. Public transport network immediately surrounding the Proposed Development.	All zones
Operational vehicle traffic and visitor vehicle traffic	Impact on amenity, and fear and intimidation on walkers, cyclists and horse riders due to increased traffic on the local road network.	Walkers, cyclists and horse riders using the local highway and footway network surrounding the Proposed Development.	All zones

14.8.9 The traffic and transport assessment will consider the potential for significant environmental effects of changes in traffic flows on sensitive receptors where construction transportation is carried out by road.

14.8.10 The potential use of rail and water for construction transportation, as considered within the Transport Strategy, is not addressed within the Guidelines for the Environmental Assessment of Traffic and Movement (IEMA, 2023). Therefore, where any part of a delivery is carried out by train or barge, these modes will only be considered in the context of other EIA chapters, unless the use of such modes will disrupt the existing services of users, such as short-term closures of railway.

14.8.11 If there are parts of the journey necessitating the use of road, for example between a railhead and the reservoir, this will be included within the traffic and transport assessment.

Effects not requiring assessment (scoped out)

14.8.12 At this stage of the development of the proposals, no effects have been identified that can be scoped out of further assessment.

14.9 Assessment methodology

14.9.1 The study area set out in Section 14.4 will be kept under review as the design and consultation processes progress, and the Proposed Development is refined. Therefore, the study area may evolve as appropriate. The evolution of the study area will be clearly communicated in the Preliminary Environmental Information Report in the ES and discussed with relevant consultees.

14.9.2 The proposals, described in Chapter 2: Project description, will also evolve and be further developed as the design process progresses. Whilst the methodologies that are set out within this chapter are not anticipated to change, the scope of assessment will be kept under review as design progresses.

Additional baseline information required

14.9.3 Collision data will be obtained from the DfT's collision statistics open data repository of STATS19 records (DfT, 2024a) and screened for the agreed study area using Esri ArcGIS. The most recent five-year period will be reviewed to identify any patterns in road traffic collisions which may need to be considered as part of the assessment. This may be supplemented by more recent data and analysis from the local highway authority at the appropriate time.

14.9.4 Local imagery and ordnance survey mapping will be utilised within the assessment.

14.9.5 Further baseline data will be required to establish the baseline scenario across the study area for all zones of the Proposed Development. This will include additional traffic counts, PRoW counts, and data relating to other major developments and infrastructure schemes.

Assessment scenarios

14.9.6 To undertake a robust assessment, the traffic and transport analysis will consider the following best practice guidance:

- Travel Plans, Transport Assessments and Statements (DfT, 2024d).
- Transport analysis guidance (DfT, 2024c).

14.9.7 Based on this guidance, the following assessment parameters will be considered:

- Morning peak period, afternoon peak period and daily impacts on a weekday (construction) and weekend (operation).
- Peak construction year – with development traffic (all road-based).

- Peak construction year – with development traffic plus rail/water (where applicable).
- Opening year – with development traffic.
- Cumulative development impacts.
- Forecast future year assessment plus five years from opening.

14.9.8 Further information on the temporal scope for the assessment is set out in Chapter 6: EIA approach and methodology.

Construction assessment methodology

14.9.9 The ES will describe and assess the potential impacts associated with any improvements or changes to the network which are required to facilitate either the construction or operational phases of the Proposed Development.

14.9.10 The details of anticipated peak phase vehicle numbers will be clearly presented within the EIA and the Transport Assessment.

14.9.11 To consider forecast future baseline impacts, the DfT's TEMPro software will be used to forecast the baseline traffic flows to a future year baseline for use in the traffic and transport assessment. These factors will be applied to the desk-based and traffic survey assessments outlined within this methodology with additional major developments considered where appropriate, as identified in Chapter 23: Cumulative effects.

Screening process

14.9.12 Assessment of the traffic and transport environmental impacts and their significance will be based on the Guidelines for the Environmental Assessment of Traffic and Movement (IEMA, 2023). This guidance provides two broad rules to be used as a screening process within the study area to identify the appropriate extent of the assessment area and likelihood of impacts. The spatial scope of the assessment is therefore made up of:

- The study area which refers to the overall larger area that will be affected by the Proposed Development in its various phases. For traffic and transport, this will contain, for example, all road links that will potentially be affected by the Proposed Development.
- The assessment area which refers to the area or specific road links determined by the application of the two IEMA rules to the study area, that will require detailed assessment.

14.9.13 The two IEMA rules can be summarised as:

- '*Rule 1 – Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%)*'.
- '*Rule 2 – Include highway links of high sensitivity where traffic flows have increased by 10% or more*' (IEMA, 2023).

14.9.14 Given that the day-to-day variation of traffic on a road is frequently at least plus or minus 10%, where the predicted increase in traffic flow is lower than the thresholds, the guidelines suggest the significance of potential effects can be stated to be low or insignificant and further detailed assessments are not warranted and as such, will be scoped out of the environmental assessment.

Sensitivity of receptors

14.9.15 The sensitivity of links is based on a qualitative assessment of the baseline scenario, taking into consideration the importance of the route and the destinations served. The thresholds are defined based on IEMA 2023 guidelines (IEMA, 2023) in Table 14-6.

Table 14-6: Sensitivity of receptors

Sensitivity of receptors
Negligible sensitivity: Receptors with negligible sensitivity to change in traffic flows including motorways and dual carriageway and/or land uses sufficiently distant from affected routes and junctions.
Low sensitivity: Receptors with low sensitivity to change in traffic flows: places of worship, public open space, nature conservation areas, listed buildings, tourist/visitor attractions and residential areas with adequate footway provision.
Medium sensitivity: Receptors of medium sensitivity to change in traffic flows: congested junctions, doctor's surgeries, shopping areas with roadside frontage, roads with narrow footways, unsegregated cycle ways, community centres, parks and recreation facilities.
High sensitivity: Receptors of high sensitivity to change in traffic flows: hospitals, schools, colleges, playgrounds, collision clusters, retirement homes and urban/residential homes without footways that are used by pedestrians and cyclists, junctions and highways links at (or over) capacity.

14.9.16 According to IEMA 2023 guidelines, particular user groups may be sensitive to changes in traffic conditions (IEMA, 2023). The following user groups should be considered:

- Walkers, cyclists, and horse riders (including carriage drivers).
- PRoWs users.
- Motorists and freight vehicles.
- Public transport.
- Emergency services.

14.9.17 Similarly, specific groups and geographic locations can be considered potentially sensitive receptors. These are:

- People at home.
- People at work.

- Sensitive and/or vulnerable groups (including children; youth; elderly; income; persons with disabilities; ethnic and racial minorities; people with social disadvantages; access/geographic factors; and inequalities).
- Locations with concentrations of vulnerable groups (e.g. hospitals, places of worship, schools).
- Retail areas.
- Recreational areas.
- Tourist attractions.
- Collision clusters and routes with road safety concerns.
- Junctions and highway links at (or over) capacity.

14.9.18 In accordance with the IEMA guidelines, where the sensitivity of a road link is judged as high or medium, Rule 2 will be applied and where traffic flows are predicted to increase by 10% or more, an assessment of potential environmental effects will be undertaken. Where the sensitivity is judged as low or negligible, Rule 1 will be applied and where traffic flows are predicted to increase by more than 30%, or where the number of HGVs is predicted to increase by more than 30%, an assessment of potential environmental effects will be undertaken of the road link.

Impacts (magnitude of impact)

14.9.19 The IEMA guidelines (2023) state that the magnitude of each impact should be determined as the predicted deviation from the baseline conditions. The guidelines also set out criteria by which the magnitude of impact can be measured. Many of the criteria do not provide specific thresholds by which such impacts can be measured, and as a result will be measured qualitatively, where necessary. These are described in Table 14-7.

Table 14-7: Assessment criteria (based on IEMA, 2023)

Criteria considered
Severance of communities – Defined as the '*perceived division that can occur with a community when it becomes separated by major traffic infrastructure*'. The term is used to describe a complex series of factors that separate people from places and other people. Severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself. It can also relate to quite minor traffic flows if they impede pedestrian access to essential facilities. The IEMA guidelines (2023) suggest that a 30%, 60% and 90% change in traffic flows will result in a low, medium and high change in severance respectively.
Road vehicle driver and passenger delay – Traffic delays impacting non-development traffic can occur at points on the road network surrounding a development site including: the site entrance, highways passing the development site, key intersections along the highway and side roads where availability of gaps to circumvent delay are reduced. This will be assessed qualitatively. Highway works and traffic management measures will also be taken into account in terms of their impact on driver delay.

Criteria considered
Walkers, cyclists and horse riders delay – Changes in volume, composition or speed of traffic may affect the ability of people to travel across road links. In general, increases in traffic levels are likely to lead to greater increases in delay. This is also dependent on existing level of activity, visibility and conditions. The IEMA guidance (2023) estimates that an increase in total hourly traffic of approximately 30% can double the delay experienced by pedestrians attempting to cross a road. Whether or not the increase in traffic results in a likely significant effect should be determined using professional judgement.
Walking, cycling and horse riding amenity – Defined as the relative pleasantness of a journey, and is considered to be affected by traffic flow, traffic composition and pavement width/separation from traffic. The IEMA guidelines (2023) note that pedestrian amenity is affected when traffic flow is halved or doubled.
Fear and intimidation on and by road users – Is dependent on the volume of traffic, its HGV composition and its proximity to people or that lack of protection caused by such factors as narrow pavement widths. The IEMA guidance (2023) requires the calculation of a degree of hazard score.
Road user and pedestrian safety – Consists of an approximation of the potential for road safety impacts through the calculation of collision rates (slight, serious and fatal). Collision clusters are identified by a detailed review of the baseline characteristics to determine the road safety sensitivity of discrete areas of the highway network.
Hazardous/large loads – Some developments may involve the transportation of dangerous or hazardous loads by road.

Operational assessment methodology

14.9.20 The assessment methodology for the operational phase is the same as the methodology described for the construction phase above.

Significance of effects

14.9.21 Significance of effects will be determined by cross referencing the ascribed level of value with the magnitude of impact as shown in Image 6.1 in Chapter 6: EIA approach and methodology. A likely significant effect in the context of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 is taken to be a moderate or greater adverse or beneficial significance.

14.10 Assessment assumptions and limitations

14.10.1 Key assumptions for the scoping of traffic and transport are as follows:

- The overview of baseline conditions is based on desk-based studies and field surveys only at a scoping stage and is based on data available at the time of writing.
- The construction assessment will assume the use of standard construction techniques commensurate with the type of works being undertaken.

- Transportation options have not been fully developed or confirmed at this time and may be subject to change.
- Traffic estimates for any stage of the Proposed Development are not confirmed at this time but will be confirmed prior to assessment.

15 Air quality

15.1 Introduction

15.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to air quality. The chapter should be read in conjunction with the description of the Proposed Development, as presented in Chapter 2: Project description.

15.1.2 Emissions to air can affect local air quality and amenity which may lead to effects on human, ecological and infrastructure receptors and are therefore considered in the EIA scoping process.

15.1.3 This chapter considers the potential for the following activities to give rise to impacts on air quality:

- Fugitive dust from demolition of existing structures; earthworks, such as reservoir embankment construction; excavation of materials; construction of operational infrastructure; construction of associated water infrastructure, such as pipeline transfers; pumping stations; and works to modify open channel transfers, water treatment works.
- Construction-related exhaust emissions from on-site construction plant and non-road mobile machinery (NRMM); exhaust emissions from construction phase transport using public highways; waterways and railways; and construction phase stationary combustion sources, such as generator plant.
- Operational, maintenance and leisure transport emissions on public highways, and potential odour from water treatment works operation.

15.2 Legislation, policy and guidance requirements

15.2.1 Legislation, policy and guidance which has informed the scope of the assessment presented within this chapter, is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

15.2.2 Table 15-1 identifies the relevant policy in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) and the National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities (DLUHC), 2023) for air quality.

Table 15-1: UK policy relevant to air quality

Relevant UK policy	Relevance to assessment
NPS for Water Resources Infrastructure (Defra, 2023)	Section 4.2 covers matters regarding air quality. Paragraph 4.2.1 states that water resources infrastructure can involve emissions to air during all phases of the Proposed Development, which could lead to adverse impacts on human health, protected species and habitats, or on the wider environment. The section refers to Planning Practice Guidance which provides information on how to consider and assess air quality. Paragraph 4.2.2 advises that air quality effects on wildlife and biodiversity should be assessed with reference to the section on wildlife and biodiversity. Paragraph 4.2.3 advises applicants should seek, through the design of any proposed scheme, to minimise the emission of air pollutants as far as reasonably practicable. Paragraph 4.2.7 requires that '*where a proposed development is likely to lead to a breach of any relevant statutory air quality limits or statutory air quality objectives or affect the ability of a non-compliant area to achieve compliance or impede meeting national statutory targets, the applicant should work with the relevant authorities to secure appropriate mitigation measures to ensure that any statutory air quality limits and statutory air quality objectives are not breached and sufficient consideration of targets is made*'. Section 4.6 deals with '*dust, odour, artificial light smoke and steam*', the potential for these to cause disamenity or nuisance and the requirement to assess and minimise these impacts.
NPPF (DLUHC, 2023)	Chapter 15 paragraphs 180 and 192 state that the planning system should prevent '*development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability.*' Planning policies and decisions should ensure that new development is appropriate for its location, taking into account the likely effects (including cumulative effects) of pollution on health and living conditions. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement.

15.3 Stakeholder engagement

15.3.1 In preparing this chapter of the EIA Scoping Report, there have been discussions and engagement with a number of stakeholders, including the relevant planning authorities.

15.3.2 The dialogue with stakeholders will continue throughout the pre-application period as part of the EIA process. A summary of the engagement undertaken so far is presented in Table 15-2.

Table 15-2: Engagement with stakeholders

Stakeholder	Engagement undertaken to date	Proposed future engagement
Cambridgeshire County Council (Public Health), Fenland District Council (Environmental Health and Local Planning Team)	**3 November 2023** – meeting to discuss the air quality assessment (including likely key impacts), relevant legislation and guidance, study areas, baseline air quality information gathered to date, project-specific baseline monitoring, and approaches to the assessment.	Ongoing engagement on a regular basis to discuss baseline monitoring, environmental assessment, design and mitigation.
Cambridgeshire County Council (Public Health, Planning and Sustainable Growth), Fenland District Council (Environmental Health and Local Planning Team)	**25 April 2024** – meeting to discuss the air quality assessment (including likely key impacts), baseline air quality update, study areas, and an introduction to approaches and proposed methods (high level) for the assessment.	Ongoing engagement on a regular basis to discuss baseline monitoring, environmental assessment, design and mitigation.
Huntingdon District Council, Peterborough City Council, Cambridgeshire County Council, South Cambridgeshire District Council, Norfolk County Council, Fenland District Council	**15 May 2024** – meeting to discuss the air quality assessment (including likely key impacts), and an introduction to approaches and proposed methods and guidance for the assessment.	Ongoing engagement on a regular basis to discuss baseline monitoring, environmental assessment, design and mitigation.

15.4 Study area

15.4.1 The study areas have been defined based on the Institute of Air Quality Management (IAQM) construction dust guidance v2.2 (IAQM, 2024). The study areas for impacts on 'human receptors' of demolition, earthworks and construction activities is proposed to be up to 250m from the Scoping boundary, in line with best practice measures for assessment on air quality. For impacts of demolition,

earthworks and construction activities on ecological receptors, the study area will be up to 50m from the Scoping boundary. For 'trackout' (material or debris tracked from a vehicle onto public roads from the construction site) impacts, the study areas for both human and ecological receptors will be up to 50m from the edge of the roads chosen to host site entrances/exits.

15.4.2 The scale of earthworks and material movement proposed for the main reservoir site is large, and it is also proposed to assess the potential impact of these using the Institute of Air Quality Management (IAQM) Guidance on the Assessment of Mineral Dust Impacts for Planning (v1.1) (IAQM, 2016). In this case, the activities would be more similar to a 'soft rock' than a 'hard rock' operation; therefore, the distance screening criterion for a fugitive dust impact assessment is 250m for both human and ecological receptors, so the study areas would remain 250m for human receptors but increase to 250m for ecological receptors.

15.4.3 For road transport of materials and workers during the construction phase and operational, and leisure transport during the operational phase, the study areas will be up to 200m from 'affected' local roads', i.e. local roads which are predicted to experience changes in traffic flow, greater than the screening criteria of an increase of 500 light duty vehicles and/or 100 heavy duty vehicles (and/or 100 or 25 respectively within an Air Quality Management Area (AQMA)), as suggested in the Environmental Protection UK (EPUK)/IAQM Planning for Air Quality guidance (2017).

15.4.4 For any construction phase rail transport of materials, the study area will be based on the recommendation for local authority review and assessment suggested in Local Air Quality Management Technical Guidance (LAQM) TG22 (Defra, 2022), i.e. up to 15m from areas where diesel locomotives might be stationary, and 30m from relevant railway tracks listed in LAQM TG22 *(ibid)* with moving diesel locomotives.

15.4.5 For any construction phase inland waterway movement of materials, no guidance is available; therefore, a study area equivalent to that used for road transport, i.e. up to 200m from affected waterways, will be adopted.

15.5 Baseline data collection

15.5.1 The baseline air quality information is presented in Section 15.6, based on a review of currently available data.

Air quality assessment criteria

15.5.2 The Air Quality Standards Regulations 2010 set the national air quality standards for major air pollutants that impact public health in the UK. The relevant limits for England and Wales for the protection of human health are reproduced in Table 15-3.

Table 15-3: Air Quality Standards relevant to the Proposed Development

Substance	Averaging period	Exceedances allowed per year	Ground level concentration limit (µg/m³)
Nitrogen dioxide (NO_2)	One calendar year	-	40
	One hour	18	200
Fine particles (PM_{10})	One calendar year	-	40
	24 hours	35	50
Fine particles ($PM_{2.5}$)	One calendar year	-	20

15.5.3 The Environment Act 1995 introduced the Local Air Quality Management (LAQM) regime based on the Air Quality (England) Regulations 2000 (as amended in 2002), and the requirement for a National Air Quality Strategy.

15.5.4 The Environment Act 2021 reinforces the LAQM framework and requires targets to be set for fine particulate matter $PM_{2.5}$, which were introduced in The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023, as follows:

- $PM_{2.5}$ concentration interim target, annual mean of 12µg/m^3 by 2028.
- $PM_{2.5}$ exposure reduction interim target of 22% reduction (compared to 2018) by 2028.
- $PM_{2.5}$ concentration binding target of annual mean of 10µg/m^3 by 2040.
- $PM_{2.5}$ exposure reduction binding target of 35% reduction (compared to 2018) by 2040.

Desk studies

15.5.5 An initial desk-based baseline air quality review was carried out to establish existing air quality conditions within the Scoping boundary. Information on air quality was gathered from the monitoring stations that form a part of the national and/or local networks, and from the estimated background air quality maps published by Defra background mapping data for local authorities. These 'Background Maps' provide estimated annual average background concentrations of NO_2, PM_{10} and $PM_{2.5}$ on a 1km^2 grid basis. Local Air Quality Management reports published by the relevant local authorities were also used to inform local air quality conditions.

Field surveys

15.5.6 In addition to the desk study, and to confirm conditions where existing air quality information is limited, project-specific air quality monitoring will be carried out as part of the preparation of the Environmental Impact Assessment. Monitoring locations will be selected in further consultation with the local authorities, to represent locations where potential impacts may occur and limited baseline

information is available; this is likely to include areas close to construction transport routes.

15.5.7 Six months of baseline air quality monitoring is proposed, focusing on NO_2 as an indicator of exhaust emissions, using passive diffusion tubes. Consideration to monitoring additional pollutants, such as particulate matter, at a limited number of locations will be given, where consultation suggests this would be useful and proportionate.

15.5.8 Diffusion tubes for nitrogen dioxide are a recognised appropriate technique in LAQM (TG22) (Defra, 2022). Tubes will be deployed according to the Defra and Devolved Administration (2008) Diffusion Tube for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users, and submitted to a United Kingdom Accreditation Service-accredited laboratory for analysis.

15.6 Baseline conditions

15.6.1 The baseline conditions for air quality are described below for the study area (defined in Section 15.4). The baseline conditions are as established from the data collection described in Section 15.5.

Baseline for sources of supply and upstream transfers

15.6.2 Baseline air quality information for each transfer route was reviewed from the following sources:

- LAQM air quality status reports.
- Defra background maps.

15.6.3 Due to the nature of the local environment, there are a limited number of air quality monitors close to each scheme aspect, one singular monitor may be the closest representation to a large majority of the scheme. This will be supplemented by site-specific monitoring to inform the Environmental Impact Assessment.

Ouse Washes (River Delph) to proposed reservoir

15.6.4 Information on likely air quality was reviewed from the Fenland District Council (2023), East Cambridgeshire District Council (2023), and Huntingdonshire District Council (2023) LAQM reports, and Defra estimated background maps. The closest diffusion tube to the study area is Fenland District Council tube S18. The measured annual average NO_2 concentration at this diffusion tube site was 11.1µg/m^3 in 2022. The route is not in or adjacent to an AQMA. Overall, no exceedances of the Air Quality Objectives (AQO) for NO_2, PM_{10} and $PM_{2.5}$ were likely, and air quality is likely to be good in the local area.

River Great Ouse at Earith to proposed reservoir

15.6.5 Information on likely air quality was reviewed from the Fenland District Council (2023), Huntingdonshire District Council (2023) and South Cambridgeshire District Council (2023) LAQM reports, and Defra estimated background maps. The closest diffusion tube to the majority of the study area is the Huntingdonshire District Council tube Bluntisham. The measured annual average NO_2 concentration at this

diffusion tube site was 17.5µg/m^3 in 2022. The route is not in or adjacent to an AQMA. Overall, no exceedances of the AQOs for NO_2,PM_{10} and $PM_{2.5}$ were likely, and air quality is likely to be good in the local area.

River Nene and its Counter Drain to proposed reservoir

15.6.6 Information on likely air quality was reviewed from the Fenland District Council (2023) and Peterborough City Council (2023) LAQM reports, and Defra estimated background maps. The closest diffusion tubes located within the study area recorded for 2022 did not exceed the AQO for NO_2. The route is not in or adjacent to an AQMA. Overall, no exceedances of the AQO for NO_2, PM_{10} and $PM_{2.5}$ were likely and air quality is considered good in the local area.

15.6.7 Construction transport routes are not yet determined and therefore baseline air quality along these routes cannot be known at this stage; however, routes will be selected to avoid Air Quality Management Areas (AQMAs) and sensitive areas as far as practicable.

Baseline for the reservoir site

15.6.8 The reservoir site is not located in or near an AQMA. It is located in a rural area, though close to the settlements of Doddington and Chatteris, and air quality overall is likely to be good.

15.6.9 Fenland District Council undertook non-automatic NO_2 monitoring using diffusion tubes at 41 locations during 2022 (Fenland District Council, 2023). The nearest nonautomatic NO_2 monitor to the reservoir site is tube S14, located 2.6km south-west from the main reservoir site, roadside to the A141 Fenland Way.
The measured annual average NO_2 concentration at this diffusion tube site was 16.2µg/m^3 in 2022, which is well below the annual mean NO_2 AQO of 40µg/m^3.
No particulate matter monitoring is carried out within the Scoping boundary.

15.6.10 Estimated background air quality data is available from the UK-AIR website operated by Defra (Defra 2024a). The website provides estimated annual average background concentrations of NO_2, PM_{10} and $PM_{2.5}$ on a 1km^2 grid basis. The estimated 2022 annual average background NO_2, PM_{10} and $PM_{2.5}$ concentrations for the grid square, including the reservoir site, are 5.8µg/m^3, 16.3µg/m^3 and 9.1µg/m^3 respectively, and are well within the relevant AQOs (NO_2 AQO: 40µg/m^3; PM_{10} AQO: 40µg/m^3; $PM_{2.5}$ AQO: 20µg/m^3). Overall, air quality is considered to be good in the local area.

15.6.11 One possible road construction transport route may be south along the A141 to join the A1 at Brampton. Brampton is in the administrative area of Huntingdonshire District Council, which has declared four AQMAs; two of which, the Brampton and Huntingdon AQMAs, are adjacent to the A141 at Brampton and Huntingdon.

15.6.12 According to the Huntingdonshire District Council (2023) Air Quality Annual Status Report, the Council undertook automatic monitoring at one site and non-automatic monitoring at 58 sites in 2022. The closest diffusion tube to the A141 adjacent to the Brampton and Huntingdon AQMAs, respectively, is the Huntingdon 5 tube. The

measured annual average NO_2 concentration at this diffusion tube site was 12.9µg/m^3 in 2022, which is well below the annual mean NO_2 AQO of 40µg/m^3.

Baseline for the water treatment works

15.6.13 The proposed water treatment works site is immediately to the south of the reservoir site and air quality is likely to be similar, and well within the relevant objectives. The water treatment works site is not in or adjacent to an AQMA. The A142 Isle of Ely Way is close to the site to the south, and air quality at roadside areas may be affected by road traffic exhaust emissions.

15.6.14 According to the Fenland District Council Annual Status Report (2023) the nearest non-automatic monitor is S18. The measured annual average NO_2 concentration at this diffusion tube site was 11.1µg/m^3 in 2022, which is well below the annual mean NO_2 AQO of 40µg/m^3. According to the Defra background maps, the estimated 2022 annual average background NO_2, PM_{10} and $PM_{2.5}$ concentrations for the grid square, including the water treatment works, are 6.7µg/m^3, 15.7µg/m^3 and 9.2µg/m$^{3,]}$, respectively.

Baseline for downstream treated water transfers

Reservoir to Madingley via Bluntisham

15.6.15 Information on likely air quality was reviewed from Huntingdonshire District Council (2023), South Cambridgeshire District Council (2023) and Fenland District Council (2023) LAQM reports and Defra background maps. The closest diffusion tube to the majority of the study area is Huntingdonshire District Council tube Bluntisham. The measured annual average NO_2 concentration at this diffusion tube site was 17.5µg/m^3 in 2022. The route is not in or adjacent to an AQMA. Overall, no exceedances of the AQO for NO_2, PM_{10} and $PM_{2.5}$ were likely, and air quality is likely to be good in the local area.

Reservoir to Bexwell

15.6.16 Information on likely air quality was reviewed from Fenland District Council (2023) and Borough Council of King's Lynn & West Norfolk (2023) LAQM reports and Defra background maps. The closest diffusion tube to the majority of the study area is Fenland District Council tube S40. The measured annual average NO_2 concentration at this diffusion tube site was 10.5µg/m^3 in 2022. The route is not in or adjacent to an AQMA. Overall, no exceedances of the AQOs for NO_2, PM_{10} and $PM_{2.5}$ were likely, and air quality is considered likely to be good in the local area.

15.6.17 Construction transport routes are not yet determined and therefore baseline air quality along these routes cannot be known at this stage; however, routes will be selected to avoid AQMA and sensitive areas as far as practicable.

Future baseline

15.6.18 Air quality in general is likely to improve in the future as a result of local, national and international measures, and these are reflected in future 1km^2 mapped background concentration estimates, taken from the Defra background maps. However, new developments may affect air quality during their construction and operational phases, for example by increasing road traffic.

15.6.19 Future background air quality will be predicted based on current air quality, and predicted reductions in future years, based on the Defra 1km^2 mapped background concentration estimates.

15.6.20 Climate change is expected to have varied effects on air quality. Temperature increases may lead to higher ground-level ozone during hot, still summer periods. Changing seasonal temperatures combined with wetter winters could increase fog and mist, altering local microclimates and visibility. Drier summers may result in more dust generation, particularly from arable fields, and smoke and particulate matter due to increased wildfire risks. The Proposed Development's impact on land use could further influence dust sources and wildfire risks. Further details can be found in Chapter 17: Climate resilience of this EIA Scoping Report.

15.6.21 Chapter 23: Cumulative effects will identify the proposed developments that are anticipated to be constructed prior to the construction of the Proposed Development. As such, these developments would form part of the future baseline for assessment within the EIA. Where this presents air quality receptors, or a change to the current baseline specific to air quality, this will be considered within the EIA.

15.7 Design and mitigation

Design

15.7.1 The design of the Proposed Development to date has taken consideration of environmental constraints and potential environmental effects where feasible. The design development process has sought to avoid and reduce potential adverse environmental effects on air quality by including consideration of sites which increase the distance of construction activities from receptors, as part of the options appraisal process.

15.7.2 The ongoing development of the design will actively explore opportunities to incorporate embedded mitigation to appropriately manage potential adverse effects, where feasible.

Mitigation

15.7.3 Documents presenting the approach to mitigation will be produced as part of the application for development consent, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. These measures would be applied to mitigate likely significant effects, including potential air quality effects. Air quality considerations will also inform the process for developing construction methods and components, such as those set out within the management plans.

15.7.4 The following list contains examples of good practice mitigation and measures relevant to air quality that will be considered as part of developing the management plans for the Proposed Development:

- Visual and/or quantitative dust monitoring during construction activities.
- Erecting solid screens or barriers around dusty activities or the site boundary.
- Switching off engines of vehicles and plant when stationary or not in use– no idling plant or vehicles.
- Avoiding the use of diesel- or petrol-powered generators and use mains electricity, battery or 'low emission' powered equipment where practicable.
- Damping down friable surfaces in dry/windy weather for effective dust/particulate matter suppression.

15.7.5 Relevant documents will be produced to set out the measures and standards of work to be applied during the operational phase. These would be applied to monitor, manage and control potential adverse environmental effects associated with operation and maintenance activities.

15.8 Proposed scope of assessments

Likely significant effects requiring assessment (scoped in)

15.8.1 The following section sets out the aspect-specific potential effects for air quality. The likely significant effects requiring assessment are presented in Table 15-4. Where potential effects may be specific to one or more zones of the Proposed Development and the relevant study area, this is identified in Table 15-4 (see Chapter 2: Project description, for further discussion of zones).

15.8.2 The construction phase transport options are still in development; therefore, a precautionary approach has been taken with regards to the scope of the assessment and the potential impacts to air quality until further information is available.

Table 15-4: Likely significant air quality effects

Activity	Effect	Receptor	Zone
Construction			
Demolition of structures and buildings	Dust and particulate matter generated by demolition activities.	Sensitive human receptors within 250m and ecological receptors within 50m of the Scoping boundary.	All zones
Excavation and earthworks	Emission of dust causing loss of amenity at sensitive receptors near to work sites and haul routes.	Any relevant sensitive receptors within 250m, e.g., residential, schools, churches and ecological	All zones

Activity	Effect	Receptor	Zone
		receptors within 50m of the Scoping boundary.	
All construction components	Dust and particulate matter generated by construction activities.	Sensitive human receptors within 250m and ecological receptors within 50m of the Scoping boundary.	All zones
All construction components	Exhaust emissions from construction transport of materials and workers, including road, rail and water as appropriate, with potential to affect human health and ecology.	Residential and commercial properties, AQMA, ecological sites.	All zones
All construction components	Exhaust emissions from plant/non-road mobile machinery (NRMM).	Sensitive human receptors within 250m of the EIA/DCO boundary.	All zones
Operation			
All operation components	Exhaust emissions from leisure and maintenance vehicles, and operational sources for associated infrastructure, such as back-up generators for water treatment works, with potential to affect human health and ecology.	Residential and commercial properties, AQMA, ecological sites.	All zones
Water treatment/inter-catchment treatment	Potential odour from the water treatment works.	Residential receptors.	Water treatment works

Effects not requiring assessment (scoped out)

15.8.3 We do not propose to scope anything out at this stage.

15.9 Assessment methodology

15.9.1 The study areas set out in Section 15.4 will be kept under review as the design and consultation processes progress, and the Proposed Development is refined. Therefore, the study area may evolve as appropriate. The evolution of the study area will be clearly communicated in the ES and PEIR.

15.9.2 The proposals, described in Chapter 2: Project description, will also evolve and be further developed as the design process progresses. Whilst the methodologies that are set out within this chapter are not anticipated to change, the scope of assessment will be kept under review as the design progresses.

Additional baseline information required

15.9.3 The baseline air quality assessment will be updated as more monitoring data is available from ongoing monitoring by national networks and LAQM studies. This will also include collecting site-specific data from the field surveys outlined in Section 15.5.

15.9.4 At the end of the monitoring, results will be bias-adjusted using the national factor for the previous year, and 'annualised' to estimate the annual mean according to the procedure suggested in LAQM (TG22) (Defra, 2022).

15.9.5 As suggested in LAQM (TG22) (Defra, 2022), the likelihood of exceedance of the hourly mean air quality standard will be assessed on the basis that exceedances of the NO_2 one-hour mean are unlikely to occur where the annual mean is below 60µg/m^3.

Construction phase fugitive dust assessment methodology

15.9.6 Construction activities, such as demolition of existing structures, earthworks and embankment construction, modifications to open channel transfers, pipeline laying and service diversions may have the potential to lead to the release of fugitive dust and particulate matter.

15.9.7 An assessment of the impact of construction phase dust and particulate matter on air quality and amenity at sensitive human and ecological receptors will be undertaken according to the IAQM (2024) construction dust guidance. Whereby, the potential dust emissions magnitudes of the planned activities will be scored based on factors including the scale of the work site and the soil type.

15.9.8 For the main reservoir site, the scale of earthworks and material movement proposed is large and the potential impact will also be assessed using the Institute of Air Quality Management (IAQM) Guidance on the Assessment of Mineral Dust Impacts for Planning (v1.1) (IAQM, 2016).

15.9.9 The sensitivity of the surrounding environment to fugitive dust will be assessed based on the number and proximity of receptors, and the inherent sensitivities of receptors, topography and weather data, as described in the IAQM (2024) construction dust guidance.

15.9.10 Human receptors will be identified and counted within the Development Consent Order (DCO) boundary and 20m, 50m, 100m and 250m 'buffer zones' using 'AddressBase' data (Ordnance Survey, 2024), which provides a detailed number of receptors within those 'buffer zones' based on post code. The sensitivity of each receptor will be scored as high, medium or low based on the criteria suggested in Box 8 of the IAQM (2024) construction dust guidance.

15.9.11 Ecological receptors will be identified and counted within 20m and 50m 'buffer zones' of the Scoping boundary. The sensitivity will be scored based on their designation and in consultation with the project ecologists.

15.9.12 The assessed potential emissions magnitude and areas sensitivity will be combined to determine the impact risk, which will be used to recommend appropriate site-specific mitigation measures to be adopted.

Construction phase plant and NRMM exhaust emissions

15.9.13 The IAQM (2024) construction dust guidance advises that '*experience of assessing exhaust emissions from on-site plant (NRMM) and [on] site traffic, suggests that they are unlikely to make a significant impact on local air quality and in the vast majority of cases, they will not need to be quantitatively assessed*'. Therefore, exhaust emissions from construction plant and NRMM for transfers and associated infrastructure will be assessed qualitatively. For the reservoir site, the impacts will be assessed quantitively using dispersion modelling, as for road traffic exhaust emissions discussed below.

Construction and operational phase road traffic exhaust emissions

15.9.14 The roads and receptors within the assessment will be dictated by the predicted traffic generation and routing. The study area will be up to 200m from 'affected roads', i.e. roads predicted to experience 'significant' changes in traffic flow, defined using the screening criteria suggested in the EPUK/IAQM Planning for Air Quality guidance (2017). These would be roads predicted to experience an increase in light duty vehicle flow greater than 100 as annual average daily traffic in (or adjacent to) an AQMA or 500 elsewhere; and/or an increase in heavy duty vehicles of 25 in (or adjacent to) an AQMA or 100 elsewhere.

15.9.15 The impact of road traffic exhaust emissions on roads with predicted traffic changes exceeding the screening criteria above will be modelled using the dispersion modelling software package, Atmospheric Dispersion Modelling System-Roads (ADMS-Roads). Sensitive receptor locations will be included in the dispersion modelling assessment. Human receptors will be chosen to include existing residential and other sensitive receptors near to junctions likely to experience the greatest changes in traffic flows. Ecological receptors will be identified using mapping data in consultation with the project ecologists.

15.9.16 Predicted pollutant concentrations will be verified by comparison with baseline monitoring results according to the procedure suggested in LAQM (TG22) (Defra, 2022).

15.9.17 Nitrogen dioxide concentrations will be predicted based on verified modelled NOx concentrations using the Defra NOx to NO_2 Calculator tool (v8.1).

15.9.18 Concentrations of pollutants including the background contribution will be predicted at relevant human and ecological receptors.

15.9.19 Vehicle emissions factors (i.e. the amount of pollution emitted from the vehicle fleet, in g/km/s) for NOx, PM_{10} and $PM_{2.5}$ will be estimated using the latest version of Defra's Emissions Factor Toolkit (Defra, 2024b).

15.9.20 It is envisaged that the following scenarios will be modelled based on the assessment scenarios described in Chapter 14 Traffic and transport, Section 14.9, and consistent with the temporal scope for assessments as set out in Chapter 6: EIA approach and methodology:

- Base year with baseline traffic data and air quality monitoring data, for verification.
- Future construction traffic baseline – year of predicted maximum construction traffic, with predicted baseline traffic (without the Proposed Development in place but with committed developments).
- Future construction traffic 'with development' – year of predicted maximum construction traffic, with baseline traffic + predicted maximum construction traffic.
- Future, operational traffic baseline – 'opening year' with predicted baseline traffic (without the Proposed Development in place but with committed developments).
- Future operational traffic 'with development' – 'opening year' with predicted operational and leisure traffic.

Construction phase rail and inland water transportation

15.9.21 Where rail transport is proposed, emissions will be screened in the first instance, based on the proportionate increase in traffic and the criteria suggested in LAQM TG22 (Defra, 2022) and, if potentially significant, incorporated into the roads model. Emissions from rail locomotives will be estimated based on the National Emissions Inventory (Department for Energy, Security and Net Zero and Defra, 2024).

15.9.22 There is considerable uncertainty around inland waterways vessel emissions; however, it is envisaged that should this option be taken forwards, dedicated tugs will be acquired for the Proposed Development and consultation will be undertaken with potential suppliers to obtain estimates of emissions.

Operational phase stationary plant & process emissions

15.9.23 Emissions from operational phase stationary plant, such as standby generators or combustion plant for domestic space and water heating (where proposed), and process emissions such as odour from water treatment plant, will be assessed in the ES chapter. At this stage, no information on any such sources is available; therefore, it is challenging to be prescriptive in terms of methodology. However, it is envisaged that an emissions inventory will be prepared in consultation with the design team, and sources will be qualitatively assessed in the first instance for example, with reference to the screening criteria suggested in the Environmental

Protection UK (EPUK)/IAQM guidance Land-Use Planning and Development Control: Planning for Air Quality (2017) for combustion sources, the odour risk assessment approach suggested in the IAQM Guidance On The Assessment Of Odour For Planning (2018) or similar, and assessed using dispersion modelling if potentially significant. The assessment will be presented in the ES Chapter.

Significance of effects

15.9.24 The significance of fugitive dust impacts of construction activities will be assessed in accordance with the approach suggested in the IAQM (2024). This approach assumes that measures to avoid or reduce the potential environmental effects are an inherent part of the Proposed Development and will result in potential significant adverse effects being controlled, so the residual effect will normally be 'not significant'.

15.9.25 The dispersion modelling predictions will be interpreted with reference to the Environmental Protection UK (EPUK)/IAQM guidance Land-Use Planning and Development Control: Planning for Air Quality (2017) and LAQM (TG22) (Defra, 2022) based on predicted impacts at individual 'receptors' and professional judgment.

15.9.26 The magnitude of impacts is described for individual receptors by the percentage change in long-term (annual) predicted pollutant concentration, relative to an Air Quality Assessment Level (AQAL) at receptor, as presented in Table 15-5.

15.9.27 Overall significance will be determined using professional judgement. Negligible or slight impacts would not normally be considered 'significant', whilst moderate and substantial would; however, a moderate adverse impact at a small number of receptors may not necessarily mean that the overall impact is 'significant'.

Table 15-5: Impact descriptors for individual receptors

Long-term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2 – 5	6 – 10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
79% – 94% of AQAL	Negligible	Slight	Moderate	Moderate
95% – 102% of AQAL	Slight	Moderate	Moderate	Substantial
103% – 109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

15.9.28 For ecological receptors, the dispersion model will predict impacts (the change in pollutant concentrations or deposition rates) and these will be interpreted, and their significance assessed in consultation with the project ecologists.

15.10 Assessment assumptions and limitations

15.10.1 The following uncertainties and assumptions will be made in the air quality assessment:

- It is assumed that base year background data obtained from Defra's website is likely to reasonably represent conditions at site in future years.
- It is assumed the data generated by the Defra Emissions Factor Toolkit provide an accurate representation of emissions generated by vehicles, which currently use (and will use in the future) the modelled roads.
- There is an element of uncertainty in all measured and modelled data. All values presented in this chapter are best-available estimates.

16 Carbon and greenhouse gases

16.1 Introduction

16.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to the potential impact of the Proposed Development upon the climate, namely through greenhouse gas (GHG) emissions, commonly referred to as carbon emissions or decarbonisation. For the proposed scope of the assessment covering the potential effects of climate change on the Proposed Development, refer to Chapter 17: Climate resilience. This chapter should be read in conjunction with the description of the project, as presented in Chapter 2: Project description.

16.1.2 For the assessment of carbon and GHG emissions, the receptor is the global climate and the potential impact is increased GHG concentrations in the atmosphere, leading to climate change.

16.1.3 The purpose of this chapter of the EIA Scoping Report is to identify and characterise any relevant climate change factors, to consider the nature and scale of potential impacts arising from and on the Proposed Development, and to confirm the methodology for assessing likely significant effects.

16.2 Legislation, policy and guidance requirements

16.2.1 Legislation, policy and guidance which has informed the scope of the assessment presented within this chapter, is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

16.2.2 Table 16-1 identifies the relevant policy in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023a) and the National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities (DLUHC), 2023) for carbon and GHG emissions.

Table 16-1: UK policy relevant to GHG emissions

Relevant UK policy	Relevance to assessment
NPS for Water Resources Infrastructure (Defra, 2023a)	Section 4.4 covers climate change mitigation – greenhouse gas emissions. Paragraphs 4.4.11 and 4.4.12 require applicants to provide evidence of the anticipated climate impact of a Proposed Development in terms of GHG emissions, and for this to feed into the EIA. This includes assessing the potential climate impact from both construction and operation. Paragraphs 4.4.13 and 4.4.14 state that applicants must provide evidence of having investigated feasible options to mitigate emissions.
NPPF (DLUHC, 2023)	Paragraphs 8, 20 and 157-158 are relevant to adaptation, mitigation and climate change resilience. Paragraphs 159-164 require a

Relevant UK policy	Relevance to assessment
	reduction of CO_2e emissions through design and reduced energy consumption.

16.2.3 In 2019, the Applicant, along with other water companies in England, committed to achieve net zero operational carbon emissions by 2030 (Water UK, 2019). This includes emissions associated with operational power use, transportation and refurbishment activities associated with maintenance (but not the emissions associated with the construction, capital replacement or development of new assets or chemical consumption). In addition, Anglian Water Services has signed up to the Construction Leadership Council's Five Client Carbon Commitments (2024), which are summarised as follows:

- Procure for low-carbon construction and provide incentives in contracts.
- Set phase-out dates for fossil fuel use.
- Eliminate the most carbon-intensive concrete products.
- Eliminate the most carbon-intensive steel products.
- Adopt PAS 2080: Carbon Management in Infrastructure, as a common standard.

16.2.4 Good practice guidance on GHG management in the built environment which has been, and will be, used to inform the EIA, is listed in Table 2-2 of Appendix 4.1: Legislation, planning policy and guidance summary.

16.3 Stakeholder engagement

16.3.1 In preparing this EIA Scoping Report, there has been engagement and discussion with stakeholders relating to the following:

- Potential provision of renewable energy infrastructure (including solar, wind and storage) within the Scoping boundary.
- Potential to develop an offsetting strategy to mitigate residual GHG emissions from the Proposed Development.

16.3.2 A summary of the engagement on matters of climate change mitigation or adaptation undertaken so far is presented in Table 16-2.

16.3.3 Engagement with local planning authorities has so far focussed on the boundary of the reservoir site itself. As the design develops, engagement with other relevant planning authorities within the zones of the associated infrastructure will also be required.

16.3.4 Further exploration of the potential to generate renewable electricity within the Scoping boundary is ongoing. Should this, or procurement of offsite renewable energy, be pursued as part of the scope of the Proposed Development, specific engagement activities will be coordinated with relevant stakeholders. Similarly,

further engagement will be coordinated as required on the potential to offset residual emissions.

Table 16-2: Engagement with stakeholders

Stakeholder	Engagement undertaken to date	Proposed future engagement
Cambridgeshire County Council	**19 September 2023** – meeting to discuss renewable energy generation. **15 November 2023** – meeting to discuss the local area energy plan (and potential interface with the proposed renewable energy plant). **16 April 2024** – meeting to discuss a potential offsetting strategy for the Proposed Development.	Further discussion on identifying potential offsetting interventions that are deemed credible and provide the greatest benefit to the region, as part of the carbon strategy for the Proposed Development.
Fenland District Council	**19 September 2023** – meeting to discuss renewable energy generation. **16 April 2024** – meeting to discuss a potential offsetting strategy for the Proposed Development.	Further discussion on identifying potential offsetting interventions that are deemed credible and provide the greatest benefit to the region, as part of the carbon strategy for the Proposed Development.
Historic England and Natural England	**7 November 2023** – Technical Working Group (TWG) meeting, at which potential renewable energy generation infrastructure was presented.	See Section 16.3.

16.4 Study area

16.4.1 The assessment of the effects on climate does not have a physical study area, as the receptor (climate and atmospheric systems) for GHG emissions is global. Climate change resulting from GHG emissions will lead to social, environmental and economic impacts felt globally, regardless of where the GHGs are emitted.

16.4.2 Instead of a defined study area, the GHG assessment will consider the potential GHG emissions arising from the activities for construction, operation and maintenance of the Proposed Development. This will also include anticipated emissions impact from land use change.

16.4.3 For the purposes of the GHG emission assessment, upstream and downstream effects are defined as follows:

- Upstream effects include all emissions caused by activities which occur in advance of enabling and construction works within the Scoping boundary. These include, but are not limited to, the extraction and processing of materials, manufacture of specific pre-fabricated components, and transportation of plant, materials and assets to site. Since these emissions are included within an

assessment of 'capital emissions' (refer to Image 16.1), they will be considered to occur within the Scoping boundary and therefore within the study area for Scoping.

- Downstream effects include all emissions due to the increase in supply of treated water within the regional network once it has left the assets contained within the Scoping boundary, as a direct consequence of the Proposed Development. The consideration of these emissions is discussed in Section 16.8.

16.5 Baseline data collection

16.5.1 The baseline conditions for GHG emissions presented in Section 16.6 represent a review of the currently available data. The data described below provide a robust context for the scoping of the assessments.

16.5.2 Current national and regional emissions have been obtained via desk study. No site surveys are required or have been carried out for the GHG assessment.

16.5.3 The baseline conditions assume the current land use in each zone of the Proposed Development. The current land information has been based on desk study information supported by information gathered during site surveys for other aspects, for example, for Chapter 12: Geology, soils, agriculture and land quality.

16.6 Baseline conditions

16.6.1 The baseline conditions for GHG emissions are described below for the Proposed Development. The baseline conditions are as established from the data collection described in Section 16.5.

16.6.2 The baseline conditions assume that the Proposed Development is a component of the best value plan for satisfying the requirements of the regional Water Resources Management Plan (WRMP). As summarised in the Non-Technical Summary of the Anglian Water WRMP24 (Anglian Water, 2024), the aim of the WRMP is to make best use of existing resources through:

- The installation and use of smart meters.
- The promotion of water efficiency and reduction of leakage.
- Investment in supply-side options, such as the Fens Strategic Resource Option.

16.6.3 Selection of the best value plan (which includes the Fens Strategic Resource Option) prioritised choosing options with lower operational GHG emissions, as well as providing carbon storage through land use change.

16.6.4 The baseline with respect to GHG emissions is essentially a 'do-nothing' scenario with no development within the Scoping boundary, and no alternative provision of greater water supply. It therefore only considers the current emissions of existing activities within this boundary, and this will be used to assess the scale of anticipated emissions. This baseline has been established in alignment to Assessing

Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2022), which states a baseline as '*a reference point against which the impact of a new project can be compared*' and can take the form of GHG emissions within the boundary of the GHG quantification but without the Proposed Development.

16.6.5 Current emissions will be established from the following:

- The annual UK territorial emissions.
- Regional emissions.
- An estimate of emissions/removals from the current land use on the site.

16.6.6 In 2023, UK net GHG emissions have been provisionally estimated at 384MtCO_2e, 5.4% lower than in 2022 and representing a 52.7% reduction from 1990.

16.6.7 In 2021 (the most recent year for which data is available), net GHG emissions within the boundary of Fenland District Council were assessed as 1,543ktCO_2e, and within the whole of Cambridgeshire were assessed as 6,786ktCO_2e.

16.6.8 Emissions/removals due to current land use will be estimated as part of the EIA, based on industry-standard carbon sequestration rates for different land use types (such as those provided by Natural England) and available ground investigation.

Construction baseline

16.6.9 Baseline conditions associated with construction are zero because there is no current construction within the Scoping boundary at the time of this report. The UK construction sector was estimated to account for 2.9% of total emissions in 2019; this will be used as context for assessment of the Proposed Development construction footprint.

Operational/future baseline

16.6.10 In establishing a baseline for operational GHG emissions, it is assumed that no additional development would occur on the site of the Proposed Development (i.e. the land use remains as per the present day). Operational emissions from within the site boundary will therefore be estimated on the basis of current land use. For the assessment of GHG emissions, the future baseline scenario is equivalent to this operational baseline.

16.6.11 For context, the current operational intensity of GHG emissions for the Applicant (Anglian Water) is 284kgCO_2e/ML of treated water (reported figures for 2022-2023).

16.6.12 Chapter 23: Cumulative effects will identify the proposed developments that are anticipated to be constructed prior to the construction of the Proposed Development. As such, these developments would form part of the future baseline for assessment within the EIA.

16.7 Design and mitigation

Design

16.7.1 GHG emissions have been considered as part of the evolution of the design to this point in the project, in alignment with a PAS 2080 carbon management process. This has included considering options and designs that would avoid or reduce GHG emissions where practicable, including the following:

- Selecting a reservoir site that optimises the cut/fill balance, which would help reduce emissions associated with the transportation of material.
- Proposing a hybrid combination for upstream transfers that re-uses existing open channel transfers to bring raw water into the reservoir, reducing the length of new pipeline required. This may need to take account of any additional raw water treatment required to allow open channel transfer to be permitted.
- Exploring the possibility of generating and storing renewable electricity for use during operation of the reservoir and associated infrastructure.

16.7.2 The ongoing development of the design will incorporate embedded mitigation to avoid and reduce adverse effects, where feasible.

16.7.3 The design development process will also include consideration of enhancement measures to improve the surrounding environment. Potential enhancements relevant to GHG emissions that have been identified to date include habitat creation which could provide carbon removal from land use change.

Mitigation

16.7.4 Documents presenting the approach to mitigation will be produced, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. These measures would be applied to mitigate likely areas of highest GHG emissions. GHG emission considerations will also inform the process for developing construction methods and components, such as those relating to energy-efficient processes, material selection and construction methodology.

16.7.5 Examples of good practice and essential mitigation relevant to GHG emissions include targeting the activities and project components that are likely to have the highest embodied GHG emissions, and seeking to reduce emissions in these areas.

16.7.6 Relevant documents will be produced to set out the measures and standards of work to be applied during the operational phase. These would be applied to monitor, manage and control adverse environmental effects associated with operation and maintenance activities.

16.8 Proposed scope of assessments

Effects of likely highest GHG emissions requiring assessment (scoped in)

16.8.1 The following section sets out the aspect-specific scope of assessment for GHG emissions. GHG emission sources are typically grouped according to the following broad categories identified in Image 16.1.

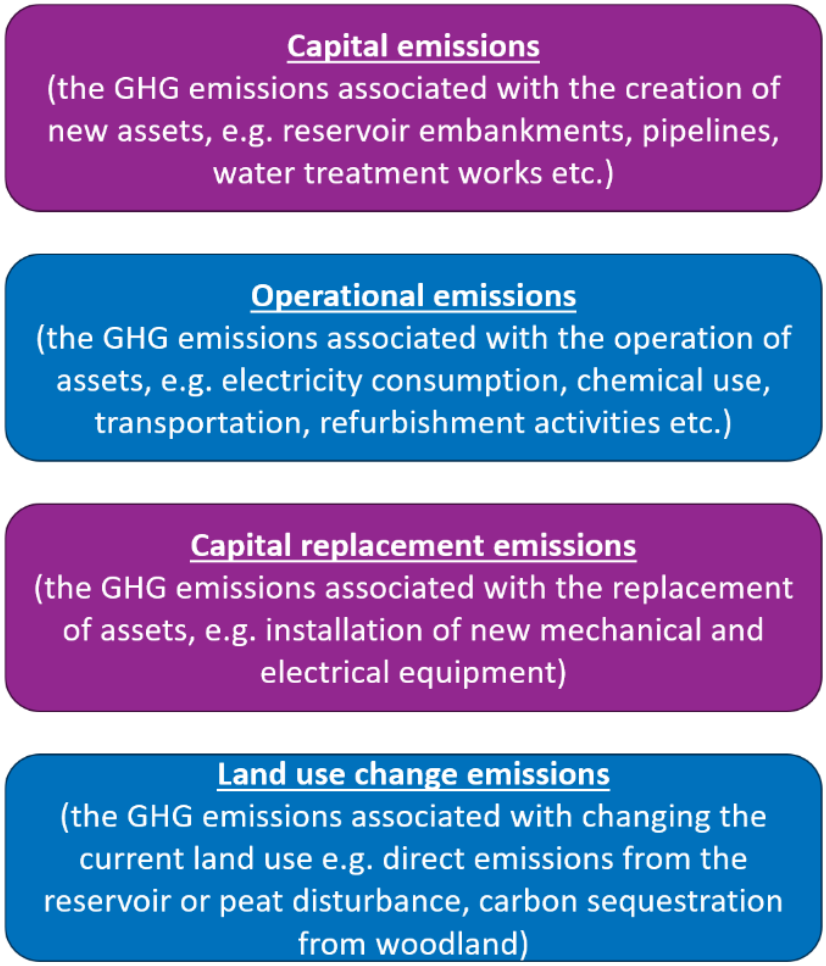

Image 16.1: Categories of GHG emission sources

16.8.2 The likely key activities with potential to generate the highest quantities of GHG emissions and therefore requiring assessment, are presented in Table 16-3. For each construction and operational activity identified, GHG emissions are anticipated from the following:

- Procurement of key materials and products – this includes emissions from extracting and processing raw materials, including rip rap, gravel and sand required for the reservoir embankment; from transportation of raw materials to

a fabrication/manufacturing plant; and from the manufacture of assets within that plant (e.g. pipeline segments, pre-cast concrete sections, etc.).

- Transportation of key materials to the works site – this includes emissions from the use of hydrocarbon fuels in transportation infrastructure.
- Installation/construction of assets on-site – this includes emissions from the use of hydrocarbon fuels in construction plant.
- Electricity use in construction site compounds and worker accommodation and welfare facilities on-site – this includes emissions from national grid electricity.

Table 16-3: GHG emission effects anticipated to be of largest scale

Activity	Effect	Receptor	Zone*
Construction			
All construction activities	Vehicles used for the delivery of construction materials to site and removal of waste. This includes construction staff travel as well. The operation of on-site plant and equipment and other activities which consume energy and/or water, and consequently lead to GHG emissions.	The global climate	All zones
All construction activities	The manufacturing of construction materials. This includes the extraction/mining of resources and any primary and secondary processing or manufacturing. There will be many new assets and changes to existing assets, with corresponding indirect GHG emissions.	The global climate	All zones
Landscaping and reinstatement	GHG emissions or capture as a result of land use change, for example, direct emissions from the reservoir, changes to peat resources or from an agricultural land use to woodland planting.	The global climate	All zones
Operation			
All operational activities	Vehicles used for the delivery of operational materials to site and removal of waste. This includes maintenance staff travel as well. The operation of pumps, treatment works and other site plant and equipment which consume energy and/or water, and consequently lead to GHG emissions. The operation of chemical treatment plant, with GHG emissions caused by the mining/extraction and any processing of	The global climate	All zones

Activity	Effect	Receptor	Zone*
	chemicals used within the plant, as well as direct process emissions from operation of the plant. Refurbishment activities for maintaining the infrastructure, including use of construction plant and replacement of used assets. GHG emissions from recreational use of the reservoir (principally assumed to be from travel to and from the site).		

*Notes: * Zones as defined in Chapter 2: Project description.*

Effects not requiring assessment (scoped out)

16.8.3 It is proposed to scope out GHG emission downstream effects, as defined in section 16.4, being emissions related to the use of water supplied within the regional network once it has left the Proposed Development's assets within the Scoping boundary. Once leaving the Scoping boundary, water from the Proposed Development would mix with the rest of the regional supply and be distributed to a wide range of users. The downstream use may include a range of personal, commercial, rural and industrial activities, over which the Proposed Development has limited to no control. It is considered that any emissions from these uses would be so varied and remote that an inevitable causation between the Proposed Development's supply and a particular downstream emissions profile cannot reasonably be found, nor could a clear assessment methodology of such emissions be employed for the purpose of EIA assessment.

16.9 Assessment methodology

16.9.1 The following section describes the approach taken to assess GHG emissions associated with the Proposed Development.

16.9.2 The proposals, described in Chapter 2: Project description, will evolve and be further developed as the design process progresses. Whilst the methodologies that are set out within this chapter are not anticipated to change, the scope of assessment will be kept under review as design progresses.

Assessment years

16.9.3 The assessment of GHG emissions, including emissions from capital construction, operation of the assets and capital replacement, will be carried out for a period of 80 years from the commencement of capital expenditure on the Proposed Development. This is to align with the recommendation of the Cost Consistency Methodology (All Company Working Group, 2022) section 4.2.3, and ensures a consistent approach between cost estimation and the assessment of GHG emissions.

Construction assessment methodology

16.9.4 Construction-related carbon will be estimated based on quantification of the number of vehicles and plant, the amount of materials required, and the sources (for example, if sourced on-site) that are anticipated to be used on the project. These will be quantified based on the design of the Proposed Development, and the carbon will be estimated based on the methodology set out in Sustainability of Construction Works (BS EN 17472:2022). This aligns with the principles of Carbon Management in Buildings and Infrastructure (BS PAS 2080:2023).

16.9.5 It is also assumed that the following information will be available for the assessment:

- Details concerning the possible points of origin of materials and pre-fabricated components and their likely means of transportation to the site.
- Details concerning the possible locations of sites for the reception of waste from the Proposed Development.
- Quantities of peat deposits that may be degraded during construction, thereby releasing GHGs, and the extent of peat that will be relocated elsewhere.

16.9.6 The above will then be assessed and quantified using carbon models based on carbon emission factors from the following sources:

- Inventory of Carbon and Energy (University of Bath, Circular Ecology, 2019).
- UK Government GHG Conversion Factors for Company Reporting (Defra, 2023b).
- Civil Engineering Standard Method of Measurement 4 Carbon & Price Book (Institution of Civil Engineers, 2013).
- Carbon storage and sequestration by habitat (Natural England, 2021).

16.9.7 Construction emissions will be profiled over the construction programme and proportioned as per the programme of capital expenditure.

16.9.8 Where details of the Proposed Development cannot be defined precisely, a reasonable worst case will be used for assessment, taking into account the relevant spatial and temporal project design parameters.

Operational assessment methodology

16.9.9 Operational carbon will be estimated based on quantification of the number of vehicles and plant required, power demand associated with plant and equipment, and chemical consumption. These will be quantified based on the knowledge of similar projects. Carbon will be estimated based on the methodology set out in Sustainability of Construction Works (BS EN 17472:2022) and quantified using carbon emission factors from the following sources:

- Table 1 in the Green Book (Department for Business, Energy and Industrial Strategy, 2023).

- Carbon Accounting Workbook (UK Water Industry Research, 2023).
- UK Government GHG Conversion Factors for Company Reporting (Defra, 2023b).

16.9.10 GHG emissions from maintenance will be approximated by applying a fixed percentage of the capital emissions as an annual figure, with a greater proportion allocated to assets comprising mechanical and electrical components than to civil assets. This is in keeping with the approach used in estimating costs due to maintenance activities.

16.9.11 For the assessment of GHG emissions due to capital replacements, asset lives will be assumed from the Cost Consistency Methodology (All Company Working Group, 2022). As a reasonable worst case, the assessment of emissions will assume that the replacement asset is a like-for-like replacement, using the same emission factors as for the initial capital works.

16.9.12 Assessment of the potential impact of land use change (whether resulting in emissions or carbon sequestration) will use the information gathered as part of the habitat assessment calculations, which will be incorporated into the carbon assessment.

Significance of effects

16.9.13 There are at present no accepted criteria for determining significance of impact, sensitivity of receptors, or magnitude of effect of GHGs on climate change. The guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2022) states '*when evaluating significance, all new GHG emissions contribute to a negative environmental impact*.' The guidance also states, '*The crux of significance therefore is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*.' The Proposed Development will produce GHG emissions and therefore there is already acceptance that it will contribute a significant impact. However, the ES will also aim to demonstrate the significant efforts taken to reduce emissions through the design process to date to get to the Proposed Development design.

16.9.14 The assessment presented within the ES will follow these three stages:

- **Stage 1** – baseline 'do-nothing' scenario. In this stage, the current GHG emissions will be presented from different contexts: nationally (including current levels of emissions and the decarbonisation trajectory required in the UK's 6th Carbon Budget), regionally (including Anglian Water's current carbon intensity in terms of the operational emissions generated compared with the deployable output of potable water) and sector-specific (with reference to Water UK decarbonisation commitments).
- **Stage 2** – 'interim' design scenario. In this stage the anticipated GHG emissions from the Proposed Development will be presented, assuming construction according to today's best practice and prior to the application of mitigation

measures focussed on addressing key contributing assets/activities to emissions. It is noted that there is already some measure of inbuilt mitigation within the scheme options selection in the WRMP process, and then selection of the preferred option and site, but this will not be quantified within the assessment. This interim design scenario will choose a point in the design where the scheme is appropriately well defined to make a meaningful comparison against the Proposed Development.

- **Stage 3** – 'Development Consent Order design' of the Proposed Development. Design development will continue alongside the identification and selection of low-carbon opportunities to reduce anticipated GHG emissions to be as low as reasonably practicable.

16.9.15 The ES will assess the scale of potential impacts by comparing the scenario at Stage 3 with the baseline at Stage 1. The comparison with Stage 1 will present the potential impact of emissions in the context of national trajectories and regional carbon intensity, and provide a basis for measuring significance.

16.9.16 The ES will also present comparison with Stage 2 to provide a quantitative narrative on the effectiveness of mitigation measures that have been captured through design development. This will be used to assess the scale of potential impacts and contribution to net zero alignment by comparing the total quantity of emission reductions secured with national and sectoral decarbonisation trajectories. This aligns with the guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2022) and the NPS for Water Resources Infrastructure (Defra, 2023a), which both highlight the importance of the appropriateness of mitigation measures in the decision making.

16.10 Assessment assumptions and limitations

16.10.1 Any GHG assessment at design stage is an estimate of the Proposed Development based on best available industry standard emissions factor data and industry design standards (refer to Section 16.9 for the sources of emissions factor data to be used in the assessment). There is an inherent limitation in GHG assessments as the assessment will be based on the scheme design at the time of the DCO application, and there will continue to be ongoing development of the DCO design into final detailed design and engineering. The final constructed asset will not have the exact same emissions as estimated due to differences in the final materials procurement specification and practices on-site.

16.10.2 There is uncertainty within GHG emissions factors themselves – even when using best available industry data – as they represent industry averages and are calculated on a set of assumptions, and thus may not reflect real world scenarios or specific products that are used in the final construction or operation. In some cases, there is not a perfect match between the material specified in the design and the available emissions factor, for example, where the unit of measurement is not directly equivalent or the material varies. In these instances, assumptions will be made to attempt to replicate the type and weight of the materials as closely as

possible. Any assumptions made will be conservative, i.e., when there is a choice, use the highest emissions factor or density.

16.10.3 The nature and timescales of the Proposed Development mean that everything related to construction assessment is a future estimate and not based on actuals. On-site construction monitoring is challenging and not fully established in the industry; however, contractual mechanisms will be explored to establish a robust and pragmatic approach to monitoring construction emissions accurately.

17 Climate resilience

17.1 Introduction

17.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to climate resilience and risks to the Proposed Development, due to changes in the future climate. The chapter should be read in conjunction with the description of the Proposed Development as presented in Chapter 2: Project description, and Chapter 10: Water resources and flood risk, of this EIA Scoping Report.

17.1.2 Climate change is projected to affect the East of England area through a number of changes to seasonal climate averages, extreme weather events and sea level rise over the course of this century and beyond. Future changes in the climate published by the Met Office in the UK Climate Projections 2018 (UKCP18) (Met Office, no date), indicates that these changes for the East of England are likely to include:

- Warmer and wetter winters, which may lead to greater severity, frequency and duration of flood events.
- Hotter and drier summers, which may lead to more frequent and longer droughts.
- Greater intensity of rainfall events, both in winter and in summer downpours.
- Gradual sea level rise and increased height of storm surges, which may affect coastal defences and flooding.
- Potential changes in the intensity and frequency of storms and high winds; however, there is less certainty within climate models relating to this.

17.1.3 The climate resilience assessment will consider these future changes to the climate and how it may affect the Proposed Development.

17.1.4 The proposed assessment methodology for the climate resilience aspect differs from the other EIA aspects, primarily because it considers the external impacts of climate change and weather conditions on the Proposed Development and study area. The climate resilience assessment is comprised of an assessment of the risks from future climate change and extreme weather conditions to the infrastructure, processes and site users that form the Proposed Development, and is an ongoing assessment integrated into the design process.

17.2 Legislation, policy and guidance requirements

17.2.1 Legislation, policy and guidance which has informed the scope of the assessment presented within this chapter is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

17.2.2 Table 17-1 identifies the relevant policy in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) and the National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities (DLUHC), 2023) for resilience to climate change.

Table 17-1: UK policy relevant to climate resilience for water infrastructure

Relevant UK policy	Relevance to assessment
NPS for Water Resources Infrastructure (Defra, 2023)	Contains requirements to build resilient infrastructure to address pressures on water supplies as a result of population growth, impacts of climate change and biodiversity degradation or enhancement: Paragraph 3.2.2 states that '*Water resources infrastructure projects will typically be long-term investments which will need to remain operational over many decades, in the face of a changing climate. Consequently, applicants must consider the effects of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of projects*.' Paragraphs 3.7.5 to 3.7.7 state the importance of considering the most recent climate change allowances and assessing high impact scenarios, including for '*safety critical elements*' of infrastructure. Also that any adaptation measures must themselves also be assessed, which should set out how and where such measures are proposed to be secured.
NPPF (DLUHC, 2023)	Paragraph 159 states that '*New development should be planned for in ways that:* *a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure* […]'

17.2.3 As part of a combined approach to managing future drought and flood risks, the Applicant is part of a group of organisations that are implementing future climate strategies for their part in water management. These include the Future Fens: Integrated Adaptation Manifesto – A Vibrant Future for the Fens strategy (Anglian Water *et al*., 2022), which has a collective vision to '*provide climate change adaptation, resilience and mitigation on a holistic scale*.'

17.3 Stakeholder engagement

17.3.1 The Applicant has held discussions with stakeholders in relation to climate resilience during the preparation of this EIA Scoping Report, principally in relation to flooding, which takes into account future climate change. The details of this are outlined in Chapter 10: Water resources and flood risk, of this EIA Scoping Report.

The Applicant will continue to have further discussions with the Environment Agency, particularly around climate change assumptions to be used in the ongoing development of the project proposals.

17.3.2 The Applicant also intends to undertake engagement with Local Resilience Forums on factors to be considered for future emergency planning during the operation of the Proposed Development, and how these can be enabled within the design. This will include consideration for response to extreme weather events, such as floods, heatwaves and wildfires.

17.4 Study area

17.4.1 Since the aim of the climate resilience assessment is to consider the impacts of future climate on the Proposed Development itself, the study area is the geographical area within the Scoping boundary for the Proposed Development.

17.5 Baseline data collection

17.5.1 The baseline data collection has comprised a review of desk-based climate data for observed present-day climatic conditions, and future climate projection data available from the Met Office. The Institute of Environmental Management and Assessment (IEMA) EIA Guide to: Climate Change Resilience and Adaptation (IEMA, 2020) recommends the use of a high-emissions scenario at the 50th percentile level (a median probability value) for future climate projections. The highest scenario available for the UK is Representative Concentration Pathway 8.5 (RCP8.5), which models the equivalent of a 4.3 degrees centigrade (°C) increase in global mean surface temperature, averaged over 2081–2100 compared to the pre-industrial period (1850 –1900) (Met Office, 2018).

17.5.2 The following key data sources have been used to inform the climate baselines within this EIA Scoping Report:

- Met Office UK regional climate summaries (Met Office, 2016).
- Met Office UK Climate Projections 2018 (UKCP18) (Met Office, no date).
- HadUK-Grid observation data from UKCP18 (Met Office *et al.*, 2018).

17.6 Baseline conditions

17.6.1 The baseline conditions for climate resilience are described below for the Proposed Development, for both the present-day baseline conditions and future baseline conditions. This section also describes the local setting, as this is important within the context of current and future climates, for example in terms of flood risk and drainage. Further details of the use of climate change parameters within the flood risk assessment are set out and examined in Chapter 10: Water resources and flood risk, of this EIA Scoping Report.

Present-day baseline

Present-day landscape context

17.6.2 The area in which the Proposed Development lies is described within the Met Office's Regional Summary for Eastern England (Met Office, 2016), identifying the altitude of much of the area as being below 60m above Ordnance Datum (mAOD), and the Fens landscape as having the largest tract of low-lying, flat land in the UK. The Scoping boundary is close to or at present-day sea level.

17.6.3 The Fens landscape is intensively managed and engineered to provide suitable conditions for food production, and to avoid the effects of both fluvial and tidal flooding. The landscape includes an extensive network of drains, Main Rivers with raised embankments, raised coastal defences, and large tidal river sluices that manage the fluvial and tidal flood risk and river flows.

Present-day climatic conditions

17.6.4 The Met Office's Regional Summary for Eastern England summarises the observed climatic conditions in the area for the period 1981 – 2010 and includes the following observations:

- Temperature: The mean annual temperature in the region varies from 9.5°C to just over 10.5°C due to altitude and proximity to the coast. Temperature varies seasonally and diurnally, with January and February being the coldest months with a mean daily minimum temperature across the region close to 1°C. Mean daily maximum temperatures range from just over 6°C to 8°C during the winter months, and from 20°C to 23°C in the summer.
- Precipitation: Much of Eastern England receives less than 700mm per year and includes some of the driest areas in the country. Across most of the region there are, on average, about 30 rain days (rainfall greater than 1mm) in winter (December to February) and less than 25 days in summer (June to August), with the highest averages being at the higher altitude of the Lincolnshire Wolds. The average number of days with snow falling each year ranges from under 20 in the south-east of the area to over 30 on higher ground. The average number of days with snow lying is less, varying from about 6 to 15, with temperatures less than 4°C needed for snow to lie. It is unusual to get accumulations of more than 15cm of snow; places on the Lincolnshire Wolds tend to be the most prone.
- Wind: A day of gale is defined as a day on which the wind speed attains a mean value of 34 knots or more, over any period of 10 minutes. Much of East Anglia and Lincolnshire has no more than two days of gale each year, but areas with exposed coasts average about five gales each year.

17.6.5 Heatwaves are of particular relevance to the study area because the two most recent record temperatures for the UK were within East Anglia, with a temperature of 37.8°C in the Cambridge Botanic Gardens in 2018, and a temperature of 40.3°C in Coningsby, Lincolnshire in July 2022.

Future baseline

Climate context

17.6.6 As sea levels rise due to climate change, much of the low lying Fens landscape would be at risk of inundation without the existing flood defences, which substantially reduce that risk. In addition, there will also be an increased risk of fluvial systems 'backing up' during higher future high tides, in combination with higher river levels that relate to climate projections of wetter winters and more intense rainfall events. Further details are provided in Chapter 10: Water resources and flood risk.

Future climate baseline data

17.6.7 The projected future climate baseline is expressed as a departure from the present-day baseline, in accordance with climate modelling standard practice. The future climate projections for the 2090s are summarised below. These are based on the highest emissions scenario in line with the IEMA EIA Guide to: Climate Change Resilience and Adaptation (IEMA, 2020) and are the furthest future UKCP18 datasets available for temperatures, precipitation and wind.

17.6.8 The climate variables that are considered to be of relevance for the climate resilience assessment are:

- Change in average seasonal temperatures in summer and winter.
- Change in maximum summer temperatures.
- Change in average total rainfall in summer and winter.
- Change in total rainfall during extreme events over one- and five-days in summer and winter.
- Change in average wind speeds and gusts.
- Changes in sea level.

Temperature projections

17.6.9 Image 17.1 shows the projected trend in hotter summers and warmer winters for the RCP8.5 10th, 50th and 90th percentiles for the 2090s.

17.6.10 Summer average daily temperatures are projected to increase from 16.3°C as the present-day baseline, to a range from 19.1°C to 24.4°C in the 2090s.

17.6.11 Winter average daily temperatures are projected to increase from 4.3°C as the present-day baseline, to a range from 5.7°C to 9.9°C in the 2090s.

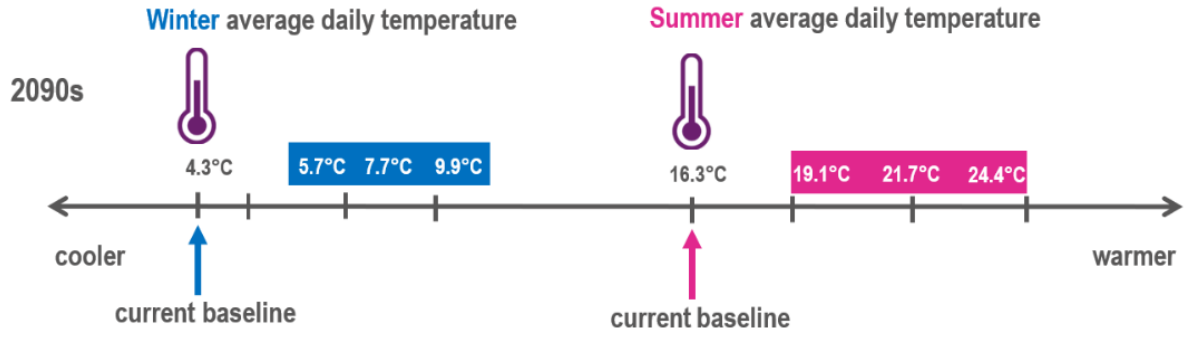

Image 17.1: Baseline and future average daily temperatures

Notes: The shaded areas represent the percentiles. Not to scale.
Source: Adapted from UK Climate Projections 2018 (Met Office, no date). Crown Copyright.

Precipitation

17.6.12 Image 17.2 shows the projected trend for drier summers and wetter winters under RCP8.5 10th, 50th and 90th percentiles for the 2090s.

17.6.13 The summer average daily precipitation rate is projected to decrease from 145.4mm as the present-day baseline to a range between 82.0mm and 138.9mm by the 2090s.

17.6.14 By contrast, winter average daily precipitation rate may increase from 123.9mm as the present-day baseline to a range between 123.4mm and 171.4mm by the 2090s.

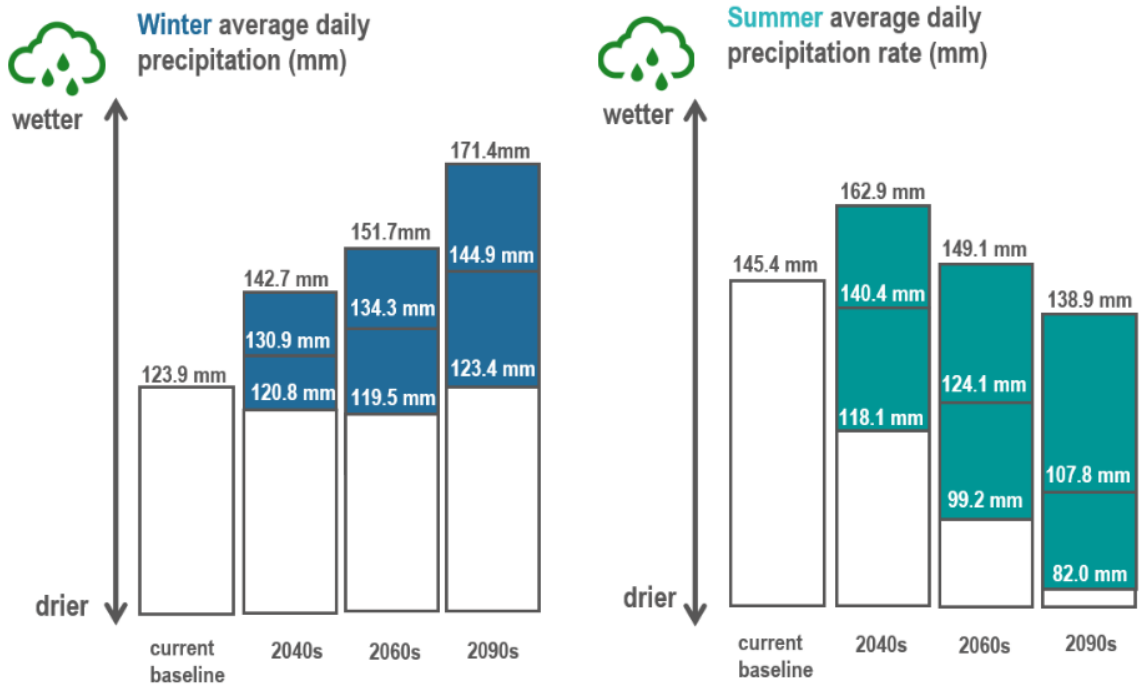

Image 17.2: Baseline and future precipitation

Notes:
The shaded area shows the range of the projected change. Not to scale.
Time periods refer to the 2040s (2030 – 2049), 2060s (2050 – 2069) and 2090s (2080 – 2099).
Source: Adapted from UK Climate Projections 2018 (Met Office, no date). Crown Copyright.

17.7 Design and mitigation

17.7.1 Climate resilience will be designed and incorporated into the Proposed Development through the means of various risk mitigation measures including:

- Resilience measures and adaptive capacity embedded into the design, and further embedded during detailed design.
- Monitoring, management and response plans to be developed and implemented during the operational phase.

Design

17.7.2 The design development process has sought to embed resilience measures and adaptive capacity into the Proposed Development from its early design stages, and this will continue to be developed and refined as the design evolves. Embedded resilience measures include:

- The site selection process for the proposed reservoir was informed by studies to identify a location that can provide a sustainable long-term water supply without damaging the water environment of the rivers from which water abstractions would be taken, taking into consideration allowances for climate change and therefore enabling a sustainable supply for the proposed reservoir through its operational lifetime.
- Modelling has been used to inform the design around how water abstraction for the proposed reservoir would be managed during drought conditions, including under future climate change conditions. The modelling considers the potential effect on water levels during future winter and summer seasons, and the potential effect on the biodiversity of the rivers. Further details of the modelling carried out are included in Chapter 10: Water resources and flood risk.
- The site selection process was also informed by studies on flood risk to identify a location where flood risk can be managed both with respect to the effects of the Proposed Development on the surrounding landscape, and the risks to the Proposed Development itself during design development. These flood risk studies included an allowance for climate change, as detailed in Chapter 10: Water resources and flood risk. The site selection process for the supporting infrastructure, such as the water transfers and water treatment works, has further considered flood risk with an allowance for climate change.
- Capacity for future adaption within the designs to allow for changing infrastructure needs and specifications as the climate changes, for example needs for additional space or capacity, design tolerances to changing peak temperatures or peak rainfall, or to consider potential changes to safe working environments during future extreme weather events. An example of this is consideration for the future needs and specifications of assets as components come to the end of their design life.

- Use of climate projection data to inform the design tolerances to long-term climatic average conditions and extreme weather conditions. RCP8.5 50th percentile climate projection data will be used to inform the Development Consent Order (DCO) design and assessment. In addition to this, and to align with the requirements in the NPS for Water Resources Infrastructure (Defra, 2023) to consider extreme climate scenarios, the DCO design and assessment process will use the RCP8.5 10th and 90th percentile and the H++ extremes climate projection data for sea level rise as appropriate to sensitivity test critical elements of the DCO design.
- The Proposed Development will be constructed and operated in accordance with the requirements of the Reservoirs Act 1975 (as amended) for managing the risk of water escape from large reservoirs. The inclusion of embedded measures such as the spillway and emergency drawdown infrastructure would be put in place to mitigate the risk of uncontrolled release of water from the proposed reservoir. The modelling for the infrastructure design and control of water levels related to this includes allowances for climate change. Further information on risk from emergency procedures is included in Chapter 22: Major accidents and disasters.

Mitigation

17.7.3 Documents presenting the approach to mitigation will be produced, either to accompany the ES or as part of other documentation produced for the DCO submission. These will set out the measures that would be applied throughout the detailed design to further embed climate resilience and adaptive capacity measures. Measures will be identified for the monitoring, management and response to observed climate changes and the potential effects of extreme weather events throughout the operational lifetime of the Proposed Development.

17.7.4 Mitigation for the operational phase would include a mechanism to review mitigation measures and actions in line with updates to climate science and industry good practice. These documents may cover routine or post-extreme weather inspection of assets or monitoring of habitat conditions, responses to climatic trigger levels, for example site management actions to be initiated in response to temperature or rainfall thresholds being reached, and the climatic parameters to be considered in future asset upgrades.

17.8 Proposed scope of assessments

Likely climate change risks requiring assessment (scoped in)

17.8.1 The assessment of climate resilience considers the potential for future physical climate change risks to the Proposed Development and its operation. The assessment would identify how the Applicant has designed the Proposed Development in relation to climate change, rather than the potential effects that the Proposed Development may have on the local environment and communities. This assessment therefore does not conform to the approach typical of other EIA

aspect chapters, as it focuses on climate change risks to the Proposed Development and how these could be mitigated through the design and operation.

17.8.2 Climate change risks to the Proposed Development during the operational phase will consider risks from both long-term chronic changes to seasonal climatic averages for temperature and precipitation, and also the potential effects of short-lived, acute extreme weather events, such as accumulated rainfall during an extreme rainfall event or elevated temperatures in a heatwave. These risks to the Proposed Development are outlined in Table 17-2. Where potential effects may be specific to one or more zones of the Proposed Development and the relevant study area, this is identified in Table 17-2 (see Chapter 2: Project description, for further discussion of zones).

17.8.3 Section 17.9 outlines the methodology that will be used to carry out a Climate Change Risk Assessment (CCRA) of these risks, including timescales to be considered.

17.8.4 The assessment of changes to the potential effects of the Proposed Development on the local environment and communities under climate change during the operational lifetime, and mitigation to manage changes and uncertainties will be considered within the development of the design and within the EIA process. Changes to the significance of the effects on the local environment and communities due to climate change will be reported as relevant within the aspect chapters of the ES. The potential changes in effects that will be considered within the EIA are in the Future baseline sections of Chapters 7 to 22 of this EIA Scoping Report.

Table 17-2: Risks associated with climate resilience

Activities	Climate change risk	Effect on operation	Zone
Operation			
All operational components including those required for the operation of the proposed reservoir	• Seasonally hotter summers. • Increasing peak temperatures and frequency of heatwaves. • Drier summers with increased risk of prolonged drought. • Increasingly intense, acute summer downpours.	• Structural damage due to expansion and thermal loading of metallic features and concrete structures. • Expansion, buckling or warping of metallic and plastic components. • Overheating and shorting out of monitoring, electrical and communications systems. • Clay embankment surfaces cracking followed by intense rainfall penetrating cracks, leading to an increasing risk of embankment	All zones

Activities	Climate change risk	Effect on operation	Zone
		destabilisation and flood defence breach. • Vegetation dieback exposing embankments and increasing risk of earthworks failure. • Greater evaporation and reduced summer supply leading to drying out of open transfer watercourses. • Potential for ground subsidence due to lower groundwater levels in peat and clay soils and pipework damage. • Risk of banks cracking adjacent to river abstraction structure in low water levels. • Melting and damage to road surfaces, drying and cracking of made surfaces, and subsidence and deformation of roads and pathways.	
All operational components	• Seasonally wetter winters. • Increasingly intense rainfall events.	• Inundation or water ingress causing structural damage or failure of electrical and communications systems. • Watercourse embankment bank slippage and failure or increased scour. • Overwhelming and backing up of piped water transfers and upstream flooding during downpours. • Increased turbidity (sediment load) and nutrient load of the river water abstractions. • Flooding of access routes and damage to road surfaces.	All zones
All operational components in particular buildings	• Increased frequency and intensity of storms.	• Storm damage to on-site electrical and communications systems	All zones

Activities	Climate change risk	Effect on operation	Zone
		from high winds and lightning. • Failure in operations within the Proposed Development due to storm damage outages in off-site external electricity grid supply and communication networks. • Risks to on-site structures from wind-blown debris, high winds and waves.	
All operational components, in particular, operation of the proposed reservoir, operation of open channel transfers, and inter-catchment treatment	• Seasonally warmer winters. • Seasonally hotter summers. • Increasing peak temperatures and frequency of heatwaves. • Drier summers with increased risk of prolonged drought.	• Decreased water quality in watercourses, reservoir and lagoons due to lower water levels, increasing water temperatures, potentially greater stratification of the water column in the reservoir, lower dissolved oxygen levels, and increased frequency and duration of algal blooms. • Reduced water quality, requiring more treatment prior to supply. • Changes in nature of invasive species, and increase in volume of biomass to be screened by the inter-catchment treatment intake.	All zones
Landscape and habitat planting	• Seasonally hotter summers. • Increasing peak temperatures and frequency of heatwaves. • Drier summers with increased risk of prolonged drought. • Seasonally wetter winters.	• Vegetation dieback due to increased temperatures and lower soil moisture content, and risk of failure of planting and habitat creation. • Increased wildfire risk of dry vegetation. • Waterlogging of soils and vegetation dieback.	All zones
Site users, including site operatives and	• Increasing intensity, frequency and duration of acute	• Health hazards, such as heat stress and heatstroke,	All zones

Activities	Climate change risk	Effect on operation	Zone
recreational users	events including heatwaves, intense rainfall and storms.	particularly to heat-vulnerable site users. • Safety risks from flood waters, including in evacuation and access for emergency services, or for operational response. • Safety risks associated with travel and use of the site in stormy conditions.	

Climate change risks not requiring assessment (scoped out)

17.8.5 Table 17-3 outlines the potential climate change risks to be scoped out of the climate resilience assessment.

17.8.6 The changes in average seasonal climate conditions would be slight between the present day and the end of construction, but they may still affect the likelihood and/or severity of extreme weather events, such as flooding and high temperatures, which may have effects on the construction works and programme. These scenarios are already considered within other chapters within this EIA Scoping Report, for example flood risk during construction from heavy rainfall or storms as assessed within Chapter 10: Water resources and flood risk. Dry summers or windy conditions that may increase dust during construction are considered within Chapter 15: Air quality. Therefore, all construction risks associated with climate change and extreme weather events are scoped out of this chapter, to avoid overlap or double counting with the other assessments.

Table 17-3: Potential risks to be scoped out of the climate resilience assessment

Activity	Climate change risk	Effect	Zone	Justification for scoping out
Construction				
All construction components	Droughts, intense rainfall events and storms	Dust creation and flood risk and storm damage affecting programme and site safety.	All zones	These matters will be covered within other EIA chapters.
Operation				
All operational components	Cold temperatures	Damage to assets due to freezing, weight of	All zones	Climate projections indicate gradual warming of winter seasonal averages. Met Office guidance indicates that while

Activity	Climate change risk	Effect	Zone	Justification for scoping out
		snow and ice build-up.		cold snaps will occur, winters are not anticipated to get colder than historic low temperatures, therefore the low temperatures already included in design standards and specifications will still apply for future low temperatures.
All operational components	Sea level rise	Changes to fluvial flows and effects on flood risk.	All zones	Sea level rise is considered within Chapter 10: Water resources and flood risk, with respect to effects on flood risk, and so is scoped out of the climate resilience assessment.
All operational components	All climate effects	Corporate financial risks relating to the Task Force for Climate-related Financial Disclosure (TCFD) (HM Treasury, 2024)	All zones	While the delivery of the Proposed Development will address the requirements of the UK government's TCFD guidance, the risks considered by this in relation to corporate financial risks due to climate change through the operational phase are not a requirement of the NPS for Water Resources Infrastructure and so will not be reported within the ES.

17.9 Assessment methodology

17.9.1 The study area set out in Section 17.4 will be kept under review as the design and consultation processes progress, and the Proposed Development is refined. Therefore, the study area may evolve as appropriate. Any evolution of the study area will be clearly communicated in the ES and discussed with relevant consultees.

17.9.2 The proposals, described in Chapter 2: Project description, will also evolve and be further developed as the design process progresses. Whilst the methodologies that are set out within this chapter are not anticipated to change, the scope of assessment will be kept under review as design progresses.

Additional baseline information required

17.9.3 No additional baseline information is expected to be obtained for the assessment other than additional parameters or time horizons from the Met Office UKCP18 datasets, or updated or revised climate projections that are published.

Assessment years

17.9.4 The assessment of resilience of the design and operation of the Proposed Development with regards to climate change, will be carried out for the operational design life of the project.

17.9.5 The assessment of climate change risks will be defined by the furthest future climate projection data available from the Met Office, which is up to the 2090s for temperatures and precipitation.

17.9.6 The potential effects of climate change on the different components of the Proposed Development will be assessed according to the climate projections for the end of their respective design lives. Where components would be renewed during the operational lifetime, the adaptive capacity of the design to cater for future plant needs or climate tolerances during a future time period will be assessed and fed back into the design development. For example, if a component is likely to need a larger footprint in the future, then capacity to expand will be allowed for in the design layout.

17.9.7 Given that the assets and components will have different design lives, two timescales are proposed for the climate resilience assessment: the 2060s as an interim time period for project components that are anticipated to be replaced after 30 years of operation, for example mechanical components of pumps that will experience wear and tear; and the 2090s for components that have a longer/permanent design life, for example the reservoir earthworks and embankments.

17.9.8 Given that the design life of the Proposed Development is anticipated to exceed the available climate projection data from the Met Office, and that climate-related physical risks are likely to continue to increase into the next century, long-term adaptability of the Proposed Development will be considered, with a focus on its primary function of continued water supply.

17.9.9 Climate guidance from the Environment Agency to be used to inform flood assessments for sea level rise up to the year 2125, is outlined in Chapter 10: Water resources and flood risk of this EIA Scoping Report.

Operational assessment methodology

17.9.10 A CCRA will be carried out for the Proposed Development as part of the design development. This will follow recognised methods for assessing climate change risks to infrastructure within the UK and will align with the IEMA EIA Guide to: Climate Change Resilience and Adaptation (IEMA, 2020), and the international

standard ISO 14091 on Adaptation to Climate Change – Guidelines on vulnerability, impacts and risk assessment (British Standards Institution, 2021).

17.9.11 The CCRA would not attribute levels of significance but instead would consider the likelihood and consequence of physical climate change risks to the Proposed Development, its operation and its users, to establish a risk rating of High, Medium, Low or Negligible.

17.9.12 The likelihood of climate change risks having a negative impact on the Proposed Development will consider the degree to which the chronic climate seasonal averages and acute extreme weather events are projected to change, in frequency and severity, the localised changes in environmental conditions that this would lead to, and the degree to which embedded resilience measures reduce climate change risks.

17.9.13 The consequence of each climate change risk will consider the ability of the Proposed Development assets, operations or users to withstand and recover from a climate impact – either chronic or acute impact – while either keeping or shortly returning to their normal functionality.

17.9.14 The climate resilience chapter within the future EIA will present findings of the CCRA, including an outline of the embedded mitigation measures that have been integrated into the design, the risks ratings after embedded mitigation has been considered, and the mitigation to be implemented during detailed design and during the operational phase to manage residual risks.

17.10 Assessment assumptions and limitations

17.10.1 The climate baseline is based on freely available information available from third parties for reporting purposes, including observational data from local weather stations, readily available climate change projections, and a range of existing climate change datasets and literature at the time of writing this assessment.

17.10.2 Climate projections are not predictions or forecasts but simulations of potential scenarios of future climate under a range of hypothetical emissions scenarios and assumptions. The results, therefore, from the experiments performed by climate models cannot be treated as exact or factual, but projection options. They represent internally consistent representations of how the climate may evolve in response to a range of potential forcing scenarios, and their reliability varies between climate variables. Furthermore, the degree of uncertainty associated with all climate change projections increases for projections further into the future.

18 Noise and vibration

18.1 Introduction

18.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to noise and vibration. The chapter should be read in conjunction with the description of the project as presented in Chapter 2: Project description.

18.1.2 Noise and vibration can have an impact on the environment and on the quality of life enjoyed by individuals and communities. They may, in certain circumstances, lead to effects on human, ecological and infrastructure receptors. Potential noise and vibration effects are therefore considered during the EIA scoping process.

18.1.3 For the aspect of noise and vibration, the receptors considered are:

- Local residents (including workers residing at possible temporary worker accommodation (if required)).
- School and hospital occupants.
- Users of parks and open spaces.
- Other potentially noise sensitive receptors, for example religious buildings.

18.1.4 This chapter focusses on the quantitative assessment of noise and vibration emissions for these receptors. More details about the full range of receptors that will be considered by the noise and vibration assessment are provided in Section 18.8.

18.1.5 The effects of noise and vibration on other receptors are considered qualitatively in the following chapters, where further interpretation by the relevant technical specialists is included:

- Chapter 7: Landscape and visual effects – considers tranquillity.
- Chapter 8: Terrestrial biodiversity and Chapter 9: Aquatic biodiversity – consider ecological receptors.
- Chapter 11: Historic environment – considers the setting of historic receptors such as listed buildings.
- Chapter 19: Public access and amenity – considers users of Public Rights of Way and other recreational or access features.
- Chapter 21: Human health – includes consideration of how noise and vibration may affect the health of local people.

18.1.6 This chapter considers the potential for the following activities to give rise to noise and vibration effects:

- Construction activity within the working areas as described in Chapter 2: Project description including areas at the reservoir site and associated water infrastructure sites.
- Construction and operational transportation movements on access roads, public highways, waterways and railways.
- Operation of the various proposed plant items at the associated water infrastructure sites, such as pumps at a pumping station and process plant at a water treatment works.
- Operation of the proposed recreational facilities at the reservoir site.

18.1.7 In this chapter, in line with current legislation, references to 'noise' can apply equally to the assessment of vibration impacts.

18.2 Legislation, policy and guidance requirements

18.2.1 Legislation, policy and guidance which has informed the scope of the assessment presented within this chapter, is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

18.2.2 Table 18-1 identifies the relevant policy in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) and the National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities (DLUHC), 2023) for noise and vibration.

Table 18-1: UK policy relevant to noise and vibration

Relevant UK policy	Relevance to assessment
NPS for Water Resources Infrastructure (Defra, 2023)	Section 4.11 provides guidance on the assessments and planning requirements that the applicant should meet with respect to noise and vibration. These include: • Factors that will determine the likely noise impact of the proposals. • The components of the noise assessment to be included in the Environmental Statement (ES). • Prediction, assessment and management techniques. • Mitigation measures. • Policy compliance requirements.
NPPF (DLUHC, 2023)	Paragraph 180(e) states that planning decisions should contribute to and enhance the natural and local environment by, among other factors, preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution.

Relevant UK policy	Relevance to assessment
	Paragraph 191 states that planning decisions should also: • Mitigate, and reduce to a minimum, potential adverse impacts resulting from noise from new development and avoid noise giving rise to significant adverse impacts on health and the quality of life. • Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

18.2.3 Good practice guidance on noise and vibration assessments, such as British and international Standards and guidance documents published by the Institute of Environmental Management and Assessment (IEMA) and various government departments and organisations, which has been and will be used to inform the EIA is listed in Table 2-2 of Appendix 4.1: Legislation, planning policy and guidance summary.

18.3 Stakeholder engagement

18.3.1 In preparing this EIA Scoping Report, there has been engagement and discussions with a number of stakeholders, as set out in Table 18-2. This engagement has principally related to the following:

- Baseline noise survey locations and methodology.
- Approach to the assessment of significance.

18.3.2 The dialogue with stakeholders will continue throughout the pre-application period as part of the EIA process. A summary of the engagement undertaken so far is presented in Table 18-2, along with proposed future engagement. In addition, Fenland District Council was also invited to observe the noise survey equipment deployment during the June/July 2024 baseline surveys for the reservoir site.

Table 18-2: Engagement with stakeholders

Stakeholder	Engagement undertaken to date	Proposed future engagement
Cambridgeshire County Council (Public Health) Fenland District Council (Environmental Health and Local Planning Team)	**3 November 2023** – Technical Working Group (TWG) meeting to discuss the scope of the noise and vibration assessment including baseline data and matters for assessment for the main reservoir site. **17 April 2024** – meeting to discuss the scope and locations for the noise surveys at the reservoir site.	Additional engagement proposed on the initial findings of the noise assessment and potential mitigation measures. Additional engagement proposed to discuss the results after

Stakeholder	Engagement undertaken to date	Proposed future engagement
	25 April 2024 – TWG meeting to discuss the proposed scope of the assessment and the assessment methodology to be used in the ES.	completion of the site surveys.
Huntingdonshire District Council Peterborough City Council Cambridgeshire County Council South Cambridgeshire District Council Norfolk County Council Fenland District Council	**15 May 2024** – Local authority associated infrastructure forum meeting to discuss outlining the proposed scope of the assessment and the assessment methodology to be used in the ES for the associated water infrastructure.	Additional engagement proposed on the initial findings of the noise assessment and potential mitigation measures.
Borough Council of King's Lynn & West Norfolk (Community Safety & Neighbourhood Nuisance) Environmental health officers from South Cambridgeshire District Council, Huntingdonshire District Council, Cambridgeshire County Council, Fenland District Council and Peterborough City Council	**17 July 2024** – meeting to discuss the scope and locations for the noise surveys related to the proposed associated water infrastructure.	Additional engagement proposed to discuss the results after completion of the site surveys.

18.4 Study area

18.4.1 The study areas for noise and vibration have been defined based on the Scoping boundary and the available information for the Proposed Development. This includes the information on construction and operational phases as described in Chapter 2: Project description. The identified study areas are considered to be sufficiently broad to allow for the ongoing refinement of the Proposed Development; however, if required they would be updated to ensure there is appropriate coverage of all likely significant environmental effects.

18.4.2 Study areas have been defined for each of the different types of noise and vibration emissions considered to have the potential to result in likely significant effects. For each emission source, the study area is defined as a buffer around the Scoping boundary, or a distance from the source itself.

18.4.3 The study areas also take into account the four operational zones listed below, and as described in Chapter 2: Project description.

- Sources of supply and upstream water transfers.
- Reservoir site.
- Water treatment works.
- Downstream treated water transfers.

Construction and bulk earthworks noise and vibration assessment

18.4.4 Following guidance in BS 5228-1:2009 +A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (British Standards Institution (BSI), 2014a) and the Design Manual for Roads and Bridges (DMRB) LA 111 (Highways England, 2020), the initial study area (for both the scoping and impact assessment stages of the EIA process) for the construction noise assessment is 300m from the Scoping boundary.

18.4.5 Whilst DMRB LA 111 applies directly to highway schemes, it is considered relevant to the Proposed Development as it represents the most recent government guidance on construction noise and vibration. Many of the construction plant items commonly used for highways schemes will be used to construct the Proposed Development.

18.4.6 Based on professional judgement and experience, the study area is extended to 500m around the bulk earthworks at the reservoir site and proposed trenchless crossing compounds.

18.4.7 The noise sources and activities undertaken for the bulk earthworks would be similar to those at mineral extraction sites. The Minerals Products Association and The Planning Officers' Society (2019) provide guidance on setting Minerals Consultation Areas, which identify the area in which the local planning authority should consult with the mineral planning authority on local plan site allocations and planning applications. These are generally up to a maximum of 500m from a mineral infrastructure site.

18.4.8 Noise assessments undertaken for Anglian Water Services Ltd's Strategic Pipeline Alliance project identified that trenchless crossing works had the potential to result in significant noise effects at night-time at distances of up to approximately 450m, if no mitigation was put in place. This distance has been extended to 500m to allow for some variations in plant between the Strategic Pipeline Alliance project and the Proposed Development.

18.4.9 The study area for the construction vibration assessment is 100m from the Scoping boundary, in accordance with DMRB LA 111, as vibration effects are commonly experienced over much shorter distances than noise effects.

Construction road traffic noise and vibration

18.4.10 The construction traffic noise study area is defined as 50m from the carriageway edge of public roads with the potential for an increase in basic noise level (BNL) of 1dB(A) or more. The procedure for calculating a BNL is set out by the Calculation of Road Traffic Noise (CRTN) document (Department of Transport and the Welsh Office, 1988) and relates to a noise level at a reference location 10m from the carriageway edge.

18.4.11 It is proposed that BNL calculations will be undertaken for all road links where baseline traffic flow information is presented in Chapter 14: Traffic and transport of this EIA Scoping Report. Baseline flows may not be available for all road links used by construction traffic, especially for quieter links. The study area may need to be extended if construction traffic using such links is likely to generate noise above the Lowest Observed Adverse Effect Level (LOAEL), and thus may have the potential to cause a likely significant effect.

18.4.12 For construction traffic vibration, the study area is based on guidance presented in Research report 53, Ground vibration caused by civil engineering works (Transport and Roads Research Laboratory, 1986), which indicates that a 'Heavy lorry on a poor road surface' would result in groundborne vibration levels (peak particle velocity (PPV)) of less than 1mm/s at a distance of approximately 2m and approximately 0.3mm/s at a distance of approximately 4m. The study area is defined as 4m from the carriageway edge of any route used by Heavy Goods Vehicles (HGVs). This includes the public highway, and access tracks within the Scoping boundary.

Construction rail movement noise and vibration

18.4.13 The Calculation of Railway Noise (Department of Transport, 1995) states that noise predictions may be made at distances of up to 300m from a railway. No further guidance related to an assessment study area is provided. An initial, conservative, study area of 300m, for both noise and vibration, will be adopted but kept under review throughout the EIA process.

Construction inland waterway transport movement noise

18.4.14 The study area for noise from the use of inland waterways to transport construction materials will be proportionate to the noise emissions from these sources. In the absence of any guidance on study areas for the assessment of noise from these sources, the study area adopted for the purposes of this EIA Scoping Report is similar to that defined for road traffic, i.e. 50m from the watercourse bank where it is considered likely that the noise from additional traffic would be above the LOAEL. Noise modelling to determine where traffic noise will be above the LOAEL will be undertaken as part of the assessment process.

18.4.15 The use of inland waterways to transport construction materials is not considered likely to be a source of potentially significant vibration effects.

On-site temporary worker accommodation

18.4.16 The site suitability assessment for any required on-site temporary worker accommodation will be restricted to the accommodation itself and any areas designated for the amenity or leisure use of the workers residing at this accommodation.

Operational industrial noise and vibration

18.4.17 There is no current authoritative guidance on how far a noise study area should extend from the operational industrial noise sources planned as part of the Proposed Development. The study area required for operational noise sources will depend on the noise emission level from those sources: a low noise emission level would result in a small study area, whereas a higher noise emission level would result in a larger study area.

18.4.18 It is anticipated that the most common receptor type with the potential to be affected by operational noise from the Proposed Development is residential. The study area will include all residential receptors within the Scoping boundary, and the nearest residential receptors to the Scoping boundary. This will be kept under review, and extended if necessary, so that the full extent of any likely significant effects is fully characterised.

18.4.19 Operational industrial vibration effects are not expected to be significant (see Section 18.8).

Operational traffic noise and vibration

18.4.20 For operational traffic noise from any new or altered highway, DMRB LA 111 recommends a study area of 600m from the edge of the carriageway. However, on the wider road network, DMRB LA 111 recommends a study area of 50m from a carriageway with the potential to experience an increase in BNL of 1dB(A) or more resulting from the introduction of a development. These study areas will be adopted as the Proposed Development may involve highway alterations, such as the creation of new permanent site access points, and will result in traffic flow changes on the wider road network.

18.4.21 As for construction vibration, the study area is defined as 4m from the carriageway edge of any route used by HGVs.

18.5 Baseline data collection

18.5.1 The baseline conditions for noise and vibration presented in Section 18.6 represent a review of the currently available data set out in this section. The data collated to date were obtained via desk-based studies and field surveys. Data collection to inform the baseline of the assessment is ongoing. The data described in this section provide a robust context for the scoping of the assessments.

Desk studies

18.5.2 A review has been undertaken of the strategic noise mapping undertaken by Defra in 2012 and 2017 for major railways and major roads respectively. These results, available through the England Noise and Air Quality Viewer (Extrium, 2019), have been used to provide a high-level description of existing road traffic and rail noise levels at receptors in parts of the study areas covered by the strategic noise mapping.

18.5.3 Since the transportation study areas have not yet been fully spatially defined, only the study areas around the Scoping boundary have been reviewed at this stage and further reference will be made to the strategic noise mapping results (Extrium, 2019) once the routing is known. The strategic noise mapping results in the transportation study areas will not directly affect the transportation noise and vibration assessment methodologies, which are designed to take into account variation in baseline noise levels.

Field surveys

18.5.4 The baseline noise survey at the reservoir site is underway at the time of writing this EIA Scoping Report and the results will be included in the ES at application. As set out at Table 18-2, the scope and locations for the reservoir site noise survey were discussed and agreed with stakeholders, including Fenland District Council.

18.5.5 Baseline noise surveys are also proposed for associated water infrastructure sites that are proposed to incorporate operational noise sources, including pumping stations, inter-catchment treatment and water treatment works. The scope and locations for the associated water infrastructure sites noise survey were discussed and agreed with stakeholders, including the relevant district councils.

18.5.6 There are no particular sources of groundborne vibration identified within the study area. Existing levels of vibration at receptors would not influence the assessment as they are typically orders of magnitude below levels that would give rise to adverse vibration effects. As such no field surveys are proposed to establish a vibration baseline.

18.6 Baseline conditions

18.6.1 The baseline conditions for noise and vibration are described below for the four zones within the Scoping boundary (defined in Chapter 2: Project description). The baseline conditions are as established from the data collection described in Section 18.5.

Baseline relevant to all zones

18.6.2 Baseline noise levels are likely to vary within the Scoping boundary as it includes a variety of rural and more built-up areas. The main factors that affect baseline noise levels are expected to be as follows:

- Higher noise levels would be expected at locations closer to transport infrastructure and industrial activity. Agricultural noise sources (e.g. tractors working in fields) are not considered due to their intermittent and highly variable nature.
- Diurnal patterns – higher noise levels would be expected at times of peak transport activity and lowest at night.
- Seasonal patterns – for example road traffic noise can vary through the year, being influenced by holiday periods and weather conditions.
- Meteorological conditions – noise levels would be at their lowest in the absence of wind and rain.

18.6.3 The Defra strategic noise mapping indicates that noise levels at some receptors in the vicinity of roads and railways could be above 55dB $L_{Aeq\ 16hr}$ and/or above 50dB L_{night}. The relevant major roads and railways included in the strategic noise map in the vicinity of each part of the Scoping boundary are identified in the following sections.

18.6.4 As part of the strategic noise mapping, Defra has produced a list of noise Important Areas (IAs), identified as areas requiring action to reduce noise levels. Various IAs have been designated on the road networks local to the Proposed Development. Those relevant to each part of the Scoping boundary are detailed in the next sections.

18.6.5 No particular sources of baseline groundborne vibration have been identified, other than highways and railways. Following the methodology outlined in DMRB LA 111 construction vibration baseline levels are assumed to be zero for all receptors.

18.6.6 For the construction and operational transport assessments, it has been assumed that the vibration levels that may be generated by the Proposed Development related road and rail movements are likely to be within the range generated by the existing movements. The baseline will therefore focus on consideration of the number of transport movements.

Baseline for sources of supply and upstream water transfers

18.6.7 Certain receptors with the potential to be affected by activities associated with the sources of supply and upstream water transfers included as part of the Proposed Development, may be affected by noise from sources included in Defra's strategic noise mapping. These noise sources include:

- A1122 east of Nordelph and at Bexwell.
- A10 at Bexwell.

- A142 near Chatteris.
- A1123 near Bluntisham.
- Ely–Peterborough railway, north-west of Manea railway station.

18.6.8 No noise IAs have been identified in the vicinity of the sources of supply or upstream transfers.

Baseline for the reservoir site

18.6.9 The roads included in Defra's strategic noise mapping in the vicinity of the reservoir site comprise:

- A141 which forms the western boundary of the site.
- A142 which forms part of the southern boundary of the site.

18.6.10 IA (ID 11365), comprising one residential property, is located on the A141 at Wimblington.

18.6.11 No major railways have been identified within the Scoping boundary of the reservoir site or its surrounds.

Baseline for the water treatment works

18.6.12 The A142 forms part of the western boundary of the water treatment works Scoping boundary.

18.6.13 No noise IA or major railways are located in the locality for the water treatment site.

Baseline for downstream treated water transfers

18.6.14 The following major roads included in Defra's strategic noise mapping intersect with or are close to the downstream treated water transfers Scoping boundary:

- A142 east and south of Chatteris.
- A1123 north of Needingworth.
- A14 south-west of Swavesey.
- A428 east of Hardwick.

18.6.15 No noise IAs or major railways have been identified in the vicinity of the downstream transfers.

Future baseline

18.6.16 The future baseline for the road traffic assessments will be calculated using the predicted future baseline traffic flow information to include the peak construction year and the opening year. Further details can be found in Chapter 14: Traffic and transport of this EIA Scoping Report.

18.6.17 Climate change, particularly temperature increases, may influence local noise levels and their effects on noise sensitive receptors. Rising temperatures may lead to increased use of cooling equipment, generating noise emissions for longer periods, including to cool equipment during hotter summer nights. Additionally, residents might keep windows open more often during hot periods, potentially altering their exposure to external noise sources. These changes may affect both noise generation and receptor behaviour. Other changes in meteorological factors may also lead to changes in local noise environments. The high variability of, and complex interactions between, meteorological factors and how they interact with existing noise sources indicates that the changes in environmental noise levels due to climate change are likely to differ for different localities. Further details can be found in Chapter 17: Climate resilience of this EIA Scoping Report.

18.6.18 Chapter 23: Cumulative effects will identify the proposed developments that are anticipated to be constructed prior to the construction of the Proposed Development. As such, these developments would form part of the future baseline for assessment within the EIA. Where this presents noise and vibration receptors, or a change to the current baseline specific to noise and vibration, this will be considered within the EIA.

18.7 Design and mitigation

Design

18.7.1 The design of the Proposed Development to date has taken consideration of environmental constraints and potential environmental effects. The design development process has sought to avoid and reduce potential adverse construction and operation environmental effects on noise and vibration sensitive receptors through the consideration of distance between noise sources and these receptors.

18.7.2 The ongoing development of the design will incorporate embedded mitigation to avoid and reduce potential adverse effects, where feasible.

Mitigation

18.7.3 The NPS for Water Resources Infrastructure (Defra, 2023) provides policy relevant to noise and vibration mitigation measures. It states that these should be proportionate and reasonable, and may include the following types of measures:

- Engineering – reduction of noise at point of generation and containment of noise generated.
- Materials – use of materials that reduce noise, such as the use of absorptive materials within buildings, or materials with better acoustic insulation properties to reduce noise breakout from buildings.
- Lay-out – adequate distance between source and noise sensitive receptors including outdoor amenity areas; incorporating good design to reduce noise

transmissions through screening by natural or purpose-built barriers or buildings.

- Administration – restricting activities allowed on the site either during construction and/or operation, such as specifying acceptable noise limits or times of use.

18.7.4 Documents presenting the approach to mitigation will be produced, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. These measures would be applied to mitigate likely significant effects, including noise and vibration effects. Noise and vibration considerations will also inform the process for developing construction methods and components, such as those relating to the use of earth-moving plant and machinery.

18.7.5 Examples of good practice and essential mitigation relevant to noise and vibration include:

- Works to be undertaken with reference to the standards for Codes of Practice set out below:
  - BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 1 – Noise (BSI, 2014a).
  - BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 2 – Vibration (BSI, 2014b).
- Review plant and equipment requirements and seek opportunities to reduce noise by best practicable means.
- Review programme and manage the timing and duration of noisy works wherever practicable.
- Undertaking community liaison about the nature and duration of noise and vibration effects, and the measures that will be put in place to appropriately manage them, so that these are well understood by the people that live in, work in and visit the local area. Relevant receptors will be notified in advance of key noise or vibration emitting activities.
- Application of a three-step construction noise mitigation approach in targeted locations:
  - Step 1 – installation of a work site barrier such as perimeter hoarding.
  - Step 2 – localised barriers or enclosures designed to target individual noise sources.
  - Step 3 – selection of quieter plant.

18.7.6 Relevant documents will be produced to set out the measures and standards of work to be applied during the operational phase. These would be applied to

monitor, manage and control potential adverse environmental effects associated with operation and maintenance activities. For example, the ES may include proposed noise limits for operational industrial plant and machinery.

18.8 Proposed scope of assessments

Sensitive receptors

18.8.1 The NPS for Water Resources Infrastructure (Defra, 2023) identifies 'noise sensitive premises' as including residential properties, schools and hospitals, and 'noise sensitive areas' as including certain parks and open spaces.

18.8.2 DMRB LA 111 provides various examples of noise sensitive receptors and states '*Examples include dwellings, hospitals, healthcare facilities, education facilities, community facilities, Environmental Noise Directive (END) quiet areas or potential END quiet areas, international and national or statutorily designated sites, public rights of way and cultural heritage assets*.'

18.8.3 The IEMA Guidelines for Environmental Noise Impact Assessment (IEMA, 2014) details additional noise sensitive receptor types, including:

- Places of worship.
- Open-air amenities.
- Cemeteries.
- Farms and kennels.
- Retail premises.
- Some commercial and industrial installations.

18.8.4 All of these noise sensitive receptors will be considered as far as relevant in the locality of the Proposed Development when identifying potential likely significant effects. The term 'noise sensitive receptors' includes vibration sensitive receptors.

Likely significant effects requiring assessment (scoped in)

18.8.5 The following section sets out the aspect-specific effects for noise and vibration. The likely significant effects requiring assessment are presented in Table 18-3.

18.8.6 Each different activity required for the construction and operation of the Proposed Development has been assigned to the relevant type of noise or vibration assessment. For example, noise from the construction of the reservoir embankment is considered by the bulk earthworks noise assessment; whereas noise from enabling works, the construction of structures/buildings and the installation of pipelines is considered as part of the construction noise assessment.

18.8.7 Where potential effects may be specific to one or more zones of the Proposed Development and the relevant study area, this is identified in Table 18-3 (see Chapter 2: Project description, for further discussion of zones).

Table 18-3: Likely significant noise and vibration effects

Activity	Effect	Receptor	Zone
Construction			
All construction activities including enabling works, construction of structures/buildings, excavation and earthworks, demolition of structures/buildings, installation of pipelines and installation/diversion of utilities and services, landscaping and reinstatement.	Potential increased noise and vibration levels due to the use of plant and machinery.	Noise sensitive receptors.	All zones. Noise from long-term bulk earthworks at the reservoir site will be assessed separately. Other smaller scale excavation work will be included in the construction noise and vibration assessment.
Construction transportation	Potential increased noise and vibration levels due to the additional construction transportation movements including road, rail and inland waterway traffic.	Noise sensitive receptors.	Traffic movements on the public transportation routes identified by Chapter 14: Traffic and transport will be included in the transport noise assessment (road, rail and inland waterways). Movements within the site will be included in the construction noise and vibration assessment.
Use of the on-site temporary worker accommodation	Potential for environmental noise and vibration to result in conditions unsuitable for residential purposes.	Noise sensitive receptors – occupants of the accommodation.	Reservoir site.
Operation			
Operational activities including operation of the	Potential increased noise levels due to	Noise sensitive receptors.	All zones. Included in the industrial noise assessment.

Activity	Effect	Receptor	Zone
reservoir; water treatment works; abstraction of water from Middle Level system, Ouse Washes or River Great Ouse and Counter Drain (Nene); inter-catchment treatment; and transfers via pipeline (including pumping stations)	the use of plant and machinery.		
Operational traffic movements	Potential increased noise and vibration levels due to the additional operational traffic including HGVs and recreational traffic.	Noise sensitive receptors.	Traffic movements on the public highway routes identified by Chapter 14: Traffic and transport.
Recreational use of the reservoir site	Potential increased noise levels due to the use of plant such as heating and ventilation units at the visitor hub.	Noise sensitive receptors.	Reservoir site buildings. Included in the industrial noise assessment.

Effects not requiring assessment (scoped out)

18.8.8 The effects proposed to be scoped out of the noise and vibration assessment are detailed in Table 18-4.

Table 18-4: Potential effects to be scoped out of the noise and vibration assessment

Activity	Effect	Receptor	Justification for scoping out
Construction			
No construction activities have been scoped out of the assessment.			
Operation			
Management of habitat creation (e.g. wetlands, lagoons)	Potential increased noise and vibration levels from the use of plant and machinery used to maintain the new habitats.	Noise sensitive receptors.	Noise and vibration sources involved in these activities will be similar to the agricultural noise and vibration sources already prevalent in the area.
Operation of open channel transfers	Potential increased noise and vibration levels.	Noise sensitive receptors.	No noise or vibration sources have been identified that are likely to have significant effects.
Operation of the reservoir; recreational use of the reservoir site; water treatment works; abstraction of water from Middle Level system, Ouse Washes or River Great Ouse and Counter Drain (Nene); inter-catchment treatment; and operation of transfers via pipeline	Potential increased vibration levels due to the use of plant and machinery.	Noise sensitive receptors.	It is assumed that any plant capable of generating vibration will be mounted appropriately with suitable isolation. Any vibration transmitted into the ground is likely to be negligible, and at orders of magnitude lower than would be expected to give rise to nuisance or damage to properties.
Operation of transfers via pipeline	Potential increased noise and vibration levels from the operation of the pipeline.	Noise sensitive receptors.	The valves are unlikely to generate sufficient noise to be perceptible at local receptors.
Operation of transfers via pipeline	Potential increased noise and vibration levels from transformers and stand-by generators.	Noise sensitive receptors.	The transformers are likely to result in negligible noise effects at all off-site receptors, based on observations from existing pumping stations. Emergency generators will only be tested for around 30 minutes once a month during daytime hours and only used in an

Activity	Effect	Receptor	Justification for scoping out
			emergency to ensure water supplies are maintained during any power outage.

18.9 Assessment methodology

18.9.1 The study areas set out in Section 18.4 will be reviewed as the design and consultation processes progress, and the Proposed Development is refined. Therefore, the study area may evolve as appropriate, with any changes clearly communicated in the ES and discussed with relevant consultees.

Additional baseline information required

18.9.2 A site-wide baseline noise survey is not proposed to support the construction noise assessment. The proposed method for the assessment of construction noise is based on methods set out in Annex E.3.2 of BS 5228-1 and DMRB LA 111. Whilst these methods use baseline noise levels to set assessment criteria, lower cut off values are set for areas with relatively low baseline noise levels. For example, where daytime baseline ambient noise levels are 65dB L_{AeqT} or less (when rounded to the nearest 5dB(A)), the assessment criterion is 65dB(A). Taking into account the predominantly rural setting of the Proposed Development, it is considered likely that ambient noise levels will generally be low, and hence the lower cut off values will apply. The most stringent thresholds from BS 5228-1 have been selected as default values, and therefore baseline noise monitoring is not required to provide a proportionate yet conservative assessment.

18.9.3 No baseline vibration survey is proposed to support the construction vibration assessment. Following guidance in DMRB LA 111, the vibration baseline will be assumed to be zero.

18.9.4 With respect to construction traffic noise, the baseline BNL will be calculated using the CRTN methodology and the baseline traffic flows for the road links identified as having the potential to experience increases in traffic due to construction activities. If flows are below the range of validity for CRTN, reference will be made to the Noise Advisory Council's (1978) A guide to the measurement and prediction of the equivalent continuous sound level L_{eq}. Baseline noise levels will only be calculated for road links where flow data is presented by Chapter 14: Traffic and transport. The need for supplementary road traffic noise baseline measurements at other locations will be kept under review.

18.9.5 Similarly, the baseline rail noise levels will be calculated using the Calculation of Railway Noise methodology. The need for baseline noise measurements at water transport routes will also be kept under review. Vibration baseline noise measurements are unlikely to be required at receptors near to rail and water transport routes. Water transport is unlikely to be a source of vibration effects. The

vibration baseline for rail movements can be calculated, where necessary, with reference to ISO 14837-1:2005 Mechanical vibration, groundborne noise and vibration arising from rail systems, Part 1: General guidance (International Organization for Standardization (ISO), 2005). The need for rail vibration baseline measurements will be kept under review.

18.9.6 Baseline surveys have been designed to support the bulk earthworks and operational industrial noise assessments. Both of these assessments have assessment criteria that are derived from existing background noise levels. The design of these surveys has been discussed and agreed with relevant stakeholders, including representatives from the environmental health and public health departments of the affected local authorities.

18.9.7 The baseline noise level survey comprises continuous noise measurements for at least 10–14 days at selected representative residential properties surrounding the reservoir site, and near to the proposed pumping stations, inter-catchment treatment works and water treatment works. Properties have been selected for measurement, which are considered representative of noise sensitive receptors in the following areas:

- Chatteris town.
- Doddington village.
- Wimblington village.
- Block Fen Drove, Wimblington.
- Sixteen Foot Bank (B1098), Stonea.
- Horseway, Chatteris.
- New Road, Chatteris.
- Northey Road, Peterborough.
- Thorney.
- Welches Dam.
- Bluntisham.

18.9.8 Where relevant, further reference may be made to baseline noise levels published as part of the strategic noise mapping undertaken by Defra. These results (Extrium, 2019) may be used to describe existing traffic and rail noise levels at receptors in parts of the study areas covered by the strategic noise mapping.

Assessment years

18.9.9 The construction activities would vary in location and intensity during the construction programme. For the construction noise and vibration assessments, the focus will be on predicting the likely noise and vibration levels when activities will have the greatest potential to lead to significant effects at each receptor group.

This is often when construction activities are closest to receptors. The bulk earthworks programme will be reviewed to provide sufficient assessment time points for modelling to capture the worst case effects at noise sensitive receptors.

18.9.10 The assessment years for the construction and operational transportation noise and vibration assessments will be based on the information presented in Chapter 14: Traffic and transport.

18.9.11 No variation with time is anticipated for the operational industrial noise assessments.

Construction assessment methodology

18.9.12 The Noise Policy Statement for England (NPSE) 2010 (Defra, 2010) introduced the concept of LOAEL and Significant Observed Adverse Effect Level (SOAEL) values for noise, but for the purposes of the assessment of the Proposed Development it is assumed these can apply equally to both noise and vibration. NPSE describes a LOAEL as the level above which adverse effects on health and quality of life can be detected, while a SOAEL is the level above which significant adverse effects on health and quality of life occur. The Planning Practice Guidance (PPG): Noise (Ministry of Housing, Communities and Local Government, 2019) also makes reference to the use of LOAEL and SOAEL in determining noise impacts.

18.9.13 The LOAEL and SOAEL for each noise and vibration source considered by the construction assessment are presented in this section and underpin the magnitude scales set out as part of the assessment methodologies.

Bulk earthworks noise

18.9.14 Noise from the bulk earthworks required for the construction of the reservoir will be predicted and managed using the BS 5228-1 methodology, implemented by the CadnaA® noise modelling software (or equivalent).

18.9.15 The bulk earthworks would last in excess of six months, and the noise sources and activities would be similar to those at mineral extraction sites. BS 5228-1 recognises that large scale and long-term earth-moving activities are more akin to surface mineral extraction than to conventional construction activity. Annex E.5 of BS 5228-1 advises that advice within the Technical Guidance to the NPPF (Department for Communities and Local Government, 2012) should also be taken into account when setting criteria for acceptability, particularly paragraphs 28 to 31. This Technical Guidance document has been withdrawn, with paragraphs 28 to 31 superseded by PPG: Minerals (Department for Communities and Local Government, 2014).

18.9.16 For daytime bulk earthworks, BS 5228-1 recommends the adoption of a 55dB $L_{Aeq\ 1hr}$ noise limit for daytime earth-moving activities lasting more than six months, which is the highest noise limit recommended by PPG: Minerals.

18.9.17 The extension of earth-moving activities beyond standard daytime hours into the evening, weekend and night-time periods (especially the early morning period) cannot currently be ruled out. This is particularly likely to occur during the summer months with longer periods of daylight and may be required in response to delays caused by periods of adverse weather. BS 5228-1 does not present specific evening,

Saturday afternoon, Sunday or night-time criteria for long-term earth-moving works. Reference has therefore been made to PPG: Minerals to develop suitable criteria for these time periods.

18.9.18 The magnitude scale for long-term earth-moving activities is presented in Table 18-5 and Table 18-6. The magnitude scale has taken account of the magnitude of impact scale set out by DMRB LA 111 for construction noise. For example, the threshold for a significant effect is set at the SOAEL.

Table 18-5: Magnitude of impact descriptions for long-term bulk earthworks

Magnitude of impact	Construction noise levels
High	Above or equal to SOAEL +5dB(A)
Medium	Above or equal to SOAEL and below SOAEL +5dB(A)
Low	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL
No change	10dB below LOAEL

Source: Adapted from Table 3.16 in DMRB LA 111.

Table 18-6: Long-term bulk earthworks noise LOAELs and SOAELs (free field values)

Time period	LOAEL	SOAEL
Day (07:00–19:00 weekday and 07:00–13:00 Saturdays)	Baseline noise levels $L_{Aeq,T}$	55dB $L_{Aeq\ 1hr}$
Night (23:00–07:00)	Baseline noise levels $L_{Aeq,T}$	42dB $L_{Aeq\ 1hr}$
Evening and weekends (time periods not covered above)	Baseline noise levels $L_{Aeq,T}$	10dB(A) over background noise level, with a maximum value of 55dB $L_{Aeq\ 1hr}$ and a minimum value of 42dB $L_{Aeq\ 1hr}$.

Source: Based on Annex E.5 in BS 5228-1:2009+A1:2014 and PPG: Minerals.

18.9.19 For context, an 'average suburban area' may have a typical noise level of 40dB(A), whilst the kerbside of a busy street would be around 80dB(A) (Sharland, 2005). The background noise level in a television or recording studio may be around 20dB(A) and would be subjectively described as very quiet (Sharland, 2005).

Construction noise

18.9.20 Construction noise levels will be predicted at selected receptors within the study area based on guidance presented by BS 5228-1. Noise modelling software CadnaA® (or equivalent) or verified bespoke spreadsheets will be used to implement the BS 5228-1 calculation methodology.

18.9.21 The magnitude scale adopted for the construction noise assessment is the same as that set out for long-term bulk earthworks noise in Table 18-5. The supporting LOAEL and SOAEL values required by the magnitude scale are detailed in Table 18-7.

Table 18-7: Construction noise LOAELs and SOAELs (façade incident values)

Time period	LOAEL	SOAEL
Day (07:00–19:00 weekday and 07:00–13:00 Saturdays)	Baseline noise levels $L_{Aeq,T}$	65dB $L_{Aeq,T}$
Night (23:00–07:00)	Baseline noise levels $L_{Aeq,T}$	45dB $L_{Aeq,T}$
Evening and weekends (time periods not covered above)	Baseline noise levels $L_{Aeq,T}$	55dB $L_{Aeq,T}$

Source: Based on Table E.1 in BS 5228-1:2009+A1:2014.

18.9.22 It is anticipated that the majority of construction activity would be undertaken during daytime hours (as defined in Table 18-7). However, it is likely there would be some works outside of daytime hours. Therefore, criteria have been set out for all possible working hours. Proposed working hours will be confirmed in the ES to be submitted as part of the application for development consent.

18.9.23 The SOAEL values have been determined as per Section E3.2 and Table E.1 of BS 52281, assuming a low baseline noise level. They are the lowest values included by this standard. Whilst considered unlikely, should site-specific baseline data be available for certain locations within the study area at the time of compiling the ES, these criteria may be reviewed. For example, a daytime ambient noise level of 65dB(A) (rounded to the nearest 5dB(A)) would be required before a higher assessment criterion would be applicable.

18.9.24 It is acknowledged that without a comprehensive baseline dataset for the entire study area, the LOAEL cannot be set. By not being able to define the LOAEL, it cannot be determined whether a location with an existing noise level below the SOAEL is within the low or negligible category. However, since significant effects would normally only occur when the magnitude is medium or above (which aligns with guidance in DMRB LA 111), this is not considered to be a limiting factor or risk to the assessment.

18.9.25 The magnitude scale, LOAEL and SOAEL set out are applicable to the range of receptors detailed in Section 18.8. Should other receptor types or unusual local circumstances be identified, reference will be made to other absolute noise criteria such as those presented by BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (BSI, 2014c) and the World Health Organisation (WHO, 1999 and 2009).

Construction groundborne noise

18.9.26 The prediction and assessment of groundborne noise, e.g. from any tunnelling work, will be undertaken with reference to the Association of Noise Consultants' (2020) Measurement and Assessment of Groundborne Noise and Vibration. In addition, where necessary, and if sufficient data from ground investigations are available, predictions of groundborne noise will be undertaken using COMSOL Multiphysics® simulation software (or equivalent).

18.9.27 The magnitude criteria for groundborne noise are based on current industry good practice, including assessments presented for projects such as High Speed 2 (HS2),

and are set out in Table 18-5, with supporting LOAEL and SOAEL values detailed in Table 18-8.

Table 18-8: Construction groundborne noise LOAELs and SOAELs

Time period	LOAEL	SOAEL
All time periods	35dB L_{ASmax}	45dB L_{ASmax}

Source: Based on industry good practice such as assessments undertaken for High Speed 2

18.9.28 The LOAEL and SOAEL set out above are applicable to residential receptors. Should other receptor types or unusual local circumstances be identified, other SOAEL values may be set based on relevant guidance.

Construction and bulk earthworks vibration

18.9.29 Vibration levels will be predicted at selected receptors within the study area based on guidance presented by BS 5228-2.

18.9.30 BS 5228-2 and DMRB LA 111 have been used to determine the magnitude of construction vibration impacts. The magnitude scale adopted for the Proposed Development, along with the supporting LOAEL and SOAEL values required by the magnitude scale, are detailed in Table 18-9 and Table 18-10 respectively.

Table 18-9: Magnitude of impact and construction vibration descriptions

Magnitude of impact	Construction vibration levels
High	Above or equal to 10mm/s PPV
Medium	Above or equal to SOAEL and below 10mm/s PPV
Low	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL
No change	N/A

Source: Based on Table B.1 in BS 5228-2:2009+A1:2014 and Table 3.33 in DMRB LA 111.

Table 18-10: Construction vibration LOAELs and SOAELs

Time period	LOAEL	SOAEL
All time periods	0.3mm/s PPV	1.0mm/s PPV

Source: Table B.1 in BS 5228-2:2009+A1:2014

18.9.31 The magnitude scale, LOAEL and SOAEL set out are applicable to the range of receptors detailed in Section 18.8. Should other receptor types or unusual local circumstances be identified, reference will be made to other vibration criteria such as those presented by BS 5228-2, which are in turn based on guidance set out in BS 7385-2:1993 Evaluation and measurement for vibration in buildings – Guide to damage levels from groundborne vibration (BSI, 1993) and BS 6472:2008 Guide to elevation of human exposure to vibration in buildings (BSI, 2008).

18.9.32 The risk of structural damage due to construction vibration is considered by reference to criteria set out in BS 7385-2. Based on this standard, BS 5228-2 and the professional experience of the assessment team, the criteria presented in Table 18-11 have been adopted.

Table 18-11: Magnitude of impact and construction vibration descriptions

Category of building	Impact criteria (PPV at building foundation)	
	Transient[(a)] vibration	Continuous[(b)] vibration
Potentially vulnerable buildings[(c)]	6mm/s	3mm/s
Structurally sound buildings	12mm/s	6mm/s

Notes:
(a) Transient vibration relative to building response such as impulsive vibration from percussive piling.
(b) Continuous vibration relative to building response such as vibrating rollers.
(c) BS 7385 highlights that the criteria for aged buildings may need to be lower if the buildings are structurally unsound. The standard also notes that criteria should not be set lower simply because a building is important or historic (listed). Properties will be considered structurally sound, unless stated otherwise.
Source: Based on Section B.3 of BS 5228-2:2009+A1:2014 and HS2 (November 2013) London – West Midlands Environmental Statement, Volume 5, Technical Appendices. Methodology, assumptions and assessment (route-wide). Sound, noise and vibration. High Speed 2 (Department for Transport, 2013).

Construction road traffic noise and vibration

18.9.33 Construction road traffic noise will be predicted using the CRTN methodology. Reference may be made to the Noise Advisory Council method for traffic flows below the range of validity for CRTN.

18.9.34 DMRB LA 111 provides guidance on describing the magnitude of impact of construction traffic noise. However, it does not define a LOAEL and SOAEL specifically for this noise source. Project-specific LOAEL and SOAEL have been developed for the purposes of the EIA, taking into account the LOAEL and SOAEL for construction noise and operational traffic set out by DMRB LA 111.

18.9.35 The magnitude scale adopted for the Proposed Development, along with the supporting LOAEL and SOAEL values are detailed in Table 18-12.

Table 18-12: Magnitude of impact and construction road traffic noise descriptions

Magnitude of impact	Change in BNL resulting from construction road traffic noise level		
	Where BNL is less than LOAEL of 55dB $L_{A10,18hr}$ façade	Where BNL is between LOAEL and SOAEL	Where BNL is more than SOAEL of 68dB $L_{A10,18hr}$ façade (equivalent to 66dB $L_{Aeq,T}$)
High	-	Greater than or equal to 10.0	Greater than or equal to 5.0
Medium	-	Greater than or equal to 5.0 and less than 10.0	Greater than or equal to 3.0 and less than 5.0
Low	-	Greater than or equal to 3.0 and less than 5.0	Greater than or equal to 1.0 and less than 3.0
Negligible	Any	Less than 3.0	Less than 1.0
No change	Less than 1.0	Less than 1.0	Less than 1.0

Source: Based on Table E.1 in BS 5228-1:2009+A1:2014 and Table 3.16 and Table 3.17 in DMRB LA 111.

18.9.36 The magnitude scale, LOAEL and SOAEL set out are applicable to the range of receptors described by DMRB LA 111 and detailed in Section 18.8. Should other

receptor types or unusual local circumstances be identified, reference will be made to other absolute noise criteria such as those presented by BS 8233 and the WHO (1999). In addition, if receptors are located at markedly different distances from the access routes, defined in Chapter 14: Traffic and transport, than the 10m assumed by the BNL value, the BNL value may be modified to take these distances into account.

18.9.37 The criteria set out in Table 18-9 to Table 18-11 for construction vibration will also be used to inform the assessment of vibration from construction vehicle movements on the public highway and access tracks.

Rail noise and vibration

18.9.38 The approach to the assessment of construction noise resulting from rail movements would be similar to that presented for construction road traffic. This is due to similar principles applying in terms of a linear noise source impacting sensitive receptors on a temporary basis. Therefore, the criteria within Table 18-12 would apply; however, a SOAEL threshold of 68dB $L_{Aeq\ 18hr}$ would apply for daytime rail movements, and a SOAEL of 63dB $L_{Aeq\ 6hr}$ at night. These values are based on the trigger values for noise insulation set out for railway noise in the Noise Insulation Regulations 1996.

18.9.39 Rail vibration predictions will be undertaken, where necessary, with reference to ISO 14837-1, supplemented by precedent set by major infrastructure projects such as High Speed 2. The rail vibration assessment criteria for potential structural damage will be the same as that detailed in Table 18-11.

18.9.40 The criteria within Table 18-13 would apply when considering potential human response to vibration resulting from construction rail movements. The LOAEL and SOAEL set out above are applicable to residential receptors. Should other receptor types or unusual local circumstances be identified, other SOAEL values may be set based on relevant guidance and precedent.

Table 18-13: Construction groundborne vibration dose value (VDV) criteria for rail movements (human response)

Category of building	Groundborne vibration effect levels (measured indoors near but not at the centre of floors), VDV	
	LOAEL	SOAEL
Residential	16hr day: 0.2m.s$^{-1.75}$ 8hr night: 0.1m.s$^{-1.75}$	16hr day: 0.8m.s$^{-1.75}$ 8hr night: 0.4m.s$^{-1.75}$

Source: HS2 (November 2013) London – West Midlands Environmental Statement, Volume 5, Technical Appendices. Methodology, assumptions and assessment (route-wide). Sound, noise and vibration. High Speed 2 (Department for Transport, 2013).

Noise from transportation via water routes

18.9.41 The prediction of noise from the use of inland waterways to transport construction materials will be undertaken using the BS 5228 methodology for mobile plant. The magnitude scale set out in Table 18-5 will be adopted, and Table 18-14 presents the LOAEL and SOAEL values which have been determined based on guidance

presented by BS 8233 and the WHO's Guidelines for Community Noise (WHO, 1999) and Night Noise Guidelines (WHO, 2009). No source-specific guidance is available for water vessels. The guidance documents used set out noise thresholds for environmental noise.

Table 18-14: Water based transportation noise LOAELs and SOAELs

Time period	LOAEL	SOAEL
Day (07:00–19:00 weekday and 07:00–13:00 Saturdays)	45dB $L_{Aeq,T}$	55dB $L_{Aeq,T}$
Night (23:00–07:00)	40dB $L_{Aeq,T}$	45dB L_{AeqT}
Evening and weekends (time periods not covered above)	40dB $L_{Aeq,T}$	50dB $L_{Aeq,T}$

Source: BS 8233:2014, WHO (1999; 2009)

18.9.42 The magnitude scale, LOAEL and SOAEL set out are applicable to residential receptors. Should other receptor types or unusual local circumstances be identified, reference will be made to other absolute noise criteria presented by BS 8233 and the WHO (1999 and 2009).

Site suitability of on-site worker accommodation

18.9.43 The Professional Practice Guidance (ProPG): Planning & Noise (Association of Noise Consultants, Institute of Acoustics, and Chartered Institute of Environmental Health, 2017) presents noise levels to enable an initial risk assessment to be undertaken to identify the likely risk of adverse noise effects for future occupants of residential development, should additional noise mitigation not be included in the proposals.

18.9.44 External environmental noise levels from transportation noise at the on-site temporary worker accommodation will be predicted using the CRTN and Calculation of Railway Noise methodologies. The ProPG: Planning & Noise guidance has been used to develop an indicative magnitude scale for use by the EIA process for the Proposed Development, presented in Table 18-15.

Table 18-15: Magnitude of impact descriptions for residential site suitability

Magnitude of impact	On-site external noise levels	
	Daytime (07:00–23:00) $L_{Aeq\ 16hr}$ dB	Night-time (23:00–07:00) $L_{Aeq\ 8hr}$ dB
High	>70	>60
Medium	61 to 70	51 to 60
Low	50 to 60	40 to 50
Negligible	<50	<40
No change	N/A	N/A

Source: Based on Figure 1 in ProPG: Planning & Noise.

18.9.45 If the EIA process identifies that additional mitigation is required to protect the on-site worker accommodation, internal noise levels will be predicted using BS EN 12354 Building acoustics. Estimation of acoustic performance of building from the performance of elements (multi-part document) (BSI, 2023) and reference will be

made to criteria presented by BS 8233 and The Building Regulations 2010 Approved Document O: Overheating (DLUHC, 2022).

Operational assessment methodology

18.9.46 Following guidance in the NPSE, LOAEL and SOAEL values have been identified for each noise and vibration source considered by the operation assessment and have been used to underpin the magnitude scales set out in this section. However, LOAEL and SOAEL values have not been defined for operational industrial noise. The Defra report Possible Options for the Identification of SOAEL and LOAEL in Support of the NPSE (Defra, 2014) states that: '*Given that there is insufficient robust information on people's response to industrial noise it is not possible to derive a LOAEL or SOAEL for industrial sources*'.

18.9.47 Reference has been made to an alternative assessment framework detailed in the following section.

Industrial noise

18.9.48 Operational noise will be predicted using CadnaA® to implement the ISO 9613-2:2024 Acoustics – Attenuation of sound during propagation outdoors, Part 2: Engineering method for the prediction of sound pressure levels outdoors (ISO, 2024) calculation methodology. The magnitude scale to be used in the assessment of operational noise has been developed based on guidance in BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BSI, 2019). The scale to be used for residential receptors, and those of a similar sensitivity, is presented in Table 18-16. Should other receptor types or unusual local circumstances be identified, reference will be made to other absolute noise criteria such as those presented by BS 8233 and the WHO (1999 and 2009).

Table 18-16: Magnitude of impact descriptions for industrial noise

Magnitude of impact	Difference between background noise level and rating noise level in accordance with BS 4142 (dB(A))
High	More than +10
Medium	+5 to +10
Low	0 to +4
Negligible	Below background
No change	10 or more below background

Source: Based on Section 11 of BS 4142:2014+A1:2019.

18.9.49 The assessment of operational industrial noise will be undertaken using the magnitude scale developed based on guidance in BS 4142. It should be noted that BS 4142 emphasises that, along with the difference between a rating level and background noise level, contextual factors should also be considered. These include consideration of the absolute level of sound, the character of the existing noise environment and industrial noise source, and whether the receptor property includes any noise insulation, mechanical ventilation or acoustic screening measures. These contextual factors may be used to modify the magnitude of impact based on professional judgement.

Road traffic noise and vibration

18.9.50 Operational road traffic noise will be predicted using the CRTN methodology. Reference may be made to the Noise Advisory Council method; however, it is envisaged that operational traffic will be focused on roads with flows above the range of validity for CRTN.

18.9.51 Section 3 of DMRB LA 111 provides guidance on determining the magnitude of impacts for road traffic noise. Magnitude of impact is considered for both the short-term and longterm. The classification of noise impact magnitude is set out in Table 18-17, adapted from Table 3.54a and Table 3.54b of DMRB LA 111.

Table 18-17: Magnitude of change for operational road traffic (short and long term)

Magnitude of impact	Short-term noise change (dB $L_{A10\ 18hr}$ or L_{night})	Long-term noise change (dB $L_{A10\ 18hr}$ or L_{night})
High	Greater than or equal to 5.0	Greater than or equal to 10.0
Medium	3.0 to 4.9	5.0 to 9.9
Low	1.0 to 2.9	3.0 to 4.9
Negligible	Less than 1.0	Less than 3.0
No change	0	0

Source: Table 3.54a and Table 3.54b of DMRB LA 111.

18.9.52 The LOAEL and SOAEL considered for this assessment are defined in Table 18-18, which is reproduced from Table 3.49.1 of DMRB LA 111. These LOAELs and SOAELs are considered to apply to both dwellings and other noise sensitive receptors.

Table 18-18: Operational road traffic noise LOAELs and SOAELs

Time period	LOAEL	SOAEL
Day (06:00–24:00)	55dB $L_{A10\ 18hr}$ (façade)	68dB $L_{A10\ 18hr}$ (façade)
Night (23:00–07:00)	40dB $L_{night,outside}$ (free-field)	55dB $L_{night,outside}$ (free-field)

Source: Table 3.49.1 of DMRB LA 111.

18.9.53 The prediction and assessment methodologies for operational road traffic vibration are the same as those set out for construction traffic vibration.

Significance of effects

18.9.54 As detailed above, the sensitivity of receptors has been considered in setting the magnitude scales. Following DMRB LA 111 and the EIA methodology set out in Chapter 6: EIA approach and methodology, a significant effect will generally be where an impact with a high or medium magnitude is predicted to occur. However, when determining significance, it is important to also take into account the duration of effect.

18.9.55 DMRB LA 111 states that significant construction noise, construction vibration and construction traffic noise effects would only occur if the following timescales are exceeded:

- 10 or more days or nights in any 15 consecutive days or nights; or

- A total number of days exceeding 40 in any six consecutive months.

18.9.56 These duration thresholds have been adopted and incorporated into the assessment of significance for activities within the construction phase.

18.9.57 Industrial noise during the operational phase would be long term, and the frequency of occurrence and duration of effect are considered as part of the assessment. A significant effect is deemed to occur for receptors identified as experiencing impacts of high or medium magnitude.

18.9.58 For operational road traffic noise, the duration of effect is also taken into account in defining separate magnitude criteria for short and long term effects. A significant effect would generally occur when a high or medium magnitude is predicted. However, based on guidance in DMRB LA 111, for effects of high, medium and low magnitudes, other factors should be considered in determining significance, including reference to the LOAEL and SOAEL.

18.10 Assessment assumptions and limitations

18.10.1 The assessment of potential construction and operational noise and vibration impacts would be undertaken using the design and construction information available at the time of assessment. It may be necessary for candidate noise sources to be used and technical assumptions to be made, in order to allow an assessment to be undertaken.

18.10.2 The operational noise assessment will assume that no powered watercraft would be permitted to use the reservoir for recreational purposes.

18.10.3 Baseline noise monitoring is proposed at up to 13 locations in the vicinity of the Scoping boundary, with the specific locations to be confirmed.

18.10.4 Any measurement of existing ambient or background sound levels as part of baseline monitoring will be subject to a degree of uncertainty. Environmental sound levels vary between days, weeks, and throughout the year due to variations in source levels and conditions, meteorological effects on sound propagation and other factors. Hence, any measurement survey can only provide a sample of the ambient levels. Every effort will be made to ensure that measurements are undertaken in such a way as to provide a representative sample of conditions, such as avoiding periods of adverse weather conditions and school holiday periods (which are often considered to result in atypical sound levels). However, a small degree of uncertainty will always remain in the values taken from such a measurement survey.

19 Public access and amenity

19.1 Introduction

19.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to public access and amenity. The chapter should be read in conjunction with the description of the Proposed Development, as presented in Chapter 2: Project description.

19.1.2 Initial work was undertaken separately to the EIA in order to identify the leisure, tourism and recreation context of the Proposed Development, and to understand the potential recreational amenity offering. This will be used to inform a recreational amenities statement which will detail the proposed recreational amenities to be provided as part of the Proposed Development. This will form part of the DCO application submission, as required by the National Policy Statement (NPS) for Water Resources Infrastructure (Defra, 2023).

19.1.3 This EIA chapter is distinct from the recreational amenities statement. The focus of this chapter is on the effects on public access and amenity as a result of the construction and operation of the Proposed Development. A people-based approach to the assessment is taken, whereby public access and amenity routes and facilities will be identified and assessed in the report; however, the impacts from the Proposed Development are experienced by the users of these facilities (the people, including residents, business owners and employees) and not the facilities themselves. As such, these facilities will be referred to as 'receptor assets' hereafter, whilst the people who use these receptor assets will be referred to as 'receptors'. These routes and facilities may be used for both leisure and/or transportation purposes.

19.1.4 In the context of this aspect, public access and amenity relates to the following receptor assets:

- Public Rights of Way (PRoWs) including footpaths, bridleways, National Trails, National Cycle Networks and local cycleways, and other routes with public access, unclassified country roads, and byways open to all traffic.
- Amenity spaces including public open space (formal provisions, such as parks, country parks and national parks), play spaces (including formal provisions, such as playgrounds and skate parks), sports facilities (including sports clubs (both land-based and water-based activities) and indoor/outdoor sports pitches, courts and sites).

19.1.5 These receptor assets were identified through professional judgement and consulting previous work to understand what needs to be considered when assessing impacts on public access and amenity.

19.1.6 This chapter should be read alongside Chapter 14: Traffic and transport, which outlines the scope of the assessment in relation to severance and amenity of

walking, cycling and horse riding (WCH) alongside the road, and effects on the public transport network.

19.2 Legislation, policy and guidance requirements

19.2.1 Legislation, policy and guidance, which has informed the scope of the assessment presented within this chapter, is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

19.2.2 Table 19-1 identifies the relevant policy in the NPS for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023), the National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities (DLUHC), 2023) for public access and amenity.

Table 19-1: UK policy relevant to public access and amenity

Relevant UK policy	Relevance to assessment
National Policy Statement (NPS) for Water Resources Infrastructure (Defra, 2023)	The NPS for Water Resources Infrastructure outlines the need for government policies to develop nationally significant water resources infrastructure projects in England. Relevance to access: • Section 4.13 outlines that construction of resources infrastructure may have short- or long term economic and social impacts, potentially resulting in both opportunities and detrimental impacts. It encourages collaboration with local communities to ensure fair access to water resources, considering socio-economic disparities. It outlines that opportunities should be taken to maximise potential positive outcomes, in addition to identifying and mitigating potential detrimental impacts. • Paragraph 3.12.2 emphasises the importance of ensuring public access to water infrastructure projects, including incorporating designs that allow for recreational use. It highlights how infrastructure planning should not restrict access but rather enhance local amenities. • Paragraph 4.10.21 focuses on preserving and enhancing public access to surrounding areas of water infrastructure, recommending that projects integrate public pathways or green spaces that provide social and environmental benefits. Relevance to amenity: • Paragraph 4.10.10 outlines that existing open space, sports and recreational buildings and land should not be developed for a new water resource project unless the land is no longer needed, or the loss would be replaced by equivalent or better provision in terms of quantity and quality in a suitable location. • 4.10.6 outlines that access to high quality open spaces and the countryside, and opportunities for sport and recreation, can be a means of providing necessary mitigation and/or compensation

Relevant UK policy	Relevance to assessment
	requirements, as access to green spaces can deliver positive health outcomes. In summary, the NPS for Water Resources Infrastructure addresses accessibility and amenity concerns, aiming to balance water resource development with societal needs and wellbeing.
National Planning Policy Framework (NPPF) (DLUHC, 2023)	The NPPF, revised in December 2023, outlines the UK Government's planning policies for England and provides guidance on their application. Relevance to access: • Community engagement is emphasised, recognising that communities are directly affected by planning decisions. Transparency and equitable access to resources are key considerations (Sections 8 and 9). • Section 8 of the document focuses on promoting healthy and safe communities, outlining that planning policies and decisions should aim to achieve healthy, inclusive and safe places which enable and support healthy lifestyles, for example, for through the provision of safe and accessible green infrastructure, sports facilities, local shops, access to healthier food, allotments and layouts that encourage walking and cycling. • The document also highlights the importance of sustainable transport options, as well as the importance of local authorities, in ensuring new development proposals provide safe and suitable access for all users (Section 9). • Paragraphs 108 – 117 focus on ensuring that transport considerations are integrated into development plans and decisions. They emphasise the importance of promoting sustainable transport modes, reducing congestion, and ensuring that the location of development maximises accessibility to walking, and cycling routes. • Paragraph 116 outlines that development applications should prioritise pedestrian and cyclist movement, ensure access to public transport, and address the mobility needs of people with disabilities. Designs must promote safety, minimise conflicts between users, reduce street clutter, and align with local character. Provisions for efficient goods delivery, emergency vehicle access, and charging infrastructure for low-emission vehicles should also be included, enhancing public access and creating safer, more accessible, and sustainable amenities. Relevance to amenity: • The document addresses topics such as conserving the natural and historic environment, and supporting high-quality environment by creating places that are safe, inclusive and accessible (and which promote health and wellbeing), with a

Relevant UK policy	Relevance to assessment
	high standard of amenity for existing and future users (Section 12). • Paragraphs 102-107 emphasise the importance of public access to high-quality open spaces and recreational facilities for the well-being of communities, enhancing PRoWs, and contributing to climate resilience. Planning should prioritise preserving existing recreational spaces unless surplus or replaced with equal or better provision. Communities can protect significant local green areas through Local Green Space designations, ensuring proximity, special value, and sustainability, with management aligned to Green Belt policies. This fosters long-term public access, environmental protection, and enhanced amenities. • Paragraphs 182 –183 provide guidance on major developments in National Parks, the Broads, and Areas of Outstanding Natural Beauty (AONBs) [now National Landscapes]. It states that such developments should only be approved in exceptional circumstances where they serve public interest, and cannot be accommodated elsewhere. In summary, the NPPF provides a comprehensive framework for planning decisions and guides future development on achieving accessible places and high-quality amenity for all, including counties and local authorities where associated water infrastructure is planned.
Water Industry Act 1991	The Act sets out the duty of water undertakers to supply drinking water that is safe and of a quality acceptable to consumers. Section 3 of the Act outlines the responsibilities of water and sewerage undertakers in providing recreational facilities on or around water bodies under their control. It requires undertakers to make the best use of their land and water for public recreation, where it is consistent with their primary functions, while also ensuring that such facilities do not interfere with water supply, sewage treatment, or the environment. Collaboration with local authorities and other bodies for this purpose is encouraged.
The Water and Sewerage (Conservation, Access and Recreation) (Code of Practice) Order 1989	The Code gives practical guidance to statutory undertakers on their environmental and recreational duties outlined in section 3 of the Water Industry Act. In addition, the code sets out desirable practices respect to those matters. • Articles 5.1 – 5.11 of The Water and Sewerage (Conservation, Access and Recreation) (Code of Practice) Order 1989 outline the duties of water and sewerage authorities to conserve natural beauty, protect flora and fauna, and promote public access to water bodies for recreation.

19.3 Stakeholder engagement

19.3.1 In preparing this EIA Scoping Report, there have been discussions and engagement with a number of stakeholders. This engagement has principally related to the following:

- Obtaining baseline information.
- Approach to the assessment of significance.
- Scope of further baseline studies.

19.3.2 The dialogue with stakeholders will continue throughout the pre-application period as part of the EIA process. A summary of the engagement undertaken so far is presented in Table 19-2, along with proposed future engagement.

Table 19-2: Engagement with stakeholders

Stakeholder	Engagement undertaken to date	Proposed future engagement
Socio-economics, Community, public access and amenity, Equalities and Health Technical Working Group (TWG) (attendees included: Cambridge and Peterborough Combined Authority, Fenland District Council, Lincolnshire County Council, British Horse Society, Inland Waterways, and Public Health England)	**10 November 2023 and 29 April 2024** – Socio-economics, community, public access and amenity, equalities and health TWG meetings to discuss the approach to the public access and amenity assessment, including the proposed guidance, the likely baseline conditions and study area definition process.	It is proposed to hold TWG meetings approximately quarterly for the duration of the pre-application stage. Future engagement for public access and amenity will discuss progress and views in relation to methodology, mitigation and preliminary assessment results.
Fens Community Liaison Group (CLG) (attendees included: South Staffordshire Water, LDA Design, and Fereday Pollard)	**7 November 2023 and 25 March 2024** – meetings to discuss the purpose and approach of the public access and amenity assessment, and an opportunity for participants to feedback their key issues for the assessment.	It is proposed to continue to engage this CLG following the scoping stage to help provide further local understanding of any emerging public concerns (i.e. from public consultation events) on relevant public access and amenity issues for the Proposed Development. This may provide information which is relevant to the determination of significance.

Stakeholder	Engagement undertaken to date	Proposed future engagement
National Farmers Union (NFU)	**13 November 2023** – meeting to discuss the 'society' EIA aspects (socio-economics and community, heritage, resource management, health, geology, soils, agriculture and land quality) and the approach to the Socio-economic Strategy.	No aspect-specific regular meetings planned, but will make use of ongoing programme-wide engagement sessions as relevant.
Environment Agency	**7 December 2023** – meeting to discuss the role of the proposed reservoir in providing a community asset and supporting an integrated water strategy.	No regular meetings planned, but ad hoc sessions could be held pending relevant responses in Phase two consultation.
Fens Water Partnership (attendees included: the Environment Agency)	**11 January 2024** – meeting to discuss the impacts from land use change in the perspective of agriculture, and the impact on food production, and the balance between recreation and wildlife.	No regular meetings planned, but ad hoc sessions could be held pending relevant responses in Phase two consultation.
Fenland District Council (FDC) (attendees included: Fenlands District Council and Cambridgeshire County Council)	**25 April 2024** – meeting to discuss Local Plan progress and how the proposed reservoir options are integrated in the emerging Local Plan, as well as concerns around design options, core requirements for transport and accessibility, tourist draw, delivery phasing, and severance.	No aspect-specific regular meetings planned, but will make use of ongoing programme-wide engagement sessions as relevant.
Local Authority Associated Infrastructure Forum (LAAIF) (attendees included: Huntingdonshire District Council, Peterborough City Council,	**15 May 2024** – Local Authority Associated Infrastructure Forum (LAAIF) meeting to discuss the approach to the public access and amenity assessment, including the	At future LAAIF meetings it is proposed to cover methodology, mitigation and preliminary assessment results.

Stakeholder	Engagement undertaken to date	Proposed future engagement
Cambridgeshire County Council, South Cambridgeshire District Council, Norfolk County Council, Fenland District Council, and South Kesteven)	study area and key considerations.	

19.4 Study area

19.4.1 This section sets out the approach to defining the study area for public access and amenity. The study area is based on the identified Scoping boundary and the available information for the Proposed Development. This includes the information on construction and operation phases as described in Chapter 2: Project description. The identified study area is sufficiently broad to allow for the ongoing refinement of the Proposed Development; however, if required this will be modified to ensure there is appropriate coverage of all potential significant environmental effects.

19.4.2 The study area has been defined applying a buffer of 1km from the Scoping boundary. This distance has been used in line with best industry practice, and it is considered to sufficiently capture the likely public access and amenity impacts.

19.4.3 The study area has not been based on the four operational zones, listed below, and as described in Chapter 2: Project description. This is because the likely impacts are considered to be wider and the baseline conditions are therefore presented at a broader level; however, where appropriate, any differences in the baseline conditions related to the following zones have been considered.

- Sources of supply and upstream water transfers.
- Reservoir site
- Water treatment works.
- Downstream treated water transfers.

19.4.4 The Lower Super Output Areas (LSOAs) within the 1km buffer have been identified and used to form the study area. LSOAs have been used as this provides the most detailed data possible to accurately capture impacts to public access and amenity.

19.4.5 All LSOAs that fall within a 1km buffer of the Scoping boundary have been identified as per industry best practice. In total, the study area includes 86 LSOAs. This includes LSOAs from Fenland, Huntingdonshire, South Cambridgeshire, King's Lynn and West Norfolk, Peterborough and neighbouring East Cambridgeshire.

19.4.6 Where LSOA boundaries are slightly beyond 1km, these LSOAs have also been included. Following stakeholder engagement at the Socio-economics, Community,

Public access and amenity, Equalities and Health Technical Working Group (TWG) in April 2024, a number of additional settlements that fall just outside of the 1km buffer were also included (where LSOA boundaries cover half of a given settlement adjacent to the study area boundary – in such instances, LSOAs which cover the whole settlement have been included. These additional settlements comprise Whittlesey, St Ives, March, Outwell and Upwell.

19.4.7 The LSOAs are shown in Figure 19.1. Some of the data retrieved is not available in 2021 LSOAs; therefore, baseline data has also been sourced from 2011 LSOAs. These only differ slightly due to the name or shape of some of the LSOAs changing between the 2011 and 2021 addition.

19.4.8 As a comparator for the study area, the Local Authority District (LAD) boundaries have been used as part of the baseline analysis in the proceeding section (Figure 19.2). The LAD geography comprises those local authorities within which the Scoping boundary of the Proposed Development falls, i.e. the 'direct' LADs. These LADs can be seen in Figure 19.2. The data for the following LADs have been aggregated to be used as a comparator in the baseline conditions assessment.

- Peterborough City Council (Unitary Authority).
- Fenland Borough Council (Cambridgeshire County District).
- Huntingdonshire District Council (Cambridgeshire County District).
- South Cambridgeshire District Council (Cambridgeshire County District).
- King's Lynn and West Norfolk Borough Council (Norfolk County District).

19.4.9 In addition, data has also been collected at both regional (East of England and East Midlands) and national levels as comparator areas.

19.5 Baseline data collection

19.5.1 The baseline conditions for public access and amenity presented in Section 19.6 represent a review of the currently available data. The data collated to date were obtained via desk studies. Data collection to inform the baseline of the assessment is ongoing. The data described below, provide a robust context for the scoping of the assessments.

Desk studies

19.5.2 Desk studies were undertaken to identify initial baseline data and are identified in Table 19-3. Further research will be provided at Preliminary Environmental Information Report (PEIR) stage, where a full breakdown of baseline data will be provided as part of the assessment.

Table 19-3: Baseline data sources

Category	Data type	Source
Population Profile	Commuting patterns	Office for National Statistics, 2021.
	Walking frequency	Sport England, 2023.
Public Rights of Way (PRoWs)	Footpaths	Google Maps, 2024; OpenStreetMap, 2024; and FootPathMap PRoW Map, 2024.
	Bridleways	Google Maps, 2024; OpenStreetMap, 2024; and FootPathMap PRoW Map, 2024.
	Byways	Google Maps, 2024; OpenStreetMap, 2024; and FootPathMap PRoW Map, 2024.
	National cycleways	Sustrans, 2024, and Strava Global Heat Map, 2024.
Public Transport	Bus stops and routes	Google Maps, 2024; OpenStreetMap, 2024; and FootPathMap PRoW Map, 2024.
	Train station and routes	Google Maps, 2024; OpenStreetMap, 2024; and FootPathMap PRoW Map, 2024.
Public open space and play space, and sports facilities	Public open spaces e.g. parks, country parks, national parks, etc.	Google Maps, 2024; OpenStreetMap, 2024; and FootPathMap PRoW Map, 2024.
	Play spaces e.g. child playgrounds, skate parks, etc.	Google Maps, 2024; OpenStreetMap, 2024; and FootPathMap PRoW Map, 2024.
	Sports clubs (both land-based and water-based activities)	Google Maps, 2024; OpenStreetMap, 2024; and FootPathMap PRoW Map, 2024.
	Indoor/outdoor sports pitches, courts and sites.	Google Maps, 2024; OpenStreetMap, 2024; and FootPathMap PRoW Map, 2024.

19.5.3 Information on national cycleways has been provided in Section 19.6 under the Public Rights of Way category for receptor assets. Assessment on local cycleways will be conducted at the next stage of baseline conditions assessment during preparation of the PEIR, as this data is considered too detailed for this Scoping stage.

Field surveys

19.5.4 No field surveys have been undertaken as part of baseline data collection to date.

19.6 Baseline conditions

19.6.1 Baseline conditions for public access and amenity are described below for the study area (defined in Section 19.4). The initial baseline conditions are as established from the data collection described in Section 19.5, and are considered sufficient to provide context for the Scoping stage. Further research on baseline conditions will

be provided at PEIR stage, where a full breakdown of baseline data will be provided as part of the assessment.

Physical activity and time spent outdoors

19.6.2 In 2022, 69% of adults nationally reported walking at least once per week for any purpose. In comparison, only 32% of adults reported to walk at least five times a week in 2022 (Fenland District Council, 2022b). In Fenland District, these rates were slightly lower than national rates; 64% reported walking at least once per week for any purpose, and people reporting walking at least five times per week was in line with national levels at 33%. King's Lynn and West Norfolk also had similar levels, with 64% of adults walking or cycling at least once a day, and only 31% at least 5 times a week. Huntingdonshire and South Cambridgeshire had comparatively higher rates of walking and cycling, with 75% and 78% of adults reporting to do either of these activities at least once a week, and 33% and 39% at least 5 times per week, respectively.

Commuting patterns

19.6.3 The most common mode of transport taken to work in 2021 was by driving a car or van; this was chosen by 54.9% in the study area (ONS, 2021). This is higher than the combined LAD average of 50.2%, the national average of 45% and regional average of 48%. Working mainly at or from home was the next most popular option with 28.1% of the study area and 29.8% of the combined LAD area claiming they do so. The proportion of residents working from home is still below national and regional averages. The third largest group travelled to work on foot; 5.9% in the study area. This is lower than the combined LAD proportion of 6.6%, the national average of 8% and the regional average of 7% (ONS, 2021). Analysing commuter patterns is extremely relevant to this baseline, as understanding how people use local PRoWs regularly is pertinent to mitigating the effects of the Proposed Development.

Receptor assets

19.6.4 Individual community receptors or 'receptor assets' have been identified for public access and amenity. These receptor assets fall into two broad categories: PRoWs and amenity spaces. Identification of the receptor assets was carried out by observing the number of receptor assets within 1km of the Scoping boundary and recording them.

19.6.5 There are over 40 receptor assets which have been identified for public access and amenity within the study area. These fall into two broad categories; PRoWs; and amenity spaces, and are described in more detail below:

- 9 PRoWs – public footpaths, bridleways, byways, etc.
- 32 amenity spaces (public open space, play space and sports facilities) – playing fields, parks, state parks, sports halls, sports courts, sports clubs (including land-based and water-based activities), etc.

19.6.6 The majority of receptor assets are located within 500m of the Scoping boundary.

19.6.7 Chapter 7: Landscape and visual effects, considers changes in views experienced by people due to the Proposed Development, including those using PRoWs. The study area includes several PRoWs, such as footpaths, bridleways, and byways, providing recreational routes and connectivity between settlements. These paths span across various areas and infrastructure projects, including the upstream transfers from River Nene to the proposed reservoir transfer corridor; River Great Ouse to the proposed reservoir transfer corridor; Ouse Washes to the proposed reservoir transfer corridor; and downstream treated water transfers from the proposed reservoir to Bexwell and Madingley.

19.6.8 Key routes include the River Nene, River Great Ouse, and various long-distance paths like the Nene Way, Hereward Way, Greenwich Meridian Trail, Rothchild Way, PathFinder Long Distance Walk, Ouse Valley Way, and Via Beata pilgrimage route. These routes provide connectivity between various settlements and along river corridors, contributing to the recreational and amenity value of these areas.

Future baseline

19.6.9 The future baseline will likely be characterised by continued population growth within the east region. The Draft Fenland District Local Plan 2021 – 2040 (Fenland District Council, 2022a) (which is due to supersede the adopted Fenland Local Plan (2014)) provides an emerging strategy to deliver new infrastructure, such as roads, sustainable transport options and accessible open space. This new provision would be expected to identify and address policy emphases around access to open space and the ability to lead active lifestyles. This is supported by adopted policy in other neighbouring authorities across the direct LADs, such as the Huntingdonshire Local Plan 2019 – 2036 (Huntingdonshire District Council, 2019), South Cambridgeshire Local Plan (South Cambridgeshire District Council, 2018), and Peterborough Local Plan 2018 – 2036 (Peterborough City Council, 2019).

19.6.10 In addition, the Cambridgeshire County Council Rights of Way Improvement Plan update (Cambridgeshire County Council, 2016), is looking to improve access, visibility and overall quality of PRoWs in the county administrative boundaries. This Rights of Way Improvement Plan is part of the wider Cambridgeshire and Peterborough Local Transport and Connectivity Plan (Cambridgeshire and Peterborough Combined Authority, 2023) which is a statutory document that sets out the combined authority's long-term strategy to make transport in Cambridgeshire and Peterborough better, faster, greener and more accessible for everyone.

19.6.11 Improvements to the number, or quality, of PRoWs and open spaces as a result of these plans and policies will be reflected in the future baseline used in the assessments presented in the PEIR and ES, where the information on the resulting changes to the baseline is available.

19.7 Design and mitigation

Design

19.7.1 The design of the Proposed Development to date has taken consideration of environmental constraints and potential environmental effects.

19.7.2 The ongoing development of the design will incorporate embedded mitigation to avoid and reduce potential adverse effects, where feasible. In addition, as set out in the NPS as part of the DCO for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023), a recreational amenities statement will be produced as part of the DCO application documents, outlining details of any amenities to be provided as part of the Proposed Development.

19.7.3 The design development process will include consideration of potential enhancement measures to improve the surrounding environment and mitigate impacts of the Proposed Development. Potential enhancements relevant to public access and amenity that are currently under consideration include those listed below. These will be appropriately considered in the PEIR and ES.

- Development of public open space and amenity areas.
- Provision and design of new access routes.
- Upgrade and improvement of connectivity of existing/missing access routes.
- Provision of appropriate signage.
- Creation of pedestrian-friendly pathways and cycling routes.
- Incorporation of landscaping and green spaces.

Mitigation

19.7.4 Documents presenting the approach to mitigation will be produced that set out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. These measures would be applied to mitigate likely significant effects, including public access and amenity effects. Public access and amenity considerations will also inform the process for developing construction methods and components, such as those relating to the ability to access receptor assets such as dwellings, businesses and community facilities, and public open spaces, as well as careful planning and sufficient information provided for the temporary closure/diversion and alternatives of PRoWs and cycle routes.

19.7.5 Examples of good practice and essential mitigation relevant to public access and amenity that are under consideration include:

- Communication with local communities and relevant stakeholders on planned closures/diversions of access routes and provision of reasonable alternatives.

- Improvement of existing, and provision of new, sustainable transport options, such as PRoWs and cycling routes.
- Provision of new public amenity spaces designed to be inclusive and accessible.
- Promotion of physical activity through design, post-delivery information distribution, and continuous engagement with relevant community groups on maintenance.

19.8 Proposed scope of assessments

Likely significant effects requiring assessment (scoped in)

19.8.1 The following section sets out the aspect specific potential effects for public access and amenity. The likely significant effects requiring assessment are presented in Table 19-4. Where potential effects may be specific to one or more zones of the Proposed Development and the relevant study area, this is identified in Table 19-4 (see Chapter 2: Project description, for further discussion of zones).

Table 19-4: Likely significant public access and amenity effects

Activity	Effect	Receptors	Zone
Construction			
All construction activities (including enabling works, construction of structures/buildings, excavation and earthworks, installation of pipelines and installation/ diversion of utilities and services, landscaping and reinstatement)	Direct temporary loss of public open space land and amenity spaces as a result of construction activities.	Users of amenity spaces and amenity facilities.	All zones
All construction activities (including enabling works, construction of structures/ buildings, excavation and earthworks, installation of pipelines and installation/ diversion of utilities and services, landscaping and reinstatement)	Direct temporary impacts on the local, PRoWs, bridleways and cycle network as a result of construction activities.	Users of local PRoWs, bridleways, and cycle network.	All zones
Construction transportation	Temporary impacts to amenity spaces due to construction traffic.	Users of local PRoWs, bridleways, and cycle network.	All zones

Activity	Effect	Receptors	Zone
		Users of amenity spaces and amenity facilities.	
Operation			
Operational traffic movements	Amenity impacts arising from permanent changes to the road network and traffic flows.	Users of amenity spaces and amenity facilities (residents, businesses).	All zones
Operational use of the reservoir. Recreational use of the reservoir.	Permanent loss or gain of amenity spaces.	Users of amenity spaces and amenity facilities (residents).	All zones
Operational use of the reservoir. Recreational use of the reservoir.	Permanent changes to the local PRoWs, bridleways, and cycle network as a result of the operation of the Proposed Development.	Users of the local PRoWs, bridleways, and cycle network.	All zones

Effects not requiring assessment (scoped out)

19.8.2 At this stage of the development of the Proposed Development, no effects have been identified that can be scoped out of further assessment.

19.9 Assessment methodology

19.9.1 The study area set out in Section 19.4 will be kept under review as the design and consultation processes progress, and the Proposed Development is refined. Therefore, the study area may evolve as appropriate. The evolution of the study area will be clearly communicated in the PEIR and ES and discussed with relevant consultees.

19.9.2 The Proposed Development, described in Chapter 2: Project description, will also evolve and be further developed as the design process progresses. Whilst the methodologies that are set out within this chapter are not anticipated to change, the scope of assessment will be kept under review as design progresses.

Additional baseline information required

19.9.3 During the stakeholder engagement at the TWG in April 2024, it was suggested by a stakeholder that consideration should also be given to other routes with public access, unclassified country roads, and byways open to all traffic. Consideration will be given on how best to capture these receptor assets within the baseline data as the EIA process continues. As there is currently no easily available and compiled

publicly available dataset which provides information on these assets, the baseline will be established through further study and engagement with stakeholders.

19.9.4 Limited PRoWs surveys will be undertaken where there are likely to be improvements to the routes or increases in usage due to connection to the Proposed Development. These can be sensitive to the locations, timing, weather and seasonality of receptor asset usage.

19.9.5 The reason for undertaking limited PRoW surveys is that the approach assumes that the current PRoW network is in use, to the extent that the assessment should aim for no loss of existing off-site provision or overall connectivity (noting that the Proposed Development may increase journey distances, notably through circumnavigating the proposed reservoir), aiming to enhance overall network utility through an understanding of the overall 'desire' lines. These topics will be considered and discussed with stakeholders as the EIA process progresses.

19.9.6 Assessment of local cycleways will be conducted at next stage of baseline conditions assessment during preparation of the PEIR, as it is considered to be too granular for the Scoping stage. Research will be undertaken on local council websites, Sustrans and other sources, followed by a validation process to ensure data is sufficiently robust.

Assessment years

19.9.7 Assessment years are the same as set out in Chapter 6: EIA approach and methodology.

Construction assessment methodology

19.9.8 The proposed methodology will include an analysis of current baseline public access and amenity conditions. This includes analysing a variety of public access and amenity data including, but not limited to, commuting patterns and levels of physical activity, and desktop-based research to identify the number and location of receptor assets within the study area.

19.9.9 The public access and amenity assessment is mainly qualitative in nature and will aim to identify the impacts from both the construction and operation of the Proposed Development, and establish the significance they have on public access and amenity and the identified receptors in the study area. This approach will be based on professional judgment and experience of comparable projects. The categories of receptor assets which will be considered in the assessment include the following:

- Users of PRoWs including footpaths, bridleways, National Trails, National Cycle Networks and local cycleways, and other routes with public access, unclassified country roads, and byways open to all traffic.
- Users of amenity spaces (including public open space (formal provisions, such as parks, country parks and national parks) and play spaces (including formal provisions, such as playgrounds and skate parks)), and sports facilities including

sports clubs (land-based and water-based activities) and indoor/outdoor sports pitches, courts and sites.

19.9.10 The methodology for the assessment of potential effects on the receptors considered within the public access and amenity assessment, will comprise the following stages:

- Identify the sensitivity of each receptor asset type.
- Determine the magnitude of impact with consideration of any embedded measures.
- Identify whether effects on receptor assets are likely to be temporary or permanent both during the construction and operation phases.
- Compare the sensitivity of receptors with the magnitude of impact, to derive the significance of effect.
- Where significant effects are identified, consider if any additional mitigation can be applied.
- Determine the residual significance of effect.

19.9.11 The assessment will draw on professional judgement and will consider the value and sensitivity of receptors from the baseline public access and amenity characteristics, considering their importance, size and potential for substitution, as well as the magnitude of the impact based on qualitative and quantitative evidence (where applicable). Tables 19-5, 19-6 and Table 19-7 set out the criteria for sensitivity of receptors and magnitude of impact.

Table 19-5: Criteria for sensitivity of receptor assets

Criteria	Indicative criteria for the sensitivity of receptor assets
High	Users of receptor assets that are highly sensitive to changes and impacts due to their nature, usage, and the potential effects on large or vulnerable populations.
Medium	Users of receptor assets that are somewhat sensitive to changes and impacts, which may affect moderate populations or have less critical functions.
Low	Users of receptor assets that have a low sensitivity to changes and impacts, with minor effects on small populations or less critical functions.
Negligible	Users of receptor assets that are minimally sensitive to changes and impacts, with little to no effect.

Table 19-6: Indicative sensitivity of receptor assets

Receptor asset	Sensitivity
PRoWs	Medium
Amenity spaces	High

Table 19-7: Criteria for magnitude of impact

Magnitude of impact	Indicative criteria for the magnitude of change
High	Significant changes that greatly enhance or impair public access, and amenity facilities. Examples include the creation or closure of large parks, major new sports facilities or extensive trail networks.
Medium	Noticeable changes that improve or degrade public access, and amenity facilities. Examples include enhancements to existing parks, new small-scale facilities, or prolonged construction disruptions.
Low	Minor changes that slightly improve or impair public access and amenity facilities. Examples include minor upgrades to parks, addition of benches or signage, or minor temporary access restrictions.
Negligible	No perceptible changes to public access and amenity facilities. Existing conditions remain largely unchanged.

19.9.12 The assessment will focus on both direct and indirect effects based on the level of design information available. The location and number of receptor assets will be considered alongside their frequency of use and their level of existing accessibility.

19.9.13 Continuous engagement with the teams undertaking the transport-related assessments and design will be ongoing to ensure a consistent approach is taken, and avoiding duplication of assessment. Chapter 14: Traffic and transport, presents the traffic and transport assessment.

Operational assessment methodology

19.9.14 The assessment methodology for the operational phase is the same as the methodology described for the construction phase above.

Significance of effects

19.9.15 Significance of effects will be determined by cross referencing the assessed level of value with the magnitude of impact, as shown in Image 6.1 in Chapter 6: EIA approach and methodology. A significant effect in the context of the Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017 is taken to be a moderate or major adverse or beneficial significance.

19.10 Assessment assumptions and limitations

19.10.1 The assessment of public access and amenity effects is qualitative, based on professional judgement, and drawing on available qualitative and quantitative information. An assumption has been applied that all PRoWs identified at baseline stage are in use.

20 Socio-economics and community

20.1 Introduction

20.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to socio-economics and community. The chapter should be read in conjunction with the description of the project as presented in Chapter 2: Project description.

20.1.2 For the aspect of socio-economics and community, the receptor assets are:

- Homes:
  - Residential dwellings.
  - Residential moorings.
  - Traveller community sites and allocations.
  - Nursing homes.
  - Other care homes.
  - Temporary or emergency accommodation.
  - Support accommodation.
  - Sheltered/very sheltered accommodation.
- Business land and development land:
  - Business sites/premises (including agricultural businesses).
  - Land allocated for use or development.
- Education:
  - Primary schools.
  - Secondary schools.
  - Special Educational Needs provision.
  - Higher/further education sites.
  - Early years/nursery sites.
  - Forest schools.
- Healthcare:
  - Hospitals.
  - Health centres.
  - GP practices.
- Community:

- Community centres/youth clubs and similar.
- Places of worship.
- Community facilities, e.g. libraries, etc.

20.1.3 The National Policy Statement (NPS) for Water Resources Infrastructure (2023) advises that applicants should evaluate any potential significant positive socio-economic impacts as part of their Environmental Statement. The socio-economics and community assessment will cover how the proposed project is likely to benefit local employment, boost economic growth and enhance community well-being. The assessment will aim to provide specific positive impacts and how they align with broader sustainable development goals.

20.1.4 The approach to assessing effects on receptors in the socio-economics and community aspect will be people-based. The people-based methodology emphasises that while the facilities listed above will be identified and assessed in the report, the impacts from the Proposed Development are experienced by the users of these facilities (the people) and not the facilities themselves. As such, the aforementioned facilities will be referred to as 'receptor assets' hereafter, whilst the people who use these receptor assets will be referred to as 'receptors'. Effects such as a rise in employment during construction and operation, and demand for services and facilities will be experienced by receptors, not receptor assets. The baseline conditions section provides a comprehensive understanding of the current socio-demographic context for the receptors, encompassing the local economy, employment, and community characteristics and challenges. This context is representative of the broader area and is crucial for assessing the changes that the Proposed Development may bring. Understanding the current conditions is essential; without this knowledge, the impact of the Proposed Development cannot be accurately assessed.

20.1.5 This chapter has links with other chapters, including Chapter 12: Geology, soils, agriculture and land quality, which provides an assessment of effects on agricultural landholdings; Chapter 19: Public access and amenity, which provides an assessment of effects on public access and amenity; and Chapter 21: Human health, which provides an assessment of effects on the wider determinants of health.

20.2 Legislation, policy and guidance requirements

20.2.1 Legislation, policy and guidance which has informed the scope of the assessment presented within this chapter, is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

20.2.2 Table 20-1 identifies the relevant policy in the NPS for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) and the National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities (DLUHC), 2023) for socio-economics and community.

Table 20-1: UK policy relevant to socio-economics and community

Relevant UK policy	Relevance to assessment
NPS for Water Resources Infrastructure (Defra, 2023)	Section 4.13 recognises the interplay between water resources and socio-economic factors. It addresses the importance of water availability for economic growth, job creation and community wellbeing (para. 4.13.1). Section 4.13 states that by emphasising sustainable water use, it aims to mitigate adverse socio-economic effects, such as water scarcity affecting livelihoods, agriculture and industry. The section emphasises the importance of identifying opportunities to integrate new water infrastructure projects with existing businesses and the broader community (para. 4.13.10). It encourages developers to seek out synergies that could benefit local economies and enhance social value. The goal is to ensure that new infrastructure contributes not only to water management but also to local development and community well-being. Section 4.13 also encourages collaboration with local communities to ensure fair access to water resources, considering socio-economic disparities (paragraphs 4.13.2, 4.13.3, 4.13.9).
NPPF (DLUHC, 2023)	The NPPF includes the following sections relevant to socio-economics and community: • Section 2 of the NPPF outlines the framework for sustainable development, emphasising the need to balance economic, social, and environmental objectives. It highlights the importance of planning policies that support sustainable growth, address social inequalities, and promote economic resilience. • Section 6 of the NPPF focuses on supporting a prosperous rural economy, emphasising the importance of sustaining and enhancing rural communities and their economic vitality. It highlights the role of planning in facilitating the growth of rural businesses and providing opportunities for rural workers, including through the development of infrastructure and the provision of housing. The section underscores the need for policies that support diversification, address rural housing needs, and promote local services, ensuring that rural areas remain vibrant and economically sustainable. • Section 8 of the NPPF focuses on promoting healthy and safe communities, emphasising the importance of social cohesion, access to services, and inclusive public spaces. It highlights the role of planning in fostering vibrant communities by ensuring access to quality housing, recreational facilities and social infrastructure. The section underscores the need for developments to support strong local economies while enhancing the social well-being and health of communities. In summary, the NPPF provides a comprehensive framework for planning decisions, considering socio-economic factors and community wellbeing.

20.3 Stakeholder engagement

20.3.1 In preparing this EIA Scoping Report, there have been discussions and engagement with a number of stakeholders. This engagement has principally related to the following:

- Obtaining baseline information.
- Approach to the assessment of significance.
- Scope of further baseline studies.

20.3.2 The dialogue with stakeholders will continue throughout the pre-application period as part of the EIA process. A summary of the engagement undertaken so far is presented in Table 20-2, along with proposed future engagement.

Table 20-2: Current and future engagement with stakeholders

Stakeholder	Engagement undertaken to date	Proposed future engagement
Socio-economics, Community, Access and Amenity, Equalities and Health Technical Working Group (TWG) (attendees included representatives from: Cambridgeshire and Peterborough Combined Authority, Cambridgeshire County Council, Fenland District Council, Lincolnshire County Council, British Horse Society, Inland Waterways and Public Health England)	**7 November 2023 and 29 April 2024** – Socio-economics, Community, Access and Amenity, Equalities and Health TWG meeting to discuss the approach to the socio-economics and community assessment, the proposed guidance to be used, the likely baseline conditions and study area definition process. Following stakeholder engagement at the Socio-economics, Community, Public access and amenity, Equalities and Health TWG in April 2024, a number of additional settlements that fall just outside of the 1km buffer were also included in the 'wider' study area (where Lower Super Output Area (LSOA) boundaries cover half of a given settlement adjacent to the 'wider' study area boundary – in such instances, LSOAs which	It is proposed to hold regular TWG meetings for the duration of the pre-application stage. Future engagement for socio-economics and community will discuss progress and views in relation to methodology, consultation feedback, mitigation and preliminary assessment results.

Stakeholder	Engagement undertaken to date	Proposed future engagement
	cover the whole settlement have been included). These additional settlements comprise Whittlesey, St Ives, March, Outwell and Upwell.	
National Farmers Union (attendees included: National Farmers Union Fisher German)	**13 November 2023** – presentation on the 'Society' EIA aspects, and the approach to the emerging and supporting standalone socio-economic strategy.	No regular meetings planned but the Applicant will explore further opportunities for sessions to be held, pending relevant responses to Phase two consultation.
Environment Agency	**7 December 2023** – meeting including discussion around the role of the proposed reservoir in providing a community asset and supporting an integrated water strategy.	No regular meetings planned but ad hoc sessions could be held, pending relevant responses to Phase two consultation.
Fens Water Partnership (attendees included: Environment Agency)	**11 January 2024** – meeting including discussion around impact from land use change in the perspective of agriculture, and the impact on food production, and the balance between recreation and wildlife.	No regular meetings planned but the Applicant will explore further opportunities for sessions to be held, pending relevant responses to Phase two consultation.
Fens Community Liaison Group (CLG) (attendees included: South Staffordshire Water, LDA Design, Fereday Pollard)	**25 March 2024** – Fens CLG meeting to discuss the purpose and approach of the socio-economics and community assessment, followed by an opportunity for participants to feedback their key issues for the assessment.	It is proposed to engage this CLG following the scoping stage to help provide further local understanding of any emerging public concerns (i.e. from public consultation events) on relevant socio-economics and community issues for the Proposed Development. This may provide information which is relevant to the determination of significance.
Local Authority Associated Infrastructure Forum (LAAIF) – relevant planning authorities and	**15 May 2024** – meeting covering the approach to the socio-economics and community assessment,	1 October 2024 – meeting will cover Phase two consultation feedback, approach and analysis.

Stakeholder	Engagement undertaken to date	Proposed future engagement
relevant technical specialists from each council: Huntingdonshire District Council, Peterborough City Council, Cambridgeshire County Council, South Cambridgeshire District Council, Norfolk County Council, Borough Council of King's Lynn & West Norfolk, Fenland District Council	together with definition of study area and key considerations.	Future LAAIF meetings are proposed to cover methodology, mitigation and preliminary assessment results.
Education and training bodies (attendees included: Steadfast Training, College of West Anglia, Eastern Education Group, Construction Industry Training Board, Cambridgeshire and Peterborough Combined Authority, Lincolnshire County Council and Grantham college)	**23 May 2024** – meeting including discussion around construction jobs and training, existing programmes for skills and training in the region, small and medium enterprises, and volunteer network, skills bootcamps, apprenticeships and internships.	General agreement on sporadic engagement throughout project programme, which will encourage contributions towards overall strategy.
Grafham Water Centre (attendees included: Cambridgeshire County Council)	**5 June 2024** – meeting included discussion around potential similar centre at the proposed reservoir, its governance, gaps and needs, and businesses and services that complement each other (not compete against each other).	No regular meetings planned but the Applicant will explore further opportunities for sessions to be held, pending relevant responses to Phase two consultation.

20.3.3 It is proposed that engagement will be undertaken with the other relevant stakeholders as these are identified, for example local business forums.

20.4 Study area

20.4.1 This section sets out the approach to defining the study area for socio-economics and community. The study area is based on the identified Scoping boundary and the available information for the Proposed Development. This includes the information on construction and operation phases as described in Chapter 2: Project description. The identified study area is sufficiently broad to allow for the ongoing refinement of the Proposed Development; however, if required this will be modified to ensure there is appropriate coverage of all potential significant environmental effects.

20.4.2 The study area has been defined applying a buffer of 1km from the Scoping boundary. This distance has been used in line with best industry practice, and it is considered to sufficiently capture the likely public access and amenity impacts.

20.4.3 The study area has not been based on the four operational zones, listed below, and as described in Chapter 2: Project description. This is because the likely impacts are considered to be wider and the baseline conditions are therefore presented at a broader level; however, where appropriate, any differences in the baseline conditions related to the following zones have been considered.

- Sources of supply and upstream water transfers.
- Reservoir site
- Water treatment works.
- Downstream treated water transfers.

20.4.4 The Lower Super Output Areas (LSOAs) within the 1km buffer have been identified and used to form the study area. LSOAs have been used as this provides the most detailed data possible to accurately capture impacts to socio-economics and community. All receptor assets within the study area have been identified.

20.4.5 All LSOAs that fall within a 1km buffer of the Scoping boundary have been identified as per industry best practice. In total, the study area includes 86 LSOAs. This includes LSOAs from Fenland, Huntingdonshire, South Cambridgeshire, King's Lynn and West Norfolk, Peterborough and neighbouring East Cambridgeshire.

20.4.6 Where LSOA boundaries are slightly beyond 1km, these LSOAs have also been included. Following stakeholder engagement at the Socio-economics, Community, Public access and amenity, Equalities and Health Technical Working Group (TWG) in April 2024, a number of additional settlements that fall just outside of the 1km buffer were also included (where LSOA boundaries cover half of a given settlement adjacent to the study area boundary – in such instances, LSOAs which cover the whole settlement have been included. These additional settlements comprise Whittlesey, St Ives, March, Outwell and Upwell.

20.4.7 The LSOAs are shown in Figure 20.1. Some of the data retrieved is not available in 2021 LSOAs; therefore, baseline data has also been sourced from 2011 LSOAs.

These only differ slightly due to the name or shape of some of the LSOAs changing between the 2011 and 2021 addition.

20.4.8 As a comparator for the study area, the Local Authority District (LAD) boundaries have been used as part of the baseline analysis in the proceeding section (Figure 20.2). The LAD geography comprises those local authorities within which the Scoping boundary of the Proposed Development falls, i.e. the 'direct' LADs. These LADs can be seen in Figure 20.2. The data for the following LADs have been aggregated to be used as a comparator in the baseline conditions assessment.

- Peterborough City Council (Unitary Authority).
- Fenland Borough Council (Cambridgeshire County District).
- Huntingdonshire District Council (Cambridgeshire County District).
- South Cambridgeshire District Council (Cambridgeshire County District).
- King's Lynn and West Norfolk Borough Council (Norfolk County District).

20.4.9 In addition, data have also been collected at both regional (East of England and East Midlands) and national levels as comparator areas.

20.4.10 The study area for socio-economics and community has been defined based on the identified Scoping boundary and the available information for the Proposed Development. This includes the information on construction and operational phases as described in Chapter 2: Project description. The identified study area is considered to be sufficiently broad to allow for the ongoing refinement of the Proposed Development; however, if required this will be modified to ensure there is appropriate coverage of all potential significant environmental effects.

20.4.11 The study area has not been defined recognising the four operational zones, listed below, and as described in Chapter 2: Project description. The baseline conditions are presented at a broader regional and local level; however, where appropriate, any differences in the baseline conditions related to the following zones have been considered.

- Sources of supply and upstream water transfers.
- Reservoir site
- Water treatment works.
- Downstream treated water transfers.

Local study area

20.4.12 Further to the analysis of national legislation and policy, a number of local and combined authorities neighbouring the Fenland District Council boundary have been included in the legislation, policy and guidance review. The review worked on the principle that if the Scoping boundary of the Proposed Development falls within

the jurisdiction of a local authority, then the policy of that area is considered pertinent to the analysis exercise.

Baseline data collection and analysis study area

20.4.13 Three study areas have been developed for the purposes of baseline data collection and comparison. Data has been collected at two statistical geographies: LSOA and Local Authority District (LAD). The three tiers of study area are set out below in turn. In addition, data has also been collected at both regional (East of England and East Midlands) and national levels as comparator areas.

Local Authority District study area

20.4.14 The LAD study area comprises those local authorities which the Scoping boundary of the Proposed Development falls within, i.e. the 'direct' LAD. These LAD can be seen in Figure 20.1. The data for the following LAD has been aggregated to form the LAD study area:

- King's Lynn and West Norfolk (Norfolk County).
- South Cambridgeshire (Cambridgeshire County).
- Huntingdonshire (Cambridgeshire County).
- Fenland (Cambridgeshire County).
- Peterborough (Unitary Authority).

Lower Super Output Area 'local' study area

20.4.15 The 'local' study area includes all LSOAs that fall within a 500m buffer of the Scoping boundary. This includes 56 LSOAs from Fenland, Huntingdonshire, South Cambridgeshire, King's Lynn and West Norfolk, and Peterborough and East Cambridgeshire. This can be seen in Figure 20.2. Some of the data retrieved is not available in 2021 LSOAs; therefore, baseline data has also been sourced from 2011 LSOAs. These only differ slightly due to the name or shape of some of the LSOAs changing between the 2011 and 2021 editions.

Lower Super Output Area 'wider' study area

20.4.16 The 'wider' study area includes all LSOAs that fall within a 1km buffer of the Scoping boundary. Following stakeholder engagement at the Socio-economics, Community, Access and Amenity, Equalities and Health TWG in April 2024, a number of additional settlements that fall just outside of the 1km buffer were also included (where LSOA boundaries cover half of a given settlement adjacent to the 'wider' study area boundary – in such instances, LSOAs which cover the whole settlement have been included). These additional settlements comprise Whittlesey, St Ives, March, Outwell and Upwell. In sum, the 'wider' study area includes the 56 LSOAs from the 'local' study area plus 30 additional LSOAs, for a total of 86 LSOAs. It is important that the 'wider' study area also includes the LSOA's from the 'local' study area as it will be used to assess the effects of the associated water infrastructure. This can be seen in Figure 20.2.

Receptor assets

20.4.17 The study area for receptor assets will be included in the next stage of work for the Preliminary Environmental Information Report (PEIR) and will involve collecting data on all likely receptors within 1km of the proposed reservoir and 500m of the associated water infrastructure.

20.5 Baseline data collection

20.5.1 The baseline conditions for socio-economics and community presented in Section 20.6, represents a review of the currently available data. The data collated to date has been obtained through desk studies and field surveys. The data described below provides a robust context for the scoping of the assessments.

Desk studies

20.5.2 The majority of the data collection involved desk-based studies where data has been retrieved, compiled and analysed from existing sources. A summary of the data collected and the sources is provided in Table 20-3.

Table 20-3: Baseline data sources

Category	Data type	Source
Population profile	Usual residents' population by age groups	TS007B – Age by broad age bands, Office for National Statistics, 2021a
	Socio-economic status (based on deprivation – overall, income, employment, living environment, barriers to housing)	Consumer Data Research Centre, Index of Multiple Deprivation, 2019
	Population density	TS006 – Population density, Office for National Statistics, 2021b
Employment profile	Economically active vs inactive population	TS066 – Economic activity status, Office for National Statistics, 2021c
	Employment and unemployment rates	TS066 – Economic activity status, Office for National Statistics, 2021c
	Employment by occupation	TS063 – Occupation, Office for National Statistics, 2021d
	Median earnings	Annual Survey of Hours and Earnings, Nomis, 2023
	Employment by industry	Business Register and Employment Survey, Broad Industrial Groups, Nomis, 2022
	Commuting patterns	TS061 – Method used to travel to work, Office for National Statistics, 2021e
Skills and qualifications	Occupation level	TS063 – Occupation, Office for National Statistics, 2021d

Category	Data type	Source
	National Vocational Qualification (NVQ) levels	TS067 – Highest level of qualification, Office for National Statistics, 2021f
Accommodation and distribution	Number of dwellings by type of ownership	TS054 – Tenure, Office for National Statistics 2021g
	Number of households	TS041 – Number of Households, Office for National Statistics, 2021h
Supply chain and business	Gross value added (GVA) in local authority/county, etc.	Regional GVA (balanced) by local authority in the UK, Office for National Statistics, 2022
	GVA by industry	Regional gross value added (balanced) by industry: all International Territorial Level (ITL) regions, Office for National Statistics, 2022
Receptor assets	• Homes. • Business land and development land. • Education. • Healthcare. • Community. As identified in paragraph 20.1.2.	Google Maps, 2024; OpenStreetMap, 2024

Site visit

20.5.3 Site visits will be conducted around the study area of the Proposed Development, to cross check the data gathered online with findings found on site. Initially, desk-based studies will establish which receptor assets fall within 1km of the Scoping boundary. The site visits will then be used to check and confirm the status of the previously identified receptor assets.

20.6 Baseline conditions

20.6.1 The baseline conditions for socio-economics and community are described below for the study areas (defined in Section 20.4). The baseline conditions are as established from the data collection described in Section 20.4.

20.6.2 The approach to assessing the socio-economics and community impacts is fundamentally people-based. While receptor assets are identified such as residential dwellings, businesses, schools and other facilities as part of the baseline assessment, the primary focus of the assessment is on the users of these facilities (the people), referred to as the receptors. It is the people, not the buildings, who will experience the impacts of the Proposed Development. The baseline conditions section provides a comprehensive understanding of the current situation of the identified receptors, including aspects of the local economy, employment, and

community characteristics and challenges, which are representative of the wider area.

20.6.3 This baseline section and data analysis on the receptor profile sets out the understanding of the current situation; without this knowledge, the changes that the Proposed Development will bring cannot be accurately assessed. Graphs and visual data representations in this report and future stages of work will illustrate the current data. If the data shows numbers that are similar, it indicates that the study area does not significantly differ from the region. However, this does not render the data meaningless; rather, it helps to understand the nuances of the area and provides context for assessing potential impacts. The data on receptor assets provided in the section below is not exhaustive and will be further refined at PEIR stage.

Population profile

20.6.4 Understanding the population profile of an area sets the context for understanding demographic trends, labour force potential, dependency ratios and social services demand, thereby informing policy decisions and resource allocation. Table 20-4 presents details on the breakdown of population by age group.

Table 20-4: Population by age group

	Children (0–14)	Young people (15–24)	Working age (25–64)	Elderly (65+)
LSOA study area	16.6%	9.5%	51.4%	22.6%
LAD combined	17.9%	9.9%	52.2%	19.9%
Regional	17.6%	10.8%	52.0%	19.6%
National	17.4%	11.7%	52.4%	18.4%

Source: TS007B – Age by broad age bands, (Office for National Statistics, 2021i), from Nomis (2021)

20.6.5 Table 20-4 shows that there is a lower concentration of children and young people in the LSOA study area, indicating a potential lower demand for services and facilities related to childcare, education and leisure.

20.6.6 Within the study area, the areas near the proposed associated water infrastructure near Peterborough have the highest proportion of children in their local population compared to the upstream, downstream and proposed reservoir areas. The proportion of young and working-age people is consistent across all areas around the Scoping boundary, whereas the areas around the upstream sources and transfers zones of the Scoping boundary have a higher proportion of elderly residents compared to other areas.

Socio-economic status

20.6.7 Socio-economic status covers factors such as social exclusion and deprivation associated with geographical areas, or inequalities or variation associated with other geographical distinctions (for example urban versus rural). This can include other groups of people within the population who may experience socio-economic disadvantage due to circumstances linked to their socio-economic status (such as

people on low incomes, people with literacy problems, homeless people, ex-offenders, and new migrants or migrant workers).

20.6.8 Given the wide and cross-cutting nature of socio-economic status, it is considered that understanding levels of deprivation in an area provides a quantifiable measure by which to consider this. Understanding the level of deprivation helps in the identification of areas of social and economic disadvantage, where potential levels of unemployment are higher and levels of income are lower compared to other areas. Data shows the assessment of potential changes to deprivation as a result of the Proposed Development. It also provides an understanding of the likely ability of communities to respond to change.

20.6.9 The English Index of Multiple Deprivation (IMD) (Consumer Data Research Centre, 2019) has been used as a measurement of deprivation within the study area. IMD is a composite index of seven different metrics for deprivation, which are: income, employment, education, health, crime, barriers to housing and services, and living environment.

20.6.10 Within the IMD, the LSOAs are divided into 10 equal groups, which are known as deciles, according to their deprivation rank. The first decile represents the 10% most deprived LSOAs in the country, whereas the tenth decile represents the 10% least deprived households in the country. As shown in Figure 20.3, the upstream zones of the Scoping boundary generally display higher levels of overall deprivation, with some areas around March and Upwell ranking in the 20% most deprived areas in England compared to national averages. The downstream areas of the Scoping boundary demonstrate much lower areas of deprivation: St Ives, West Cambridge and other surrounding villages all containing areas in the top 20% least deprived areas in England compared to national averages. The reservoir site shows mixed levels of deprivation with Doddington, Wimblington and Manea ranking in the 6th and 7th decile for deprivation, putting them in the top 40% or 50% least deprived neighbourhoods in the country. However, Chatteris ranks much lower, with some neighbourhoods in the 40% most deprived decile.

Population density

20.6.11 Understanding the distribution of a population is important to mitigating any negative impacts of a proposed development on local communities, as impacts in a densely-populated area will affect more people. The average population density for the LSOA study area is 1,522 people per square km. This is reasonable, as the LSOA study area includes some of the larger settlements surrounding the proposed reservoir including March, Whittlesey and St Ives, which would raise the average population density. Population density is displayed in Table 20-5.

20.6.12 The study area is denser than the regional and national averages. The combined LAD area has a population density of 275.7 people per square km. The regional population density in 2021 was 331.4 and national population density was 433.5 people per square km. The comparator areas likely have a much lower population density because they account for far more rural farmland, which is sparsely populated compared to the study area of towns and villages.

20.6.13 The study area around the sources of supply and upstream water transfers zone has the highest population density where it borders East Peterborough. The rest of the study area surrounding the Scoping boundary has a similar population density; however, overall the sources of supply and upstream water transfers zone has a slightly higher density then the downstream treated water transfers zone and around the reservoir site and water treatment works zones.

Table 20-5: Population density

	Population density (per square km)
LSOA study area	1,521.6
LAD combined	275.7
Regional	331.4
National	433.5

Source: TS006 – Population density, (Office for National Statistics, 2021b), from Nomis (2021)

Economic activity

20.6.14 Understanding economic activity provides decision makers with context to decrease impacts of the scheme on local employment, as well as those who are unemployed and student populations.

20.6.15 The study area has a working age population of 121,306 people. 58.8% of this population are economically active but are not full-time students. This proportion is comprised of 56.5% employed and 2.2% are unemployed. Of the population, 39.9% are economically inactive. The majority of this group are retired, comprising 26.4% of the total population. Economically inactive demographics include students, those looking after family, that are long term sick or disabled; these make up the rest of the economically inactive population in much smaller amounts, less than 5%. Economically active students comprise 1.3% of the population.

20.6.16 The LAD area has proportions of the economically active similar to the study area at 60.4%, with active but full-time students at 1.5% and economically inactive at 38.1%. The LSOA study area's economically active and inactive population is in line with national and regional averages. There is a higher proportion of retired residents in the LSOA study area compared to national (21.5%) and regional (22.9%) averages. This information is presented graphically in Image 20.1.

20.6.17 The downstream treated water transfers and water treatment works areas around the Scoping boundary have the highest proportion of residents who are economically active compared to the sources of supply and upstream water transfers and reservoir.

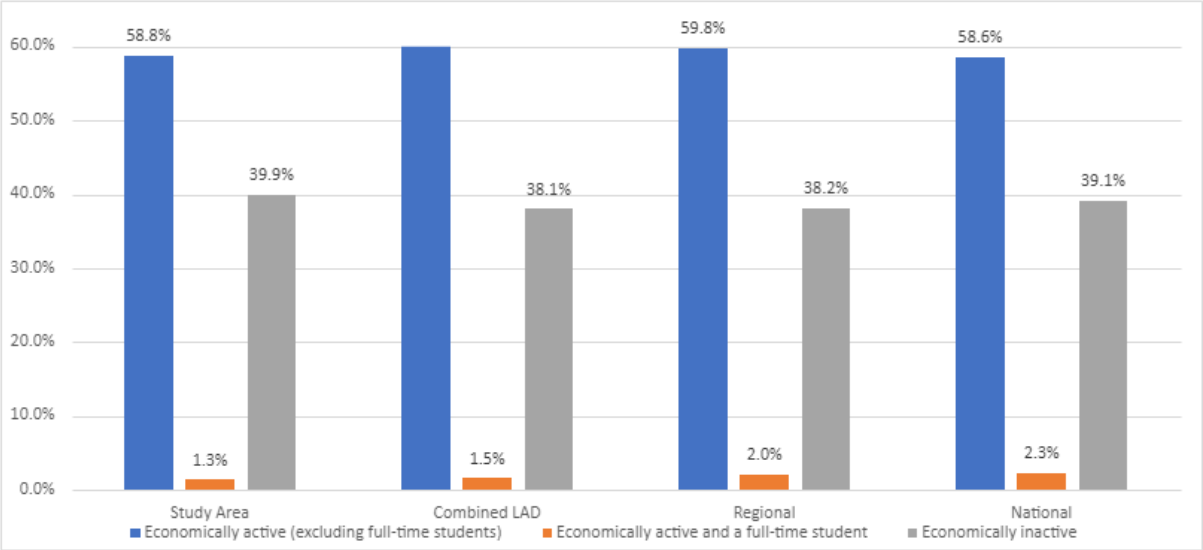

Image 20.1: Levels of economic activity
Source: TS066 – Economic activity status, (Office for National Statistics, 2021c)

Employment by occupation

20.6.18 Understanding the occupation profile of the study area improves the understanding of the level of skills and education within that area. This will assist in identifying whether the jobs created by the Proposed Development will align with the existing occupation profile of the area. There were 69,853 residents aged 16 years and over in employment the week before the Census 2021 (Office for National Statistics, 2021c) in the study area. Professional occupations were the largest group in the study area with 16.6%, of the population in these occupations. This is lower than the national and regional average of 20%.

20.6.19 In the LSOA study area 'Associate professional and technical occupations' is second with 12.5%, followed closely by 'Managers, directors and senior officials' with 12.4%. The proportion of the population in skilled trades is 12.1% for the LSOA study area. This is higher than the national average of 10% and regional average of 11%.

20.6.20 The three most common occupations for the study area are the same as the three most common occupations across England. These being professional occupations (20.3%), associate professional and technical occupations (13.3%), and finally managers, directors and senior officials (12.9%). The regional and combined LAD areas also have professional occupations as their most common occupation (19.6% and 19.2%, respectively). Managers, directors and senior officials are in second (13.7% regional and 12.6% LAD). In third is associate professional and technical occupations, with 13.3% regionally and 12.4% in the combined LAD area.

20.6.21 Professional occupations are the most common occupations across all areas around the Scoping boundary. However, managers, directors and senior officials are the second most common upstream and downstream of the study area whereas the

second most common for the proposed reservoir and water treatment works is associate professional and technical occupations.

Employment by industry

20.6.22 Understanding the employment profile of the study area improves the understanding of the local economy and the existing skills within the area. This will assist in understanding whether the jobs created by the Proposed Development are within existing industries which are highly prevalent, or whether there are likely to be skills shortages. The Business Register and Employment survey (BRES) (Nomis, 2022) collects data on employment by industry, which is shown in Table 20-6. BRES shows that there are 61,295 people in employment in the study area. The largest industry by employment for the study areas is manufacturing with 16.3% of the LSOA study area population working in this field. This is higher than the national, regional and local authority area averages of 7.5%, 7.4%, and 11.7% respectively.

20.6.23 Within the study area health is the second most common profession with 9% of the population, and transport and storage comes closely behind in third with 8.9% of the population.

Table 20-6: Employment by the most popular industries

Study area	Industry*						
	3	4	7	8	13	14	17
LSOA study area	16.3%	8.1%	8.7%	8.9%	5.7%	7.5%	9.0%
Combined LAD	11.7%	5.3%	8.0%	5.6%	9.1%	9.1%	12.5%
Regional	7.4%	6.7%	8.7%	5.6%	7.9%	10.9%	12.3%
National	7.5%	4.8%	8.5%	5.1%	9.4%	9.2%	13.2%

Notes:
***
3: Manufacturing (C)
4: Construction (F)
7: Retail (Part G)
8: Transport & storage (including postal) (H)
13: Professional, scientific & technical (M)
14: Business administration & support services (N)
17: Health (Q)
Source: Business Register and Employment Survey, Broad Industrial Groups (Office for National Statistics, 2022)

20.6.24 In the combined LAD area, the most common industry by employment is health, employing 12.5% of the population. This is followed by manufacturing, employing 11.7% and professional, scientific and technical, as well as business administration and support services, which both employ 9.1% of the working population. The health sector is also the largest regional employer across the East of England, supporting 12.3% of jobs. The second largest is business administration and support services with 10.9% of employment, followed by retail which supports 8.7% of jobs.

20.6.25 Manufacturing is the most popular industry in the upstream, downstream and the water treatment works areas of the study area. However, around the proposed

reservoir the industry with the most employment is health. Manufacturing is the second highest employer in the study area surrounding the proposed reservoir. This differs across every zone around the Scoping boundary. The study area for sources of supply and upstream water transfers shows the second highest employer is the 'business administration and support services'. The second highest employer for the study area for the downstream treated water transfers zone is 'professional, scientific & technical' and the zone around the water treatment works is 'transport & storage'.

Skills and qualifications

20.6.26 Understanding the skills and qualifications of the population in the study area is vital information when considering the Proposed Development. It may impact local educational facilities such as schools and colleges in a multifaceted way: for example, providing opportunities for physical education, extracurricular activities, research, field trips, and outdoor education programmes – as well as enhancing environmental awareness and providing opportunities for internships.

20.6.27 NVQs run from levels 1–7, whereby Level 2 is equivalent to GCSE level, Level 3 is equivalent to A-levels, Level 4 is equivalent to a foundation degree, Level 6 is equivalent to a bachelor's degree and Level 7 is equivalent to a master's degree. The largest group have the equivalent of a Level 4 NVQ or higher: at 26.6% in the LSOA study area. The next largest group have no formal qualifications: 20.8% in the LSOA study area. This is followed by Level 3 qualifications, Level 2 qualifications, an apprenticeship and the smallest group was 'other' qualifications, which was only 3% of the population for the study area. This follows trends at national, regional and LAD area levels. At the regional level, 18.1% of residents have no formal qualifications and 31.6% of residents have qualifications at Level 4 and above.

20.6.28 The downstream treated water transfers zone of the Scoping boundary has the highest concentration of people with qualifications Level 4 or higher, almost double the amount of the other zones including the sources of supply and upstream water transfers, the reservoir site and the water treatment works. The downstream treated water transfers zone of the study area also has the lowest number of people with no qualifications at all whereas the water treatment works has the highest.

Accommodation and distribution

20.6.29 Understanding accommodation and home ownership status is key to understanding how local communities are structured. There are approximately 63,491 households in the study area. The majority of dwellings in the study area are owned by their occupiers at 68.7%. This is above the national, regional and LAD area average of 61.3%, 65.2% and 64.9% of homes owned by occupiers, respectively. The next largest proportion of homes are privately rented at 18.5% in the LSOA study area. Around 10% –12% of homes in the study area are socially rented, and less than 1% are owned through shared ownership or live rent free. This is lower than the national, regional and LAD area average of socially-rented homes, which is 20.5%, 18.2% and 18.9% respectively.

20.6.30 The sources of supply and upstream water transfers zone of the local study area has the highest number of homes owned by their occupiers, comprising of three quarters of all homes. In contrast, the local study area around the water treatment works outside of Peterborough has the lowest number of owner occupied homes, consisting of just over half of all homes. As expected this means that the local study area around the water treatment works has the highest percentage of socially rented and privately rented homes. The majority of the homes in the sources of supply and upstream water transfers, downstream treated water transfers and reservoir site zones around the Scoping boundary are owner occupied.

Supply chain and business

20.6.31 GVA is '*the value generated by any unit engaged in the production of goods and services*' (Office for National Statistics, 2022). GVA provides important context to what sectors and industries contribute most value to the study area's local economy. Data on GVA is only available at the International Territorial Level 3: Countries and groups of unitary authorities (ITL3 level). The ITL classification system allows for comparison of regions and sub-national areas for statistical purposes. There is no currently defined study area for these geographies; however, the most appropriate ITL3 areas that fit best into the LAD area have been identified. These include Peterborough, Cambridgeshire County Council, and North and West Norfolk. Table 20-7 shows the total amount of GVA produced across all sectors, and details the three largest sectors in each of the relevant areas. The services sector and production sector were clearly the largest two sectors across all three areas. The third largest sector differed across all three areas between manufacturing, real estate activities, and professional, scientific, and technical activities.

Table 20-7: Largest sectors by GVA in ITL3 boundaries

Area	All industries GVA (current prices)	Largest industry	Second-largest industry	Third-largest industry
Peterborough	£7,189 million	Services Sector: £5,322 million	Production Sector: £1,424 million	Manufacturing: £1,098 million
North and West Norfolk	£5,179 million	Services Sector: £3,497 million	Production Sector: £1,270 million	Real Estate activities: £928 million
Cambridgeshire County Council	£23,844 million	Services Sector: £18,322 million	Production Sector: £3,999 million	Professional, scientific and technical activities: £3,364 million

Source: Regional GVA (balanced) by industry: all ITL regions (Office for National Statistics, 2022)

Receptor assets

20.6.32 Individual community receptors or 'receptor assets' have been identified for socio-economics and community. These receptors fall into four broad categories: business and residential, education, healthcare, and community. For simplicity, not

every home that was found within the study area was recorded; instead, they were grouped into sections. For example, several homes that fell into the study area in Chatteris were recorded once in this assessment as 'homes in Chatteris'.

20.6.33 Within the study area, the majority of the receptor assets fall into the community category, which includes town halls, places of worship, community centres and other community facilities. Many of the closest receptor assets to the Scoping boundary fell within the 'business and residential' category. This includes farms, pubs, shops and other local businesses.

20.6.34 The study area includes several residential areas. The closest of these to the Scoping boundary are Wimbotsham, Downham Market, Nordelph, Bluntisham, Somersham, Chatteris, Doddington, Swavesey, Fen Drayton and Hardwick. As mentioned above for simplicity, not every home that was found within the study area was recorded; instead, they were grouped into sections, for example, 'homes in Chatteris' is one observation.

Future baseline

20.6.35 The methodology relating to the proposed approach to future baseline is presented in Chapter 6, Section 6.2: Environmental assessment methodology, alongside a list of proposed developments that, at this time, are expected to fall into this category. As such, these developments would form part of the future baseline for assessment within the EIA. Where this presents new environmental receptors or a change to the current baseline specific to socio-economics and community, this is discussed further below.

20.6.36 The future baseline will likely be characterised by continued population growth within the east region. The adopted Fenland District Local Plan 2021–2031 (Fenland District Council, 2014) provided a strategy to deliver new infrastructure, such as education facilities, new housing and employment floorspace. An emerging Fenland Local Plan (2021–2040) is being developed and will replace the 2014 Local Plan once it is adopted in the coming years. This new provision would be expected to identify and address policy emphases around improving socio-economic conditions. This is supported by adopted policy in other neighbouring authorities across the direct LAD area, such as the Huntingdonshire Local Plan 2019–2036 (Huntingdonshire District Council, 2019), South Cambridgeshire Local Plan (South Cambridgeshire District Council, 2018) and Peterborough Local Plan 2016–2036 (Peterborough City Council, 2019).

20.7 Design and mitigation

Design

20.7.1 The design of the Proposed Development to date has taken consideration of environmental constraints and potential environmental effects. The design development process has sought to avoid and reduce adverse environmental effects on socio-economics and community. Firstly, through avoidance and

prevention to prevent the effect, and then reduction (and mitigation) where avoidance is not possible.

20.7.2 The ongoing development of the design will incorporate embedded mitigation to avoid and reduce adverse effects, where feasible.

20.7.3 The design development process will include consideration of enhancement measures to improve the surrounding environment.

Mitigation

20.7.4 Documents presenting the approach to mitigation will be produced, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. These measures would be applied to mitigate likely significant effects, including socio-economics and community effects. Socio-economics and community considerations will also inform the process for developing construction methods and components, such as those relating to supply chain and procurement.

20.7.5 Examples of good practice and essential mitigation relevant to socio-economics and community include:

- Development of a socio-economic strategy for the construction and operational phases to increase employment opportunities and upskilling for certain unskilled and/or poorly resourced groups, the unemployed, young people and those in the study area.
- Continued engagement with relevant stakeholders.
- Implementation of a programme for community liaison: Establish a dedicated community liaison team to act as a bridge between the project and local residents.
- Cultural and social infrastructure support associated with any lost facilities or assets, taking account of business and residential effects, as well as training, education and skills.
- Agreement of Section 106 contributions.

20.7.6 Relevant documents will be produced to set out the measures and standards of work to be applied during the operational phase. These would be applied to monitor, manage and control adverse environmental effects associated with operation and maintenance activities.

20.8 Proposed scope of assessments

Likely significant effects requiring assessment (scoped in)

20.8.1 The following section sets out the aspect-specific effects for socio-economics and community. The likely significant effects requiring assessment are presented in Table 20-8. Where potential effects may be specific to one or more zones of the

Proposed Development and the relevant study area, this is identified in Table 20-8 (see Chapter 2: Project description, for further discussion of zones).

Table 20-8: Likely significant socio-economics and community effects

Activity	Effect	Receptor assets	Zone
Construction			
All construction activities (including enabling works, site clearance, setting up of compounds, demolition of buildings, vegetation removal, excavation and earthworks, the presence of compounds and laydown areas, and construction of haul roads works to the affected existing road network)	Loss or displacement of existing residential properties and businesses through land requirements impacting local residents and business owners.	Residential dwellings. Businesses.	All zones
All construction activities (including enabling works, site clearance, setting up of compounds, demolition of buildings, vegetation removal, excavation and earthworks, the presence of compounds and laydown areas, and construction of haul roads works to the affected existing road network)	Creation of direct, indirect and induced employment and GVA (including local spending).	Residential dwellings. Businesses.	All zones
All construction activities (including enabling works, site clearance, setting up of compounds, demolition of buildings, vegetation removal, excavation and earthworks, the presence of compounds and laydown areas, and construction of haul roads works to the affected existing road network)	Changes to the demand and availability of community facilities during construction impacting local residents.	Residential dwellings. Businesses. Community facilities.	All zones
All construction activities (including enabling works, site clearance, setting up of compounds, demolition of buildings, vegetation removal, excavation and earthworks, the presence of compounds and laydown areas, and construction of haul roads works to the affected existing road network)	Changes to the nature and size of the local population due to the presence of the construction workforce leading to additional temporary population, may result in changes to crime rates, as well as increased demand for	Residential dwellings. Businesses.	All zones

Activity	Effect	Receptor assets	Zone
	services, businesses, and facilities.		
Operation			
Operation of the reservoir. Recreational use of the reservoir.	Direct, indirect and induced impact on local and regional employment and GVA to the economy impacting local residents and business owners.	Residential dwellings. Businesses.	All zones
Operation of the reservoir. Operation of transfers via pipeline (including pumping stations and service reservoirs). Operation of open channel transfers.	Permanent loss or gain of community facilities due to land required to operate the Proposed Development impacting local residents and visitors.	Residential dwelling. Businesses. Community facilities.	All zones

Effects not requiring assessment (scoped out)

20.8.2 The effects proposed to be scoped out of the socio-economics and community assessment are detailed in Table 20-9. There are no construction effects that have been scoped out.

Table 20-9: Potential effects to be scoped out of the socio-economics and community assessment

Activity	Effect	Receptor	Justification for scoping out	Zone
Operation				
Operation of the reservoir. Operation of transfers via pipeline (including pumping stations and service reservoirs). Operation of open channel transfers.	Demand for community services and facilities as a result of the delivery of the Proposed Development.	Community facilities.	While it is recognised there will be an influx of visitors due to the delivery of the Proposed Development, it is not expected that the demand will be such as to lead to likely significant effects.	All zones

20.9 Assessment methodology

20.9.1 The study areas set out in Section 20.4 will be kept under review as the design and consultation processes progress, and the Proposed Development is refined.

Therefore, the study areas may evolve as appropriate. Any evolution of the study areas will be clearly communicated in the ES and discussed with relevant consultees.

20.9.2 The proposals, described in Chapter 2: Project description, will also evolve and be further developed as the design process progresses. Whilst the methodologies that are set out within this chapter are not anticipated to change, the scope of assessment will be kept under review as design progresses.

Additional baseline information required

20.9.3 Additional baseline information on receptor assets will be obtained at PEIR stage, such as detail on residential dwellings and businesses using the Ordnance Survey AddressBase Plus tool (Ordnance Survey, 2024).

20.9.4 Site visits will be conducted around the study area of the Proposed Development to cross check the data gathered online with findings found in the study area. Initially, desk-based studies are done to establish what receptor assets fall within 1km of the Scoping boundary. The site visits will then be used to confirm that the previously identified receptor assets are still there and still in use.

Assessment years

20.9.5 Assessment years are the same as set out in Chapter 6: EIA approach and methodology.

Construction assessment methodology

20.9.6 The proposed methodology will include an analysis of current baseline socio-economics and community data, which will focus on providing an understanding on the profile of receptors, their age, employment and socio-economic status. This includes analysing a variety of socio-economic and demographic data including, but not limited to, population data, deprivation, economic activity, sectoral employment and occupations, education and housing. Additional baseline information on receptor assets will also be obtained at PEIR stage, such as detail on residential dwellings and businesses.

20.9.7 The objective of the assessment is to identify the impacts of the construction of the Proposed Development, and establish the potential significance of effects they have on local receptors and receptor assets in the immediate vicinity of the project. The categories of receptor assets which will be considered in the assessment include residential dwellings, businesses (including agricultural businesses), education, healthcare and community facilities. Agricultural businesses will be considered from a socio-economics point of view, considering how the Proposed Development would impact the businesses in terms of employment, economic activity and contributions towards the wider economy. Chapter 12: Geology, soils, agriculture and land quality provides an assessment of effects on agricultural landholdings.

20.9.8 The assessment of effects on receptor assets will be qualitative and based on experience, and professional judgment will be applied considering the sensitivity of the receptor.

20.9.9 There is no definitive approach to assessing the significance of socio-economics and community effects. The assessment of likely significant effects will be qualitative and quantitative and guided by professional judgement, and will consider the value and sensitivity of receptors from the baseline socio-economic characteristics, considering their importance, size and potential for substitution, as well as the magnitude of the net additional impact based on qualitative and quantitative evidence (where applicable).

20.9.10 The key indicators used to assess the socio-economics and community impacts of the Proposed Development are outlined below. These indicators establish the context for the assessment, providing a framework for evaluating the significance of potential impacts:

- Spatial scope:
  - Local: Impacts confined to the study area.
  - Wider: Impacts confined to the LAD comparator study area.
  - Regional: Impacts affecting a larger geographic area such multiple neighbourhoods or towns within the region.
- Extent:
  - Localised: Impacts affecting a small, specific area or a limited number of people or businesses.
  - Moderate: Impacts affecting a larger area or a significant portion of the community, but not widespread.
  - Widespread: Impacts affecting a broad area, potentially including multiple communities or regions.
- Duration:
  - Short-term: Impacts occurring only during a specific phase of the project, such as construction, with minimal long-term effects.
  - Medium-term: Impacts lasting through initial operational phases, including early operational stages, with moderate long-term effects.
  - Long-term: Impacts persisting throughout the project's lifespan or indefinitely, with significant and enduring effects.
- Reversibility:
  - Temporary: Impacts that can be reversed or mitigated after the project ends, returning conditions to their original state.

- Partially reversible: Impacts that can be partially mitigated, but some residual effects may remain.
- Permanent: Impacts that cannot be reversed or fully mitigated, resulting in lasting changes or effects.

20.9.11 This approach, and the proposed sensitivity, magnitude and significance levels, will be tested with stakeholders as part of the TWG meetings. Tables 20-10 and 20-11 set out the criteria for sensitivity of receptors and magnitude of impact.

Table 20-10: Criteria for sensitivity of receptor assets

Receptor asset	Sensitivity
Residential dwellings	High
Businesses	Medium
Education provision	Medium
Healthcare provision	Medium
Community infrastructure	Low

20.9.12 The criteria for sensitivity levels are as follows:

- High sensitivity: Receptors that are highly sensitive to changes and impacts due to their nature, usage and the potential effect on large or vulnerable populations.
- Medium sensitivity: Receptors that are somewhat sensitive to changes and impacts, which may affect moderate populations or have less critical functions.
- Low sensitivity: Receptors that are less sensitive to changes and impacts, with minor effects on small populations or less critical functions.
- Negligible sensitivity: Receptors that are minimally sensitive to changes and impacts, with little to no significant effect.

Table 20-11: Criteria for magnitude of impact

Magnitude of impact	Indicative criteria for the magnitude of change
Major	• A large proportion of the local study area is impacted. • Affects many (for e.g. over 1,000) receptors The impact is permanent or long-term (e.g. more than a year). • Requires considerable intervention to return to the baseline.
Moderate	• A moderate proportion of the 'local' study area is impacted. • Affects a moderate (for e.g. over 100) number of receptors. • The duration over which the impact is experienced is medium-term (e.g. between six months and a year). • May require some intervention to return to the baseline.
Minor	• A small proportion of the 'local' study area is impacted. • Affects a small (for e.g. less than 10) number of receptors.

Magnitude of impact	Indicative criteria for the magnitude of change
	• The duration over which the impact is experienced is short-term (e.g. between three and six months). • Baseline returns without intervention or with only limited intervention.
Negligible	• A very small proportion of the 'local' study area is impacted. • Impact is very short-term (e.g. less than three months). • Affects a very few number of receptors. Baseline remains consistent.

20.9.13 As part of the socio-economics and community assessment, employment impacts from the development and construction phases of the Proposed Development will also be considered quantitatively. An existing socio-economic model/toolkit developed by the aspect team will be used to assess the direct and indirect employment impacts of the Proposed Development, and will be applied to establish the significance of the Proposed Development. The model has been created for the purposes of estimating socio-economic effects using existing guidance on employment density and additionality (Homes & Communities Agency, 2014; Homes & Communities Agency, 2015; HM Treasury, 2022). The model has been applied and used for evidence in previous DCO projects such as the London Luton Airport Expansion DCO (Ref: TR020001, 2023), Port of Tilbury (Expansion) DCO (Ref: TR030003, 2017) (Planning Inspectorate, 2017a) and North London Heat and Power Generating Station DCO (Ref: EN010071, 2017) (Planning Inspectorate 2017b).

20.9.14 The model produces estimates on employment and GVA generated through the development and construction of the Proposed Development. The model also estimates direct, indirect and induced employment using the following employment multipliers:

- Direct employment directly generated through the construction of the Proposed Development.
- Indirect employment created and/or sustained in suppliers to the Proposed Development. These jobs represent the cumulative effect through the supply chain, as initial suppliers make purchases from their suppliers and so on.
- Induced employment supported by the wages and salaries of workers employed both directly by the Proposed Development, and indirectly by suppliers.

20.9.15 The employment estimates produced via the model will be compared to those construction employment estimates being produced as part of ongoing constructability considerations for the Proposed Development. These constructability estimates are being produced to inform design, construction, transport and similar aspects of the Proposed Development. The constructability estimates will be used to update the model parameters and refine the employment calculations.

20.9.16 The direct, indirect, and induced jobs are initially produced as gross estimates; however, in line with industry standards and relevant guidance (Homes & Communities Agency, 2014; Homes & Communities Agency, 2015; HM Treasury, 2022), other 'additionality' factors will be applied to also allow for an estimate of the net new jobs to be made. The additionality factors taken into consideration include:

- Leakage – the number or proportion of outputs that benefit those outside of the Proposed Development's local study area.
- Displacement/substitution – the number or proportion of outputs accounted for by reduced outputs elsewhere in the local study area.
- Deadweight – output that would have occurred without the Proposed Development.
- Multipliers – Further economic activity (jobs, expenditure or income) associated with additional local income, local supplier purchases and longer-term effects. For this assessment appropriate employment multipliers will be applied.

20.9.17 In terms of effects on receptor assets, social infrastructure thresholds will be benchmarked against similar projects to ensure accuracy in projections for demand of services and facilities.

Operational assessment methodology

20.9.18 The assessment methodology for the operational phase is the same as the methodology described for the construction phase above.

Significance of effects

20.9.19 Significance of effects will be determined by cross referencing the assessed level of value with the magnitude of impact as shown in Image 6.1 in Chapter 6: EIA approach and methodology. A significant effect in the context of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 is taken to be a moderate or greater adverse or beneficial significance.

20.10 Assessment assumptions and limitations

20.10.1 This EIA scoping report is based on the project description of the Proposed Development as it currently stands at the time of writing.

20.10.2 The assessment of socio-economics and community effects is based on professional judgement and is drawing on available qualitative and quantitative information.

20.10.3 Evidence- and judgement-based assumptions will be made on employment multipliers for indirect and induced effects. This includes multipliers for leakage, deadweight and displacement of employment effects; employment densities; and social infrastructure thresholds based on previous experience of similar projects.

20.10.4 These assumptions are crucial to understanding the potential impact and have been integrated into the assessment methodology (see Section 20.9 for details). For instance, employment multipliers and employment densities are used to estimate indirect job creation, while leakage and deadweight factors are considered in evaluating net employment effects. Additionally, social infrastructure thresholds will be benchmarked against similar projects to ensure accuracy in projections.

21 Human health

21.1 Introduction

21.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to human health. The chapter should be read in conjunction with the description of the project, as presented in Chapter 2: Project description.

21.1.2 Health is defined as a '*state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*' (World Health Organization (WHO), 1948). Mental health is defined as a '*state of mental wellbeing that enables people to cope with the stresses of life, realise their abilities, learn well and work well, and contribute to their community*' (WHO, 2022). The terms mental health and mental wellbeing are used interchangeably in this chapter. The scoping assessment has adopted a population health approach. The term 'population health' means the health outcomes of a group of individuals, including the distribution of such outcomes within the group (Kindig and Stoddart, 2003). A health outcome is defined as a '*change in health status of an individual, group or population attributable to a planned intervention or series of interventions, regardless of whether such an intervention was intended to change health status*' (WHO, 2021). In this context, the Proposed Development would comprise a series of interventions with the potential to affect health outcomes.

21.1.3 The health of a population is influenced by a range of matters known as 'wider determinants of health'. The broad categories of wider determinants of health considered in this scoping assessment, taken from the Institute of Environmental Management and Assessment (IEMA) Guide to Effective Scoping of Human Health in EIA (Pyper *et al.,* 2022a), are as follows:

- Health-related behaviours (matters relating to the promotion of healthy behaviour and lifestyles).
- Social environment (matters relating to the organisation of society and promotion of social interactions to achieve safe and cohesive communities).
- Economic environment (matters relating to health-promoting socio-economic conditions and resources).
- Biophysical environment (matters relating to health protection to achieve healthy environmental conditions).
- Institutional and built environment (matters relating to institutions for health-related care, organisations and systems that support communities, and wider system resources that support health).

21.1.4 Many of these wider determinants involve matters which are addressed in other aspect chapters (i.e. other EIA topic chapters) of this EIA Scoping Report. For example, Chapter 15: Air quality, Chapter 18: Noise and vibration and Chapter 10:

Water resources and flood risk, relate to biophysical health determinants. Chapter 19: Public access and amenity and Chapter 20: Socio-economics and community, cover matters that relate to the health-related behaviours and the social, economic and institutional, and built environment determinants of health.

21.1.5 The scoping exercise for the human health assessment has considered information in other aspect chapters to determine which matters would give rise to likely significant effects in terms of public health priorities, relevant population health outcomes and effects on health inequalities.

21.2 Legislation, policy and guidance requirements

21.2.1 Legislation, policy and guidance which has informed the scope of the assessment presented within this chapter is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

21.2.2 Table 21-1 identifies the relevant policy in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023), and the National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities (DLUHC), 2023) for human health.

Table 21-1: UK policy relevant to human health

Relevant UK policy	Relevance to assessment
NPS for Water Resources Infrastructure (Defra, 2023)	Section 3.12 notes '*that the construction and use of water resources infrastructure has the potential to affect people's health, wellbeing and quality of life'*. It identifies potential direct impacts *'because of traffic, noise, vibration, air quality and emissions, light pollution, community severance, dust, odour, polluting water discharges, hazardous waste and pests'* and indirect health impacts, for example, if water resources infrastructure affects *'access to key public services, local transport opportunities for cycling and walking, or the use of open space for recreation and physical activity'*. The NPS notes that '*there is potential for increased employment, along with the new recreational opportunities (particularly for reservoirs) that may have indirect positive health impacts*'. It states that *'Where the proposed project has likely significant environmental impacts that would have an effect on human population or health, the applicant should identify and set out the assessment of any likely significant health impacts'*. It states that applicants '*should identify measures to avoid, reduce or compensate for adverse health impacts and seek enhancement opportunities as appropriate'*.
NPPF (DLUHC, 2023)	Chapter 8 of the NPPF sets out overarching planning policy for promoting healthy and safe communities. Paragraph 96 states that '*planning decisions should aim to achieve healthy, inclusive and safe places*'. Paragraph 102 identifies how access to high-quality

Relevant UK policy	Relevance to assessment
	open spaces opportunities for physical activity '*is important for the health and wellbeing of communities, and can deliver wider benefits for nature and support efforts to address climate change*'.

21.3 Stakeholder engagement

21.3.1 In preparing this EIA Scoping Report, efforts have been made to engage stakeholders, including community organisations, to establish a degree of participation in the scoping process. In accordance with the IEMA Guide to Effective Scoping of Human Health in EIA (Pyper *et al*., 2022a), the first point of contact for engagement is the Director of Public Health for the relevant Local Authority. Other organisations suggested in the guidance are Integrated Care Systems representatives, the Office for Health Improvement and Disparities (OHID), the United Kingdom Health Security Agency (UKHSA) and local Environmental Health Officers. Representatives of these organisations have been invited to be members of Technical Working Groups (TWGs) which cover health.

21.3.2 Since health is interlinked with various environmental and social matters, the health topic has been included within two TWGs: Noise and vibration, air quality and health TWG; and Socio-economics, community, access and amenity, equalities and health TWG. A further TWG 'sub-group' for health assessment was also set up, which is comprised of members who have a particular interest in the health assessment. The aim of the group was to guide the approach and quality of the health assessment at key points in the process, namely the scoping stage, development of methodologies, and preliminary assessment findings.

21.3.3 The dialogue with stakeholders will continue throughout the pre-application period as part of the EIA process. A summary of the engagement undertaken so far is presented in Table 21-2, along with proposed future engagement for the health assessment.

Table 21-2: Engagement with stakeholders

Stakeholder	Engagement undertaken to date	Proposed future engagement
Fens Community Liaison Group (CLG)	**7 November 2023 and 25 March 2024** – meeting to discuss the purpose and approach of the health assessment, with participants provided with the opportunity to feedback their key issues for the health assessment (see Appendix 21-1: Participation at health scoping stage).	The Fens CLG is planned to continue running at approximately quarterly intervals for the duration of the Proposed Development, from planning and through the construction phase.

Stakeholder	Engagement undertaken to date	Proposed future engagement
Noise and vibration, air quality and health TWG (attendees included OHID, Cambridgeshire County Council Health in All Policies, and Fenland District Environmental Health)	**3 November 2023 and 25 April 2024** – meetings to discuss the approach to the health assessment, including the proposed guidance, the intention to incorporate Health Impact Assessment (HIA) principles, the likely scope of health determinants, and relevant population groups.	It is proposed to hold TWG meetings approximately at quarterly intervals for the duration of the pre-application stage. It is expected that future engagement for health will cover issues of study area definition, methodology, baseline data, securing positive health outcomes, mitigation and preliminary assessment results.
Socio-economics, community, access and amenity, equalities and health TWG (attendees included OHID, Cambridgeshire County Council Health in All Policies, NHS Cambridge and Peterborough Integrated Care System)	**10 November 2023 and 29 April 2024** – meetings to discuss the approach to the health assessment, including the proposed guidance, the intention to incorporate HIA principles, the likely scope of health determinants and relevant population groups.	As above.
TWG Health Assessment Sub-Group (attendees included Cambridgeshire County Council Health in All Policies, and Fenland District Environmental Health)	**7 February 2024** – collaborative scoping meeting to discuss relevant health determinants, aided by a checklist (see Appendix 21-1: Participation at health scoping stage).	It is proposed to further engage this sub-group throughout the health assessment to collaborate on issues such as methodology, defining population groups, identifying and interpreting local health data, and securing health benefits and mitigation.
Fens Local Authority Associated Infrastructure Forum (LAAIF) (attendees included Huntingdonshire District Council, Peterborough City Council, Cambridgeshire County Council,	**15 May 2024** – meeting to discuss the approach to the health assessment, including acknowledgement of each Local Authority's policy and guidance relating to health and wellbeing, and any local policy expectations for HIA.	At future LAAIF meetings it is proposed to cover issues of study area definition, methodology, baseline data, securing positive health outcomes, mitigation and preliminary assessment results. This may involve creating a sub-group of public health consultees.

Stakeholder	Engagement undertaken to date	Proposed future engagement
South Cambridgeshire District Council, Norfolk County Council, and Fenland District Council)		

21.4 Study area

21.4.1 The study area for human health has been defined based on the identified Scoping boundary and the available information for the Proposed Development. This includes the information on construction and operational phases, as described in Chapter 2: Project description. The study area has not been defined recognising the four operational zones identified in Chapter 2: Project description, as the baseline conditions are presented at a broader regional and local level.

21.4.2 As noted in the IEMA health scoping guidance (Pyper *et al*., 2022a), health effects vary spatially depending on the nature of health determinants to be assessed. The study areas applied at this scoping stage for health are purposefully broad. This is to help identify relevant population groups on which likely significant effects are anticipated, using a source-pathway-receptor approach, as described in Section 21.8. The study areas are indicated on Figure 21.1 and defined in Table 21-3.

Table 21-3: Human health study areas

Study area	Description
Regional study area	The regional study area has been applied to establish the population health baseline with regard to wider determinants of health that interact with populations at a more regional scale. For example, climate resilience, water supply and demand, health and social care service provision, employment and education. The study area is loosely defined to include populations of the Anglian Water and Cambridge Water supply areas; the Integrated Care Board areas for NHS Cambridgeshire and Peterborough, and NHS Norfolk and Waveney; and the local authorities within which the Proposed Development is situated (East Cambridgeshire, Fenland, Huntingdonshire, King's Lynn and West Norfolk, Peterborough and South Cambridgeshire).
Local study area	The local study area has been applied to establish the population health baseline with regard to wider determinants of health that interact with populations at a more local level. For example, quality of local environment (matters such as noise, dust, visual amenity), local access, community identity, social participation, interaction and support. The local study area for the purposes of scoping has been based on the middle super output areas (MSOAs), which encompass the lower super output areas (LSOAs) within the local baseline study area, identified in Chapter 20: Socio-economics and community. LSOAs are made up of output areas (the lowest level of geographical area for census statistics) and comprise between 400 and 1,200 households.

Study area	Description
	The socio-economics and community assessment has based its study area on LSOAs. However, local health data is more readily available at MSOA level, which is the reason that MSOAs have been used to define the local study area for the health assessment. MSOAs are made up of groups of LSOAs and comprise between 2,000 and 6,000 households.
Site-specific population	The site-specific study area has been applied to identify population groups most likely to be directly affected by the Proposed Development, such as landowners, residents and occupiers and future site workers. For the purposes of scoping this has been defined by the Scoping boundary. This study area will be refined further throughout the assessment.

21.5 Baseline data collection

21.5.1 The baseline conditions for human health presented in Section 21.6 represent a review of the currently available data. The data collated to date were obtained via desk studies. Data collection to inform the baseline of the assessment is ongoing. The data described below provide a robust context for the scoping of the assessments.

Desk studies

21.5.2 A review of publicly-available information has been undertaken to create preliminary population health profiles for the study areas. The following resources were used:

- Fingertips – Local Health Profiles (OHID, 2024a).
- Local Health (OHID, 2024b).
- Office for National Statistics (ONS) Census (ONS, 2021).
- Cambridgeshire and Peterborough Insight (Cambridgeshire and Peterborough Combined Authority, 2024) – a shared research knowledge base for the area which includes public health data, the Joint Strategic Needs Assessments, Director of Public Health Annual Reports, and Health and Wellbeing Integrated Care Strategy (Cambridgeshire and Peterborough Joint Health and Wellbeing Board/Integrated Care Partnership, 2023).
- Norfolk Insight webpage (Norfolk County Council, 2024), which includes population data and Norfolk and Waveney Integrated Care Strategy, and Norfolk Joint Health and Wellbeing Strategy (Norfolk and Waveney Integrated Care System, 2024).

Field surveys

21.5.3 No specific field surveys have been undertaken for the health assessment; however, information gained from surveys undertaken to inform other aspects have been used where relevant.

21.6 Baseline conditions

21.6.1 An overview of baseline population health conditions, trends and priorities is set out below for each of the study areas. For each study area, the information has been structured around the wider determinants of health likely to be affected, as included in the IEMA guidance (Pyper *et al*., 2022a).

Regional study area

Water supply population

21.6.2 Anglian Water supplies water and wastewater services to almost seven million customers in the East of England and Hartlepool. Cambridge Water provides water supply services to customers in Cambridge and the surrounding area. The East of England geographical area, referred to by Anglian Water (Anglian Water, 2023a), approximately covers the local authority areas of Cambridgeshire, Rutland, Peterborough, Bedford, North Northamptonshire, West Northamptonshire, Lincolnshire, Essex, Norfolk and Suffolk (see Figure 21.1).

21.6.3 The population served by Anglian Water is expected to grow by 18% by 2050, meaning an additional 911,000 people will need water supplies. Without action, and taking into account other pressures, such as climate change and the need to reduce water abstraction to improve the environment, there is expected to be a supply shortfall of 593Ml/d by 2050 (Anglian Water, 2024). The population served by Cambridge Water is expected to grow by 32% by 2050 (an additional 89,650 people) (Cambridge Water, 2024). These population increases and associated demand for water is a key driver behind the need for the Proposed Development. Further details can be found in Chapter 1: Introduction, of this EIA Scoping Report.

Health services

21.6.4 The Scoping boundary for the Proposed Development falls within the Integrated Care Board (ICB) areas for NHS Cambridgeshire and Peterborough, and NHS Norfolk and Waveney (see Figure 21.1). The NHS Cambridgeshire and Peterborough ICB is responsible for planning and delivering healthcare services to 950,000 people across 88 general practitioners (GP) surgeries in Peterborough, Fenland, Huntingdonshire, Cambridge, South Cambridgeshire and East Cambridgeshire (Support Cambridgeshire, 2023).

21.6.5 The NHS Cambridgeshire and Peterborough ICB delivers healthcare services within a region characterised by a mix of cities, towns and rural areas. The Cambridgeshire and Peterborough Joint Strategic Needs Assessment (JSNA) (Cambridgeshire and Peterborough Combined Authority, 2024) identifies that between the 2011 and 2021 census, there has been a 17% growth in population in Cambridge and Peterborough (among the highest growth rates in England), and an 11.1% growth across Cambridgeshire and Peterborough combined. The growth was driven by migration into the area, and the difference between births and deaths. The JSNA reports that there has been growth in the age group of people aged 65 years and older (across the Integrated Care System (ICS) area) and the age group of people aged under 15 years. Increases in these age groups are set to continue. The JSNA

identifies that more population growth is predicted over the next 20 years, meaning that demand for health services will increase further.

21.6.6 NHS Norfolk and Waveney ICB is responsible for delivering health services within a predominantly rural and coastal region in the East of England, covering Norfolk County Council and part of Suffolk County Council. The population covered by NHS Norfolk and Waveney ICB consists of over one million residents living in small towns, agricultural villages and some urban areas, such as Norwich and King's Lynn.

21.6.7 According to the Primary Care Workforce Strategy 2022 – 2025 (Norfolk and Waveney ICS, 2022), the workforce in Norfolk and Waveney ICB faces substantial pressures. The region has struggled with recruiting and retaining healthcare staff due to factors such as geographic isolation and limited opportunities. There is a pressing need for more appropriately-qualified professionals across health and social care services, to meet the growing demands of the ageing population. Additionally, the current workforce shortage further strains the system, as they are key in delivering healthcare services.

21.6.8 The Norfolk and Waveney ICB is focusing on collective and collaborative approaches to healthcare, leveraging local resources and partnerships with providers, voluntary and community organisations and people from the community to create a resilient and sustainable health system. Furthermore, there is an emphasis on training and education programs to build a sustainable workforce, ensuring current and future healthcare needs in the region are met.

Local authority health profiles

21.6.9 The Scoping boundary for the Proposed Development coincides with the local authority areas of Fenland, Huntingdonshire, King's Lynn and West Norfolk, Peterborough, and South Cambridgeshire. The sources of supply and upstream raw water transfers would be located in the local authorities of Peterborough, Huntingdonshire and Fenland. The proposed reservoir site and water treatment works would both be located within Fenland. The proposed downstream treated water transfers would be located within the local authorities of Fenland, Huntingdonshire, South Cambridgeshire, and King's Lynn and West Norfolk.

21.6.10 For reasons of proportionality, only the health profile of Fenland is reported in this chapter. This is because Fenland would host the greatest proportion of the Proposed Development, including the proposed reservoir site and water treatment works. The scale of associated water infrastructure is expected to be relatively limited within other local authority areas, and so the local and site-specific study areas are more relevant in terms of reporting baseline information on the populations likely to be affected. In contrast, the scale, duration and spatial influence of construction and operational activities for the Proposed Development within Fenland are expected to be greater, and it is therefore considered more relevant to report the health profile for the Fenland district. The baseline health indicator data used to establish Fenland's health profile are set out in Tables 21-4 and 21-5.

Table 21-4: Demographic indicators

Demographic indicators	Fenland	England
Population 65 and over	23.3%	18.5%
Disabled under the Equality Act	20.3%	17.3%
Total population	**102,500**	**56,490,000**

Source: ONS, 2021

Table 21-5: Health indicators

Health indicators	Fenland	England
Life expectancy at birth for males, 3-year range (2020 – 2022)	77.5*	78.9
Life expectancy at birth for females, 3-year range (2020 – 2022)	82.0*	82.8
Under 75 mortality rates from all causes – Directly standardised rate per 100,000 (2022)	384.3*	342.3
Emergency hospital admissions for intentional self-harm – Directly standardised rate per 100,000 (2022 – 2023)	154.9*	126.3
Income deprivation (2019) %	14.1	12.9

*Notes: * Values which are significantly worse than average for England (based on OHID calculations)*
Source: OHID, 2024a

21.6.11 Fenland had a total population of 102,500 at the time of the 2021 National Census (ONS, 2021). The majority of the population lives in one of the four market towns, namely: Whittlesey, March, Chatteris and Wisbech.

21.6.12 In terms of age demographics, the district has a lower proportion of children (17.8%) compared to the national average (19.2%) but has a higher proportion of older residents. The median age of Fenland is 44 years with 59.9% of adults being of working age, and 20.9% being under the age of 19 (ONS, 2021).

21.6.13 According to census data, life expectancy at birth for males and females in Fenland is comparable to the national average (ONS, 2021).

21.6.14 Overall, the health of people in Fenland is worse than the national average, with residents reporting a lower rate of general health. According to the last census, 79% of residents in Fenland reported their health as being 'good' or 'very good'. This is lower than the proportion of people who reported the same in Cambridgeshire (83.6%) and England (81.7%) overall (ONS, 2021). Fenland also has a relatively high proportion of adults living with a disability compared to England as a whole (see Table 21-4).

21.6.15 The district scored significantly worse than average for indicators of emergency hospital admissions for intentional self-harm, and mortality rate from all causes under the age of 75 (see Table 21-5). Additionally, the 2023 Joint Strategic Needs Assessment for Cambridgeshire and Peterborough reports that Fenland has significantly higher rates of recorded disease prevalence than the England average for 13 out of 16 of its listed diseases (hypertension, depression, diabetes mellitus, asthma, cancer, coronary heart disease, chronic obstructive pulmonary disease,

atrial fibrillation, stroke and transient ischaemic attack, heart failure, rheumatoid arthritis, epilepsy and dementia). However, for chronic kidney disease, osteoporosis and serious mental illness, Fenland reported significantly lower prevalence rates than the national average (Cambridgeshire and Peterborough Insight, 2023).

21.6.16 The Index of Multiple Deprivation (IMD) 2019 provides a measure of relative deprivation at the LSOA level. In Fenland, 11 of the LSOA fall within the top 20% most deprived in Cambridgeshire and Peterborough, with four of these LSOAs ranked among the 10% most relatively deprived nationally (Cambridgeshire County Council and Cambridge Research Group, 2019a).

21.6.17 Fenland is the most deprived district in Cambridgeshire with 14.1% of its population being income deprived, compared with 8.0% for Cambridgeshire and 12.1% for England, overall. The district is characterised by a north-south divide, with the most deprived areas concentrated in the north and east, particularly in Wisbech and March. The southern areas of Fenland, such as Doddington, Wimblington and Manea and Chatteris, are more affluent (Cambridgeshire County Council and Cambridge Research Group, 2019a) and is where the proposed reservoir would be located.

21.6.18 Evidence shows that those living in the most deprived areas face the worst healthcare inequalities in relation to healthcare access, experience and health outcomes (NHS, 2024). The absolute gap in life expectancy data for the years 2015 – 2017 revealed that in Fenland, life expectancy at birth for males in the most deprived quintile is 7.3 years lower than in the least deprived quintile, while females face a 2.7 year gap (O'Neill, 2019). The main causes of the mortality gap in males were external causes (including deaths from injury, poisoning and suicide) and 'other' causes. For females, the leading causes of the mortality gap were cancer, digestive causes (including alcohol-related conditions) and external causes.

21.6.19 As noted above, when compared with the Cambridgeshire and national data, Fenland has significantly higher levels of deprivation, poor health outcomes and disability. Therefore, this community population is likely to be more sensitive to impacts from the Proposed Development, as they are likely to have less capacity to adapt.

Local study area

21.6.20 Baseline characteristics for local communities are described in Section 20.6 of Chapter 20: Socio-economics and community, of this EIA Scoping Report. Chapter 20: Socio-economics and community, uses LSOAs within 1km of the Scoping boundary to define the study area for its baseline (see Figure 20.2: Baseline data collection, and Section 20.6 of Chapter 20). The local study area for the human health scoping assessment differs in that it is based on the corresponding MSOAs (see Table 21-3: Human health study areas, for further information on the definition of study areas). For the purposes of scoping, the baseline local study area in proximity to the proposed reservoir site zone is reported. The baseline health profiles will be developed for relevant local communities to cover all zones of the

Proposed Development, and reported in an appendix to the Preliminary Environmental Information Report (PEIR) and ES.

21.6.21 The proposed reservoir itself would be located approximately 1km north of the town of Chatteris, while the Scoping boundary for the Proposed Development abuts the northern and north-eastern extents of the settlement. The settlements of Wimblington and Doddington abut the northern and western extents of the Scoping boundary around the proposed reservoir site. The town of March is located some 3.5km north of the proposed reservoir site; therefore, potential health impacts on these communities will be considered further in the PEIR and ES. The MSOAs of Chatteris and Doddington, Wimblington and Manea (DWM) intersect the proposed reservoir location. Table 21-6 identifies key indicators for the nearest communities to the reservoir, based on data for the relevant MSOAs.

Table 21-6: Health indicators for key communities

Indicators	Middle Super Output Area (MSOA)					England
	Chatteris	DWM[1]	March East	March West	March North	
Population density, people per square kilometre (2020)	181	82	510	223	262	434
Income deprivation, English Indices of Deprivation (2019) %	11.6**	9.2**	14.8*	12.8	12.9	12.9
Population aged 0 – 15 years (2020) %	18.9	17.6	18.3	16.5	18.1	19.2
Population 65 years and over (2020) %	21.5	25.3	25.4	29.3	17.1	18.5
Life expectancy at birth (male) 2016 – 2020 (years)	80.2	79.4	78.5	80.8	81.1	79.5
Life expectancy at birth (female) 2016 – 2020 (years)	83.1	79.4*	82	82.4	84.8	83.2
Deaths from all causes under 75 (2016 – 2020), Indirectly standardised ratio per 100,000 [2]	97.7	109.4	120.6*	105.3	119.7*	100
Emergency hospital admissions for intentional self-harm (SAR) [3] (2016 – 2017, to 2020 – 2021)	112.8	86.0	149.0*	145.1*	157.6*	100
Disabled under the Equality Act (2021) % [4]	20.1	20.2	22.9	22.0	18.1	17.3

Indicators	Middle Super Output Area (MSOA)					England
	Chatteris	DWM[(1)]	March East	March West	March North	

Notes:
(1) DWM: Doddington, Wimblington and Manea MSOA.
(2) Includes deaths due to, and involving COVID-19.
(3) SAR = Standardised Admissions Ratio.
(4) Source: Nomis 2021 National Census. Table TS038 – Disability.
** Values which are significantly worse than average for England (based on OHID calculations)*
*** Values which are significantly better than average for England (based on OHID calculations)*
Source: OHID, 2024a – except disability data from National Census 2021 (see note 4)

21.6.22 As can be seen from Table 21-6, the levels of income deprivation in Chatteris and DWM are significantly lower than average for England, while in March East, the levels are significantly higher. All five MSOAs have higher than average proportions of people classed as disabled under the Equality Act 2010. This may in part be linked to generally older populations, although this does not explain the slightly higher than average levels of disability in March North, which has a lower than average proportion of adults aged 65 years and older.

21.6.23 While DWM's population health is generally comparable to average for England for the indicators presented in Table 21-6, it does have a significantly worse than average life expectancy for females.

21.6.24 March East and March North both have worse than average rates of premature death. All three of the March MSOAs have significantly worse than average rates of emergency admissions for intentional self-harm, which indicates poor levels of mental health. The potential reasons for this will be explored as part of the ongoing health assessment in consultation with the two TWGs, and with reference to the Cambridgeshire and Peterborough Mental Health Needs Assessment (Cambridgeshire and Peterborough Joint Health and Wellbeing Board, 2024).

Community feedback

21.6.25 During the CLG, attended by the health assessment team in Wimblington in March 2024 (see Table 21-2), negative views were expressed relating to concerns around construction traffic, stress, pollution, dust and mosquito-borne diseases. In contrast, a number of community representatives were relatively positive about the proposals and opportunities associated with the Proposed Development. For example, the opportunity for improved walking and cycling routes and connectivity, and the provision of leisure facilities (see Appendix 21-1: Participation at health scoping stage). Therefore, local views appear to be mixed.

21.6.26 Using IEMA sensitivity criteria as a guide (see Table 21-10), the data would indicate that the population in the local study area around the proposed reservoir site is of medium-high sensitivity. This reflects that there are pockets of deprivation and relatively wide health inequalities. The relatively high proportion of people living with disabilities would suggest that daily activities may be limited, and the relatively low population density could indicate high levels of isolation or challenges in accessing services. Local views tended to reflect uncertainty with

some concern. Baseline health indicators and consultation feedback will be reviewed further as the EIA is progressed, to better understand baseline health sensitivity in the local study area.

Site-specific study area

21.6.27 Approximately 188 residential properties have been identified from OS AddressBase data (Ordnance Survey, 2024) within the site-specific study area that covers all the Proposed Development zones. The majority of these properties are semi-detached or detached houses, but there are also a small number of caravans recorded in the data. Based on the average household occupancy for East England (2.4) (ONS, 2021), the baseline site specific population is estimated to be 456 people. The properties are generally isolated rural dwellings and farmhouses surrounded by farmland, as the site selection process for the proposed reservoir and associated water infrastructure sought to avoid settlements.

21.6.28 At the time of preparation of this Scoping chapter, the Phase Two Public Consultation had been launched, revealing the extents of the Scoping boundary. Engagement with landowners within the footprint of the Proposed Development had already taken place, prior to proposals being made public. The baseline for the residents and farmers in the site-specific study area is therefore that they would be aware of the Proposed Development. Many of them would have questions about the degree to which they would be affected. For example, the majority of properties are located within the broad (500m wide) corridors identified for the upstream and downstream transfer routes. As design work is progressed, the width of construction land required would typically be much narrower, in most cases avoiding direct (physical) adverse impacts on homes. A small number of residents are within the footprint of land required to construct the reservoir, and will be aware that their property would be acquired.

21.6.29 While it is not appropriate to apply statistical health data to such a small population, the site-specific residential population is assessed as having high sensitivity. Using IEMA sensitivity criteria as a guide (see Table 21-10), it is expected that this population are likely to have an interest in, and awareness of, the Proposed Development, with potential for many people to feel uncertain as to the impacts. There is also potential for feelings, such as a lack of control or influence over the proposals, which can adversely impact mental wellbeing (Cooke *et al*., 2011).

21.6.30 Other population groups likely to be present in the site-specific study area would include people who travel via the Public Rights of Way (PRoWs), lane and road network. These are likely to be less sensitive as a group, as it is assumed they would be a relatively transient population within the site-specific study area, and have more capacity to adapt to change, for example, through the use of alternative routes to avoid more affected areas.

Baseline wider determinants of health

21.6.31 This preliminary identification of baseline issues has been shaped around the wider determinants of health included in the IEMA Guide to Effective Scoping of Human

Health in EIA (Pyper *et al*., 2022a), and issues raised anecdotally through the TWG and CLG.

Health-related behaviours

21.6.32 Risk taking behaviour was highlighted as a potential issue for the Proposed Development during the collaborative scoping meeting held with the TWG Health Assessment Sub-Group (see Appendix 21-1: Participation at health scoping stage). In particular, there were concerns that the reservoir site itself could attract antisocial behaviour related to alcohol, smoking or drug use.

21.6.33 In contrast, during the CLG held in Wimblington in March 2024, it was commented by a local resident that there are currently some issues of antisocial behaviour taking place on the land where the reservoir is proposed, and that construction of a reservoir could help to remove this issue in that location.

21.6.34 Table 21-7 shows some behavioural risk factor data for Fenland compared to England.

Table 21-7: Behavioural risk factors for Fenland

Indicator	Fenland	England
Hospital admissions for alcohol-related conditions (2022/2023) (rate per 100,000)(1)	424	475
Smoking prevalence in adults (18+), current smokers (2022) (%)(2)	14	12.7
Percentage of physically active adults (19+) (2022/2023) (%)(3)	58.2	67.1
Overweight (including obesity) prevalence in adults (18+) (2022/2023) (%)(4)	70.6	64.0

Notes:
(1) Admissions to hospital where the primary diagnosis is an alcohol-attributable code, or a secondary diagnosis is an alcohol-attributable external cause code. Directly age standardised rate per 100,000 population (standardised to the European standard population).
(2) Prevalence of smoking among persons 18 years and over from Annual Population Survey.
(3) The number of respondents aged 19 and over, with valid responses to questions on physical activity, doing at least 150 moderate intensity equivalent (MIE) minutes physical activity per week in bouts of 10 minutes or more in the previous 28 days expressed as a percentage of the total number of respondents aged 19 and over.
(4) Percentage of adults aged 18 and over classified as overweight or obese (BMI greater than or equal to 25kg/m²).
Source: OHID, 2024a

21.6.35 While Table 21-7 indicates alcohol-related hospital admissions are lower in Fenland than average for England, Cambridgeshire has above-average rates of unsafe alcohol consumption and alcohol-related hospital admissions for mental and behavioural disorders, according to the Mental Health Needs Assessment (Cambridgeshire and Peterborough Joint Health and Wellbeing Board/Integrated Care Partnership, 2024). The issue is more prevalent in deprived areas, like Fenland, where open-space drinking and related antisocial behaviour has previously been reported to negatively impact the local communities' quality of life and increase the fear of crime and disorder, particularly in areas of the Medworth, Clarkson and Peckover wards (Wisbech) (Cambridgeshire County Council and Cambridge Research Group, 2019b; Fenland District Council, 2023). These areas are over 14km

from the proposed reservoir site. The Fenland community safety report outlines that the wards within the MSOA where the proposed reservoir would be located, had the lowest number of antisocial behaviour incidents between 2015 and 2018 (Cambridgeshire County Council and Cambridge Research Group, 2019b).

21.6.36 According to substance misuse data, Cambridgeshire's rates are comparable to England's, except for the Fenland area, where rates of both illicit and prescribed drugs exceed the average (Cambridgeshire County Council, 2019). The Drugs and Alcohol Needs Assessment (Cambridgeshire and Peterborough Public Health Intelligence Team, 2023) recommends early identification of problematic alcohol use in Cambridgeshire, where high rates of alcohol use among children are reported.

21.6.37 While hospital admissions for substance misuse in young people (aged 15 – 24) are below the national average, substance misuse is linked to a number of crimes and antisocial behaviour, including violence, and the exploitation of both adults and children. Furthermore, harm from drug and alcohol use is also seen in some education data, with 92 school suspensions in Cambridgeshire attributed to drugs and alcohol in the latest years (Cambridgeshire and Peterborough Public Health Intelligence Team, 2023).

21.6.38 The data above suggests that while the specific wards where the reservoir would be located have relatively low levels of reported antisocial behaviour, there is evidence of antisocial behaviour and drugs and alcohol misuse in the wider area. This indicates that the potential for the Proposed Development to attract antisocial behaviour at the reservoir site itself could be an issue, and is therefore relevant to the scope of assessment.

21.6.39 This would suggest that while antisocial behaviour around drug and alcohol use could be an issue, it is unlikely to be a disproportionate issue due to the distance from the areas with the greater level of problems.

Social environment

21.6.40 Chapter 20: Socio-economics and community, reports the baseline regarding housing, while Chapter 19: Public access and amenity, reports the baseline relating to open space, leisure and play and PRoWs. These are all factors identified in the IEMA guidance (Pyper *et al*., 2022a) as relevant to the social environment wider determinants of health.

21.6.41 Population growth and immigration have significantly shaped Cambridgeshire, bringing cultural diversity to the historical county but also changing demand for housing. The Cambridgeshire and Peterborough housing strategy notes the need for more affordable housing across the region and in some areas of high deprivation, a distinct need for more social housing (Cambridgeshire and Peterborough Combined Authority, 2018).

21.6.42 The crime rate in Cambridgeshire is relatively low when compared to the national average. This low rate is supported by community policing and safety initiatives, such as the Cambridgeshire and Peterborough Community Safety Agreement 2022

– 2025, which brings together various stakeholders and community groups to tackle crime and improve safety across the combined authority (Cambridgeshire Countywide High Harms Board, 2022).

21.6.43 The county transport infrastructure is well developed, with major roads and effective transport networks. Cambridgeshire promotes a healthy lifestyle through public health policies (e.g. Cambridgeshire Active Travel Strategy), and by ensuring open spaces and recreation opportunities support the health and wellbeing of residents (Cambridgeshire County Council, 2023). However, the percentage of physically active adults is significantly lower in Fenland compared to the England average (Table 21-7). An issue was raised at the CLG held in Wimblington in March 2024, that there was a lack of good-quality walking and cycling routes in the local area (see Appendix 21-1), and therefore there is a potential opportunity to improve physical activity through the design of the Proposed Development.

Economic environment

21.6.44 Chapter 20: Socio-economics and community reports the baseline in relation to education and training, and employment and income, which are matters identified in the IEMA guidance (Pyper *et al*., 2022a) as relevant to the economic environment wider determinants of health. Section 20.6 of Chapter 20: Socio-economics and community, identifies that professional and technical occupations were the most prevalent in the study area. Levels of economic inactivity were marginally higher in the socio-economic local study area and wider study area, than the national average. The chapter notes that the majority of this group are retired, but that there are also students and those looking after family, long-term sick or disabled people. This would suggest that the economically inactive in the area are, as a whole, not likely to benefit from new employment opportunities, as they may not be in a position to take up employment.

21.6.45 The Cambridgeshire and Peterborough economic growth strategy describes Greater Peterborough, Greater Cambridgeshire and the Fens as three distinct but overlapping and interconnected economies, home to key industries such as technology, healthcare, life sciences, agricultural technology (agritech), and advanced manufacturing. With 80% of employment in Cambridgeshire and Peterborough in sectors like health, education, food production, retail and construction, the region is a net contributor to the UK economy. Overall, the strategy notes that employment growth has increased in some places which host higher-value sectors and education. Other places, with a lower level of skills, are linked to a lack of good jobs that provide a route for progression (Cambridgeshire and Peterborough Combined Authority, 2022).

Biophysical environment

21.6.46 The East of England is experiencing significant impacts from climate change, including rising temperatures, more frequent and intense heatwaves, and water-stress. Chapter 17: Climate resilience, provides information on the baseline climate relevant to the Proposed Development. These environmental changes are leading to a range of health risks, for example, heat- and cold-related deaths, flooding and vector-borne diseases which are greater for vulnerable groups, such as the elderly,

young children, people with pre-existing health conditions and those from disadvantaged socio-economic groups (UKHSA, 2023).

21.6.47 Environmental changes have a direct impact on population health, including the exacerbation of chronic conditions, such as cardiovascular and respiratory diseases, increased risk of hospitalisations, and increased mortality rates (UKHSA, 2024). According to the Health Effects of Climate Change in the UK (UKHSA, 2023) report, the East of England has one of the highest heat-related mortality rates.

21.6.48 Chapter 15: Air quality, reports the air quality baseline. It identifies that generally, air quality is considered to be good in the local area and that the Proposed Development is not located in or near an Air Quality Management Area (AQMA). It notes that construction transport routes are not yet determined; therefore, there is no baseline data identified, but routes would be selected to avoid AQMA as far as practicable.

21.6.49 Chapter 10: Water resources and flood risk, reports the baseline in relation to water. As described in Chapter 10, the Proposed Development crosses several flood zone areas in multiple locations. The flood of December 2020 in the River Great Ouse Catchment (potential transfer option) affected many homes and communities across the region (Environment Agency, 2022). Flooding is identified as a top risk by the Cambridgeshire and Peterborough Local Resilience Forum (2024) and was also raised as a concern by representatives at the CLG, when attended by the health assessment team (see Table 21-2). Flooding can have a significant impact on the mental health of people whose homes are flooded or whose lives are disrupted by flooding. Mental health problems associated with flooding include post-traumatic stress disorder, anxiety and depression (Waite *et al*., 2017).

21.6.50 The IEMA Guide to Effective Scoping (Pyper *et al*., 2022a) advises the consideration of water quality, including biological and chemical agents and disease vectors. During the collaborative scoping meeting held with the TWG Health Assessment Sub-Group (see Table 21-2), the issue of Per- and polyfluoroalkyl substances (PFAS) was raised. PFAS are a large, complex group of approximately 5,000 synthetic chemicals known as ‘forever chemicals’ because of their persistence in the environment. Their resistance to biodegradation leads to long-term continuous exposure for people and other environmental receptors. There is also no toxicity data for many PFAS, meaning there is a general lack of understanding of the health impacts. One of the uses of some PFAS is in firefighting foam, which has been commonly used on airbases. Given the number of historic airbases in the region, there is concern about PFAS contamination in groundwater sources. However, it is important to note that PFAS continue to be widely used in many domestic products, including outdoor clothing, cosmetics, cooking and baking equipment, food packaging, paints and photography (European Environment Agency, 2023). Therefore, there are multiple pathways, in addition to water sources, through which humans can be exposed to PFAS. It is proposed to further review the evidence for PFAS as part of the ongoing literature review (see Section 21.9) to further inform the health baseline in this regard.

21.6.51 The issue of disease vectors associated with open water was also raised during the collaborative scoping meeting. The potential rise of an emerging infectious disease is identified as a top risk to the area by the Cambridgeshire and Peterborough Local Resilience Forum (2024), and is highlighted as a climate change related health risk by the UKHSA (UKHSA, 2023). A number of infectious and vector-borne diseases have increased in Europe, and climate change is expected to be a contributary factor. For example, the West Nile Fever (WNF), which is a mosquito-borne virus that can be harmful to humans, has been progressively spreading in Europe since the 1960s (Public Health England, 2020). There were 23 reported cases in France in 2023 (European Centre for Disease Prevention and Control, 2024). Although there is no evidence that WNF is present in the UK, populations of the relevant species of mosquito have been recorded in Essex and Kent (Public Health England, 2020).

21.6.52 Cases of avian influenza (bird flu) have been reported in Cambridgeshire with a case reported near March on 31 October 2022 (Fenland District Council, 2024). The main human health threat relates to impacts on livelihoods, including mental health impacts, for affected poultry farmers. Since bird flu tends to be spread by waterfowl, open water habitats can be a source. It is proposed to further review the evidence for disease vectors as part of the ongoing literature review (see Section 21.9), to better inform the health evidence base regarding these risks.

21.6.53 Chapter 12: Geology, soils, agriculture and land quality, reports the baseline with regard to ground conditions and agriculture. It does not identify any significant sources of land contamination likely to be affected by the Proposed Development, as much of the land appears to have remained as agricultural farmland, historically. While agricultural land is a possible source of contaminants, it is not considered to be a significant source due to the biodegradation of pesticides and fertilisers, and infrequency of chemical storage areas or likely buried waste. However, Chapter 12 does identify the presence of high-quality agricultural land (Agricultural Land Classification Grades 1, 2 and 3a), which is an important resource for food production and food security. It also identifies the presence of peat soils which are given particular value in the emerging Draft Fenland Local Plan 2021 – 2040 (Fenland District Council, 2022) for their carbon sink and sequestration properties (of relevance to climate change mitigation).

21.6.54 Chapter 18: Noise and vibration, provides an overview of the baseline noise environment relevant to the local study area. Much of the area is relatively tranquil, with the main noise pollution relating to the major roads.

Institutional and built environment

21.6.55 The main baseline issues of relevance to the institutional and built environment wider health determinants, as described in the IEMA Guide to Effective Scoping of Human Health in Environmental Impact Assessment (Pyper *et al*., 2022a), relate to healthcare services and water resources infrastructure. The health baseline concerning healthcare service issues is described above in relation to the regional study area. Chapter 20: Socio-economics and community, includes healthcare as receptor assets searched for, as part of its baseline studies and should be cross-referenced for further information.

Vulnerable groups

21.6.56 Vulnerable groups or sub-populations are groups who would be sensitive to changes in health determinants in a given context. For example, these can include groups such as '*ethnic minorities, people with disabilities, people who are homeless, people living in poverty, those struggling with addiction and substance abuse, and isolated older people*' (Pyper *et al*., 2022a).

21.6.57 Potential vulnerable populations have been identified through a review of the baseline and information provided during the collaborative scoping meeting with the TWG Health Assessment Sub-Group. The population group most likely to be affected by the Proposed Development is that living and occupying property in close proximity to the Proposed Development Scoping boundary, and any relevant routes for construction traffic (to be determined). The presence of asylum centres and traveller sites in the area was raised during the collaborative scoping meeting, which may indicate groups with potentially increased sensitivity to impacts of the Proposed Development. Construction workers required to work on the Proposed Development may also be considered a vulnerable group, as some would be likely to live away from their homes and family support networks, due to the relatively rural location of the Proposed Development. Other potentially vulnerable groups in the area may include:

- Farmers and agricultural workers, including migrant agricultural workers.
- Income deprived.
- People with severe mental illness.
- Older adults.
- Those living in isolated locations.
- Groups at higher risk of discrimination or other social disadvantage, such as those with protected characteristics defined by the Equality Act 2010.

21.6.58 Further research and baseline analysis will be developed as part of the EIA process and reported in the PEIR and ES. This, alongside ongoing engagement with the TWG, will inform a better understanding of the likely vulnerable groups. The health assessment will also reference the Equality Impact Assessment (EqIA), a standalone document to be prepared on behalf of Anglian Water to help meet requirements of the Equality Act 2010, and the socio-economics and community assessment (see Chapter 20: Socio-economics and community), for further information on potentially vulnerable groups and how they may be affected. This will include consideration of potential health inequalities.

Future baseline

21.6.59 The future baseline will likely be characterised by continued population growth within the east region, with a projected population increase of 8.7% over the next two decades (OHID, 2021). Coupled with climate change impacts, this would increase demand on drinking water supply, as well as the number of people

interacting with the study area. Furthermore, climate change will continue to contribute to water stress (refer to Chapter 17: Climate resilience). Other information relating to the future baseline is provided above in relation to baseline health trends described for the population groups and health determinants.

21.6.60 The adopted Fenland Local Plan (Fenland District Council, 2014) refers to an Infrastructure Delivery Plan (IDP) for Fenland which set out costed, phased and prioritised programmes of infrastructure to respond to economic and housing growth. Key elements of the IDP include schools, roads, health facilities and open space. The emerging strategy within the emerging Draft Fenland Local Plan 2021 – 2040 (Fenland District Council, 2022) also references an IDP and includes new infrastructure as part of its vision. This new provision would address some current issues relating to health inequalities and access to healthcare.

21.6.61 Climate change presents significant threats to human health through various pathways. Temperature increases may alter the range and prevalence of vector-borne (transmitted by mosquitoes, ticks, etc.) and/or zoonotic diseases (transmitted between animals and humans). Temperature increases may also increase the risk of algal blooms, potentially increasing human exposure to environmental toxins.

21.6.62 Temperature increases are likely to give rise to increases in heat stress and heat stroke risk in the local population, with groups such as the elderly, young children, pregnant women and those with underlying health conditions particularly at risk.

21.6.63 Health impacts may arise from drier future summers, putting pressure on clean water supply systems. This has implications for public health and the efficient functioning of healthcare systems. Wetter winters and more intense rainfall could lead to more frequent surcharging of drainage networks, and health issues relating to foul water, flood risk and associated mental health responses. Further details can be found in Chapter 17: Climate resilience, of this EIA Scoping Report.

21.6.64 Chapter 23: Cumulative effects will identify the proposed developments that are anticipated to be constructed prior to the construction of the Proposed Development. As such, these developments would form part of the future baseline for assessment within the EIA. Where this presents human health receptors, or a change to the current baseline specific to human health, this will be considered within the EIA.

21.7 Design and mitigation

Design

21.7.1 The design of the Proposed Development to date has taken consideration of environmental constraints and potential environmental effects. The ongoing development of the design will incorporate embedded mitigation to avoid and reduce adverse effects, where feasible. Chapter 7: Landscape and visual effects, Chapter 8: Terrestrial biodiversity, Chapter 9: Aquatic biodiversity, Chapter 10: Water resources and flood risk, Chapter 12: Geology, soils agriculture and land

quality, Chapter 15: Air quality and Chapter 18: Noise and vibration, outline how the design can avoid or reduce adverse impacts on the biophysical health determinants, such as landscape and visual intrusion, flood risk, agriculturally productive land, air quality, noise and vibration.

21.7.2 Chapter 16: Carbon and greenhouse gases, addresses relevant design measures to reduce embedded carbon and greenhouse gas emissions, while Chapter 17: Climate resilience, outlines design considerations for climate resilience. The Proposed Development is intended to alleviate some of the predicted future baseline climate impacts by providing water resilience. Furthermore, the Proposed Development would provide heatwave resilience opportunities, such as through the inclusion of cool recreational and green spaces, and water-based recreational activities during hotter summers.

21.7.3 Chapter 14: Traffic and transport, Chapter 19: Public access and amenity, and Chapter 20: Socio-economics and community, address measures to reduce impacts on social and economic health determinants. For example, this includes reducing land requirements and routing of traffic to avoid adverse effects on business and employment. Chapter 22: Major accidents and disasters, outlines the legislative procedures in place to protect safety for the workforce and local communities, and to protect people and the environment from major accidents, such as an uncontrolled escape of water from the reservoir.

21.7.4 Chapter 13: Material assets and waste management, outlines design considerations to reduce resource use and waste production, thereby reducing adverse impacts on wider societal infrastructure and resources.

21.7.5 Section 2.4 of Chapter 2: Project description, sets out how the four headline design principles of the National Infrastructure Committee – namely, Climate, People, Places and Value – have underpinned the Proposed Development's design principles to ensure that the Proposed Development would be adapted to climate change, and provide multiple benefits to wider society and the local area. It also sets out how feedback from consultation with land and property owners, communities and stakeholders has helped to inform the design to date, and will continue to inform the design (refer also to Chapter 5: Consultation and engagement). This process of engagement with local communities has ensured a degree of public participation and inclusion in the design process, which is a core protective factor for mental health (Cooke *et al*., 2011). Ongoing pre-application consultation and engagement will further allow participation throughout the process of design development.

21.7.6 The design development process will include consideration of potential enhancement measures to improve the surrounding environment. Potential enhancements relevant to human health that have been identified to date, include the provision of recreational facilities and improved routes for walkers, cyclists and horse-riders. Chapter 19: Public access and amenity, outlines potential enhancements. These potential enhancements may provide inclusive access

opportunities to increase physical activity levels and social interactions with benefits on overall health and wellbeing for a range of people.

21.7.7 Chapter 8: Terrestrial biodiversity, Chapter 9: Aquatic biodiversity and Chapter 7: Landscape and visual effects, outline enhancement opportunities under consideration to increase biodiversity and landscape value. Proposals involving the creation of high-quality green and blue spaces would also bring opportunities for outdoor recreation with potentially multiple health benefits, including increased physical activity levels and associated physical and mental health outcomes.

Mitigation

21.7.8 Documents presenting the approach to mitigation will be produced, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. These measures would be applied to mitigate likely significant effects, including human health effects. Human health considerations will also inform the process for developing construction methods and components, such as those relating to noise abatement (see Chapter 18: Noise and vibration) and control of dust and emissions (see Chapter 15: Air quality).

21.7.9 Examples of good practice and essential mitigation relevant to human health include:

- Continued engagement with local community groups via the CLG. This will provide a forum for communities to put forward their concerns and recommendations, supporting participation in the process. Information can also be provided so that communities better understand the proposals, including issues of risk and safety measures.
- Continued engagement and support for landowners and other individuals who would be directly affected by the Proposed Development. This would help to limit potential health impacts and loss of wellbeing associated with involuntary land and property acquisition, such as psychological distress, loss of control and feelings of uncertainty.
- Good practice construction measures to break source-pathway-receptor links between environmental hazards and human health receptors, and/or measures to reduce potential exposure to hazards such as dust, noise and polluting substances. These are outlined where relevant in Chapter 10: Water resources and flood risk, Chapter 12: Geology, soils, agriculture and land quality, Chapter 15: Air quality, and Chapter 18: Noise and vibration.
- Effective communication of construction proposals and appropriate signage for any route diversions or closures to mitigate likely health outcomes, such as journey delays, annoyance, psychological stress and other wellbeing concerns.
- Mitigation measures relating to community, recreation, access and amenity relevant to health are covered in Chapter 19: Public access and amenity, and Chapter 20: Socio-economics and community.

21.7.10 Relevant documents will be produced to set out the measures and standards of work to be applied during the operational phase. These would be applied to monitor, manage and control adverse environmental effects associated with operation and maintenance activities.

21.8 Proposed scope of assessments

Likely significant effects requiring assessment (scoped in)

21.8.1 The following section sets out the aspect-specific effects for human health. The likely significant effects requiring assessment are presented in Table 21-8. Where potential effects may be specific to one or more zones of the Proposed Development and the relevant study area, this is identified in Table 21-8 (see Chapter 2: Project description, for further discussion of zones).

Table 21-8: Likely significant human health effects

Activity (source)	Effect (health determinants and impact pathways)	Receptor	Zone
Construction			
Communication and support to local communities relating to construction proposals	**Social environment**: Impacts on perception of the local environment and civic pride (protective factors for mental health and wellbeing). Impacts on inclusion, participation and control (protective factors for mental health and wellbeing).	Communities in local study area	All zones
Land acquisition for construction and operation of the Proposed Development	**Social environment**: Relocation – impacts on protective factors for mental health, loss of control, upheaval of social networks. Community identity culture, resilience and influence – impacts on sense of belonging, control and social networks.	Residents and landowners (site-specific study area)	All zones
	Health-related behaviours: Diet and nutrition – availability and quality of agricultural land.	Farmers (site-specific study area) Wider society (regional study area)	All zones
Construction transportation	**Social environment:**	Communities (pedestrians,	All zones

Activity (source)	Effect (health determinants and impact pathways)	Receptor	Zone
	Transport modes, access and connections – impacts identified in Chapter 14: Traffic and transport, and Chapter 19: Public access and amenity. Health effects related to active travel, road safety concerns, routine journey times, access to health, social care and education, emergency response times and community severance.	cyclists, horse riders, vehicular travellers) in local study area and affected road network	
	Biophysical environment: Air quality (Chapter 15) and noise and vibration (Chapter 18). Health effects related to exposure to air and noise pollution from construction traffic and traffic diversions.	Communities in local study area and affected road network	All zones
All construction activities including enabling works, construction of structures/buildings, excavation and earthworks, demolition of structures/buildings, installation of pipelines and installation/diversion of utilities and services, landscaping and reinstatement	**Social and biophysical environment:** Impacts of noise (see Chapter 18), dust (see Chapter 15), lighting and visual intrusion (see Chapter 7) on local amenity and quality of life. Health risks relating to pollution pathways and potential exposure to harmful substances (see Chapter 10, Chapter 12 and Chapter 15). Open space, leisure and play (see Chapter 19). Interaction of noise, dust, lighting and visual impacts on amenity and quality of outdoor recreation and associated health effects.	Communities in local study area (including local residents and participants in outdoor recreation)	All zones
Construction workforce requirements and supply chains	**Health-related behaviours:** Effect on behaviours including opportunities to reduce risk taking behaviours for its workforce, provide for healthy food choices and opportunities for physical activity.	Construction workers	All zones

Activity (source)	Effect (health determinants and impact pathways)	Receptor	Zone
	Social environment: Housing – potential impacts on local housing demand and availability due to change in population size due to presence of construction workforce (see Chapter 20). Quality and availability of accommodation for workforce. Community identity, culture, resilience and influence – potential impacts on community cohesion due to presence of construction workforce. Social participation, interaction and support – potential health impacts associated with workforces being isolated from family and social networks.	Communities in local study area Construction workers	Reservoir site
	Economic environment: Health effects of changes to socio-economic conditions relating to opportunities for education, training and employment as well as income related matters (see Chapter 20).	Communities in local study area (including residents and businesses) Regional population	All zones
	Institutional and built environment: Health and social care services – Effect on use of health and social care services.	Construction workers Regional population	Reservoir site
Operation			
Operational traffic movements	**Social environment:** Transport modes, access and connections – impacts identified in Chapter 14: Traffic and transport, and Chapter 19: Public access and amenity. Health effects related to active travel, road safety concerns, routine journey times, access to health, social care and	Communities (pedestrians, cyclists, horse riders, vehicular travellers) in local study area and affected road network	Traffic movements on the public highway routes to be identified in the traffic and transport assessment

Activity (source)	Effect (health determinants and impact pathways)	Receptor	Zone
	education, emergency response times and community severance.		
	Biophysical environment: Air quality (Chapter 15) and noise and vibration (Chapter 18). Health effects related to exposure to air and noise pollution from operational traffic.	Communities in local study area and affected road network	Traffic movements on the public highway routes to be identified in the traffic and transport assessment
Operation of reservoir and associated infrastructure (water abstraction and supply)	**Biophysical environment:** Potential impacts on flood risk and water quality (see Chapter 10) and associated human health effects (including community concern). Potential biosecurity risks, for example, wildfowl carrying avian influenza which presents a risk to poultry farms.	Communities in local study area	All zones
	Social environment: Community safety – perceptions of risk, including fears around accidents and disasters, such as reservoir embankment breach and flooding.	Communities in local study area	All zones
	Institutional and built environment: Effects on water supply infrastructure and associated health benefits.	Water supply area population in regional study area	All zones
Operation of reservoir (recreational facilities)	**Health-related behaviours:** Changes to risk of antisocial behaviours. Opportunities for promoting healthy lifestyles through incorporating public information on, and opportunities for, physical activity, diet and nutrition.	Communities in local study area Recreational visitors to the site	All zones

Activity (source)	Effect (health determinants and impact pathways)	Receptor	Zone
	Social environment: Open space, leisure and play – changes to access to green and blue space and recreational opportunities (with reference to Chapter 19) and associated health outcomes. Community safety: Measures to address safety risks, security and incorporate opportunities to minimise actual crime and fear of crime. Community identity, culture, resilience and influence: Opportunities to contribute to positive community identity, visual and cultural assets.	Communities in local study area Recreational visitors to the site Site workers	All zones
	Economic environment: Health effects associated with impacts on local and regional employment opportunities and impacts on local economy (see Chapter 20).	Communities in local and regional study area (including business owners, employees and site workers)	All zones
	Biophysical environment: Measures to reduce greenhouse gas emissions and address climate resilience (Chapters 16 and 17) and associated health effects. Health effects associated with potential impacts on noise, air quality, lighting and water quality. Risks of exposure to vector-borne diseases and/or blue-green algae (including climate change related increased risks).	Communities in local and regional study area Recreational visitors to the site (site specific study area) Site workers (site specific study area)	All zones
	Institutional and built environment: Contributions to local neighbourhood design and integration into wider spatial planning context to support	Communities in local and regional study area	All zones

Activity (source)	Effect (health determinants and impact pathways)	Receptor	Zone
	physical, mental and social wellbeing.		

Notes:
References to Chapters are as follows:
Chapter 7: Landscape and visual effects
Chapter 10: Water resources and flood risk
Chapter 12: Geology, soils, agriculture and land quality
Chapter 14: Traffic and transport
Chapter 15: Air quality
Chapter 16: Carbon and greenhouse gases
Chapter 17: Climate resilience
Chapter 18: Noise and vibration
Chapter 19: Public access and amenity
Chapter 20: Socio-economics and community

Effects not requiring assessment (scoped out)

21.8.2 Based on the scoping exercise (see Appendix 21-1), the determinants presented in Table 21-9 have not been included in the scope of assessment. The detailed rationale behind scoping out these determinants is set out in Table 1-1 of Appendix 21-1.

Table 21-9: Health determinants not requiring assessment

Health determinants	Receptor	Justification for scoping out	Zone
Construction and operation			
Health-related behaviours: Problem gambling	Site workers	Although prevalence of problem gambling was raised as a potential issue among the construction workforce during the scoping meeting, it is unlikely that the Proposed Development would disproportionately influence factors associated with lifestyle choice. Therefore, no likely significant effects are predicted.	All zones
Social environment: Housing – Social housing; safeguarding and modern slavery; and population out-migration (including effects on minorities, community cohesion and social isolation)	Communities in the local study area Site workers	The Proposed Development would not influence the availability, provision or layout of social housing and therefore no likely significant effects on social housing are predicted. Company policy and legislation mean that safeguarding and modern slavery are not likely significant effects.	All zones

Health determinants	Receptor	Justification for scoping out	Zone
Biophysical environment: Food production and malnutrition; population displacement; labour productivity and economic loss; odour; and radiation	Communities in the local study area Site workers Communities in the site specific study area	Impacts associated with food production and population displacement are addressed in relation to 'Soil' and 'Housing' in the scoping checklist (see Table 1-1 in Appendix 21-1). The Proposed Development is not considered likely to make a notable contribution to odour emissions and is not of the nature to affect actual or perceived exposure to electromagnetic and ionising radiation risks.	All zones
Institutional and built environment: Communication and IT infrastructure	Wider society (regional study area)	The Proposed Development would not contribute to noticeable levels of new IT or communication infrastructure. During construction, measures would be in place to avoid utilities or limit any outages in consultation with service providers and in accordance with standard practice.	All zones

21.9 Assessment methodology

21.9.1 The study area set out in Section 21.4 will be kept under review as the design and consultation processes progress, and the Proposed Development is refined. Therefore, the study area may evolve as appropriate. The evolution of the study area will be clearly communicated in the ES and discussed with relevant consultees.

21.9.2 The proposals, described in Chapter 2: Project description, will also evolve and be further developed as the design process progresses. Whilst the methodologies that are set out within this chapter are not anticipated to change, the scope of assessment will be kept under review as design progresses, and where any further evidence of source-pathway-receptor relationships between the Proposed Development and population groups in the study areas is identified.

Additional baseline information required

21.9.3 Further baseline data will be gathered to focus on the scoped in health determinants and population groups likely to be significantly affected by the Proposed Development. The main source of health data will be desktop based using publicly available data, such as from the Cambridgeshire and Peterborough Insight and OHID's Fingertips websites (Cambridgeshire and Peterborough Combined Authority, 2024; OHID, 2024a). However the results of public

engagement will also be used to inform the baseline regarding public views of the proposals.

21.9.4 Information on relevant vulnerable groups likely to be affected will be obtained from the EqIA, socio-economics and community assessment (see Chapter 20: Socio-economics and community), and from consultation with the local authority public health teams and other relevant stakeholders during further TWG meetings.

21.9.5 Reference will be made to the baseline data to be collected as set out in the following chapters:

- Chapter 7: Landscape and visual effects.
- Chapter 10: Water resources and flood risk.
- Chapter 12: Geology, soils, agriculture and land quality.
- Chapter 15: Air quality.
- Chapter 17: Climate resilience.
- Chapter 18: Noise and vibration.

21.9.6 This will provide information regarding biophysical health hazards, such as light pollution, air pollutants, climate change, water quality and flood risks, contaminated land and environmental noise levels.

21.9.7 Reference will also be made to the baseline data to be collected, as set out in the following chapters:

- Chapter 14: Traffic and transport.
- Chapter 19: Public access and amenity.
- Chapter 20: Socio-economics and community.

21.9.8 This will provide information relating to social and economic determinants, such as housing, open space, recreational and community assets, land use, access and connectivity, active travel, traffic flows, community severance, education, local employment and income.

Assessment years

21.9.9 Assessment years are the same as set out in Chapter 6: EIA approach and methodology.

Approach and proportionality

21.9.10 The approach is to undertake a comprehensive health assessment aligned to the International Association of Impact Assessment's best practice principles for Health Impact Assessment (Winkler *et al.*, 2021), whilst meeting the requirements of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (see Appendix 4.1). The assessment will cross reference assessment results from other aspects of the EIA where appropriate, rather than duplicating them. The health

assessment will consider the implications of assessment results in the context of public health outcomes. Image 21.1 sets out the approach to assessment.

21.9.11 For some matters included in the scope of likely significant effects, only a light touch consideration may be reported in the ES. For example, to confirm whether a health promotion opportunity has been included within the proposal. For other matters, a more detailed analysis will be provided, such as, where a larger population is expected to be affected or where an issue is of substantial public concern. Key areas of focus for the assessment, and the agreed level of detail, will be developed in consultation with the TWG and Health Sub-group.

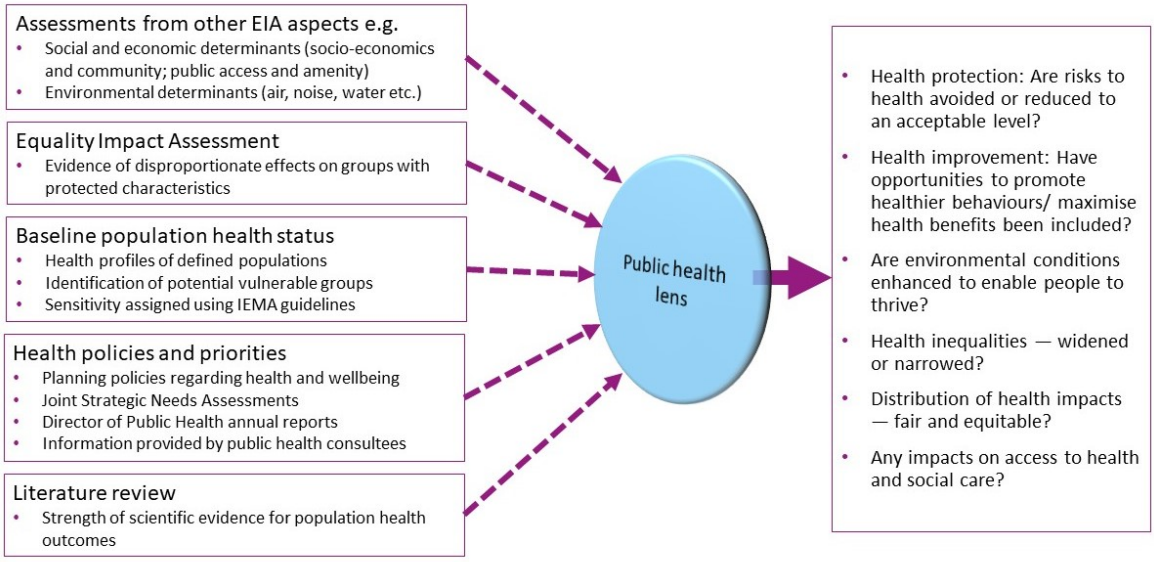

Image 21.1: Key assessment considerations
Source: Author's own

Participation and engagement

21.9.12 It is proposed to continue to seek involvement from the TWG and Health Sub-Group, as appropriate, as the assessment progresses. It is also proposed to seek information on community views and perceptions via the CLG, and the results of the second and third round of public consultations (see Table 21-2). The results of engagement with other organisations, undertaken to inform other assessments, such as traffic and transport and major accidents and disasters, will also be used where appropriate. This may include information relating to emergency services access, antisocial behaviour, safety and security.

Literature review

21.9.13 The assessment will be supported by a literature review. The literature review will seek out peer-reviewed systematic reviews, where available. Systematic reviews provide a summary of all the literature available on a particular topic which meets pre-defined eligibility criteria. These are more helpful as an evidence base as they

synthesise the available research. This helps to reduce the overall level of bias, which may influence an individual research paper. The literature review will help to provide the evidence base on which to judge significance of effects, in line with the assessment criteria outlined below.

Mental health and wellbeing

21.9.14 It is proposed to use the Mental Wellbeing Impact Assessment Toolkit (Cooke *et al*., 2011) to enable a systematic consideration of the Proposed Development's likely significant impacts on the protective factors of mental wellbeing:

- Enhancing control.
- Increasing resilience and community assets.
- Facilitating participation and promoting inclusion.

21.9.15 Reference will be made to the data, guidance and evidence set out in the Mental Health and Wellbeing JSNA Toolkit (National Mental Health Intelligence Network, 2019). Potential mental health outcomes will be assessed in the same way as potential physical health outcomes. This will involve considering the likely significant impacts on wider determinants of health, and the evidence of pathways to health outcomes, with consideration of relevant population groups (and vulnerable groups) who may be exposed to those impacts.

Assessment criteria

21.9.16 It is unlikely that there will be a reliable means of quantifying the health impacts from the data available and size of the populations exposed to impacts. Therefore, the assessment of likely significant effects will be largely qualitative and guided by IEMA assessment criteria (Pyper *et al*., 2022b) and professional judgement. Tables 21-10 and 21-11, set out the criteria for sensitivity and magnitude.

Table 21-10: Criteria for sensitivity of population groups

Sensitivity level	Indicative criteria for the population*
High	• High levels of deprivation (including pockets of deprivation). • Reliance on shared resources (between the population and the Proposed Development). • Existing wide inequalities between the most and least healthy. • A community whose outlook is predominantly anxiety or concern. • People who are prevented from undertaking daily activities. • People who are dependants. • People with very poor health status. • People with a very low capacity to adapt.
Medium	• Moderate levels of deprivation. • Few alternatives to shared resources. • Existing widening inequalities between the most and least healthy. • A community whose outlook is predominantly uncertainty with some concern.

Sensitivity level	Indicative criteria for the population*
	• People who are highly limited from undertaking daily activities. • People providing or requiring a lot of care. • People with poor health status. • People with a limited capacity to adapt.
Low	• Low levels of deprivation. • Many alternatives to shared resources. • Existing narrowing inequalities between the most and least healthy. • A community whose outlook is predominantly ambivalence with some concern. • People who are slightly limited from undertaking daily activities. • People providing or requiring some care. • People with fair health status. • People with a high capacity to adapt.
Very low	• Very low levels of deprivation. • No shared resources. • Existing narrow inequalities between the most and least healthy. • A community whose outlook is predominantly support with some concern. • People who are not limited from undertaking daily activities. • People who are independent (not a carer or dependant). • People with good health status. • People with a very high capacity to adapt.

*Notes: * Judgement based on most relevant criteria – some criteria will span categories.*
Source: Pyper et al., 2022b

Table 21-11: Criteria for magnitude of impact

Magnitude of impact	Indicative criteria for the magnitude of change for health determinants on the population groups*
High	• High exposure or scale. • Long-term duration. • Continuous frequency. • Severity predominantly related to mortality or changes in morbidity (physical or mental health) for very severe illness/injury outcomes. • Majority of the population affected. • Permanent change. • Substantial service quality implications.
Medium	• Low exposure or medium scale. • Medium-term duration. • Frequent events. • Severity predominantly related to moderate changes in morbidity or major change in quality of life.

Magnitude of impact	Indicative criteria for the magnitude of change for health determinants on the population groups*
	• Large minority of population affected. • Gradual reversal. • Small service quality implications.
Low	• Very low exposure or small scale. • Short-term duration. • Occasional events. • Severity predominantly related to minor change in morbidity or moderate change in quality of life. • Small minority of population affected. • Rapid reversal. • Slight service quality implications.
Negligible	• Negligible exposure or scale. • Very short-term duration. • One-off frequency. • Severity predominantly relates to a minor change in quality of life. • Very few people affected. • Immediate reversal once activity complete. • No service quality implication.

*Notes: * Judgement based on most relevant criteria – some criteria will span categories.*
Source: Pyper et al., 2022b

Definition of timescales

21.9.17 The IEMA Guide to Determining Significance does not define long-term, medium-term or short-term. It is proposed to define the timescales as set out in Table 21-12, which have been based on professional judgement.

Table 21-12: Definitions of timescales of impact

Timescale	Definition
Long-term	Impacts lasting approximately ten years or more.
Medium-term	Impacts which would last approximately three to ten years.
Short-term	Impacts which would last approximately six months to three years.
Very short-term	Impacts which would last up to six months.
Transient	Impacts lasting a matter of hours or up to a weekend.

Significance of effects

21.9.18 The judgement of significance will involve the synthesis of information to determine whether health effects are important, desirable and/or acceptable in terms of public health. It will be guided by significance criteria from the IEMA Guide to determining significance for Human Health in Environmental Impact Assessment (Pyper *et al.*, 2022b), as set out in Table 21-13.

Table 21-13: Criteria for significance of effect

Significance	Indicative criteria for the significance of effect*
Major (significant)	• Changes, due to the Proposed Development, have a substantial effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size (magnitude and sensitivity levels), and as informed by consultation themes among stakeholders, particularly public health stakeholders, that show consensus on the importance of the effect. • Change, due to the Proposed Development, could result in a regulatory threshold or statutory standard being crossed (if applicable). • There is likely to be a substantial change in the health baseline of the population, including as evidenced by the effect size and scientific literature, showing there is a causal relationship between changes that would result from the Proposed Development and changes to health outcomes. • In addition, health priorities for the relevant study area are of specific relevance to the determinant of health or population group affected by the Proposed Development.
Moderate (significant)	• Changes, due to the Proposed Development, have an influential effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size, and as informed by consultation themes among stakeholders, which may show mixed views. • Change, due to the Proposed Development, could result in a regulatory threshold or statutory standard being approached (if applicable). • There is likely to be a small change in the health baseline of the population, including as evidenced by the effect size and scientific literature, showing there is a clear relationship between changes that would result from the Proposed Development and changes to health outcomes. • In addition, health priorities for the relevant study area are of general relevance to the determinant of health or population group affected by the Proposed Development.
Low	• Changes, due to the Proposed Development, have a marginal effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size of limited policy influence and/or that no relevant consultation themes emerge among stakeholders. • Change, due to the Proposed Development, would be well within a regulatory threshold or statutory standard (if applicable), but could result in a guideline being crossed (if applicable). • There is likely to be a slight change in the health baseline of the population, including as evidenced by the effect size and/or scientific

Significance	Indicative criteria for the significance of effect*
	literature showing there is only a suggestive relationship between changes that would result from the Proposed Development and changes to health outcomes. • In addition, health priorities for the relevant study area are of low relevance to the determinant of health or population group affected by the Proposed Development.
Negligible	• Changes, due to the Proposed Development, are not related to the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size or lack of relevant policy, and as informed by the Proposed Development having no responses on this issue among stakeholders. • Change, due to the Proposed Development, would not affect a regulatory threshold, statutory standard or guideline (if applicable). • There is likely to be a very limited change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature, showing there is an unsupported relationship between changes that would result from the Proposed Development and changes to health outcomes. • In addition, health priorities for the relevant study area are not relevant to the determinant of health or population group affected by the Proposed Development.

*Notes: * Judgement based on most relevant criteria – some criteria will span categories*
Source: Pyper et al., 2022b

Reporting

21.9.19 It is proposed to report the human health assessment as a chapter in the forthcoming PEIR and ES, supported by appendices. One appendix will contain population health data for the relevant population groups in the study areas, while another appendix will summarise the evidence, including literature review findings and policy review, that help to support the judgement of significance.

21.9.20 Within the main chapter, it is proposed to report health impacts in relation to distinct population groups, to enable individuals to easily identify the key health issues predicted to be of relevance to their specific communities.

21.10 Assessment assumptions and limitations

21.10.1 This scoping assessment has been undertaken based on a preliminary understanding of the baseline using a limited number of health indicators. Further, likely significant effects, including in-combination effects and relevant vulnerable groups, will be identified as part of the ongoing EIA process to close existing gaps.

21.10.2 Views obtained via the CLG and public consultation are not necessarily representative of the views of the population as a whole, and may be subject to

bias due to the self-selecting nature of these groups. However the information is indicative of the views among some parts of the community.

21.10.3 The health assessment to be reported in the ES will consider health effects and data relating to population level data, rather than health data and effects relating to individuals. The aggregated data and statistics used to support the assessment cannot be used to make inferences about the health of specific individuals within the communities assessed, as individual genetics, medical histories, sensitivities, exposures and other circumstances can vary considerably from the average.

21.10.4 Although the assessment will refer to research that demonstrates evidence of associations between changes in health determinants and effects on health, this should not be interpreted as causation. It is not possible to draw conclusions on cause-and-effect relationships for human health using aggregated population-level data.

21.10.5 There are difficulties in estimating the level of exposure of the population to impacts on certain health determinants. For example, it is difficult to ascertain what proportion of their lives each individual within a given population spends in a place that is exposed to the impact, and also whether individuals have been exposed to other factors also associated with a given health outcome. It is also difficult to estimate exposure due to the nature of environmental assessment results yielded by the industry standard guidelines, applied for various aspects. Any such uncertainty will be set out in the ES.

21.10.6 Health data is not always available at consistent geographical levels or time periods of most relevance to the EIA process. Geographic or temporal limitations in the data obtained will be set out in the ES where relevant.

22 Major accidents and disasters

22.1 Introduction

22.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to major accidents and disasters. The chapter should be read in conjunction with the description of the Proposed Development as presented in Chapter 2: Project description. The focus of the major accidents and disasters aspect is on low-likelihood yet high-consequence events. The definitions, approach and considerations included in this chapter have been largely informed by Major Accidents and Disasters in EIA: A Primer (Institute of Environmental Management and Assessment (IEMA) and Arup, 2020) (referred to hereafter in the chapter as 'the Primer'). The Primer is the main guidance available on major accidents and disasters in the context of EIA at this time.

22.1.2 A major accident is defined as '*an event (for instance, train derailment or major road traffic accident) that threatens immediate or delayed serious environmental effects to human health, welfare and/or the environment and requires the use of resources beyond those of the client or its appointed representatives (i.e. contractors) to manage. Major accidents can be caused by disasters resulting from both man-made and natural hazards*' (IEMA and Arup, 2020, page 3).

22.1.3 A disaster is defined as '*a man-made/external hazard (such as an act of terrorism) or a natural hazard (such as an earthquake) with the potential to cause an event or situation that meets the definition of a major accident*' (IEMA and Arup, 2020, page 3).

22.1.4 For the aspect of major accidents and disasters, the matters include:

- Various sources of hazard and pathways associated with the Proposed Development itself whereby it could lead to, or exacerbate, a major accident and/or disaster.
- Various external sources of hazard and pathways that could lead to, or exacerbate, a major accident and/or disaster to which the Proposed Development would be vulnerable.

22.1.5 The scoping process has sought to identify the matters which should be scoped in based on the following considerations:

- Whether the matter is relevant, as there is a credible source-pathway-receptor linkage that could lead to a major accident and/or disaster in the context of the Proposed Development.
- Whether the matter could be scoped out, as it would be adequately controlled through existing design measures, legal requirements, codes and standards such that the risk of a major accident or disaster is as low as reasonably practicable.

- Whether the matter could be scoped out of major accidents and disasters assessment, as it will be assessed within other aspects of the EIA.

22.1.6 The decision process for scoping major accidents and disasters is outlined in Image 22.1 from the Primer.

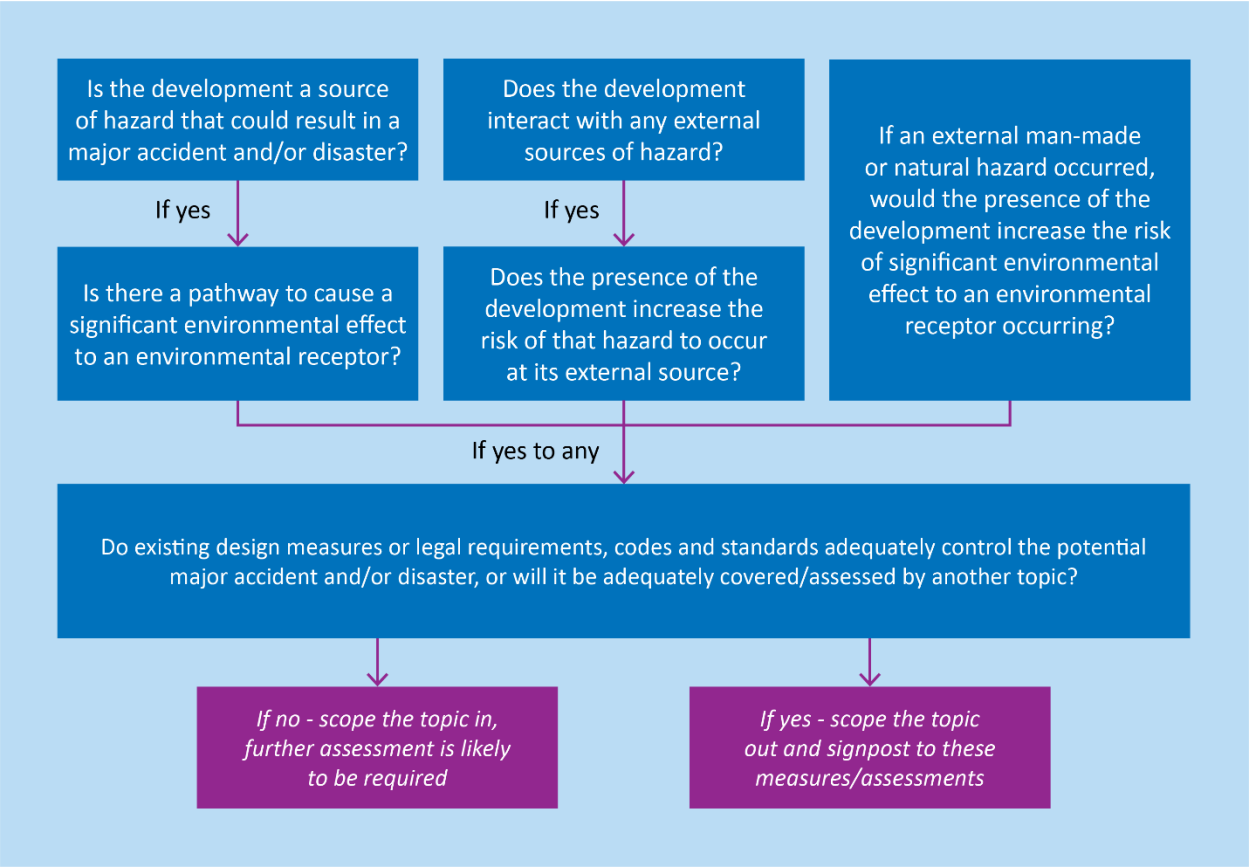

Image 22.1: Scoping decision process flow
Source: IEMA and Arup (2020)

22.2 Legislation, policy and guidance requirements

22.2.1 The EIA Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU) introduced the aspect of major accidents and disasters, which has been transposed into UK law via The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, as amended by The Environmental Assessments and Miscellaneous Planning (Amendment) (EU Exit) Regulations 2018 (S.I. 2018/1232) (the EIA Regulations).

22.2.2 Schedule 4 (5) to the EIA Regulations requires '*A description of the likely significant effects of the project on the environment resulting from, inter alia: (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)*'.

22.2.3 Schedule 4 (8) requires '*A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to retained EU law […] or UK environmental assessments may be used for this purpose provided that the requirements of any law that implemented this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies*'.

22.2.4 A key aim of the EIA Directive was to avoid duplication of processes required through other legislation. Paragraph 15 of the EIA Directive states that '*it should be possible to use any relevant information available and obtained through risk assessments carried out pursuant to Union legislation…or national legislation*'. The Primer (IEMA and Arup, 2020) suggests a 'sign-posting' approach to assessment, making efficient use of existing and available risk assessments rather than duplicating the processes.

22.2.5 The UK has a structured framework of risk management legislation in place. Appendix 4.1: Legislation, planning policy and guidance summary, lists legislation which manages health and safety, reservoir safety and environmental and pollution risks. All water bodies held above surrounding natural ground level and holding an escapable volume greater than 25,000m^3 are considered as large, raised reservoirs by the Reservoirs Act 1975. '*The Act and its associated SIs* [statutory instruments] *provide a legal and administrative framework for the construction and management of reservoirs in a manner that reduces to an acceptable level the risks associated with escapes of water from reservoirs*' (Institute of Civil Engineers (ICE), 2014).

22.2.6 The Primer recognises that a development's vulnerability to major accidents and/or disasters is already covered by a range of inherent design measures, legislative requirements and standard practices regarding safety and environmental protection. Further information about the Reservoirs Act 1975 and other Health and Safety legislation is set out in Section 22.7 of this chapter, in relation to requirements for design and safety.

22.2.7 The guidance in the Primer aims to help applicants communicate these measures to stakeholders to demonstrate how a development's vulnerability to major accidents and disasters is adequately managed, to avoid or reduce potential significant adverse effects to environmental receptors. Section 22.7 of this chapter describes the design management and mitigation measures which will be implemented as standard for the Proposed Development, many of which are requirements of the legislation, planning policy and guidance listed in Appendix 4.1: Legislation, planning policy and guidance summary.

22.2.8 Table 22-1 identifies the relevant policy in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) and the National Planning Policy Framework (NPPF)

(Department for Levelling Up, Housing and Communities (DLUHC), 2023) for major accidents and disasters. Other legislation, policy and guidance which has informed the scope of the assessment presented within this chapter, is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and this should be read in conjunction with this chapter.

Table 22-1: UK policy relevant to major accidents and disasters

Relevant UK policy	Relevance to assessment
NPS for Water Resources Infrastructure (Defra, 2023)	Section 3.10 relates to safety. • Paragraph 3.10.1 advises that the Health and Safety Executive (HSE) is a statutory consultee on matters relating to safety. • Paragraph 3.10.2 identifies that reservoirs covered by the NPS will be subject to requirements of the Reservoirs Act 1975. • Paragraph 3.10.5 notes the requirement to consider implications of major accidents or disasters under the EIA Regulations. It is considered this reference supports the assessment of safety concerns for reservoirs within this chapter. • Paragraph 3.10.6 notes that under the Water Industry Act 1991, water companies have powers to introduce byelaws which could address operational issues relating to public safety, access and security of facilities. Safety legislation relevant to reservoir safety and the water industry has been considered as relevant to the scope of this chapter. The HSE has been identified as a consultee for future engagement on the assessment. Section 3.11 relates to security considerations. • Paragraph 3.11.1 notes that national security considerations apply across all national infrastructure sectors. • Paragraph 3.11.3 advises that *'the applicant should consult with Defra to ensure that physical, procedural and personnel security measures have been adequately considered in the design process and that adequate consideration has been given to the management of security risks.'* • Paragraph 3.11.5 states that the '*applicant should only include such security-related information in the application as is necessary to enable the Examining Authority to examine the development consent issues and make a properly informed recommendation on the application*'. Section 22.10 of this chapter sets out a limitation that some details relating to emergency preparedness may not be reported in the ES due to security considerations. The Applicant has commenced consultation with Defra over security.
NPPF (DLUHC, 2023)	Paragraph 101 states that planning decisions '*should promote public safety and take into account wider security and defence requirements by: a) anticipating and addressing possible malicious threats and natural hazards especially in locations*

Relevant UK policy	Relevance to assessment
	where large numbers of people are expected to congregate…This includes appropriate and proportionate steps that can be taken to reduce vulnerability, increase resilience and ensure public safety and security'. The scope of this chapter considers measures to promote public safety and account for wider security, signposting to information in other chapters of this EIA Scoping Report where relevant.

22.3 Stakeholder engagement

22.3.1 In preparing this EIA Scoping Report, there have been discussions and engagement with a number of stakeholders. This engagement has generally been undertaken in relation to wider issues such as design, flood risk management and other environmental aspects in the EIA, but which have relevance to the assessment of major accidents and disasters.

22.3.2 The dialogue with stakeholders will continue throughout the pre-application period as part of the EIA process. A summary of the engagement undertaken so far is presented in Table 22-2, along with proposed future engagement.

Table 22-2: Engagement with stakeholders

Stakeholder	Engagement undertaken to date	Proposed future engagement
Health and Safety Executive	No specific consultation with the HSE has been undertaken to inform the scope of the major accidents and disasters assessment to date. The HSE has confirmed that it will provide appropriate statutory advice when approached at the EIA stage. Data has been obtained from the HSE's publicly available records.	Proposed engagement to identify COMAH sites within relevant distance of the Proposed Development and to consult on other safety related matters as appropriate in accordance with the Planning Inspectorate's Advice Note Eleven (Planning Inspectorate, 2024).
Department for Environment, Farming and Rural Affairs (Defra)	The Applicant has commenced engagement with Defra on security, and confirmed that the intention is to address security related matters based on the Security and Emergency Measures Direction (SEMD) and associated Protective Security Guidance (PSG) (Defra, 2022) and Water UK Security Standards (WUKSS).	Engagement will continue with Defra on security matters with the aim of demonstrating adequate consideration of security has been made to the satisfaction of Defra such that confirmation of this can be provided by Defra to the Examining Authority in accordance with the NPS.
Cambridgeshire and Peterborough Local Resilience Forum	No specific engagement has been held to date regarding the scope of major accidents and disasters.	Proposed engagement to identify key source-pathway-receptor relationships relating to potential hazards of the

Stakeholder	Engagement undertaken to date	Proposed future engagement
		Proposed Development as external risks that have potential to be exacerbated by features of the Proposed Development.
Environment Agency	The Environment Agency has been consulted in relation to the Reservoirs Act 1975, and separately in relation to the scope of the flood risk assessment and is part of the Technical Working Groups (TWGs) relating to water and other environmental aspects. Refer to Chapter 10: Water resources and flood risk and Chapter 12: Geology, soils agriculture and land quality, for more information on consultation to date.	The Environment Agency has a role as the enforcement agency under the Reservoirs Act 1975. Engagement will continue with the Environment Agency throughout the pre-application and post-application stages on matters relating to reservoir safety.
UK Health Security Agency (UKHSA)	The UKHSA has been invited to attend the TWG on matters relating to health (refer to Chapter 21: Human health, for information on the TWG).	Proposed engagement to identify key source-pathway-receptor relationships relating to potential hazards of the Proposed Development as external risks that have potential to be exacerbated by features of the Proposed Development.

22.4 Study area

22.4.1 The study area for major accidents and disasters has been defined based on the identified Scoping boundary and the available information for the Proposed Development. This includes the information on construction and operational phases as described in Chapter 2: Project description. The identified study area is considered to be sufficiently broad to allow for the ongoing refinement of the Proposed Development; however, if required, the study area will be expanded to ensure there is appropriate coverage of all potential significant environmental effects. The study area may need to be revised as part of the ongoing EIA process to capture potential receptors or secondary hazards which would fall within the spatial extents modelled for a specific risk event, for example, a flood event or transport collision. Such spatial extents are not currently determined and are subject to further analysis as part of the ongoing refinement of the Proposed Development and assessment process.

22.4.2 There is no standard size of buffer area set out in the guidance. At this scoping stage, searches for major utilities, such as 400kV overhead lines and high-pressure gas mains, and major transport routes (roads and railways) have focused on identifying any within the Scoping boundary or within 100m of its extents. This is based on professional judgment and deemed reasonable to enable the identification of on-site hazards which may be vulnerable to impacts of the Proposed Development, for example potential utility strikes or traffic collisions during construction.

22.4.3 A search radius of 3 miles (approximately 4.8km) from the Scoping boundary has been applied for the identification of establishments which fall under the Control of Major Accident Hazards Regulations 2015 (COMAH). This reflects the distance around a specific location that is applied by the HSE's online public database for the identification of COMAH establishments.

22.4.4 A buffer of 13km has been applied for the identification of officially safeguarded aerodromes. This aligns with the Civil Aviation Authority's guidance on relevant distances for bird-related aviation risks (Civil Aviation Authority, 2020). Bird-related aviation risks is deemed the most relevant aviation risk for the Proposed Development on the basis that the proposed reservoir may attract increased numbers of wildfowl and other birds to the area, which could increase the risk to aircraft of a bird strike.

22.4.5 The study area will be refined for the assessment of scoped in matters through application of a source-pathway-receptor approach when analysing risks to and from the Proposed Development. The refinement of the study area to be reported in the Preliminary Environmental Information Report and ES will take account of any relevant consultation feedback from the HSE and other stakeholders.

22.5 Baseline data collection

22.5.1 The baseline conditions for major accidents and disasters presented in Section 22.6 represents a review of the currently available data. The data collated to date was obtained via desk studies and risk assessments prepared for the design and construction of the Proposed Development. It also cross-references baseline information reported within other aspect chapters, where relevant. Data collection to inform the baseline of the assessment is ongoing. The data described below provides a robust context for the scoping of the assessments. However, it will be further developed following additional consultation with key stakeholders (see Table 22-2), to characterise sources of risk and key receptors following a source-pathway-receptor analysis of the matters scoped into the assessment.

Desk studies

22.5.2 A desk study has been undertaken to develop a preliminary understanding of sources of risk to and from the Proposed Development. Information has been sought from the Proposed Development's Health and Safety team, as well as the engineering design and construction advisors. This includes information from risk assessments prepared in relation to the Construction (Design and Management)

Regulations 2015 (the CDM Regulations) and reservoir safety requirements. Data on relevant risks has also been obtained through web-based searches on the International Federation of the Red Cross and Red Crescent Societies (2024), National Risk Register (HM Government, 2023), HSE (2024), Local Resilience Forum and local authority websites.

Field surveys

22.5.3 No specific field surveys have been undertaken for this aspect. However, baseline survey information prepared for other aspect chapters has been drawn upon and cross-referenced, where relevant.

22.6 Baseline conditions

22.6.1 The baseline conditions for major accidents and disasters for the study area (defined in Section 22.4) are described in this section. The baseline conditions are as established from the data collection described in Section 22.5.

Hazardous installations and utilities

22.6.2 The preliminary search of hazardous installations has identified one site which falls under COMAH, within 4.8km of the Scoping boundary. This is a lower tier establishment operated by Flogas Britain Limited, which is a fuel storage and distribution site. The hazardous substances involve flammable gas, aerosol and liquid. It is located within an industrial estate off Newark Road, Peterborough, approximately 660m west of the nearest part of the Scoping boundary, which is associated with the proposed upstream water supply infrastructure at the River Nene and its Counter Drain. No other COMAH sites have been identified within 5km of the Scoping boundary (either upstream, around the proposed reservoir site or downstream infrastructure).

22.6.3 Utilities searches have been undertaken to inform site option appraisal for the proposed reservoir site, and will continue to be undertaken to inform the design of associated water infrastructure and construction safety planning. The Proposed Development (all zones) would cross a number of utilities. No high-pressure gas pipelines have been identified within the Scoping boundary. The nearest is located approximately 76m north of the Scoping boundary for the proposed upstream water supply infrastructure at the River Nene and its Counter Drain.

22.6.4 400kV high voltage electricity overhead lines have been identified which cross the Scoping boundary in two places: one crosses the proposed reservoir to Madingley, via Bluntisham downstream transfer route; and the other crosses the proposed reservoir to Bexwell downstream transfer route. Further 400kV overhead lines are located within 50m of the Scoping boundary for the proposed upstream water supply infrastructure at the River Nene and its Counter Drain.

Transport-related hazards

22.6.5 Part of the downstream proposed reservoir to Madingley, via Bluntisham transfer route (between Swavesey and Madingley) coincides with the extents of Cambridge

Airport's Air Safeguarding Zones. Based on information in the South Cambridgeshire Adopted Local Plan (South Cambridgeshire District Council, 2018), the zone which coincides with the Scoping boundary applies to proposals involving any structure greater than 45m above ground level. Therefore, this is not a likely significant baseline constraint in terms of risk of major accidents and disasters. No other officially safeguarded aerodromes, as listed under The Town and Country Planning (Safeguarded Aerodromes, Technical Sites and Military Explosives Storage Areas) Direction 2002 (Department for Transport (DfT), 2016), have been identified within 13km of the Scoping boundary through the preliminary desk study. There are several recreational flying and gliding clubs in the area which may have local restrictions, for example, the club may need to be consulted via the relevant planning authority, in relation to specific areas of concern they may have, for example any use of cranes within a certain distance of the club's aerodrome.

22.6.6 National transport infrastructure routes represent a potential pathway for human exposure to risks arising on-site, as well as being a potential critical infrastructure receptor. The major roads and railways have been identified where they coincide with the Scoping boundary and are described below. Chapter 14: Traffic and transport, provides further baseline information in relation to transport infrastructure and transport capacity.

22.6.7 The A14 trunk road crosses the downstream proposed reservoir to Madingley, via Bluntisham transfer route approximately 1.4km south of Fen Drayton in South Cambridgeshire. This road had an estimated annual average daily traffic flow of 60,536 vehicles in 2023 at the nearest relevant manual count point (DfT, 2024).

22.6.8 The A141 and A142 abut or cross the Scoping boundary at the west and southern boundaries of the reservoir site. Available traffic data indicated 13,749 annual average daily flow for an automatic traffic counter on the A141 in 2021, and 11,055 annual average daily flow for the A412 2018 manual count (DfT, 2024).

22.6.9 The A10 crosses the downstream proposed reservoir to Bexwell transfer route some 470m east of Downham Market where an annual average daily traffic flow of 12,274 was measured for 2023 at the nearest manual traffic count site (DfT, 2024).

22.6.10 The Scoping boundary is crossed by two railway routes. One regional route between Ely and March crosses the downstream proposed reservoir to Madingley, via Bluntisham transfer route approximately 4.5km west of Wimblington. This route forms part of the CrossCountry, Greater Anglia and East Midlands train operator networks. A second regional route crosses the downstream proposed reservoir to Bexwell transfer route approximately 200m north of Downham Market, and forms part of the Great Northern train operator network.

Natural and environmental hazards

22.6.11 Chapter 10: Water resources and flood risk, describes the baseline in relation to surface watercourses and groundwater resources which are present throughout the Scoping boundary and the study area for water resources and flood risk. These represent both potential receptors to major accidents or disasters arising on-site, as well as potential pathways to human or environmental exposure in the wider

area. Chapter 10 also sets out the baseline sources and level of flood risk. The Nene Washes Flood Storage Reservoir and Ouse Washes Flood Storage Reservoir represent existing sources of reservoir flood risk (see Chapter 10: Water resources and flood risk). Both of these reservoirs are regulated under the Reservoirs Act 1975. The Cambridgeshire and Peterborough Local Resilience Forum (2024) identifies flooding as an important local risk.

22.6.12 Chapter 12: Geology, soils, agriculture and land quality describes the baseline with regard to groundwater resources, which represent potential pathways and receptors for major pollution incidents. Chapter 12 also identifies potential sources of historical or current contamination risk. The soils, geology, agriculture and land quality aspect will continue to develop the baseline throughout the EIA process, which will provide a reference for information relating to pollution and geological risks.

22.6.13 In terms of geohazards, the Proposed Development is located in an area with generally gentle to flat topography, meaning that risks of landslides are not a relevant baseline issue. Earthquakes severe enough to cause damage are rare in the UK, and the route passes through areas considered to be of very low seismicity. The British Geological Survey (BGS) data indicate that the Proposed Development passes through areas with a Peak Ground Acceleration of 0.02g to 0.04g. This is the second lowest of the nine BGS seismicity categories for the UK (BGS, 2024) and therefore presents an extremely low baseline risk. The proposed reservoir will be designed to withstand risks of earthquake via the design and legislative considerations described in Section 22.7 of this chapter.

22.6.14 Chapter 7: Landscape and visual effects, Chapter 8: Terrestrial biodiversity, Chapter 9: Aquatic biodiversity and Chapter 11: Historic environment, describe the preliminary baseline in relation to landscape, terrestrial biodiversity, aquatic biodiversity and cultural heritage respectively. These baselines include sensitive environmental features, which may become relevant receptors in the event of a major accident and/or disaster. This includes nature conservation and heritage sites of international and national importance.

22.6.15 Wind direction and weather conditions can be relevant baseline considerations for potential pathways to atmospheric emissions, in the event of certain types of major accidents and/or disaster. Regional climate data from the Met Office (2016) show that the Eastern England region is relatively sheltered compared to other parts of the UK, since Atlantic storms tend to track western and northern parts of the UK. The strongest winds in the region tend to occur during winter months when the frequency of depressions across the UK increases. As Atlantic depressions approach the UK, the wind typically blows from the south or south-west, but later comes from the west or north-west as the depression moves away. The strongest winds in the region tend to blow from directions ranging from the south to the north-west (Met Office, 2016). Chapter 17: Climate resilience provides a description of baseline climate and climate change projections, such as extreme weather events. This is of relevance in relation to climate change-related risks.

22.6.16 Chapter 19: Public access and amenity, provides the baseline regarding public access within approximately 1km of the Scoping boundary, while Chapter 20: Socio-economics and community, describes baseline communities local to the Scoping boundary. Chapter 21: Human health, outlines baseline populations within different defined geographic scales. These aspects provide relevant information on the human populations that may be exposed to risks of certain types of major accidents and disasters.

22.6.17 This baseline will be developed further based on responses to the Planning Inspectorate's scoping consultation from relevant organisations, and to reflect analysis of the major accident and disaster risks scoped into the EIA.

Future baseline

22.6.18 Chapter 23: Cumulative effects will identify anticipated future developments to be constructed prior to the construction of the Proposed Development. As such, these developments would form part of the future baseline for assessment within the EIA. Proposed new housing or employment developments may mean future human health receptors need to be considered in the major accidents and disasters future baseline. Other types of development may represent new sources of major accident or disaster. The information on proposed developments to be obtained for the cumulative effects chapter will therefore be reviewed for relevance to major accidents and disasters and the future baseline updated in the EIA where appropriate.

22.6.19 Chapter 17: Climate resilience outlines future baseline issues in relation to projections for climate change. Climate change has the potential to exacerbate some risks of major accidents and disasters in some contexts, either through increasing the potential of the Proposed Development to cause accidents or disasters, or by increasing the vulnerability of the Proposed Development to potential accident or disaster. Reference should be made to Chapter 17 for analysis of the future baseline regarding climate change, and associated risks to/from the Proposed Development.

22.7 Design and mitigation

Design

22.7.1 The design of the Proposed Development to date has taken consideration of various risks of accidents and/or disasters. The CDM Regulations require that designers eliminate foreseeable health and safety risks to anyone affected by the Proposed Development (if possible), and to take steps to reduce or control, and pass on information about, any risks which cannot be eliminated. The Regulations require consideration of risks from the construction, maintenance, proposed use and demolition of the Proposed Development, reducing risks from any remaining hazard and giving collective safety measures priority over individual measures. While consideration of the risks of demolition is a requirement of the CDM Regulations, it should be noted that the decommissioning of the Proposed Development has been scoped out of the EIA process on the basis that there are no

plans to decommission the Proposed Development (refer to Chapter 6: EIA approach and methodology).

22.7.2 A Design Risk Assessment, overseen by the Principal Designer and Project Manager, is maintained for the Proposed Development. The Design Risk Assessment identifies various hazards and risks along with measures to control them. Regular 'Safe by Design' meetings are also held for the Proposed Development. Each meeting focuses on specific design elements of the Proposed Development so that the hazards can be identified and addressed in line with Anglian Water's Safe by Design procedures.

22.7.3 Reservoir safety management in the UK is the process of managing the risk of an uncontrolled release of the contents of a reservoir. The Proposed Development will be subject to the Reservoirs Act 1975 and is expected to include water bodies classed as a 'Category A' reservoir, in accordance with the fourth edition of Floods and Reservoir Safety (ICE, 2015). This is a flood consequence class of reservoir, where it is deemed a breach could endanger lives in a community. In addition to the proposed reservoir, there are other water bodies anticipated to be created as part of the Proposed Development and their categorisation in relation to the Reservoirs Act 1975 will be assessed in subsequent design phases.

22.7.4 Under the separate regulatory process set under the Reservoirs Act, a Construction Engineer from the All Reservoir Panel takes responsibility on behalf of a reservoir for the design and construction of a reservoir and for issuing various certificates. This requires the Construction Engineer's stipulations to be met prior to filling of the reservoir commencing, along with the issue of a final certificate once the Construction Engineer is content that the reservoir has been designed, constructed and is initially performing as expected to meet appropriate safety specifications.

22.7.5 In order to provide an additional level of scrutiny on the design for reservoir safety, an Independent Reservoir Expert Panel has been convened for the proposed reservoir, in accordance with recommendations from the Coxon Report (Coxon, 1986). This Independent Reservoir Expert Panel is being regularly convened throughout the design process to provide challenge and advice.

22.7.6 The reservoir design proposed for the Proposed Development includes a potential failure mode identification process, and also considers design concepts and solutions to reduce the risks of failure to as low as reasonably practical. The designers have followed the guide to risk assessment for reservoir safety management (Environment Agency, 2013), which provides a comprehensive framework for conducting a failure mode identification process. This process seeks to foresee problems before they occur by examining what could go wrong, i.e. identifying all the potential ways through which a reservoir embankment could fail and preparing strategies to prevent or mitigate those risks. From this process, design elements and principles are adopted to ensure the risks are not credible and/or not significant in relation to that guidance.

22.7.7 Chapter 2: Project description of this EIA Scoping Report provides a description of the key features of the proposed reservoir. The design includes several features

identified below to ensure safety (these features are described in the overall context of the proposed reservoir in Section 2.5):

- The design features of the reservoir embankments themselves are designed to ensure structural integrity, such as the core, chimney drain, structural shoulders, horizontal composite blanket drain, and landscape shoulder.
- A spillway, which will be designed to prevent uncontrolled overtopping of the reservoir embankment in the unlikely event that the water exceeds the top water level. Since the reservoir is not directly connected to any rivers, the reservoir operator would have complete control over the transfer of water into it. On this basis, it would be a rare event that the spillway would convey significant flows. Significant flows may be expected in the highly unlikely event that the outlets are closed, and the inlet pumps have been left on, combined with an extreme rainfall event when the reservoir is already full.
- An emergency drawdown facility. This is a safety measure comprising a low level outlet valve and associated pipework with sufficient capacity to rapidly lower the reservoir's water level in the highly unlikely event of a problem occurring which threatens the structural performance of the embankment. This valve discharges into a test pond, so that water released during regular testing can be returned to the reservoir.

22.7.8 There will be security measures incorporated in the design of the safety critical elements of the Proposed Development. This is a requirement of The Security and Emergency Measures (Water and Sewerage Undertakers and Water Supply Licensees) Direction (Drinking Water Inspectorate, 2022) (see Appendix 4.1 of this EIA Scoping Report). Security fencing, closed circuit television cameras (CCTV) and other security measures, such as lighting, will be designed and included where appropriate within the proposed reservoir site (including proposed recreation and amenity facilities, where appropriate) and at water treatment works infrastructure, service reservoirs, and pumping stations. These embedded design measures would help to mitigate the risk of malicious or terrorist actions.

22.7.9 Section 10.7 of Chapter 10: Water resources and flood risk, provides a description of design measures to reduce flood risk associated with the Proposed Development from various sources. Section 12.7 of Chapter 12: Geology, soils agriculture and land quality, provides a description of design measures to reduce risks and vulnerabilities relating to hazardous ground conditions and sources of ground contamination. Section 17.7 of Chapter 17: Climate resilience, provides a description of design measures to address vulnerability to the effects of climate change. Section 21.7 of Chapter 21: Human health, provides a description of design requirements to reduce health and safety risks to relevant groups of the population. This information has all been considered for relevance to the scope of the major accidents and disasters assessment.

22.7.10 The ongoing development of the design will continue to be subjected to various designers' risk assessments and will incorporate embedded mitigation to eliminate or reduce risks to be as low as reasonably practicable.

Mitigation

22.7.11 Documents presenting the approach to mitigation will be produced, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. These measures would be applied to mitigate risks to people and the environment from potential major accidents and disasters relevant to the Proposed Development.

22.7.12 The Proposed Development will be designed, constructed and operated in accordance with applicable health and safety legislation as outlined above. All aspects of the Proposed Development will comply with the provisions of the Health and Safety at Work etc. Act 1974 (HSWA) and all relevant subordinate legislation. A health and safety policy and a detailed site-specific health and safety plan will be prepared and maintained. Method statements, accompanied by safety risk assessments, would be produced to cover the construction activities.

22.7.13 Security fencing, CCTV and other security measures such as lighting, will be incorporated around enabling works and construction sites, as appropriate to the location to help mitigate the risk of malicious actions.

22.7.14 Section 10.7 of Chapter 10: Water resources and flood risk, Section 12.7 of Chapter 12: Geology, soils agriculture and land quality, Section 17.7 of Chapter 17: Climate resilience, and Section 21.7 of Chapter 21: Human health, all provide examples of mitigation to avoid or reduce various environmental risks which have been considered for relevance to the scope of the major accidents and disasters assessment.

22.7.15 As noted above, the design of the proposed reservoir includes measures to ensure that risks of embankment failure are 'not credible' or are 'not significant' in line with the guide to risk assessment for reservoir safety management (Environment Agency, 2013). In addition to the design requirements noted above, Category A reservoirs under the Reservoirs Act 1975 also require a detailed assessment of the downstream impacts of any embankment breach prior to construction of the reservoir. Furthermore, reservoir undertakers have a duty to prepare a flood plan for reservoirs as per section 12A of the Reservoirs Act 1975 and The Flood Plan (Reservoirs Emergency Planning) Direction 2021 (the Flood Plan Direction) (Defra, 2021). The flood plan must contain, as a minimum, the following information:

- A clear plan of actions that the undertaker will take in order to prevent, and otherwise control or mitigate, an uncontrolled escape of water.
- Instructions on how to carry out an emergency drawdown of the reservoir.
- The areas that may be flooded in the event of an uncontrolled escape of water from the reservoir, including reservoir flood risk maps published by the Environment Agency where available.
- Key risk factors or visual indicators that may indicate when the reservoir could fail and flooding occur.

- Contact arrangements for key personnel who should be contacted in the event of an emergency.
- Information about the reservoir (name, location, capacity, description of the reservoir and its structures, how inflow and outflow are controlled, whether it is under construction or modification, access details, key holders, and rendezvous points).

22.7.16 The flood plan must be prepared before the Construction Engineer issues a preliminary certificate for the reservoir, i.e. before the reservoir can be filled with any water. Once constructed and filling has commenced, the reservoir will have a period of supervision by the Construction Engineer, which allows them to observe the early behaviour and performance of the reservoir during this critical period. When the Construction Engineer is satisfied that the reservoir is sound, they will issue a final certificate, at which point the undertaker must appoint a Supervising Engineer at all times to provide advice of any behaviour(s) that may affect the safety of the reservoir and to monitor compliance with legal requirements of the Reservoirs Act 1975.

22.7.17 During normal operation, there will be regular monitoring and inspection of the reservoir embankments carried out by the undertaker in accordance with directions made by the Construction Engineer and under the advice of the Supervising Engineer to ensure that they continue to be safe and secure.

22.7.18 In the unlikely event of a safety issue being identified during any of this monitoring, which cannot be controlled by the other design safety measures, the emergency drawdown procedures can be enacted to rapidly (in a controlled way) drawdown water levels within the reservoir so that an uncontrolled release from the reservoir is avoided. The use of the emergency drawdown facility is described in Section 2.7 of Chapter 2: Project description. The emergency drawdown facility will be tested at least annually. The emergency drawdown pond is sized to contain this regular testing of the emergency drawdown valves, with the water released during the test being returned to the reservoir by pump. The emergency drawdown testing regime will therefore not increase any flood risk.

22.8 Proposed scope of assessments

22.8.1 A two-step process was undertaken to scope the major accidents and disasters assessment. The first step was to screen a long list of hazards and events to identify those that could plausibly occur within the study area. A long list was drawn up based on those listed within the Primer (IEMA and Arup, 2020, page 5) with reference also made to the National Risk Register (HM Government, 2023). The list included natural hazards, such as extreme weather conditions, as well as man-made hazards and events, such as conflict and sabotage. Although the Primer states that the list is not limited to those hazards, the list was considered relatively comprehensive, and few additions were made. The long list was screened to remove the hazards that were not relevant to the context of the Proposed Development, such as conflict, volcanic eruption and avalanche. This is reported in Table 1-1 in Appendix 22.1: Major accidents and disasters scoping.

22.8.2 The second step was to analyse each relevant hazard or event in turn, to identify whether the Proposed Development was a potential source of hazard that could result in a major accident or disaster, or whether the Proposed Development could interact with any relevant external source of hazard. The analysis sought to determine whether there would be a valid source-pathway-receptor relationship present, whereby a hazard could plausibly lead to a major accident or disaster outcome involving the Proposed Development.

22.8.3 The analysis also took account of existing design measures, legal requirements, codes and standards to adequately control the risk of major accidents and/or disasters. The process of scoping analysis is aligned to the approach in the Primer, as reproduced in Image 22.1. Where a hazard or event would be addressed through an existing regulatory regime outside of the EIA process and/or through another EIA aspect, to the extent that the risk is as low as reasonably practicable, the hazard has been scoped out of major accidents and disasters. The results of the analysis are documented in Table 22-3, which is based on the hazard identification record template in the Primer (IEMA and Arup, 2020).

22.8.4 The reference numbers included in Table 22-3 relate to the reference numbers applied to each hazard or risk event covered in the screening exercise reported in Table 1-1 in Appendix 22.1: Major accidents and disasters scoping. Where the scoping analysis has considered different sources or pathways to an accident or disaster event, the hazard reference numbers have been subdivided (i.e. as is the case for ref.3 human error, which has been subdivided into 3a and 3b).

Table 22-3: Major accidents and disasters scoping analysis

Ref.	Hazard/risk event	Source and/or pathway	Receptor	Reasonable worst consequence/s if event occurred	Existing design measures, legal requirements, codes and standards	Coverage in scope of other aspects	Scoping conclusion for major accidents and disasters aspect
Human, societal, industrial and built environment related hazards							
1	Reservoir dam/ embankment/structural failure	• Floods/inflows exceeding outflow capacity. • Wind/waves leading to wave overtopping. • Intense rainfall leading to scour. • Intense dry weather causing desiccation of core material. • Earthquake (see earthquake). • Actions of people.	People, property and environmental features within area of inundation	Endangerment to human life and widespread environmental and property damage from uncontrolled release of water.	As described in Section 22.7, the risk of reservoir dam/embankment/structural failure is managed and regulated via the Reservoirs Act 1975 and standards set out in Floods and Reservoir Safety (Fourth Edition) (ICE, 2015), and Failure Mode Identification (FMI) process. The design to date has been developed following these design standards and legislative requirements.	N/A	**Scoped out:** This risk of major accident and disaster is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA. (See ref. 3c and 17c for scoping considerations made around the enactment of emergency drawdown procedures to mitigate risk of embankment failure.)
2	Structural/building collapse	Inappropriate design or construction.	Construction workers and end users	Endangerment to human life in immediate vicinity of structure/building.	As described in Section 22.7, design and construction is managed via CDM Regulations. Design and construction of buildings and other structures is subject to risk assessment, design standards and construction supervision to ensure safety.	N/A	**Scoped out:** This risk of major accident and disaster is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.
3a	Human error/management failure (relating to construction-related activities and materials storage)	Inappropriate operation of construction plant, and/or storage of hazardous materials due to lack of training, supervision or management procedures could lead to construction related accidents.	Construction workers and members of the public	Endangerment to human life and damage to property and various environmental features.	Managed via HSWA, CDM Regulations and all relevant subordinate legislation. The requirements for training, supervision and following of method statements and procedures are standard practice on construction sites in the UK.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.
3b	Human error/management failure (during operation of water treatment infrastructure)	Inappropriate operation of water treatment infrastructure could lead to water treatment failure.	Various	Public health incident due to poor drinking water quality.	Managed via HSWA, and The Water Supply (Water Quality) Regulations 2016. Appropriate training and supervision of staff are standard requirements in the water supply industry.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.

Ref.	Hazard/risk event	Source and/or pathway	Receptor	Reasonable worst consequence/s if event occurred	Existing design measures, legal requirements, codes and standards	Coverage in scope of other aspects	Scoping conclusion for major accidents and disasters aspect
3c	Human error/management failure (relating to operation of downstream drainage infrastructure)	Inappropriate operation and maintenance of downstream drainage infrastructure, for example at pumping stations, which may contribute to flood risk in event of an emergency drawdown procedure being enacted.	People, property and environmental features within area of inundation	Endangerment to human life and damage to property and various environmental features.	The Reservoirs Act 1975 and standards set out in Floods and Reservoir Safety (Fourth Edition) (ICE, 2015) and the Flood Plan Direction set requirements for emergency planning.	N/A	**Scoped into major accidents and disasters assessment:** This is related to the consequences of the enactment of an emergency drawdown procedure. Refer to ref 17c.
4	Design error	Inappropriate design of safety critical infrastructure.	Various	See consequences related to hazard/event refs: 1, 2, 10, 11 and 12.	Reservoir design risk is covered in related hazard/risk event ref. 1. Risk of design error in general is managed via CDM Regulations and adherence to relevant best practices and quality assurance procedures.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.
5a	Sabotage/arson (of the construction and operation sites of the Proposed Development)	Individuals with malicious intent could damage or burn equipment and buildings used in construction or operation.	Construction workers, members of the public, property and surrounding environment	Endangerment to human life.	Security measures are standard measures in the design, construction and operation of water infrastructure projects as required under The Security and Emergency Measures (Water and Sewerage Undertakers and Water Supply Licensees) Direction 2022.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.
5b	Sabotage/arson (of water supplies)	Individuals with malicious intent could sabotage water treatment works or downstream water transfers.	Workers, members of the public, critical infrastructure	Water supplies could be contaminated or cut off, leading to a public health incident.	Security measures are standard measures in the design, construction and operation of water infrastructure projects as required under The Security and Emergency Measures (Water and Sewerage Undertakers and Water Supply Licensees) Direction 2022.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.
6(i)	Aircraft crash	An aircraft could crash into the Proposed Development, threatening the integrity of the structures.	People, property and environmental features	Endangerment to human life, environmental and property damage, which could be widespread in event of embankment failure and subsequent uncontrolled release of water.	Risk to aviation managed through existing legislation (e.g. The Town and Country Planning (Safeguarded Aerodromes, Technical Sites and Military Explosives Storage Areas) Direction 2002) and standards (e.g. Civil Aviation Authority, 2020). Risk to reservoir integrity managed via Reservoirs Act 1975 and standards set out in Floods and Reservoir Safety (Fourth Edition) (ICE, 2015), and FMI process.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.

Ref.	Hazard/risk event	Source and/or pathway	Receptor	Reasonable worst consequence/s if event occurred	Existing design measures, legal requirements, codes and standards	Coverage in scope of other aspects	Scoping conclusion for major accidents and disasters aspect
6(ii)	Train derailment or crash	Pipeline installation could cause instability which could damage the tracks and result in a derailment. The Proposed Development itself is not considered particularly vulnerable to this hazard.	People and transport infrastructure	Endangerment to human life and damage to major infrastructure.	Managed via existing legislation and Network Rail design codes and standards. These mitigate the risk of settlement and other instability issues.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.
6(iii)a	Road collision or crash (relating to the physical footprint of the Proposed Development)	Pipeline installation could cause instability which could damage the road surface and increase risk of a crash. The Proposed Development itself is not considered particularly vulnerable to this hazard.	People (vehicle travellers) and transport infrastructure	Endangerment to human life and damage to major infrastructure.	Managed via existing legislation and highway design codes and standards. These mitigate the risk of settlement and other instability issues.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.
6(iii)b	Road collision or crash (relating to traffic generated by the Proposed Development)	Increased use of roads by construction traffic and/or staff/visitors to the reservoir site could also increase the risk of a crash.	People (vehicle travellers)	Endangerment to human life.	Construction and operational traffic management plans are standard practice measures to help protect highway safety and are expected to be included for the Proposed Development (see Chapter 14: Traffic and transport).	Chapter 14: Traffic and transport Chapter 21: Human health	**Scoped out:** The traffic and transport assessment will cover road safety issues (see Chapter 14: Traffic and transport). Risks to human health from road transport will be assessed in the health assessment (see Chapter 21: Human health); therefore, this will be excluded from major accidents and disasters to avoid duplication.
6(v)	River transport – collision, overloading or hull failure	Use of watercourses by barges during construction could provide a source and pathway for a major pollution incident, in the event of a collision and/or spillage of load involving polluting substances.	Watercourses and associated wildlife	A pollution event to watercourses could result in damage to water-dependent habitats, fish kills and other wildlife fatalities. This could include linked nature conservation sites and their designated features.	Managed via existing environmental protection and pollution control legislation; see Appendix 4.1: Legislation, planning policy and guidance summary.	Chapter 10: Water resources and flood risk Chapter 8: Terrestrial biodiversity Chapter 9: Aquatic biodiversity	**Scoped out:** Risk of water pollution will be addressed in the assessment of water resources and flood risk (see Chapter 10: Water resources and flood risk). Risks to wildlife and habitats will be addressed in the assessments of biodiversity (see Chapter 8: Terrestrial biodiversity and Chapter 9: Aquatic biodiversity); therefore, this will be excluded from major

Ref.	Hazard/risk event	Source and/or pathway	Receptor	Reasonable worst consequence/s if event occurred	Existing design measures, legal requirements, codes and standards	Coverage in scope of other aspects	Scoping conclusion for major accidents and disasters aspect
							accidents and disasters to avoid duplication.
7a	Terrorism	Terrorists could attack the reservoir embankment and associated water infrastructure which could lead to a breach and uncontrolled release of water.	People, property and environmental features within area of inundation	Endangerment to human life and widespread environmental and property damage from uncontrolled release of water.	Security measures are standard measures in the design, construction and operation of water infrastructure projects as required under The Security and Emergency Measures (Water and Sewerage Undertakers and Water Supply Licensees) Direction 2022. Risk of breach managed via Reservoirs Act 1975 and standards set out in Floods and Reservoir Safety, (Fourth Edition) (ICE, 2015) and FMI process.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.
7b	Terrorism	Terrorists could attack the water supply infrastructure with biological or chemical agents that could pollute water supplies.	Members of the public	Public health incident.	Security measures are standard measures in the design, construction and operation of water infrastructure projects as required under The Security and Emergency Measures (Water and Sewerage Undertakers and Water Supply Licensees) Direction 2022.	N/A	**Scoped out:** Risk of disaster is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.
8	Cyber-attack	IT systems which are used to control valves and gates for the reservoir could be vulnerable to cyber-attack. This could lead to rapid inflow into the reservoir, leading it to exceed its outflow capacity and lead to flooding.	People, property and environmental features within area of inundation	Endangerment to human life and widespread environmental and property damage from uncontrolled release of water.	Managed via Reservoirs Act 1975 and standards set out in Floods and Reservoir Safety (Fourth Edition) (ICE, 2015) and FMI process. Security provisions in the design will include no remote operation of valves. Provisions relating to the Reservoirs Act 1975 include a clear plan of actions to prevent an uncontrolled escape of water.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.
9	Industrial/technological accident	Failure of industrial plant or operational errors associated with the Proposed Development could lead to an industrial accident involving hazardous machinery or substances.	Workers, members of the public, critical infrastructure	Endangerment to human life and damage to major infrastructure.	Managed via HSWA, CDM Regulations, COMAH and all relevant subordinate legislation.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.
10a	Explosion (chemical, nuclear or other)	Hazardous substances may be stored and/or used on-site during construction or operation that could present a source of explosion. Pathways would include storage or	Construction workers, members of the public, property and surrounding environment	Endangerment to human life.	Managed via HSWA, CDM Regulations, COMAH and all relevant subordinate legislation.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further

Ref.	Hazard/risk event	Source and/or pathway	Receptor	Reasonable worst consequence/s if event occurred	Existing design measures, legal requirements, codes and standards	Coverage in scope of other aspects	Scoping conclusion for major accidents and disasters aspect
		operational errors, or an incident such as a collision from mobile plant or wildfire.					assessment of this hazard is proposed in the EIA.
10b	Explosion (chemical, nuclear or other)	Unexploded ordnance (UXO) may be present within the Scoping boundary due to the presence of past and present military sites, including airbases, within the region. There is potential for UXO to be disturbed or struck during construction, resulting in a detonation.	Construction workers, members of the public, property and surrounding environment	Endangerment to human life.	UXO surveys are undertaken as part of standard construction practice prior to works being carried out. Survey teams and construction workers will be given training in UXO risk and what actions to take should UXO be discovered.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through established practices in UXO surveys, training and construction practice. No further assessment of this hazard is proposed in the EIA.
11	Pollution (oil, chemical or other)	Substances may be stored and/or used on-site during construction or operation that could present a source of pollution. Pathways would include storage or operational errors, or an incident such as a collision from mobile plant which may result in leakage of pollutants.	Construction workers, members of the public, and surrounding environment including water bodies and soils	Endangerment to human life and/or environment, such as soil, plant and animal health.	Managed via existing environmental protection and pollution control legislation; see Appendix 4.1: Legislation, planning policy and guidance summary.	Chapter 8: Terrestrial biodiversity Chapter 9: Aquatic biodiversity Chapter 10: Water resources and flood risk Chapter 12: Geology, soils, agriculture and land quality Chapter 21: Human health	**Scoped out:** Pollution risk is controlled through existing regulatory requirements and standards; however, the residual risk of an accident resulting in a pollution event remains. Risks to wildlife and habitats from pollution will be addressed in the assessments of biodiversity (see Chapter 8: Terrestrial biodiversity and Chapter 9: Aquatic biodiversity). Risk of water pollution will be addressed in the assessment of water resources and flood risk (see Chapter 10: Water resources and flood risk). Risks of ground pollution will be addressed in the assessment of land quality (see Chapter 12: Geology, soils, agriculture and land quality). Risks to human health from pollution will be addressed in the assessment of human health (see Chapter 21: Human health).

Ref.	Hazard/risk event	Source and/or pathway	Receptor	Reasonable worst consequence/s if event occurred	Existing design measures, legal requirements, codes and standards	Coverage in scope of other aspects	Scoping conclusion for major accidents and disasters aspect
12	Fire	There is potential for fires during construction and operation. Sources would include the presence of flammable substances, as well as electrical equipment on construction site and within temporary and operational buildings, and water supply and treatment facilities.	Construction workers, members of the public, emergency fire crews, property and surrounding environment	Endangerment to human life.	Managed via existing health and safety legislation (see Appendix 4.1: Legislation, planning policy and guidance summary) and standard practices. Standard fire safety measures such as heat/smoke detection equipment, fire suppression, fire insulation, use of non-flammable materials and monitoring of equipment would be included as appropriate, informed by risk assessments.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.
Natural hazards							
16	Earthquake	The Proposed Development is in an area of very low seismic hazard, so the potential source is very limited. However, an earthquake could cause failure of the embankment, foundation or tower and tunnel.	People, property and environmental features within area of inundation	Endangerment to human life and widespread environmental and property damage from uncontrolled release of water.	Managed via Reservoirs Act 1975 and standards set out in Floods and Reservoir Safety (Fourth Edition) (ICE, 2015), and FMI process (see Section 22.7 of Chapter 22: Major accidents and disasters) which accounts for seismic risk in the design process.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.
17a	Flooding (vulnerability of Proposed Development to external sources of flooding)	Chapter 10: Water resources and flood risk, identifies various sources of flooding that could affect the Proposed Development during construction and operation. As a non-impounding reservoir, the reservoir itself is not particularly vulnerable to fluvial flooding. However, construction sites and associated water infrastructure sites could be affected.	Construction workers, site users, local environment and water customers	Endangerment to human life, damage to construction site and associated water infrastructure, including the release of pollutants to water environment. Potential disruption of water supplies.	Managed via flood risk legislation and Flood Risk Assessment (see Appendix 4.1: Legislation, planning policy and guidance summary).	Chapter 10: Water resources and flood risk	**Scoped out:** Flood risk from external sources will be addressed in the EIA via Chapter 10: Water resources and flood risk; therefore, it is proposed to exclude it from the major accidents and disasters assessment to avoid duplication.
17b	Flooding (sourced from footprint and normal operation of Proposed Development)	Day-to-day operation of the reservoir could affect water levels downstream which has the potential to alter flood risk downstream. Alterations to landform and increases in hard surfacing may also alter flood risk.	People, property and environmental features within area of inundation	Endangerment to human life and damage to property and various environmental features.	Managed via flood risk legislation and Flood Risk Assessment (see Appendix 4.1: Legislation, planning policy and guidance summary). Embedded design measures would mitigate flood risk from the footprint and operation of the Proposed Development (refer to Section 10.7 in Chapter 10: Water resources and flood risk).	Chapter 10: Water resources and flood risk	**Scoped out:** Flood risk from the day-to-day operation of the Proposed Development will be addressed in the EIA via Chapter 10: Water resources and flood risk; therefore, it is proposed to exclude it from the major accidents and disasters

Ref.	Hazard/risk event	Source and/or pathway	Receptor	Reasonable worst consequence/s if event occurred	Existing design measures, legal requirements, codes and standards	Coverage in scope of other aspects	Scoping conclusion for major accidents and disasters aspect
							assessment to avoid duplication.
17c	Flooding (sourced from enactment of emergency drawdown procedures)	The use of the emergency drawdown facility would result in a controlled release of a substantial volume of water which would discharge to the downstream network of channels.	People, property and environmental features within area of inundation	Endangerment to human life and damage to property and various environmental features.	The Reservoirs Act 1975 and standards set out in Floods and Reservoir Safety (Fourth Edition) (ICE, 2015) and the Flood Plan Direction set requirements for emergency planning, including how to carry out emergency drawdown of the reservoir. However, the focus of this regulatory framework is on avoiding an uncontrolled release of water and planning for that type of major accident. The emergency drawdown process is mitigation for that type of accident.	None. As an extremely low likelihood/high consequence event, this falls within the scope of major accidents and disasters as per the Primer (IEMA and Arup, 2020).	**Scoped into major accidents and disasters assessment:** It is proposed to address the controlled release of water from enactment of emergency drawdown procedures within the scope of major accidents and disasters assessment. The assessment will outline the emergency response proposals to manage the consequential risks.
20	Extreme temperature (heatwave, cold snap)	The Proposed Development would generally be resilient to effects of climate change. The main pathway to an impact would be the impact of severe dry weather which could lead to structural damage via various pathways as set out in Table 17-2, Chapter 17: Climate resilience.	People, critical infrastructure	Loss of structural integrity of certain features, for example the embankment could lead to a need to decommission the reservoir, meaning a loss of resilient water supply.	Managed via Reservoirs Act 1975 and standards set out in Floods and Reservoir Safety (Fourth Edition) (ICE, 2015), and FMI process (see Section 22.7 of Chapter 22: Major accidents and disasters).	Chapter 17: Climate resilience	**Scoped out:** Vulnerability to extreme temperatures and weather events will be assessed by the climate resilience aspect (see Chapter 17: Climate resilience); therefore, it is proposed to exclude it from major accidents and disasters to avoid duplication.
21	Ground subsidence	Ground subsidence could cause foundations and structures of built elements to fail.	Construction workers, members of the public, property and surrounding environment	Endangerment to human life.	Managed via CDM Regulations. Design and construction of buildings and other structures is subject to risk assessment, design standards and construction supervision to ensure safety.	N/A	**Scoped out:** Risk of major accidents is reduced to as low as reasonably practicable through existing regulatory requirements and standards. No further assessment of this hazard is proposed in the EIA.
23	Storm surge	A storm surge could increase the risk of flooding from downstream channels, should water back up.	People, property and environmental features within area of inundation	Endangerment to human life, damage to property and various environmental features.	Managed via flood risk legislation and Flood Risk Assessment (see Appendix 4.1: Legislation, planning policy and guidance summary). Embedded design measures would mitigate flood risk from the footprint and operation of the Proposed Development (refer to Section 10.7 in Chapter 10: Water resources and flood risk).	Chapter 10: Water resources and flood risk	**Scoped out:** Flood risk will be addressed in Chapter 10: Water resources and flood risk; therefore, it is proposed to exclude it from major accidents and disasters to avoid duplication.

Ref.	Hazard/risk event	Source and/or pathway	Receptor	Reasonable worst consequence/s if event occurred	Existing design measures, legal requirements, codes and standards	Coverage in scope of other aspects	Scoping conclusion for major accidents and disasters aspect
25	Insect/animal infestation	Open water may attract flies and other invertebrates while food waste from visitors may attract wasps and vermin such as rats and gulls. This may increase risk of bites, stings and spread of vector-borne diseases.	Local communities, site workers and visitors	Health impacts (disease and public nuisance). However, it is not considered credible that the scale of source and pathway could lead to a disaster-level event.	Managed via existing legislation and standard practices regarding health and safety, environmental health and waste management.	Chapter 21: Human health	**Scoped out:** Chapter 21: Human health addresses likely significant effects on health from insect/animal sources; therefore, it is proposed to exclude it from major accidents and disasters.
27a	High winds/storms	High winds and storms could result in large waves within the reservoir that could cause loss of freeboard and overflowing, as well as erosion and saturation of embankments that could cause a breach. (Intense rainfall from storms is considered to be included against ref. 17a, which addresses flood risk from external sources).	People, property and environmental features within area of inundation	Endangerment to human life and widespread environmental and property damage from uncontrolled release of water.	Managed via Reservoirs Act 1975 and standards set out in Floods and Reservoir Safety (Fourth Edition) (ICE, 2015) and FMI process (see Section 22.7 of Chapter 22: Major accidents and disasters).	Chapter 17: Climate resilience	**Scoped out:** Storm related damage is scoped in Chapter 17: Climate resilience; therefore, it is proposed to exclude it from major accidents and disasters to avoid duplication.
27b	High winds/storms	High winds and storms could result in damage to construction site and built structures, leading to flying debris and falling objects.	Local communities, site workers and visitors, and property	Endangerment to human life.	Managed via CDM Regulations. Design and construction of buildings and other structures is subject to risk assessment, design standards and construction supervision to ensure safety.	Chapter 17: Climate resilience	**Scoped out:** Storm related damage is scoped in Chapter 17: Climate resilience; therefore, it is proposed to exclude it from major accidents and disasters to avoid duplication.
28	Wildfire	There is potential for wildfires to spread to construction site or operational infrastructure. Sources would likely be surrounding trees/vegetation during dry weather events.	Construction workers, members of the public, emergency fire crews, property and surrounding environment	Endangerment to human life and/or damage to Proposed Development associated water infrastructure, meaning a loss of resilient water supply.	Managed via existing health and safety legislation (see Appendix 4.1: Legislation, planning policy and guidance summary) and standard practices. Standard fire safety measures such as heat/smoke detection equipment, fire suppression, fire insulation, use of non-flammable materials and monitoring of equipment would be included as appropriate, informed by risk assessments.	Chapter 17: Climate resilience	**Scoped out:** Increased risk of wildfire linked to seasonally hotter/drier summers is included in the scope of Chapter 17: Climate resilience; therefore, it is proposed to exclude it from major accidents and disasters to avoid duplication.
30	Drought	The Proposed Development would generally be resilient to effects of climate change. The main pathway to an impact	People and water supply infrastructure	Loss of structural integrity of the embankment could lead to a need to decommission the	Managed via Reservoirs Act 1975 and standards set out in Floods and Reservoir Safety (Fourth Edition) (ICE, 2015) and FMI process (see Section 22.7	Chapter 17: Climate resilience	**Scoped out:** Drought risks linked to seasonally hotter/drier summers is included in the scope of

Ref.	Hazard/risk event	Source and/or pathway	Receptor	Reasonable worst consequence/s if event occurred	Existing design measures, legal requirements, codes and standards	Coverage in scope of other aspects	Scoping conclusion for major accidents and disasters aspect
		would be the impact of severe dry weather which could lead to basin heave and embankment uplift and desiccation of the embankment, affecting structural integrity which would become a breach risk when next filled with water.		reservoir meaning a loss of resilient water supply.	of Chapter 22: Major accidents and disasters).		Chapter 17: Climate resilience; therefore, it is proposed to exclude it from major accidents and disasters to avoid duplication.
31a	Biological hazard – algal blooms	The reservoir could be vulnerable to algal blooms which could compromise water quality.	People (recreational users of the reservoir and drinking water consumers) and wildlife	Harm to human health from contaminated drinking water or exposure to toxins in bathing water.	Managed via existing legislation such as The Water Supply (Water Quality) Regulations 2016 (SI 2016/614) and Water Resources Act 1991 (see Section 22.7 of Chapter 22: Major accidents and disasters).	Chapter 17: Climate resilience Chapter 21: Human health	**Scoped out:** Chapter 17 addresses increased likelihood of algal blooms, while Chapter 21: Human health addresses health risks from algal blooms; therefore, it is proposed to exclude it from major accidents and disasters to avoid duplication.
31b	Biological hazard – epidemic, pandemic	The reservoir could attract wildfowl which may be a source of bird flu. However, it is noted that there are several other locations of open water in the region where wildfowl congregate in high numbers; therefore, it is not likely that the Proposed Development itself would be a credible source of a disaster, compared to other locations.	Poultry and poultry farmers	A bird flu outbreak could destroy poultry flocks or spread to human population.	Managed via legislation such as that provided by the Animal Health Act 1981 and the Public Health (Control of Disease) Act 1984 (see Appendix 4.1: Legislation, planning policy and guidance summary).	Chapter 21: Human health	**Scoped out:** Risk of disaster is reduced to as low as reasonably practicable through existing regulatory requirements and standards. Chapter 21: Human health addresses health risks from zoonoses and vector-borne disease; therefore, it is proposed to exclude it from major accidents and disasters to avoid duplication.

Likely major accident and disaster risks requiring assessment

22.8.5 Following the screening of the long list of hazards and risk events presented in Table 1-1 in Appendix 22.1 and the subsequent scoping of the relevant hazards and risks presented in Table 22-3 in this chapter, it is concluded that the aspect of major accidents and disasters should be scoped into the EIA. Table 22-4 summarises the matters scoped into the major accidents and disasters aspect.

Table 22-4: Risk of likely significant major accidents and disasters

Hazard or event	Major accident or disaster	Receptor	Zone
Construction			
Flooding (sourced from enactment of emergency drawdown procedures).* There would be partial filling of the proposed reservoir during the commissioning phase of construction, which, in the unlikely event of a safety concern, may require the enactment of emergency drawdown procedures.	Endangerment to human life and environmental and property damage from flooding, arising from controlled release of large volume of water into downstream channels.	Downstream communities, infrastructure and environmental designations.	Reservoir site and downstream treated water transfers.
Operation			
Flooding (sourced from enactment of emergency drawdown procedures).*	Endangerment to human life and environmental and property damage from flooding, arising from controlled release of large volume of water into downstream channels.	Downstream communities, infrastructure and environmental designations.	Reservoir site and downstream treated water transfers.

*Notes: * This includes addressing the risk of human error/management failure relating to the operation and maintenance of downstream drainage infrastructure which may contribute to flood risk in the event of an emergency drawdown procedure being enacted.*

22.8.6 The emergency drawdown facility is a safety mechanism embedded into the design of the reservoir to mitigate the risk of an uncontrolled release of water. As described in Section 22.7, it would only be used in the event of a threat to embankment integrity, which is highly unlikely and not expected during the operation of the reservoir. On this basis, it is considered to fall within the scope of the major accidents and disasters assessment. It is not proposed to address this risk in the flood risk assessment (refer to Chapter 10: Water resources and flood risk) because it is a scenario which is not expected to arise, due to the high safety standards incorporated into reservoir safety design. Instead, the flood risk assessment will cross-refer to the major accidents and disasters assessment.

22.8.7 The safety design measures and emergency planning, including the use of the emergency drawdown procedure, to mitigate the threat of a reservoir embankment failure, will be developed and regulated under the Reservoirs Act 1975 (as outlined in Section 22.7) which is a separate legislative regime from the Development Consent Order (DCO) process under the Planning Act 2008 and the EIA Regulations. The major accidents and disasters assessment will therefore be limited to reporting the safety and emergency planning activities undertaken in response to the requirements of the Reservoirs Act 1975, including the Flood Plan Direction.

22.8.8 As part of the Proposed Development safety and emergency planning, ongoing engagement will be held between the designers and relevant stakeholders including the Environment Agency, HSE and Local Resilience Forum. This will include discussion between the reservoir undertaker and the Environment Agency (as the enforcement authority under the Reservoirs Act 1975) on the effects of operating the emergency drawdown procedure, the appropriate emergency planning response and any requirements for the maintenance and operation of downstream infrastructure to support an emergency response. It should also be noted, as outlined in Section 22.7, that the safety mechanisms under the Reservoirs Act 1975 (including the flood plan) are undertaken via a process outside of the public domain for reasons of security. Therefore, the major accidents and disasters assessment will be limited to qualitative reporting of the engagement, analysis and the subsequent actions required to inform the flood plan.

Effects not requiring assessment

22.8.9 The effects proposed to be scoped out of the major accidents and disasters assessment are summarised in Table 22-5. Further detail on reasons for scoping out certain hazards/events are provided in Table 22-3.

22.8.10 A breach of the dam or reservoir embankments would result in an uncontrolled release of water of a scale to meet the definition of a major accident and disaster. However, as described in Section 22.7, there is a strict regulatory process around the design, construction and operation of reservoirs. These existing design measures, legal requirements, codes and standards adequately control the risk of an uncontrolled release of water from the reservoir due to a breach of dam or reservoir embankments to the extent that it is extremely unlikely to ever occur. This issue can therefore be scoped out in accordance with the Primer decision process (see Section 22.1 of this chapter and Image 22.1). With the exception of the enactment of the emergency drawdown procedure as mitigation for an embankment breach, the other hazards are typical considerations of any construction and water supply project, and are managed through existing health and safety, environmental protection and pollution control legislation, as well as standard practices. Matters such as pollution, climate resilience and certain health impacts will be assessed within the scope of other chapters, as outlined in Table 22-3, and therefore are proposed to be scoped out of major accidents and disasters to avoid duplication.

Table 22-5: Potential effects to be scoped out of the major accidents and emergency assessment

Hazard or event	Justification for scoping out	Zone
Construction		
Various construction site sourced hazards: • Structural or building collapse. • Human error. • Fire. • Explosion (including UXO). • Pollution.	Risk of major accidents or disasters is reduced to as low as reasonably practicable through existing health and safety, environmental protection, and pollution control legislation (e.g. Health and Safety at Work and CDM Regulations – see Appendix 4.1 and Section 22.7 of this chapter) and standard practice (e.g. construction phase management plans, risk assessments and method statements).	All zones
Reservoir dam/ embankment/structural failure of the proposed reservoir during commissioning (partial filling) leading to uncontrolled release of water.	Risk is reduced to not credible or significant via the requirements of Reservoirs Act 1975 and reservoir safety design codes and standards (see Section 22.7 and Table 22-3).	Reservoir site and downstream infrastructure
Transport hazards (road traffic collision, train derailment, river transport collision).	Risk of major accidents or disasters for trains and aircraft are reduced to as low as reasonably practicable through specific design codes and standards (see Table 22-3). Consequences of river transport collision (water pollution) will be addressed in other aspects (Chapter 10: Water resources and flood risk; Chapter 8: Terrestrial biodiversity; and Chapter 9: Aquatic biodiversity). Endangerment to human life from traffic collisions will be addressed in other aspects (Chapter 14: Traffic and transport; and Chapter 21: Human health). Therefore, transport hazards are scoped out of major accidents and disasters.	All zones
Pollution (oil, chemical or other).	Risk is managed via existing pollution control legislation (see Appendix 4.1) and will also be addressed within the scope of other aspects: • Risks to wildlife and habitats from pollution will be addressed in the assessments of biodiversity (see Chapter 8: Terrestrial biodiversity and Chapter 9: Aquatic biodiversity). • Risk of water pollution will be addressed in the assessment of water resources and	All zones

Hazard or event	Justification for scoping out	Zone
	flood risk (see Chapter 10: Water resources and flood risk). • Risks of ground pollution will be addressed in the assessment of land quality (see Chapter 12: Geology, soils, agriculture and land quality). • Risks to human health from pollution will be addressed in the assessment of human health (see Chapter 21: Human health). Therefore, it is proposed to exclude it from major accidents and disasters to avoid duplication.	
Flooding (vulnerability of Proposed Development to external sources of flooding).	Flood risk will be addressed in Chapter 10: Water resources and flood risk, and therefore it is proposed to exclude it from major accidents and disasters to avoid duplication.	All zones
Operation		
Reservoir dam/ embankment/structural failure of reservoir leading to uncontrolled release of water.	Risk is reduced to not credible or significant via the requirements of Reservoirs Act 1975 and reservoir safety design codes and standards (see Section 22.7 and Table 22-3).	Reservoir site and downstream infrastructure
Various operational hazards/events: • Structural/building collapse. • Design error. • Human error/management failure. • Sabotage/arson. • Terrorism. • Aircraft crash/rail derailment/road collision. • Fire. • Explosion. • Ground subsidence.	Risk of major accidents or disasters is reduced to as low as reasonably practicable through existing regulatory frameworks and embedded mitigation (see Table 22-3 for analysis of each hazard/event and scoping justification).	All zones
Pollution (oil, chemical or other).	Risk is managed via existing pollution control legislation (see Appendix 4.1) and will also be addressed within the scope of other aspects: • Risks to wildlife and habitats from pollution will be addressed in the assessments of biodiversity (see Chapter 8: Terrestrial	All zones

Hazard or event	Justification for scoping out	Zone
	biodiversity and Chapter 9: Aquatic biodiversity). • Risk of water pollution will be addressed assessment of water resources and flood risk (see Chapter 10: Water resources and flood risk). • Risks of ground pollution will be addressed in the assessment of land quality (see Chapter 12: Geology, soils, agriculture and land quality). • Risks to human health from pollution will be addressed in the assessment of human health (see Chapter 21: Human health). Therefore, it is proposed to exclude it from major accidents and disasters to avoid duplication.	
Flooding (vulnerability of Proposed Development to external sources of flooding).	Managed via flood risk legislation (see Appendix 4.1) and Flood Risk Assessment. Flood risk will be addressed in Chapter 10: Water resources and flood risk; therefore, it is proposed to exclude it from major accidents and disasters.	All zones
Flooding (sourced from footprint and normal operation of Proposed Development).		All zones
Extreme weather and climate change-related events (storms/storm surges/high winds/heatwaves/ droughts/intense rainfall/extreme cold/wildfires).	Potential vulnerability to relevant extreme temperatures and weather events will be assessed by the climate resilience aspect (see Chapter 17: Climate resilience); therefore, it is proposed to exclude it from major accidents and disasters.	All zones
Insect/animal infestation and biological hazards – epidemic and pandemic.	Health impacts such as risks from insects and biological hazards will be addressed in the human health assessment aspect (see Chapter 21: Human health); therefore, it is proposed to exclude it from major accidents and disasters.	All zones

22.9 Assessment methodology

22.9.1 The study area set out in Section 22.4 will be kept under review as the design and consultation processes progress, and the Proposed Development is refined. Therefore, the study area may evolve as appropriate. The evolution of the study area will be clearly communicated in the ES and discussed with relevant consultees.

22.9.2 The proposals, described in Chapter 2: Project description, will also evolve and be further developed as the design process progresses. However, the scope of the assessment and methodologies that are set out within this chapter are not anticipated to be affected.

Baseline development and identification of receptors

22.9.3 The baseline context regarding reservoir safety in the UK will be described. The baseline hazards with potential to interact with reservoir safety, together with relevant receptors with potential to be affected by flooding as a consequence of the unlikely event of emergency drawdown enactment, will also be described. This will be informed by the spatial extents determined by flood modelling of emergency drawdown scenarios expected as part of the emergency planning requirements under the Flood Plan Direction. The characteristics of these receptors would be analysed to understand their likely vulnerability to flooding. Information on potential receptors will be obtained from the baseline assessments for other aspects, from risk assessments being developed for the Proposed Development, and through consultation with organisations such as the HSE and Environment Agency.

Assessment

22.9.4 The assessment will seek to establish, via the emergency planning work to be undertaken to meet the requirements of the Reservoirs Act 1975 regulatory framework, the reasonable worst-case consequences expected as a result of an emergency drawdown procedure being enacted. It will outline the various pathways to impacts on receptors which fit the definition of a major accident or disaster which are being taken into account as part of the safety planning. This will be informed through taking account of the vulnerability of receptors that was established through the baseline assessment. The assessment will report the reasonable worst-case scenario for the likely scale of endangerment to human life, damage to critical infrastructure, and/or damage to the natural environment to be accounted for as part of the emergency planning.

22.9.5 The likelihood of the enactment of emergency drawdown procedures will be described, as informed by preliminary risk assessments developed for the Proposed Development, and advice from reservoir designers. The combination of likelihood and consequence will enable a risk score to be presented using an established risk assessment framework. The specific risk assessment framework to be used will be determined through ongoing consultation with the reservoir designers and consultees, such as HSE and the Environment Agency. This will be confirmed within the methodology section of the ES.

Mitigation

22.9.6 The major accidents and disasters chapter to be reported in the ES will set out the mitigation principles that will have been developed in response to requirements of the regulatory framework provided by the Reservoirs Act 1975. The reporting of this mitigation will take account of the mitigation hierarchy as set out in the Primer (IEMA and Arup, 2020). This will include the considerations made, as part of the

work to inform the flood plan, as to whether making alterations to processes or physical infrastructure would be appropriate and proportionate for the risk, or whether emergency response measures would better control the risk.

Residual assessment

22.9.7 The residual assessment will set out how risks associated with the enactment of the emergency drawdown procedure would be eliminated, reduced or controlled to a level that is considered tolerable (as low as reasonably practicable) and therefore not significant.

22.10 Assessment assumptions and limitations

22.10.1 It is assumed that mitigation measures would be confirmed via the flood plan as required by the Flood Plan Direction. As noted in Section 22.7, this flood plan must be prepared before the Construction Engineer issues a preliminary certificate. The Construction Engineer is personally responsible for overseeing the design and proper construction of the reservoir. Therefore, the confirmation of the exact mitigation for enactment of the emergency drawdown facility may not be available until after detailed design has been completed to the satisfaction of the Construction Engineer's requirements. However, it is assumed that sufficient analysis will have been undertaken to establish the credibility of the Proposed Development in terms of safety of design and emergency response principles.

22.10.2 The ES will therefore set out the status of mitigation proposals and the process of securing the level of safety mitigation required prior to issue of the preliminary certificate (and subsequent filling of the reservoir with water), rather than providing a full description of the measures (which will rely on the final detailed design of the reservoir, and therefore cannot be provided at the DCO stage). Furthermore, for reasons of security, it is unlikely that full emergency planning details for an uncontrolled or controlled release of reservoir water can be made publicly available. This is consistent with advice in the NPS for Water Resources Infrastructure (see Table 22-1).

23 Cumulative effects

23.1 Introduction

23.1.1 This chapter of the EIA Scoping Report describes the proposed scope of assessment as it relates to the cumulative effects assessment (CEA). The chapter should be read in conjunction with the description of the project as presented in Chapter 2: Project description.

23.1.2 Cumulative effects occur when impacts caused by present and reasonably foreseeable activities combine to create an increased level of effect. A single environmental impact resulting from a development may not be significant on its own but may become significant when combined with other environmental impacts of the same development or of other developments.

23.1.3 Cumulative effects are the result of multiple actions on environmental receptors or resources. Two categories of cumulative effects are considered: 'intra-project' and 'inter-project' effects (Institute of Environmental Management and Assessment (IEMA), 2011). These are introduced below:

- **Intra-project cumulative effects** occur when a resource, receptor or group of receptors are potentially affected by more than one source of direct environmental impact resulting from the same development (IEMA, 2011). For example, a community may be affected by noise and dust impacts resulting from the construction phase activities of a single development. Intra-project cumulative effects are referred to as 'interrelationships between aspects' in the Planning Inspectorate's (2019) Advice Note Seventeen: Cumulative effects assessment, relevant to nationally significant infrastructure projects.

- **Inter-project cumulative effects** occur when a resource, receptor or group of receptors are potentially affected by more than one development at the same time (IEMA, 2011). For example, the construction traffic effects of a development in isolation may not be significant, but when combined with the construction traffic effects of another development (using the same geographical area at the same time), this may result in significant cumulative effects on the surrounding highways network. Inter-project cumulative effects are referred to as 'cumulative effects' in Advice Note Seventeen (Planning Inspectorate, 2019).

23.1.4 This chapter has links with all environmental chapters as it considers the interrelationships between aspects.

23.1.5 This chapter is supported by Appendix 23.1: Long list of other developments for inter-project CEA, as well as the following figures:

- Figure 23.1: Nationally Significant Infrastructure Projects (NSIP).

- Figure 23.2: Planning applications and local development plan site allocations.

23.2 Legislation, policy and guidance requirements

23.2.1 Legislation, policy and guidance which has informed the scope of the assessment presented within this chapter, is listed in Appendix 4.1: Legislation, planning policy and guidance summary, and should be read in conjunction with this chapter.

23.2.2 Table 23-1 identifies the relevant policy in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023), and the National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities (DLUHC), 2023) for CEA.

Table 23-1: UK policy relevant to cumulative effects

Relevant UK policy	Relevance to assessment
NPS for Water Resources Infrastructure (Defra, 2023)	Paragraph 3.2.6 states that any ES should provide information on how the effects of an applicant's proposal would combine and interact with the effects of other development (including projects for which consent has been granted). Footnote 69 also states that the applicants should refer to the Planning Inspectorate's advice on assessing cumulative effects (Advice Note Seventeen (Planning Inspectorate, 2019)). This chapter sets out the proposed scope of assessment for intra-project and inter-project cumulative effects. The Planning Inspectorate's (2019) Advice Note Seventeen has been used as guidance for the proposed scope of assessment.
NPPF (DLUHC, 2023)	Addressing cumulative effects is a common theme in the NPPF, including cumulative impacts on the road network (paragraph 115), cumulative impacts on flood risk (paragraph 166), cumulative impacts of pollution (paragraph 191), cumulative impacts on compliance with relevant limit values or national objectives for pollutants (paragraph 192), and cumulative impacts of mineral resource use and extraction (paragraphs 216 and 217).

23.3 Stakeholder engagement

23.3.1 The relevant planning authorities will be afforded opportunity to comment on the provisional Long list of other developments (provided in Appendix 23.1: Long list of other developments for inter-project CEA) as part of the Scoping Opinion consultation undertaken by the Planning Inspectorate on behalf of the Secretary of State.

23.3.2 The Applicant will take into account any comments received by the relevant planning authorities through the Scoping Opinion consultation, and will engage with the relevant planning authorities during the EIA to identify specific other developments that the relevant planning authorities are aware of, to include in the Long list of other developments.

23.4 Study area

23.4.1 The study area for cumulative effects has been identified based on the identified Scoping boundary and the available information for the Proposed Development. This includes the information on construction and operational phases as described in Chapter 2: Project description. The identified study area is considered to be sufficiently broad to allow for the ongoing development of the Proposed Development; however, if required this will be expanded to ensure there is appropriate coverage of all potential significant environmental effects.

Intra-project cumulative effects

23.4.2 The study area for intra-project cumulative effects is the same as that presented within each of the preceding environmental chapters in this EIA Scoping Report.

Inter-project cumulative effects

23.4.3 The study areas for inter-project cumulative effects are the buffers from the Scoping boundary within which relevant other reasonably foreseeable development are identified for the inter-project CEA (see Section 23.9 for further details regarding the types of other development considered in the CEA). The study areas are provided in Table 23-2.

Table 23-2: Study areas for inter-project CEA

Type of other development	Study areas (distance from the Scoping boundary)
NSIP	20km.
Major developments* and sites allocated in relevant local development plans	Reservoir – 5km.
	Associated water infrastructure, including inter-catchment treatment, service reservoirs and water treatment works – 3km.
	Pipelines – 2km.
Minor developments	Within the Scoping boundary.

Notes: * Major developments are defined at paragraph 23.4.4 of this chapter.

23.4.4 Major developments are defined under Article 2 of The Town and Country Planning (Development Management Procedure) (England) Order 2015 (as amended) as *'development involving any one or more of the following:*

(a) the winning and working of minerals or the use of land for mineral-working deposits;

(b) waste development;

(c) the provision of dwelling houses where —

(i) the number of dwelling houses to be provided is 10 or more; or

(ii) the development is to be carried out on a site having an area of 0.5 hectares or more and it is not known whether the development falls within sub-paragraph (c)(i);

(d) the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or

(e) development carried out on a site having an area of 1 hectare or more.'

23.4.5 The study areas differ for NSIP, major developments and local development plan site allocations, and for the associated water infrastructure for the Proposed Development. This is due to recognition of the differing scale and nature of the developments and infrastructure, and the potential for inter-project cumulative effects. The study areas have been chosen based on the Zones of Influence (ZoI) for environmental aspects, which are listed in Table 23-5 in Section 23.9 of this chapter.

23.5 Baseline data collection

23.5.1 The baseline information collated to date has been informed by a desk study which has drawn on the following key information sources:

- A review of the Planning Inspectorate's Register of Applications.
- A review of accepted planning applications and local development plan site allocations, utilising relevant planning authority websites (including the relevant planning authority planning portals and local development plans) within the study areas.

23.6 Baseline conditions

23.6.1 The baseline conditions for cumulative effects are described below for the study areas (defined in Section 23.4). The baseline conditions are as established from the data collection described in Section 23.5.

23.6.2 The baseline conditions for each of the environmental aspects have been detailed in the respective aspect chapters in this EIA Scoping Report, as set out in Table 23-3, and are not repeated here. Chapter 22: Major accidents and disasters is not included within the CEA, as the embedded measures identified within the chapter are such that there are unlikely to be significant cumulative effects.

Table 23-3: Environmental aspects and their location within this EIA Scoping Report

Environmental aspect	EIA Scoping Report chapter where covered
Landscape and visual	Chapter 7
Terrestrial biodiversity	Chapter 8
Aquatic biodiversity	Chapter 9
Water resources and flood risk	Chapter 10
Historic environment	Chapter 11
Geology, soils, agriculture and land quality	Chapter 12
Material assets and waste management	Chapter 13
Traffic and transport	Chapter 14
Air quality	Chapter 15

Environmental aspect	EIA Scoping Report chapter where covered
Carbon and greenhouse gases	Chapter 16
Climate resilience	Chapter 17
Noise and vibration	Chapter 18
Public access and amenity	Chapter 19
Socio-economics and community	Chapter 20
Human health	Chapter 21

23.6.3 To inform the scope of the inter-project CEA, a preliminary review has been undertaken to compile a provisional long list of other developments to be considered in the inter-project CEA. The provisional Long list of other developments for the inter-project CEA is provided in Appendix 23.1 of this EIA Scoping Report.

23.6.4 The study areas set out in Section 23.4 of this chapter were used as a buffer from the Scoping boundary, within which the other developments were identified. A search period commencing in 2017 was chosen to take into consideration other developments that may have a temporal overlap with the Proposed Development.

23.6.5 The Long list of other developments will change as new applications are submitted for development consent or planning permission, or where applications are withdrawn or refused. Therefore, Appendix 23.1: Long list of other developments for inter-project CEA of this EIA Scoping Report reflects the current situation as of August 2024, and will be reviewed and updated as the Proposed Development progresses.

23.6.6 Further details regarding the methodology used to compile the provisional Long list of other developments can be found at Section 23.9 of this chapter, and assumptions and limitations are described in Section 23.10 of this chapter.

Future baseline

23.6.7 The operational impacts of other developments that have been or are likely to have been constructed before the Proposed Development commences construction, will be considered as part of the future baseline for the aspect assessments to be reported in the ES. The shortlist of other developments (to be provided in the PEIR and ES) will identify other developments that have been considered, as part of the future baseline for the aspect assessments.

23.7 Design and mitigation

Design

23.7.1 The design of the Proposed Development to date has taken consideration of environmental constraints and likely significant environmental effects.

23.7.2 The ongoing development of the design will incorporate embedded mitigation to avoid and reduce adverse effects, where appropriate.

Mitigation

23.7.3 Documents presenting the approach to mitigation will be produced, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, monitoring, management and control during construction. These measures would be applied to mitigate likely significant effects, including cumulative effects if appropriate.

23.7.4 Relevant documents will be produced to set out the measures and standards of work to be applied during the operational phase. These would be applied to monitor, manage and control adverse environmental effects associated with operation and maintenance activities.

23.7.5 The CEA will draw upon the mitigation identified within the preceding aspect chapters of the ES as the basis for the inter-project CEA.

23.8 Proposed scope of assessments

Likely significant effects requiring assessment (scoped in)

23.8.1 The following section sets out the aspect-specific effects for cumulative effects. The likely significant effects requiring assessment are presented in Table 23-4.

Table 23-4: Likely significant cumulative effects

Sub-aspect	Likely significant effects	Timing
Intra-project cumulative effects	There is the potential for significant effects to arise between environmental aspects from the construction and/or operation of the Proposed Development.	Construction and Operation
Inter-project cumulative effects	There is the potential for significant effects to arise between the Proposed Development and other developments during construction and/or operation.	Construction and Operation

Effects not requiring assessment (scoped out)

Intra-project cumulative effects

23.8.2 The proposed scope of the intra-project CEA is the same as that reported for the individual aspect assessments in the preceding chapters of this EIA Scoping Report, and is not duplicated here to avoid repetition.

Inter-project cumulative effects

23.8.3 The proposed scope of the intra-project CEA is largely the same as that reported for the individual aspect assessments in the preceding chapters of this EIA Scoping Report, and is not duplicated here to avoid repetition. However, the following aspects and matters are proposed to be scoped out of the inter-project CEA:

- Carbon and greenhouse gases and climate resilience (construction and operation) – the assessments reported in the carbon and greenhouse gases, and

the climate resilience aspect chapters (Chapters 16 and 17 of this EIA Scoping Report, respectively) consider the Proposed Development's potential to affect the global climate (as a result of changes in greenhouse gas emissions) rather than an impact on the local area. The assessments also consider the effect of changes in climate on the Proposed Development itself, and therefore this does not require further assessment in the CEA. Furthermore, the IEMA (2020) Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation advises that the extent to which climate exacerbates or ameliorates the effects of a Proposed Development on the environment (i.e. 'in-combination' climate effects) should be considered. The IEMA guidance advises that the 'in-combination assessment' (where climate has the potential to exacerbate or conversely diminish the effect of an existing impact of a proposed development) is best analysed in the existing environmental aspect chapters of an ES, and is suited to using traditional significance criteria from the respective chapters.

- Material assets and waste (construction and operation) – the assessment reported in Chapter 13: Material assets and waste management of this EIA Scoping Report, considers the influence of constructing the Proposed Development on national material recovery targets, regional recycled aggregate targets, sub-regional minerals sterilisation and regional landfill capacity. Therefore, this aspect does not require further assessment in the CEA.
- Major accidents and disasters (construction and operation) – due to the extraordinary circumstances under which a major accident or disaster would occur, a cumulative scenario will be addressed within the specific aspect chapter if deemed relevant for the risk being assessed.
- Traffic and transport (operation) – the traffic and transport assessment will utilise the Department for Transport Trip End Model Presentation Program (TEMPro), which provides typical growth factors for development. As the traffic and transport assessment is therefore inherently cumulative, separate CEA for traffic and transport during the operational phase will not be undertaken. However, this will be kept under review in the event that any new, other development is identified that has potential to exceed the previous worst-case assumptions based on growth data (e.g. not previously included in modelled forecasts). This CEA approach is based on paragraph 3.4.4 of the Planning Inspectorate's (2019) Advice Note Seventeen.

23.9 Assessment methodology

23.9.1 The study areas set out in Section 23.4 will be kept under review as the design and consultation processes progress, and the Proposed Development is refined. Therefore, the study areas may evolve as appropriate. The evolution of the study areas (and the identification of likely significant cumulative effects within them) will be discussed with relevant stakeholders, such as the relevant planning authorities. This will include discussions on the reasons driving such changes and the measures taken to ensure a comprehensive baseline is collected, and a robust assessment is

undertaken. Any evolution of the study areas will be clearly communicated in the ES.

23.9.2 The proposals, described in Chapter 2: Project description, will evolve and be further developed as the design process progresses. However, the scope of the assessment and methodologies that are set out within this chapter are not anticipated to be affected.

Additional baseline information required

23.9.3 The CEA undertaken for the ES will draw upon the results of the environmental aspect assessments undertaken and reported within the relevant chapters of the ES.

23.9.4 As noted in Section 23.6, the preliminary Long list of other developments will be updated as new applications are submitted for development consent or planning permission or where applications are withdrawn or refused.

Assessment years

23.9.5 The temporal scope for the assessment would be the same as set out in Chapter 6: EIA approach and methodology.

23.9.6 As the construction and operational phases of the Proposed Development occur at different times, they are not expected to act cumulatively with each other. The inter-project CEA will consider whether the construction or operational phases of the Proposed Development are likely to interact with other developments.

Intra-project CEA methodology

23.9.7 The intra-project CEA will consider the environmental effects reported in the individual aspect chapters of the ES. These will be summarised in the cumulative effects chapter of the ES, where there is considered to be potential for a likely significant cumulative effect.

23.9.8 There is no standard approach to the assessment of intra-project cumulative effects. A checklist matrix will be used to scope-in receptors subject to multiple effects. The matrix approach is useful as a tool, as it can visually represent relationships between project impacts and environmental components. For example, protected lanes could have effects identified within the landscape, ecological, cultural heritage, and traffic and transport assessments. The checklist matrix will plot key project activities against representative groups and/or individual receptors to identify potential intra-project cumulative effects, and the following steps will be followed to scope in potential intra-project cumulative effects:

- Step 1: Review ES aspect chapters and discussions with technical specialists to identify representative groups and/or individual receptors.
- Step 2: Identify key project activities during the construction and operational phases, which could have an impact on representative groups and/or individual receptors.

- Step 3: Identify potential intra-project cumulative effects. The key project activities which could impact on each representative group and/or individual receptor will be identified, and further review of the ES aspect chapters will be undertaken to determine whether effects of multiple project activities on each representative group and/or individual receptor have already been assessed within the ES aspect chapters. Effects which have not been assessed within ES aspect chapters are identified for inclusion within the intra-project CEA.

23.9.9 The assessment will consider the receptors which are likely to experience minor, moderate or major significance of effects in the individual chapters. Negligible effects will not be included within the assessment, as there is no potential for negligible effects to combine into significant cumulative effects. If the same receptor is identified in more than one chapter, this will indicate a spatial overlap. These effects will then be checked for a temporal overlap. If both a spatial and temporal overlap exists, then the receptor will be assessed for intra-project cumulative effects.

23.9.10 If likely significant cumulative effects are identified, appropriate mitigation measures will be identified, and any residual effects will be described within the ES cumulative effects chapter.

Inter-project CEA methodology

23.9.11 The methodology of the inter-project cumulative effects assessment is structured using the staged assessment approach detailed in Advice Note Seventeen (Planning Inspectorate, 2019). In summary, this involves the following steps which are explained in further detail in the following sub-sections:

- Stage 1: Long list of other developments – Establishing a Long list of other developments and screening of the Long list of other developments to identify other developments to progress to Stage 2.
- Stage 2: Shortlist of other developments – Establishing a Shortlist of other developments to progress to Stages 3/4 based on threshold criteria.
- Stage 3: Data gathering – Gathering information on each of the other developments progressed to Stages 3/4.
- Stage 4: Assessment – Assessment of likely significant cumulative effects arising from the Proposed Development in combination with the other developments progressed to Stages 3/4 of the inter-project CEA.

23.9.12 Stage 1 has been completed as part of this EIA Scoping Report. Stage 1 will be regularly reviewed during the EIA, and Stages 2, 3 and 4 will also be completed as part of the EIA and reported in the ES.

Stage 1: Long list of other developments

23.9.13 At Stage 1 of the inter-project CEA, the ZoI is defined, and a Long list of other developments is compiled based on a search undertaken of relevant other developments within the study areas for the inter-project CEA. These steps are explained in further detail in the following sub-sections.

Zone of Influence

23.9.14 The ZoI is the defined geographic area within which potential environmental receptors are located. The assessment will be based on pathways between receptors and potential impacts and effects. A maximum ZoI has been developed for each environmental aspect using professional judgement, a reasonable worst case assumption and knowledge of effects experienced on similar developments. The ZoI are listed in Table 23-5.

23.9.15 The ZoI are currently based on a distance extending from the Scoping boundary shown on Figures 23.1 and 23.2. As the design of the Proposed Development evolves, the ZoI will be based on the relevant distances (according to the individual environmental aspect) extending from the Order Limits.

23.9.16 The maximum ZoI will be used to determine which environmental aspects are of relevance for the inter-project CEA. For example, if another development is located 0.5km from the Proposed Development, only those environmental aspects with ZoI equal to or greater than 0.5km will be assessed for potential inter-project cumulative effects, as environmental aspects with a ZoI less than 0.5km are unlikely to experience a significant cumulative effect.

Table 23-5: ZoI for inter-project CEA

Aspect	ZoI*
Landscape and visual	• Reservoir: 5km. • Associated water infrastructure: 3km. • Pipelines: 2km.
Biodiversity	• Statutory designated sites of international/European importance: within 2km of the Scoping boundary, unless hydrologically linked. Alternatively, any overlap of a relevant Impact Risk Zone (IRZ), including any defined functionally linked land, within 300m of the Scoping boundary (see below for sites where bats are a feature). • Statutory designated sites of national or county importance, and non-statutory designated sites of county or local nature conservation importance: 2km. • Ancient woodland, ancient and veteran trees: 2km. • Habitats of principal importance (HPIs), notable plant species: 0.25km. • Bats: – Within 30km of the Scoping boundary for Special Areas of Conservation (SACs) where bats are listed as a qualifying feature. There are no SACs within 30km of the Scoping boundary where bats are listed as a qualifying feature. – Within 6km of the Scoping boundary for all bat species, including those that are listed features of Sites of Special Scientific Interest.

Aspect	ZoI*
	• Badger, birds, terrestrial invertebrates, reptiles and other notable animal species, hazel dormouse, water vole and otter: 2km. • Great crested newt: 1km. • Invasive non-native species (INNS): 2km for animal species; within the Scoping boundary for plant species. • Fish: 2km. • Aquatic invertebrates: 2km. • Macrophytes: 2km. Potential for cumulative effects at the catchment level will be considered as part of the Habitats Regulations Assessment (HRA) process and are not duplicated in the CEA.
Water resources and flood risk	• Flood risk: 2km from the Scoping boundary and the Middle Level to the proposed reservoir. • Groundwater: 0.5km from the Scoping boundary and the Middle Level to the proposed reservoir. • Surface water: – 0.25km from the Scoping boundary for the reservoir site, water treatment works and downstream treated water transfers. – 1km for sources of supply, upstream water transfers, and inter-catchment treatment works.
Historic environment	• 2km.
Geology, soils, agriculture and land quality	• Geology: N/A (scoped out – see Chapter 12: Geology, soils, agriculture and land quality). • Soils: Scoping boundary. • Agriculture: Agricultural land holdings that are completely or partially located within the Scoping boundary. • Land quality: 0.25km.
Traffic and transport	• Construction: 5km from roads relevant to construction of the proposed reservoir and associated water infrastructure for other development not covered by typical growth factors (see paragraph 23.8.3 for further details). • Operation: N/A – scoped out (see Section 23.8 of this chapter).
Air quality	• Construction dust (human receptors): 0.25km. • Construction dust (ecological receptors): 0.05km. • Construction dust (trackout): 0.05km. • Construction and operational road traffic emissions: 0.2km from affected roads (see paragraph 23.9.17 for further details).
Noise and vibration	• Construction: 0.38km. • Operation: 0.4km.

Aspect	ZoI*
	• Operation (receptors near to transport routes): 0.6km from road modifications.
Public access and amenity	• Lower Super Output Area (LSOA) within 1km.
Socio-economics and community	• LSOA within 1km. • Potential cumulative economic effects resulting from NSIP: regional (East of England and East Midlands).
Human health	• Biophysical health determinants: ZoI as defined by air quality, noise and vibration, water resources and flood risk, land quality, and landscape and visual aspects (see relevant entries in this table). • Socio-economic, community and recreation health determinants: ZoI as defined by the public access, amenity and recreation, and socio-economics and community aspects (see relevant entries in this table). • Cumulative effects on healthcare resulting from NSIP: Integrated Care Boards (ICB) — National Health Service (NHS), Lincolnshire ICB, NHS Cambridge and Peterborough ICB, and NHS Norfolk and Waveney ICB.

*Notes: * Distance from the Scoping boundary unless otherwise specified*

23.9.17 At this stage, a 5km buffer from the Scoping boundary has been used as the ZoI for traffic and transport to identify other developments for the preliminary Long list of other developments. This will be refined and extended if required once the affected road network has been defined.

Long list of other developments

23.9.18 A Long list of other developments will be produced to list other developments identified within the study areas, as set out in Section 23.4. The following development types will be included in the Long list of other developments:

- NSIP listed on the Planning Inspectorate's Register of Applications.
- Major developments (as defined under Article 2 of The Town and Country Planning (Development Management Procedure) (England) Order 2015 (as amended)).
- Minor developments located within the Scoping boundary.
- Sites allocated in relevant Local Development Plans.
- Development for transport systems authorised by Transport and Works Act Order (Transport and Works Act 1992).
- Hybrid bills currently before parliament.
- Other projects proposed by the Applicant that fit within the parameters of the inter-project CEA.

23.9.19 Applications for development consent and planning permission submitted up to 12 years prior to the anticipated construction of the Proposed Development will be included in the Long list of other developments.

23.9.20 Minor developments are of small scale and local importance, and are considered to be highly unlikely to give rise to significant cumulative effects over and above the Proposed Development in isolation. Therefore, minor planning applications will be excluded from the Long list of other developments, except where these are located within the Scoping boundary, as there is potential for cumulative effects to arise due to proximity to the Proposed Development.

23.9.21 Refused or withdrawn planning applications will be included in the Long list of other developments for completeness, but will not be progressed to Stage 2 (Shortlist of other developments) of the inter-project CEA. However, any successful appeals or new planning applications brought forward will be assessed in the inter-project CEA where applicable.

23.9.22 The Applicant will review the scope of their capital investment projects to determine if any upcoming projects fit within the parameters of the inter-project CEA. This will include projects that may require (but have not yet submitted) an application for development consent or planning permission, and also permitted development projects. Where the parameters are met, these will be added into the Long list of developments as 'other known developments' for further consideration.

23.9.23 Advice Note Seventeen (Planning Inspectorate, 2019) identifies three tiers of development based on where they are in the planning process, and recognises that the amount of information available to inform the assessment varies according to which tier the development fits in to. Tier 1 developments are the most certain, with a high level of publicly available information, while Tier 3 developments are the least certain, with limited publicly available information to inform assessments. Details of the three tiers are listed in Table 23-6, and the relevant tier is referenced in the provisional Long list of other developments in Appendix 23.1 of this EIA Scoping Report.

Table 23-6: Tier of other development for inter-project CEA

Tier	Development status	Level of available data
1	Under construction.	Decreasing level of available data ↓
	Permitted application(s), whether under the Planning Act 2008 or other regimes, but not yet implemented.	
	Submitted application(s), whether under the Planning Act 2008 or other regimes, but not yet determined.	
2	Projects on the Planning Inspectorate's Register of Applications or in the relevant planning authorities' portal where a Scoping Report has been submitted.	
3	Projects on the Planning Inspectorate's Register of Applications or in the relevant planning authorities' portal where a Scoping Report has not been submitted.	
	Identified in the relevant Development Plan (and emerging Development Plans with appropriate weight	

Tier	Development status	Level of available data
	being given as they move closer to adoption) recognising that much information on any relevant proposals would be limited.	
	Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.	

Source: Planning Inspectorate, 2019 (Adapted from Advice Note Seventeen)

23.9.24 A provisional Long list of other developments has been produced for this EIA Scoping Report, and can be found in Appendix 23.1 of this EIA Scoping Report. A table format similar to Matrix 1 of Appendix 1 from Advice Note Seventeen (Planning Inspectorate, 2019) has been used. The locations of the other developments are shown on Figure 23.1 and Figure 23.2.

23.9.25 The provisional Long list of other developments will continue to change as new planning applications or applications for development consent are submitted, approved, rejected or withdrawn. The provisional Long list of other developments reflects a review of the status of planning applications in August 2024. The provisional Long list of other developments will be updated regularly during the EIA process, with an intended cut-off date six months prior to the application for development consent being submitted, to allow sufficient time for the inter-project CEA to be undertaken and reported in the ES.

Stage 2: Shortlist of other developments

23.9.26 As set out in Advice Note Seventeen (Planning Inspectorate, 2019), following identification of the Long list of other developments, threshold criteria should be applied to the Long list of other developments to establish a Shortlist of other developments to be progressed to Stages 3/4 of the inter-project CEA that is proportionate.

23.9.27 The proposed threshold criteria that will be used to screen the Long list of other developments to identify a Shortlist of other developments to progress to Stages 3/4 of the inter-project CEA, are listed in Table 23-7. Professional judgement will be used to identify whether potential inter-project cumulative effects are likely to be significant; only potential significant effects will be taken forward to the next stage of assessment.

Table 23-7: Stage 2 shortlisting threshold criteria

Criteria	Threshold
Temporal scope	Other developments within the ZoI with overlapping construction phases could have potential for inter-project cumulative effects. Other developments which are identified to be under construction and are considered likely to be completed before construction of the Proposed Development commences, will be considered within the future baseline sections of the relevant aspect assessments, rather than in the inter-project CEA. Where other developments are considered as future baseline, this will be noted in the temporal overlap column of the shortlist of other developments.
Scale and nature of development	Developments identified in Schedule 1, 2 or 3 of the relevant EIA Regulations, are considered to have potential for significant cumulative effects due to the nature and/or scale of the development. Documentation submitted by applicants or relevant planning authorities (e.g. screening letters and opinions) will be used to identify if other developments are EIA development, where available. Where not available, professional judgement will be used to determine if other developments are EIA development, based on screening of the other developments' project description against the EIA Regulations schedules. Developments which are not identified as EIA development (i.e. are not considered to exceed the relevant threshold criteria in the EIA Regulations) will not be progressed to Stages 3/4 of the inter-project CEA, unless it is further considered that there is potential for significant cumulative effects due to the scale/nature of development, distance from the Proposed Development, and/or location in relation to receptors.
Other factors	Where there are potential source-pathway-receptor linkages between the Proposed Development and other developments, cumulative effects will be considered further. Other developments with no clear source-pathway-receptor linkage with the Proposed Development will not be progressed to Stages 3/4 of the inter-project CEA.

23.9.28 A shortlist of other developments will be produced for the PEIR and ES. A table format similar to Matrix 1 of Appendix 1 from Advice Note Seventeen (Planning Inspectorate, 2019) will be used.

Stage 3: Data gathering

23.9.29 Stage 3 of the inter-project CEA will include a review of publicly available environmental assessment information (for example, ES or Scoping Reports) for each of the other developments progressed to Stages 3/4 of the inter-project CEA. The review will extract potential receptors and environmental effects arising from

the other developments, as identified within the applicant's documentation. Design information, planning application documentation, location plans, and proposed construction, operation and decommissioning programmes will also be reviewed, where publicly available. This information will be gathered from sources including the relevant planning authority planning portals, the Planning Inspectorate's website, and through engagement with the relevant planning authorities.

23.9.30 Details from the information gathering exercise will be referenced in a table format which will be produced for Stage 4 of the inter-project CEA in the ES. A table format similar to the table in Matrix 2 provided in Appendix 2 of Advice Note Seventeen (Planning Inspectorate, 2019), will be used to report on Stages 3 and 4 of the inter-project CEA. Where environmental assessment information for other developments is limited or absent, this will be noted in the table.

23.9.31 Online information sources will be used to determine the potential for a temporal overlap in construction between other developments and the Proposed Development. For approved developments, where a construction programme has been specified in an applicant's documentation (publicly available on online relevant planning authority planning portals or the Planning Inspectorate's website) or the applicant's website, the starting assumption will be that the specified construction programme is accurate. There may also be information related to the phasing of any large developments which, for example, is common practice for large housing schemes. Where a construction programme is not publicly available in an applicant's documentation or on the applicant's website, it will be assumed that other developments with planning permission would start construction by the date of expiration of the planning permission (as stated in the decision letter issued by the relevant planning authority), if information on the planning portals (such as a building control initial application) or recent Google Maps aerial data does not indicate that other developments appear to be under construction.

Stage 4: Assessment

23.9.32 The assessment at Stage 4 of the inter-project CEA will be undertaken by a competent EIA practitioner (as set out in Section 6.2 of this EIA Scoping Report) in collaboration with the environmental aspect competent experts. The assessment of likely significant cumulative effects will be based on professional judgement and qualitative assessments, taking into account the publicly available environmental information gathered for other developments at Stage 3 of the inter-project CEA.

23.9.33 The inter-project CEA will assume the construction phasing as presented in Chapter 2: Project description. For the purposes of the inter-project CEA, it will be assumed that construction activities would take place throughout the whole duration of the construction programme; however, in practice, individual construction activities will not take place over the full duration of the construction programme.

23.9.34 It will be assumed that a housing development of 100+ dwellings would be constructed at a rate of 50 dwellings per year (unless otherwise specified within the applicant's planning application documentation). This will allow the assessment to make assumptions about the duration of the construction activity. Where construction programmes for housing development – including any phasing – are

available on planning portals or developer's websites, these will be used to inform the inter-project CEA and will be assumed to be accurate.

23.9.35 The inter-project CEA will rely on publicly available third-party information available on web-based sources, such as the Planning Inspectorate's Register of Applications and relevant planning authority planning portals (which can differ between local authorities), or information provided by other third parties. It will be assumed that the information presented within planning application documents is accurate, and will be supplemented with information sourced from engagement with the relevant planning authorities, Anglian Water and Cambridge Water teams, and third-party developers.

23.9.36 Some of the other developments will be an early stage of design development. Environmental Statements or other environmental assessment documents may not be available or may not be adequate to allow for a meaningful inter-project CEA to be undertaken. It is not within the scope of the inter-project CEA to assess the individual effects of other developments. No additional work will be undertaken to identify potential receptors and impacts not evident from an applicant's application documents. Professional judgement will be used where necessary to interpret the available information for use in the inter-project CEA. The information sources used for the CEA will be noted in the table used to present Stages 3/4 of the inter-project CEA in the ES.

23.9.37 Where significant cumulative effects are identified in the assessment resulting from the Proposed Development in combination with other development, the Applicant will liaise with the proponent(s) of the other development to agree appropriate mitigation where practicable.

Significance of effects

23.9.38 Significance of effect will be extracted from the environmental aspect chapters to inform the CEA. Where significant effects have been identified in the environmental aspect chapters, these are described as short-term or long-term, permanent or temporary. Where environmental aspect assessments have proposed to scope out whole aspects, or particular sub-matters, these indicate that there would be no likely significant effects. Where this is the case, the CEA will not consider any aspects or sub-matters scoped out of the EIA, if the Planning Inspectorate's Scoping Opinion agrees with the proposed scope, and the aspects or sub-matters are not subsequently scoped back into the EIA.

23.9.39 For the shortlisted other developments, whose own environmental assessments may have used different significance criteria or terminology, their effects will be interpreted using professional judgement, based on the available environmental documents submitted by the applicant.

23.9.40 As stated in Section 6.3 of this EIA Scoping Report, the CEA will not assign a category of significance to effects and will instead conclude whether an effect is likely to be significant or not. The need for additional mitigation measures will be considered with the resulting residual significance of effects identified.

23.10 Assessment assumptions and limitations

23.10.1 Planning applications submitted or determined before 2017 have not been included in the preliminary Long list of other developments in Appendix 23.1. Unless already identified in the provisional Long list of other developments found in Appendix 23.1 of this EIA Scoping Report, it is considered reasonably likely that developments related to permissions granted before 2017 will have expired, or been completed before the Proposed Development is planned to start construction. Such developments will therefore be considered unlikely to give rise to cumulative effects during construction, and operational effects will already form part of the baseline environment. This will be kept under review, and extant applications identified as part of compiling the Long list will be included.

23.10.2 Housing developments of fewer than 100 dwellings located over 2km from the Proposed Development have not been progressed to Stage 2 of the inter-project CEA in the preliminary Long list of other developments in Appendix 23.1, on the basis that, given the distance from the Proposed Development and the small scale of development, significant cumulative effects are considered unlikely.

23.10.3 Additional parameters for assessment and assumptions can be found in each of the aspect chapters.

24 Summary

24.1 Summary of proposed scope of assessment

24.1.1 Table 24-1 sets out the matters that the Applicant proposes to scope in to and out of the assessments to be presented in the Environmental Statement (ES). This is based on the available information on the construction and operation of the Proposed Development, the current understanding of the current baseline, and consideration of whether the Proposed Development is likely to result in significant effects. Table 24-1 also identifies matters that are proposed to be scoped out of the ES, as it is not anticipated that there would be significant effects. Further details and the justification for this scope is set out within the aspect chapters (Chapters 7 to 23) of this EIA Scoping Report. The detail contained within the aspect chapters includes where the assessment is specific to a particular zone of the Proposed Development, or to a particular asset or feature. Notes are provided in Table 24-1, where relevant.

Table 24-1: Proposed scope of assessment

Aspect/Receptor	Impacts to be assessed	Scoped in for construction	Scoped in for operation
Chapter 7: Landscape and visual			
Landscape character	Impacts on local district/city council Landscape Character Areas.	Scoped in	Scoped in
	Indirect distant effects on local district/city council Landscape Character Areas located on the periphery of the study area.	Scoped out	Scoped out
	Impact on National Character Areas at a national scale.	Scoped out	Scoped out
	Night-time lighting effects on night sky/dark skies.	Scoped out	Scoped out
Visual receptors within the Zone of Theoretical Visibility	Impacts on visual receptors including residential receptors, recreational receptors e.g. users of Public Rights of Way or visitors to tourist sites, and users of the local road network.	Scoped in	Scoped in
	Night-time lighting effects on residential receptors within 500m of the Scoping boundary.	Scoped in	Scoped in
Chapter 8: Terrestrial biodiversity			
Terrestrial habitats Terrestrial flora and fauna Features (habitats, flora or fauna) of designated sites*	Change in surface water quality/quantity, including salinity.	Scoped in	Scoped in
	Change in groundwater quality/quantity.	Scoped in	Scoped in
	Air pollution from vehicle emissions resulting in nutrient enrichment and/or acidification of habitats, leading to possible changes in plant community composition.	Scoped in	Scoped in
	Dust from vehicle movements with potential for effects on plant physiological processes and possible changes in plant community composition.	Scoped in	Scoped in
	Killing or injury through road traffic collisions.	Scoped in	Scoped in
	Disturbance and displacement – noise and vibration.	Scoped in	Scoped in**
	Disturbance and displacement – lighting.	Scoped in	Scoped in
	Disturbance and displacement – human presence.	Scoped in	Scoped in
	Changes to the availability of foraging and commuting habitat and resting or breeding sites.	Scoped in	Scoped in
	Increase in biodiversity value through creation and management of suitable habitats.	Scoped in	Scoped in
	Change in water chemistry and water regime during operation of the reservoir and transfers.	N/A	Scoped in
	Mortality and injury of species.	Scoped in	Scoped in**
	Habitat loss, modification and severance.	Scoped in	Scoped out
	Introduction and/or spread of invasive species.	Scoped in	Scoped in**
	Effects related to Middle Level to proposed reservoir transfer: • Loss of habitat (including through soil compaction). • Killing or injury through the removal of occupied resting or breeding sites. • Severance of habitats resulting in fragmentation and loss of ecological connectivity.	Scoped out	Scoped out
Notes related to scope of Chapter 8: Terrestrial biodiversity: ** For details related to individual species and/or groups of receptors, refer to Chapter 8: Terrestrial biodiversity.* *** Some species and groups or receptors are scoped out related to certain operational activities – refer to Chapter 8: Terrestrial biodiversity for details.*			
Chapter 9: Aquatic biodiversity			
Aquatic habitats Aquatic flora and fauna Features of sites designated for nature importance	Degradation and/or direct loss of habitat.	Scoped in	Scoped in
	Changes in surface water quality/quantity, including salinity.	Scoped in	Scoped in
	Changes in water chemistry and water regime.	Scoped in	Scoped in
	Deposition of nitrogen, sulphur and/or dust from vehicle emissions resulting in enrichment and/or acidification of habitats of principle importance, including those contained within statutory designated sites.	Scoped in	Scoped in
	Introduction and/or spread of invasive species.	Scoped in	Scoped in
	Loss of ecological connectivity through severance of habitats resulting in fragmentation.	Scoped in	Scoped out
	Disturbance and potential displacement due to noise, vibration, lighting and/or human presence.	Scoped in	Scoped in*
	Effects related to Middle Level to proposed reservoir transfer:	Scoped out	Scoped out

Aspect/Receptor	Impacts to be assessed	Scoped in for construction	Scoped in for operation
	• Loss of habitat (including through soil compaction). • Killing or injury through the removal of occupied resting or breeding sites. • Severance of habitats resulting in fragmentation and loss of ecological connectivity.		
	Positive increase in biodiversity value through creation and management of wetland habitats.	Scoped in	Scoped in
	Killing or injury of fauna through the removal of occupied resting or breeding sites.	Scoped in	Scoped out
	Changes to availability of foraging and commuting habitat, and resting or breeding sites.	Scoped in	Scoped in
	Positive effect of reservoir and any new open water channels providing additional foraging and commuting habitat, and resting or breeding sites. This will include the construction phase when ephemeral and early successional stage open water will provide new and expanded habitat for these features.	Scoped in	Scoped in
Notes related to scope of Chapter 9: Aquatic biodiversity: ** Scoped out for operation of open channel transfers.*			
Chapter 10: Water resources and flood risk*			
Surface water	Changes in flow/level and water quality.**	Scoped in	Scoped in
	Changes to channel footprint, sedimentation deposition and/or hydromorphology.	Scoped in	Scoped in
	Changes in flows between groundwater and surface water not in a groundwater body from pipeline crossings.	Scoped in	Scoped out
Groundwater	Remobilised residual contamination within shallow soils into shallow groundwater or other water receptors.	Scoped in	Scoped out
	Changes in groundwater flows and levels in shallow aquifers.	Scoped in	Scoped in
	Formation of preferential flow pathways for shallow contamination to deeper aquifers.	Scoped in	Scoped in
Flood risk	Increased risk of flooding to watercourses or adjacent land from water stored above ground in the event of defence breach or from failure of hydraulic controls.***	Scoped in	Scoped in
	Changes to flow conveyance and flood level due to new structures in or across watercourses	Scoped in	Scoped in
	Changes to surface water runoff rate from hard standing increasing flood risk.	Scoped in	Scoped in
	Changes to floodplain capacity and flow paths available during floods from new structures in the floodplain or changes to river banks.	Scoped in	Scoped in
	Changes to the shallow hydrogeological regime leading to groundwater flooding.	Scoped out	Scoped in
Notes related to scope of Chapter 10: Water resources and flood risk: ** Refer to Chapter 10: Water resources and flood risk, for details related to the specific zones of the Proposed Development, geology and water bodies for which the assessments are scoped in or scoped out.* *** Refer to Chapter 10: Water resources and flood risk, for details on activities which are scoped out as these would be addressed through the application of good construction and operational practice and/or regulated by relevant consents.* **** However, refer to Chapter 22: Major accidents and disasters, for risk of flooding to watercourses or adjacent land from reservoir dam breach or emergency drawdown scenarios.*			
Chapter 11: Historic environment			
Designated heritage assets	Impacts on the value of designated heritage assets through change to setting or character.	Scoped in	Scoped in
	Impacts on the value of designated heritage assets through damage, excavation, demolition, removal or alteration, overwatering or dewatering.	Scoped in	Scoped in
Non-designated heritage assets of archaeological interest	Impacts on the value of non-designated heritage assets through change to setting.	Scoped in	Scoped in
	Impacts on the value of non-designated heritage assets through damage, excavation, demolition, removal or alteration, overwatering or dewatering.	Scoped in	Scoped in
Non-designated built heritage assets	Impacts on the value of non-designated built heritage assets through change to setting.	Scoped in	Scoped in
	Impacts on the value of non-designated built heritage assets through damage, excavation, demolition, removal or alteration, overwatering or dewatering.	Scoped in	Scoped in
Non-designated historic landscapes	Impacts on the value of non-designated historic landscapes through changes to setting or character.	Scoped in	Scoped in
Chapter 12: Geology, soils, agriculture and land quality			
Geology	Impacts to geological resources including designated sites.	Scoped out	Scoped out
Soil resources	Impacts to soil resources including peat.	Scoped in	Scoped in

Aspect/Receptor	Impacts to be assessed	Scoped in for construction	Scoped in for operation
Agriculture	Impacts to agricultural farm holdings.	Scoped in	Scoped in
Land quality (human health and controlled water receptors)	Impacts to human health, surface and groundwater receptors from contamination.	Scoped in	Scoped out
Chapter 13: Material assets and waste management			
Quarries and other sources of materials	The availability of key construction materials.	Scoped in	Scoped in*
	Depletion of non-renewable resources.	Scoped in	Scoped in*
Mineral safeguarding areas, mineral allocation area resources	Potential sterilisation of minerals resources.	Scoped in	Scoped in
Waste management facilities such as landfill sites	Reduction in waste management capacities.	Scoped in	Scoped in*
Notes related to scope of Chapter 13: Material assets and waste management: ** Scoped out for some operational activities – refer to Chapter 13: Material assets and waste management, for details related to the activities of the Proposed Development for which the assessments are scoped in.*			
Chapter 14: Traffic and transport			
Users of the strategic road network including motorists, freight vehicles and emergency services.	Impacts of traffic on the strategic road network (including severance, delays, accidents and road safety).	Scoped in	Scoped in
Users of the local road network including motorists, freight vehicles and emergency services.	Impacts of traffic on the local road network (including severance, delays, accidents, road safety, and fear and intimidation).	Scoped in	Scoped in
Walkers, cyclists and horse riders	Impacts of traffic on walkers, cyclists and horse riders (including severance, delays, amenity, and fear and intimidation).	Scoped in	Scoped in
Public transport users	Impacts to traffic, public transport users and the public transport network (including severance, delays, accidents and road safety) immediately surrounding the Proposed Development comprising: • Bus services serving settlements and in proximity to the reservoir site and water treatment works, and operational site accesses. • Bus services in proximity to associated infrastructure and accesses. Impacts to the rail network between Peterborough and Ely (including delays) due to an increase in trains or barges through crossings and passenger rail services.	Scoped in	Scoped in
Sensitive geographic locations such as people at home/work, sensitive and/or vulnerable groups (e.g., hospitals, places of worship, schools), retail areas, recreational areas, tourist attractions, collision clusters and routes with road safety concerns, and junctions and highways links at (or over) capacity.	Impacts of traffic on communities and sensitive geographic locations (including severance, delays, fear and intimidation, road safety) due to an increase in traffic on the road network.	Scoped in	Scoped in
Public transport users	Impacts from demand for local services resulting from provision of on-site worker accommodation.	Scoped in	N/A

Aspect/Receptor	Impacts to be assessed	Scoped in for construction	Scoped in for operation
Walkers, cyclists and horse riders Users of the local road network including motorists, freight vehicles and emergency services.			
Chapter 15: Air quality			
Human and/or ecological receptors	Impacts from dust and particulate matter generation.	Scoped in	N/A
	Impacts from vehicle exhaust emissions from construction, operation, maintenance and leisure.	Scoped in	Scoped in
	Impacts from exhaust emissions from construction plant/non-road mobile machinery (NRMM).	Scoped in	N/A
	Impacts from operational combustion sources, such as back-up generators.	N/A	Scoped in
	Impacts from odour from water treatment works.	N/A	Scoped in
Air Quality Management Areas	Impacts from vehicle exhaust emissions, including construction and operational traffic movements.	Scoped in	Scoped in
	Impacts from exhaust emissions from construction plant/NRMM.	Scoped in	N/A
Chapter 16: Carbon and greenhouse gases			
The global climate	Vehicles used for the delivery of materials to site and removal of waste, which also includes construction and operational staff travel.	Scoped in	Scoped in
	The operation of on-site plant and equipment that consume energy and/or water, and consequently lead to greenhouse gas (GHG) emissions.	Scoped in	Scoped in
	Construction of structures/buildings, excavation and earthworks, installation of pipelines, installation/diversion of utilities and services. Refurbishment activities for maintaining the infrastructure, including use of construction plant and replacement of used assets.	Scoped in	Scoped in
	The manufacturing of construction materials. This includes the extraction/mining of resources and any primary and secondary processing or manufacturing.	Scoped in	Scoped in
	Landscaping and reinstatement: GHG emissions or capture as a result of land use change, for example direct emissions from the reservoir, changes to peat resources, or from an agricultural land use to woodland planting.	Scoped in	Scoped in
	GHG emissions from recreational use of the reservoir (principally assumed to be from travel to and from the site).	N/A	Scoped in
	GHG emissions downstream of the Proposed Development (e.g. pumping, water storage and distribution within the supply network).	Scoped out	Scoped out
Chapter 17: Climate resilience			
The Proposed Development assets, operations, users and environmental receptors within the Scoping boundary	Risks to the Proposed Development from future climate changes in temperatures, precipitation patterns and extreme weather events: • Seasonally hotter summers and warmer winters. • Seasonally wetter winters. • Increasing peak temperatures and frequency and duration of heatwaves. • Drier summers with increased risk of prolonged drought. • Increasingly intense rainfall events. • Increasingly intense, acute summer downpours. • Increased frequency and intensity of storms.	Scoped out*	Scoped in
	Sea level rise.	N/A	Scoped out*
	Changes to the significance of the effects of the Proposed Development on the local environment and communities due to climate change.	N/A	Scoped out*
	Cold temperatures.	N/A	Scoped out**
	Corporate financial risks relating to the Task Force for Climate-related Financial Disclosure.	N/A	Scoped out***

Notes related to scope of Chapter 17: Climate resilience:
** These risks are scoped out of the climate resilience assessment because they are already considered within other aspect chapters of this EIA Scoping Report. Refer to Chapter 17: Climate resilience for details.*
*** Scoped out as seasonal temperatures and extreme cold events are not projected to become colder. Refer to Chapter 17: Climate resilience for details.*
**** Scoped out as this is not a requirement of the National Policy Statement for Water Resources Infrastructure. Refer to Chapter 17: Climate resilience for details.*

Aspect/Receptor	Impacts to be assessed	Scoped in for construction	Scoped in for operation
Chapter 18: Noise and vibration			
Noise sensitive receptors	Noise and vibration from plant and machinery.	Scoped in	Scoped in (noise only)
	Noise and vibration from construction transportation movements, including road, rail and inland waterway traffic, and operational traffic movements including Heavy Goods Vehicles and recreational traffic.	Scoped in	Scoped in
	Noise from the use of plant such as heating and ventilation units at the visitor hub.	N/A	Scoped in (noise only)
	Noise and vibration from the operation of the pipeline and open channel transfers.	N/A	Scoped out
	Noise and vibration from transformers and stand-by generators.	N/A	Scoped out
Occupants of on-site temporary worker accommodation	Potential for environmental noise and vibration from construction activities to result in conditions unsuitable for residential purposes.	Scoped in	N/A
Chapter 19: Public access and amenity			
Users of amenity spaces and facilities	Direct temporary loss of public open space land and amenity spaces as a result of construction activities.	Scoped in	N/A
	Impacts to amenity spaces due to construction traffic.	Scoped in	N/A
	Amenity impacts arising from permanent changes to the road network and changes to traffic flows.	N/A	Scoped in
	Loss or gain of amenity space due to operational or recreational use of the reservoir.	N/A	Scoped in
Users of Public Rights of Way (PRoWs), bridleways, and cycle networks	Direct impacts on PRoWs, bridleways and cycle networks as a result of construction and operation of the Proposed Development.	Scoped in	Scoped in
	Impacts to amenity spaces due to construction traffic.	Scoped in	N/A
	Temporary impacts due to construction traffic.	Scoped in	N/A
Chapter 20: Socio-economics and community			
Residential dwellings Businesses	Loss or displacement of existing businesses through land requirements impacting local residents and business owners.	Scoped in	N/A
	Creation of direct, indirect and induced employment and Gross Value Added impacting local residents and business owners.	Scoped in	Scoped in
	Changes to the nature and size of the local population due to the presence of the construction workforce leading to additional temporary population which may result in changes to crime rates and increased demand for services, businesses and facilities.	Scoped in	N/A
Residential dwellings Businesses Community facilities	Changes to the demand and availability for community services and facilities impacting local residents.	Scoped in	Scoped out
	Loss or gain of community facilities impacting local residents and visitors, due to land required to operate the Proposed Development.	N/A	Scoped in
Chapter 21: Human health			
Communities in local study area	**Social environment**: Potential effects of activities around communication and support to local communities relating to construction proposals and design and creation of the proposed reservoir site on the following protective factors for mental health and wellbeing: • Perception of the local environment and civic pride. • Inclusion, participation and control.	Scoped in	Scoped in
Residents and landowners (site-specific study area)	**Social environment:** • Relocation – impacts on protective factors for mental health, loss of control, upheaval of social networks arising from activities around land acquisition for construction and operation of the Proposed Development. • **Social environment:** Community identity culture, resilience and influence – impacts on sense of belonging, control and social networks arising from activities around land acquisition for construction and operation of the Proposed Development.	Scoped in	Scoped in
Farmers (site-specific study area) and wider society (regional study area)	**Health-related behaviours:** Diet and nutrition – health impacts relating to changes in availability and quality of agricultural land arising from activities around land acquisition for construction and operation of the Proposed Development.*	Scoped in	Scoped in

Aspect/Receptor	Impacts to be assessed	Scoped in for construction	Scoped in for operation
Communities (pedestrians, cyclists, horse riders, vehicular travellers) in local study area and affected road network	**Social environment:** Transport modes, access and connections – health effects related to active travel, road safety concerns, routine journey times, access to health, social care and education, emergency response times and community severance due to traffic during construction and operation.*	Scoped in	Scoped in
Communities in local study area and affected road network	**Biophysical environment:** Health effects related to exposure to air and noise pollution from construction and operational traffic and traffic diversions.*	Scoped in	Scoped in
Communities in local study area (including local residents and participants in outdoor recreation)	**Social and biophysical environment:** Health effects associated with pathways from combination of construction activities, such as: • Impacts of noise, dust, lighting and visual intrusion on local amenity and quality of life arising from combination of construction activities.* • Health risks relating to pollution pathways and potential exposure to harmful substances arising from combination of construction activities.* • Interaction of noise, dust, lighting and visual impacts on amenity and quality of outdoor recreation affecting the health determinants of open space, leisure and play.*	Scoped in	N/A
Construction workers	**Health-related behaviours:** Opportunities as part of construction workforce and supply chain requirements to reduce risk-taking behaviours for the workforce, provide for healthy food choices and opportunities for physical activity.	Scoped in	N/A
Construction workers and local communities	**Social environment**: Safe and cohesive communities (housing). • Potential impacts regarding local housing demand and availability due to change in population size with the presence of the construction workforce. • Quality and availability of accommodation for workforce. • Potential impacts on community cohesion due to presence of construction workforce. • Social participation, interaction and support – potential health impacts associated with workforces being isolated from family and social networks.	Scoped in	N/A
Communities in local study area (including residents and businesses); and regional population	**Economic environment:** Health effects of changes to socio-economic conditions relating to opportunities for education, training and employment as well as income-related matters.*	Scoped in	N/A
Communities in local and regional study area (including business owners, employees and site workers)	**Economic environment:** Health effects associated with impacts on local and regional employment opportunities and impacts on local economy (see Chapter 20).	N/A	Scoped in
Construction workers and regional (Integrated Care Board) population	**Institutional and built environment:** Health and social care services – effect on use of health services due to potential construction workforce requirements.	Scoped in	N/A
Communities in local study area	**Biophysical environment:** Pathways to health impacts from operation of reservoir and associated infrastructure (water abstraction and supply) such as: • Potential impacts on flood risk and water quality (with reference to scope of assessment in Chapter 10: Water resources and flood risk) and associated human health effects (including community concern). • Potential biosecurity risks, for example wildfowl carrying avian influenza which presents a risk to poultry farms.	N/A	Scoped in
Communities in local study area	**Social environment:** Community safety – perceptions of risk relating to the operation of reservoir and associated infrastructure (water abstraction and supply), including fears around accidents and disasters, such as reservoir embankment breach and flooding.	N/A	Scoped in
Water supply area population in regional study area	**Institutional and built environment:** Effects of operation of Proposed Development on water supply infrastructure and associated health benefits.	N/A	Scoped in

Aspect/Receptor	Impacts to be assessed	Scoped in for construction	Scoped in for operation
Communities in local study area; recreational visitors to the site and site workers	**Health-related behaviours:** Effects of operation of Proposed Development on behaviours such as: • Changes to risk of antisocial behaviours. • Opportunities for promoting healthy lifestyles through incorporating public information on, and opportunities for, physical activity, diet and nutrition.	N/A	Scoped in
Communities in local study area and recreational visitors to the site Site workers	**Social environment:** Effects of operation of Proposed Development on wider determinants such as: • Open space, leisure and play – changes to access to green and blue space and recreational opportunities and associated health outcomes.* • Community safety – measures to address safety risks, security and incorporate opportunities to minimise actual crime and fear of crime. • Community identity, culture, resilience and influence – opportunities to contribute to positive community identity, visual and cultural assets.	N/A	Scoped in
Communities in local and regional study area Recreational visitors to the site (site specific study area) Site workers (site specific study area)	**Biophysical environment**: Measures to reduce GHG emissions and address climate resilience and associated health effects.*	Scoped in	Scoped in
Communities in local and regional study area	**Institutional and built environment:** Contributions to local neighbourhood design and integration into wider spatial planning context to support physical, mental and social wellbeing.	N/A	Scoped in
Construction workers	**Health-related behaviours**: Problem gambling.	Scoped out	N/A
Communities in the local study area Site workers	**Social environment**: Social housing; safeguarding and modern slavery; population out-migration (including effects on minorities, community cohesion and social isolation).	Scoped out	Scoped out
Local communities Site workers	**Biophysical environment**: Food production and malnutrition; population displacement; labour productivity and economic loss; odour and radiation.	Scoped out	Scoped out
Wider society (regional study area)	**Institutional and built environment**: Communication and IT infrastructure.	Scoped out	Scoped out
Notes on Chapter 21: Human health: **Assessments are linked with assessments presented in other chapters of this EIA Scoping Report. Refer to Chapter 21: Human health for further details.*			
Chapter 22: Major accidents and disasters			
Downstream communities, infrastructure and environmental designations	Risk from flooding (sourced from enactment of emergency drawdown procedures) when the filling the reservoir as part of the commissioning phase of construction, or during operation. This includes addressing the risk of human error/management failure relating to the operation and maintenance of downstream drainage infrastructure which may contribute to flood risk in the event of an emergency drawdown procedure being enacted.	Scoped in	Scoped in
Notes on Chapter 22: Major accidents and disasters: All other hazards or events are scoped out of the major accidents and disasters assessment. Refer to Chapter 22: Major accidents and disasters for details.			
Chapter 23: Cumulative effects			
Relevant environmental assets and receptors	Intra-project cumulative effects.	Scoped in	Scoped in
	Inter-project cumulative effects.	Scoped in	Scoped in
	Inter-project cumulative effects.	Scoped in	Scoped in

24.2 Next steps

24.2.1 Following the submission of this EIA Scoping Report to the Planning Inspectorate, the design, planning, consultation, engagement and EIA activities refining the Proposed Development will continue, including:

- Obtaining the EIA Scoping Opinion and reviewing scoping consultation feedback to refine the scope of surveys and assessments, and to inform the Environmental Statement.
- Continued desk studies, data collation and field surveys to obtain further baseline information to support the assessment.
- Continued stakeholder engagement with both statutory/prescribed consultees, and with landowners and tenants.
- Ongoing design evolution and identification of potential additional mitigation measures, as well as identification of potential environmental enhancements including biodiversity net gain.
- Preparation of the Preliminary Environmental Information Report, which will be submitted as part of the engagement material presented at the Statutory Consultation.
- Preparation of the Environmental Statement, which will be submitted as part of the application for development consent.

References

Introductory Chapters 1-6

All Company Working Group (2023). Water Resources: Design Principles and User Guidance.

Anglian Water (2024). Water Resources Management Plan 2024 (WRMP24).

Anglian Water and Cambridge Water (2021). Strategic Solution Gate One Submission: Preliminary Feasibility Assessment: Fens Reservoir.

Anglian Water and Cambridge Water (2022a). Fens Reservoir Site Selection Report.

Anglian Water and Cambridge Water (2022b). Fens Reservoir Gate two report.

Anglian Water and Cambridge Water (2023). Phase One Consultation Feedback Summary.

Anglian Water and Cambridge Water (2024). Fens Reservoir Associated Water Infrastructure Options Appraisal Report.

Cambridge Water (2023). Revised Draft Water Resources Management Plan 2024.

Climate Change Committee (2021). Independent Assessment of UK Climate Risk.

Department for Environment, Food & Rural Affairs (2021). Reservoirs Act 1975: The Flood Plan (Reservoirs Emergency Planning) Direction 2021.

Department for Environment, Food and Rural Affairs (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework (NPPF).

Flood and Water Management Act 2010. (c. 29). London: The Stationery Office.

Highways England (2020). Design Manual for Roads and Bridges LA 104 Environmental Assessment and Monitoring.

Institute of Environmental Management and Assessment (2015). Environmental Impact Assessment Guide to: Shaping Quality Development. Lincoln.

Institute of Environmental Management and Assessment (2016). Environmental Impact Assessment Guide to: Delivering Quality Development. Lincoln.

Ministry of Housing, Communities and Local Government and Department for Levelling Up, Housing and Communities (2024). Planning practice guidance. Published 2014, last updated 2024.

National Infrastructure Commission (2020). Design Principles for National Infrastructure.

Planning Act 2008 (as amended). (c. 29). London: The Stationery Office.

Planning Inspectorate (2015). Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects.

Planning Inspectorate (2017). Advice Note Eighteen: The Water Framework Directive.

Planning Inspectorate (2018). Advice Note Nine: Rochdale Envelope.

Planning Inspectorate (2020a). Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements.

Planning Inspectorate (2020b). Advice Note Twelve: Transboundary Impacts and Process.

Planning Inspectorate (2024a). Advice Note Three: EIA Notification and consultation.

Planning Inspectorate (2024b). Nationally Significant Infrastructure Projects: Advice on the Consultation Report.

R (Finch) v Surrey County Council (2024) UKSC 20.

R v Rochdale Metropolitan Borough Council ex parte Tew (1999). [2000] Environmental Law Reports 1.

R v Rochdale Metropolitan Borough Council ex parte Milne (2000). [2001] Environmental Law Reports 22, Part 3.

Reservoirs Act 1975. (c. 23). London: The Stationery Office.

The Construction (Design and Management) Regulations 2015. SI 2015/51. London: The Stationery Office.

The Control of Major Accident Hazards (COMAH) Regulations 2015. SI 2015/483. London: The Stationery Office.

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. SI 2017/572. London: The Stationery Office.

The Invasive Non-Native Species (Amendment etc.) (EU Exit) Regulations 2019. SI 2019/223. London: The Stationery Office.

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. SI 2017/407. London: The Stationery Office.

Water Industry Act 1991. (c. 56). London: The Stationery Office.

Water Resources East (2023). Regional Water Resources Plan for Eastern England.

Wildlife and Countryside Act 1981 (as amended). (c. 69). London: The Stationery Office.

Chapter 7: Landscape and visual

Borough Council of King's Lynn & West Norfolk (2007). King's Lynn and West Norfolk Borough Landscape Character Assessment.

Borough Council of King's Lynn & West Norfolk (2011). King's Lynn and West Norfolk Borough Council Local Development Framework Core Strategy.

British Standards Institution (2012). BS 5837: 2012 Trees in Relation to Design, Demolition and Construction – Recommendations. London: British Standards Institution.

Cambridgeshire County Council (1991). Cambridgeshire Landscape Guidelines.

Cambridgeshire Green Infrastructure Forum (2011). Cambridgeshire Green Infrastructure Strategy.

Campaign to Protect Rural England (2007). Tranquillity Map: England. National Map with 2001 regional boundaries.

Department for Environment, Food and Rural Affairs (Defra) (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Environment, Food and Rural Affairs (Defra) (2024). Multi-Agency Geographic Information for the Countryside (MAGIC). Available at: https://magic.defra.gov.uk/MagicMap.aspx. Accessed June 2024.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework (NPPF).

East Cambridgeshire District Council (2011). East Cambridgeshire Local Plan 2015 (as amended 2023).

Fenland District Council (2009). Fenland Wind Turbine Study.

Fenland District Council (2014). Fenland Local Plan (Adopted May 2014).

Fenland District Council (2022). Fenland Local Plan 2021 - 2040: Draft Local Plan Consultation.

Fens for the Future Partnership Steering Group (2012). Fens for the Future Vision and A Strategic Plan for Fenland: A Proposal for an Enhanced Ecological Network Final Report, June 2012.

Forest Research (2020). The National Forest Inventory Digital Woodland Map (2020). Available at: https://www.forestresearch.gov.uk/tools-and-resources/national-forest-inventory/. Accessed June 2024.

Google Earth (2024). Map data ©2024 Google.

Google Maps (2024). Google Maps imagery ©2024. Available at: https://www.google.co.uk/maps/. Accessed June 2024.

Greater Cambridge Shared Partnership (2021). Greater Cambridgeshire Landscape Character Assessment.

Highways England (2020). Design Manual for Roads and Bridges, LA 107 Landscape and Visual Effects.

Huntingdonshire District Council (1999). Bluntisham Conservation Area Character Statement, Adopted March 1999.

Huntingdonshire District Council (2019). Huntingdonshire's Local Plan to 2036.

Huntingdonshire District Council (2022). Huntingdonshire Landscape and Townscape Supplementary Planning Document 2022.

Landscape Institute (2019). Technical Guidance Note 06/19: Visual Representation of Development Proposals.

Landscape Institute and Institute of Environmental Management and Assessment (IEMA) (2013). Guidelines for Landscape and Visual Impact Assessment. Third Edition.

Microsoft Bing Maps (2024). Microsoft Bing Maps imagery. Available at: www.bing.com/maps. Accessed June 2024.

Natural England (2014). An Approach to Landscape Character Assessment.

Natural England (2024a). Statutory landscape designations (National Parks, National Landscapes). Available at: https://naturalengland-defra.opendata.arcgis.com/datasets/d333c7529754444894e2d7f5044d1bbf_0/explore and https://naturalengland-defra.opendata.arcgis.com/datasets/6f2ad07d91304ad79cdecd52489d5046_0/explore?location=52.681676%2C-2.528092%2C6.77 Accessed June 2024.

Natural England (2024b). National Character Area Profiles. Available at: https://nationalcharacterareas.co.uk/#:~:text=Each%20NCA%20represents%20an%20area,and%20planning%20for%20future%20change. Accessed June 2024.

Ouse Washes Landscape Partnership Scheme (2013). Ouse Washes Landscape Character Assessment.

Peterborough City Council (2007). Peterborough Landscape Strategy, Landscape Character Assessment for Peterborough City Council.

Peterborough City Council (2019). Peterborough Adopted Local Plan 2016 to 2036.

South Cambridgeshire District Council (2018). South Cambridgeshire Local Plan 2018.

Sustrans The National Cycle Network mapping (2024). Available at: https://www.sustrans.org.uk/national-cycle-network/. Accessed June 2024.

Chapter 8: Terrestrial biodiversity

Baker, M.P. (2023). An Interim Nature Recovery Network for Fenland. Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire.

Botanical Society of Britain and Ireland (BSBI) (2019). Cambridgeshire (v.c.29) Rare Plant Register. Available at: https://bsbi.org/wp-content/uploads/dlm_uploads/vc29-RPR.pdf. Accessed March 2023.

Botanical Society of Britain and Ireland (2023a). BSBI species accounts. Available at: http://bsbi.org/species-accounts. Accessed March 2023.

Botanical Society of Britain and Ireland (2023b). BSBI Register of Plants of Conservation Concern in Cambridgeshire (v.c.29). 13th Edition. 31 December 2023. Available at: https://legacy.bas.ac.uk/met/jds/cnhs/vc29%20RPCC.pdf

British Standards Institution (2012). BS 5837:2012 Trees in relation to design, demolition and construction.

Buglife (2024). Important invertebrate areas. Available at: https://www.buglife.org.uk/our-work/important-invertebrate-areas/. Accessed May 2024.

Cambridgeshire and Peterborough Biodiversity Group (2021). Cambridgeshire and Peterborough Additional Species of Interest. Available at: https://www.cperc.org.uk/downloads/CambsPboro_Additional_Species_of_Interest.pdf. Accessed May 2024.

Cambridgeshire County Council (2024). Cambridgeshire and Peterborough Local Nature Recovery Strategy. Available at: https://www.cambridgeshire.gov.uk/residents/libraries-leisure-culture/biodiversity-and-greenspaces/cambridgeshire-and-peterborough-local-nature-recovery-strategy. Accessed August 2024.

Chartered Institute of Ecology and Environmental Management (CIEEM) (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial. Freshwater, Coastal and Marine. Version 1.2 Updated April 2022. Chartered Institute of Ecology and Environmental Management, Winchester.

Cheffings, C.M. and Farrell, L. (eds), Dines, T.D., Jones, R.A., Leach, S.J., McKean, D.R., Pearman, D.A., Preston, C.D., Rumsey, F.J., Taylor, I. (2005). The Vascular Plant Red Data List for Great Britain. Species Status No. 7. JNCC, Peterborough, ISSN 1473-0154.

Collins, J. (2023). Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition). The Bat Conservation Trust, London.

Department for Environment, Food and Rural Affairs (Defra) (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Environment, Food and Rural Affairs (Defra) (2024a). Multi-Agency Geographic Information for the Countryside (MAGIC). Available at: https://magic.defra.gov.uk/MagicMap.aspx. Accessed May 2024.

Department for Environment, Food and Rural Affairs (Defra) (2024b). Statutory Biodiversity Metric Calculation Tool. Available at: https://www.gov.uk/government/publications/statutory-biodiversity-metric-tools-and-guides. Accessed May 2024.

Department for Environment, Food and Rural Affairs (Defra) and Natural England (2022). List of habitats and species of principal importance in England. Available at: https://www.gov.uk/government/publications/habitats-and-species-of-principal-importance-in-england. Accessed May 2024.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework (NPPF).

Environment Act 2021. (c. 30). London: The Stationery Office.

Environment Agency (2023). Groundwater Dependent Terrestrial Ecosystems (England only). Available at: https://data.gov.uk/dataset/72a149a2-1be7-441f-bc37-94a77f261e27/groundwater-dependent-terrestrial-ecosystems-england-only. Accessed July 2023.

Environment Agency (2024). Catchment Data Explorer. Available at: https://environment.data.gov.uk/catchment-planning/RiverBasinDistrict/5. Accessed July 2024.

European Union (2022). An introduction to the invasive alien species of Union concern. Luxembourg: Publications Office of the European Union, 2022. Available at: https://circabc.europa.eu/ui/group/4cd6cb36-b0f1-4db4-915e-65cd29067f49/library/79885406-e439-4961-ab2e-717191190f34/details. Accessed May 2024.

Google Earth (2024). Map data ©2024 Google.

Google Maps (2024). Google Maps Imagery ©2024. Available at: https://www.google.co.uk/maps/. Accessed May 2024.

Harrower, C.A., Rorke, S.L. and Roy, H.E. (2023). England Biodiversity Indicators 2023.

Highways England (2019). Design Manual for Roads and Bridges, LA 105 Air Quality.

Natural England (2023a). Statutory designated sites open data. Available at: https://naturalengland-defra.opendata.arcgis.com/. Accessed July 2023.

Natural England (2023b). SSSI Impact Risk Zones (England). Available at: https://www.data.gov.uk/dataset/5ae2af0c-1363-4d40-9d1a-e5a1381449f8/sssi-impact-risk-zones-england. Accessed July 2023.

Natural England (2024a). Ancient woodland (England). Available at: https://www.data.gov.uk/dataset/9461f463-c363-4309-ae77-fdcd7e9df7d3/ancient-woodland-england. Accessed June 2024.

Natural England (2024b). Great Crested Newt Class Survey Licence Returns (England). Available at: https://www.data.gov.uk/dataset/5e3d32c2-200a-4ed2-982c-be0c5ea3bc0f/great-crested-newt-class-survey-licence-returns-england. Accessed May 2024.

Natural England (2024c). Great Crested Newt eDNA Habitat Suitability Index Pond Surveys for District Level Licensing 2017, 2018, 2019. Last updated 3 June 2024. Available at: https://www.data.gov.uk/dataset/8643f1b9-b419-4ee8-8e9c-18200e0edc31/great-crested-newt-edna-habitat-suitability-index-pond-surveys-for-district-level-licensing-2017-2018-2019. Accessed July 2024.

Natural England (2024d). Priority Habitats Inventory (England). Available at: https://www.data.gov.uk/dataset/4b6ddab7-6c0f-4407-946e-d6499f19fcde/priority-habitats-inventory-england. Accessed June 2024.

Natural England (2024e). Designated Sites View. Search for designated sites details. Available at: https://designatedsites.naturalengland.org.uk. Accessed July 2024.

Norfolk County Council (2024). Mapping Areas of Particular Importance for Biodiversity. Step One of the Norfolk Local Nature Recovery Strategy. Available at: https://storymaps.arcgis.com/stories/97aeee1a7d0d4c7cb03c8ded990cf2fc. Accessed June 2024.

Stanbury, A.J., Eaton, M.A., Aebischer, N.J., Balmer, D., Brown, A.F., Douse, A., Lindley, P., McCulloch, N., Noble, D.G., and Win, I. (2021). The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: 723747.

Stroh, P.A., Leach, S.J., August, T.A., Walker, K.J., Pearman, D.A., Rumsey, F.J., Harrower, C.A., Fay, M.F., Martin, J.P., Pankhurst, T., Preston, C.D. & Taylor, I. (2014). A Vascular Plant Red List for England. Botanical Society of Britain and Ireland, Bristol.

The Conservation of Habitats and Species Regulations 2017. SI 2017/1012. London: The Stationery Office.

The Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire (2016). The Water Voles in the Middle Level. A Repeat Survey of Curf Fen and Ransonmoor. February 2016.

The Woodland Trust (2024). Ancient Tree Inventory. Available at: https://opendata-woodlandtrust.hub.arcgis.com/datasets/9d2d13b04d654ceb9ba6e0697c1e0c29_0/explore. Accessed January 2024.

Wildlife and Countryside Act 1981 (as amended). (c. 69). London: The Stationery Office.

Chapter 9: Aquatic biodiversity

Baker, M.P. (2023). An Interim Nature Recovery Network for Fenland. Wildlife Trust for Bedfordshire, Cambridgeshire & Northamptonshire.

Botanical Society of Britain and Ireland (BSBI) (2019). Cambridgeshire (v.c.29) Rare Plant Register.

Buglife (n.d.). Important invertebrate areas. https://www.buglife.org.uk/our-work/important-invertebrate-areas/. Accessed May 2024.

Cambridgeshire County Council (2024). Cambridgeshire and Peterborough Local Nature Recovery Strategy. Available at: https://www.cambridgeshire.gov.uk/residents/libraries-leisure-culture/biodiversity-and-greenspaces/cambridgeshire-and-peterborough-local-nature-recovery-strategy. Accessed August 2024.

CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial. Freshwater, Coastal and Marine. Version 1.2 Updated April 2022. Chartered Institute of Ecology and Environmental Management, Winchester.

Department for Environment, Food and Rural Affairs (Defra) (2020). UK Marine Policy Statement.

Department for Environment, Food and Rural Affairs (Defra) (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Environment, Food and Rural Affairs (Defra) (2024). Statutory Biodiversity Metric Calculation Tool.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework (NPPF).

Environment Act 2021. (c. 30). London: The Stationery Office.

Environment Agency (2023). Catchment Data Explorer. Available at: https://environment.data.gov.uk/catchment-planning/ Accessed August 2024.

Environment Agency (2024). Ecology and Fish Data Explorer. Available at: https://environment.data.gov.uk/ecology/explorer/ Accessed August 2024.

Natural England (n.d.). Designated Sites View. Search for designated sites details. Available at: https://designatedsites.naturalengland.org.uk. Accessed July 2024.

Natural England (2023a). Statutory designated sites open data. Available at: https://naturalengland-defra.opendata.arcgis.com/. Accessed July 2024.

Natural England (2023b). SSSI Impact Risk Zones (England). Available at: https://www.data.gov.uk/dataset/5ae2af0c-1363-4d40-9d1a-e5a1381449f8/sssi-impact-risk-zones-england. Accessed July 2024.

Natural England (2024). Priority Habitats Inventory (England). Available at: https://www.data.gov.uk/dataset/4b6ddab7-6c0f-4407-946e-d6499f19fcde/priority-habitats-inventory-england. Accessed June 2024.

Norfolk County Council (2024). Mapping Areas of Particular Importance for Biodiversity. Step One of the Norfolk Local Nature Recovery Strategy. Available at: https://storymaps.arcgis.com/stories/97aeee1a7d0d4c7cb03c8ded990cf2fc Accessed July 2024.

Stroh, P.A., Leach, S.J., August, T.A., Walker, K.J., Pearman, D.A., Rumsey, F.J., Harrower, C.A., Fay, M.F., Martin, J.P., Pankhurst, T., Preston, C.D. & Taylor, I. (2014). A Vascular Plant Red List for England. Botanical Society of Britain and Ireland, Bristol.

The Conservation of Habitats and Species Regulations 2017. SI 2017/1012. London: The Stationery Office.

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. SI 2017/407. London: The Stationery Office.

Wildlife and Countryside Act 1981 (as amended). (c. 69). London: The Stationery Office.

Chapter 10: Water resources and flood risk

Anglian Water (2024). Application of the Sequential Test for Gate 3 site selection.

British Geological Survey (BGS) (1980). Sheet 173: Ely. Geological Survey of England and Wales 1:63,360/1:50,000 geological map series.

British Geological Survey (BGS) (1994). BGS England and Wales 1:50,000 Geological Map, Sheet 172 (Ramsay).

British Geological Survey (BGS) (2023). 1:50,000 Scale Digital Geology. Available at: https://www.bgs.ac.uk/datasets/bgs-geology-50k-digmapgb/. Accessed May 2024.

Construction Industry Research and Information Association (CIRIA) (2015). The Sustainable Urban Drainage System Manual.

Department for Environment, Food and Rural Affairs (Defra) (2020). UK Marine Policy Statement. Available at: https://www.gov.uk/government/publications/uk-marine-policy-statement. Accessed May 2024.

Department for Levelling Up, Housing and Communities (Defra) (2022). Flood risk and coastal change guidance.

Department for Environment, Food and Rural Affairs (Defra) (2023). River modelling: technical standards and assessment.

Department for Environment, Food and Rural Affairs (Defra) (2024). Multi-Agency Geographic Information for the Countryside (MAGIC). Available at: https://magic.defra.gov.uk/MagicMap.aspx. Accessed May 2024.

Endeavour Drilling (2023). Long Term Groundwater Installations (Factual Report). Ref: END23-011.

Environment Agency (2008). Supplementary note on flood hazard ratings and thresholds for development planning and control purpose – Clarification of the Table 13.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1.

Environment Agency (2021a). National Standard Technical Specifications for Surveying Services.

Environment Agency (2021b). Risk of Flooding from Reservoirs – Maximum Flood Extent.

Environment Agency (2022). Flood and coastal risk projects, schemes and strategies: climate change allowances.

Environment Agency and Defra (2022). Flood risk assessments: climate change allowances. Available at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances. Accessed May 2024.

Environment Agency (2023a). Fens 2100+ strategy outline. Available online at: https://consult.environment-agency.gov.uk/east-anglia-c-e/fens2100/. Accessed May 2024.

Environment Agency (2023b). Draft Ouse Washes Water Level Management Plan.

Environment Agency (2024a). Flood Map for Planning. Available at: https://flood-map-for-planning.service.gov.uk/. Accessed May 2024.

Environment Agency (2024b). Reservoir flood maps. Available at: https://check-long-term-flood-risk.service.gov.uk/map. Accessed May 2024.

Environment Agency (2024c). Water quality archive. Available online at: https://environment.data.gov.uk/water-quality/view/landing. Accessed May 2024.

Environment Agency (2024d). Hydrology data explorer. Available online at: https://environment.data.gov.uk/hydrology/explore. Accessed May 2024.

Environment Agency (2024e). Statutory Main River Map. Available online at: https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386. Accessed May 2024.

Geotechnics (2024). Fens Reservoir Gate 3 Ground Investigation, Factual Report. Project No: PC238628.

JBA (2018). King's Lynn and West Norfolk Strategic Flood Risk Assessment. Final Report.

Middle Level Commissioners (2024). IDB drainage maps.

Ordnance Survey (2024). Topographical Mapping.

Peterborough City Council and Cambridgeshire County Council (2021). Strategic Flood Risk Assessment.

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. SI 2017/407. London: The Stationery Office.

UK Centre for Ecology and Hydrology (2012). EA Detailed River Network.

Chapter 11: Historic environment

Allen, M., N. Blick, T. Brindle, T. Evans, M. Fulford, N. Holbrook, L. Lodwick, J. D. Richards, and A. Smith (2018). The Rural Settlement of Roman Britain: an online resource. Archaeology Data Service. Available at: https://doi.org/10.5284/1030449. Accessed March 2024.

Anglian Water and Cambridge Water (2023a). Archaeological Strategy. Mott MacDonald.

Anglian Water and Cambridge Water (2023b). Built Heritage Methodology. Mott MacDonald.

Anglian Water and Cambridge Water (2023c). Historic Landscape Methodology. Mott MacDonald.

Association of Local Government Archaeological Officers (ALGAO) East of England (2024). East of England Regional Research Framework. Available at: https://researchframeworks.org/eoe/. Accessed March 2024.

Atkins, R. (2011). Multi-period Settlement and Funerary Evidence at Tithe Barn Farm, Chatteris. Oxford Archaeology East.

Beacon Planning Ltd. (2017). Peterborough City Centre Conservation Area Appraisal and Management Plan.

British Geological Survey (BGS) and Historic England (2023). Building Stones Database for England Map Explorer. Available at: https://historicengland.org.uk/advice/technical-advice/buildings/building-stones-england/. Accessed March 2024.

British Geological Survey (BGS) (2024). GeoIndex Onshore. Available at: https://mapapps2.bgs.ac.uk/geoindex/home.html. Accessed March 2024.

British History Online (1932). Parishes: Somersham, in A History of the County of Huntingdon: Volume 2 (London, 1932) pp. 223-230. British History Online.

Cambridgeshire County Council (2014). Ouse Washes Landscape Character Assessment.

Cambridgeshire County Council (2023) Cambridgeshire HER: Search References CHER5229; CHER5313; 5393.

Cambridgeshire County Council (2024). Cambridgeshire HER: Search Reference CHER5552.

Chris Blandford Associates (2007). King's Lynn and West Norfolk Borough Landscape Character Assessment.

Cooper S. and S. Kenney (2001). Medieval Remains at Priory House, Swavesey: An Archaeological Evaluation. Cambridgeshire County Council Archaeological Field Unit.

Council for British Archaeology (2006). Defence of Britain Archive. Archaeology Data Service. Available at: https://doi.org/10.5284/1000327 Accessed March 2024.

Department for Environment, Food and Rural Affairs (Defra) (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework (NPPF).

Evans, C. and J. Tabor (2012). Excavations at Barleycroft Farm, Plant Site 2012. Cambridge Archaeological Unit.

Gibson, D. and M. Knight (2006). Bradley Fen Excavations 2001-2004, Whittlesey, Cambridgeshire. An Archaeological Assessment Report. Cambridge Archaeological Unit.

Hall, D. (1987). The Fenland Project No.2: Fenland Landscapes and Settlement between Peterborough and March. East Anglian Archaeology 35.

Hall, D. and J. Coles (1994). Fenland Survey: An Essay in Landscape and Persistence. Swindon: English Heritage.

Highways England (2020). Design Manual for Roads and Bridges, LA 104 Environmental assessment and monitoring. Revision 1. Available at: https://www.standardsforhighways.co.uk/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a. Accessed March 2024.

Historic England (2011). Historic England National Record of the Historic Environment Excavation Index. Available at: https://doi.org/10.5284/1057540. Accessed March 2024.

Historic England (2015). Managing Significance in Decision-Taking in the Historic Environment: Historic Environment Good Practice Advice in Planning Note 2.

Historic England (2017). The Setting of Heritage Assets; Good Practice Advice in Planning Note 3.

Historic England (2023). Heritage at Risk Register. Available at: https://historicengland.org.uk/advice/heritage-at-risk/. Accessed March 2024

Historic England (2024a). National Heritage List for England. Available at: https://historicengland.org.uk/listing/the-list/. Accessed March 2024.

Historic England (2024b). Heritage Gateway. Available at: https://www.heritagegateway.org.uk/gateway/. Accessed March 2024.

Historic England (2024c). 1406460: A Bronze Age post alignment and timber platform at Flag Fen and associated Bronze Age and later field systems and settlement to either side of the Northey Road. Available at: https://historicengland.org.uk/listing/the-list/list-entry/1406460. Accessed March 2024.

Kenney, S. (2005). Peterborough to Whittlesey Reinforcement Main: An Archaeological Desk-Based Assessment. Cambridgeshire County Council Archaeological Field Unit.

Knight, M. and Brudenell, M. (2020). Pattern and process: Landscape Prehistories from Whittlesey Brick Pits: The King's Dyke and Bradley Fen Excavations 1998-2004. Cambridge: McDonald Institute Monographs.

Knight, M., Ballantyne, R., Brudenell, M., Cooper, A., Gibson, D. and Robinson Zeki, I. Eds (2024). Must Farm Pile-Dwelling Settlement: Volume 1. Landscape, Architecture and Occupation. Cambridge: McDonald Institute Monographs.

Ministry of Housing, Communities and Local Government (2019). Historic Environment Planning Practice Guidance. Available at: https://www.gov.uk/guidance/conserving-and-enhancing-the-historic-environment. Accessed March 2024.

MOLA Headland Infrastructure (2019). A14 Cambridge to Huntingdon Improvement Scheme, Cambridgeshire. Archaeological Investigations. Volume 1: Post-Excavation Assessment.

Norfolk County Council (2023). Norfolk HER. Search Reference 23_07_26.

Peterborough City Council (2024). Peterborough HER: Search Reference 02/24.

Phillips, T. (2009). Nene Washes Peterborough: Archaeological Watching Brief Report. Oxford Archaeology East.

Powell-Smith, A. (2024). Open Domesday. Available at: https://opendomesday.org/. Accessed May 2024.

Pryor, F. (2001). The Flag Fen Basin. Archaeology and environment of a Fenland landscape. Swindon: English Heritage.

Pryor, F. and Redding, M. (1999). Preliminary Archaeological Evaluation for Wind Turbines at Three Locations Near March, Cambs. Soke Archaeological Services Ltd.

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. SI 2017/572. London: The Stationery Office.

Waller, M. (1994). The Fenland Project, Number 9: Flandrian Environmental Change in Fenland. East Anglian Archaeology 70. Fenland Project Committee: Cambridgeshire County Council.

Chapter 12: Geology, soils, agriculture and land quality

Airfields of Britain Conservation Trust. (2024). Airfields of Britain: Chatteris. Available at: https://www.abct.org.uk/airfields/airfield-finder/chatteris/. Accessed June 2024.

Borough Council of King's Lynn & West Norfolk (2022). Contaminated Land Inspection Report: Fairfield Road Refuse Tip and Sewage Works Downham Market.

British Geological Survey (1980). Geological Survey of England and Wales 1:63,360/1:50,000 geological map series. New Series Solid and Drift Edition: Sheet 173 Ely. British Geological Survey (BGS) | large image viewer | IIPMooViewer 2.0. Accessed April 2024.

British Geological Survey (2024a). BGS GeoIndex. Available at: https://mapapps2.bgs.ac.uk/geoindex/home.html. Accessed April 2024.

British Geological Survey (2024b). Hydrogeological Maps. Available at: https://www2.bgs.ac.uk/groundwater/datainfo/hydromaps/hydro_maps_scanviewer.html. Accessed June 2024.

British Geological Survey, UKRI. (n.d.). Borehole Records. Available at: https://www.bgs.ac.uk/information-hub/borehole-records/. Accessed April 2024.

British Standards Institution (2017). BS 10175:2011+A2:2017 Investigation of potentially contaminated sites. Code of practice.

Construction Industry Research and Information Association (CIRIA) (2024). Contaminated Land Risk Assessment – A Guide to Good Practice (C552).

Cranfield University (2024). The Soils Guide. Available at: https://www.landis.org.uk/. Accessed May 2024.

Department for Environment, Food & Rural Affairs (Defra) (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Environment, Food and Rural Affairs (Defra) (2024). Multi-Agency Geographic Information for the Countryside (MAGIC). Available at: https://magic.defra.gov.uk/MagicMap.aspx. Accessed April 2024.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework.

Highways England (2019). Design Manual for Roads and Bridges (DMRB) LA 109 Geology and soils.

Environment Agency (2024). Land contamination: risk management. Available at: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm. Accessed May 2024.

Hodge, C. (1984). Soils and Their Use in Eastern England. Soil Survey of England & Wales (1 Dec. 1984).

HS2 (2013). London West Midlands Environmental Statement Volume 5 Scope and Methodology Addendum CT-001-000/2.

Institute of Environmental Management and Assessment (IEMA) (2022). A new perspective on land and soil in Environmental Impact Assessment.

National Library of Scotland (2024). Georeferenced maps. Available at: https://maps.nls.uk/geo/explore/side-by-side/#zoom=10.0&lat=52.17331&lon=-0.20404&layers=225&right=osm. Accessed June 2024.

Natural England (2007). Provisional Agricultural Land Classification (ALC) dataset.

Natural England (2012). Agricultural Land Classification: protecting the best and most versatile agricultural land (TIN049) Second edition.

Natural England (2021). Guide to assessing development proposals on agricultural land. Available at: https://www.gov.uk/government/publications/agricultural-land-assess-proposals-for-development/guide-to-assessing-development-proposals-on-agricultural-land. Accessed June 2024.

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. SI 2017/572. London: The Stationery Office.

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. SI 2017/407. London: The Stationery Office.

UK Topographic Map (2022). Available at: https://en-gb.topographic-map.com/map-cgt/United-Kingdom/. Accessed April 2024.

Chapter 13: Material assets and waste management

British Geological Survey (2023). United Kingdom Minerals Yearbook 2022.

Cambridgeshire City Council and Peterborough City Council (2021). Cambridgeshire and Peterborough Minerals and Waste Local Plan 2036.

Cambridgeshire City Council and Peterborough City Council (2023). Cambridgeshire and Peterborough Local Aggregates Assessment 2022.

Council of the European Union (2008). Waste Framework Directive (2008/98/EC).

Department for Environment, Food & Rural Affairs (Defra) (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework (NPPF).

East of England Aggregates Working Party (2023). Annual monitoring report – 2022.

Environment Agency (2024a). 2022 Waste Data Interrogator – Waste received Version 3 . Available at: https://environment.data.gov.uk/api/file/download?fileDataSetId=0f0879a7-221e-4543-b520-55c6c8d64155&fileName=2022%20Waste%20Data%20Interrogator%20-%20Wastes%20Received%20(Excel)%20-%20Version%204.zip. Accessed June 2024.

Environment Agency (2024b). 2022 Waste Data Interrogator – Waste removed Version 3. Available at: https://environment.data.gov.uk/api/file/download?fileDataSetId=0f0879a7-

221e-4543-b520-55c6c8d64155&fileName=2022%20Waste%20Data%20Interrogator%20-%20Wastes%20Removed%20(Excel)%20-%20Version%204.zip. Accessed June 2024.

Environment Agency (2024c). 2022 Waste Data Interrogator – Waste summary tables for England Version 3. Available at: https://environment.data.gov.uk/api/file/download?fileDataSetId=0f0879a7-221e-4543-b520-55c6c8d64155&fileName=2022%20Waste%20Summary%20Tables%20for%20England%20-%20Version%204.zip. Accessed June 2024.

Environment Agency (2024d). 2022 Remaining landfill capacity Version 2 (online). Available at: https://www.data.gov.uk/dataset/237825cb-dc10-4c53-8446-1bcd35614c12/remaining-landfill-capacity. Accessed June 2024.

Environment Agency (2024e). Historic landfill sites. Available at: https://www.data.gov.uk/dataset/17edf94f-6de3-4034-b66b-004ebd0dd010/historic-landfill-sites. Accessed June 2024.

Environment Agency (2024f). Permitted waste sites – authorised landfill site boundaries (online). Available at: https://www.data.gov.uk/dataset/ad695596-d71d-4cbb-8e32-99108371c0ee/permitted-waste-sites-authorised-landfill-site-boundaries. Accessed June 2024.

High Speed Two (HS2) Limited (2022). Impact Assessment Route-wide waste and material resources assessment (WM-001-00000).

Institute of Environmental Management and Assessment (2020). Materials and Waste in Environmental Impact Assessment.

Mineral Products Association (2022). AMPS 2022 – 10th Annual Mineral Planning Survey Report.

Mineral Products Association (2023). Profile of the UK Mineral Products Industry.

Norfolk County Council (2011). Norfolk Mineral and Waste Development Framework, Core Strategy and Minerals and Waste Development Management Policies Development Plan Document 2010-2026.

Norfolk County Council (2024). Norfolk Minerals and Waste Local Plan – Monitoring Report Mineral Data Local Aggregate Assessment for calendar year 2022.

Qualis Flow Limited (2023). The UK Construction Industry Annual Waste Report.

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. SI 2017/572. London: The Stationery Office.

World Steel Association (2024). Apparent steel use (finished steel products). Available at: https://worldsteel.org/data/annual-production-steel-data/?ind=C_asu_fsp_pub/GBR. Accessed June 2024.

Chapter 14: Traffic and transport

Department for Environment, Food and Rural Affairs (Defra) (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework (NPPF).

Department for Transport (DfT) (2024a). Road Safety Data. Available at: https://www.data.gov.uk/dataset/cb7ae6f0-4be6-4935-9277-47e5ce24a11f/road-safety-data. Accessed June 2024.

DfT (2024b). Road traffic statistics. Available at: https://roadtraffic.dft.gov.uk/#15/52.4600/0.0600/basemap-countpoints. Accessed June 2024.

DfT (2024c). Transport analysis guidance. Available at: https://www.gov.uk/guidance/transport-analysis-guidance-tag. Accessed June 2024.

DfT (2024d). Travel Plans, Transport Assessments and Statements. Available at: https://www.gov.uk/guidance/travel-plans-transport-assessments-and-statements#transport-assessments-and-statements. Accessed June 2024.

Highways Act 1980. (c. 66). London: The Stationery Office.

IEMA (2023). IEMA Guidelines: Environmental Assessment of Traffic and Movement.

National Highways (2024). Design Manual for Roads and Bridges. Available at: https://www.standardsforhighways.co.uk/dmrb. Accessed June 2024.

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. SI 2017/572. London: The Stationery Office.

Chapter 15: Air quality

Borough Council of King's Lynn and West Norfolk (2023). Annual Quality Status Report.

Department for Energy, Security and Net Zero and Department for Environment, Food and Rural Affairs (2024). National Atmospheric Emissions Inventory. Available at: https://naei.beis.gov.uk/. Accessed June 2024.

Department for Environment, Food and Rural Affairs (Defra) (n.d.). Background mapping data for local authorities. Available at: https://uk-air.defra.gov.uk/data/laqm-background-home. Accessed June 2024.

Department for Environment, Food and Rural Affairs (Defra) (2020). NO_x to NO_2 Calculator (v8.1).

Department for Environment, Food and Rural Affairs (Defra) (2022). Local Air Quality Management (LAQM) Technical Guidance (TG22).

Department for Environment, Food and Rural Affairs (Defra) (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Environment, Food and Rural Affairs (Defra) (2024a). UK-AIR Air Information Resource. Available at: https://uk-air.defra.gov.uk/. Accessed June 2024.

Department for Environment, Food and Rural Affairs (Defra) (2024b) Emissions Factors Toolkit (EFT) Available at: https://laqm.defra.gov.uk/air-quality/air-quality-assessment/emissions-factors-toolkit/. Accessed June 2024.

Department for Environment, Food and Rural Affairs (Defra) and Devolved Administration (2008). Diffusion Tube for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework (NPPF).

East Cambridgeshire District Council (2023). East Cambridgeshire District Council Annual Status Report.

Environment Act 1995 (as amended). (c. 25). London: The Stationery Office.

Environment Act 2021. (c. 30). London: The Stationery Office.

Environmental Protection UK (EPUK)/IAQM (2017). Land-Use Planning and Development Control: Planning for Air Quality.

Fenland District Council (2023). Fenland District Council Annual Status Report.

Huntingdonshire District Council (2023). Huntingdonshire District Council Annual Status Report.

Institute of Air Quality Management (IAQM) (2016). Guidance on the assessment of mineral dust Impacts for planning (v1.1)

Institute of Air Quality Management (IAQM) (2018). Guidance on the assessment of odour for planning.

Institute of Air Quality Management (IAQM) (2024). Guidance on the assessment of dust from demolition and construction (v2.2).

Ordnance Survey (2024). Ordnance Survey AddressBase. Available at: https://www.ordnancesurvey.co.uk/products/addressbase. Accessed June 2024.

Peterborough City Council (2023). Peterborough City Council Annual Status Report.

South Cambridgeshire District Council (2023). 2023 Air Quality Annual Status Report.

The Air Quality (England) Regulations 2000. SI 2000/928. London: The Stationery Office.

The Air Quality Standards Regulations 2010. SI 2010/1001. London: The Stationery Office.

The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023. SI 2023/96. London: The Stationery Office.

Chapter 16: Carbon and greenhouse gases

All Company Working Group (2022). Cost Consistency Methodology.

Anglian Water (2024). Non-Technical Summary of the Anglian Water; Water Resources Management Plan.

British Standards Institution (2022). BS EN 17472:2022, Sustainability of construction works. Sustainability assessment of civil engineering works. Calculation methods.

British Standards Institution (2023). BS PAS 2080:2023 Publicly Available Specification 2080 Carbon Management in Buildings and Infrastructure.

Construction Leadership Council (2024). Five Client Carbon Commitments.

Department for Business, Energy and Industrial Strategy (2023). Green Book.

Department for Energy Security and Net Zero (2023). UK local authority and regional greenhouse gas emissions statistics, 2005 to 2021: revision note (added 6 July 2023).

Department for Energy Security and Net Zero and Department for Business, Energy and Industrial Strategy (2023). Provisional UK greenhouse gas emissions national statistics 2023.

Department for Environment, Food and Rural Affairs (Defra) (2023a). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Environment, Food and Rural Affairs (Defra) (2023b). UK Government GHG Conversion Factors for Company Reporting.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework (NPPF).

Institution of Civil Engineers (2013). Civil Engineering Standard Method of Measurement 4 Carbon & Price Book.

Institute of Environmental Management and Assessment (2022). Assessing Greenhouse Gas Emissions and Evaluating their Significance.

Natural England (2021). Carbon storage and sequestration by habitat.

University of Bath, Circular Ecology (2019). Inventory of Carbon and Energy.

UK Water Industry Research (2023). Carbon Accounting Workbook.

Water UK (2019). Net Zero 2030 Routemap.

Chapter 17: Climate resilience

Anglian Water, Water Resources East, Environment Agency, and Cambridgeshire and Peterborough Combined Authority (2022). Future Fens: Integrated Adaptation Manifesto – A Vibrant Future for the Fens.

British Standards Institution (2021). BS EN ISO 14091:2021 Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment.

Department for Environment, Food & Rural Affairs (Defra) (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework (NPPF).

HM Treasury (2024). Task Force on Climate-related Financial Disclosure (TCFD) -aligned disclosure application guidance - Phase 1 and Phase 2.

IEMA (2020). IEMA EIA Guide to: Climate Change Resilience and Adaptation.

Met Office (2016). UK Regional Climate Summaries: Eastern England.

Met Office (2018). UKCP18 Guidance: Representative Concentration Pathways.

Met Office et al. (2018). HadUK-Grid gridded and regional average climate observations for the UK.

Met Office (n.d.). UKCP18 User Interface. Available at: https://ukclimateprojections-ui.metoffice.gov.uk/ui/home. Accessed July 2024.

Reservoirs Act 1975 (c. 23). London: The Stationery Office.

Chapter 18: Noise and vibration

Association of Noise Consultants, Institute of Acoustics, and Chartered Institute of Environmental Health (2017). Professional Practice Guidance: Planning & Noise.

Association of Noise Consultants (2020). Measurement and Assessment of Groundborne Noise and Vibration. Suffolk: Lavenham Press.

British Standards Institution (1993). BS 7385-2:1993 Evaluation and measurement for vibration in buildings - Guide to damage levels from groundborne vibration.

British Standards Institution (2008). BS 6472:2008 Guide to elevation of human exposure to vibration in buildings.

British Standards Institution (2014a). BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 1: Noise. London: British Standards Institution.

British Standards Institution (2014b). BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 2: Vibration. London: British Standards Institution.

British Standards Institution (2014c). BS 8233:2014 Guidance on sound insulation and noise reduction for buildings. London: British Standards Institution.

British Standards Institution (2019). BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. London: British Standards Institution.

British Standards Institution (2023). BS EN 12354 - Building acoustics. Estimation of acoustic performance of building from the performance of elements (multi-part document). London: British Standards Institution.

Department for Communities and Local Government (2014). Planning Practice Guidance: Minerals. s.l.: Department for Communities and Local Government (now known as Department for Levelling Up, Housing and Communities (DLUHC)).

Department for Environment, Food and Rural Affairs (Defra) (2010). Noise Policy Statement for England, NPSE. London: Department for Environment, Food and Rural Affairs.

Department for Environment, Food and Rural Affairs (Defra) (2014). Possible options for the identification of SOAEL and LOAEL in support of the NPSE. Glasgow: Department for Environment, Food and Rural Affairs.

Department for Environment, Food and Rural Affairs (Defra) (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Levelling Up, Housing and Communities (DLUHC) (2022). Overheating: Approved Document O, The Building Regulations 2010.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework (NPPF).

Department of Transport and the Welsh Office (1988). Calculation of Road Traffic Noise, CRTN. s.l.: Her Majesty's Stationery Office, HMSO (now His Majesty's Stationery Office).

Department of Transport (1995). Calculation of Railway Noise (CRN). London: Her Majesty's Stationery Office, HMSO (now His Majesty's Stationery Office).

Department for Transport (DfT) (2013). Guidance - HS2 Phase One environmental statement, volume 5: sound, noise and vibration.

Extrium (2019). England Noise and Air Quality Viewer. Available at: http://www.extrium.co.uk/noiseviewer.html. Accessed May 2024.

Highways England (2020). Design Manual for Roads and Bridges (DMRB) LA 111 Noise and vibration, Rev 2. London: Highways England.

Institute of Environmental Management and Assessment (IEMA) (2014). Guidelines for Environmental Noise Impact Assessment.

International Organization for Standardization (ISO) (2005). ISO 14837-1:2005 Mechanical vibration — Ground-borne noise and vibration arising from rail systems, Part 1: General guidance.

International Organization for Standardization (ISO) (2024). ISO 9613-2:2024 Acoustics - Attenuation of sound during propagation outdoors, Part 2: Engineering method for the prediction of sound pressure levels outdoors.

The Mineral Products Association and The Planning Officers' Society (2019). Minerals Safeguarding Practice Guidance V1.4.

Ministry of Housing, Communities and Local Government (2019). Planning Practice Guidance – Noise. s.l.: Ministry of Housing, Communities and Local Government (now known as Department for Levelling Up, Housing and Communities).

Noise Advisory Council (1978). A Guide to Measurement and Prediction of the Equivalent Continuous Sound Level Leq. London: HMSO.

Sharland, I. (2005). Fläkt Woods Practical Guide to Noise Control, 9th ed. Colchester: Fläkt Woods Limited.

Transport and Roads Research Laboratory (1986). Ground vibration caused by civil engineering works, Research Report 53. Wokingham: Transport and Roads Research Laboratory.

World Health Organisation (WHO) (1999). Guidelines for Community Noise. s.l.: World Health Organisation Regional Publications, European Series.

World Health Organisation (WHO) (2009). Night Noise Guidelines for Europe. s.l.: World Health Organisation.

Chapter 19: Public access and amenity

Cambridgeshire County Council (2016). Cambridgeshire Rights of Way Improvement Plan (ROWIP) Update April 2016.

Cambridgeshire and Peterborough Combined Authority (2023). The Local Transport and Connectivity Plan (LTCP).

Department for Environment, Food & Rural Affairs (Defra) (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework (NPPF).

Fenland District Council (2014). Fenland Local Plan (Adopted May 2014).

Fenland District Council (2022a). Draft Fenland District Local Plan 2021 –2040.

Fenland District Council (2022b). Fenland Cycling, Walking, and Mobility Improvement Strategy – Adopted 2022.

FootPathMap (2024). PRoW Map. Available at: https://footpathmap.co.uk/map/?zoom=7.0&lng=-2.05000&lat=52.89690. Accessed June 2024.

Google Maps (2024). Google Maps Imagery ©2024. Available at: https://www.google.co.uk/maps/. Accessed June 2024.

Huntingdonshire District Council (2019). Huntingdonshire Local Plan 2019 –2036.

Office for National Statistics (2021). TS061 - Method Used to Travel to Work, Census 2021. 2021.

OpenStreetMap (2024). Available at: https://www.openstreetmap.org/#map=6/54.91/-3.43. Accessed June 2024.

Peterborough City Council (2019). Peterborough Local Plan 2016 –2036.

South Cambridgeshire District Council (2018). South Cambridgeshire Local Plan.

Sport England (2023). Proportion of Adults Who Do Any Walking or Cycling by Purpose, Frequency and Local Authority, Active Lives Survey. 2023.

Strava (2024). Global Heat Map. Available at: Strava's Global Heatmap. Accessed June 2024.

Sustrans (2024). National Cycle Network. Available at: https://www.sustrans.org.uk/national-cycle-network/. Accessed June 2024.

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. SI 2017/572. London: The Stationery Office.

The Water and Sewerage (Conservation, Access and Recreation) (Code of Practice) Order 1989. SI 1989/1152. London: The Stationery Office.

Water Industry Act 1991. (c. 56). London: The Stationery Office.

Chapter 20: Socio-economics and community

Consumer Data Research Centre (2019). Index of Multiple Deprivation (IMD).

Department for Environment, Food & Rural Affairs (Defra) (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework (NPPF).

Fenland District Council (2014). Fenland Local Plan, May 2014.

Google Maps (2024). Google Maps Imagery ©2024. Available at: https://www.google.co.uk/maps/. Accessed June 2024.

HM Treasury (2022). The Green Book.

Homes & Communities Agency (2014). Additionality Guide.

Homes & Communities Agency (2015). Employment Density Guide.

Huntingdonshire District Council (2019). Huntingdonshire Local Plan 2019 – 2036.

NOMIS (2022). Businesses Register and Employment Survey (BRES). Accessed on 1 May 2024.

NOMIS (2023). Annual Survey of Hours and Earnings.

Office of National Statistics (2021a). Census, Age by 5-year bands.

Office of National Statistics (2021b). Census, TS006 – Population Density.

Office of National Statistics (2021c). Census, TS066 – Economic activity status.

Office of National Statistics (2021d). Census, TS063 – Occupation

Office of National Statistics (2021e). Census, TS061 – Method used to travel to work.

Office of National Statistics (2021f). Census, TS067 – Highest level of qualification.

Office of National Statistics (2021g). Census, TS054 – Tenure.

Office of National Statistics (2021h). Census, TS041 – Number of Households.

Office of National Statistics (2021i). Census, TS007B – Age by broad age bands.

Office for National Statistics (2022). GVA by Industry 2022, ITL3 Level.

OpenStreetMap (2024). Available at: https://www.openstreetmap.org/#map=6/54.91/-3.43. Accessed June 2024.

Ordnance Survey (2024). AddressBase Plus.

Peterborough City Council (2019). Peterborough Local Plan 2016 –2036.

Planning Inspectorate (2017a). Port of Tilbury (Expansion) DCO (Ref:TR030003).

Planning Inspectorate (2017b). North London Heat and Power Generating Station DCO (Ref: EN10071).

Planning Inspectorate (2023). London Luton Expansion DCO (Ref: TR020001).

South Cambridgeshire District Council (2018). South Cambridgeshire Adopted Local Plan 2018.

Chapter 21: Human health

Anglian Water (2023a). Who we are – Our region. Available at: https://www.anglianwater.co.uk/corporate/about-us/who-we-are/. Accessed July 2024.

Anglian Water (2024). Our Water Resources Management Plan 2024.

Cambridgeshire and Peterborough Combined Authority (2018). CPCA Housing Strategy September 2018.

Cambridgeshire and Peterborough Combined Authority (2022). Cambridgeshire and Peterborough Economic Growth Strategy.

Cambridgeshire and Peterborough Combined Authority (2024). Cambridgeshire and Peterborough Insight web page for health and community data for the Cambridgeshire and Peterborough Combined Authority. Available at: https://cambridgeshireinsight.org.uk/. Accessed July 2024.

Cambridgeshire and Peterborough Insight (2023). Joint Strategic Needs Assessment for Cambridgeshire and Peterborough.

Cambridgeshire and Peterborough Local Resilience Forum (2024). Know your risks. Available at: https://www.cpprepared.org.uk/risks/know-your-risks/. Accessed July 2024.

Cambridgeshire and Peterborough Joint Health and Wellbeing Board/Integrated Care Partnership (2023). Cambridgeshire and Peterborough's Health and Wellbeing and Integrated Care Strategy.

Cambridgeshire and Peterborough Joint Health and Wellbeing Board/Integrated Care Partnership (2024). Mental Health Needs Assessment. Available at: https://cambridgeshireinsight.org.uk/mentalhealthneedsassessment/. Accessed July 2024.

Cambridgeshire and Peterborough Public Health Intelligence Team (2023). Drugs and Alcohol Needs Assessment for Cambridgeshire and Peterborough: Summary report.

Cambridgeshire County Council (2019). Cambridgeshire's Annual Public Health Report 2019.

Cambridgeshire County Council and Cambridge Research Group (2019a). English Indices of Multiple Deprivation 2019, District Level Reports, Summary Report for Fenland.

Cambridgeshire County Council and Cambridge Research Group (2019b). Fenland Community Safety Partnership.

Cambridge Water (2024). Revised Draft Water Resources Management Plan. February 2024 Revision.

Cambridgeshire Countywide High Harms Board (2022). Cambridgeshire and Peterborough Community Safety Agreement 2022 – 2025.

Cambridgeshire County Council (2023). Active Travel Strategy.

Cambridgeshire County Council and Cambridgeshire Research Group (2019). Fenland Community Safety Partnership Q3 Strategic Assessment 2018/2019.

Cooke, A., Friedl, L., Coggins, T., Edmonds, N., Michaelson, J., O'Hara, K., Snowden, L., Stansfield, J., Steuer, N., Scott-Samuel, A. (2011). Mental Wellbeing Impact Assessment: A toolkit for wellbeing.

Department for Environment, Food & Rural Affairs (Defra) (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework (NPPF).

Environment Agency (2022). Increasing flood resilience in the River Great Ouse. Available at: https://www.gov.uk/government/news/increasing-flood-resilience-in-the-great-river-ouse. Accessed July 2024.

European Centre for Disease Prevention and Control (2024). Epidemiological update: West Nile virus transmission season in Europe, 2023. Available at: https://www.ecdc.europa.eu/en/news-events/epidemiological-update-west-nile-virus-transmission-season-europe-2023-0. Accessed July 2024.

European Environment Agency (2023). Emerging Chemical Risks in Europe – 'PFAS'. Available at: https://www.eea.europa.eu/publications/emerging-chemical-risks-in-europe. Accessed July 2024.

Fenland District Council (2014). Fenland Local Plan: Adopted May 2014.

Fenland District Council (2022). Fenland Local Plan 2021 – 2040 Draft Local Plan Consultation August 2022.

Fenland District Council (2023). Wisbech PSPO (alcohol). Available at: https://www.fenland.gov.uk/article/13622/Wisbech-PSPO-alcohol. Accessed July 2024.

Fenland District Council (2024). Avian Flu Guidance. Available at: https://www.fenland.gov.uk/article/16987/Avian-Flu-Guidance. Accessed July 2024.

Kindig, D. and Stoddart, G. (2003). What is Population Health?

National Health Service (NHS) (2024). Cardiovascular disease (CVD). Available at: https://www.england.nhs.uk/ourwork/clinical-policy/cvd/. Accessed July 2024.

National Mental Health Intelligence Network (2019). Mental health and wellbeing JSNA toolkit. Public Health England. Available at: https://www.gov.uk/government/publications/better-mental-health-jsna-toolkit. Accessed July 2024 .

Nomis (2021). National Census. Table TS038 – Disability.

Norfolk County Council (2024). Norfolk Insight. Available at: https://www.norfolkinsight.org.uk/. Accessed June 2024.

Norfolk and Waveney Integrated Care System (ICS) (2022). Primary Care Workforce Strategy 2022 – 2025.

Norfolk and Waveney Integrated Care System (ICS) (2024). Norfolk and Waveney Integrated Care Strategy and Norfolk Joint Health and Wellbeing Strategy: Setting the agenda for our Integrated Care System across Norfolk and Waveney.

O'Neill (2019). Public Health England Segment Tool 2015-17 Analysis – Peterborough City Council and Cambridgeshire County Council.

Office for Heath Improvement and Disparities (OHID) (2021). Health Profile for the East of England 2021. Available at: https://fingertips.phe.org.uk/static-reports/health-profile-for-england/regional-profile-east_of_england.html. Accessed July 2024.

Office for Heath Improvement and Disparities (OHID) (2024a). Fingertips – Public health data. Available at: https://fingertips.phe.org.uk/profile/health-profiles. Accessed July 2024.

Office for Health Improvement and Disparities (OHID) (2024b). Local Health. Available at: https://www.localhealth.org.uk/#c=home. Accessed July 2024.

Office for National Statistics (ONS) (2021). Census. https://www.ons.gov.uk/census. Accessed July 2024.

Ordnance Survey (2024). OS AddressBase.

Public Health England (2020). Human Animal Infections and Risk Surveillance (HAIRS) group. Qualitative assessment of the risk that West Nile virus presents to the UK human health population.

Pyper, R., Lamming, M., Beard C., Waples, H., Birley, M., Buroni, A., Douglas, M., Turton, P., Hardy, K., Netherton, A., McClenaghan, R., Barratt, T., Bhatt, A., Fenech, B., Dunne, A., Hodgson, G., Gibson, G., Purdy, J. and Cave, B. (2022a). IEMA Guide to Effective Scoping of Human Health in Environmental Impact Assessment.

Pyper, R., Waples, H., Beard, C., Barratt, T., Hardy, K., Turton, P., Netherton, A., McDonald, J., Buroni, A., Bhatt, A., Phelan, E., Scott, I., Fisher, T., Christian, G., Ekermawi, R., Devine, K., McClenaghan, R., Fenech, B., Dunne, A., Hodgson, G., Purdy, J. and Cave, B. (2022b). IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment.

Support Cambridgeshire (2023). How will the Integrated Care System deliver the services in the community? Available at: https://supportcambridgeshire.org.uk/how-will-the-integrated-care-system-deliver-the-services-in-the-community/. Accessed July 2024.

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. SI 2017/572. London: The Stationery Office.

UK Health Security Agency (UKHSA) (2023). Health Effects of Climate Change in the UK: State of the evidence 2023.

UK Health Security Agency (UKHSA) (2024). Heat Mortality Monitoring Report: 2023.

Waite, T.D., Chaintarli, K., Beck, C.R., Bone, A., Amlôt, r., Kovats, S., Reacher, M., Armstrong, B., Leonardi, G., Rubin, G.J. and Oliver, I. (2017). The English national cohort study of flooding and health: cross-sectional analysis of mental health outcomes at year one.

Winkler, M.S., Viliani, F., Knoblauch, A.M., Cave, B., Divall, M., Ramesh, G., Harris-Roxas, B. and Furu, P. (2021). Health Impact Assessment International Best Practice Principles. Special Publication Series No. 5. Fargo, USA: International Association for Impact Assessment.

World Health Organization (WHO) (1948). Constitution of the World Health Organization.

World Health Organization (WHO) (2021). Health Promotion Glossary of Terms 2021. Geneva: World Health Organization.

World Health Organization (WHO) (2022). Fact sheets – Mental health. Available at: https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response. Accessed July 2024.

Chapter 22: Major accidents and disasters

Animal Health Act 1981 (as amended) (c.22). London: The Stationery Office.

British Geological Survey (BGS) (2024). GeoIndex Onshore: Seismic hazard maps. https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.114205699.542297184.1719411557-459341140.1719411557. Accessed June 2024.

Cambridgeshire and Peterborough Local Resilience Forum (2024). Know your risks. Available at: https://www.cpprepared.org.uk/risks/know-your-risks/. Accessed July 2024.

Civil Aviation Authority (2020). CAP 738: Safeguarding of Aerodromes. Available at: https://www.caa.co.uk/our-work/publications/documents/content/cap-738/. Accessed June 2024.

Coxon, R. E. (1986). Failure of Carsington Dam. Report to the Secretary of State for the Environment. HMSO, London.

Department for Environment, Food & Rural Affairs (2021). Reservoirs Act 1975: The Flood Plan (Reservoirs Emergency Planning) Direction 2021.

Department for Environment, Food and Rural Affairs (2022). Protective Security Guidance. HMSO, London.

Department for Environment, Food and Rural Affairs (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Levelling Up, Housing and Communities (DLUHC) (2023). National Planning Policy Framework (NPPF).

Department for Transport (DfT) (2016). The Town and Country Planning (Safeguarded Aerodromes, Technical Sites and Military Explosives Storage Areas) Direction 2002 (Updated 2016). Available at: https://www.gov.uk/government/publications/safeguarding-aerodromes-technical-sites-and-military-explosives-storage-areas/the-town-and-country-planning-safeguarded-aerodromes-technical-sites-and-military-explosives-storage-areas-direction-2002. Accessed June 2024.

Department for Transport (DfT) (2024). Road traffic statistics. https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints. Accessed June 2024.

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.

Drinking Water Inspectorate (2022). The Security and Emergency Measures (Water and Sewerage Undertakers and Water Supply Licensees) Direction. Available at: https://assetwastes.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1057909/water-security-emergency-measures-direction-feb2022.pdf. Accessed June 2024.

Environment Agency (2013). Guide to risk assessment for reservoir safety. Available at: https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/risk-assessment-for-reservoirs. Accessed June 2024.

Health and Safety at Work etc. Act 1974 (HSWA) (c. 37). London: The Stationery Office.

Health and Safety Executive (2024). A-Z of guidance by topic. Available at: https://www.hse.gov.uk/. Accessed June 2024.

HM Government (2023). National Risk Register 2023 edition. Available at: https://assets.publishing.service.gov.uk/media/64ca1dfe19f5622669f3c1b1/2023_NATIONAL_RISK_REGISTER_NRR.pdf. Accessed June 2024.

Institute of Civil Engineers (2014). A guide to the Reservoirs Act 1975, Second edition. ICE Publishing.

Institute of Civil Engineers (ICE) (2015). Floods and Reservoir Safety, Fourth Edition. ICE Publishing.

Institute of Environmental Management and Assessment (IEMA) and Arup (2020). Major Accidents and Disasters in EIA: A Primer.

International Federation of the Red Cross/Crescent (IFRC) (2024). Evaluations and Research. Available at: https://www.ifrc.org/evaluations. Accessed June 2024.

Planning Inspectorate (2024). Nationally Significant Infrastructure Projects – Advice Note Eleven: working with public bodies in the infrastructure planning process. Available at: https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-eleven-working-with-public-bodies-in-the-infrastructure-planning-process. Accessed June 2024.

Public Health (Control of Disease) Act 1984 (as amended) (c.22). London: The Stationery Office.

Reservoirs Act 1975 (c. 23). London: The Stationery Office.

South Cambridgeshire District Council (2018). South Cambridgeshire Local Plan. South Cambridgeshire District Council.

The Construction (Design and Management) Regulations 2015. SI 2015/51. London: The Stationery Office.

The Control of Major Accident Hazards (COMAH) Regulations 2015. SI 2015/483. London: The Stationery Office.

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. SI 2017/572. London: The Stationery Office.

The Met Office (2016). Eastern England: Climate. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/weather/regional-climates/eastern-england_-climate-met-office.pdf. Accessed June 2024.

The Water Supply (Water Quality) Regulations 2016. SI 2016/614. London: The Stationery Office.

Water Industry Act 1991. (c. 56). London: The Stationery Office.

Water UK (2023) Water UK Security Standards, Version 4.3. January 2023. Water UK Standards Board.

Chapter 23: Cumulative effects

Department for Environment, Food and Rural Affairs (2023). National Policy Statement for Water Resources Infrastructure. London: The Stationery Office.

Department for Levelling Up, Housing and Communities (2023). National Planning Policy Framework.

Institute of Environmental Management and Assessment (2011). The State of Environmental Impact Assessment Practice in the UK.

Institute of Environmental Management and Assessment (2020). Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation.

Planning Act 2008. (c. 29). London: The Stationery Office.

Planning Inspectorate (2019). Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects.

The Town and Country Planning (Development Management Procedure) (England) Order 2015. SI 2015/595. London: The Stationery Office.

Transport and Works Act 1992. (c. 42). London: The Stationery Office.

Chapter 24: Summary

None.

Abbreviations and acronyms

Term	Definition
ACWG	All Company Working Group
ADS	Archaeology Data Service
AIM	Aerial Investigation and Mapping
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
ARN	Affected Road Network
AWP	Aggregates Working Party
BGS	British Geological Survey
BMV	Best and Most Versatile land
BNG	Biodiversity Net Gain
BNL	Basic Noise Level
BSBI	Botanical Society of Britain and Ireland
BSI	British Standards Institution
C&D	Construction and Demolition
C&I	Commercial and industrial waste
CCRA	Climate Change Risk Assessment
CCTV	Closed-circuit Television
CDEW	Construction, Demolition and Excavation Waste
CDM Regulations	Construction (Design and Management) Regulations 2015
CEA	Cumulative Effects Assessment
CHER	Cambridgeshire Historic Environment Record
CIEEM	Chartered Institute of Ecology and Environmental Management
CLG	Community Liaison Group
CoCP	Code of Construction Practice
COMAH	Control of Major Accident Hazards Regulations 2015
CPERC	Cambridgeshire and Peterborough Environmental Records Centre
CRTN	Calculation of Road Traffic Noise
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero
DfT	Department for Transport
DLUHC	Department for Levelling Up, Housing and Communities
DMRB	Design Manual for Roads and Bridges
DNO	District Network Operator
DWM	Doddington, Wimblington and Manea
EBI	England Biodiversity Indicators
EcIA	Ecological Impact Assessment
ECoW	Ecological Clerk of Works
EEA	European Economic Area
EIA	Environmental Impact Assessment
ENG	Environmental Net Gain

Term	Definition
EPS	European Protected Species
EqIA	Equalities Impact Assessment
ES	Environmental Statement
EU IAS	European Union Invasive Alien Species
FDC	Fenland District Council
FLL	Functionally Linked Land
FMI	Failure Mode Identification
FRA	Flood Risk Assessment
FWP	Fens Water Partnership
GAC	Granular Activated Carbon
GCN	Great crested newt
GHG	Greenhouse gas
GI	Ground Investigation
GIS	Geographic Information System
GP	General Practitioner (medical)
GWDTE	Groundwater Dependent Terrestrial Ecosystems
HER	Historic Environment Record
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment
HLCA	Historic Landscape Character Area
HPI	Habitats of Principal Importance
HRA	Habitats Regulations Assessment
HS2	High Speed 2
HSM	Habitat Suitability Modelling
HSWA	Health and Safety at Work etc. Act 1974
ICB	Integrated Care Board
IDB	Internal Drainage Board
IDP	Infrastructure Delivery Plan
IEMA	Institute of Environmental Management and Assessment
IMD	Index of Multiple Deprivation
INNS	Invasive Non-Native Species
IRZ	Impact Risk Zone
ISO	International Organization for Standardization
JSNA	Joint Strategic Needs Assessment
km	Kilometre
LAA	Local Aggregate Assessment
LAAIF	Local Authority Associated Infrastructure Forum
LAD	Local Authority District
LCA	Landscape Character Area
LCT	Landscape Character Type
LNR	Local Nature Reserve
LOAEL	Lowest Observed Adverse Effect Level
LSOA	Lower Super Output Area
LVIA	Landscape and Visual Impact Assessment

Term	Definition
LWP	Lincolnshire Water Partnership
LWS	Local Wildlife Site
m	Metre
m^3	Cubic metre
MAA	Mineral allocation area
MCA	Mineral Consultation Area
MCC	Motor Control Centre
MDA	Mineral Development Areas
MHCLG	Ministry of Housing, Communities and Local Government
Ml/d	Megalitres per day
Mm^3	Million cubic metres
MoRPh	Modular River Physical Habitat
MPA	Mineral Products Association
MSA	Mineral safeguarding area
MSW	Municipal Solid Waste
NBIS	Norfolk Biodiversity Information Service
NCA	National Character Area
NCR	National Cycle Route
NHER	Norfolk Historic Environment Record
NHLE	National Heritage List for England
NHS	National Health Service
NIC	National Infrastructure Committee
NNR	National Nature Reserve
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NSIP	Nationally Significant Infrastructure Project
NVQ	National Vocational Qualification(s)
NVZ	Nitrate Vulnerable Zones
OHID	Office for Health Improvement and Disparities
ONS	Office for National Statistics
OS	Ordnance Survey
OWL	Operational Water Level
PA 2008	Planning Act 2008
PEIR	Preliminary Environmental Information Report
PFAS	Per- and polyfluoroalkyl substances
PFOS	Perfluorooctanesulfonic acid
PMP	Probable Maximum Precipitation
PPG	Planning Practice Guidance
PPV	Peak Particle Velocity
ProPG	The Professional Practice Guidance
PRoW	Public Right of Way
PRV	Protected Road Verges
RAG	Red, Amber, Green

Term	Definition
RAPID	Regulators' Alliance for Progressing Infrastructure Development
RCP 8.5	Representative Concentration Pathway 8.5
RPCC	Register of Plants of Conservation Concern
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SDG3	Sustainable Development Goal 3
SOAEL	Significant Observed Adverse Effect Level
SPA	Special Protection Area
SRO	Strategic Resource Option
SSSI	Site of Special Scientific Interest
SuDS	Sustainable drainage systems
SUTW	Start up to waste
TCFD	Task Force for Climate-related Financial Disclosure
TEMPro	Trip End Model Presentation Programme
TPO	Tree Preservation Order
TWG	Technical Working Group
TWL	Top Water Level
UK	United Kingdom
UKCP 18	UK Climate Projections 2018
UKHSA	UK Health Security Agency
UN	United Nations
UXO	Unexploded ordnance
VDV	Vibration Dose Value
WCA	Wildlife and Countryside Act
WCH	Walking, cycling and horse-riding
WFD	Water Framework Directive
WHO	World Health Organisation
WMAs	Waste Management Areas
WNF	West Nile Fever
WRC	Water Recycling Centre
WRMP	Water Resources Management Plan
WTR	Wildlife Trust Reserves
WWT	Wildfowl and Wetlands Trust
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility

Glossary

Term	Definition
A-weighting	A frequency weighting for sound that relates to the response of the human ear.
Abstraction	The removal of water from any source, either permanently or temporarily.
Abstraction infrastructure	Infrastructure required to abstract water from a water source, including intake structures, pumping stations and initial treatment.
Abstraction wet well	A structure used to house pumps that draws water from a source, such as a river or reservoir, for treatment or distribution.
ACWG	The ACWG was set up to ensure that water companies with SROs were using a consistent approach where possible, and includes representatives from nine water companies and regional water resource planning groups.
Bar screens	Vertical or horizontal bars in an intake structure to trap debris, such as leaves, while allowing water to pass through to prevent blockages and protect downstream equipment.
Biofouling	Accumulation of microorganisms, algae and other biological matter in a thin layer over surfaces.
Borrow pit	An excavated area used to source material for the construction works.
Break pressure tank	A closed water tank located at the highest elevation of a pipeline which is required to manage the water pressures that will be generated in the operation of the pipeline.
Broadband	A broad spectrum of sound energy that comprises a large number of frequency components, with none individually dominant. The opposite of narrow-band noise.
Bund	An embankment used for containment.
Carbon costs	The calculated cost associated with the carbon emissions generated during the construction and operation of a scheme.
Chimney drain	A vertical or inclined drainage system placed within an embankment dam next to the core.
Component	Term used in the options appraisal process. A part of an element that does not provide the whole solution for that element on its own. Examples of components are service reservoirs, transfer routes, pumping stations or water treatment works.
Component option	An option for a partial solution to a project element, assessed in Stages B and C of the options appraisal process.
Downstream transfer	The transfer of water from the proposed reservoir to the public water supply network.
Downstream infrastructure	Infrastructure required to transfer water from the proposed reservoir to the proposed reservoir supply connection point, including the water treatment works.

Term	Definition
Water Resources Management Plan	Developed by the respective water company, this sets out what action they will take and the investment that will be needed to meet the requirements set out in the regional plan.
EIA	EIA is an assessment process which: determines the likely environmental impact of a given action or intervention; describes the mitigation to avoid or reduce these likely impacts; and identifies likely significant effects on the environment. It is used to inform the decision maker before deciding whether to grant consent.
Element	Term used in the options appraisal process. The elements are the main features that combine to create a whole scheme option and comprise: upstream infrastructure; main reservoir site; downstream infrastructure; and the emergency drawdown disposal route.
Element option	An option consisting of combined components produced at the end of Stage C of the options appraisal process.
Embankment toe	The area at the base of an embankment's exposed face.
Emergency drawdown	A provision required under the Reservoirs Act 1975 to lower a reservoir's water level quickly in the event of an emergency to ensure reservoir safety in the event of a problem occurring which threatens the structural performance of the dam.
Equivalent continuous sound level, Leq	A steady noise level, which over a period of time, has the same sound energy as the time varying noise it represents. This is the most widely used parameter for assessing environmental noise, and since this descriptor is a type of average level, it must, by definition, have an associated time period over which the measurement is referring to. This is often included in the abbreviation in the form Leq,T, where T is the time period (i.e. Leq,5min).
Façade level	Noise levels taken at a distance of 1 metre from the façade of a building. The difference between the façade and free-field level will depend on the distance from the reflecting surface, but is generally accepted to be approximately 3dB(A).
Feed corridors	Pipeline corridors in the vicinity of the proposed reservoir used by both upstream transfer pipelines and downstream transfer pipelines, allowing the transfers to start or end at the appropriate points either within the reservoir site or water treatment works site.
Fens Water Partnership	Stakeholder engagement group consisting of local stakeholders. This group informed the approach taken for options appraisal and contributed to the findings and outcomes of the first three options appraisal stages.
Finger drain	A type of drainage system consisting of narrow, finger-like projections that will channel seepage flows out of the embankment dam.

Term	Definition
Freeboard	The height differential between the top water level and the crest of the reservoir embankment.
Free-field level	Noise levels that have been measured or predicted in the absence of any influence of reflections from nearby surfaces. In practice, a measurement is considered to be free-field if it was taken at a distance of over 3.5 metres from any reflecting surfaces.
Granular activated carbon	Used in water treatment, a porous media that adsorbs contaminants such as organic compounds.
Grit chambers	A chamber which is used to remove heavy solids, such as sand and sludge, from water by slowing down the flow so it settles to the bottom where it can be removed.
High-level carrier	Typically refers to a watercourse that is elevated or situated at a higher level relative to its surroundings.
Historic designated assets	A heritage asset which is formally protected by legal status. This includes scheduled monuments, registered parks and gardens and listed buildings.
Horizontal blanket drain	Horizontal drainage blanket placed along the formation of the embankment to drain and filter the downstream shoulder.
HRA	There is a requirement under the Conservation of Habitats and Species Regulations 2017 (as amended) to determine if a plan or project may have an adverse impact on a site designated under the same (or preceding) Regulations prior to any consent or permission being determined. The process of undertaking this assessment is known as HRA.
Hydraulic capacity	The ability of a watercourse or channel to convey water, considering, for example, volume, cross-sectional area and whether there are any obstructions.
IDB	A public body responsible for the management of water levels in an area. They play a fundamental part in the management of flood risk and land drainage in England.
Initial treatment	Initial treatment refers to treatment of abstracted water in proximity to the source to address concerns in respect of INNS or WFD.
Intake	A structure through which water is withdrawn from the water source, after which the water is conveyed to the associated water infrastructure.
Inter-catchment treatment plant	A water treatment plant used to remove contaminants (including microorganisms) to prevent them spreading between catchments where water is transferred between them.
Listed building	A building or structure designated under Chapter 1 of the Planning (Listed Buildings and Conservation Areas) Act 1990 as being of '*special architectural or historic interest*'.
Lmax	The maximum sound pressure level occurring in a specified time period.

Term	Definition
Ln	The Ln is a statistical descriptor and refers to the level that is exceeded for n% of the time during a particular measurement period. Again, the measurement period that the descriptor refers to is often included in the abbreviation in the format Ln,T. Two of the most commonly used statistical descriptors used for environmental noise assessments are the L90 and the L10. These are described in more detail below.
Local Transport and Connectivity Plan	Statutory document that sets out Cambridgeshire and Peterborough Combined Authority's long-term strategy to make transport better, faster, greener and more accessible for everyone.
L10	The L10 refers to the level exceeded for 10% of the measurement period and is commonly used in assessing road traffic noise as it has been found to give a good indication of the subjective human response to this type of noise.
L90	The L90 refers to the level exceeded for 90% of the measurement period and is widely considered to represent background noise, or the underlying noise in an area between noisy events (such as cars passing, etc.).
MSA	Designated areas that provide for the safeguarding of proven mineral resources which are, or may become, of economic importance from unnecessary sterilisation by non-mineral development (such as being covered by buildings).
Ml/d	Megalitres per day. One megalitre = one million litres (1,000 cubic metres).
Moses bridge	A type of bridge that allows pedestrians to cross a body of water at water level, creating the illusion of walking through the water.
Motor Control Centre	Electric panels that control and monitor the operation of pumps to ensure they are running efficiently.
NPPF	Sets out the government's economic, environmental and social planning policies. A revised NPPF was published by DLUHC in December 2023.
NPS	Documents produced by the government, which set out the need and government's policies for development of nationally significant infrastructure projects in England under the Planning Act 2008 regime, and the decision-making framework for relevant development consent order applications to be considered against.
Net present value	Net present value. The present-day financial value of costs for construction and operation calculated over a 100-year period.
Nature recovery network	A national network of wildlife-rich places aimed to expand, improve and connect these places across cities, towns, countryside and the coast as committed to in the government's 25 Year Environment Plan.
Non-impounding reservoir	A type of reservoir that does not obstruct the flow of a river and is normally filled by pumping water into it.

Term	Definition
Non-road mobile machinery	Non-road mobile machinery is defined as any mobile machine, transportable equipment or avehicle that is not intended for carrying passengers or goods on the road. In this context it refers to machinery used for demolition and construction activities. Examples include, but are not limited to, excavators, telehandlers, cranes, piling rigs and power generators.
Open channel transfers	The transfer of water in a natural or man-made conduit that has an open top (a free surface).
Options appraisal	Process through which options are appraised to select the best performing scheme.
Outlet tower	The outlet tower draws-off water at different levels in the reservoir and transfers the water out of the reservoir. The supply pipe passes from the outlet tower to the water treatment works.
PPV	The greatest instantaneous particle velocity. Used as a measure of vibration.
Pipeline corridor	An area of land within which the pipeline could be routed. Pipeline corridors vary in width depending on the stage of the assessment and the presence of known constraints.
Polygon	The indicative area or parcel of land on which a pumping station, inter-catchment treatment works, service reservoir or water treatment works could be developed.
Proposed Development	The Fens Reservoir Proposed Development being jointly promoted by Anglian Water and Cambridge Water including the proposed reservoir, associated water infrastructure and other associated development.
Pumping station	A building that houses a pump to lift water or push water along a pipeline. It can also mean the building and the pump(s) inside.
Ramsar sites	Wetland areas of international importance which have been designated under the criteria of the Ramsar Convention on Wetlands 1971 for containing representative, rare or unique wetland habitat types or for their importance in conserving biological diversity. The designation of UK Ramsar sites has generally been underpinned through prior notification of these areas as SSSI.
RAPID	An alliance of regulators made up of the Water Services Regulation Authority (Ofwat), the Environment Agency and the Drinking Water Inspectorate, to help accelerate the development of new water infrastructure and design future regulatory frameworks.
Raw water	Water that is untreated. In terms of the Proposed Development, all water upstream of the water treatment works is considered ‘raw water’. Downstream of the water treatment works it is considered ‘potable water’, following treatment.
Rights of Way Improvement Plan	Part of the wider Cambridgeshire and Peterborough Local Transport and Connectivity Plan (LTCP) which sets out the Combined Authority’s long term strategy to improve transport.

Term	Definition
	The Rights of Way Improvement Plan is looking to improve access, visibility and overall quality of PRoWs in the county administrative boundaries.
Rotating band screens	Mechanical screens that rotate to remove debris from water, commonly used in water intake systems.
Run to waste	When starting up a water treatment process the water is initially run to a waste stream (where it may later be re-treated) until it has reached the required water quality standard to be put into supply.
SAC	European habitat sites designated under the Conservation of Habitats and Species Regulations 2017, as amended.
Scheduled monuments	Nationally important monuments that have been afforded statutory protection through their inclusion in the Schedule of monuments maintained under section 1 of the Ancient Monuments and Archaeological Areas Act 1979. The Secretary of State must be informed about any work that might affect a monument above or below ground, and Historic England gives advice to the government on each application. In assessing each application the Secretary of State will try to ensure that damage done to protected sites is kept to a minimum.
Scour pipe	A pipe used to remove sediment and debris from a reservoir or lower the water level in an emergency.
Seepage	The slow steady movement of water through small cracks or pores in the embankment dam.
Sequential Test	A sequential, risk-based approach to development and flood risk set out in the NPS and the NPPF. It is undertaken to ensure that areas at little or no risk of flooding (from all sources) are developed in preference to areas at higher risk of flooding.
Service reservoir	A water storage facility that holds potable water after it has been treated in a water plant, and before it is piped to the end users. These storage areas are covered and are designed to keep the water safe from contamination.
Site selection	Process that identifies and assesses potential suitable locations for the purposes of identifying the preferred location for a project. For example, the site selection process undertaken to identify the preferred location for the reservoir site.
Sound Power Level (Lw or SWL)	A measure of the acoustic energy output of a source and is a property of the source itself. Sound power is measured in watts, while the sound power level is measured on a decibel scale.
Sound Pressure Level (LP or SPL)	The fluctuation in air pressure, as perceived by the ear, is known as sound pressure and measured in pascals (Pa). The sound pressure level is measured on a decibel scale.
Source	River or watercourse from which water will be sourced to fill the reservoir.

Term	Definition
SPA	Protected areas for birds in the UK classified under the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea).
Strategic Resource Option	Water resources infrastructure project required to address deficits in future public water supply
Upstream infrastructure	Infrastructure required to transfer raw water from a source towards the proposed reservoir.
Vibration Dose Value (VDV)	A measure of vibration exposure over a defined time period.
V-notch weir	A triangular-shaped weir used to measure flow rates.
WFD	Water Framework Directive. European Directive (2000/60/EC) transposed into English and Welsh law through The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. The WFD sets out requirements to prevent the deterioration of the status of water bodies and to support the achievement of the water bodies' environmental objectives.
Whole scheme	The Proposed Development as a whole, combining upstream transfers, reservoir site, downstream infrastructure and emergency drawdown.
Whole scheme option	An option assessed in Stage D of the options appraisal process which combines options for all associated water infrastructure elements to give a holistic solution.
Water Resources East	Water Resources East. One of five regional water resource groups (made up of different interested organisations, including water companies for that region) responsible for development of regional plans aligned with the National Framework for Water Resources.
Water Resources Management Plan (WRMP)	Water Resources Management Plan. Sets out a water company's intended approach towards water resource planning for meeting its duty to supply water for at least the next 25 years, to ensure the long-term balance between supply and demand is maintained; legally required to be updated every five years.
Water treatment works	A facility where raw water is treated to a standard suitable for drinking water.

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