AtkinsRéalis



Environmental Scoping Report

Greater Cambridge Partnership

12 August 2024

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WATERBEACH TO CAMBRIDGE

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1. Introduction

Background

1.1. The Greater Cambridge Partnership (GCP), through Cambridgeshire County Council (CCC) as the applicant is proposing to develop a new segregated guided busway and travel hub to improve public transport connections between the proposed new town of Waterbeach and the city of Cambridge. The Scheme is called Waterbeach to Cambridge (referred to throughout this document as 'the Scheme'). The location of the Scheme is shown in Figure 1-1. The proposed route boundary, shown in the figure is referred to as 'the Site' throughout this report.

Figure 1-1 - Scheme location



1.2. The GCP is a local body responsible for overseeing the delivery of a City Deal funding package from the Government. The City Deal is worth up to £500 million over 15 years with the investment aimed at enabling economic development in Greater Cambridge; through improving infrastructure, creating new jobs and developing new homes. The GCP comprises representatives from Cambridgeshire County Council, South Cambridgeshire District Council, Cambridge City Council, the Mayor of the Cambridge and Peterborough Combined Authority, and the University of Cambridge. The Waterbeach to Cambridge scheme is one of the projects being proposed as part of the City Deal.

Need for the scheme

1.3. The Waterbeach to Cambridge corridor is the key route into Cambridge from the north. The A10 road suffers from significant congestion during peak times, particularly at the Cambridge end. The railway between Waterbeach and Cambridge also suffers overcrowding at peak times. The planned developments in the area, such as Waterbeach New Town and in north-east Cambridge, will place considerable additional pressure on the transport network. Waterbeach New Town is planned to deliver up to 11,000 new homes. Existing congestion problems experienced on the A10 will increase without suitable mitigation to address additional trips from all of the planned developments. GCP is therefore working on a number of projects, including the Scheme, to address the growing transport needs of the Waterbeach to Cambridge corridor.

Purpose of this report

- 1.4. To deliver the Scheme, GCP, through CCC as lead local authority (the Applicant), is applying to the Secretary of State for an order under the Transport and Works Act 1992 (TWA) and a Planning Direction under Section 90(2A) of the Town and Country Planning Act 1990 (TCPA). If authorised, the Transport Works and Act Order (TWAO) and deemed planning permission would together provide the powers required for the construction, maintenance and operation of the C2C Scheme. The Secretary of State and the applicant must follow the rules and procedures set out in the Transport and Works (Applications and Objections Procedure) (England and Wales) Rules 2006 (as amended) (Rules).
- 1.5. The Rules state that the TWAO application must be accompanied by an Environmental Statement (ES), unless the Secretary of State has provided a direction that an ES is not required. No such direction has been issued to date and an ES is therefore determined to be required as part of the application documents.
- 1.6. Section 13B of the TWA requires the Secretary of State to consider the information contained within the ES and form a reasoned conclusion about the likely significant effects of the Scheme on the environment prior to determining the TWAO application. The purpose of the ES is to provide the information required by the Secretary of State to form such a reasoned conclusion and determine the TWAO application.
- 1.7. The ES will form part of the process of Environmental Impact Assessment (EIA). EIA is a process required for certain projects by virtue of their size, activities, location and potential to give rise to likely significant effects on the environment. The information that the Applicant is required to provide about the predicted environmental effects of the Scheme as part of the EIA process will be provided in the ES, which will identify and assess likely significant environmental effects. Prior to writing the ES, an environmental scoping process has been undertaken to identify the potential impacts that should be taken forward for further assessment and which should be reported in the ES. The scoping assessment also presents a proposed scope/methodology of the assessment that should take place to determine the significance of the impacts. This Environmental Scoping Report presents the findings of the environmental scoping assessment. It will be sent to the Secretary of State for an opinion on the proposed scope of the assessment (scoping opinion) and CCC Nationally Significant Infrastructure Projects (NSIP) team to collate responses from relevant technical teams.

EIA process

1.8. The requirement for an EIA to be carried out falls under the Transport and Works (Applications and Objections Procedure) (England and Wales) Rules 2006 (as amended) (Rules). Regard is also had to the EIA process set out in the Town and Country Planning (Environmental Impact Assessment)

Regulations 2017 (referred to as the EIA Regs). The Scheme is Schedule 2 development falling under paragraph 10(f) 'construction of roads'.

- 1.9. Rule 7A of the Rules states that the environmental impact assessment is a process consisting of (a) the preparation of an ES by the applicant; (b)the carrying out of consultation, publication and notification as required by rules 13 and 14 and, where relevant, rule 16; and (c) the steps that are required to be undertaken by the Secretary of State under section 13B. 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 Scheme on the factors listed at Rule 7A(2), which include.
 - population and human health;
 - biodiversity, with particular attention to species and habitats protected under any law of any part of the United Kingdom which implemented <u>Directive 92/43/EEC</u> and <u>Directive 2009/147/EC</u>;
 - land, soil, water, air and climate;
 - material assets, cultural heritage and the landscape; and
 - the interaction between the factors referred to in sub-paragraphs (a) to (d).
- 1.10. The significant effects to be identified, described and assessed under paragraph (2) shall include:
 - the operational effects of the proposed works, where those works will have operational effects; and
 - the expected significant effects arising from the vulnerability of the proposed works to major accidents or disasters that are relevant to those works.
- 1.11. The purpose of the scoping assessment is to identify the impacts from the Scheme that could result in significant environmental effects. These will be scoped in for detailed assessment in the ES. Impacts that are minor in nature and not likely to result in significant environmental effects can be scoped out and will not be reported in the ES.
- 1.12. The purpose of this document is to provide the Secretary of State with the information that they need to provide an ES Scoping Opinion. Rule 8 of the Rules sets out the minimum information to be included where a request for an ES Scoping Opinion is made.
 - A plan sufficient to identify the land affected by the works in question,
 - A brief description of the nature and purpose of the proposed works, and
 - A brief description of the possible effects on the environment from the works and may include such other information as the applicant wishes to provide.

2. Scheme description

2.1. The Scheme comprises the construction and operation of a segregated guided busway and travel hub (park and ride). The Scheme is currently at preliminary design stage and the route proposed to be taken forward is the Site.

Guided busway

2.2. The Scheme comprises a 6.5 km long, mainly segregated guided busway connecting northern Cambridge with the new town of Waterbeach. Specifically, the busway will extend from the Cambridgeshire Guided Busway (CGB), to the west of the A14 Impington underpass, extending north through agricultural fields and connecting with the A10 at Waterbeach. The southern end of the busway will connect with the Cambridgeshire Guided Busway (CGB) at the A14 Impington underpass. The proposed alignment remains under development and may change depending on design considerations and landowner negotiations.

- 2.3. The guided busway will be for the uses of buses only (i.e. no cars, trucks, motorbikes). It is intended that the scheme services will use fully electric buses from opening should the technology be available, and at a minimum Euro VI buses. The infrastructure will also allow other bus services to use the route for some of their journey, but these buses may not be electric or Euro VI.
- 2.4. The guided busway will be 7.3m wide. An emergency and maintenance access track, which will also be used as an active travel path, will run alongside the guided busway, separated from the carriageway by a verge of approximately 2.5m. This track will vary in width between approximately 3m and 4m. Design work determined that the track will run just along one side.
- 2.5. To accommodate the guided busway, the following elements are also required:
 - Butt Lane and Milton Road will be widened between Milton Park and Ride and the new guided busway to accommodate buses,
 - Creation of new junctions where the guided busway crosses and/or connects with existing roads at the CGB, A10, Milton Road, Butt Lane, Landbeach Road and Waterbeach Road, and
 - Access to Milton Park and Ride will be altered to provide bus priority out of the site.

Bus services

2.6. The core bus services using the guided busway are expected to route between Cambridge City Centre and Waterbeach Relocated Station, with some services continuing to Cambridge Biomedical Campus, West Cambridge and Ely, via Cambridge Research Park. The exact service patterns and frequencies will be determined by the operators of the route.

Travel hub

- 2.7. The travel hub would be located to the west of the A10 near Waterbeach New Town. The travel hub will provide approximately 1,600 parking spaces allowing commuters and people travelling to and from urban centres to park their cars and access public transport connections. This will include access to the bus route to be provided by the proposed Scheme. The location of the travel hub near the A10 provides close proximity to one of the main transport routes entering and exiting the north of Cambridge as well as proximity to Waterbeach New Town.
- 2.8. It will also connect with the active travel route, Mere Way, being constructed by the Waterbeach New Town developers, Urban& Civic, and the active travel route alongside the guided busway.
- 2.9. The design of the travel hub is still being progressed. Features of the site such as the layout, final number of car park spaces, EV charging points, buildings for maintenance and welfare facilities are not yet finalised. Facilities could include a building with refreshments, waiting area, turning circle for buses, shelters, cycle parking, motorcycle parking and coach parking.

Landscaping

2.10. Planting and landscaping will be integral to the Scheme design and a preliminary landscaping strategy has been prepared. The landscaping strategy will be used to develop a landscape design which will

integrate the Scheme into the local landscape as far as possible, including providing vegetation screening for sensitive viewpoints.

2.11. The landscape design will also seek to maximise the biodiversity potential of the habitat surrounding the Scheme, to achieve GCP's target of 20% Biodiversity Net Gain (BNG).

Lighting

- 2.12. Lighting provision proposals are still being developed and will aim to provide safety and wellbeing benefits whilst minimising light spill and glare.
- 2.13. It is envisaged that lighting will be provided within the travel hub, on access roads into the Travel Hub, at the new junctions formed between the highway and the new guided busway including any stops and where the new guided busway intersects with the existing guided busway. Where shared use paths run alongside the guided busway in darker, unlit areas, solar studs will be considered to provide good delineation of the path layouts. Refer to Appendix A for figures of indicative locations of proposed lighting.

Drainage

- 2.14. A drainage strategy is being prepared for the Scheme and will seek to maximise surface water attenuation and infiltration through the use of Sustainable Urban Drainage Systems (SUDS) such as swales. The drainage design will take into account climate change predictions and will ensure that drainage generated as a result of the Scheme can be accommodated without causing any additional flooding to the surrounding area, as well as within the guided busway and travel hub. SUDS that are proposed will also incorporate pollution prevention measures to ensure that any captured water that is discharged to ground or water courses does not negatively impact on water quality.
- 2.15. Where the proposed guided busway crosses existing watercourses then culverts and controlled outfalls will be implemented, any overland flow will be intercepted by ditches/swales at the edge of the guided busway and taken to the nearest outfall. The locations and details of culverts and outfalls will be agreed with the relevant LLFA and IDB accordingly.
- 2.16. Where the proposed guided busway and travel hub is located in the flood plain then appropriate areas for flood plain compensation shall be arranged and agreed with the EA.

Construction details and programme

- 2.17. Detailed construction information with regards to construction methods, types and quantities of materials, equipment and machinery, site compound locations, construction traffic routes and trip numbers are being developed. Details will be provided as the design progresses and will form the basis against which environmental impacts are identified and assessed in the ES. For the purposes of identifying potential impacts in this scoping assessment, the following construction activities are assumed to be required:
 - Removal of vegetation and top soil,
 - Excavation and earthworks,
 - Installation of telecommunications for utilities and lighting,
 - Laying down of surface materials (e.g. concrete, tarmac),

- Installation of drainage features,
- Landscaping and planting, and
- Painting of road markings and signage installation.
- 2.18. There will be several site compounds along the guided busway route, with a temporary haul road to allow movement of materials between them. Construction is anticipated to commence in 2026 and continue over approximately 29 months, with the Scheme opening in 2028.
- 2.19. The information provided in this report will comprise of each environmental designation such as:
 - Population and Human Health,
 - Ecology,
 - Landscape and Visual,
 - Cultural Heritage,
 - Water Environment,
 - Noise and Vibration,
 - Traffic and Movement,
 - Air Quality,
 - Soils, Geology and Contaminated Land,
 - Material Resources and Waste,
 - Climate Vulnerability,
 - Climate Effects,
 - Major Accidents and Hazards, and
 - Cumulative Effects.

3. Population and human health

Legislation and policy

- 3.1. The population and human health assessment is guided by legislation and policy. Those of particular note are listed below.
 - Countryside and Rights of Way Act (2000),
 - Equality Act 2010,
 - National Planning Policy Framework (2023) (particularly Chapter 8),
 - South Cambridgeshire Local Plan 2018 (Policy S/2 Objectives of the Local Plan, Policy SC/2 Health Impact Assessment and Policy NH/2 Protecting agricultural land),
 - Cambridge Local Plan 2018 (Policy 35 Protection of human health and quality of life from noise and vibration and Policy 67 Protection of open space),
 - The Greater Cambridge Local Plan and
 - The Cambridgeshire & Peterborough Local Transport Plan, 2023 (Policy 7.1 Public rights of way and waterway and Policy 7.3 Supporting and promoting health and wellbeing)

Scoping assessment methodology

Study area

- 3.2. Baseline data has been calculated for a Local Impact Area (LIA) and Wider Impact Area (WIA). The areas are shown in Figure 3-1. The LIA and WIA have been created based on guidance and professional judgement¹ and are defined as follows:
 - LIA: The area located within a 500m distance from the Site. This is the primary study area for this topic and is designed to capture most potential community and health effects of the Scheme and
 - WIA: A wider study area encompassing Cambridge City and South Cambridgeshire.
- 3.3. Broad socio-economic effects are considered using the wider study area and local specific effects have been assessed within the smaller study area.

Desk study

- 3.4. A desk based study has been carried out to inform the scoping assessment and the following data sources have been used to establish the population and human health baseline:
 - Office for National Statistics (ONS) population estimates data 2021²,
 - Cambridge Insight Open Data Portal³,
 - Cambridgeshire & Peterborough Join Strategic Needs Assessment (JSNA) 2023⁴ and
 - Local authority health profiles⁵.

¹ DMRB LA112 Population and Human Health has been used as relevant guidance, with professional judgement used where there is no standard definition of the study area for some effects like employment.

² Population estimates - Office for National Statistics (ons.gov.uk)

³ Cambridgeshire Insight Open Data | Open Data Portal

⁴ Cambridgeshire & Peterborough Insight – Joint Strategic Needs Assessment (JSNA) – Published Joint Strategic Needs Assessments (cambridgeshireinsight.org.uk)

⁵ Local Authority Health Profiles - Data - OHID (phe.org.uk)





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Baseline conditions

Population, residential property and economic activity

3.5. The total population of the LIA as of 2021 is approximately 12,100. The total population of the WIA is 307,500. (145,700 in Cambridge and 162,100 in South Cambridgeshire). The table below shows the population and age baseline in the LIA and WIA.

Area	Total population	Age		
		Under 15	15-64	65+
LIA	12,100	16.2%	70.8%	13%
WIA	307,500	16.1%	68.2%	15.7%
Cambridge	145,700	13.6%	75.2%	11.3%
South Cambridgeshire	162,100	18.4%	62.1%	19.5%
England	56,490,000	17.3%	64.3%	18.4%

Table 3-1 - Population

Source: ONS - Census 2021.

- 3.6. The population of the LIA has a lower proportion of older people compared to the WIA as a whole and nationally. Conversely, the proportion of those ages 15-64 is higher when compared to both the WIA and England. The proportion of children is similar to the WIA and national figures.
- 3.7. Key communities and residential areas within the LIA are primarily in the settlements of Milton, Landbeach, Waterbeach and Orchard Park (south of the A14). The city of Cambridge, to the south of the Site is the largest nearest community with a population of approximately 145,700 people.

Employment and economic activity

- 3.8. Information presented here is from 2021 and is considered reflective of the present situation but may not fully reflect the changes to the economy and employment associated with the Covid-19 pandemic in 2020.
- 3.9. Table 3-2 shows the economic baseline for the WIA. Employment is relatively high and unemployment is relatively low in the WIA authorities compared to the national average. The proportion of working age population (age 16-64) claiming jobseekers' allowance in 2018 was also lower in the WIA when compared to the national and regional averages.

Area	Economically active (16-64)	Employment rate (16-64)	Unemployed (16-64)	Claimant Count (December 2021) ⁶	Total Jobs
WIA	62.4%	59.9%	2.5%	2.0%	152,000
Cambridge	59.5%	56.6%	2.9%	2.1%	70,000
South Cambs.	65.2%	63.1%	2.1%	2.0%	82,000
England	60.9%	57.4%	3.5%	4.4%	26,405,000

Table 3-2 - Economic activity and employment data

Source: ONS 2021 Census Profile; Jobseekers Allowance 2019 average.

^{3.10.} While the settlements of Milton, Landbeach, Waterbeach and Orchard Park contain locallevel services and businesses, the main employment centre in the WIA is Cambridge city. This is the main centre for study and regional-level services in the WIA, containing major universities as well as a major shopping and office centre. Major industries of employment in the WIA are shown in the table below. The largest industry groups in the WIA are highskills industries such as education (19%), professional, scientific and technical industries (13%) and health (15%).

Industry	WIA	Cambridge	South Cambs.	England
Agriculture, mining, utilities (A, B, D,	2%	1%	2%	2%
_E)				
Manufacturing (C)	7%	6%	8%	7%
Construction (F)	6%	4%	7%	9%
Wholesale, retail and motor trades (G)	10%	9%	10%	15%
Transport & storage (including postal)	3%	2%	3%	5%
Accommodation & food services (I)	4%	5%	3%	5%
Finance, ICT and Property (J, K, L)	12%	13%	12%	10%
Professional, scientific & technical	13%	14%	12%	7%
(M)				
Business administration & support	4%	4%	4%	5%
services (N)				
Public administration & defence (O)	3%	3%	4%	6%
Education (P)	19%	22%	16%	10%
Health (Q)	15%	15%	14%	15%
Arts, entertainment, recreation &	4%	4%	4%	5%
other services (R, S, T and U)				

Table 3-3 - Industries of employment

Source: Business Register and Employment Survey, 2018; ONS 2021 Census Profile

Deprivation

3.11. The English Indices of Multiple Deprivation (IMD) 2019 are commonly used for the measurement and comparison of relative levels of deprivation (poverty). Most WIA

⁶ The number of people claiming Jobseeker's Allowance plus those who claim Universal Credit who are out of work, calculated as percentage of the working age population, 2021

residents (43%) live in the 20% least deprived neighbourhoods in the country. This is higher than the national average.

Location	Most deprived	Second most deprived	Third most deprived	Fourth most deprived	Least deprived
WIA	2%	5%	19%	32%	43%
Cambridge	4%	10%	31%	31%	25%
South Cambs.	0%	1%	10%	33%	56%
England ⁷	20%	21%	20%	20%	19%

Table 3-4 - Population by deprivation quintiles

Source: Indices of Multiple Deprivation, 2019

Health

3.12. Table 3-5 presents key health indicators, with data provided for the WIA where this is publicly available. The WIA is largely in line with health indicators showing general health and disabilities. Both Cambridge and South Cambridgeshire generally perform better than the national average on public health indicators, including for conditions sensitive to environmental factors such as respiratory diseases.

Table 3-5 - Public health data

Measure	WIA	Cambridge	South Cambs.	England
General health, self-reported (bad/very bad, 2021)	3.3%	3.3%	3.5%	5.2%
Long-term health problem or disability (2021)	14.7%	14.7%	14.7%	17.3%
Life expectancy at birth (male, 2020-22)	n/a	80.8	82.7	78.9
Life expectancy at birth (female, 2020-22)	n/a	84.2	85.4	82.8
Under-75 mortality rate from respiratory diseases (per _100,000, 2020-22)	n/a	18.2	14.2	28.9
Under-75 mortality rate from cardiovascular diseases considered preventable (per 100,000, 2016-18)	n/a	63.6	43.4	71.7
Mortality rate, chronic obstructive pulmonary disease (COPD) (per 100,000, 2020-22)	n/a	36.5	22.2	42.8
Physically active adults (%, 2021/22)	n/a	81.1	68.9	67.3

Source: Census 2021; Public Health England, Fingertips, 2024

⁷ IMD measures relative deprivation of Lower Super Output Areas (LSOAs), ranking all English LSOAs from most to least deprived. Population change since LSOAs were created in 2011 means the population is slightly higher in the second most deprived quintile.

3.13. In addition, areas and communities sensitive to changes in environmental health determinants as a result of the Scheme such as air quality management areas, areas of landscape amenity or areas sensitive to noise will be identified by the relevant environmental assessments and used to inform the human health assessment.

Community resources

3.14. There are several community resources located in the LIA, as shown in Figure 3-1. These include Cambridge Regional College, the Orchard Community Centre, Faith Community Church, and a Travelodge to the south of the Site in Orchard Park. Milton Household Waste Recycling Centre and Milton Park and Ride are south of the Site on Butt Lane. Milton C of E Primary School and Waterbeach Angling Club are east of the Site. Overbrook Nursery School, The Brambles B&B and Waterside Lodges are north of the Site. Beach Babies Nursery School is also within the LIA to the west.

Non-motorised users, PRoWs, public transport and noise action planning important areas

- 3.15. As shown in Figure 3-1, one PRoW is located within the LIA.
- 3.16. Several other PRoWs are located just outside of the LIA. In conjunction with the PRoW located within the LIA, these provide a network of routes for walkers, cyclists and pedestrians, ensuring connectivity between Cambridge City, Impington, Milton, Landbeach and Waterbeach. A Walking, Cycling and Horse-Riding Assessment Report (WCHAR) will be updated as part of preliminary design and will be used to inform the population and human health assessment.
- 3.17. The National Cycle Network (NCN) Route 51 Varsity Way is partially located within the LIA and close to the southern end of the Site.
- 3.18. Existing public transport includes rail and bus services, the Guided Busway and Community Transport.
- 3.19. Four Noise Action Planning Important Areas that are within or intersect the LIA. These are all associated with roads. Further details on the noise environment is contained in Chapter 8.

Development land, businesses and agriculture

- 3.20. Business properties are primarily located close to the boundary of the LIA in the Orchard Park district and villages of Milton, Waterbeach and Landbeach. Sites include Denny End Industrial Estate, Grasshopper Business Park, Evolution Business Park and Allia Future Business Centre. There are also individual businesses located outside of these locations, within the LIA.
- 3.21. Most land outside of settlements within the LIA is within agricultural use. Agricultural businesses in the LIA include a range of farm types and sizes. An Agricultural Impact Assessment (AIA) will be undertaken in support of the EIA. Findings from the AIA will be integrated with the population and human health assessment, where appropriate.

- 3.22. The following areas within the LIA are allocated in local plans for development:
 - Waterbeach New Town (South Cambridgeshire Local Plan 2018). Allocated for a new town of 8,000-9,000 dwellings and associated uses and
 - Orchard Park (South Cambridgeshire Local Plan 2018). Allocated for sustainable housing-led mixed-use development providing a minimum of 900 dwellings, a public transport interchange on the Guided Busway along the former railway line, up to 18,000m2 B1 Business development, a primary school, a local centre, public open space, and the preservation or enhancement of the Arbury Camp site of archaeological interest.
- 3.23. None of the above developments are within the Site.

Potential impacts

Construction

- 3.24. The Scheme requires temporary and permanent land taken within the LIA. The route travels through a mixture of privately owned land and Cambridgeshire County Council owned land. The current land use is primarily agricultural. Land acquisition will be required for the locations where the route passes through privately owned land. The permanent land take is not anticipated to affect residential property or community land. However, construction of the Scheme will require both permanent and temporary use of agricultural land along the route, potentially impacting the functioning of agricultural businesses. As such an Agricultural Impact Assessment will be undertaken in support of the EIA.
- 3.25. Temporary changes to access and increases in traffic from construction activities could also impact the entrances to residential properties, community resources and businesses in the LIA. This is particularly likely to impact residents of dwellings along the A10 at Denny End, Waterbeach Road, the High Street and Landbeach Road at Landbeach, Butt Lane and Milton Road.
- 3.26. There are four premises adjacent to Butt Lane and Milton Road that could be directly impacted by the works, including:
 - Milton Park & Ride,
 - Milton Household Waste Recycling Centre it is understood that there are plans to upgrade the recycling centre, but it is assumed that construction will be complete by the time works on the Milton Road begin,
 - A Fruit Farm and
 - Evolution Business Park six properties occupied by high-tech manufacturing businesses.
- 3.27. Also accessed via Milton Road, but not directly impacted by the works are:
 - Four properties/smallholdings,
 - One large farm,
 - A small number of industrial units and
 - Access to adjacent farmland.

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- 3.28. The construction of the Scheme could impact on existing walking, cycling and equestrian routes within the LIA, requiring both temporary and permanent diversions where they cross the route of the Scheme. These NMU routes include:
 - National Cycle Network (NCN) Route 51 Varsity Way and
 - Mere Way Byway (135/3 and 162/3)
- 3.29. These potential temporary diversions or closures to these PRoWs could result in temporary disruption to users from increased journey lengths. Changing or disrupting these routes can also create severance, by restricting the ability for users to travel between communities to access community facilities and good and services.
- 3.30. The Scheme is anticipated to result in temporary changes to the local environment which may affect the amenity and/or health of communities. Potential adverse impacts could include noise and air quality impacts during construction impacting amenity and/or health of communities mentioned in chapter 8 and chapter 10 respectively.
- 3.31. The Scheme requires a construction workforce to deliver it, which would likely result in direct beneficial, indirect and induced indirect effects from temporary employment in the WIA.

Operation

- 3.32. The Scheme is not expected to impact direct access from the existing road network to residential or business properties. Public transport access to community resources are likely to be improved by the Scheme.
- 3.33. An emergency and maintenance access track, which will run alongside the segregated section of the guided busway, will also be used as an active travel path.
- 3.34. The new walking and cycling provision along may also encourage people to use active travel modes, bringing potential health benefits to the population. This could result in beneficial changes in air quality and noise that could improve the environment and subsequently have beneficial impacts on human health. The Scheme would improve connectivity between existing PRoWs through the new shared use path along the route.
- 3.35. The proposed guided busway may result in permanent changes to the local environment which may affect the amenity and/or health of communities. Potential adverse impacts could include result from noise and air quality impacts during operation impacting amenity and/or health of communities. These potential impacts are discussed in Chapters 8 and 10 respectively.
- 3.36. The Scheme may result in beneficial impacts for future users of planned development land under the South Cambridgeshire Local Plan. Waterbeach New Town and Orchard Park are allocated for housing and are likely to increase the population in this area, one of the key reasons for constructing the Scheme. The presence of the Scheme could also make the area attractive to new residents (commuters).
- 3.37. The Scheme may also create additional permanent employment throughout operation. It would also deliver wider economic benefits to the economy of the WIA through delivering improved public transport and supporting greater productivity and investment.

Proposed scope of ES

3.38. The summary table of scoping assessment is provided in chapter 17.

Scoped in

3.39. The following impacts will be considered in the ES.

Construction

Health related behaviours

 Physical Activity - Potential impacts such as disruption to access to public open space, recreation, and leisure time activities as well as on existing walking, cycling and horse riding routes within the study and wider area would reduce opportunities for physical activity.

Social environment

- Transport modes, access and connections Further assessment required of potential health outcomes from construction related traffic and traffic disruptions,
- Social participation, interaction and support Significant effects in relation to human health are possible due to potential disruption to opportunities for community participation and interaction and
- Open space, leisure and play potential health outcomes from temporary loss of access / disruption to WCH routes and potential effects (including visual and amenity impacts) on recreational spaces such as playing fields, golf courses and public parks and gardens.

Economic environment

 Education and training - The Scheme may provide opportunities for apprenticeships or training in the local workforce. Temporary changes to access and increases in traffic from construction activities could also impact the entrances to residential properties, community resources and businesses in the LIA.

Bio-physical environment

- Air quality Further assessment required and reference should be made to Chapter 10,
- Land quality and land use / agricultural activities Further assessment on soils and agricultural land and reference should be made to Chapter 11,
- Noise and vibration Further assessment on soils and agricultural land and reference should be made to Chapter 8 and
- Water quality or availability Further assessment on soils and agricultural land and reference should be made to Chapter 7.

Institutional and built environment

 Built environment - Temporary changes to access and increases in traffic from construction activities could also impact the entrances to residential properties, community resources and businesses in the LIA. There are four premises adjacent to Butt Lane and Milton Road that will be directly impacted by the works.

Operation

Health related behaviours

 Physical Activity - The new walking and cycling provision along the Scheme may encourage people to use active travel modes, resulting in positive impacts on physical activity. Public transport access to public open space, recreation and leisure time activities are likely to be improved by the Scheme. The Scheme would improve connectivity between existing PRoWs through the new shared use path along the route.

Social environment

- Further assessment required of potential health outcomes on residents within the study area as a result of operational activities (including visual disturbance),
- Open space, leisure and play The new walking and cycling provision along the Scheme will increase opportunities for leisure and play. Public transport access to recreational spaces is likely to be improved by the Scheme. The Scheme would improve connectivity between existing PRoWs through the new shared use path along the route,
- Transport modes, access and connections The improved public transport and active travel opportunities created by the Scheme may result in beneficial health outcomes due to a decrease in traffic and traffic disruptions and
- Social participation, interaction and support Significant beneficial effects in relation to human health are considered likely due to increased opportunities for community participation and interaction.

Economic environment

- Education and training There is potential for significant beneficial effects during operation due to increased access by public transport and active travel routes to schools within the LIA and
- Employment and income Health benefits resulting from increased employment opportunities in the wider area due to a more reliable route.

Bio-physical environment

- Air quality Further assessment required and reference should be made to Chapter 10,
- Land quality and land use / agricultural activities Further assessment on soils and agricultural land and reference should be made to Chapter 11,
- Noise and vibration Further assessment on soils and agricultural land and reference should be made to Chapter 8 and
- Water quality or availability Further assessment on soils and agricultural land and reference should be made to Chapter 7.

Scoped out

3.40. As a result of the information collected in the preparation of this Scoping Report it is proposed that the following aspects will be scoped out of further consideration in the ES because there will be no likely significant environmental effects to assess.

Construction

Health related behaviours

- Risk taking behaviour Construction is not anticipated to give rise to significant effects on risk taking behaviour where standard best practice construction methods are used. This could include for example, erection of security fencing and controlled access into and out of Site where appropriate, though it is acknowledged this would not be possible / appropriate along a long linear route in a sparsely populated area and
- Diet and nutrition No significant effects in relation to human health from diet or nutrition have been identified. It is anticipated that loss / disruption to agricultural activities would not have a significant effect on diet or nutrition in the wider area.

Social environment

- Housing No potential health outcomes on residents within the study area as a result of construction activities (including visual disturbance). Temporary changes to access and increases in traffic from construction activities could also impact the entrances to residential properties, community resources and businesses in the LIA,
- Relocation No significant effects in relation to human health identified as no relocation is anticipated as a result of construction activities,
- Community safety No significant effects in relation to human health where standard best
 practice is adopted. This could include for example, erection of security fencing and controlled
 access into and out of Site where appropriate, though it is acknowledged this would not be
 possible / appropriate along a long linear route in a sparsely populated area. Construction of
 the road is not anticipated to give rise to an increase in the population of pests or migration of
 pests off-site and
- Community identity, culture, resilience and influence Construction activities are not anticipated to give rise to significant adverse effects on community, identity, resilience and influence.

Economic environment

- Education and training There are schools within the LIA, however these are separated from the Site by the A10 (Milton C of E Primary School) and A14 (Cambridge Regional College) and effects in relation to human health would not occur as a result of disruption that may affect educational and skills attainment, maintain or improve school availability, capacity or quality and
- Employment and income Health benefits resulting from construction employment and income. Temporary changes to access and increases in traffic from construction activities could also impact the entrances to businesses in the LIA.

Institutional and built environment

 Health and social care services – potential health outcomes as a result of construction activities to health and social care facilities and other potentially vulnerable receptors.

Bio-physical environment

 Climate change mitigation and adaptation - No significant effects in relation to human health from the interaction with climate change during construction have been identified and Radiation - No significant effects in relation to human health. The project is not expected to affect actual or perceived exposure to electromagnetic and ionising radiation risks during construction.

Operation

Health related behaviours

- Risk taking behaviour Operation is not anticipated to give rise to potentially significant effects on risk taking behaviour where best practice operational procedures are adopted i.e. standard road safety measures etc.and
- Diet and nutrition No significant effects in relation to human health from diet or nutrition within the wider study area are considered likely.

Social Environment

- Relocation No significant effects in relation to human health identified as no relocation is anticipated as a result of operational activities,
- Community safety Operation is not anticipated to give rise to potentially significant effects on community safety where best practice operational procedures are adopted i.e. standard road safety measures etc. Operation of the road is not anticipated to give rise to an increase in the population of pests or migration of pests off-site and
- Community identity, culture, resilience and influence potential impacts of permanent changes to the local environment and removal of agricultural land.

Bio-physical environment

- Climate change mitigation and adaptation It is anticipated the road will be designed to take account of climate change and no significant effects in relation to human health are anticipated in respect of the roads interaction with a changing climate and
- Radiation No significant effects in relation to human health. The project is not expected to affect actual or perceived exposure to electromagnetic and ionising radiation risks during operation.

Institutional and built environment

- Built environment No significant effects in relation to human health during construction have been identified,
- Health and social care services No potential health outcomes as a result of operational activities to health and social care facilities and other potentially vulnerable receptors and
- Wider societal infrastructure and resources No potential health outcomes as a result of operation activities to wider societal infrastructure and resources.

Assessment method

Guidance documents

3.41. The following guidance will be used to carry out the population and human health assessment:

- Highways England (2020) Design Manual for Roads and Bridges (DMRB) LA 112 Population and human health⁸ and
- The Institute of Environmental Management and Assessment (IEMA) Guide To 'Determining Significance for Human Health in Environmental Impact Assessment'⁹.
- 3.42. It is considered that the requirements set out in LA 112 can be integrated with the IEMA guidance in order to provide an assessment and report that is both compliant with DMRB LA 112 and that of the EIA Regulations (The Transport and Works (Applications and Objections Procedure) (England and Wales) Rules 2006 (as amended) (Rules))¹⁰.

Background to the assessment methodology

- 3.43. This chapter sets out the assessment methodology adopted for the assessment of the anticipated impacts on population and human health. It is to be noted that while these issues are considered together and are complimentary, they are assessed separately, with a slightly different methodology taken in relation to consideration of population and its assets, to that taken when considering impacts on human health.
- 3.44. In terms of population / land use, the Design Manual for Roads and Bridges (DMRB) LA 112¹¹ sets out the requirements for assessing and reporting the environmental effects on population from construction, operation, and maintenance of highways projects. Professional judgement is also used to guide the assessment. The DMRB standard requires reporting on the following elements:
 - Private property and housing,
 - Community land and assets,
 - Development land and businesses,
 - Agricultural land holdings and
 - Walkers, cyclists, and horse-riders (WCH).
- 3.45. In relation to human health DMRB LA 112 sets out the requirements for assessing and reporting the environmental effects on human health for construction, operation, and maintenance of highways projects. While regard is made of these requirements, it must be borne in mind that LA 112 provides a means to derive a human health outcome category and provides no mechanism to derive significance of effect. However, it is to be noted that The Transport and Works (Applications and Objections Procedure) (England and Wales) Rules 2006 require ES to include, among other topics, assessment of potential effects upon human health, and it is taken that this will include potential impacts/effects on

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 ⁸ Highways England. Design Manual for Roads and Bridges LA 112 Population and human health (2020). Available at: <u>LA 112</u>
 <u>- Population and human health (standardsforhighways.co.uk)</u>

⁹ IEMA. Guide To 'Determining Significance For Human Health In Environmental Impact Assessment'

^{(2022).} Available at: IEMA-EIA-Guide-to-Determining-Significance-for-Human-Health (3).pdf

¹⁰ Department for Transport. *The Transport and Works (Applications and Objections Procedure) (England and Wales) Rules* 2006 (2006). Available at: <u>The Transport and Works (Applications and Objections Procedure) (England and Wales) Rules 2006</u> (legislation.gov.uk)

¹¹ Standards for Highways (2020) DMRB LA 112 Population and Human Health. Available: <u>1e13d6ac-755e-4d60-9735-</u> <u>f976bf64580a (standardsforhighways.co.uk)</u>

physical, mental, and social wellbeing. A key element to the EIA Regulations is that they require a description of 'the likely significant effects of the proposed project'.

- 3.46. Therefore, in order to remain compliant with the requirements of the EIA Regulations, in addition to DMRB LA 112, consideration is also made of The Institute of Environmental Management and Assessment (IEMA) Guide To 'Determining Significance for Human Health in Environmental Impact Assessment' which sets out the requirements for assessing the direct and indirect effects, in an appropriate manner, of a proposed development on human health.
- 3.47. Health is influenced by a range of factors, termed the 'wider determinants of health'. Determinants of health span the bio-physical, social, behavioural, economic and institutional factors The IEMA guidance document provides a framework for concluding on the significance of population health effects that can be applied across the wider determinants of health.
- 3.48. The IEMA guidance document recognises that significance at the level of individuals is not proportionate, and as such establishes a method for assessing significance at a population level, or disproportionate effects to relevant sub-populations, i.e. groups of more sensitive individuals.
- 3.49. It is considered that the requirements set out in LA 112 can be integrated with the IEMA guidance in order to provide an assessment and report that is both compliant with DMRB LA 112 and that of the EIA Regulations. This is developed further throughout this Chapter.
- 3.50. In order to integrate the separate but overlapping requirements set out in the respective DMRB and the IEMA guidance, groupings are made of the 'Wider determinants of health' and 'Community aspect' headings under respective IEMA Categories. This linkage is set out in Table 3-6 and provides the reporting structure for the purposes of the assessment.

Categories	Wider determinants of health (IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment ⁹)	Community Aspect (DMRB LA 11211 – Land use and accessibility)
Health related behaviours	Physical activity Risk taking behaviour Diet and nutrition	Walkers, cyclists and horse-riders

Table 3-6 - Linking IEMA wider determinants of health with DMRB LA 112

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Social Environment	Housing Relocation	Private property and housing
	Open space, leisure and play Transport modes, access and connections Community safety Community identity, culture, resilience, and influence Social participation, interaction and support	Community land and assets
Economic environment	Education and training Employment and income	Development land and business
Bio-physical environment	Climate change mitigation and adaptation Air quality Water quality or availability Land quality Noise and vibration Radiation	
Institutional and built environment	Health and social care services Built environment Wider societal infrastructure and resources	Agricultural Land Holdings

Determining value and sensitivity

Determining value and sensitivity of population / land use and accessibility / socioeconomic issues

3.51. Using DMRB LA112 Population and Human Health¹¹, the sensitivity of land use and accessibility receptors (i.e., private property and housing, community land and assets, development land and businesses, agricultural land holdings, and walkers, cyclists and horse-riders) is determined by their proximity to the Proposed Development, and characteristics and capacity to cope with change. This sensitivity criteria are set out in more detail in Table 3-7.

Table 3-7 - DMRB LA 112 criteria for determining sensitivity

Receptor Sensitivity	Description
	Private property and housing:

Receptor Sensitivity	De	escription
Very high	•	Existing private property or land allocated for housing located in a local authority area where the number of households are expected to increase by >25% by 2041 (ONS data); and/or
	•	Existing housing and land allocated for housing (e.g., strategic housing sites) covering >5ha and / or >150 houses
	Community land and assets where there is a combination of the following:	
	•	Complete severance between communities and their land/assets, with little/no accessibility provision,
	•	Alternatives are only available outside the local planning authority area,
	•	The level of use is very frequent (daily) and
	•	The land and assets are used by the majority (>=50%) of the community
	De	evelopment land and businesses:
	•	Existing employment sites (excluding agriculture) and land allocated for employment (e.g., strategic employment sites) covering >5h
	Ag	ricultural land holdings:
	•	Areas of land in which the enterprise is wholly reliant on the spatial relationship of land to key agricultural infrastructure and
	•	Access between land and key agricultural infrastructure is required on a frequent basis (daily)
	Wa	alkers, cyclists, and horse-riders (WCH):
	•	National trails and routes likely to be used for both commuting and recreation that record frequent (daily) use. Such routes connect communities with employment land uses and other,
	•	Services with a direct and convenient WCH route. Little/no potential for substitution,
	•	Routes regularly used by vulnerable travellers such as the elderly, school children and people with disabilities, who could be disproportionately affected by small changes in the baseline due to potentially different needs and
	•	Rights of way for WCH crossing roads at grade with >16,000 vehicles per day.
High	Pri	ivate property and housing
	•	Private property or land allocated for housing located in a local planning authority area where the number of households are expected to increase by 16-25% by 2041 (ONS data); and/or
	•	Existing housing and land allocated for housing (e.g., strategic housing sites) covering >1-5ha and/or >30-150 houses
	Со	ommunity land and assets where there is a combination of the following:
	•	There is substantial severance between community and assets, with limited accessibility provision,

Receptor Sensitivity	Description		
	•	Alternative facilities are only available in the wider local planning authority area,	
	•	The level of use is frequent (weekly); and	
	•	The land and assets are used by the majority (>=50%) of the community.	
	De	evelopment land and businesses:	
	•	Existing employment sites (excluding agriculture) and land allocated for employment (e.g., strategic employment sites) covering >1 -5ha.	
	Agricultural land holdings:		
	•	Areas of land in which the enterprise is dependent on the spatial relationship of land to key agricultural infrastructure; and	
	•	Access between land and key agricultural infrastructure is required on a frequent basis (weekly).	
	W	CH:	
	•	Regional trails and routes (e.g., promoted circular walks) likely to be used for recreation and to a lesser extent commuting, which record frequent (daily) use. Limited potential for substitution; and/or	
	•	Rights of way for WCH crossing roads at grade with >8,000 -16,000 vehicles per day.	
Medium	Private property and housing:		
	•	Houses or land allocated for housing located in a local authority area where the number of households are expected to increase by >6-15%by 2041 (ONS data); and/or	
	•	Existing housing and land allocated for housing (e.g., strategic housing sites) covering <1ha and / or <30 houses	
	Со	mmunity land and assets where there is a combination of the following:	
	•	There is severance between communities and their land/assets but with existing accessibility provision,	
	•	Limited alternative facilities are available at a local level within adjacent communities,	
	•	The level of use is reasonably frequent (monthly); and	
	•	The land and assets are used by the majority (>=50%) of the community.	
	De	evelopment land and businesses:	
	•	Existing employment sites (excluding agriculture) and land allocated for employment (e.g., strategic employment sites) covering >1ha	
	Ag	ricultural land holdings	
	•	Areas of land in which the enterprise is partially dependent on the spatial relationship of land to key agricultural infrastructure; and	

Receptor Sensitivity	De	escription	
	•	Access between land and key agricultural infrastructure is required on a reasonably frequent basis (monthly)	
	WCH		
	•	Public rights of way and other routes close to communities which are used for recreational purposes (e.g., dog walking), but for which alternative routes can be taken. These routes are likely to link to a wider network of routes to provide options for longer, recreational journeys, and / or	
	•	Rights of way for WCH crossing roads at grade with >4000 – 8000 vehicles per day.	
Low	Pri	ivate property and housing:	
	•	Proposed development on unallocated sites providing housing with planning permission/in the planning process.	
	Со	mmunity land and assets where there is a combination of the following:	
	•	Limited existing severance between community and assets, with existing full Disability Discrimination Act (DDA) DDA 1995 (Ref 2.N)161 compliant accessibility provision,	
	•	Alternative facilities are available at a local level within the wider community,	
	•	The level of use is infrequent (monthly or less frequent); and	
	•	The land and assets are used by the minority (<=50%) of the community.	
	De	evelopment land and businesses:	
	•	Proposed development on unallocated sites providing employment with planning permission/in the planning process.	
Agricultural land holdings:		ricultural land holdings:	
	•	Areas of land which the enterprise is not dependent on the spatial relationship of land to key agricultural infrastructure; and	
	•	Access between land and key agricultural infrastructure is required on an infrequent basis (monthly or less frequent)	
	W	СН	
	•	Routes which have fallen into disuse through past severance, or which are scarcely used because they do not currently offer a meaningful route for either utility or recreational purposes, and/or	
	•	Rights of way for WCH crossing roads at grade with <4000 vehicles per day.	
Negligible	Pri	ivate property and housing:	
	•	N/A	
	Со	mmunity land and assets where there is a combination of the following:	
	•	No or limited severance or accessibility issues,	
	•	Alternative facilities are available within the same community,	

Receptor Sensitivity	Description	
	 The level of use is very infrequent (a few occasions yearly); and The land and assets are used by the minority (<=50%) of the community. 	
	Development land and businesses: N/A	
	Agricultural land holdings:	
	 Areas of land which are infrequently used on a non-commercial basis WCH: 	
	• N/A	

Determining Value and Sensitivity of Human Health Issues

3.52. The criteria for determining the sensitivity for health receptors has been taken from the IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment⁹, as set out in Table 3-8. Due to the nature of the receptor, it is likely that the sensitivity of many health receptors will span more than one sensitivity. Where this is the case, professional judgement has been applied to determine the most appropriate sensitivity.

Table 3-8 - IEMA criteria for determining health sensitivity

Sensitivity	Criteria
High	High levels of deprivation (including pockets of deprivation); reliance on resources shared (between the population and the project); 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; dependants; people with very poor health status; and / or 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; people who are highly limited from undertaking daily activities; people providing or requiring a lot of care; people with poor health status; and/or 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; and/or people with a high capacity to adapt

Sensitivity	Criteria
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; and/or people with a very high capacity to adapt

Impact assessment

Determining impact magnitude of population / land use and accessibility / socioeconomic issues

3.53. Identifying and assessing the likely impacts of the proposed scheme depends on the sensitivity of the receptors to changes to the baseline conditions. In accordance with DMRB LA 112 Population and Human Health¹¹, the magnitude of any change to the baseline conditions will be reported according to the criteria set out in Table 3-9.

Magnitude of impact (change)	Description			
Major	 Private property and housing, community land and assets, development land and businesses and agricultural land holdings: Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements e.g., direct acquisition and demolition of buildings and direct development of land to accommodate highway assets; and/or Introduction (adverse) or removal (beneficial) of complete severance with no/full accessibility provision. 			
	 >500m increase (adverse) / decrease (beneficial) in WCH journey length 			
Moderate	 Private property and housing, community land and assets, development land and businesses and agricultural land holdings: Partial loss of/damage to key characteristics, features or elements, e.g., partial removal or substantial amendment to access or acquisition of land compromising viability of property, businesses, community assets or agricultural holdings; and/or Introduction (adverse) or decrease (beneficial) of severe severance with limited/moderate accessibility provision. WCH: >250m – 500m increase (adverse) or decrease (beneficial) in WCH >250m – 500m increase (adverse) or decrease (beneficial) in WCH 			
Minor	Private property and housing, community land and assets, development land and businesses			

Table 3-9 - DMRB L/	A 112 criteria	for assessing	population	magnitude	of impact
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Magnitude of impact (change)	Description
	 A discernible change in attributes, quality or vulnerability; minor loss of, or alteration to one (maybe more) key characteristics, features or elements, e.g., amendment to access or acquisition of land resulting in changes to operating conditions that do not compromise overall viability of property businesses, community assets or agricultural holdings; and/or Introduction (adverse) or removal (beneficial) of severance with adequate accessibility provision.
	WCH
	 >50m – 250m increase (adverse) or decrease (beneficial) in WCH journey length
Negligible	 Private property and housing, community land and assets, development land and businesses and agricultural land holdings: Very minor loss or detrimental alteration to one or more characteristics, features or elements, e.g., acquisition of non-operational land or buildings not directly affecting the viability of property, businesses, community assets or agricultural holdings; and/or Very minor introduction (adverse) or removal (beneficial) of severance
	with ample accessibility provision.
	WCH
	<50m increase (adverse) or decrease (beneficial) in WCH journey length
No change	No loss or alteration of characteristics, features, elements or accessibility; no observable impact in either direction

Determining impact magnitude of human health issues

3.54. DMRB LA 112 does not attribute magnitude for health so, in respect of Human health, magnitude is derived through assessment against indicative criteria taken from the IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment⁹. This is set out in Table 3-10.

Table 3-10 - IEMA criteria for assessing health magnitude of impact

Category/Level	Criteria
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 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; 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.

Determining effect significance

Determining significance of impact on population / land use and accessibility / socio-economic issues

- 3.55. The significance of population, land use, accessibility and socio-economic effects has been derived by combining the assigned sensitivity of receptors with the magnitude of change arising from a project, in accordance with Table 3-11, taken from DMRB LA 104 Environmental Assessment and Monitoring. Effects determined to be Very Large, Large or Moderate are deemed to be significant and those that are Slight or Neutral, are not considered to be significant.
- 3.56. Professional judgement has been exercised to validate the significance of effect value by considering the effect permanence (temporary or permanent) and duration (short-term or long-term) and by providing a narrative description of the effects.

		Magnitude of impact				
		Major	Moderate	Minor	Negligible	No change
Receptor Sensitivity	Very high	Very large	Large or very large	Moderate or large	Slight	Neutral
	High	Large or very large	Moderate or large	Slight or moderate	Slight	Neutral
	Medium	Moderate or large	Slight or moderate	Slight	Neutral or slight	Neutral
	Low	Slight or moderate	Slight	Neutral or slight	Neutral or slight	Neutral
	Negligible	Slight	Neutral or slight	Neutral or slight	Neutral	Neutral

Table 3-11 - Determining the significance (source DMRB LA 104)

Determining significance of impact on human health issues

- 3.57. The impact to human health from the proposed scheme is a function of the impact magnitude and receptor sensitivity as shown in Table 6.7. Impacts can be beneficial or adverse. Major or moderate impacts are deemed to be significant, and minor and negligible impacts are deemed to be not significant.
- 3.58. DMRB LA 112 does not assign significance of effect for human health and instead identifies likely health outcomes (positive, neutral, negative; and uncertain). In order to remain aligned to DMRB LA 112 these categories are also communicated, in the impact assessment, alongside the significance of effect described in Table 3-12 and Table 3-13. When determining significance, professional judgement is exercised as it is likely in any given analysis that some effects will span categories.
| | | Major | Moderate | Minor | Negligible |
|----------------------|------------|-----------------------|-----------------------|---------------------|--------------------|
| Receptor Sensitivity | High | Major | Major /
moderate | Moderate /
minor | Minor / negligible |
| | Medium | Major /
moderate | Moderate | Minor | Minor / negligible |
| | Low | Moderate /
minor | Minor | Minor | Negligible |
| | Negligible | Minor /
negligible | Minor /
negligible | Negligible | Negligible |

Table 3-12 - IEMA EIA significance matrix for determining health effects

Magnitude of impact

Table 3-13 - Significance conclusion and	reasoning related to public health (IEM	4)
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Significance	Indicative criteria
Major (significant)	 Changes, due to the project, 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, which show consensus on the importance of the effect, Change, due to the project, 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 project and changes to health outcomes and In addition, health priorities for the relevant study area are of specific relevance to the determinant of health or population group affected by the project
Moderate (significant)	 Changes, due to the project, 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 project, 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 project and changes to health outcomes and In addition, health priorities for the relevant study area are of general relevance to the determinant of health or population group affected by the project.
Minor (not significant)	 Changes, due to the project, 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,

Significance	Indicative criteria
	 Change, due to the project, 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 literature showing there is only a suggestive relationship between changes that would result from the project and changes to health outcomes and
	 In addition, health priorities for the relevant study area are of low relevance to the determinant of health or population group affected by the project.
Negligible (not significant)	 Changes, due to the project, 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 project having no responses on this issue among stakeholders, Change, due to the project, 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 project and changes to health outcomes and In addition, health priorities for the relevant study area are not relevant to the determinant of health or population group affected by the project.

4. Ecology

Legislation and policy

4.1. Legislation and policy relevant to the ecological scoping assessment is listed below.

- The Environment Act 2021,
- The National Planning Policy Framework (NPPF) (2023),
- Natural Environment and Rural Communities (NERC) Act 2006 (as amended),
- The Wildlife and Countryside Act 1981
- The Conservation of Habitats and Species Regulations 2017
- The Invasive Alien Species (Enforcement and Permitting) Order 2019,
- A Green Future: Our 25 Year Plan to Improve the Environment (DEFRA, 2018),
- The Environmental Improvement Plan 2023,
- Greater Cambridge Shared Planning (2021) Greater Cambridge Local Plan, First Proposals,
- South Cambridge Local Plan, and
- Transport Strategy for Cambridge and South Cambridgeshire (2014).

Scoping assessment methodology

- 4.2. The geographical area for obtaining ecological data through desk studies has been determined using current guidance¹² and professional judgement. Baseline data has been gathered from a range of sources as outlined below. The study areas used for the data gathering are detailed in Table 4-1 showing distances from the Site (the boundary of the Scheme as detailed in Figure 1-1). The desk study was undertaken in November 2022. For species records collected, only those within 10 years of the data collection date have been considered within this scoping assessment. The following online resources have been used:
 - Cambridgeshire & Peterborough Environmental Records Centre (CPERC) were contacted to request records of protected and priority species and habitats and details of non-statutory designated sites for nature conservation,
 - Multi-Agency Geographic Information for the Countryside (MAGIC) website¹³ and
 - Woodland Trust Ancient Tree Inventory¹⁴.

Data type	Search area – distance from Site
Statutory designated sites for nature	2 km ¹⁵
conservation	Extended to 30 km, where bats are noted as
	one of the qualifying interests ¹⁶
Irreplaceable habitats	1 km
Veteran trees	50 m
Priority habitats and species	1 km (extended to 2 km for bats)

Table 4-1 - Desk study search distances

Field survey

4.3. Following Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines for Preliminary Ecological Appraisal¹⁷ a walkover survey was undertaken in October 2022, focusing on protected and priority habitats and / or species. The walkover included all land within the site as understood at the time, plus a buffer of up to 50 m from the site boundary where access was allowed (the walkover survey area). The walkover survey area is shown on Figure 4-1. The survey area followed a former alignment route of the Scheme and therefore the route walked does not exactly align with the current design.

¹² CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.

¹³ Multi-Agency Geographic Information for the Countryside (MAGIC) [Online]. Available at: <u>https://magic.defra.gov.uk/</u> [Accessed November 2022].

¹⁴ Woodland Trust *Ancient Tree Inventory* [Online]. Available at: <u>https://ati.woodlandtrust.org.uk/</u> [Accessed: December 2022]. ¹⁵ The proposed scheme is not hydrologically linked to any statutory designated sites and search areas downstream are not

considered. ¹⁶ DMRB. (2020). Sustainability & Environment Appraisal. LA 115 Habitats Regulations assessment. Rev. 1 Available at LA 115

⁻ Habitats Regulations assessment (standardsforhighways.co.uk)

¹⁷ CIEEM. (2018) Guidelines for Preliminary Ecological Appraisal

An assessment of the possible presence of priority habitats, protected or priority species, and an assessment of the likely importance of habitat features present that could support such species was also undertaken during the walkover survey.

Figure 4-1 - Walkover survey area



4.4. Additional ecological survey work commenced in March 2024 and is on-going. This includes daytime bat walkover and preliminary roost assessment, badger and breeding bird surveys as well as presence / likely absence surveys for reptile, otter, water vole and white-clawed crayfish and detailed botanical surveys to inform a Biodiversity Net Gain (BNG) assessment. As these surveys are on-going, detailed results are not included in this scoping report.

Baseline conditions

4.5. This section presents a preliminary assessment of baseline ecological information for the site established through desk study and preliminary ecological surveys.

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Statutory and non-statutory designated sites

4.6. Statutory and non-statutory designated sites for nature conservation are shown on Figure 4-2 and Figure 4-3. Table 4-2 and Table 4-3 detail the statutory and non-statutory designated sites for nature conservation identified though the desk study.

Figure 4-2 - Statutory designated sites





Figure 4-3 - Non-statutory designated sites

Table 4-2	Statutory	designated	sites fo	or nature	conservation	within t	he study	area
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Site name	Designation	Location of designated site ¹⁸	Features of interest ¹⁹		
Sites of inte	Sites of international importance				
Eversden and	Special Area of	Approximately 13.5 km south-west of the site.	Barbastelle bats (an Annex II species) are the primary reason for selection of this SAC.		

¹⁸ Where designated sites are situated outside of the site boundary, the distance and direction is given to the closest point that the designated site is from the site.

¹⁹ Including qualifying features of internationally designated sites and reasons for designation for SSSIs.

Site name	Designation	Location of designated site ¹⁸	Features of interest ¹⁹
Wimpole Woods	Conservation (SAC)		The SAC comprises a mixture of ancient coppice woodland (Eversden Wood) and high forest woods likely to be of more recent origin (Wimpole Woods). A colony of barbastelle is associated with the trees in Wimpole Woods. These trees are used as a summer maternity roost where the female bats gather to give birth and rear their young. Most of the roost sites are within tree crevices. The bats also use the site as a foraging area. Some of the woodland is also used as a flight path when bats forage outside the site.

Sites of Nat	ional importance			
None				
Sites of Local importance				
Worts Meadow	Local Nature Reserve (LNR)	350 m west of the site. The town of Landbeach is located between the LNR and the proposed scheme.	The LNR consists of improved lowland grassland pasture, hedgerows, native plantation woodland and three ponds. The ponds support populations of great crested newts ²⁰ . The hedgerows are species rich and have supported yellowhammers, whitethroats and turtle doves ²¹ .	

Table 4-3 - Non-statutory designated sites for nature conservation within the study area (1 km)

Site name	Designation	Location of designated site ¹⁸	Features of interest
King's Hedges	City Wildlife Sites (CiWS)	250 m south-east of the Site.	This CiWS supports a hedgerow of at least 100 m in length and 2 m width
Hedgerow The A14 and commercial Orchard Par located betw CiWS and th	The A14 and commercial properties of Orchard Park are located between the CiWS and the Site.	at its widest point, with four or more woody species, with at least one section of the hedge allowed to flower and fruit.	
Cambridge Road Willow Pollards	County Wildlife Sites (CoWS)	695 m east of the Site. The A10, residential properties and parcels of woodland are located	This CoWS consists of more than five mature pollard willows in association with semi-natural habitat.

²⁰ Cambridge County Council (2020) Worts Meadow Local Nature Reserve. Available at:

https://www.cambridgeshire.gov.uk/directory/listings/worts-meadow-local-nature-reserve [Accessed: 16/11/2022].

²¹ Natural England (2022) Designated Sites View Worts Meadow LNR. Available at:

https://designatedsites.naturalengland.org.uk/SiteLNRDetail.aspx?SiteCode=L1477766 [Accessed: 16/11/2022].

Site name	Designation	Location of designated site ¹⁸	Features of interest
		between the CoWS and the Site.	
Milton Road Hedgerows	CiWS	1 km south-east of the Site.	This CiWS qualifies due to its valuable hedgerows.
		The town of Milton, the A10 and the A14 are located between the CiWS and the Site.	

Irreplaceable habitats

4.7. The desk study has not identified any irreplaceable habitats, including ancient woodland within 1 km of the Site, nor were there any ancient, veteran, or notable trees identified within 50 m of the Site. Furthermore, no potential ancient, veteran or notable trees or areas which were considered to potentially be ancient woodland were identified during the walkover survey. However, further detailed tree surveys are due to take place to check for any ancient or veteran trees.

Habitats

Site description

- 4.8. The Site consists predominantly of arable land, formed of cereal crops, non-cereal crops and, temporary grass and clover leys. The arable fields are commonly bordered by native hedgerows, lines of trees and drainage ditches.
- 4.9. Other neutral grassland, the majority of which is frequently mown, is present on road verges, on the banks of drainage ditches, and as large parcels within Milton Park and Ride and on non-cultivated farmland within the site. A small number of individual fields and road verges within the Site also consisted of modified grassland.
- 4.10. Isolated patches of mixed scrub are also present within the Ssite as arable field margins, roadside verges and as margins to woodland parcels adjacent to Butt Lane.
- 4.11. Broadleaved and mixed woodland is distributed throughout the Site; broadleaved woodland being the more common and concentrated predominantly adjacent to Butt Lane. Mixed woodland is predominantly present as linear parcels demarcating arable fields in the south of the Site.
- 4.12. Built linear features, consisting of hardstanding concrete within the Site include the Butt Lane, Landbeach Road and Waterbeach Road. Developed land of hardstanding is present throughout the Site as arable field tracks, car parks, pedestrian walkways / bridges and highway infrastructure. Mosaics of developed and natural land use are also present adjacent to the site, predominantly within residential and commercial land adjacent to Butt Lane, in which residential properties, barns, storage containers, breeze block structures

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and other agricultural storage buildings are also present. Non-sealed, non-vegetated land is also present in farmyards and along tracks.

- 4.13. One pond is located within the Site, just north of the A14 and Cambridgeshire Guided Busway. A further four ponds / lakes are located immediately adjacent to the Site which are all considered to be artificially created; a fishing lake adjacent to the A14 (Cawcutts Lake), a fishing pond adjacent to Butt Lane, and two ponds located within the recently landscaped Milton Park and Ride.
- 4.14. A single watercourse is located immediately adjacent to the Site to the north of Waterbeach Road and between two arable fields.

Priority habitats

4.15. A review of MAGIC identified the following priority habitats within 1 km of the Site; priority coastal and floodplain grazing marsh, priority deciduous woodland, traditional orchard and a pond. Further details are provided in Table 4-4 below. Priority habitats are depicted in Figure 4-4.

Figure 4-4 - Priority habitats



Table 4-4 - Priority habitats within 1 km of the site as identified on MAGIC

Priority habitat	Number of Parcels	Location of habitat
Coastal and floodplain grazing marsh	6	These parcels are located north of Landbeach, one of which falls within the footprint of the Site, north of where the route bisects Waterbeach Road.
Deciduous woodland	73	Four parcels totalling approximately 0.2 ha located within the Site, where they are located adjacent to Butt Lane.
Traditional orchard	14	Two of these parcels are located adjacent to the Site, one of which is adjacent to the south-west of the proposed travel hub at the north of the Site, and the other is located within the existing Milton Park and Ride, adjacent to Butt Lane on which the Site is located.
Pond	1	430 m west of the Site

4.16. In addition, during the walkover survey, the following priority habitats were recorded within the Survey Area:

- 4.7 km of priority hedgerows²² were recorded throughout the walkover survey area. These
 were predominantly on the margins of arable fields and adjacent to Butt Lane, Landbeach
 Road, Waterbeach Road, A10 and Green End Road,
- One river (0.12 km) was identified within the walkover survey area located between two arable fields, north of Waterbeach Road, and
- It should be noted that rivers and streams, woodland, scrub, hedgerows, arable farmland and ponds, all of which are recorded within the walkover survey area, are included on the South Cambridgeshire District Council (SCDC) Biodiversity Action Plan (BAP) priority habitat²³.
- 4.17. Habitats within the site will be subject to more detailed surveys including habitat condition assessments, which will allow the presence of priority habitats within the Site to be confirmed.

Priority plants

- 4.18. CPERC returned a single recent Jersey cudweed record within 1 km of the Site, although due to the coarse spatial resolution of the record provided, it is not possible to determine the distance from the Site.
- 4.19. A review of MAGIC did not identify any granted European Protected Species (EPS) applications relating to priority plant species within 1 km of the Site.
- 4.20. Black poplars are on the SCDC BAP. Several poplar trees were identified within the Site during the walkover survey, however, due to fact the survey was conducted in October

²² Priority hedgeorws are not shown on MAGIC, however, all hedgerows consisting predominantly (i.e. 80% or more cover) of at least one woody UK native species are considered to be a priority habitat. UK BAP Priority Habitat Descriptions (<u>https://data.jncc.gov.uk/data/ca179c55-3e9d-4e95-abd9-4edb2347c3b6/UKBAP-BAPHabitats-17-Hedgerows.pdf</u>)

²³ South Cambridgeshire District Council (2009) Local Development Framework, Biodiversity, Supplementary Planning Document. Available at: <u>https://www.scambs.gov.uk/media/6675/adopted-biodiversity-spd.pdf</u> [Accessed: 21/11/2022].

and many of the trees had lost their leaves, it was not possible to determine whether these trees are black poplars.

4.21. No other priority plants were identified during the field survey, however, as the walkover survey was undertaken in late October, this is outside the main growing season of many plants and priority plants may have been missed.

Protected and priority animal species

Badgers

- 4.22. CPERC returned five recent badger records within 1 km of the site, the nearest of which is located 400 m west of the Site which consists of a sighting on Cottenham Road. One of these records is of a badger sett, 960 m east of the Site, north of the A14.
- 4.23. The walkover survey identified suitable habitat for badger sett creation throughout the walkover survey area, most notably within linear parcels of broadleaved or mixed woodland and hedgerows along the margins of arable fields. Piled mounds of soil are also present on the margins of arable fields which provide suitable sett building opportunities. Areas of uneven topography within neutral grassland, typically within or adjacent to arable land use also present sett building opportunities. A total of 11 potential badger setts were identified within the walkover survey area during the field survey.
- 4.24. The combination of broadleaved and mixed woodlands, arable fields, grasslands, and hedgerows present within the walkover survey area also provide optimal opportunities for commuting and foraging badgers, and in the absence of any major roads, there are substantial habitat corridors across the walkover survey area. Mammal runs were identified frequently across the walkover survey area, indicating the frequent movement of mammals, including the potential movement of badgers across the landscape. The habitats within the walkover survey area are also well connected via hedgerows and linear parcels of woodland to further arable fields and field margins which provide potential habitat for badgers in the wider area.

Hazel dormouse

4.25. Hazel dormouse populations are considered to be absent from Cambridgeshire and, therefore, they are not considered to be present in the site or within the surrounding walkover survey area²⁴.

Bats

4.26. CPERC returned a total of 141 recent bat records within 2 km of the site formed of at least nine species of bats; common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, pipistrelle sp., brown long-eared, long-eared sp., unidentified bat sp., Natterer's, serotine, noctule, myotis sp. and Daubenton's bat. The closest of these records relates to bat activity of noctule and myotis sp., recorded approx. 80 m south of the Site adjacent to the

²⁴ Hazel dormice range and distribution in the UK (ptes.org)

A14. A number of these records provided by CPERC were for bat roosts as detailed below:

- Two unidentified pipistrelle bat species roosts (unknown type), the nearest located approximately 260 m east of the Site along Mere Way in close proximity to the A14,
- Three brown long-eared roosts, two of which is a hibernation roosts, located approximately 320 m north of the northern tip of the Site and one of which relates to a roost (unknown type) approximately 1.82 km west of the northern tip of the Site,
- Five soprano pipistrelle roosts, of which two are considered to be maternity roosts and are both located approximately 330 m west of the Site in the town of Landbeach. Of the other roost records (type unknown), the nearest is located approximately 360 m west of the Site, also within Landbeach,
- One unidentified bat species bat roost (unknown type) located approximately 430 m west of the Site in the town of Landbeach,
- 10 common pipistrelle roosts (unknown type), the nearest of which is located 550 m northwest of the Site on the outskirts of the town of Impington,
- One Natterer's roost (unknown type) located approximately 1.98 km east of the Site within Horningsea,
- One serotine roost (unknown type) located approximately 1.98 km east of the Site within Horningsea, and
- One unidentified long-eared bat sp. roost (unknown type) located 1.98 km east of the Site within Horningsea.
- 4.27. A review of MAGIC identified four granted EPS applications relating to bats within 2 km of the Site that were active within the last ten years which allowed for the destruction of resting places of common pipistrelle, soprano pipistrelle, brown long-eared bat and / or noctule. The closest of these was located 1.08 km east of the Site.
- 4.28. During the walkover survey, potentially suitable habitat for roosting bats both within trees and structures were identified within the walkover survey area. This primarily included the presence of potential roosting features within trees in hedgerows or small woodland belts within / adjacent to the site. In addition, the walkover survey area supports suitable habitat for foraging and commuting bats, including woodland blocks, ditches, hedgerows, lakes and ponds.

Breeding and non-breeding (wintering and passage) birds

- 4.29. CPERC returned records of 48 species of birds within 1 km of the site. Of the species recorded, kingfisher, bittern, stone-curlew, Cetti's warbler, little ringed plover, marsh harrier, merlin, peregrine, hobby, brambling, Mediterranean gull, crossbill, red kite, osprey, black-necked grebe, garganey, green sandpiper, redwing, fieldfare and barn owl are listed under Schedule 1 Part 1 of the Wildlife and Countryside Act 1981 (as amended). None of these records relate to breeding, with all but one record relating to individual birds in flight. A record of barn owl evidence consists of 25 pellets located within a barn approximately 330 m west of the Site in the town of Landbeach.
- 4.30. Of the species returned by CPERC, skylark, swift, cuckoo, yellowhammer, merlin, linnet, smew, yellow wagtail, spotted flycatcher, curlew, house sparrow, tree sparrow, wood warbler, turtle dove, starling, fieldfare, ring ouzel and lapwing are included on the Birds of Conservation Concern (BoCC) red list. All species, bar cuckoo and linnet have been

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recorded in the core breeding season (March to August inclusive). Of the species recorded, pintail, greylag goose, bittern, barnacle goose, stone-curlew, marsh harrier, reed bunting, Mediterranean gull, osprey, black-necked grebe, dunnock, bullfinch, garganey, common tern, Arctic tern, green sandpiper, redwing and song thrush are included on the BoCC amber list. All species, bar bittern and reed bunting have been recorded in the core breeding season (March to August inclusive). Of the wildfowl / waders recorded which are listed on the BoCC lists, smew, lapwing, greylag goose, bittern, barnacle goose, Mediterranean gull and green sandpiper have been recorded during the winter period. Skylark, house sparrow and barn owl are also included on the SCDC BAP.

- 4.31. The site and surrounding walkover survey area provide woodland blocks, individual trees, hedgerows and grassland habitats which could be used by nesting birds during the breeding season including the protected and priority bird species listed above. The ditches and river within the walkover survey area may provide suitable foraging and breeding habitat for kingfisher, which has been recorded within 1 km of the Site. of barn owls flying within the walkover survey area and considering the record of barn owl evidence 330 m from the Site, it is considered likely that barn owls are present within or adjacent to the Site. Ground nesting birds such as skylark have been identified during the desk study and may nest within the arable land and grassland associated within the walkover survey area.
- 4.32. The walkover survey area also supports potentially suitable habitat for wintering and passage birds. The arable fields and grassland may provide suitable foraging and resting habitat for such as wildfowl and waders, and the woodland, scrub, arable fields and grassland may provide suitable foraging and resting habitat for overwintering thrushes and other passerines.

Reptiles

- 4.33. CPERC returned three recent grass snake records within 1 km of the Site, the nearest of which is located within Waterbeach, approximately 930 m east of the site. CPERC also returned 25 recent common lizard records within 1 km of the Site, the nearest of which is located approximately 35 m south of the site and relates to a count of 20 individuals on the grassland verge adjacent to the A14.
- 4.34. A review of MAGIC did not identify any granted EPS applications relating to reptiles within 1 km of the Site.
- 4.35. The majority of the land use within the walkover survey area is arable formed of predominantly intensely managed fields which are considered sub-optimal habitat for widespread reptile species. The arable field margins formed of linear parcels of mixed and broadleaved woodland and mature hedgerows and treelines, however, are considered to provide suitable foraging, resting and hibernation habitat. In addition, the rough grassland and vegetated banks associated with arable drainage ditches, along with grassland road verges and areas of scattered scrub also provide suitable resting, foraging and dispersing habitat for widespread reptile species. Individual compost heaps, log piles, matting, rubble, earth bunds and manure piles associated with the arable land and areas of dense scattered scrub within road verges located within the walkover survey area also provide suitable hibernation and resting habitat for widespread reptile species.

Amphibians

- 4.36. CPERC returned the following recent records of amphibians within 1 km of the Site:
 - Eight great crested newt records, all of which are located within Worts Meadow LNR, the nearest of which is 455 m west of the Site,
 - Seven common toad records, the nearest of which is from the pond within Milton Park and Ride 20 m south of the Site, although the majority of records are located within Worts Meadow LNR and
 - Nine common frog records, three of which are located within Worts Meadow LNR and the remaining records are separated from the Site by the A14 or A10 which are considered to be barriers to their dispersal.
- 4.37. A review of MAGIC identified one granted EPS licence (2019-40817-EPS-AD2) for great crested newts within 1 km of the Site. This is located approximately 560 m north-east of the Site on the northern outskirts of Waterbeach, separated from the site by the A10. The licence was granted in 2019 and is valid until December 2031 and allows for impact and destruction of a breeding site and damage and destruction of a resting place.
- 4.38. A review of MAGIC also identified one great crested newt class survey licence return within 500 m of the Site in which great crested newt presence has been confirmed. It is located 400 m east of the Site within pasture/grassland approximately 450 m north of the A14.
- 4.39. A review of Ordnance Survey maps and aerial imagery revealed there are 34 drains and 21 ponds within 500 m of the Site which could support breeding populations of amphibians, including great crested newts. Of these, within the walkover survey area, there are five ponds, two of which are located within the site, and 23 ditches, all of which were entirely or partially within the Site.
- 4.40. The majority of the walkover survey area comprises intensively managed arable land, which generally provides sub-optimal terrestrial habitat for amphibian species. More suitable habitats within the site for amphibian species comprise arable field margins, grassland, woodland, hedgerows, treelines, ponds and non-flowing drainage ditches. Parcels of woodland and hedgerows which have been subject to minimal grazing impacts have retained a ground flora which provides some suitable refugia for amphibians, including potential hibernacula. The rough grassland and vegetated banks associated with arable drainage ditches along with grassland road verges also provide suitable resting, foraging, and dispersing habitat for amphibian species. Log piles, compost heaps, and piles of earth associated with arable fields and areas of dense scrub within grassland road verges may be used by amphibian species as hibernacula.
- 4.41. The suitable terrestrial habitat within the walkover survey area provides habitat connectivity between potentially suitable breeding habitat within ponds and ditches both within the site and within the wider area.
- 4.42. No further detailed surveys are considered necessary for common toad, common frog or other amphibians, as the assessment will assume that these species occur in suitable habitats throughout the Site.

Otters

- 4.43. CPERC returned six recent otter records within 1 km of the Site, all of which relate to sightings of individuals and not to holts or other resting sites. The nearest record is located within a fishery approximately 210 m east of the Site.
- 4.44. A review of MAGIC did not identify any granted EPS applications relating to otters within 1 km of the Site.
- 4.45. The walkover survey identified 23 ditches and one watercourse within the walkover survey area, all of which fall entirely or partially within the Site boundary. Many of these ditches were found directly adjacent to arable fields, with minimal surrounding vegetation or inchannel vegetation, these ditches provide suitable commuting and foraging habitat, and limited resting habitat. The linear parcels of woodland adjacent to arable drainage ditches also provide suitable terrestrial habitat for otter resting sites, including holts.
- 4.46. The watercourse located within the site had flowing water and was surrounded by dense scrub which could provide suitable cover for otter resting sites (including holts). This watercourse could also be used by commuting and foraging otters. No otter evidence was identified during the field survey.
- 4.47. The presence of fishing ponds / lakes within the walkover survey area also provide suitable foraging opportunities for otters.

Water voles

- 4.48. CPERC did not return any recent water vole records within 1 km of the Site.
- 4.49. The field survey identified 23 ditches and one watercourse within the walkover survey area, all of which fall entirely or partially within the Site boundary. Many of these ditches were found directly adjacent to arable fields, with minimal surrounding vegetation of short-mown grassland and minimal in-channel vegetation, making them sub-optimal habitat for use by water voles at the time of the survey. However, there is potential for the short-mown vegetation to develop, and for a herbaceous cover to provide suitable foraging and sheltering opportunities. In addition, the bank profiles of the ditches are suitable for water vole burrow creation. Therefore, all ditches within the site provide suitability for water voles.
- 4.50. The watercourse within the Site was surrounded by dense scrub which provides potentially suitable habitat for water vole burrow creation and foraging. However, the watercourse was heavily shaded by trees, thereby reducing its potential to support water voles. Therefore, the watercourse has limited suitability for water voles.

White-clawed Crayfish

- 4.51. CPERC did not return any recent, white-clawed crayfish records within 1 km of the Site.
- 4.52. The river / stream located within the walkover survey area is considered to have low suitability for white-clawed crayfish due to the absence of rocks or boulders which could provide individuals with refuge. However, due to the dense vegetation present at the time of survey, it was not possible to determine the presence of undercut banks, tree root systems or other debris within the channel which may provide suitable sheltering habitat.

No evidence of white-clawed crayfish was identified within this watercourse at the time of survey.

4.53. The drainage ditches present across the Site are generally free of aquatic vegetation and debris within the channel, therefore they are determined to have low suitability for whiteclawed crayfish. No evidence of white-clawed crayfish was identified within these watercourses at the time of survey.

Terrestrial invertebrates

- 4.54. CPERC did not return any recent priority invertebrate records within 1 km of the Site.
- 4.55. The majority of the Site and walkover survey area comprises intensively managed arable land, which generally does not provide suitable habitat for priority invertebrates. The woodland, hedgerows, scrub, ponds and arable field margin ditches on Site may provide some suitable habitats for invertebrates, however, these are common habitats, found frequently within the Site, walkover survey area and wider landscape, and therefore the site is unlikely to support an invertebrate community of special interest and is scoped out from further assessment.

Other priority mammal species

- 4.56. CPERC returned seven recent hedgehog records within 1 km of the Site, five of which are separated from the Site by the A14 (dual carriageway) which is considered to be a barrier to their movement, whilst the remaining two are located east of the A10 in the urban area of Milton. CPERC also returned one recent record of a brown hare within 1 km of the Site, although due to the coarse spatial resolution of the record provided, it is not possible to determine the distance of the record from the Site.
- 4.57. No evidence of other priority mammal species was identified during the survey. However, habitats within the walkover survey area including arable fields, grassland, woodland, hedgerows, and scrub could provide suitable commuting and foraging habitats for other priority mammal species including brown hare and hedgehogs.

Invasive non-native species

- 4.58. CPERC did not return any recent records of invasive non-native plant species (INNPS) within 1 km of the Site.
- 4.59. Furthermore, no INNPS were identified during the field survey. However, as the survey was undertaken during October, outside the main plant growing season, it is possible that any INNPS present within the walkover survey area not visible.

Potential impacts

- 4.60. Baseline ecological survey work and assessment is currently on-going. The desk study and walkover survey have identified the potential for the following ecological receptors to be affected by the Scheme during construction and operation phases:
 - Statutory designated sites: Eversden and Wimpole Woods SAC,

- Priority habitats; and
- Legally protected and priority species.
- 4.61. This section provides a preliminary assessment of potential of construction and operation activities which could affect important ecological features. Further survey work is required to refine this assessment and identify any likely significant effects. The principles of the mitigation hierarchy^{25 / 26} will be used when considering impacts and subsequent effects on important ecological features within the zone of influence. Any embedded mitigation incorporated into the design will be identified within the ES. The principles of the mitigation hierarchy are that in order of preference impacts on biodiversity should be subject to:
 - Avoidance,
 - Mitigation,
 - Compensation and
 - Enhancement.

Construction

- 4.62. Construction activities could have direct and indirect adverse effects on important ecological features through the following:
 - Permanent habitat loss: including potential loss of priority habitats (if found to be present on site), and loss of habitat used for foraging basking, sheltering, breeding and hibernating protected and priority species,
 - Temporary habitat loss: temporary loss of or damage to land used during construction could result in damage to priority habitat (if found to be present on site) and temporary loss of habitat used for foraging basking, sheltering, breeding and hibernating protected and priority species,
 - Habitat degradation (e.g. through sediment release, pollution events and dust),
 - Habitat fragmentation affecting movements of protected and priority species,
 - Injury or mortality of protected and priority species,
 - Disturbance to protected and priority species during construction through lighting, noise and vibration, dust and human presence and
 - Spread of INNPS.

Operation

4.63. Operation of the Scheme could have direct and indirect adverse effects on important ecological features through the following:

²⁵ Department for Communities and Local Development (2018) National Planning Policy Framework, Paragraph 118. https://www.gov.uk/government/publications/national-planning-policy-framework--2

²⁶ CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, Paragraph 1.19. Chartered Institute of Ecology and Environmental Management, Winchester.

- Habitat degradation (e.g. through emissions affecting air quality / nitrogen deposition or water quality) and
- Disturbance to protected and priority species through noise, human presence, vehicle movements or external lighting arrangements.

Proposed scope of ES

Scoped in

4.64. The following ecological features will be subject to further assessment to determine the impacts and subsequent effects as a result of the Scheme. The effects scoped in are for both the construction and operation stages.

Statutory designated sites for nature conservation:

- 4.65. **Sites of International Importance:** The Scheme has potential to adversely affect Barbastelle bats (that may be linked to the Eversden and Wimpole Woods SAC and are a primary reason SAC selection), by roost disturbance (including via noise and lighting), habitat loss and fragmentation. A separate Habitat Regulations Assessment (HRA) Stage 1 Screening will be undertaken for the Eversden and Wimpole Woods SAC European Designated Sites identified within the study area, and if any potential impacts are found, a HRA Stage 2 Appropriate Assessment will be undertaken.
- 4.66. **Irreplaceable habitats ancient or veteran trees:** No potentially ancient or veteran trees have been identified to date. However, further detailed tree surveys are required to confirm.
- 4.67. **Priority plants:** Should these species be present within and directly adjacent to the Site, priority plants have potential to be adversely affected by removal or subject to habitat degradation via pollution and/or encroachment.
- 4.68. Badgers: The Scheme is also likely to affect badgers by increased disturbance.
- 4.69. **Bats:** Further surveys are required to determine the use of the Site / adjacent habitats by bats, and how bats may be affected by the Scheme.
- 4.70. **Breeding and non-breeding birds:** Further surveys are required to determine the use of the Site / adjacent habitats by breeding birds, wintering birds and barn owls, and how birds may be affected by the Scheme.
- 4.71. **Reptiles:** Further surveys are required to determine the presence / likely absence of reptiles within the Site, and how reptiles may be affected by the Scheme.
- 4.72. **Great crested newts:** Further surveys are required to determine the presence / likely absence of great crested newts within the Site, and how reptiles may be affected by the Scheme.
- 4.73. **Other priority mammals:** The Scheme has potential to affect other priority species due to habitat loss and killing/injury.

Scoped out

4.74. As a result of the information collected in the preparation of this Scoping Report it is proposed that the following aspects will be scoped out of further consideration in the Ecological Impact Assessment (EcIA) because there will be no likely significant environmental effects to assess. These effects are for both the construction and operations stage.

Statutory designated sites for nature conservation:

- 4.75. **Sites of National importance**: None present within the study area.
- 4.76. **Sites of Local importance:** Worts Meadow LNR is separated from the site by a network of minor roads and the residential properties of Landbeach. Due to the presence of urban infrastructure acting as a physical barrier between the LNR and the site, the distance between the LNR and the site, and the absence of a hydrological connection between the LNR and the site, Worts Meadow LNR is not anticipated to be affected by the proposed scheme and has therefore been scoped out from further assessment, statutory designated sites are not considered to pose a constraint to the proposed scheme and are scoped out from further assessment.
- 4.77. Non-statutory designated sites for nature conservation including King's Hedges Hedgerow CiWS, Cambridge Road Willow Pollards CoWS and Milton Road Hedgerows CiWS. All non-statutory designated sites are at least 250 m from the site. In addition, all three non-statutory designated sites are separated from the site by a network of major and minor roads, most notably the A14 and A10, in addition to residential properties and commercial units. Due to the presence of urban infrastructure acting as a physical barrier between these non-statutory designated sites and the site, the distance between the non-statutory designated sites and the absence of any hydrological connections between the non-statutory designated sites and the site, non-statutory designated sites are not anticipated to be affected by the proposed scheme. Therefore, non-statutory designated sites are not considered to pose a constraint to the proposed scheme and are scoped out from further assessment.
- 4.78. **Irreplaceable habitats (with exception of ancient or veteran trees)**: None present within the study area.
- 4.79. **Hazel dormouse**: Assumed absent within the Cambridgeshire area.
- 4.80. **Terrestrial invertebrates**: The terrestrial habitats within the walkover survey area (predominantly including arable fields, and associated hedgerows and field margins) are of a structure and diversity that would be unlikely to promote a notable assemblage of terrestrial invertebrates and therefore terrestrial invertebrates are not considered to pose a constraint to the proposed scheme and are scoped out from further assessment.

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Assessment method

- 4.81. The EcIA will be undertaken with reference to current good practice and in particular the CIEEM Guidelines for Ecological Impact Assessment in the United Kingdom²⁷ with some reference to the Design Manual for Roads and Bridges (DMRB)²⁸. The scope of the baseline field surveys, nature conservation evaluation and impact assessment methodology is set out below.
- 4.82. A separate Habitat Regulations Assessment (HRA) Stage 1 Screening will be undertaken for the Eversden and Wimpole Woods SAC European Designated Sites identified within the study area, and if any potential impacts are found, a HRA Stage 2 Appropriate Assessment will be undertaken.
- 4.83. In order to inform the impact assessment, the following steps will be undertaken:
 - Consultation with relevant stakeholders,
 - Establishment of baseline further field surveys (see below) and
 - Establishment of appropriate avoidance, mitigation and / or compensation measures as and / or where appropriate.

Establishing the baseline

- 4.84. Further ecological surveys are required to establish the ecological baseline to inform a robust assessment of the likely effects of the proposed scheme on important ecological features. Surveys will be undertaken in accordance with current good practice guidance. A summary of the surveys is listed below, with details of current good practice guidance provided as footnotes:
- 4.85. **Bat surveys²⁹:** Surveys to include a daytime bat walkover (DBW) to assess the suitability of the site for roosting and foraging / commuting bats and preliminary roost assessment (PRA) of structures and trees commenced in March 2024. Further bat surveys including (but not limited to) transect surveys of suitable foraging / commuting habitat or presence / likely absence surveys of trees or structures with suitability for roosting bats potentially affected by the proposed scheme may be required. Presence / likely absence surveys would include climbed tree inspections to check for evidence of roosting bats. For structures or where trees are unsafe to climb, dusk emergence surveys using night-vision aids will be carried out.
- 4.86. **Great crested newt surveys**³⁰: Habitat suitability index (HSI) assessment and presence / likely absence survey of ponds within 250 m of the site will be undertaken in April 2024.

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²⁷ CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine.

²⁸ Design Manual for Roads and Bridges; Sustainability and Environment Appraisal, LA108 Biodiversity, Revision 1, March 2020. Available at LA 108 - Biodiversity (standardsforhighways.co.uk)

²⁹ Collins, J. (ed.) (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition). The Bat Conservation Trust, London.

³⁰ Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000) Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus) Herpetological Journal 10 (4), 143-155 (2000).

Water samples taken from the pond will be tested for the presence of great crested newt eDNA.

- 4.87. **Badger surveys**³¹: Walkover surveys to search for evidence of badger activity within the site and a 30 m buffer extending out in all directions from the site boundary where access allowed commenced in April 2024.
- 4.88. **Bird surveys**³²: Breeding bird surveys commenced in April 2024. These surveys are being carried out using the Common Bird Census methodology. The aim of the breeding bird surveys will be to establish information about the bird assemblage at the site, such as number and distribution of Priority, legally protected or scarce species. Up to six visits will be carried out between April and end of July 2023. In addition, wintering bird surveys and barn owl surveys will also be required.
- 4.89. **Reptile surveys**³³: Presence / likely absence surveys for widespread species of reptile will be undertaken at the site between June and September 2024. Artificial refuges consisting of roofing felt and corrugated bituminous sheets measuring approximately 0.5 m² will be laid out within suitable habitat which is present within the site and a 50 m buffer extending out in all directions from the site boundary where access allows. Seven checks of the artificial refuges will be undertaken in suitable weather conditions. Other suitable refuge features already present on the site that could be used by reptiles (e.g. litter and logs) will also be checked where present.
- 4.90. **Otter surveys**^{34, 35}: Presence / likely absence surveys for otter will be undertaken in May 2024. Surveys will search for evidence of otters along suitable watercourses and waterbodies within 250 m of the site, extending along watercourses up to 250 m upstream and downstream of the site, where access allows.
- 4.91. **Water vole survey**³⁶: Presence / likely absence surveys for otter will be undertaken between April and September 2024. Surveys will search for evidence of water vole along suitable watercourses and waterbodies within 100 m of the site, extending along watercourses up to 250 m upstream and downstream of the site, where access allows;
- 4.92. White-clawed crayfish surveys³⁷: Habitat suitability assessment along with environmental DNA (eDNA) surveys to test for white-clawed crayfish DNA, as well as

³¹ Harris S., Cresswell P. and Jefferies D. (1989) Surveying badgers. Mammal Society – No9.

³² Bird Survey & Assessment Steering Group. (2023). Bird Survey Guidelines for assessing ecological impacts, v.1.1.1. Available at: <u>https://birdsurveyguidelines.org</u>

³³ Froglife (1999) Reptile Survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife advice sheet 10.

³⁴ English Nature (2006). The Dormouse Conservation Handbook (2nd edition). 30 Chanin and Smith (2003). Monitoring the otter Lutra lutra. Conserving Natura 2000 Rivers Monitoring Series No 10. Peterborough, English Nature.

³⁵ Liles G. (2003). Otter Breeding Sites. Conservation and Management. Conserving Natura 2000 Rivers Conservation Techniques Series No. 5. English Nature, Peterborough

³⁶ Dean, M. et al (2016) The Water Vole Mitigation Handbook. Mammal Society.

³⁷ Peay S. (2003) Monitoring the White-clawed Crayfish Austropotamobius pallipes. Conserving Nature 2000 Rivers Monitoring Series No. 1. English Nature, Peterborough.

signal crayfish and crayfish plague³⁸ will be carried out between July and September 2024. The survey area will include watercourses entirely or partially within the site (and 200 m up and downstream of suitable habitats in these areas).; and

4.93. **Botanical surveys:** Habitats within the site will be subject to habitat condition assessments using criteria set out within the DEFRA Statutory Biodiversity Metric³⁹ to inform the Biodiversity net gain assessment and impact assessment.

Nature conservation evaluation / sensitivity of resource

- 4.94. In line with CIEEM guidance⁴⁰, the nature conservation importance or potential importance of an ecological feature will be determined within the following geographic context:
 - International,
 - National,
 - Regional,
 - County,
 - Local,
 - The site and its immediate environs and
 - Negligible.

Assessment of impacts

- 4.95. An assessment of the potential effects of the proposed scheme will take into account both on-site impacts and those that may occur to adjacent and more distant ecological features. This will be undertaken in line with CIEEM guidance⁴¹ and reference the DMRB⁴².
- 4.96. The zone of influence is an area within which ecological features may be subject to biophysical changes as a result of the proposed scheme. Throughout the EcIA process the zone of influence will be regularly reviewed based on further understanding of the proposed scheme impacts and on the results of the desk study, field surveys and consultation.
- 4.97. Where impacts are identified, details will be provided within the assessment to characterise these in terms or their extent and magnitude, duration, frequency and timing, and reversibility. Both positive and negative impacts are discussed. Impacts will also be

³⁸ Signal crayfish are known to out-compete and predate white-clawed crayfish and are also known to carry *Aphanomyces astaci* fungus, commonly known as crayfish plague, which is fatal to white-clawed crayfish. As such, the presence of signal crayfish and / or crayfish plague contributes towards the presence / likely absence of white-clawed crayfish and should be considered as part of white-clawed crayfish presence / likely absence surveys.

³⁹ https://www.gov.uk/government/publications/statutory-biodiversity-metric-tools-and-guides

⁴⁰ CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.

⁴¹ CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

⁴² Design Manual for Roads and Bridges; Sustainability and Environment Appraisal, LA108 Biodiversity, Revision 1, March 2020. Available at LA 108 - Biodiversity (standardsforhighways.co.uk)

characterised in terms of how they occur, i.e. direct, indirect secondary or cumulative. Impacts can be permanent or temporary and can include:

- Direct loss and degradation of wildlife habitats,
- Fragmentation and isolation of habitats,
- Mortality and injury to species,
- Disturbance to species from noise, light or other visual stimuli,
- Changes to key habitat features and
- Changes to the local hydrology, water quality and/or air quality.
- 4.98. For designated sites, effects are considered significant when a project and associated activities is likely to either undermine or support the conservation objectives or condition of the site(s) and its features of interest.
- 4.99. For ecosystems, effects are considered significant when a project and associated activities is likely to result in a change in ecosystem structure and function.
- 4.100. Consideration will be given to whether:
 - Any processes or key characteristics will be removed or changed,
 - There will be an effect on the nature, extent, structure and function of component habitats,
 - There is an effect on the average population size and viability of component species and
 - Functions and processes acting outside the formal boundary of a designated site has also been considered, particularly where a site falls within a wider ecosystem e.g. wetland sites.
- 4.101. Some ecosystems can tolerate a degree of minor changes, such as localised or temporary disturbance or changes in physical conditions, without such changes harming their function or importance. Ecological effects will be considered in the light of any information available about the capacity of ecosystems to accommodate change. Significant effects will be determined as being either negative or positive.
- 4.102. The conservation importance of undesignated habitats and species within a defined geographical area (International to Local) will be used to determine whether the effects of the proposals are likely to be significant:
 - For habitats, conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area and
 - For species, conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.
- 4.103. When assessing potential effects on conservation importance, the known or likely background trends and variations in status will be taken into account. The level of ecological resilience or likely level of ecological conditions, that would allow the population of a species or area of habitat to continue to exist at a given level or continue to increase along an existing trend or reduce a decreasing trend, will be estimated where appropriate to do so. The assessment will consider important ecological features considered to be of local value or above.
- 4.104. The avoidance, mitigation, compensation and/or enhancement measures described below will be into the design and operational phasing programme and taken into account in the

assessment of the significance of effects. These mitigation measures will include those required to achieve the minimum standard of established good practice together with additional measures to further reduce any negative impacts of the proposed scheme. The mitigation measures include those required to reduce or avoid the risk of committing legal offences.

- 4.105. If the design changes or the agreed mitigation cannot be implemented the effects will need to be reassessed and further surveys may be required.
- 4.106. In addition to measures required to ameliorate negative effects on important ecological features, further biodiversity enhancement measures will be identified and will be incorporated into the Scheme as it is progressed.
- 4.107. The impact assessment will also take into account cumulative effects.
- 4.108. Any avoidance, mitigation, compensation and / or enhancement measures incorporated into the design of the Scheme will be taken into account in the assessment of the significance of effects.

Mitigation hierarchy

- 4.109. The principles of the mitigation hierarchy⁴³ will be adopted and used during design and when considering impacts and subsequent effects on important ecological features within the zone of influence.
- 4.110. The principles of the mitigation hierarchy are that in order of preference impacts on biodiversity should be subject to:
 - Avoidance,
 - Mitigation, and
 - Compensation

Additionally, projects should seek to provide enhancements which are net benefits for biodiversity over and above the requirements for avoidance, mitigation or compensation.

Biodiversity Net Gain (BNG)

4.111. A BNG strategy will be developed and consulted on with Natural England and Local Planning Authority. The BNG strategy will reference the Greater Cambridge Partnership (GCP) project BNG guidance⁴⁴. As a TWO application accompanied by a request for deemed planning permission, the Scheme will not be the subject of an application for planning permission under the Town and Country Planning Act 1990 subject to the mandatory provision of at least 10% BNG. However, the GCP aims to achieving 20% BNG across the GCP Infrastructure Programme. The proposed Waterbeach to Cambridge guided busway is one of the projects that fall within the GCP Infrastructure Programme.

⁴³ CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, Paragraph 1.19. Chartered Institute of Ecology and Environmental Management, Winchester.

⁴⁴ GCP project BNG guidance V.1.2. Issued 10.01.2024 Revised: 23.02.2024 Contact: Rory.Wilson@cambridgeshire.gov.uk

4.112. Field survey data including condition assessment of habitats will be undertaken to inform the baseline assessment and feasibility study.

5. Landscape and visual

Legislation and policy

- 5.1. An overview of the relevant national, regional and local policy, legislation and guidance which will be used to inform the Landscape and Visual Impact Assessment (LVIA) is provided below.
 - National Planning Policy Framework (NPPF) 2023,
 - Countryside and Rights of Way Act 2000 (CRoW),
 - A Green Future: Our 25 Year Plan to Improve the Environment (DEFRA, 2018),
 - The Environmental Improvement Plan 2023,
 - South Cambridgeshire Local Plan 2018,
 - Cambridge Local Plan 2018,
 - Greater Cambridge Shared Planning (2021) Greater Cambridge Local Plan, First Proposals and
 - Cambridgeshire Green Infrastructure Strategy (2011) Cambridge City Council.

Scoping assessment methodology

- 5.2. A desk-based review of policy, guidance, published landscape character assessments, OS mapping, Google Earth and Streetview supported by an initial site visit has been undertaken to gain an understanding of the existing landscape and visual environment. This has informed an assessment of how the landscape might be affected by the Scheme and to establish the study area. Further site survey will be carried out to inform the landscape and visual baseline assessment.
- 5.3. A number of representative viewpoints have been identified as shown in Figure 5-1 to represent the character of the landscape and existing views.

Study area

5.4. An initial 2 km search area has been used to explore potential effects on landscape and visual receptors. This then enabled a smaller study area to be established at a distance of 1km either side of the Scheme i.e. 1km from the redline boundary defining the Travel Hub and either side of the new guided busway route. It has been defined through verification in the field and the professional judgement of a chartered landscape architect as the area within which there is the potential for likely significant landscape and visual effects.

5.5. It is noted that as the design is developed and the assessment process develops, it is possible that the study area will be further refined. It may be either expanded or contracted depending on the results of further landscape and visual assessment and reference to the results of other related environmental topics including historic environment, ecology, socio-economy, noise and traffic.

Baseline conditions

- 5.6. As part of the methodology The LVIA considers the landscape character and visual amenity during construction and operation as two separate but related issues:
 - Likely effects on landscape as a resource in its own right; and
 - Likely effects on people's views and visual amenity.
- 5.7. The baseline conditions are described in two separate sections. The first section identifies the landscape resource and relevant designations whilst the second section identified the types of visual receptors and representative viewpoints. This is to inform the LVIA that considers the impact of the Scheme on landscape character and visual amenity during construction and operation as two separate but related issues.

Landscape

Landscape character

National Landscape Character

- 5.8. The study area is located within National Character Area (NCA) 88: Bedfordshire and Cambridgeshire Clayland. The relevant landscape features of NCA 88 include:
 - gently undulating lowland plateau,
 - lime-rich, loamy and clayey soils,
 - open arable farmland landscape of planned and regular fields bound by open ditches and trimmed, often species poor hedgerow and
 - major transport routes, larger settlements cluster along major road and rail corridor and smaller settlements often nucleated around a church or village green.
- 5.9. The design of the Scheme will be guided by the relevant statements of environmental opportunities set out within the NCA 88: Bedfordshire and Cambridgeshire Clayland Character Profile.

Local Landscape Character

5.10. The Greater Cambridge Landscape Character Assessment (GCLCA) by Chris Blandford Associates (2021) locates the Scheme predominantly in Landscape Character Area 2B: Cottenham Fen Edge Claylands.

- 5.11. The key landscape characteristics relevant to the Scheme are:
 - Well-settled rural landscape comprising a number of large villages with historic linear cores located on elevated 'islands,
 - Pockets of remnant parkland alongside orchards, hedgerows and shelterbelts create a distinctive, localised vegetation pattern in proximity to the villages and
 - Urban influences associated with the urban edge of Cambridge and major road network in the south which are discordant with the otherwise rural character.
- 5.12. It is noted that a Landscape Character Area 1D: North Fen to Milton Fen lies approximately 1.3km to the east of the Scheme and outside the proposed 1km study area.
- 5.13. The key landscape characteristics relevant to the Scheme are:
 - Broad, flat, floodplain landscape with wide views often punctuated by tree groups and framed by shelterbelts,
 - Distinctive regular, rectilinear field pattern defined by a combination of ditches, drains and hedgerow boundaries with frequent tree shelterbelts,
 - Smaller fields along the green corridor following the River Cam, where there is a sense of separation between Milton and Horningsea,
 - Limited settlement comprising small, scattered farms strung out on the high land alongside roads and
 - Electricity pylons are very prominent, providing a strong contrast to the flat landscape.
- 5.14. The following fen edge villages described in the GCLCA lie within the 1km study area:
 - Histon,
 - Impington,
 - Landbeach,
 - Milton and
 - Waterbeach.

Relevant landscape designations

National landscape designations

5.15. There are no national landscape designations within the 1km study area.

Land with access

5.16. There is no access land within the 1km study area.

Scheduled monuments, conservation areas and listed buildings

5.17. The potential impacts on heritage features will be covered by the Cultural Heritage Chapter; however, any potential impacts on these designations in relation to landscape character and visual amenity will be covered by this chapter. It is noted that there is a high concentration of heritage assets around Landbeach and this is reflected in the selection of representative viewpoints below.

Public Rights of Way (PRoW)

5.18. The following footpaths are found within the 1km study area:

- Bridleway 162/6,
- Byway 162/3,
- Footpath 247/1 and
- Footpath 143/2.
- 5.19. The impacts on PRoW in relation to severance will be considered in the People and Communities Chapter; however, the impact on visual amenity will be considered in this chapter.

Designated ecological sites

- 5.20. There are no National Nature Reserves (NNRs) found within the 1km study area.
- 5.21. The following Local Nature Reserve (LNR) can be found within the 1km study area:
 - Worts Meadow

Ancient woodland, veteran trees, Tree Preservation Orders (TPOs)

- 5.22. There are no ancient woodlands or veteran / notable trees on the Woodland Trust map that would be directly affected by the Scheme.
- 5.23. There are no TPOs listed on the South Cambridgeshire District Council (SCDC) planning map that would be directly affected by the Scheme.

Green belt

5.24. The Site lies within the South Cambridgeshire Green Belt. Effects on the Green Belt will be dealt with in the Green Belt Review.

Visual

Visual receptors

5.25. Visual receptors potentially affected by the Scheme include:

- People in residential properties,
- User of public rights of way (PRoW),
- Road users,
- Visitors of outdoor tourist attractions, heritage and nature sites; and
- Users of the Emmaus charity facilities to the north of the Scheme.

Views of the Cambridge Skyline

- 5.26. Policy 60 of the Cambridge Local Plan 2018 Tall buildings and the skyline in Cambridge aims to ensure the overall character and qualities of the Cambridge skyline are maintained and, where appropriate, enhanced as the city continues to grow and develop in the future.
- 5.27. Distant views in strategic viewpoint locations identified in Figure F.3 Topography and Strategic Viewpoints in the Cambridge Local Plan 2018 have been reviewed. It has been concluded as part of this review that given the location of the Scheme to the north of Cambridge, topography and distance that no strategic viewpoint locations would be impacted.
- 5.28. Strategic viewpoints on the higher ground above 20m are located to the west and south of Cambridge. These are vantage points to the north east to south east or north/north west to south west, which afford panoramic views overlooking Cambridge that is low lying between 10-20m and at less than 10m along the River Cam.
- 5.29. The Scheme is located on land to the north of Cambridge and is located on land between 10 20m that dips northwards. The Scheme, which comprises a ground level bus route with vehicles moving through the landscape would not impact upon the Cambridge skyline and would blend with existing highway infrastructure to the north of the city. Views of the Cambridge Skyline are scoped out of further assessment.

Representative viewpoints

5.30. A total of 21 representative viewpoints (VP01 – VP21) have been identified and are listed in Table 5-1 and shown in Figure 5-1. These viewpoints have been selected to represent the character of the landscape and existing views and will be used in the preparation of a selected number of photomontages once discussed and agreed with South Cambridgeshire District Council (SCDC).

Viewpoint Number	Name	OS Grid Ref	
VP01	Green End Emmaus	TL4808766812	
VP02	A10 near Air Cadets	TL4861366125	
VP03	A10 near Pembroke House	TL4879565787	
VP04	Waterbeach Rd	TL4807965110	
VP05	Car Dyke Road	TL4882664985	
VP06	Landbeach South	TL4785763964	
VP07	Milton Cemetery	TL4784463574	
VP08	A10 near Milton Allotments	TL4813163514	
VP09	A10 near Rectory Farm	TL4738463241	
VP10	A10 Footbridge	TL4708762953	
VP11	Milton Park-and-Ride	TL4684863039	
VP12	Guided Busway near A14	TL4530261997	
VP13	Impington	TL4506162567	
VP14	Milton Road / Mere Way	TL4634563413	

Table 5-1 – Representative viewpoint locations

Viewpoint Number	Name	OS Grid Ref
VP15	Milton Road west	TL4604963523
VP16	Mere Way nurseries	TL4654663813
VP17	Mere Way north	TL4675364179
VP18	Landbeach Tithe Barn	TL4774765172
VP19	Landbeach Churchyard	TL4770465348
VP20	Landbeach north	TL4762265631
VP21	Green End	TL4793766487

Potential impacts

5.31. Landscape and visual effects will be influenced by the flat topography and screening provided by vegetation and built form. Significant landscape and visual effects are likely to occur within approximately 1 km of the Scheme.

5.4.1 Construction

- 5.32. The most apparent changes to landscape and views would result from the temporary presence of construction plant and the construction compound, the removal of existing trees and hedgerow and the construction of the Scheme itself.
- 5.33. The potential impacts on landscape character and visual amenity during construction include:
 - Presence of construction traffic, construction plant and equipment,
 - Construction activity, generating noise and movement,
 - Earthworks, changes in landform and storage of soils and materials,
 - Presence of a construction compounds, temporary security fencing and hoardings,
 - Vehicle movements including private vehicles belonging to site staff,
 - Removal of existing vegetation which will open up views of the construction works, and
 - Use of lighting if night-time works are required and security lighting.
- 5.34. Environmental impacts would be avoided or reduced through an iterative design process to minimise the footprint of the Scheme and the loss of existing vegetation and farmland. Construction would be carried out in accordance with the Code of Construction Practice.

Landscape

- 5.35. There would be direct impacts on the following character areas:
 - NCA 88: Bedfordshire and Cambridgeshire Claylands and
 - LCA 2B: Cottenham Fen Edge Claylands

Visual

- 5.36. Views of the Scheme would be possible from residential areas in Cambridge, Landbeach, Waterbeach, Impington and Milton and properties on or near Waterbeach Road, Landbeach Road, Green End, Ely Road (A10), Butt Lane, and the A14. Views would also be possible from the PRoW in the area including Mere Way, the route of a Roman Road on the western edge of Milton Landfill site.
- 5.37. The potential for adverse effects on residents will be assessed further. The assessment will also include visual impacts on users of the PRoW in the study area.

5.4.2 Operation

- 5.38. The Scheme would form a new, linear infrastructure feature in the area, visible from elevated locations and PRoW close to, or crossing the route. Moving buses and maintenance vehicles would be apparent in much of the area, introducing further transport infrastructure into an open and farmed landscape. Mitigation planting would be incorporated into the proposals to strengthen the existing landscape structure and provide some screening.
- 5.39. The potential impacts on landscape character and visual amenity during operation will include:
 - Loss of hedgerow and trees from the along the new guided busway route and within the footprint of the Travel Hub,
 - Presence of a Travel Hub on former farmland,
 - Presence of a linear paved route and vehicles passing through farmland and urban areas and
 - Presence of stops and lighting in the Travel Hub and at stops and road junctions in the rural landscape and on the edge of settlements.

Landscape

- 5.40. The Scheme would cut across the existing landscape pattern, severing fields and changing field boundaries. It would also cross minor roads and would result in a loss of farmland and short lengths of hedgerow and tree belts. The most apparent changes to landscape character would result from the introduction of a guided busway, maintenance/active travel track, travel hub, bus stops, lighting and moving vehicles into a predominantly rural landscape.
- 5.41. There would be direct impacts on the following character areas:
 - NCA 88: Bedfordshire and Cambridgeshire Claylands; and
 - LCA 2B: Cottenham Fen Edge Claylands

Visual

5.42. Views of the Scheme operation would be possible from residential areas in Cambridge, Landbeach, Waterbeach, Impington and Milton and properties on or near Waterbeach Road, Landbeach Road, Green End, Ely Road (A10), Butt Lane, and the A14. Views would also be possible from the PRoW in the area including Mere Way.

5.43. The potentially for adverse effects on residents will be assessed further. The assessment will also include visual impacts on users of the PRoW in the study area.

Proposed scope of ES

5.44. The summary table of scoping assessment is provided in Chapter 17.

5.5.1 Scoped in

- 5.45. The Scheme has the potential to result in likely significant effects to landscape character and visual amenity during construction and operation. It is therefore considered necessary to undertake a detailed landscape and visual impact assessment to understand the potential impacts of the Scheme.
- 5.46. The impacts of the Scheme on the openness of the Cambridge Green Belt will be included in a separate review that will be informed by the LVIA.

5.5.2 Scoped out

5.47. A 2km area of search has been considered and a 1km study area from the redline boundary of the travel hub and from the new guided busway route for landscape and visual effects to be determined. Within the study area, it is not proposed that any elements of landscape and visual impact would be scoped out for further assessment.

Assessment method

- 5.48. The Landscape and Visual Impact Assessment (LVIA) will be undertaken by a chartered landscape architect. The LVIA will address two separate but related issues:
 - Likely effects on landscape as a resource in its own right; and
 - Likely effects on people's views and visual amenity.

5.49. The LVIA will identify and report on:

- The likely nature, extent and scale of the Scheme to determine effects of change and development,
- The likely nature and scale of landscape effects (adverse, neutral or beneficial) during the construction and operation of the Scheme and
- The likelihood of the Scheme to affect the aesthetic and perceptual aspects of the landscape, its distinctive character and its elements. Key sources of information will include OS mapping, aerial photography, published landscape character assessments and historic landscape characterisation documents.

- 5.50. In addition, the findings of LVIA will be used to inform a Green Belt Review that will be drafted as part of the planning application.
- 5.51. The LVIA chapter will include figures that show the baseline landscape character areas and assessment.
- 5.52. The methodology for the assessment will be undertaken in accordance with the following guidance:
 - Guidelines for Landscape and Visual Impact Assessment (GLVIA), 3rd Edition: Landscape Institute and Institute of Environmental Management and Assessment (2013); and
 - DMRB LA 107 Landscape and visual effects (this supersedes DMRB Volume 11 Section 3 Part 5 Landscape Effects and IAN 135/10).

Photomontages

5.53. To support the assessment a number of photomontage visualisations will be prepared using the representative viewpoint locations shown in Appendix B. These will illustrate the Scheme to show immediate impact of the Scheme post construction (year one winter) and how the Scheme will appear in summer 15 years' time once mitigation planting has established.

Photomontage Methodology

- 5.54. The camera will be mounted on a tripod 1.6m above the ground and high quality architectural photographic practice is used to capture the view in two-point perspective. For panoramic images the camera is placed on a rotating mount and a sequence of images sharing the same point of perspective and orientation with respect to the horizon are captured using a fixed 35mm lens. Images are captured in RAW format and a photograph is taken of the camera in its location. AutoCAD, 3DS Max and Photoshop are used to model the proposed scheme to generate perspective overlays for each photograph.
- 5.55. Photomontages are produced by placing a computer-generated camera at the surveyed camera position within the 3D model. The photograph taken from the actual camera position is used as a backdrop to the 3D model. A view of the 3D model within the photographic context is rendered.
- 5.56. Photoshop is used to merge the perspective taken from the 3D model and the photograph to illustrate the visual appearance of the proposals.

Assessment criteria

Baseline landscape criteria

5.57. As part of the development of the Scheme, the landscape baseline has been considered based on the constituent elements, features and other factors that contribute to existing landscape character within the study area including:

- The physical influences on the landscape resource including topography, geology, soils, microclimate, water bodies and water courses,
- The influence of human activity including land use, open space, transport routes, public rights of way, land management, the character of settlement and buildings, the night-time environment, and the pattern and type of fields and enclosure,
- The aesthetic and perceptual aspects of the landscape including scale, complexity, openness, tranquillity, and wildness, and
- Habitats and heritage features including nature reserves, sites of special scientific interest, conservation areas, listed buildings, registered parks and gardens and other elements contributing to historic landscape character. For the lvia, local landscape character areas (broadly homogeneous units of distinct features and elements) within the study area will be identified. The areas will be established using published landscape character assessment, desk study and site survey.

The value of each landscape character area will be evaluated in accordance with the criteria set out in the Table 5-2Table 5-2 - Level of landscape value

5.58.

LCA Value	Criterion for accessing landscape value
High	Designated landscape (such as National Park, AONB). Landscape of high scenic quality with
	a distinctive combination of features, elements and characteristics, outstanding views and a
	strong sense of place. A scarce or fragile landscape with cultural, historic or ecological
	elements which make a major contribution to landscape character. No or very few landscape
	detractors. Has components which are difficult to replace (such as mature trees). A tranquil
	landscape in good condition, largely intact, with an unspoilt character.
Medium	Landscape locally designated (such as conservation area, regional park) or locally valued (for
	its recreational facilities and footpath networks for instance). Some scenic quality and a
	moderate sense of place. A landscape with some distinctive features, elements and
	characteristics. Some cultural, historic or ecological elements which contribute to landscape
	character. Some high use areas, but overall medium tranquillity. Few landscape detractors.
Low	Undesignated landscape, not valued for its scenic quality, with a disparate combination of
	features, elements and characteristics and a weak sense of place. Mainly common features
	and few or no cultural, historic or ecological elements that contribute to landscape character.
	Many landscape detractors. A landscape of low tranquillity, in poor condition.
Criteria base	d on guidance in paragraph 5.19, GLVIA 3rd edition (LI and IEMA, 2013)

Table 5-2 - Level of landscape value

Baseline visual criteria

- 5.59. The visual amenity baseline study will identify the people in the area and important, designated or protected views potentially affected by the development. Viewpoints have been selected to represent the visual receptor types in the study area. The selection of representative viewpoints has taken into account:
 - The accessibility of the viewpoint,
 - The number of receptors likely to be affected,
 - The viewing direction and distance from the site to the scheme,

- The nature of the viewing experience and
- Cumulative views, in conjunction with other projects.
- 5.60. The viewpoints will be discussed with SCDC, reviewed against the findings of further site visits and updated if required.
- 5.61. The value of the view will be determined based on indicators including:
 - The value attached to a view in relation to a heritage asset, through planning designation and by visitors to the area; and/or
 - Views described in guidebooks, shown on maps and/or referred to in literature or art.

Assessment criteria

- 5.62. The assessment will identify the daytime effects likely to arise from the Scheme for both the construction and operation phases, taking into account mitigation measures and changes over time. The significance of effects will be assessed by considering the sensitivity of the receptor and the predicted magnitude of change in relation to the baseline conditions for the following:
- 5.63. Construction phase assessment:
 - a winter's day during the construction of the proposed Scheme (reflective of the worst-case scenario).
- 5.64. Operational phase assessment:
 - a winter's day in the year that the proposed Scheme becomes operational (reflective of the worst-case scenario) and
 - a summer's day fifteen years after the proposed Scheme becomes operational when mitigation measures, such as screen planting, have established (reflective of the best-case scenario).

Landscape assessment criteria

5.65. The sensitivity of the landscape will be evaluated by considering the existing value of the landscape and its susceptibility to the type of change arising from the Scheme using the criteria set out in the Table 5-3.

Landscape sensitivity	Typical description
Very high.	Landscape of very high international/national importance, rarity and value with no or very limited ability to accommodate change without substantial loss/gain (i.e. national parks, internationally acclaimed landscapes - UNESCO World Heritage Sites). A very high susceptibility to change due to the type of development proposed.
High	Landscape of high national importance, rarity and value with distinctive features/elements with limited ability to accommodate change without incurring

Table 5-3 - Landscape sensitivity

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	substantial loss/gain (i.e. designated areas, registered parks and gardens, country		
	development proposed.		
Medium	Landscape of medium value and local or regional recognition of importance, able to		
	accommodate some change (i.e. with features worthy of conservation, some sense		
	of place or value through use of perception). A medium susceptibility to change due		
	to the type of development proposed.		
Low	Undesignated landscape of low value, low to medium importance able to		
	accommodate change (i.e. non-designated or designated areas of local recognition		
	or areas with little sense of place). A low susceptibility to change due to the type of		
	development proposed.		
Negligible	Landscapes of very low importance and rarity, able to accommodate change. A very		
	low susceptibility to change due to the type of development proposed.		

Source: Criteria based on guidance in LA107 Landscape and visual effects Rev 0 (2019) and GLVIA 3rd edition (LI and IEMA, 2013)

The magnitude of change to landscape character will be determined by considering:

- The nature of an impact whether the introduction of a proposed development will be of benefit or detriment to the existing landscape character,
- The scale of the change extent of the loss of landscape elements, the degree to which aesthetic features or perceptual aspects of the landscape are altered (by the removal of hedgerows or introduction of new structures for example) and whether a key characteristic of the landscape is altered,
- The geographical extent of the area affected and
- The duration of the change and its reversibility.
- 5.66. The evaluation of the magnitude of change will be based on the criteria set out in the Table 5-4.

Magnitude of effect (change)		Typical description	
Major	Adverse	Total loss or large-scale damage to existing landscape character or distinctive features or elements; and/or addition of new uncharacteristic, conspicuous features or elements (i.e. road infrastructure). Changes that alter a substantial proportion of the LCA. Introduction of long-term and/or irreversible changes to an LCA or its setting.	
	Beneficial	Large scale improvement of landscape character to features and elements; and/or addition of new distinctive features or elements, or removal of conspicuous road infrastructure elements Changes that alter a substantial proportion of the LCA.	
Moderate	Adverse	Partial or noticeable damage to existing landscape character or distinctive features or elements; and/or addition of new uncharacteristic, noticeable features or elements (i.e. road infrastructure), but which do not necessarily conflict with key characteristics of the existing landscape.	

Tablo 5-4 -	Magnitude and	naturo of	offact on	the landscape
Table 3-4 -	magnitude and	nature or	enect on	the landscape

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Beneficial	Partial or noticeable improvement of landscape character by restoration of existing features or elements; or addition of new characteristic features or elements or removal of noticeable features or elements.
Adverse	Slight loss or damage to existing landscape character of one (maybe more) key features and elements; and/or addition of new uncharacteristic features and elements. Changes that will alter a small to a small proportion of the LCA and its immediate setting.
Beneficial	Slight improvement of landscape character by the restoration of one (maybe more) key existing features and elements; and/or the addition of new characteristic features. Changes that will alter a small to a small proportion of the LCA and its immediate setting. Very minor loss, damage or alteration to existing landscape character of one or more features and elements.
Adverse	Very minor noticeable improvement of character by the restoration of one or more existing features and elements
Beneficial	No noticeable alteration or improvement, temporary or permanent, of landscape character of existing features and elements.
	No noticeable alteration or improvement, temporary or permanent, of landscape character of existing features and elements.
	Beneficial Adverse Beneficial Adverse Beneficial

Source: LA 107 Landscape and visual effects Rev 0 (2019)

Visual assessment criteria

- 5.67. The sensitivity of visual receptors will be evaluated by considering the value attached to specific views and the susceptibility of individual visual receptors to changes to views and visual amenity. The value attached to a view could derive from a planning designation or an association with a heritage asset. The susceptibility to change depends on the occupation or activity of the receptor and the extent to which their attention is focused on the view and visual amenity.
- 5.68. The evaluation of the sensitivity of visual receptors will be based on the criteria set out in the Table 5-5.

Table 5-5 - Visual receptor sensitivity

Sensitivity	Receptor
Very high	Static views from and of major tourist attractions.
	Views from and of very important national/international landscapes,
	cultural/historical sites (e.g. National Parks, UNESCO World Heritage sites).
	Receptors engaged in specific activities for enjoyment of dark skies
High	Views by users of nationally important PRoW / recreational trails (e.g. national
	trails, long distance footpaths).
	Views by users of public open spaces for enjoyment of the countryside (e.g.
	country parks.
	Static views from dense residential areas, longer transient views from
	designated public open space, recreational areas.
	Views from and of rare, designated landscapes of national importance.
Moderate	Static views from less populated residential areas, schools and other
	institutional buildings and their outdoor areas.

Views by outdoor workers. Transient views from local/regional areas such as public open space, scenic roads, railways or waterways, users of local/regional designated tourist routes of moderate importance.
Views from and of landscapes of regional importance
Views by users of main roads or passengers in public transport on main arterial routes. Views by indoor workers. Views by users of recreational/formal sports facilities where the landscape is secondary to enjoyment of the sport. Views by users of local public open spaces with limited variety or distinctiveness
Quick transient views such as from fast moving vehicles.
Views from industrial area, land awaiting re-development. Views from landscapes of no importance with no variety or distinctiveness.

Source: LA107 Landscape and visual effects Rev 0 (2019)

- 5.69. The magnitude of change to views in construction will be determined by considering the scale, nature and duration of the change, the distance of the change from the visual receptor, the receptor's direction of view, the extent of screening and filtering of the view and whether the receptor is static or moving.
- 5.70. Approximate distances between the representative viewpoints and the Scheme will be classified as follows:
 - Close up to 500m from the Scheme,
 - Mid-distance between 500m and 1000m from the Scheme; and
 - Distant more than 1000m from the Scheme.
- 5.71. The evaluation of the magnitude of change will be based on the criteria set out in the Table 5-6 below.

Table 5-6 - Magnitude of change to views

Magnitude	Criteria
Major	Total loss or substantial alteration to key characteristics of the view.
	Addition of new features or components that become the dominant feature or
	focal point of the view.
Moderate	Addition of new features or components that are noticeable features of the
	view, clearly visible to the receptor.
	Substantial change partially filtered by intervening vegetation and/or built
	form or viewed obliquely.
Minor	The Proposed Scheme or part of it would be perceptible but not alter the
	overall balance of features and elements that comprise the existing view.
	Changes largely filtered by intervening vegetation and/or built form or viewed
	obliquely.
Negligible	Only a small part of the Proposed Scheme would be discernible or changes
	in the background of the view, would be seen as an inconspicuous element
	within the wider panorama.
	Change almost entirely obscured by intervening vegetation and/or built form.

Magnitude	Criteria
No Change	No part of the Proposed Scheme would be discernible.
A A U U U	

Source: Criteria based on guidance in LA107 Landscape and visual effects Rev 0 (2019) and GLVIA 3rd edition (LI and IEMA, 2013)

Significance of effects

5.72. Professional judgement will be used to determine the overall level of significance of effects on landscape and visual receptors by weighing the sensitivity of the receptors against the magnitude of change. The evaluation of the significance of effects will be guided by the matrix in the Table 5-7 below. Generally, where effects are moderate, large or very large these are deemed to be significant; whereas slight or neutral effects are not significant.

Table 5-7 - Significance of effects

Sensitivity	Magnitude of impact						
	Major	Moderate	Minor	Negligible	No Change		
Very high	Very Large	Large/Very Large	Moderate/Large	Slight	Neutral		
High	Large/Very Large	Moderate/Large	Slight/Moderate	Slight	Neutral		
Moderate	Moderate/Large	Moderate	Slight	Neutral/Slight	Neutral		
Low	Slight/Moderate	Slight	Neutral/Slight	Neutral/Slight	Neutral		
Negligible	Slight	Neutral/Slight	Neutral/Slight	Neutral	Neutral		

Source: Table 3.8.1 LA104 Environmental assessment and monitoring Revision 1 (2019)



6. Cultural heritage

Legislation and policy

6.1. An overview of the legislation and policies relevant to this assessment is provided below.

- Planning (Listed Buildings and Conservation Areas) Act 1990,
- National Planning Policy Framework (NPPF) 2023 (Section 16: conserving and enhancing the historic environment),
- The Cambridge City Local Plan (2018) (Policy 61: Conservation and enhancement of Cambridge's historic environment, Policy 62: Local heritage assets and Policy 63: Works to a heritage asset to address climate change) and
- South Cambs District Council Local Plan (2018) (Policy NH/14: Heritage assets and Policy NH/15: Heritage assets and adapting to climate change.
- 6.2. This scoping assessment has also been undertaken in accordance with current best practice and in line with, but not limited to, the following standards and guidance:
 - Standards and guidance for historic environment desk-based assessment (Chartered Institute for Archaeologists, 2023),
 - Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment (Chartered Institute for Archaeologists, 2023),
 - Managing significance in decision-taking in the historic environment, Historic Environment Good Practice Advice in Planning Note 2 (Historic England, 2015),
 - The Setting of Heritage Assets Historic Environment Good Practice Advice in Planning Note 3 (Historic England, revised 2017) and
 - Planning Practice Guidance: Conserving and Enhancing the Historic Environment (NPPF, DCLG, 2014: updated 2019).

Scoping assessment methodology

Data sources

- 6.3. In the preparation of this scoping assessment, a range of historical and technical data has been collected and analysed. The following sources have been consulted:
 - National Heritage List for England (NHLE),
 - Cambridgeshire Historic Environment Record (CHER),
 - Ordnance Survey Mapping and LiDAR imagery,
 - Online resources including the British Geological Survey (BGS) Geology of Britain Viewer were consulted to obtain an overview of the archaeological burial environment and
 - These sources have been used in order to gain an understanding of the designated and non-designated heritage assets within the location of the Scheme.

Study area

- 6.4. The study area is located to the north-east of Cambridge. The study area is largely rural in character with a number of dispersed settlements. The study area is defined as the area of the proposed guided busway and travel hub plus a 1km zone of interest, in order to account for visual impacts to the settings of heritage assets as well as to characterise the archaeological landscape.
- 6.5. As the assessment process develops, it may be possible for the study area to be refined. It could be either expanded or contracted depending on the results of landscape assessment and/or results of archaeological investigations.

Assumptions and limitations

- 6.6. The following assumptions have been made in the preparation of this Scoping Report:
 - Specific impacts and mitigation measures cannot be fully identified at the scoping level, and further assessments may expand or limit the study areas identified in this document,
 - No site visit was undertaken to ascertain the condition of any known assets or their settings,
 - No detailed baseline data gathering was conducted for the scoping activities (such as archival records, previous archaeological investigations, or geotechnical data) and
 - No archaeological fieldwork (geophysical survey, evaluation trenching or excavation) was undertaken for the scoping exercise.

Baseline conditions

Gazetteer

6.7. An abbreviated gazetteer of the heritage assets discussed below is included in Appendix B.

Designated assets

No designated assets fall within the immediate Site of the proposed Scheme (see Figure 1 for the Site boundary). However, within the defined study area, there is one Scheduled Monument, four Conservation Areas and 47 Listed Buildings. These are shown on Figure 6-1.

Figure 6-1 - Cultural heritage designated assets



- 6.8. The majority of the Listed Buildings fall within Conservation Areas associated with historic villages and towns; namely Impington, Milton, Waterbeach and Landbeach with the exceptions being two milestones along the A10 and one memorial stone to Elizabeth Woodcote located 40m north of the Cambridge to Histon Railway line. The closest Listed Building to the Scheme is Milestone half a mile south of Green End Junction and Goose Hall at NGR 484 664 (Grade II, 1302189) which is located approximately 100m north of the Site.
- 6.9. Listed Buildings of particular note within the study area are the four assets immediately adjacent to The Common to the east of Landbeach as the guided busway route will pass through fenland which forms part of the setting of these assets. These comprise:
 - Parish Church of All Saints (Grade I Listed Building, 1127349) located approximately 490m west of the Site,
 - The Old Rectory (Grade II* Listed Building, 1178950) located approximately 440m west of the Site,
 - Milton Cottage, Oak Cottage, Plough Cottage (Grade II Listed Building, 1331298) located approximately 470m west of the Site and
 - Tithe Barn, east of number 14 (The Old Rectory) (Grade II Listed Building, 1127382) located approximately 370m west of the Site.
- 6.10. The Scheduled Monument within the study area is the Shrunken Medieval Village of Landbeach (1006870) which is located approximately 350m west of the Site. However, given the density of archaeology known to be present in this area, it is likely that evidence associated with this feature will

extend beyond the boundaries of the Scheduled Monument. It is understood that the remains of the Roman and Iron Age settlement which extends across the Site could be of schedulable quality and this should be considered throughout the assessment process.

Non-designated assets

- 6.11. There are 404 non-designated assets within the study area. A preliminary review of these heritage assets identified several cropmarks and known archaeological features recorded within the immediate Site area. Within the area of the travel hub, previous investigations (not related to the Scheme) have revealed a Middle Iron Age (300-50AD) to Roman settlement site (MCB10621) with evidence including ditches, coins, trackways, pottery and other isolated artefacts. A further settlement site of this date is located further south, to the east of Landbeach (MCB9973).
- 6.12. To the south of the route to the east of Impington, areas of ridge and furrow (MCB22591) have been identified within the Site as well as the location of the Impington Hall Park and Garden (MCB14254). This is an archaeologically rich area and within the wider study area there is a complex archaeological record ranging in date from prehistoric to Modern. The earliest evidence is a fossilized bison horn and Palaeolithic axe (MCB6530) found 880m to the north-east of the Site but there is extensive prehistoric evidence across the Site which ranges from isolated findspots to feature clusters. There are also significant World War II military remains to the south-west (MCB17527) and north-east (MCB15155).
- 6.13. A number of cropmarks indicative of potential features and/or sites have also been identified through aerial survey data. This shows a high level of potential activity across the Site extent but particularly concentrated at the portion of the route to the east of Landbeach as showing in Figure 6-2. It has been interpreted that this area represents an extensive settlement site, equivalent to a village, likely of Iron Age to Roman date and possibly connected to the settlement identified in the area of the travel hub during previous archaeological investigations within this area.

Figure 6-2 – Cropmarks



Potential impacts

Construction

- 6.14. The high presence of known heritage assets and archaeological features recorded directly within the Site footprint and up to 1km indicates the potential for impacts on cultural heritage as a result of the Scheme. Impacts on known assets during construction could occur from direct damage during excavation works, movement of plant and machinery around the Site, the presence of site compounds and the general construction of the guided busway and travel hub.
- 6.15. Impacts are likely to be greater in the areas where there is a higher concentration of archaeological potential. Namely, the northern end of the Site in the location of the proposed travel hub and the portion of the guided busway which runs parallel to Landbeach where there is extensive evidence of an expansive Iron Age to Roman settlement. In addition, there is considered to be high potential for archaeology to the south of the Site adjacent to the Milton Landfill Site where the Scheme is proposed to pass through the former site of the sixteenth century Impington Park and Garden as well as areas of identified Medieval ridge and furrow and field systems.
- 6.16. There is also a risk to as-yet unknown archaeological remains being present within the study area which could also be impacted by the construction activities. Some of these remains may be of high significance, contributing to the understanding of the late prehistoric and Roman settlement of the area.

If such remains are encountered, removal of the remains in part or whole would constitute a significant adverse effect.

6.17. The construction of the Scheme could also generate indirect impacts to the setting of heritage assets outside of the Site. These impacts could include disturbance and obstruction to views of the Scheduled Monument for example. Such impacts will be temporary and reversible, but the significance of them should be considered in further assessment.

Operation

- 6.18. Initial assessment suggests that there will be very limited effects to the majority of the designated assets within the Study Area once the Scheme is operational, for both direct damage to features of interest as well as to settings. This conclusion is based on there being no designated assets within the Site and for those that are present in the wider Study Area, their distance from the Site is such that no impacts from the operation of the Scheme is expected. The exception to this is the potential for impacts on the setting of the Scheduled Monument, Landbeach Conservation Area and the four Listed Buildings in the Study Area.
- 6.19. The Scheduled Monument and Landbeach Conservation Area draw aspects of their significance from the rural setting through which the guided busway will pass. Similarly, for the Tithe Barn (Grade II Listed Building, 1127382) which draws much significance from its rural setting upon the fen-edge. It is possible that impacts on setting to these assets could represent a significant adverse effect.

Proposed scope of ES

Scoped in

6.20. The following effects will be considered in the ES and assessed for the risk of a likely significant effect.

Construction

- 6.21. Impacts on the setting of the following designated assets within the Study Area; the Scheduled Monument, the four Listed Buildings to the east of Landbeach and the Landbeach Conservation Area.
- 6.22. The potential for adverse impact to known non-designated assets such as cropmarks. This will include both direct loss and/or damage to these features within the Site as well as impacts on setting within the Study Area.
- 6.23. The potential for adverse impact to unknown buried archaeological remains within the Site and working area. This will include both direct loss and/or damage to these features as well as impacts on setting.

Operation

6.24. Impacts on the setting of the following designated assets within the Study Area; the Scheduled Monument, the four Listed Buildings to the east of Landbeach and the Landbeach Conservation Area. Assessment of impacts on all other designated assets in the Study Area will be scoped out.

Scoped out

6.25. The following effects are not considered to cause a likely significant effect and will not be considered further in the ES:

Construction

- 6.26. Impacts on the setting of designated assets within the Study Area will be scoped out, except for the Scheduled Monument, the four Listed Buildings to the east of Landbeach and the Landbeach Conservation Area.
- 6.27. Impacts from direct damage and/or loss to designated assets within the Study Area as these assets are all a sufficient distance from the Site to not be impacted from the construction works.

Operation

- 6.28. Impacts on the setting of designated assets within the Study Area will be scoped out, except for the Scheduled Monument, the four Listed Buildings to the east of Landbeach and the Landbeach Conservation Area.
- 6.29. Impacts from direct damage and/or loss to designated assets within the Study Area.
- 6.30. The potential for adverse impact to known non-designated assets such as cropmarks.

Assessment method

- 6.31. The assessment will be undertaken in accordance with the DMRB, LA104 Environmental Assessment and Monitoring. This provides guidance on the assessment of the value (sensitivity) of receptors, as well as the assessments of magnitude of impact and determination of significance of effect.
- 6.32. To better understand the existing baseline conditions, the following activities will be carried out to inform the environmental assessment:
 - A site visit to ascertain the condition of known assets and/or their settings,
 - Further baseline data gathering including a review of available archival records, previous archaeological investigations, and previous geotechnical data; and
 - Fieldwork a geophysical survey is ongoing and initial results have identified anomalies denoting probable rectilinear enclosures and features within the north of the survey area. Evidence for historical agricultural activity has also been detected as ridge and furrow cultivation as well as former mapped and unmapped field boundaries. Further geophysical survey is planned for late summer 2024. The results of the completed survey will be used to develop an archaeological mitigation strategy which is likely to initially take the form of evaluation trenching with potential for further excavation in consultation with Cambridgeshire County Council's archaeologist.

Assessment of significance

- 6.33. Where known heritage assets are identified, the heritage significance of such assets is determined by reference to existing designations where available. For previously unidentified sites where no designation has been assigned, an estimate has been made of the likely historic, artistic, or archaeological importance of that resource based on professional knowledge and judgement.
- 6.34. The definition of cultural significance is readily accepted by heritage professionals both in the UK and internationally and was first fully outlined in the Burra Charter, which states in article one that 'cultural significance' or 'cultural heritage value' means aesthetic, historic, scientific, social or spiritual value for past, present or future generations (Burra Charter Article 1.2). This definition has since been adopted by

heritage organisations around the world and is applicable to 'Section 16: Conserving and enhancing the historic environment' of the National Planning Policy Framework (NPPF, 2023).

- 6.35. The following paragraphs as set out in the NPPF include key provisions considered of particular importance to this assessment.
- 6.36. Paragraph 200 In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance.
- 6.37. Paragraph 209 = Any harm to, or loss of, the significance of a designated heritage asset (from its alteration or destruction, or from development within its setting), should require clear and convincing justification. Substantial harm to or loss of:
- 6.38. a) grade II Listed Buildings, or grade II registered parks or gardens, should be exceptional;
- 6.39. b) assets of the highest significance, notably Scheduled Monuments, protected wreck sites, Registered Battlefields, grade I and II* Listed Buildings, grade I and II* Registered Parks and Gardens, and World Heritage Sites, should be wholly exceptional (Fn. 68).
- 6.40. Paragraph 203 The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that directly or indirectly affect non-designated heritage assets, a balanced judgment will be required having regard to the scale of any harm or loss and the significance of the heritage asset.
- 6.41. In the NPPF Glossary, significance is defined as: 'The value of a heritage asset to this and future generations because of its heritage interest. The interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting. For World Heritage Sites, the cultural value described within each site's Statement of Outstanding Universal Value forms part of its significance.'
- 6.42. Within the DMRB, LA104 *Environmental Assessment and Monitoring* provides guidance on the assessment of the value (sensitivity) of receptors, as well as the assessments of magnitude of impact and determination of significance of effect.
- 6.43. The treatment of Cultural Heritage is further discussed in LA106, *Cultural Heritage Assessment*, which outlines the methodology specific to heritage. In contrast to the previous guidance in HA208/07, LA106 no longer divides the Cultural Heritage resource into archaeological remains, historic buildings and historic landscape, nor does it provide any prescriptive determination of value (sensitivity) based on designation. The applicability of the guidance provided in HA208/07 has long made it a standard for assessing value and significance in the historic environment, including outside the realm of highways schemes. As such, some of the detail of the methodologies in HA208/07 have been used to provide exemplars to assist in the understanding of how the LA104 guidance has been applied to the assessment of Cultural Heritage.
- 6.44. The first step in environmental assessment is in understanding the value or sensitivity of environmental receptors. For Cultural Heritage, the receptors are defined as heritage assets. The value of a heritage asset is defined by its heritage interest and ability to contribute to local, regional, national and/or international research agendas and frameworks. The guidance provided by LA104 lays out the requirements for assessment, as noted in the descriptions of values are laid out as shown in Table 6-1 below.

6.45. For previously unidentified sites where no designation has been assigned, an estimate has been made of the likely historic, artistic or archaeological importance of that resource based on professional knowledge and judgement. Assessment of the significance of heritage assets is undertaken using professional judgement guided by the criteria set out in Table 6-1 below.

Significance	Description	Example
Very High	Internationally important or significant heritage assets	World Heritage Sites, or buildings recognised as being of international importance.
High	Nationally important heritage assets generally recognised through designation as being of exceptional interest and value.	Grade I and II* Listed Buildings, Grade I and II* Registered Parks and Gardens, Scheduled Monuments, Protected Wreck Sites, Registered Historic Battlefields, Conservation Areas with notable concentrations of heritage assets and non- designated assets of national or international importance.
Medium	Nationally or regionally important heritage assets recognised as being of special interest, generally designated.	Grade II Listed Buildings, Grade II Registered Parks and Gardens, Conservation Areas and non-designated assets of regional or national importance, including archaeological remains, which relate to regional research objectives or can provide important information relating to particular historic events or trends that are of importance to the region.
Low	Assets that are of interest at a local level primarily for the contribution to the local historic environment.	Non-designated heritage assets such as locally Listed Buildings, non-designated archaeological sites, non-designated historic parks and gardens etc. Can also include degraded designated assets that no longer warrant designation.
Negligible	Elements of the historic environment which are of insufficient significance to merit consideration in planning decisions and hence be classed as heritage assets.	tNon-designated features with very limited or no historic interest. Can also include highly degraded designated assets that no longer warrant designation.
Unknown	The importance of an asset has not	been ascertained.

Table 6-1 - Assessing the significance of heritage assets

6.46. Once significance has been established, the impact of any proposal can be appropriately assessed.

Magnitude of impact

- 6.47. Assigning the magnitude of impact is the second stage of identifying the significance of effect. The magnitude of impact can be either beneficial or adverse; in some cases, the impact will result in a neutral situation, where there is no change to the value (sensitivity) of the receptor.
- 6.48. A variety of professional guidance is used to assess the magnitude of impacts a scheme may have on Cultural Heritage. This guidance includes:
 - Historic England Guidance Note 1: The Historic Environment in Local Plans (2015),
 - Historic England Guidance Note 2: Decision-Taking in the Historic Environment (2015),
 - Historic England Guidance Note 3: The Setting of Heritage Assets (Second Edition 2017),
 - Historic England Guidance Note 4: Enabling Development and Heritage Assets (2020),

- Conservation Principles, Policies and Guidance: For the sustainable management of the historic environment (2008) and
- Preserving Archaeological Remains: Decision-taking for Sites under Development (2016).
- 6.49. The magnitude of the impact of the Scheme is evaluated against the effect on the value of the heritage asset and harm to its significance, either to its historic fabric or its setting, as shown in Table 6-2.

Table 6-2 - Assessing magnitude of impact (Heritage)

Magnitude of Impact		Typical Description		
Major	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements. For example, this could include: major changes that remove or alter elements of high significance; alterations to the setting of an asset that very substantially affect our appreciation of it and its significance; or total unrecorded loss of archaeological interest.		
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.		
Moderate	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements. For example, this could include: physical alterations that remove or alter some elements of significance, but do not substantially alter the overall significance of the asset; notable alterations to the setting of an asset that affect our appreciation of it and its significance; or the unrecorded loss of archaeological interest.		
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.		
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements. For example, this could include: physical changes that alter some elements of significance but do not noticeably alter the overall significance of the asset; and small-scale alterations to the setting of an asset that hardly affect its significance.		
	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/ neutra	1	No loss or alteration of characteristics, features or elements; no observable impact in either direction		

Significance of effect

- 6.50. The significance of effect on the cultural heritage resource is determined by consideration of a combination of the magnitude of the impact and the value of each asset, with a level of professional judgement included in the determination. The magnitude of impact to a heritage asset is identified by the degree of change that would be experienced by the asset and its setting, if the Scheme were to be completed as compared with a 'do nothing' situation. The definition of the magnitude of impact, and the matrix for determining the significance of effect, can be found in LA104, (section 3.3-3.9). The matrix by which significance of effect is determined is demonstrated in Table 6-3.
- 6.51. Where two potential values of significance of effect are identified in DMRB, professional judgement will be used to assign the value, based on understanding of details of both the magnitude of impact and value of the asset.

Table 6-3 - Significance of effect (Heritage)

Value	Impact Magnitude						
	Major	Moderate	Minor	Negligible	No change		
Very high	Very Large	Large or Very Large	Moderate or Large	Slight	Neutral		
High	Large or Very Large	Moderate or Large	Slight or Moderate	Slight	Neutral		
Medium	Moderate or Large	Moderate	Slight	Neutral or Slight	Neutral		
Low	Slight or Moderate	Slight	Neutral or Slight	Neutral or Slight	Neutral		
Negligible	Slight	Neutral or Slight	Neutral or Slight	Neutral	Neutral		

Assessing buried archaeological potential

- 6.52. Buried archaeological evidence is often an unknown quantity which can be difficult to fully identify during a desk-based assessment. The assessed potential is based on available evidence, but the physical nature and extent of any archaeological resource surviving within the Site cannot be confirmed without detailed information on the below ground deposits or results of on-site fieldwork, typically through non-intrusive (e.g. geophysical, LiDAR), and intrusive (archaeological, geoarchaeological evaluation) survey.
- 6.53. A site's archaeological potential is identified using professional judgement and knowledge. A site's baseline potential is compared to the level of existing impact upon it, from modern and historic developments. The potential for surviving archaeological evidence of past activity within the Scheme boundary is expressed in the report as being:
 - High: The available evidence suggests a high likelihood for past activity within the Scheme boundary and a strong potential for archaeological evidence to survive intact or reasonably intact,
 - Medium: The available evidence suggests a reasonable likelihood for past activity within the Scheme and consequently there is a potential that archaeological evidence could survive,
 - Low: The available evidence suggests archaeological evidence of activity is unlikely to survive within the Scheme, although some minor land-use may have occurred and
 - Uncertain: Insufficient information to assess.
- 6.54. Given what is known from the archaeological baseline identified above, the potential for buried archaeology cannot be scoped out. Additional investigations, including both non-intrusive geophysical survey and intrusive evaluation trenching are anticipated as being required to fully assess the value of known and as-yet unknown buried archaeological remains.

7. Water environment

Legislation and policy

- 7.1. The relevant national, regional and local policy, legislation and guidance which will be used as the basis for preparation of the Environmental Impact Assessment is provided below.
 - Water Environment (Water Framework Directive) (England and Wales) Regulations 2017,

- The Groundwater (England and Wales) Regulations 2009 and The Groundwater (Water Framework Directive) (England) Direction 2016,
- Antipollution Works Regulations 1999,
- Environment Act 1995,
- Environmental Damage (Prevention and Remediation) Regulations 2015,
- Environmental Protection Act 1990,
- Flood Risk Regulations 2009,
- Flood and Water Management Act 2010 and Commencement Orders,
- Highways Act 1980 (HA 1980),
- National Planning Policy Framework (2023),
- National Planning Practice Guidance (NPPG) (2022),
- The Environmental Permitting (England and Wales) Regulations 2016,
- The Water Resources (Environmental Impact Assessment) (England and Wales) Regulations 2006,
- Water Act 2003 and Water Act 2014,
- WFD (Standards and Classification) Directions (England and Wales) 2015,
- Water Industry Act 1991 (Amendment) (England and Wales) Regulations 2009,
- Water Resources Act 1991,
- The Land Drainage Act 1991 and 1994,
- The Control of Pollution (Oil Storage) (England) Regulations 2001,
- The Environment Bill 2021,
- Planning Inspectorate (PINS) advice note 18,
- Anglian River Basin Management Plan (RBMP),
- Cambridgeshire and Peterborough Flood and Water Partnership (CPFloW),
- Cambridgeshire Flood Risk Management Strategy 2021-2027 and
- South Cambridgeshire Local Plan Adopted September 2018.

Assessment methodology

- 7.2. As stated in the Design Manual for Roads and Bridges (DMRB) LA 113 (Road drainage and the water environment) Table 3.2 (Levels and methods of assessment) the level and method of assessment for scoping shall follow the requirements documented in DMRB LA 103 (Scoping projects for environmental assessment).
- 7.3. For the water environment the scoping assessment is desked based. The baseline conditions within the study area are collected using publicly available data. Following a review of the concept design (Waterbeach to Cambridge Revised Central Concept Designs 1.0), draft drainage strategy (W2CPTS-ATK-HDG-XX-RP-CD-000001) and proposed Red Line Boundary (RLB) (W2C Red Line Boundary) potential impacts have been identified.
- 7.4. Based on the estimated importance of the baseline conditions, which is based on DMRB LA 113 Table 3.70 (Estimating the importance of water environment attributes) it has been predicted whether the identified impacts are likely to result in significant effects. The magnitude of the impacts has been estimated using the criteria and typical examples provided in DMRB LA 113 Table 3.71 (Estimating the magnitude of an impact on an attribute) and professional judgement. The potential significance of an

impact has been estimated using the DMRB LA 104 (Environmental assessment and monitoring) Table 3.8.1 (Significance Matrix).

- 7.5. Where significant effects are predicted these have been scoped in for further assessment. Where there is insufficient data available to predict potential significance these impacts have also been scoped in for further assessment.
- 7.6. Justification for scoping in or out has been provided along with the proposed level of assessment, which is defined in DMRB LA 113 Table 3.2 (Levels and methods of assessment).

Study area

- 7.7. The scope of the assessment includes, as a minimum, features of the water environment within 1 km of the Site for surface water quality, hydromorphology and groundwater.
- 7.8. A 1 km study area is considered appropriate in the context of surface water quality as beyond 1 km it is likely any impacts associated with soluble pollutants will be sufficiently diluted, thereby reducing any potential impact. For the hydromorphological assessment the study area is focused on the watercourses directly susceptible to change (i.e. physical modification through watercourse crossings) and all watercourses hydraulically connected within 1 km of the Scheme. Where impacts to surface water bodies are anticipated to extend beyond the 1 km study area, this has been noted as a deviation.
- 7.9. For groundwater, the 1 km study area will be used to assess potential impacts to any underlying groundwater receptors. Impacts to groundwater levels and flows are not expected to extend beyond the 1 km study area.
- 7.10. The study area for flood risk is the Site boundary (as shown on Figure 1-1 (also referred to as the Red Line Boundary). This study area is felt appropriate in the context of flood risk because this is predominately where the impacts will be located. If there is potential that the Scheme will increase flood risk in areas outside of the land take area then the study area will extend outside of this area to investigate potential impacts.
- 7.11. This chapter includes impacts on surface water quality and hydromorphology, flood risk and impacts to groundwater level, flow and quality. Impacts related to contaminated land, soil resources and geology are included in Chapter 11 Soils, Geology and Contaminated Land. Impacts to ponds will be considered in Chapter 4 Ecology.

Baseline conditions

Introduction

- 7.12. This section sets out the baseline conditions of the water environment. At this stage, a high-level, deskbased assessment has been undertaken using publicly available spatial data under the Open Government Licence and from open sources including the Environment Agency.
- 7.13. The focus of the baseline assessment for the study consisted of the following:

- Identification of surface watercourses including reported reaches under the WFD based on publicly available information from the Environment Agency⁴⁵,
- Collation of surface watercourse characteristics and WFD classification, objectives and Reasons for Not Achieving Good status (RNAG),
- Identification of existing fluvial flood risk and surface water flood risk as determined from the Environment Agency's online flood mapping⁴⁶,
- Identification of permitted abstraction and discharge points as determined from the Environmental Permitting Regulations⁴⁷,
- Identification of international/nationally designated conservation sites with citations related to the water environment based on publicly available information from the Defra Multi-Agency Geographic Information for the Countryside (MAGIC) website⁴⁸,
- Identification of permitted discharges based on publicly available information from the Environment Agency Environmental Permitting Regulations website⁴⁹ and
- Review of the underlying geology using the 1:50k BGS online mapping50, aquifer designations and other groundwater receptors such as Groundwater Dependant Terrestrial Ecosystems (GWDTEs) and Source Protection Zones (SPZs).

Surface water (quality and hydromorphology)

- 7.14. There are no Main Rivers located in the study area. The nearest Main Rivers are the River Cam and Old West River. The River Cam flows in a northerly direction and at its closest point, is located approximately 0.3 km east of the study area. The Old West River flows in a north westerly direction and is located approximately 3 km north west of the study area. The River Cam and The Old West River are considered to be hydrologically connected to the study area as they are joined by the ordinary watercourses within the study area.
- 7.15. There are numerous ordinary watercourses within the study area. Ordinary watercourses are defined as every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows and which does not form part of a Main River. Main Rivers fall under the legal powers of the Environment Agency, whereas ordinary watercourses are the responsibility of Internal Drainage Boards (IDBs) or the Local Lead Flood Authority (LLFA).
- 7.16. The ordinary watercourses generally consist of smaller streams and drainage ditches, which are heavily impacted by physical modification. Based on OS mapping there are two named drains within the study area: Public Drain and Thirteenth Public Drain. The Public drain flows in a westerly direction from the west of the study area near Implington to Beck Brook approximately 3 km west of the study area. Thirteenth Public Drain flows in a south easterly direction from Milton Park and Ride to join the River Cam to the south of the study area. There are numerous unnamed watercourses within the study area which have been identified as being ditches due to their straight, linear nature which generally follow field or highway boundaries.
- 7.17. The northern section of the study area falls within the Old West IDB and the Waterbeach Level IDB.

⁴⁵ <u>https://environment.data.gov.uk/catchment-planning</u>

⁴⁶ <u>https://flood-map-for-planning.service.gov.uk/</u>

⁴⁷ Environmental Permitting Regulations – Discharges to Water and Groundwater (data.gov.uk) [Accessed 15 April 2024]

⁴⁸ https://magic.defra.gov.uk/MagicMap.aspx

⁴⁹ Environmental Permitting Regulations – Discharges to Water and Groundwater (data.gov.uk)

⁵⁰ BGS Geoindex: <u>GeoIndex - British Geological Survey (bgs.ac.uk)</u>

7.18. Surface watercourses within the study area are located within the Anglian River Basin District (RBD), as set out in the Anglian River Basin Management Plan (RBMP). Although none of the watercourses within the study area are WFD designated reaches, they lie within catchments of WFD water bodies. The study area falls within the Old West River WFD Water Body catchment and the Cam WFD Water Body catchment. Table 7-1 provides a summary of the WFD baseline information for these catchments. Figure 7-1 shows the WFD river water body catchments, Main Rivers and ordinary watercourses.



Figure 7-1 - WFD river waterbodies

WFD reported reach and ID	Ecological Status (Cycle 3 2022)	Chemical Status (Cycle 3 2022)	RNAG	Objective	Artificial/Heavily Modified Water Body (HWMB)	Associated watercourses
Old West River Water Body GB205033043375	Moderate	Does not require assessment	Perfluorooctane sulphonate (PFOS) Polybrominated diphenyl ethers (PBDE) Ammonia (Phys- Chem) Phosphate Dissolved oxygen Mitigation Measures Assessment	Ecological: Moderate by 2015 (Disproportionate Burdens) Chemical: Good by 2063 (Disproportionately expensive, Natural conditions, Technical feasibility)	HMWB	Public Drain and various unnamed ditches
Cam Water Body GB105033042750	Moderate	Does not require assessment	PFOS PBDE Phosphate Mitigation Measures Assessment	Ecological: Moderate by 2015 (Disproportionate Burdens) Chemical: Good by 2063 (Natural conditions, Technical feasibility)	HMWB	Thirteenth Public Drain and various unnamed ditches

Table 7-1 - WFD baseline for water body catchments within the study area

Lakes and other surface water features

7.19. Lakes are defined as man-made or natural standing water bodies greater than 2 ha (20,000 m²) with Ponds being defined as man-made or natural standing water bodies less than 2 ha (20,000m²)⁵¹. There are a number of lakes and ponds within the 1 km study area, and they are listed in Table 7-2. None of these are designated as WFD lake water bodies. The lakes and ponds identified will be assessed as part of Chapter 4 - Ecology and where relevant, cross references will be made.

Name of the waterbody	Туре
Cawcutts Lake	Lake
Unnamed Pond at Cambridgeshire Science Park	Pond
Unnamed Pond adjacent to A14	Pond
Todd's Pit	Lake
Unnamed Pond at Milton Park & Ride	Pond
Unnamed Pond at Rectory Farm	Pond
Lake near Waterbeach angling club	Lake
Unnamed Pond at Hatley's Childrens' Pit	Pond
Unnamed pond at New Farm Green End Road	Pond
Unnamed Lake in former Royal Airforce Base	Lake

Table 7-2 - Lakes and ponds within the study area

Abstractions and discharges

- Thirteen permitted discharges⁵² to water are located within the study area and are summarised in Table 7-3.
- 7.21. At the time of reporting there was no water abstraction information available.

Table 7-3 - Active (green fill) and revoked (grey fill) permitted discharges within 1 km of the Scheme

Permit Number	Site Name	Effluent Type	National Grid Reference	Operational status
AN/PRCNF04229/001	Milton Landfill Site	Miscellaneous	TL4662062450	Revoked 20/07/2003
AN/PRCNF04229/002	Milton Landfill Site	Trade	TL4662062450	Revoked 19/05/2005
AN/PRCNF05155/001	Milton Landfill Site	Miscellaneous	TL4694062400	Revoked 19/05/2005

⁵¹ Williams et al. 1999. The Pond Book: A Guide to Management and Creation of Ponds. 2nd Addition, s,I :Freshwater Habitats Trust.

⁵² Environmental Permitting Regulations – Discharges to Water and Groundwater (data.gov.uk) [Accessed 15 April 2024]

Permit Number	Site Name	Effluent Type	National Grid Reference	Operational status
AN/PR1NFG0110/001	Manor Farm	Agriculture	TL4750065400	Revoked 25/07/1991
AN/PRCLF17653/001	Parks Golf Club	Sewage - not water company	TL4838063350	Revoked 13/12/2011
AN/PRCLF17653/002	Parks Golf Club	Sewage - not water company	TL4838063350	Active.
				Start date: 14/12/2011
AN/AW1NF2747/001	Bryant/Costain Dev. Pumping Station	Sewage - water company	TL4845063760	Revoked 24/10/2008
AN/PR1NF3472/001	Cosy Nook Caravan Park	Sewage - not water company	TL4882064500	Revoked 13/02/1992
AN/PR1NF3472/002	Cosy Nook Caravan Park	Sewage - not water company	TL4882064500	Revoked 13/03/1996
AN/PR1NF3472/003	Cosy Nook Caravan Park	Sewage - not water company	TL4882064500	Active.
				Start date: 14/03/1996
AN/PR1LF2067/001	Bellevue	Miscellaneous	TL4877664777	Revoked 01/10/1996
AN/AW1NF2617/001	Denny Ind. Centre	Miscellaneous	TL4874065890	Active.
				Start date: 27/04/1987
AN/EPRNB3897RJ/00 1	Emmaus	Sewage - not	TL4827566644	Active.
	Campridge	water company		Start date: 08/11/2019

Designated sites

- 7.22. Worts Meadow a Local Nature Reserve (LNR) is located to the west of the study area, south west of the Waterbeach Road and Cockfen Road junction. Worts Meadow LNR is shown in Figure 4-2.
- 7.23. There are no other European or National designated sites including Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Special Protected Areas (SPA), RAMSAR and National Nature Reserves (NNR) within the study area.

Groundwater

Geology and hydrogeology

- 7.24. A summary of the geology⁵³, based on BGS 1:50k mapping, for the study area within the context of the groundwater environment is provided below. Lithological descriptions and a generalised geological sequence are provided in
- 7.25. Table 7-4. Further detail particularly regarding made ground, soils and local geology can be found in Chapter 11 Soils, Geology and Contaminated Land.
- 7.26. BGS 1:50 k mapping shows the study area is entirely underlain by the Gault Formation bedrock. There is moderate superficial deposit coverage across the study area comprising River Terrace Deposits with moderate coverage across the Scheme.
- 7.27. The study area is underlain by bedrock designated as an unproductive aquifer⁵⁴ associated with the Gault Formation and a Secondary A superficial aquifer associated with the River Terrace Deposits. Unproductive aquifers are defined as "largely unable to provide usable water supplies and are unlikely to have surface water and wetland systems dependent on them". Secondary A aquifers are defined as "permeable layers permeable layers that can support local water supplies and may form an important source of base flow to rivers"⁵⁵. The Scheme is not underlain by a WFD groundwater body. The superficial and bedrock geology is shown in Figure 11-1 and Figure 11-2.
- 7.28. There is currently no available site-specific information on groundwater levels and flow in the study area.

Table 7-4 -	Generalised	geological	sequence	for the study	v area with	accompanying	aguifer designation
		3					

Period	Formation	Lithological description ⁵⁶	Environment Agency aquifer designation ⁵⁴
Quaternary	River Terrace Deposits	Sand and gravel, locally with lenses of silt, clay or peat.	Secondary A
Cretaceous	Gault Formation	Pale to dark grey or blue-grey clay or mudstone, glauconitic in part, with a sandy base. Discrete bands of phosphatic nodules, some pyrite and calcareous nodules.	Unproductive

Groundwater designations

7.29. There are no GWDTEs within the study area⁵⁷.

⁵³ BGS Geoindex: <u>GeoIndex - British Geological Survey (bgs.ac.uk)</u> [Accessed 15 April 2024]

⁵⁴ MAGIC - <u>Magic Map Application (defra.gov.uk)</u> [Accessed 15 April 2024]

⁵⁵ <u>https://www.gov.uk/government/publications/protect-groundwater-and-prevent-groundwater-pollution/protect-groundwater-and-prevent-groundwater-pollution [Accessed 19 April 2024]</u>

⁵⁶ SEARCH Rock Name Database | Lexicon of Named Rock Units | British Geological Survey (BGS)

⁵⁷ Groundwater Dependent Terrestrial Ecosystems (England only) - data.gov.uk

7.30. There are no SPZs and no groundwater drinking water safeguard zones within the study area⁵⁸.

Groundwater abstractions and discharges

- Thirteen permitted discharges⁵⁹ to water are located within the study area and are summarised in Table 7-3.
- 7.32. At the time of reporting there was no groundwater abstraction information available.

Flood risk

7.33. As is standard in the assessment of flood risk, all sources of flood risk have been considered. This section focuses on baseline risk within the flood risk study area (i.e. land take area),but has been extended to a 1 km buffer area surrounding the study area where appropriate.

Flood risk from watercourses

- 7.34. There are no Main Rivers located within the study area. There is a network of ordinary watercourses, likely classed as artificial drainage ditches within the study area.
- 7.35. The north of the study area (the area to the north of Landbeach and west of the A10) is at high risk of fluvial flooding as show within Flood Zones 2 and 3. The Flood Zones are associated with unnamed ordinary watercourses that are tributaries of Beach Drain which later join Old West River. These ordinary watercourses are within the Old West Internal Drainage Board (IDB).
- 7.36. The Old West IDB extends south of Waterbeach Road and between the A10, however, the rest of the study area is not within an IDB.
- 7.37. The area south of Landbeach would be at low and medium risk of fluvial flooding as there are numerous drainage ditches that cross the study area. There are no mapped Flood Zones associated with the artificial field drains within the study area because the ordinary watercourses have catchments less than 5 km². Nonetheless, a fluvial flood risk from these watercourses will likely be present, despite this not being quantified through flood risk mapping.
- 7.38. Figure 7-2 presents the fluvial flood risk in the study area.

⁵⁸ Magic Map Application (defra.gov.uk)

⁵⁹ Environmental Permitting Regulations – Discharges to Water and Groundwater (data.gov.uk) [Accessed 15 April 2024]

Figure 7-2 - Fluvial flood risk



Flood risk from surface water

- 7.39. The Environment Agency's Risk of Flooding from Surface Water (RoFSW) map indicates that there are areas at High, Medium and Low risk of flooding from surface water. Medium and high flood risk areas (i.e. 1% to 3.33% Annual Exceedance Probability (AEP) events respectively) are identified within the central section of the study area, particularly to the south of Landbeach. Additionally, there are areas south of Butt Lane and Milton Road to the south of the study area. In general, these risk areas are associated with the field drains or are discrete areas of low elevation (in comparison to surrounding area). There are no apparent overland surface water flow paths within the study area.
- 7.40. There are larger areas of low surface water flood risk (0.1% AEP) that cross the study area. The areas at risk include the Orchard Park, King Hedges and Milton in the south of the study area and extensive areas south of Waterbeach Road.
- 7.41. Figure 7-3 presents the RoFSW in the study area.

Figure 7-3 - Flood risk from surface water



Tidal flooding

7.42. The study area is not at risk of tidal flooding due to its inland location.

Flooding from artificial water bodies

- 7.43. There are no canals in Cambridgeshire as identified on the Canal and River Trust mapping⁶⁰, therefore there is no risk of flooding from this source.
- 7.44. The Environment Agency's reservoir inundation maps⁶¹ indicate that the study area is at not at risk of flooding from reservoirs.

Flood risk from groundwater

- 7.45. Given the presence of a Secondary A aquifer underlying some of the study area, there is potential for flooding from groundwater.
- 7.46. The BGS Geology Viewer shows the bedrock geology of the study area is comprised of the Gault Formation mudstone, which is a less permeable rock type. The superficial deposits are comprised of

⁶⁰ Canal Map UK | UK Canal Network | Canal & River Trust (canalrivertrust.org.uk)

⁶¹ See flood risk on a map - Check your long term flood risk - GOV.UK (check-long-term-flood-risk.service.gov.uk)

river terrace deposits (sand and gravel). Both the bedrock and superficial deposits are less and semipermeable respectively, thus may be prone to groundwater flooding.

- 7.47. The BGS susceptibility maps show however that the study area is not susceptible to groundwater flooding.
- 7.48. Further information associated with groundwater level and flood risk will become available from Ground Investigations scheduled for Autum 2024.

Flooding from sewers

7.49. Given the predominantly rural nature of the surrounding area, it is unlikely that a large number of sewerage systems will be present in the study area.

Assumptions and limitations

7.50. The limitations of this study are as follows:

- Data quality only a desk study, using mainly web-based data has been undertaken,
- Data quantity as per quality, only open, freely licensed data has been reported at this stage and therefore the amount of detail on certain topics is limited,
- There is very limited design information, for example there is not enough information on the watercourse realignments or the park and ride site, therefore, once further design information is available further assessment will be required, and
- The Scheme interacts with the Mere Way Scheme. Limited information is available regarding the Mere Way Scheme, in particular regarding floodplain compensation areas.
- 7.51. The assumptions of this study are as follows:
 - Where impacts are uncertain a precautionary approach has been adopted,
 - It is assumed that a culvert will be required at each watercourse crossing,
 - General assumptions have been made with regard to the impact of the ditch realignment on the watercourses,
 - Outfalls are assumed to all be new outfalls due to the lack of information about them, and
 - It is assumed that greenfield runoff rates will be maintained as part of this Scheme.

Potential impacts

Construction

Surface water quality

7.52. Potential impacts to surface water quality receptors during construction of the Scheme could arise from:

- Risks to the surface water environment due to excavation, and the subsequent deposition of soils, sediment, or other construction materials to accommodate new watercourse crossings,
- Spillage of fuels or other contaminating liquids,
- Mobilisation of contamination following disturbance of contaminated ground or groundwater, or through uncontrolled site runoff,

- Accidental leaks of hazardous materials, particularly concrete and cement products, which can be contained in uncontrolled wash-down water and surface water runoff has the potential to impact the quality of surface water and
- The release of hydrocarbons and oils due to a large number of vehicles accessing the site, leakage from oil/fuel storage tanks and accidental spillages could impact the quality of surface water.

Surface water hydromorphology

- 7.53. Potential impacts to surface water hydromorphology receptors during construction of the Scheme could arise from:
 - Risks to the surface water environment due to excavation, and the subsequent deposition of soils, sediment, or other construction materials to accommodate new watercourse crossings,
 - Construction of culverts may result in localised damage to channel and riparian features and disruption of the natural hydraulic and sediment transport processes,
 - Realignment of minor watercourses to connect to new culverts may result in temporary increased sediment loads and changes in hydrology during construction. There is potential that over pumping or damming of ditches may be required to allow for the installation or alteration of culverts which will result in temporary changes in sediment movement and flows and
 - There is a potential for a temporary increase in sediment ingress to watercourses from bare ground and construction activities across the study area as a result in vegetation loss and surface water runoff.

Groundwater

7.54. Potential impacts to groundwater receptors during construction of the Scheme could arise from:

- Polluted surface water runoff and direct migration of mobile pollutants to groundwater resources from construction vehicles, plant and high-risk activities that may contaminate groundwater resource,
- New cuttings which have the potential to cause a local reduction of groundwater levels, should dewatering be required as part of construction,
- The disposal of pumped water to surface may follow contamination pathways into surface water bodies or infiltrate down into the groundwater body and
- Deep foundations and associated sheet piling may have the potential to form rapid vertical flow pathways for pollution into the groundwater bodies and reduce groundwater flow to dependent receptors.

Flood risk

7.55. The potential impacts on flood risk receptors, during construction, from the Scheme could arise from:

- 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,
- Blockage within watercourses and excavation adjacent to the banks of watercourses can increase the risk
 of overtopping and/or a breach through reduced bank stability or lower capacity/conveyance of the channel.
 This can increase flood risk to adjacent land and property,
- Ponds constructed to hold water to manage sediment could cause flooding of local watercourses or adjacent land in the event of overtopping or a breach,
- Temporary diversion of a watercourse could increase flood risk to third parties,
- Diversion of runoff and increased runoff (from the introduction of impermeable areas) into existing small
 watercourses leading to inundation. Sediment runoff from the site could cause risk of blockage in existing
 structures downstream of temporary outfalls,

- Earthworks changing overland flow routeing or reducing infiltration rates through increased soil compaction in discrete areas, could increase the risk of surface water flooding. This is unlikely to be significant due to the predominantly rural nature of the study areas. However, this will be considered at the next stage and will assess the possible flooding of adjacent land,
- Construction activities that extend below ground have the potential to be affected by groundwater and affect groundwater flooding. Sections of the route options are located within areas susceptible to groundwater flooding,
- Sewerage and potable water pipes have the potential to increase flooding if damaged through excavation works or pilling and drilling activities and
- No impacts to or resulting from the schemes are anticipated associated with tidal, canals or reservoirs sources of flood risk. Climate change does not need to be considered for the construction phase.

Operation

Surface water quality

- 7.56. Potential significant impacts to surface water quality receptors during the operation of the Scheme could arise from:
 - Contaminants e.g., oils from fuel combustion/accidental spillages and salts or herbicides from road maintenance) deposited on the new impermeable road surface being washed off during rainfall events into the receiving watercourses.

Surface water hydromorphology

7.57. Potential significant impacts to the hydromorphology of surface water receptors during the operation of the Scheme could arise from direct physical impacts on the watercourses which have the potential to cause direct morphological changes to the watercourses. This could include the construction of new culverts (same as mentioned above in Section 0) or alterations to existing culverts or realignment of the ditches. These may include destabilisation of the channel (changes in erosion and deposition patterns), less dynamic flows, loss of sediment continuity and increased sedimentation.

Groundwater

- 7.58. Potential significant impacts to groundwater receptors during the operation of the Scheme could arise from:
 - Increased areas of hardstanding may increase the risk of polluted surface water runoff and direct migration of mobile pollutants to groundwater resources,
 - Deep foundations, associated sheet piling or other permanent below ground features may have the potential reduce groundwater flow to dependent receptors.

Flood risk

7.59. The potential impacts to flood risk receptors during operation of the Scheme from could arise from:

 Potential impacts to flood risk are associated with development in the floodplain. Potential increases in flood risk could result from constrictions to flow causing water to back up during times of flooding and raise peak water levels. Potential flood risk increase could also result from development in the floodplain reducing areas used to store water in times of flood, thereby displacing it elsewhere,

- Potential increase in fluvial flood risk associated with the realignment of existing watercourses and change
 of existing structures, as well as the development of new structures over watercourses and the culverting
 required for these structures,
- Impermeable areas have the potential to impact fluvial and surface water flooding, due to increased runoff. This risk, however, will be mitigated through the drainage design, and it is expected that greenfield runoff rates will be maintained,
- Below-ground elements of the scheme, such as deep foundations, piling and drainage may affect or be affected by groundwater. The route options are located within areas susceptible to groundwater flooding.
 Further site-specific ground investigation is required to confirm the nature of the groundwater flood risk,
- Potential impact on the floodplain compensation proposal associated with the Mere Scheme encroaching onto the same land as this Scheme. This may result in ineffective compensation provision by the Mere Way Scheme, or both schemes utilising the same area for compensation provision and
- Flood risk has the potential to increase overtime, as climate change may increase rainfall intensities and river flows, exacerbating the impacts identified.

Proposed scope of ES

Scoped in/out

7.60. Table 7-5 presents the scoping decision for the water environment receptors. Those receptors which have been scoped in will be considered in the ES. Comment/justification for the scoping decision is also provided.

Receptor/s	Scoped in/out	Comment/justification
Surface water quality (including WFD compliance)	In	The potential impacts from construction activities and operational changes to receiving water quality need to be further considered.
		Further information on Annual Average Daily Traffic (AADT) flow is required to determine the appropriate water quality assessment to undertake to assess operational impacts and determine if the mitigation suggested in the concept design is adequate.
		A WFD screening and scoping assessment has been undertaken to support this Scoping report, which is based on the existing design information and has considered impacts to water quality (see Appendix C). The conclusions of the WFD assessment have identified that an Impact assessment is required following completion of the detailed design of the Scheme to support the planning application or alternative planning route which should consider potential impacts to water quality in line with WFD legislation.
Surface water hydromorphology (including WFD compliance)	In	Walkover surveys will also be required to fully understand the construction and operational impacts of the Scheme on hydromorphology.
		A WFD screening and scoping assessment has been undertaken to support this Scoping report which is based on the existing design information and has considered impacts to

Table 7-5 – Receptors and scoping decision and level of assessment

		hydromorphology. The conclusions of the WFD assessment have identified that an Impact assessment is required following completion of the detailed design of the Scheme to support the planning application.
Groundwater (including WFD compliance)	In	More information is needed to assess the potential impacts of the Scheme on the groundwater environment such as presence of any abstractions and excavation depths and details of any below ground works.
		A WFD screening and scoping assessment has been undertaken to support this Scoping report which is based on the existing design information and has considered impacts to groundwater. The conclusions of the WFD assessment have identified that an Impact assessment is required following completion of the detailed design of the Scheme to support the planning application or alternative planning route.
Flood risk	In	Fluvial flood risk:
		Sections of the route alignment and the Park and Ride are proposed within Flood Zone 3. Therefore, further assessment is needed to ensure that these elements of the Scheme are at an acceptable level of flood risk and do not increase flood risk elsewhere through either floodplain displacement or alteration of flood routes. It is known that floodplain compensation will be required, however the compensation design will need to take into account the Mere Way embankment proposal. This compensation will also need to take into account the impact of climate change on fluvial flood risk.
		For planning requirements, the Scheme will need to satisfy both the Sequential and Exception tests. Associated consents with the LLFA, Environment Agency and IDB will be required as appropriate.
		Surface water flood risk:
		Surface water flood risk could increase, but it is assumed that this will be adequately managed and justified within a drainage strategy.
		Groundwater flood risk:
		Risk level associated with groundwater flood risk is unclear at present, but given the scale of the scheme, there could be impacts to or from this source as a result of the development. Therefore, it is recommended that further assessment is completed to determine implications on groundwater flood risk.
		Other sources of flood risk:
		In general implications associated with other sources of flood risk are low and can be scoped out for detailed assessment. However, in line with planning policy requirements other potential flood risk impacts will need to be addressed when the Scheme design is adequately progressed and included within a formal Flood Risk Assessment (FRA) which will be needed for the planning application or alternative planning route

Proposed assessment methodology

- 7.61. DMRB LA 113 provides details on the assessment of the likely significance of effects on surface water quality, hydromorphology, groundwater quality, groundwater levels and flow and flood risk associated with highway schemes. This standard will be used to assign both the importance of the receptors and the magnitude of impact. The significance of the potential impacts shall be determined in accordance with DMRB LA 104. The following sections provided further details on the specific assessment methodology for each element of the water environment.
- 7.62. All the assessments will involve desk based studies which will be conducted using a range of open source data. A data request to the Environment Agency will be necessary to gather the following information (but not limited to):
 - WFD programme of measures for all surface water bodies scoped into the WFD Impact assessment,
 - Abstraction locations and
 - Flood product data including flood levels.
 Commercial groundwater data should also be purchased.

Surface water quality

7.63. For surface water quality it is anticipated that an assessment using the CIRIA Simple Index Approach as outlined in the SuDS Manual shall be undertaken to determine the polluting potential of the bus way and to determine the level of SuDs mitigation required. The Simple Index Approach is suitable for low traffic roads. It is estimated that the bus way will have an AADT flow of between 300-500. Traffic modelling will confirm that the Simple Index Approach is the most appropriate assessment for the bus way. Where works are proposed to existing roads, again traffic modelling will confirm the appropriate assessment method to follow. As previous stated the Simple index Approach is suitable for low traffic roads. Assessment of roads with an AADT flow above 10,000 should use National Highways Water Risk Assessment Tool (HEWRAT) to determine the risk to surface water quality.

Hydromorphology

7.64. For the hydromorphology of surface water bodies a site-specific assessment shall be undertaken as set out in Appendix E of DMRB LA 113. As part of this assessment it is recommended that a site walkover is conducted alongside the desk-based survey this should determine how the characteristics (e.g. flow processes, sediment movement) of the watercourses within the study area are likely to be affected by the Scheme and what impacts these changes might have on the hydromorphological characteristics of, or the ecology within, that watercourse and downstream water bodies.

Groundwater quality

7.65. At the time of reporting, it is unknown if discharge to ground will be required and the suitability of this method. Once confirmed, the assessment of the potential pollution impacts from runoff to groundwater may be required. As stated in section 00 the AADT flow of the roads will determine the assessment method which will be used, either the Simple Index Approach or the HEWRAT.

Groundwater levels and flow

7.66. At the time of reporting, it is unknown if there are any groundwater receptors (i.e. abstractions) or if any of the anticipated activities have a groundwater element i.e. deep piling, cutting, dewatering. Once details are confirmed, a groundwater level and flow assessment may be required. If required, the assessment shall be undertaken as set out in Appendix A of DMRB LA 113. It is assumed at the time of reporting that there is no requirement for numerical modelling.

WFD compliance

7.67. A WFD impact assessment be completed following the WFD screening and scoping assessment to ensure the Scheme and embedded mitigation is compliant with WFD guidelines. The WFD assessment will consider if the Scheme has the potential to cause deterioration or prevent future objectives of water bodies scoped into the assessment in relation to ecology (including hydromorphology), water quality and groundwater. In addition to the LA113 Standard, the WFD assessment will also follow guidance presented in LA108 (Highways England et al., 2019d). The WFD compliance assessment will require site walkover surveys to be undertaken following Advice Note 18, The Planning Inspectorate (The Planning Inspectorate, 2017).

Flood risk

- 7.68. A Flood Risk Assessment (FRA) will be undertaken for the Scheme. This will make use of readily available data from the Environment Agency but will also involve a site-specific data request to the Environment Agency and purchase of additional information, including groundwater flood risk data. The FRA will consider the implications of climate change and be used to inform the Sequential and Exception tests set out in the NPPF.
- 7.69. The FRA will need to demonstrate that the Scheme is at an acceptable level of fluvial flood risk and that associated mitigation features planned can achieve this. The FRA will also need to demonstrate that the Scheme will not increase flood risk elsewhere and it is anticipated that this will be achieve through the provision of floodplain compensation. There is significant overlap with this requirement and the Mere Way proposed scheme and hence the FRA will also need to consider this additional scheme.
- 7.70. The FRA will also need information from the drainage strategy to adequately demonstrate that the Scheme will manage surface water runoff to greenfield rates, through a system which is agreeable to the LLFA.
- 7.71. Groundwater flood risk will also need further consideration and will be informed by purchased groundwater data, borehole records and Ground Investigation (GI) as applicable. This will provide greater confidence in the level of risk assigned to the scheme location and also aid determination of potential implications of the scheme on groundwater flood risk to third parties.
- 7.72. Although all other sources of flood risk are unlikely to be significantly impacted by the proposed scheme when appropriate mitigation is taken forward, all sources must be considered within an FRA.
- 7.73. Consent will need to be obtained from the Environment Agency and the LLFA for the temporary outfalls and temporary diversion of watercourses.
- 7.74. Further conversations will need to take place with the consultants responsible for the Mere Way Scheme, to ensure the most efficient floodplain compensation area is developed for both schemes.

8. Noise and vibration

Legislation and policy

8.1. Relevant national plans and policies include:

- National Planning Policy Framework (Section 180e and Section 191),
- Noise Policy Statement for England,
- Planning Practice Guidance for Noise, 2019,

- The Control of Pollution Act (CoPA)1974 (Section 61),
- The Noise Insulation (Railways and Other Guided Transport Systems) (Amendments) Regulations (NIRR) 1996 (amended in 1998) and
- South Cambridgeshire Local Plan 2018 (Policy SC/10: Noise pollution).

Scoping assessment methodology

8.2. This scoping assessment has been carried out through a high level desk-based review of publicly available information.

Baseline conditions

- 8.3. The proposed Scheme is situated in open farmland, and along the majority of the route, there are very few sensitive receptors in close proximity. Locations where receptors are in proximity to the guided busway are the village of Landbeach (approximately 350m to the west of the central portion of the route) and Impington (approximately 600m to the west of the southern section of the route). To the east of the guided busway but separated by the A10 is the village of Milton towards the southern end of the guided busway.
- 8.4. The proposed travel hub site is located directly west of the A10. The A10 separates the travel hub from the proposed Waterbeach New town. It is not known at this stage how close future residential properties may be located to the A10 within this development. Also located near to Waterbeach New Town is an educational receptor Cambridgeshire Army Cadet Force at approximately 80m from the travel hub. The land use to the north, west and south of the proposed travel hub site are fields of farmed land.
- 8.5. The Site and the surrounding noise sensitive receptors (NSR) are shown in Figure 8-1.

Figure 8-1 – Noise sensitive receptors areas



- 8.6. Based on the high-level review, the existing dominant noise source in the area would be road traffic noise from the A14 and A10. For the residential receptors to the south-east, given the proximity to A10, moderate to high existing noise levels are expected. For the residential receptors to the north-west, an existing low acoustic environment is expected due to a significant offset to main roads. However, they are located adjacent to a commercial farm and may have noise contribution from this in their existing acoustic climate.
- 8.7. The Defra Noise Maps for the area, at a height of 4 m above ground (first floor height), are shown in Figure 8-2 (Daytime LAeq,16hr) and Figure 8-3 (Night-time LAeq,8hr). This information was prepared as part of the Round 3 strategic noise mapping exercise, undertaken by Defra in 2017 and made available in 2019.
- 8.8. The noise contours in Figure 8-2 and Figure 8-3 show high ambient noise levels next to A14 and A10, on either side along the roads.

Figure 8-2 – Defra noise map, daytime LAeq, 16hr


Figure 8-3 – Defra noise map, night-time LAeq, 8hr



8.9. The Noise Important Areas are the areas where 1% of the population affected by the highest noise levels from major roads are located, according to the strategic noise mapping undertaken by Defra under the terms of the Environmental Noise (England) Regulations 2006, as amended. The Noise Important Areas are shown in Figure 8-4. It can be noted that there are a few Noise Important Areas identified along A10 and A14, however these are a fair distance away from the Scheme.

Figure 8-4 - Defra noise important areas



8.10. In addition to baseline data presented above, it is recommended that further noise surveys are undertaken as part of the noise scope for the ES to better establish the baseline noise conditions.

Potential impacts

Construction

- 8.11. During the construction phase, there will be a number of activities that have the potential to alter the noise climate in the local area on a short-term, temporary basis. Typical noise generating activities likely to be carried out as part of the Scheme include:
 - Vegetation clearance and site setup including fencing,
 - Earthworks including ground compaction,
 - Road, parking and None Motorised User (NMU) associated pavement work,
 - Foundations for structures, buildings and fences/barriers,
 - Construction of structures, buildings and fences/barriers and
 - Vegetation, drainage and landscaping.
- 8.12. In addition, the local road network may experience changes in traffic flows and speeds during construction, as a result of temporary traffic management measures, diversions and/or additional vehicles travelling to and from the construction site transporting materials, plant and labour. It should be noted, however, that any effects on the noise climate from construction activities, including construction traffic and traffic diversions, would be temporary in nature (i.e. during the period of construction works only).
- 8.13. These activities shall be assessed using guidance provided in BS 5228:2009+A1:2014 Part 1 Noise and Part 2 Vibration.

Operation

- 8.14. Once the project is operational, the noise climate at nearby receptors could be affected by the introduction of noise from bus pass-bys on the new bus route and mechanical plant noise and parking activities at the travel hub.
- 8.15. There is also the potential for the Scheme to create changes (both positive and negative) in traffic flows on the surrounding road network from use of the buses. For example, trips using the guided busway could result in a corresponding reduction in the number of trips by car so some road links may experience a decrease in noise which might be a significant benefit.
- 8.16. The potential impacts for the operational guided busway shall be assessed using the guidance provided in the NIRR and DMRB LA 111, and for the Travel Hub using guidance provided in BS 4142:2014 + A1 2019.
- 8.17. Operational vibration from vehicle movements on the guided busway and from within the travel hub is scoped out of the assessment methodology as a maintained road surface will be free of irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects.
- 8.18. There are also no anticipated operational vibration sources from the facilities within the travel hub and operational vibration is therefore scoped out from further assessment.

Proposed scope of ES

Scoped in

8.19. Potential noise impacts from the following will be considered in the ES. To inform the assessment, existing baseline noise levels will be established through a noise monitoring survey and a 3D noise model will be developed.

Construction

- 8.20. Noise impacts from construction activities and plant.
- 8.21. Vibration impacts from construction activities and plant.
- 8.22. Noise impacts from changes in traffic flows on the surrounding road network as a result of construction traffic.

Operation

- 8.23. Noise impacts from buses travelling along the guided busway and noise generated within the travel hub from bus and vehicle movements and any mechanical plant/equipment used for any of the on-site facilities.
- 8.24. Noise impacts from changes in traffic flows on the surrounding road network.

Scoped out

8.25. As a result of the information collected in the preparation of this Scoping Report it is proposed that the following aspects will be scoped out of further consideration in the ES because there will be no likely significant environmental effects to assess:

Construction

8.26. No potential noise effects during construction have been scoped out.

Operation

8.27. Operational vibration from the Scheme.

Assessment methodology

- 8.28. The noise assessment will use the following guidance documents:
 - Calculation of Railway Noise (CRN) 1995,
 - BS 5228,
 - BS 5228,
 - BS 4142,
 - DMRB LA111 Noise and Vibration (2020),
 - Calculation of Road Traffic Noise (1988),
 - WHO Guidelines for Community Noise (2000),

- WHO Night Noise Guidelines (2009),
- BS 8233 (2014) and
- ProPG: Planning and Noise (2017).

Construction noise

- 8.29. The calculation of construction noise levels will follow the methodology in BS 5228-1:2009+A1:2014. The predicted noise levels from construction noise sources will be compared against noise levels recommended in the guidance documents listed above. Recommended noise levels are influenced by the existing baseline noise levels. Baseline noise levels will be obtained through:
 - Strategic noise mapping (Defra) and
 - Noise monitoring survey data.
- 8.30. Noise sources that will be considered during the assessment include:
 - Construction plant in use on the project,
 - Construction compounds and
 - Traffic on haul roads that are not part of the public highway.
- 8.31. Details of the construction plant, including the activities being carried out, the number and types of plant being used and the typical working hours will be required to undertake this assessment.

Study area

8.32. The consideration of effects on human receptors during the construction phase will identify noise sensitive receptors located within 300 m of the edge of the construction works. A study area defined in this way is normally sufficient to determine the sensitive receptors that are potentially affected. The study area will be derived using a desktop review of maps and guidance, as set out in BS 5228-1:2009+A1:2014.

Noise significance criteria

- 8.33. The noise significance criteria for residential receptors used to appraise construction noise are summarised in Table 8-1. The table shows threshold levels above which effects are assessed as adverse based on the lowest observed adverse effect level (LOAEL) or significant adverse based on the significant observed adverse effect level (SOAEL).
- 8.34. The construction noise thresholds and baseline noise data are free-field noise levels.

Table 8-1 – Construction noise - summary of significance criteria for residential buildings

Assessment type	Time period	LOAEL	SOAEL
Construction noise	Day 07:00-19:00 Weekday and 07:00-13:00 Saturdays	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS 5228-1 Section E3.2 and Table E.1 BS 5228-1
	Night 23:00-07:00	Baseline noise levels L _{Aeq,T}	Threshold level determined as per BS 5228-1 Section E3.2 and Table E.1 BS 5228-1

Assessment type	Time period	LOAEL	SOAEL
	Evening and weekends (time periods not covered above)	Baseline noise levels L _{Aeq,T}	Threshold level determined as per BS 5228-1 Section E3.2 and Table E.1 BS 5228-1

- 8.35. Once LOAEL and SOAEL values have been identified, the magnitude of potential noise impact is then assessed. To assess the magnitude of impact for construction noise at a given receptor, reference is made to DMRB LA 111, Table 3.16. 'Minor' magnitudes of impact are considered to represent the threshold of perceptibility (see Table 8-2 below).
- 8.36. Construction traffic BNL changes shall be calculated for roads within the construction traffic study area using the methodology found in the 'Calculation of Road Traffic Noise', 1988 (CRTN). Reference is made to DMRB LA 111 (Table 3.17) to identify the magnitude of impact on receptors. This is also included in Table 8-2 below.

Table 8-2 – Magnitude of impact and construction noise descriptions

Magnitude of Impact	Construction Noise Level (L _{Aeq})	Change in Construction Traffic Noise Level (L _{A10,18h})
Major	Above or equal to SOAEL +5dB	Greater than or equal to 5 dB
Moderate	Above or equal to SOAEL and below SOAEL +5dB	Greater than or equal to 3 dB and less than 5 dB
Minor	Above or equal to LOAEL and below SOAEL	Greater than or equal to 1 dB and less than 3 dB
Negligible	Below LOAEL	Less than 1 dB

- 8.37. A significant effect is determined for construction noise, or construction traffic noise, where a major or moderate magnitude of impact will occur for a "significant time period" which is either:
 - 10 or more days or nights in any 15 consecutive days or nights or
 - A total number of days exceeding 40 in any 6 consecutive months.

Construction vibration

- 8.38. The calculation of construction vibration levels will follow the methodology in BS 5228-2:2009+A1:2014. The predicted vibration levels from construction vibration sources will be compared against the assessment criteria shown in Table 8-3. Vibration sources that are considered during the assessment include:
 - Piling and
 - Earthworks, including excavation, dig and replace, compaction, etc.
- 8.39. Details of the construction plant, including the activities being carried out, the number and types of plant being used and the typical working hours will be required to undertake this assessment.

Study area

8.40. The construction vibration study area will be defined as being 100 m from the closest construction activity that generates vibration. A study area defined in this way is normally sufficient to determine the sensitive receptors that are potentially affected.

Vibration significance criteria

8.41. Predictions on the level of vibration will be made in accordance with the methodology found in BS 5228-2, 'Code of practice for noise and vibration control on construction and open sites. The significance of potential impacts shall be ascertained using the methodology contained in DMRB LA 111, which takes into account the magnitude of the vibration and whether threshold levels for the LOAEL or SOAEL are exceeded. Table 8-3 below shows the vibration LOAEL and SOAEL values.

Table 8-3 - Construction vibration LOAELs and SOAELs for all receptors

Time Period	LOAEL	SOAEL
All time periods	0.3 mm/s PPV	1.0 mm/s PPV

8.42. To assess the magnitude of impact of construction vibration reference is made to DMRB LA 111, Table 3.33, reproduced below in Table 8-4.

Table 8-4 - Magnitude of impact of vibration levels

Magnitude of Impact	Vibration level
Major	Above or equal to 10 mm/s PPV
Moderate	Above or equal to SOAEL and below 10 mm/s PPV
Minor	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

- 8.43. A significant effect attributed to construction vibration is likely where it is determined that a major or moderate magnitude of impact shall occur for a "significant time period" which is either:
 - 10 or more days or nights in any 15 consecutive days or nights or
 - A total number of days exceeding 40 in any 6 consecutive months
- 8.44. Further to the above criteria for human perception to vibration, the vibration and potential for building damage will be assessed using criteria shown in Table 8-5.

Table 8-5 - Transient vibration guide values for cosmetic damage

Type of building	Peak component particle velocity in frequency range of predominant pulse		
	4 Hz to 15 Hz	15 Hz and above	
Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above	
Unreinforced or light framed structures	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above	

Type of building

Peak component particle velocity in frequency range of predominant pulse

4 Hz to 15 Hz

15 Hz and above

Residential or light commercial buildings

NOTE 1 Values referred to are at the base of the building.

8.45.

Operational Noise

- 8.46. Due to the character of a guided busway (intermittent pass-bys rather than a steady flow of traffic), noise from guided busways is not assessed in the same way as conventional road traffic. The character of noise from a guided busway is more similar to a railway with individual pass-by events. Therefore, operational noise from the guided busway is to be assessed according to the Noise Insulation Regulations predicting noise with Calculation of Railway Noise method.
- 8.47. In order to assess potential impacts from the guided busway, a 3D noise model will be developed. The noise modelling will incorporate details of traffic flows, speeds, type of road surfacing and topography within the Site as well as any mechanical equipment used for on-site facilities at the travel hub during operation.
- 8.48. For a quantitative assessment of potential noise impacts from the operational guided busway, the following scenarios will be considered:
 - Do Minimum scenario in the opening year (DMOY) and
 - Do Something scenario in the opening year (DSOY).
- 8.49. There is the potential for electric buses to be considered for this project. This will have an acoustic benefit at slower speeds and when idling at bus stops. However, at higher speeds (typically at and above 40mph) the interaction between the tyres and the road surface will dominate noise generation. At these speeds, there may be marginal acoustic benefit from operating electric buses.
- 8.50. The calculations of operational noise for the Travel Hub will follow the methodology in BS 4142:2014 + A1 2019. The noise sources associated with the operational noise from Travel Hub may include ventilation and heating plant, and noise emissions from car parking and bus movements within the Travel Hub. Vehicle movements within the carpark and closing of car doors etc will be calculated at the nearest NSRs and assessed against appropriate BS8233 criteria.

Study area

- 8.51. The consideration of effects on human receptors during the operational phase will identify noise sensitive receptors located within 600 m of the edge of the guided busway and Travel Hub. A study area defined in this way is normally sufficient to determine the sensitive receptors that are potentially affected.
- 8.52. The extent of the study area may be extended based on information from the local authority or based on local concerns known to the project team.

Noise Significance Criteria

The guided busway

The classifications for the magnitude of changes in predicted guided busway noise is outlined below: A change in guided busway noise of 1dB(A) (DM to DS in the opening year) is the smallest that is considered perceptible in the short term.

8.54. The classification of magnitude of impact is presented below for the short term in Table 8-6.

Table 0-0 – Glassification of magnitude for holise impacts			
Short term impact classification	Change road traffic noise level dB L _{Aeq,18h} /L _{night}		
Negligible	0.0 dB and < 1.0 dB		
Minor	≥ 1.0 dB and < 3.0 dB		
Moderate	≥ 3.0 dB and < 5.0 dB		
Major	≥ 5.0 dB and < 10.0 dB		
	≥ 10.0 dB		

Table 8-6 – Classification of magnitude for noise impacts

8.55. In addition to this, the predicted noise levels at the noise sensitive receptors will be used to provide an indication of the number of properties that may potentially exceed the LOAEL and the SOAEL.

8.56. The thresholds assigned to the LOAEL and the SOAEL are as provided in Table 8-7.

Table 8-7 – LOAEL and SOAEL values at receptors (1m from Façade)

Assessment type	Time period	LOAEL	SOAEL
Operational noise from	Day 0700-2300	53 dB L _{Aeq}	68 dB L _{Aeq}
guided busway	Night 2300-0700	43 dB L _{night}	58 dB L _{night} and where appropriate 80 dB or 85 dB L _{Amax,F} *

8.57. * 80 dB $L_{Amax,F}$ when > 20 events and 85 dB $L_{Amax,F}$ when \leq 20 events

- 8.58. Moderate and major adverse impacts are to be considered as potential significant adverse effects as part of an initial assessment. Final operational significance is determined taking into account the predicted noise levels compared to the LOAEL and SOAEL values as well as the magnitude of change in noise levels. A significant adverse effect is considered where:
 - The predicted operational noise from the guided busway is above the LOAEL and below the SOAEL, and the magnitude of impact is moderate and major adverse; or
 - The predicted operational noise from the guided busway is above the SOAEL, and the magnitude of impact is minor, moderate and major adverse.
- 8.59. No significant effects are considered where the predicted operational noise from the guided busway is below the LOAEL.

^{8.53.} The following comparison is required to determine the impact of the Scheme at opening: DMOY against DSOY.

The Travel Hub

- 8.60. The operational noise from the Travel Hub is to be predicted and assessed against BS 4142:2014 + A1 2019 criteria for each item of mechanical plant within the site. There may also be noise emissions from car and bus movements within the Travel Hub, which will be assessed against appropriate BS8233 criteria.
- 8.61. The predicted noise emissions will be compared to the background noise levels. As per the methodology in BS 4142:2014 + A1 2019, the significance of a sound source's impact depends on how much louder it is compared to the background sound level. However, where the background noise levels are low BS 4142:2014 + A1 2019 also states that absolute noise level criteria to protect the ambient acoustic environment (i.e. outdoor living areas and internal sleep disturbance in bedrooms).
- 8.62. The thresholds assigned to the LOAEL and the SOAEL are as provided in Table 8-8.

Assessment type	Time period	LOAEL	SOAEL
Operational noise	Day 0700-2300	The higher of:	The higher of:
from Travel Hub		Baseline noise levels $L_{Aeq,T}$	10dB above baseline noise
		and	levels L _{Aeq,T}
		50 dB L _{Aeq,T}	and
			60 dB L _{Aeq,T}
	Night 2300-0700	The higher of:	10dB above baseline noise
		Baseline noise levels LAeq,T	levels L _{Aeq,T}
		and	and
		40 dB L _{night}	50 dB L _{night}

Table 8-8 – LOAEL and SOAEL values at receptors – rating noise level (Free Field)

8.63. A significant effect attributed to operational noise from the Travel Hub is considered where the above LOAEL level is exceeded.

9. Traffic and movement

Legislation and policy

9.1. A summary list of relevant legislation, policy and guidance applicable to the traffic and movement assessment is provided in the following sections.

National plans and policies

- 9.2. Relevant national plans and policies include:
 - National Planning Policy Framework 2023 (paragraphs 108, 109 & 115),
 - National Planning Practice Guidance 2014 (travel Plans, transport assessments and statements),
 - National Policy Statement (NPS) for National Networks 2014 (p 27-28),
 - 1st and 2nd National Highways Road Investment Strategies (2014; 2020),
 - DfT Transport Investment Strategy (2017),
 - DfT Transport Decarbonisation Plan (2023),

- 10 Point Plan for a Green Industrial Revolution (2020) & Net Zero Strategy: Build Back Better (last updated in 2022),
- Bus Back Better (2021),
- Cycling and Walking Investment Strategy (2022),
- Gear Change (2020) and Gear Change: one year on (2021), and
- Levelling Up Economic Programme (2022).

Regional plans and policies

9.3. Relevant regional plans and policies include:

- Cambridgeshire County Council Third Local Transport Plan (2011-2031),
- Greater Cambridge Greater Peterborough Strategic Economic Plan (2014),
- Transport Strategy for Cambridge City and South Cambridgeshire (2014),
- Cambridgeshire County Council's Climate Change and Environment Strategy (2022),
- Cambridgeshire County Council's Transport Investment Plan (2022),
- Cambridgeshire and Peterborough Combined Authority Local Transport Plan (2020),
- Cambridgeshire and Peterborough Combined Authority Local Transport and Connectivity Plan (2023),
- Cambridgeshire County Council Draft Local Cycling and Walking Infrastructure Plan (2022),
- Partnering for Prosperity: the Cambridge Milton Keynes Oxford Arc (2017),
- Cambridgeshire County Council Transport Proposal Database (2023),
- Cambridge and Peterborough Economic Growth Strategy (2022), and
- Cambridge and Peterborough Independent Economic Review (2018).

Local plans and policies

9.4. Relevant local plans and policies include:

- South Cambridgeshire Local Plan (2018),
- Cambridge Local Plan (2018),
- Cambridgeshire County Council's Transport Assessment Requirements (2019),
- Greater Cambridge Partnership: Making Connections Project (2022),
- Cambridge Air Quality Management Plan (2018-2023),
- Cambridgeshire and Peterborough Local Industrial Strategy (2019),
- Emerging Greater Cambridge Local Plan (2021), and
- Greater Cambridge City Deal (2014).

Scoping assessment methodology

9.5. The scoping assessment has been carried out through a desk-based study of publicly available information, including the use of online maps to identify the existing transportation network in the area surrounding the Site.

Baseline conditions

9.6. The existing and future forecast baseline conditions will be established through a combination of site observations, surveys, traffic modelling and desktop analysis.

Desktop analysis

9.7. Desktop analysis will consist of interrogation of public websites to obtain information on public transport routes and services, PRoW, road traffic accident records, characteristics of the road network, facilities for pedestrians and cyclists, etc.

Surveys

- 9.8. Numerous traffic surveys have been undertaken to support the development of the traffic models used to evaluate the traffic impacts of the scheme. Non-motorised user surveys in the vicinity of the scheme will also be undertaken to establish current usage by pedestrians, cyclists, and equestrians.
- 9.9. Traffic survey data from surveys undertaken in 2023 has been obtained from Cambridgeshire County Council (CCC) for the following junctions for review and reference in the ES Traffic and Movement chapter:
 - A10/Waterbeach Road priority junction MCC turning count,
 - A10/Landbeach Road priority junction MCC turning count,
 - A10/Butt Lane signalised junction MCC turning count,
 - Butt Lane/Milton P&R site access MCC turning count, and
 - A10/Milton P&R site access MCC turning count.

Non-motorised user surveys have been obtained from the Waterbeach Greenways scheme that were commissioned by the Greater Cambridge Partnership (GCP). These surveys were undertaken in November 2022 and specified in the Table 9-1.

Table 9-1 - Locations of the Waterbeach Greenway traffic counts

Site	Description	Site	Description
1	Cottenham Road/Green End junction	11	A10/Ely Road junction
2	A10 (Ely Road)/Denny End Road junction	12	Landbeach Road/A10 junction
3	Denny End Road/High Street/Bannold Road junction	13	Milton Road (Butt Lane)/Mere Way junction
4	Bannold Road/Bannold Drove junction	14	Butt Lane/Milton Road junction
5	High Street/Cattell's Lane junction	15	Milton Road/A10 junction
6	High Street/Green Side junction	16	High Street/Willow Crescent/Ely Road/Fen Road junction
7	Waterbeach Road/Cambridge Road/A10 Ely Road junction	17	Cambridge Road
8	Cambridge Road/Car Dyke Road junction	18	Cowley Road junction
9	Halingway footpath	19	Cambridge Science Park Road/A1309/Cowley Road junction
10	Clayhithe Road		

9.10. Further NMU surveys were undertaken in July 2023 at the Guided Busway Bridleway and the access to Mere Way and New Road and Burgoynes Road in Impington which connect with Butt Lane and the proposed route for the Waterbeach to Cambridge guided busway.

Traffic modelling

- 9.11. Cambridge Sub-Regional Model (CSRM2) currently has a 2019 base year, with 2026 and 2041 forecast years. An additional forecast year will be added to the model to better reflect the scheduled scheme opening year (2028). As construction of the scheme is scheduled to be 2027 to 2028, it is considered that the CSRM2 2026 forecast year will provide a good approximation for the assessment of the scheme during construction.
- 9.12. Traffic modelling for the forecast years consists of a Do-minimum (DM) scenario without the scheme and a Do-something (DS) scenario with the scheme. The traffic modelling outputs for the DM scenario will be used as the future baseline situation regarding traffic flows and the operational performance of the road network against which the DS scenario can be compared to establish the traffic related impacts of the scheme.
- 9.13. The DM scenarios include forecast traffic growth, accounting for both general background traffic growth based on Department for Transport (DfT) forecasts and committed or near certain developments as identified in the Uncertainty Log that will be reported in TA. Therefore, the DM scenario will represent a future situation that accounts for forecast cumulative traffic growth, excluding any changes due to the scheme.

Potential impacts

- 9.14. IEMA Guidelines: Environmental Assessment of Traffic and Movement indicates that the following potential effects should be assessed:
 - Severance of communities,
 - road vehicle driver and passenger delay,
 - non-motorised user delay,
 - non-motorised amenity,
 - fear and intimidation on and by road users,
 - road user and pedestrian safety, and
 - hazardous/large loads
- 9.15. The IEMA guidance also states that "*This list is not exhaustive, however, and further specific aspects can be added to by the competent traffic and movement expert during EIA scoping, if appropriate*".
- 9.16. Based on the IEMA guidance, the traffic and movement related impacts due to the scheme, and the associated potential consequential effects, during both construction and operation, that will be included in the environmental assessment are described below. The effects of hazardous loads have been scoped out as the scheme will not involve the transportation of dangerous or hazardous loads.

Construction

- 9.17. The temporary transport related impacts arising from construction of the proposed Waterbeach to Cambridge guided busway could be as follows:
 - Temporary increases in traffic on the road network from deliveries by road of construction materials and equipment to the worksites, especially heavy-duty vehicles (HDVs), and from construction workforce commuting by car,
 - temporary traffic management arrangements and short-term road closures (temporary change in road configuration), and

- temporary short-term closures and diversions of PRoW.
- 9.18. The potential transport related consequential effects of these impacts on the travelling public and people living and working alongside impacted corridors could be as follows:
 - temporary changes in traffic congestion and delay on the road network,
 - temporary changes in accident risks from additional traffic flows on the road network,
 - temporary changes in severance for non-motorised uses from additional traffic flows on the road network,
 - temporary changes in amenity and wellbeing for those people living or working alongside the affected transport network, and
 - temporary changes in amenity for non-motorised users, including ambience, fear, and intimidation.

Operation

- 9.19. The permanent transport related impacts arising from the operation of the scheme could be as follows:
 - Changes in traffic volumes on the road network due to the scheme,
 - highway modifications to the road network (Change in road configuration),
 - diversions of PRoW; and
 - changes in the frequency and/or capacity of public transport services.
- 9.20. The potential transport related significant consequential effects from these impacts on the travelling public and people living and working in the vicinity are as follows:
 - Changes in traffic congestion and delay on the road network,
 - changes in accident risks from additional traffic flows on the road network,
 - changes in severance for non-motorised uses from additional traffic flows on the road network,
 - changes in amenity and wellbeing for those people living or working alongside the affected transport network,
 - changes in amenity for non-motorised users, including ambience, fear, and intimidation; and,
 - changes in accessibility to public transport.

Proposed scope of ES

Scoped in

9.21. The following effects arising from the transport related impacts due to the Scheme will be assessed in the Traffic and Movement section of the ES.

Construction

- Severance,
- amenity, including fear, intimidation, and ambience
- safety,
- delay, and
- public transport accessibility

Operation

- Severance,
- amenity, including fear, intimidation, and ambience
- safety,
- delay, and
- public transport accessibility

Scoped out

- 9.22. The following effects arising from the transport related impacts due to the Scheme will be excluded from the Traffic and Movement section of the ES for both construction and operation phases.
- 9.23.

The proposed development would not result in the need for any hazardous loads to be transported and so any effects due to the movement of hazardous loads, including potential for spillage, will be scoped out of the Traffic and Movement ES chapter.

The noise and air quality effects of the changes in traffic flows due to the scheme will be excluded from the Traffic and Movement chapter of the ES, as these topics will be covered separately in the noise and air quality sections of the ES.

Assessment methodology

- 9.24. Guidance and best practice applied to the traffic and movement assessment is given in the: Institute of Environmental Management and Assessment (IEMA) Guidelines: Environmental Assessment of Traffic and Movement, July 2023⁶². This document contains guidance on determining the magnitude of transport related impacts and the severity of the consequential effects.
- 9.25. Further guidance is provided in the Design Manual for Roads and Bridges (DMRB):
- 9.26. Two sections within the DMRB, published in 2020, are generally applicable to the environmental assessment of traffic and transport impacts. These are:
 - LA 104 'Environmental assessment and monitoring' of the "Design Manual for Roads and Bridges" (DMRB) "Sustainability & Environment Appraisal", 2020⁶³
 - LA 112 'Population and human health' of the "Design Manual for Roads and Bridges" (DMRB) "Sustainability & Environment Appraisal", 2020⁶⁴
- 9.27. However, the DMRB does not contain any guidance on determining the magnitude of impacts and their consequential effects on either the travelling public or people living or working alongside the affected transport network. Therefore, IEMA Guidelines: Environmental Assessment of Traffic and Movement has been used to inform the assessment of traffic and movement related impacts and their consequential effects.

⁶² Institute of Environmental Management and Assessment (IEMA) Guidelines, July 2023. Available at: <u>IEMA - New IEMA Guidance:</u> <u>Environmental Assessment of Traffic and Movement - July 2023</u>

⁶³ https://standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a

⁶⁴ https://www.standardsforhighways.co.uk/dmrb/search/1e13d6ac-755e-4d60-9735-f976bf64580a

Study area

- 9.28. The study area for environmental assessment of traffic and movement will be informed by traffic modelling undertaken using the Cambridgeshire County Council's (CCC) Cambridge Sub-Regional Model (CSRM2) in combination with guidance contained in (IEMA) Guidelines: Environmental Assessment of Traffic and Movement.
- 9.29. CSRM2 is an established strategic and dynamic land use and transportation model, which incorporates housing, employment, transport demand and transport infrastructure. Testing with the model allows the outcomes of differing strategies and schemes to be independently assessed to identify which perform best accounting for forecast changes in travel behaviour and patterns of job and population growth. The use of the CSRM2 model is considered appropriate, as the proposed Waterbeach to Cambridge guided busway scheme intends to change travel behaviour, which will be dependent on both housing and employment growth.
- 9.30. The study area for traffic related impacts and effects of the scheme will be informed by a comparison of the traffic modelling results with the scheme (Do-something (DS) scenario) to the traffic modelling results without the scheme (Do-minimum (DM) scenario) to identify those roads where the changes in traffic flows are forecast to be above the relevant thresholds identified for determining the magnitude of impacts that are likely to lead to significant consequential effects.
- 9.31. The study area related to changes in Public Rights of Way (PRoW) will encompass the area in the vicinity of the Scheme, including all areas where it will result in a change in the PRoW network or its usage during construction or operation.
- 9.32. The study area related to changes in the accessibility to public transport will be determined by the changes in the population/passenger catchment areas arising from changes in provision of public transport services due to the Scheme.
- 9.33. Consequently, the study area for the environmental assessment of traffic and movement related impacts will vary by the different effects being considered.

Temporal scope of assessment

- 9.34. The proposed Waterbeach to Cambridge guided busway scheme is currently forecast to be operational in 2028, with the construction expected to take place from 2026 to 2028.
- 9.35. The most appropriate CSRM2 traffic model forecast years will be used to inform the assessment of traffic related impacts and effects of the scheme during both construction and operation, but the CSRM2 forecast model years may not exactly match the expected opening and construction years of the scheme.

Magnitude of impacts thresholds

9.36. IEMA Guidelines: Environmental Assessment of Traffic and Movement recommends that the following rules-of-thumb are applied to determine the magnitude of impacts below which their consequential effects are highly unlikely to be significant:

Rule 1: Include highway links where traffic flows will change by more than 30% (or the number of heavy duty vehicles (HDVs) will change by more than 30%).

Rule 2: Include highway links of high sensitivity where traffic flows will change by 10% or more.

9.37. However, the IEMA guidance also states that "*It should be noted that the Rule 1 and Rule 2 'criteria'* process may not be appropriate for some impacts, and it is generally accepted by regulators and

practitioners that it should not be applied to assessments of air quality, noise, road safety and driver delay".

- 9.38. It should be noted that changes in traffic flows above 30% will not automatically result in the consequential effects of this change being significant, since this is dependent on both the absolute increase in traffic flows and the sensitivity of the affected receptors.
- 9.39. Traffic flow changes that are less than 10% are generally accepted as being within the range of typical daily variations in traffic flows and, therefore, are considered to have no discernible environmental effect.
- 9.40. The thresholds for the magnitude of traffic impacts that will be adopted for this assessment, for each type of potential effect, below which their consequential effects are considered highly unlikely to be significant, are presented in Table 9-2.

Table 9-2 - Magnitude of impact thresholds

Impact threshold	Applicable effects
Operational and construction phases:	Severance, amenity,
Change of less than 30%, or less than 60 pcus/hour, or where resultant traffic flows remain less than 500 pcus/hour over weekday hours.	including fear, intimidation & ambience, and safety
Operational phase:	Delay
Change in traffic flow of less than 60 pcus/hour and demand to capacity ratio over weekday hours remains less than 80%.	
Construction phase:	
Change in traffic flow of less than 60 pcus/hour and less than less than a 5% change in traffic flow in pcus over weekday hours.	
Operational and construction phases:	Public transport accessibility
Change in weekday frequency of public transport services of less than one service per hour in each direction.	

- 9.41. Traffic flows will be measured in passenger car units (pcus) that represent car equivalents, where larger vehicles are categorised as being the equivalent of multiple cars to represent their greater impact. The multiplication factor for larger vehicles is based on the vehicle classification, e.g., HDVs are given a pcu value of 2.5, meaning that they have an impact deemed equivalent to two and half times that of a car.
- 9.42. Any changes above the thresholds in Table 9-2 that are remote from the scheme corridor will be excluded from the assessment. This is on the basis that they are likely to be due to strategic model anomalies and, therefore, unlikely to be directly caused by the scheme.

Receptor sensitivity

9.43. The receptors subject to potential transport related effects of the scheme are the travelling public and people living or working alongside the affected transport corridors. The travelling public can be subdivided into motor vehicle occupants and non-motorised users (NMUs), i.e., pedestrians, cyclists, and equestrians. Table 9-3 below provides a summary of the criteria that will be used to establish receptor sensitivity, which is different for the different types of receptors and effects.

Table 9-3 – Receptor sensitivity

or	Applicable	Receptor sensitivity			
Recept	effect	Low	Medium	High	
e nts	Delay	Local roads	Non-primary A-roads and B-roads	Primary A-roads and motorways	
Vehicl occupar	Safety	Average accident rate per year at or below typical level	Average accident rate per year up to 20% above typical level	Average accident rate per year 20% or more above typical level	
6	Delay & Amenity	Low pedestrian density environment	Medium pedestrian density environment	High pedestrian density environment	
NMUs	Safety	Average number of NMU accidents per year at or below typical level	Average number of NMU accidents per year up to 20% above typical level	Average number of NMU accidents per year 20% or more above typical level	
Property occupants	Severance	Low-level frontage activity and negligible demand to cross the impacted corridor, or any level of frontage activity or crossing demand where adequate controlled crossings exist	Medium-level frontage activity and moderate demand to cross the impacted corridor where inadequate controlled crossings exist	High-level frontage activity or buildings used by vulnerable people fronting impacted corridor and high demand to cross impacted corridor where inadequate controlled crossings exist	
	Amenity	Low-level frontage activity	Medium-level frontage activity	High-level frontage activity or buildings used by vulnerable people fronting impacted corridor	
	Public transport accessibility	Low passenger/ population catchment	Medium passenger/ population catchment	High passenger/ population catchment	

Impact magnitude

- 9.44. Table 9-4 below summarises the criteria that will be used to determine the magnitude of the impacts for each type of impact in relation to applicable consequential effects.
- 9.45. Demand to capacity ratios of below 80% indicate that junctions are operating well within practical capacity and traffic congestion and delay are unlikely. Ratios between 80 and 90% indicate that junctions are approaching practical capacity and that delays and traffic congestion can occur during periods when traffic levels are above typical levels. Ratios between 90 and 99% indicate that a junction is operating over practical capacity, but within theoretical capacity, meaning that some intermittent traffic congestion and delay is likely. Demand to capacity ratios over 99% indicate junctions are operating over both practical and theoretical capacity and frequent and persistent traffic congestion and delay is therefore highly likely.

- 9.46. Although percentage change is an important tool to determine the magnitude of impacts, the absolute value is also required to provide context. For the purposes of assessment, large proportional increases in traffic flow will be considered negligible, if total flow on an existing road remains low.
- 9.47. The magnitude of the impacts due to diversions of PRoW will be determined using professional judgement based on the length of the diversion.
- 9.48. Modification to the road layout or highway configuration changes during both the operational and construction phases of the scheme, such as a new or modified junction or temporary traffic management arrangements, will potentially result in changes in traffic patterns and/or journey distances. These impacts will be reflected in the traffic modelling as changes in traffic flows and vehicle delay. Consequently, the magnitude of the resulting change in traffic patterns is captured in the changes in traffic flow impact assessment. The magnitude of the impact due to the resulting changes in journey distances will be determined using professional judgement based on the length of alternative routes and the volume of traffic affected.

Impact	Applicable effect	Magnitude of impact			
		Neutral/Nominal	Slight	Modest	Substantial
Change in traffic flow	Delay (Operational phase)	Change in traffic flow <60 pcus/hour and demand to capacity ratio over all weekday hours remains less than 80%	Change in traffic flow of 60 or more pcus/hour and peak hour demand to capacity ratio changes by >5% and increases from <80% to between 80 and 90% or decreases from between 80 and 90% to <80% in any weekday hour	Change in traffic flow of 60 or more pcus/hour and peak hour demand to capacity ratio changes by >5% and increases from <90% to between 90 and 100% or decreases from between 90 and 100% to <90% in any weekday hour	Change in traffic flow of 60 or more pcus/hour and peak hour demand to capacity ratio changes by >5% and increases to 100% or more or decrease from 100% or more in any weekday hour
	Delay (Construction phase)	Change in traffic flow <60 pcus/hour and less than <5% change in traffic flow in pcus over all weekday hours	Change in traffic flow of 60 or more pcus/hour and between a 5% and 10% change in traffic flow in pcus over any weekday hour	Change in traffic flow of 60 or more pcus/hour and between a 10% and 15% change in traffic flow in pcus over any weekday hour	Change in traffic flow of 60 or more pcus/hour and >15% change in traffic flow in pcus over any weekday hour
	Safety, Severance & Amenity	Change of <30% or <60 pcus/hour or where resultant traffic flows remain <500 pcus/hour over all weekday hours	Change of 30% to <60% and >60 pcus/hour where resultant traffic flows are >500 pcus/hour or reduce to <500 pcus/hour in any weekday hour	Change of 60% to <90% and >60 pcus/hour where resultant traffic flows are >500 pcus/hour or reduce to <500 pcus/hour in any weekday hour	Change of 90% or more and >60 pcus/hour where resultant traffic flows are >500 pcus/hour or reduce to <500 pcus/hour in any weekday hour
Public transport frequency/ capacity	Public transport accessibility	Change of less than one service per hour in each direction	Change of 1 to 2 services per hour in each direction in each direction	Change of 2 to 4 services per hour in each direction	Change of more than 4 services per hour in each direction

Table 9-4 – Impact Magnitude

Temporal scope of impacts and effects

- 9.49. For the operational assessment, the impacts and their consequential effects will be permanent. Whereas for construction, they are likely to be temporary. The temporal scope of impacts and their consequential effects will be defined as short, medium, or long-term, based on the below definitions:
 - Short-term: less than 13 consecutive weeks (< three months),
 - Medium-term: 13 consecutive weeks to 52 consecutive weeks (three months to a year), and
 - Long-term: greater than 52 consecutive weeks (> one year)

Effect significance

- 9.50. The significance of effect will be determined through a combination of the magnitude of the impact and the sensitivity of the asset/receptor in accordance with Table 9-5 below.
- Effects will be classified as adverse, beneficial, negligible, or neutral, as well as whether they are 9.51. permanent or temporary, i.e., long, medium, or short-term.
- 9.52. Any identified effects will only be deemed to be significant if they are assessed as being moderate or large, whether adverse or beneficial. Minor, negligible, and short-term effects will not be considered significant.

Table 9-5 Significance of effects Adverse or beneficial Sensitivity of receptors Low Medium High Neutral or nominal Negligible Negligible Negligible Magnitude of impacts Slight Minor Minor Minor Modest Moderate Minor Moderate Substantial Moderate Moderate Major

9.53. A summary of the identified traffic and movement related significant effects due to the scheme will be presented in tabular format.

10. Air quality

Legislation and policy

- 10.1. A summary of the relevant legislation, planning policy and technical guidance relevant to air quality, is provided as follows.
 - National Planning Policy Framework 2023 (NPPF) (paragraphs 109 and 192 relate to sustainable transport and local air quality),
 - Planning Practice Guidance (PPG) (paragraph 005),
 - South Cambridgeshire District Council Local Plan (SCDC) (2018) (Policy SC/12 Air Quality, Policy SC/14 Odour and Other Fugitive Emissions to Air, and Policy SS/6 Waterbeach New Town),
 - South Cambridgeshire District Council Air Quality Strategy 2021-2025,
 - Greater Cambridge Sustainable Design and Construction Supplementary Planning Document (SPD),
 - Air Quality Strategy (AQS) for England (April 2023),
 - Clean Air Strategy 2019,
 - Defra Environmental Improvement Plan 2023,
 - Environment Act 2021,
 - Air Quality Standards Regulations 201010(Statutory Instrument (SI) 2010 No. 1001) and The Air Quality Standards (Amendment) Regulations 2016 (SI 2016 No. 1184),
 - Air Quality (England) Regulations 2000 (SI 2000 No. 928)14 and Air Quality (England) (Amendment) Regulations 2002 (SI 2002 No.3043),
 - The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 (SI 2023 No.96), and
 - United Nations Economic Commission for Europe (UNECE) 2022.

Scoping assessment methodology

- 10.2. This scoping assessment has been carried out through a desk-based search of publicly available information. Information on existing ambient air quality i.e., baseline conditions, has been collated from the following sources:
 - Information on Air Quality Management Areas (AQMA) and baseline air quality conditions from the latest South Cambridgeshire District Council (SCDC) Air Quality Annual Status Report (ASR) and
 - DEFRA UK AIR Mapped Background Data and Pollution Climate Mapping (PCM).
- 10.3. The following sources have been used to identify potential sensitive receptors:
 - OpenStreetMap mapping and
 - DEFRA Multi–Agency Geographic Information for the Countryside (MAGIC) website to identify boundaries of designated ecological sites.

Study area

10.4. The air quality study area for the potential effects of construction dust is defined as the area within 250m of the Scheme red line boundary and/or within 50m of the route(s) used by construction vehicles on the

public highway up to 250m from the site entrance, in accordance with the IAQM Construction Dust Guidance.

10.5. For the operational impacts on air quality, the study area will be defined as the area within 200m of road links which exceed the air quality scoping criteria given in the DMRB LA105 Air Quality. The DMRB guidance has been determined as the most appropriate guidance for this assessment, rather than the scoping criteria within the EPUK/IAQM Planning Guidance, as the Scheme is transport related, and is likely to impact the strategic road network (A14). In the absence of traffic data at the time of writing this scoping report, an indicative study area of within 1km of the Scheme red line boundary as shown in Figure 10-1 has been assumed for the air quality assessment of operational effects.



Figure 10-1 - Air quality study area

Base map and data from Bing Maps Satellite Imagery

Air pollutants

10.6. The air pollutants of concern in the context of this chapter are the key pollutants associated with vehicles: nitrogen dioxide (NO₂); and fine particles known as PM₁₀ and PM_{2.5}. These pollutants are the

most likely to be present at concentrations close to or above air quality criteria in an urban environment and are hence the focus of the assessment.

Nitrogen dioxide

10.7. NO₂ is a secondary pollutant produced by the oxidation of nitric oxide (NO) in ambient air. The pollutants NO and NO₂ are collectively termed oxides of nitrogen (NO_x). Just over a quarter of UK NO_x emissions are from road transport, while a fifth are from other forms of transport. The majority of NO_x emitted from vehicles is in the form of NO, which oxidises rapidly in the presence of ozone (O₃) to form NO₂. In high concentrations NO₂ can affect the respiratory system, whereas NO does not have any observable effect on human health at the range of concentrations found in ambient air. High concentrations of NO_x can have an adverse effect on vegetation, including leaf or needle damage and reduced growth. Deposition of pollutants derived from NO_x emissions contribute to acidification and/or eutrophication of sensitive habitats.

Particulate matter

10.8. Particles with an effective aerodynamic diameter of less than 10 micrometres (μm) are referred to as PM₁₀. Primary PM₁₀ emissions in the UK are derived from combustion sources including road transport²⁴, from quarrying and construction activities, and from wind-blown dust. Particulate matter is associated with a range of symptoms of ill health including effects on the respiratory and cardiovascular systems, on asthma and on mortality. There is evidence that exposure to a finer fraction of particles (PM_{2.5} particles with a diameter of less than 2.5 μm, which typically make up around two thirds of PM₁₀ emissions and concentrations) has a significant contributory role in human all-cause mortality and in particular in cardiopulmonary mortality²⁵.

Dust

- 10.9. Dust is defined within the IAQMs Construction Dust Guidance²⁰ as solid particles that are suspended in air or that have settled out onto a surface after having been suspended in air. It includes particles that give rise to soiling (deposited dust) and to human health and ecological effects.
- 10.10. The IAQM Construction Dust Guidance states that there is evidence that, without effective mitigation, major construction sites can lead to an increase in annual mean PM₁₀ concentrations and the number of exceedances of the short-term 24-hour objective for PM₁₀. In addition, construction activities have the potential to cause higher than normal levels of dust deposition in the surrounding area. Dust emissions from a construction site may be mechanically generated due to land preparation (e.g., demolition, land clearing and earth moving) or released from site plant and from the movement of road vehicles on temporary roads, open ground and haul routes.

Air quality criteria

10.11. Relevant air quality criteria for the protection of human health and vegetation are provided in Table 10-1 below.

Pollutant	Criteria	
NO ₂ [#] Hourly mean concentration should not exceed 200 μg/m ³ more than 18 time Annual mean concentration should not exceed 40 μg/m ³		
PM ₁₀ #	24-hour mean concentration should not exceed 50 µg/m ³ more than 35 times a year Annual mean concentration should not exceed 40 µg/m ³	
PM _{2.5}	UK (Except Scotland) annual mean concentration should not exceed 20 μ g/m ^{3†}	

Table 10-1 - Statutory air quality criteria for relevant air pollutants

Pollutant Criteria

Exposure reduction^ (UK urban areas): target of 15% reduction in concentrations at urban background between 2010 and 2020* A legal target to require a maximum annual mean concentration of 10 μ g/m³ by December 2040, with a new interim target of 12 μ g/m³ by January 2028 Population exposure target of at least a 35% reduction by the end of 2040 (compared to a base year of 2018)

NO_x Annual mean concentration should not exceed 30 µg/m³

+ AQS objective is 20 µg/m³ to be met by 31st December 2020. Limit value is 25 µg/m³ to be met by 2015, with a requirement in urban areas to bring exposure down to below 20 µg/m³ by 2020.

^ Limit value exposure reduction target of 20% reduction between 2010 and 2020.

* 20 μ g/m³ is a cap to be seen in conjunction with 15% reduction.

#AQS objectives and limit values are the same criteria.

Dust

10.12. There are no national standards or guidelines for dust deposition currently set for the UK, nor by the European Union or any international organisation. This is mainly due to the difficulty that any standard set would need to relate to dust being a perceptual problem rather than being specifically related to health effects. A threshold of a dust deposition rate of 200 mg/m²/day is recommended as a level for action in line with the IAQM Construction Dust Guidance.

Baseline conditions

Local air quality management

- 10.13. The Scheme is located within the administrative boundary of South Cambridgeshire District Council (SCDC). It is not within an AQMA. SCDC previously had one AQMA approximately 6km from the Scheme along the A14 between Bar Hill and Milton. This AQMA was designated due to exceedances of the AQS objectives for annual mean NO₂ and daily mean PM₁₀. A trend of decreasing monitored concentrations below the objectives since 2014 resulted in the revocation of this AQMA in 2022.
- 10.14. The closest current AQMA is located approximately 1.9km to the south of the Scheme red line boundary in Cambridge City Centre (Cambridge AQMA).

Air quality monitoring data

- 10.15. Air quality monitoring is undertaken by national and local authorities and is a key component of local air quality management. The following monitoring locations have been identified in proximity to the study area.
- 10.16. SCDC undertake continuous monitoring at three locations. The nearest is at Orchard Park Primary School (approximately 700m southwest of the study area, as shown in Figure 10-1 (labelled as ORCH). This monitoring site is located at an urban background location, and it is considered to be representative of background concentrations in the study area.
- 10.17. Annual mean NO₂ concentrations are also measured by SCDC using passive diffusion tubes at 37 locations within the council area. There are twelve diffusion tubes located within the study area as shown in Figure 10-1. These locations are considered to be representative of the receptors within the study area. The closest background diffusion tube is DT22 on Flack End, Orchard Park, located approximately 180m to the southwest of the Site.

- 10.18. DEFRA's PCM model provides estimates of roadside concentrations of annual mean NO₂, which are used in reporting regarding compliance with limit values. The model provides projected roadside concentrations for the years 2018-2030 inclusive, based on a 2018 reference year. There is one PCM link within the study area leaving the A1309 and joining onto the A14 and A10 (PCM Census ID 802037632), which is located approx. 820m south of the Scheme red line boundary.
- 10.19. Estimates of current and future year background pollutant concentrations in the UK are available on the DEFRA UK-AIR website. The background estimates, which are a combination of measured and modelled data, are available for a reference year of 2018 which is the basis for the future year estimates up to 2030. These background estimates include contributions from all source sectors, e.g., road transport, industry and domestic and commercial heating systems.
- 10.20. An assessment of modelling data using the above sources, shows that the air quality within the study area is likely to be relatively good, as the study area is not within an AQMA and nearby monitoring data shows that relevant AQS objectives for NO₂, PM₁₀ and PM₂₅ have all been met in recent years. For PM_{2.5} annual mean concentrations are equal or slightly above the interim target of 12 μ g/m³ to be achieved by the end of January 2028 and were above the 10 μ g/m³ target to be met across England by 2040. DEFRA mapped background concentrations for 2024 and 2028, are also below the relevant AQS objectives for all pollutants and the interim PM_{2.5} target of 12 μ g/m³. The annual mean NO₂ concentrations at the DEFRA PCM Road links in the study area show that there is no risk of exceeding the air quality limit value.

Sensitive receptors

10.21. Existing sensitive receptors may potentially be affected by changes to air quality during both construction and operation of the Scheme. Receptors could be affected by construction dust emissions, and by changes in traffic emissions during both the construction and operational phases.

Human health receptors

- 10.22. Sensitive human health receptors for the purposes of air quality assessment include residential properties, locations of susceptible populations e.g., schools, hospitals and care homes for the elderly, or any other location where a member of the public may be exposed to an air pollutant for the relevant exposure time period.
- 10.23. Sensitive human health receptors within 1 km of the Scheme include residential properties and schools. The closest residential receptors to the Scheme are located; on Waterbeach Road, approximately 70m from the Scheme red line boundary; on High Street, approximately 10m from the Scheme red line boundary; on Milton Road, approximately 9m from the Scheme red line boundary. There is also a school in the Study Area, Orchard Park Primary School, approximately 700m from the Scheme red line boundary.

Ecological receptors

- 10.24. Designated nature conservation sites may contain features that are sensitive to increased concentrations of airborne pollutants and dust. IAQM Designated Site Guidance²² requires assessment of air quality effects on Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar sites, Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), Local Nature Reserves (LNRs), Local Wildlife Sites (LWSs) and areas of Ancient Woodland (AW) within 200 m of any road affected by the Scheme.
- 10.25. No internationally nor nationally important ecological sites with a statutory designation have been identified within 1 km of the Scheme red line boundary. There is one local nature reserve within the 1km

of the Study Area, Worts Meadow & Bourne Wood Local Nature Reserve, located just on the western edge of the Study Area boundary, west of Landbeach.

Potential impacts

Construction

- 10.26. During construction there could be increased emissions of dust during the construction of the Scheme from dust-raising activities on the site.
- 10.27. There is potential for elevated dust deposition and soiling at nearby receptors if dust raising activities are not effectively controlled and mitigated. The level and distribution of dust emissions varies according to the duration and location of activity weather conditions and the effectiveness of suppression measures.
- 10.28. Air quality could also be affected by changes in traffic flows during construction as a result of temporary traffic management and/or additional vehicles travelling to and from site, transporting materials, plant and labour.
- 10.29. It should be noted that any effects during the construction phase are temporary. At this stage is estimated that the length of the construction phase for the Scheme will be approximately two years.

Operation

- 10.30. Once the Scheme is operational, there is potential for both beneficial and adverse air quality effects on air quality at sensitive receptors due to changes in traffic flow, speed and composition of the road network as a result of the Scheme with traffic flows expected to increase around the Travel Hub site and reduce across the wider network due to modal shift from private vehicle to bus across the wider network. The Scheme aims to reduce traffic congestion on the A10 and adjacent road network, in light of the planned development of the Waterbeach new town and associated increase in traffic demand.
- 10.31. Given that the buses servicing the Travel Hub are proposed to be Euro VI, there is a possibility that the Cambridge AQMA could be affected by the Scheme.

Proposed scope of ES

Scoped in

10.32. The following impacts will be considered in the ES.

Construction

Construction Dust - increased emissions of dust and particulate matter at sensitive receptors (human and ecological sites within 250m of the Scheme red line boundary and within 50m of an affected public road up to 250m from the site access) during the construction phase.

Construction Vehicle Emissions - change in air quality at sensitive receptors (human and ecological receptors within 200m of an affected road) as a result of changes in traffic on the road network due to construction vehicles and/or traffic management during the construction phase.

Operation

Operational Vehicle Emissions - change in air quality at sensitive receptors (human and ecological receptors within 200m of an affected road) as a result of changes in traffic on the road network during the operational phase. This includes the potential for impacts on the AQMA.

Scoped out

10.33. As a result of the information collected in the preparation of this Scoping Report it is not proposed that any air quality aspects be scoped out of further consideration in the ES at this stage.

Assessment method

- 10.34. The following guidance documents will be used for the assessment:
 - DEFRA's Local Air Quality Management (LAQM) Technical Guidance (22),
 - Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) 'Land-use Planning and Development Control: Planning for Air Quality' (IAQM Planning Guidance),
 - Design Manual for Roads and Bridges (DMRB LA 105),
 - IAQM 'Guidance on the assessment of dust from demolition and construction.' (IAQM Construction Dust Guidance), and
 - IAQM 'A guide to the assessment of air quality impacts on designated nature conservation sites' (IAQM Conservation Site Guidance).
- 10.35. The desk-based evaluation of baseline air quality conditions provided in this scoping report will use the monitoring data available as described in this section.

Construction phase

10.36. A qualitative assessment of potential impacts of dust emissions during construction phase will be undertaken once construction methods and programme become available. The assessment will be carried out with reference to the four-step process described in the IAQM Construction Dust Guidance. This will consider effects on amenity, human health receptors and designated nature conservation sites by considering the sensitivity of the receptors, their proximity to the construction works and dust emission magnitude for each activity. The construction activities which may give rise to dust emissions are demolition, earthworks, construction and trackout (i.e. deposition of mud and dust on to public highways by vehicles leaving construction sites). The aim of this assessment will be to identify suitable dust mitigation measures that are proportionate to the risk of impacts of dust emissions.

Operational phase

- 10.37. The air quality assessment for the Scheme will be undertaken in line with guidance outlined in the DMRB LA105 Air Quality, Greater Cambridge Sustainable Design and Construction SPD, EPUK/IAQM Planning Guidance, and DEFRA's LAQM Technical Guidance.
- 10.38. Assessment of the operational phase of the Scheme on air quality with regards to vehicle emissions will be carried out with reference to the screening criteria in the DMRB LA105 Air Quality. These determine whether air quality impacts can be scoped out or require quantitative assessment based on changes between the do something traffic (with the project) and the do minimum traffic (without the project) in the opening year. These criteria are summarised below:
 - Annual average daily traffic (AADT) >=1000; or
 - Heavy duty vehicle (HDV) AADT >200; or

- A change in speed band; or
- A change in carriageway alignment by >=5m.
- 10.39. Should a quantitative assessment of vehicle emissions be required, an assessment of the likely changes in air pollutant concentrations during operation of the Scheme shall be undertaken at selected sensitive human receptors and ecological receptors. The assessment will follow the 'detailed' assessment methodology outlined in DMRB LA105 Air Quality, and the ADMS-Roads dispersion model will be used to estimate NO₂ and particulate matter concentrations at selected receptors for a base year and opening year
- 10.40. Assessment of significance of the air quality effects with the Scheme in the opening year will be undertaken considering the change in concentrations and total concentrations at receptors using the impact descriptors in Table 6.3 of the EPUK/IAQM Planning Guidance, presented in Table 10-2 below.
- 10.41. Should habitats sensitive to nitrogen deposition be identified within 200m of roads that meet the relevant screening criteria, an assessment will be undertaken to calculate NOx concentrations and nitrogen deposition rates, in accordance with IAQM Designated Site Guidance.

Table 10-2 - Air quality impact descriptors for individual receptors

Long term average concentration at receptor in assessment year as % of AQAL	% Change	in concentra	ation relative	to AQAL
	1%	2-5%	6-10%	>10%
75% or less	Negligible	Negligible	Slight	Moderate
76-94%	Negligible	Sligh	Moderate	Moderate
95-102%	Sligh	Moderate	Moderate	Substantial
103-109%	Moderate	Moderate	Substantial	Substantial
110% or more	Moderate	Substantial	Substantial	Substantial

11. Soils, geology and contaminated land

Legislation and policy

11.1. This section identifies and describes the legislation and policy framework guidance of relevance to the assessment of the likely geology and soils impacts associated with the Scheme.

- Water Environment (Water Framework Directive) (England & Wales) Regulations 2017,
- National Planning Policy Framework (NPPF) 2023 (Chapter 15),
- Planning Practice Guidance (PPG) 2023,
- Part IIA of the Environmental Protection Act (EPA) 1990,
- Environment Act 2021,
- Water Resources Act (WRA) 1991 (as amended),
- The Control of Substances Hazardous to Human Health (COSHH) Regulations 2002 (as amended),
- Construction (Design and Management) Regulations (CDM Regulations) 2015,
- Landfill (England and Wales) Regulations 2005,
- Waste Management Regulations 2016 (as amended),
- Hazardous Waste (England and Wales) Regulations 2005,

- The Environmental Permitting (England and Wales) Regulations 2016,
- Government's 25 Year Environment Plan,
- Environmental Improvement Plan 2023,
- South Cambridgeshire District Council Local Plan 2018, and
- Cambridge Local Plan 2018.

Scoping assessment methodology

- 11.2. This scoping assessment has been carried out through a desk-based review of publicly available information, including data from a site-specific Groundsure report⁶⁵.
- 11.3. In line with DMRB LA 109, the following aspects have been considered in the scoping assessment:
 - Effects on bedrock geology and superficial deposits, including geological designations and sensitive / valuable non-designated features;
 - Effects on soil resources; and,
 - Effects from contamination on human health, surface water and groundwater.
- 11.4. Effects on mineral deposits as a resource are provided in Chapter 12 (Materials and Waste). Effects associated with water quality (surface water and groundwater) are provided in Chapter 7 (Water Environment) and effects associated with landform are reported in Chapter 5 (Landscape). Impacts on commercial farming activities utilising the agricultural land are discussed in Chapter 3 (Population and Human Health).

Study area

11.5. To consider the effects associated with land contamination, the Study Area will include the Site (refer to Figure 1-1) and land immediately beyond it to a distance of 500 m (off-site). This is considered appropriate for identifying historic and current potentially contaminative land uses, which may have resulted in contamination within the Study Area and which may be affected by the Scheme.

Baseline conditions

Current land use

- 11.6. The Site generally comprises agricultural land with several surface drainage channels present. Several minor roads, including Butt Lane in the centre of the site to the west of the village of Milton (Ordnance Survey National Grid Reference (NGR) 546021, 263528), Landbeach Road in the centre of the site to the south of the village of Landbeach (NGR 547857, 263974) and Waterbeach Road present in the north of the site to the east of the village of Landbeach approximately 0.8 km south of the proposed travel hub (NGR 548069, 265098) are present crossing the site and extend off-site into the wider Study Area.
- 11.7. The land use surrounding the site within the Study Area mainly comprises agricultural land and farms. Commercial and residential properties are present off-site associated with the villages of Milton, Landbeach and Waterbeach.

⁶⁵ Groundsure. Groundsure Insight Report and Historical Mapping. Ref: GS-UAZ-5JH-KEY-CPO. 2024

- 11.8. The former Waterbeach Aerodrome is present in the Study Area located 40 m off-site to the north-east. Milton Landfill is present off-site adjacent to the southern extent of the site to the west of Milton.
- 11.9. Two main roads, the A14 and A10 are present within the Study Area, the A14 is present off-site adjacent to the south of the site to the north of Cambridge and the A10 is present off-site in parallel to the Scheme to the west of Milton, connecting the north of Cambridge to Waterbeach.

Site history

- 11.10. Review of available historical plans in the Groundsure report, shows that the Study Area has comprised agricultural fields with surface water drainage channels from the earliest available historical mapping, dated 1901. The map also shows many of the roads that are currently present within the Study Area, as well as farms and the residential properties associated with the towns of Milton, Landbeach and Waterbeach.
- 11.11. In 1901, a railway line (the Cambridge and St Ives Branch) is present off-site adjacent to the southern site boundary, this is present to the immediate south of the Scheme, near Impington Park. A water well is recorded in the Study Area approximately 450m north-west of the northern extent of the site at Brookside (a residential property).
- 11.12. In 1927, allotments are shown adjacent to the Site around Butt Lane, overlap with the Site boundary at the location of the present-day Milton Park & Ride. Milton Nurseries are located 480m to the east of the site.
- 11.13. In the late 1950s railway sidings were present approximately 300m east of the southern extent of the Site, these were shown to connect into the Cambridge and St Ives branch line which is present in the south-east of the Study Area (off-site). A potential commercial area was also present to the north of the railway sidings, approximately 500m south of the Site, to the south of the Milton Park & Ride.
- 11.14. Four farms were located within the Study Area comprising Rectory Farm and Meadow Farm situated approximately 400m and 480m east of the central section of the Site respectively, New Farm situated approximately 250m west of the northern extent of the Site and New Close Farm / Sun Close Farm immediately adjacent to the south-eastern section of the Site. Allotments were located in the Study Area, immediately adjacent to the south-east of the central section of the Site.
- 11.15. The Waterbeach Aerodrome was also shown to be present off-site located 40m to the north-east of the site in mapping dating from 1958.
- 11.16. The railway sidings in the south-east of the Study Area (300m east of the site) were no longer shown to be present from mapping dated from 1974.
- 11.17. The railway line which is present off-site adjacent to the south of the Site boundary, is no longer shown to be an operational railway from 1980. At this time, several surface water ponds (including Leland Water and Dodd's Water) are shown to be present off-site within the Study Area, they are located approximately 200 m south-east of the Site. Several of the larger pond features that are present off-site, including Leland Water and Dodd's Water, are likely to be associated with historical gravel pits which are present within this area, and outside of the Study Area in the village of Milton. Another man-made surface water pond (Cawcutts Reservoir) is present off-site approximately 20m south of the Site within the southern extent of the Study Area, to the north of the A14. The former Brookside residential property has been redeveloped into OverBrook Farm, located in the Study Area approximately 450m north-west of the Site. The allotments, located in the Study Area immediately adjacent to the south-eastern section of the site, are no longer present.

- 11.18. In 1991, Mereway Poultry Farm is located in the Study Area immediately adjacent to the south-east of the central area of the Site, located on Mere Way and Milton Road.
- 11.19. A recycling centre (Milton Landfill) is shown to be present within the centre of the Study Area from 2001. This is located off-site approximately 10m south of the centre of the Site on Butt Lane.
- 11.20. Current mapping shows that the off-site residential areas shown in the mapping dating from 1901 associated with Milton, Landbeach and Waterbeach villages have expanded in size to the present day.
- 11.21. In summary the site and the surrounding Study Area has largely comprised agricultural land from the earliest available mapping to the present day. There is evidence of commercial land use as well as established residential villages.

Geology

Artificial ground

11.22. The available published information from the Groundsure Report and the British Geological Survey (BGS) indicates that no areas of artificial ground / Made Ground is mapped as present within the Study Area. However, Made Ground is anticipated to be present within the Study Area associated with general urban development and farming activities.

Superficial geology

11.23. The Groundsure 1:10,000 scale geological mapping indicates that superficial deposits comprising River Terrace Deposits (RTD) are present underlying the majority of the northern and southern extents of the Study Area. Superficial deposits are recorded as absent in the centre of the Study Area between the Milton Park and Ride and Landbeach Road. The superficial geology is shown on Figure 11-1.

Figure 11-1 - Superficial geology



- 11.24. The BGS describes the RTD as typically comprising sands and gravels. Historical borehole records available from the BGS indicate that RTD was encountered in five exploratory holes located within the Study Area at depths of up to 2m below ground level (bgl). These included:
 - boreholes TL46SE95 and TL46SE96, located in the southern extent of the Study Area adjacent to the connection to the existing busway to the north of the A14,
 - boreholes TL46SE188 in the centre of the Study Area adjacent to Butt Lane, and
 - boreholes TL46SE100 and TL46NE11 located in the northern extent of the Study Area on Waterbeach Aerodrome and Worts Farm off of Landbeach Road.

Bedrock geology

11.25. The bedrock geology underlying the Study Area comprises mudstone of the Gault Formation. The bedrock geology is shown on Figure 11-2.

Figure 11-2 - Bedrock geology



Contains British Geological Survey materials © UKRI [2024]. Contains Environment Agency information © Environment Agency 2024

11.26. The BGS describes the Gault Formation as typically comprising *'pale to dark grey or blue grey clay and mudstone'*. The historical borehole records available from the BGS, and as listed above, record that the Gault Formation from the base of the River Terrace Deposits (where encountered) to depths of up to 24.50m bgl.

Mining activity and quarrying

- 11.27. The Study Area is not located within an area affected by coal mining activities. There are two BGS recorded mineral sites located within the Study Area (BritPits), these are located off-site. The Landbeach Gravel Pits are located 250m and 325m north-east of the Site where it crosses Waterbeach Road. The BritPits and the Landbeach pit are indicated to be no longer operational and are identified as surface water ponds on current mapping (Leland Water and Dodd's Water), utilised for angling.
- 11.28. Surface workings are present off-site in the south of the Study Area associated with the Milton Landfill (250m south-east of the site at Butt Lane) and the Cawcutts Reservoir (10 m south-west of the southern extent of the Site).
- 11.29. There is one Mineral Safeguarding Areas (MSA) for sand and gravel in the Study Area which is discussed in Chapter 12 (Material Assets and Waste). There are no Mineral Consultation Areas (MCA) within the Study Area.

Geological sites of special scientific interest and local geological sites

11.30. There are no Geological Sites of Special Scientific Interest (SSSIs) or Local Geological Sites (LGS) within the Study Area.

Hydrogeology

Aquifer designations

11.31. The RTD superficial deposits are classified by the Environment Agency as a secondary A aquifer. The underlying bedrock geology of the Gault Formation is classified as an unproductive stratum.

Groundwater abstractions

- 11.32. There are four active groundwater abstraction licenses within the Study Area all of which are located offsite. One abstraction is located in the centre of the Study Area adjacent to Butt Lane (20m south-west of the site) and three abstractions are located in the south-west of the Study Area (241m south-west of the southern extent of the Site).
- 11.33. The four abstraction licenses are for the abstraction of groundwater for irrigation purposes. Three of the abstractions relate to the abstraction of water at Cawcutts Reservoir in Impington and the fourth abstraction licence relates to the abstraction of water from a borehole at Milton.
- 11.34. Further details of the groundwater abstraction licences within the Study Area, including their annual abstraction volumes, licence numbers and licence holders are provided in the Groundsure report.

Source protection zones

11.35. There are no groundwater SPZs located within the Study Area.

Groundwater vulnerability zones

11.36. The majority of the Study Area, where the RTD are present, is located within an area of 'high' groundwater vulnerability. Where the RTD are not present, the groundwater vulnerability is classified as unproductive.

Contaminated land

Waste sites

11.37. There is one active waste management site within the Study Area, located 5 m south-west of the Site at Butt Lane centred at NGR 546931, 263071. This comprises the Milton Landfill waste facility and it is indicated to be active and accepts commercial, industrial and household wastes⁶⁶. This has been extended from its historical location, which was more southerly to now extend northwards toward the Site.

⁶⁶ Groundsure. Groundsure Insight Report and Historical Mapping. Ref: GS-UAZ-5JH-KEY-CPO. 2024

- 11.38. The Milton Household Recycling Centre is located adjacent to the Milton Landfill waste facility. The operator is stated to be East Waste Limited.
- 11.39. There are no additional historical or active licensed waste facilities within the Study Area. All historical records reported in the Groundsure report appear to be in relation to the Milton Landfill and it's extension over time.
- 11.40. The site is located within the consultation area for the Waste Management Area associated with Milton Landfill.

Fuel stations

11.41. There are no active or historical fuel stations within the Study Area.

Pollution incidents

11.42. Groundsure records two pollution incidents which have occurred within the Study Area and were reported to have a significant impact (Category 2) to water and land receptors. One pollution incident dates to 2001 (Category 2 impact to land) and one pollution incident dates to 2003 (Category 2 impact on water).

Likelihood of the presence of contaminated land

11.43. The assessment has not identified the presence of contaminated land within the Site and therefore it is very unlikely that there will be any contamination sources that could result in significant effects. The waste site close to the Site at Butt Lane is site-specific and outside of the Site and proposed construction works.

Soils and agricultural land

Soil data

- 11.44. The 1:250,000 National Soil Map of England and Wales for Eastern England published by the Soil Survey of England and Wales provides details of the soil associations present within the Study Area.
- 11.45. The Milton Association is present underlying the majority of the Study Area. The Evesham 3 Association is also present within the south and central areas of the Study Area. The soil associations for the site are shown in Figure **11-3** and a summary of the soils typical of this area is provided in Table 11-1

Figure 11-3 - Soil associations



Association	Parent Material	Description ⁶⁷
Milton	River Terrace and chalky drift	Deep permeable calcareous fine loamy soils variably affected by groundwater. Some similar shallower well drained soils over gravel in places
Evesham 3	Jurassic and Cretaceous clays	Slowly permeable calcareous clayey, and fine loamy over clayey soils. Some slowly permeable seasonally waterlogged non-calcareous clayey soils

Agricultural land classification

11.46. The quality of agricultural land is assessed using the Ministry of Agriculture, Fisheries and Food (MAFF) guidance on ALC⁶⁸. The ALC system provides a framework for classifying land according to the extent to

 ⁶⁷ Cranfield University 2024. *The Soils Guide.* Available: www.landis.org.uk. Cranfield University, UK. Last accessed 05/04/2024.
 ⁶⁸ Ministry of Agriculture, Fisheries and Food (MAFF), Revised guidelines and criteria for grading the quality of agricultural land.
 Agricultural Land Classification of England and Wales, 1988.
which its physical or chemical characteristics in combination with climatic and site conditions impose long-term limitations on agricultural use.

- 11.47. The ALC system divides agricultural land into Grades 1 to 5 (Grade 1 being the highest quality), with Grade 3 being divided into Subgrades 3a and 3b in the 1988 revised classification⁶⁹. ALC Grades 1 and 2 and Subgrade 3a are considered Best and Most Versatile (BMV) agricultural land as defined in Annex 2 of the National Planning Policy (NPPF).
- 11.48. The data provided in the Groundsure report records that the ALC Grade of the land present within the Study Area comprises Grade 2 (very good quality) agricultural land which is considered to be BMV and Grade 3 (good to moderate quality) agricultural land. The Grade 3 designation is based on the provisional ALC maps (pre-1988)⁷⁰ which does not differentiate between Subgrade 3a and 3b. As the presence or absence of BMV agricultural land within the areas of Grade 3 cannot be determined, it is assumed for this assessment that all Grade 3 soils could be 3a and BMV.
- 11.49. A detailed ALC survey (post-1988) is available for an area of land 100 m to the south of the Site along Butt Lane, which was undertaken in 1991 for the extension of the Milton Landfill site⁷¹. The results of the survey reported that, prior to the extension of the landfill, the agricultural land quality was classified as Grade 2 and Subgrade 3a. No further detailed surveys are available for the remaining land within the Study Area.
- 11.50. Considering the information presented above, BMV agricultural land is likely to be present in the Site and within the Study Area. Further assessment will be undertaken to derive a definitive ALC grading for the Site at a later stage within the EIA process, once an ALC survey has been completed for the Scheme.

Potential impacts

Construction

Land contamination

- 11.51. The potential impacts of the construction of the Scheme related to land contamination has considered the following:
 - Effects associated with the disturbance, mobilisation, re-use and disposal of contaminated land related to historical agricultural / commercial and residential land operation. Considering the baseline data summarised in the previous sections of this chapter, and with the implementation of mitigation measures, significant impacts related to land contamination related to the Scheme are not considered to be likely.
 - Effects associated with the introduction of potential new sources of contamination which may arise from construction activities related to the Scheme i.e. from spillages and leaks. These would be managed through best practice construction methods and are not expected to cause a significant effect.

⁶⁹ Natural England (1988). Agricultural Land Classification of England and Wales: Revised criteria for grading the quality of agricultural land. <u>https://publications.naturalengland.org.uk/publication/6257050620264448</u> accessed April 2024.

⁷⁰ Natural England. Provisional Agricultural Land Classification England, East Region (1:250,000). 2019.

⁷¹ Agricultural Land Classification detailed Post 1988 ALC survey, Milton Landfill Site (ALCC00491). April 1991. Available at: <u>Agricultural Land Classification detailed Post 1988 ALC survey, Milton Landfill Site - ALCC00491 (naturalengland.org.uk)</u>

Soils and agricultural land

- 11.52. Potential impacts related to soils and agriculture are related to the disturbance of soil and permanent loss of agricultural land through temporary and permanent land take as outlined below:
 - The permanent land take for the Scheme is currently anticipated to be approximately 26 hectares (ha) (subject to final design and construction methods).
 - The temporary land take for the construction phase of the Scheme will include haul roads, stockpile areas and construction compounds. However, at this stage, their extents and locations have not been confirmed and a land take cannot be calculated.
- 11.53. An ALC survey will be required in order to confirm the ALC grade and areas of BMV agricultural land effected by the Scheme.

Operation

- 11.54. The operation of the Scheme may potentially introduce new sources of contamination i.e. spillages and leaks from vehicles and below ground services could create additional potential pathways for the migration of potential contamination which were not present at baseline.
- 11.55. The Scheme may also generate limited waste soils during operation due to maintenance requirements which may include excavations for landscaping, repairs and maintenance of services.

Proposed scope of ES

Scoped in

11.56. The following impacts will be considered in the ES.

Construction

11.57. Temporary and permanent disturbance/loss of soil during construction works.

Operation

11.58. There are no operational likely significant effects that are anticipated to occur as a result of the Scheme.

Scoped out

11.59. As a result of the information collected in the preparation of this Scoping Report it is proposed that the following aspects will be scoped out of further consideration in the ES because there will be no likely significant environmental effects to assess.

Construction

11.60. Effects on bedrock geology and superficial deposits, including geological designations have been scoped out of further assessment in the ES, as no geological environmentally sensitive land designations have been identified within the red line boundary of the Proposed Scheme or within the Study Area.

- 11.61. There are no geological Sites of Special Scientific Interest (SSSIs) or Local Geological Sites (LGS) within the Study Area and therefore effects on sensitive or valuable geological features have been scoped out of further assessment.
- 11.62. Effects from existing sources of land contamination related to historical urban development and potential introduction of new sources of land contamination from the Scheme to human health, surface water and groundwater receptors.

Operation

11.63. Potential new sources of contamination which may arise from construction activities related to the Scheme i.e. from spillages and leaks. These would be managed through best practice construction methods and are not expected to cause a significant effect.

Assessment methodology

- 11.64. The assessment of soil resources and agricultural land will follow DMRB LA 109 guidance⁷². Relevant published datasets and mapping will be reviewed to assess the receptor value.
- 11.65. No published or existing detailed soil survey data are available for the footprint of the Scheme. In accordance with Section 3.6.1 of DMRB LA 109, where data is incomplete, a soil resource and/or agricultural land classification (ALC) survey should be undertaken. Therefore, an ALC survey will be completed to inform the assessment at Stage 2 and Stage 3.

12. Material resources and waste

Legislation and policy

- 12.1. A summary of legislative requirements in relation to material assets and waste and how they apply to the Scheme is presented below. It should be noted that the details presented in this section are not intended to provide a full consideration of the relevant documents and their application to the Scheme.
- 12.2. Many of the relevant UK acts and regulations relating to waste incorporate EU directives into UK Law. These include:
 - EU Revised Waste Framework Directive (2008/98/EC) implemented in law through the Waste Regulations.
 - EU Landfill Directive (1993/31/EC), as amended by the EU Directive (2003/33/EC) implemented in law through the Environmental Permitting Regulations.
 - EU Hazardous Waste Directive (1991/689/EEC) implemented in law through the Hazardous Waste Regulations.
 - Further to the above it should be noted that the European Commission Decision 2000/532/EC established the European Waste Catalogue (EWC) list of waste types which provides a standardised way of describing waste. The EWC list of wastes was transposed into UK law and in some cases takes precedence on hazardous waste thresholds.

⁷² National Highways, DMRB Manual: LA 109 Geology and Soils - Revision 0, 2019

Policy

- National Planning Policy Framework (NPPF), 2021 (Chapter 17 and Chapter 6),
- The Government's 25 Year Environment Plan, 2018,
- Our Waste, Our Resources: A Strategy for England, 2018,
- Waste Management Plan for England 2021Cambridgeshire and Peterborough Minerals and Waste Local Plan, 2021 (Policy 2 Providing for mineral extraction, Policy 3 Waste management needs, Policy 4 Providing for waste management, Policy 8 Recycled and secondary aggregates and concrete batching and Policy 14 Waste management needs arising from residential and commercial development),
- South Cambridgeshire District Council Local Plan, 2018 (Policy CC/6 Construction Methods), and
- Cambridge Local Plan, 2018 (Policy 1, Policy 28).

Legislation

- The Environmental Protection Act, 1990,
- The Waste (England and Wales) Regulations, 2011,
- Hazardous Waste (England and Wales) Regulations, 2005,
- Environmental Permitting (England and Wales) Regulations, 2016, and
- Waste Electrical and Electronic Equipment (WEEE) (England and Wales) Regulations, 2013.

Scoping assessment methodology

- 12.3. This scoping assessment has been written in accordance with requirements in DMRB LA 110 Material Assets and Waste.
- 12.4. Material assets are defined in DMRB LA 110 as "the materials and construction products required for the construction, improvement and maintenance of the trunk road network. Material assets include primary raw materials such as aggregates and minerals, and manufactured construction products. Many material assets will originate off site, purchased as construction products, and some will arise on site such as excavated soils or recycled road planings."
- 12.5. Waste is defined as per the Waste Framework Directive (2008/98/EC) as "any substance or object which the holder discards or intends or is required to discard."

Baseline conditions

12.6. The baseline information presented in the following sections will be used to assess the Scheme's impact and determine the significance of the effect.

Study area

- 12.7. Two study areas have been defined for the assessment, as per DMRB LA 110. These are:
 - First Study Area the scheme limits including temporary construction areas (such as construction compounds) where construction materials will be consumed, and waste generated, and
 - Second Study Area this will cover the feasible sources and availability of materials required to construct the main elements of the Scheme and suitable recovery and waste management infrastructure that could accept waste generated by the Scheme.

- 12.8. Using DMRB LA 110 as a guide, the Second Study Area will be the East of England region for material assets, where data is available and Cambridgeshire for waste. The Second Study Area takes into account the proximity principle which should ensure that the most appropriate material sources and waste management facilities are utilised while balancing other issues such as logistics, cost and environmental impacts of sourcing materials and managing waste at greater distance.
- 12.9. The baseline has been established through a desk-based review of data from the following sources:
 - The Mineral Products Association's Profile of the UK Mineral Products Industry, 2023,
 - East of England Aggregates Working Party Annual Report: 202215,
 - Peterborough and Cambridgeshire Minerals and Waste Local Policies Map 2021,
 - Magic map,
 - World Steel Association World Steel in Figures 2023,
 - Environment Agency, Remaining Landfill Capacity, 2022, and
 - Environment Agency, Waste Data Interrogator, 2022.
- 12.10. The assessment itself will use information from the Scheme's Bill of Quantities.

Baseline conditions

12.11. The baseline information presented in the following sections will be used to assess the Scheme's impact and determine the significance of the effect in the ES.

First study area - material assets and waste current state

12.12. The current material asset use and waste generation and disposal are both expected to be low as the Scheme goes through undeveloped land.

First study area – mineral safeguarding areas and peat resource current state

- 12.13. The Peterborough and Cambridgeshire Minerals and Waste Local Policies Map shows a sand and gravel Mineral Safeguarding Area (MSA) immediately beneath and adjacent to the Scheme.
- 12.14. There are no Blanket Bogs, Lowland Fens or Lowland Raised Bog areas along the Scheme. Therefore, there are no areas that are / could give rise to peat reserves.

Second study area – materials assets current state

12.15. The baseline for the current availability of material assets required to construct the main elements of the Scheme is presented below. Table 12-1 provides a breakdown of annual sales of material assets in East England and the UK for 2022 (the most recently available data) taken from the Profile of the UK Mineral Products Industry 2023 Report. Primary aggregate data for crushed rock, sand and gravel and Secondary and Recycled aggregate data for the East of England is taken from the East of England Aggregates Working Party Annual Report 2022 (the most recently available data).

Table 12-1 - Availability of material assets

Material Assets	Annual Sales in East of England (Million tonnes)	Annual Sales in UK (Million Tonnes)
Primary aggregate crushed rock	0.2	116.2
Primary aggregate sand & gravel	11.9	55.9

Material Assets	Annual Sales in East of England (Million tonnes)	Annual Sales in UK (Million Tonnes)	
Recycled and secondary aggregate	2.4	74.0	
Secondary aggregate	0.3	Not Available	
Recycled aggregate	2.1	Not Available	
Asphalt	2.4	26.7	
Concrete*	2.8	35.1	
Steel	Not Available	9.2	

*cubic metres have been converted to tonnes using density of 2.38 tonnes/m³.

12.16. As per the DMRB LA 110, regional recycled aggregate targets shall be used in the assessment of material assets and waste. Table 12-2 below presents the minimum requirements for use of recycled or secondary aggregates in construction of the Scheme for the East and England. The target for East England is 31% and will be used to assess the Scheme's aggregate use.

Table 12-2 - Recycled aggregate targets

Region	Recycled content target (alternative materials)	Total aggregate provision (million tonnes)
East England	31%	382
England	25%	3,908

Second study area – waste current state

- 12.17. The baselines to assess against for the Scheme's generation of wastes during construction are presented below.
- 12.18. Construction, demolition and excavation (CD&E) waste generated by the Scheme will predominately be non-hazardous and inert, with small quantities of hazardous waste (e.g. paints, solvents and possible contaminated soils).
- 12.19. The baseline for remaining landfill capacity data for the Second Study Area of Cambridgeshire is calculated by the Environment Agency and is presented below in Table 12-3.

Table 12-3 - Landfill capacity in Cambridgeshire

Waste Stream	Cambridgeshire (m3)
Inert and non-hazardous	16,970,018
Hazardous	0

12.20. The baseline for waste infrastructure capacity for the Second Study Area of Cambridgeshire is calculated by the Environment Agency and is presented below in Table 12-4.

Waste Stream	Cambridgeshire (Tonnes)
Inert and non-hazardous	1,965,795
Hazardous	103,649

Table 12-4 - Waste infrastructure capacity in Cambridgeshire

Second study area – mineral safeguarding areas and peat reserves current state

- 12.21. The Peterborough and Cambridgeshire Minerals and Waste Local Policies Map shows a sand and gravel MSA immediately beneath and adjacent to the Scheme.
- 12.22. There are no Blanket Bogs, Lowland Fens and/or Lowland Raised Bogs in the Second Study Area. Therefore, there are no areas that are / could give rise to peat reserves.

First study area – mineral safeguarding area and peat resource future state

12.23. The likely future state (in the absence of the Scheme) of MSAs and peat resources within the First Study Area are expected to remain the same due to the protection provided to them largely preventing development on or within them.

Second study area - material asset likely future state

12.24. The likely future state of material asset use is expected to be very similar to the current state, potentially reducing as fewer primary materials are used as aspects of the circular economy are embraced and more recycled materials are used.

Second study area – waste likely future state

12.25. The likely future remaining landfill and waste management infrastructure capacity is shown in the figures below in Figure 12-1 to Figure 12-3, for Cambridgeshire. The estimates use historic and current Environment Agency data and extrapolates it forward, using a Microsoft Excel formula, to 2028, the opening year of the Scheme.



Figure 12-1 - Estimated future remaining landfill capacity (non-hazardous and inert)

Figure 12-2 - Estimated future waste management infrastructure capacity (non-hazardous and inert)





Figure 12-3 - Estimated future waste management infrastructure capacity (hazardous)

Second study area – mineral safeguarding areas and peat resources likely future state

12.26. The likely future state (in the absence of the Scheme) of MSAs and peat resources within the Secondary Study Area are expected to remain the same due to the protection provided to them largely preventing development on or within them.

Potential impacts

Construction

- 12.27. The Scheme would likely result in two main impacts from construction, these are;
 - The use of material assets, likely to be aggregate and asphalt. Smaller quantities of materials that would be used include concrete, metal and wood, amongst others; and
 - The generation of waste from activities including but not limited to demolition of any existing buildings, other general site clearance and excavations. Key waste streams that will require management or disposal are likely to be soil and concrete. Smaller quantities of other wastes that may be generated include metal, wood and vegetation, as well as municipal waste and septic tank waste from the workforce.

Operation

12.28. DMRB LA 110 states that operational activities are those which occur in the opening year. It is considered that negligible material asset use will take place in this time, as the Scheme will just have opened. Consequently, operational material assets assessment will be scoped out. Similarly, it is considered that the opening year will not generate large quantities of waste relative to regional landfill capacity or have an effect on the ability of waste infrastructure within the local area to continue to accommodate waste from other sources. As such operational waste assessment will also be scoped out.

Proposed scope of ES

Scoped in

12.29. The following impacts will be considered in the ES.

Construction

- 12.30. Assessment required to evaluate the impacts of the Scheme against the sales of material assets during the construction phase.
- 12.31. Assessment required to evaluate the impacts of waste arisings from the Scheme against the regional waste infrastructure baseline during the construction phase.

Operation

12.32. No operational effects on materials and waste are anticipated and therefore this is scoped out of the assessment (see section below).

Scoped out

12.33. As a result of the information collected in the preparation of this Scoping Report it is proposed that the following aspects will be scoped out of further consideration in the ES because there will be no likely significant environmental effects to assess.

Construction

12.34. No effects have been scoped out.

Operation

- 12.35. Operational demand for material assets from the Scheme will not be assessed as it is envisaged that this will be minimal.
- 12.36. Operational waste arisings from the Scheme will not be assessed as it is envisaged that this will be minimal.

Assessment method

- 12.37. An environmental assessment, as defined in DMRB LA 110, will be carried out to assess the impacts of material assets and waste from the Scheme during its construction and operation phase. The assessment process will comprise of the following tasks:
 - Review of relevant legislation and guidance to identify material and waste management objectives and targets,
 - Establish the baseline demand for material assets and the baseline capacity of waste management infrastructure,
 - Review of the Bill of Quantities (BoQ) to establish the quantities and types of materials to be used and wastes to be generated during construction,
 - Identify and assess the impacts of the Scheme by comparing the information in the BoQ against the baseline data, and

 Identify mitigation measures to reduce, re-use, recycle and/or recover materials and wastes from the scheme.

Assessment criteria

12.38. An assessment of the level of environmental effect from the use of material assets and generation of waste will be made using the criteria in Table 12-5, which are set out in DMRB LA 110.

Significance Category	Description		
Very Large	Material Assets 1) no criteria: use criteria for large categories.		
	Waste 1) >1% reduction or alteration in national capacity of landfill, as a result of accommodating waste from a project; or 2) construction of new (permanent) waste infrastructure is required to accommodate waste from a project.		
Large	 Material Assets 1) project achieves <70% overall material recovery / recycling (by weight) of non-hazardous Construction and Demolition Waste (CDW) to substitute use of primary materials; and 2) aggregates required to be imported to site comprise <1% re-used / recycled content; and 3) project sterilises ≥1 mineral safeguarding site and/or peat resource. 		
	Waste 1) >1% reduction in the regional capacity of landfill as a result of accommodating waste from a project; and 2) >50% of project waste for disposal outside of the region.		
Moderate	Material Assets 1) project achieves less than 70% overall material recovery / recycling (by weight) of non-hazardous CDW to substitute use of primary materials; and 2) aggregates required to be imported to site comprise re-used/recycled content below the relevant regional percentage target. Waste		
	 1) >1% reduction or alteration in the regional capacity of landfill as a result of accommodating waste from a project; and 2) 1-50% of project waste for disposal outside of the region. 		
Slight	Material Assets 1) project achieves 70-99% overall material recovery / recycling (by weight) of non- hazardous CDW to substitute use of primary materials; and 2) aggregates required to be imported to site comprise re-used/recycled content in line with the relevant regional percentage target.		
	Waste 1) ≤1% reduction or alteration in the regional capacity of landfill; and 2) waste infrastructure has sufficient capacity to accommodate waste from a project, without compromising integrity of the receiving infrastructure (design life or capacity) within the region.		
Neutral	Material Assets 1) project achieves >99% overall material recovery / recycling (by weight) of non- hazardous Construction Demolition Waste (CDW) to substitute use of primary materials; and 2) aggregates required to be imported to site comprise >99% re-used / recycled content.		

Table 12-5 - Criteria for classifying environmental effects

	Waste 1) no reduction or alteration in the capacity of waste infrastructure within the region.
12.39.	Table 12-5 defines 'neutral' to 'very large' environmental effects for both material assets and waste.
12.40.	The effects of the Scheme can then be defined as significant or not significant, as shown in Table 12-6 below.

Table 12-6 - Significance	criteria for	material	assets	and	waste
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Significance	Description		
Significant (one or more criteria met)	Material Assets: 1) category description met for moderate or large effect.		
	Waste: 1) category description met for moderate, large or very large effect.		
Not significant	Material Assets: 1) category description met for neutral or slight effect.		
	Waste: 1) category description met for neutral or slight effect		

Assumptions and limitations

12.41. Several assumptions are applicable to the proposed assessment methodology, as outlined below:

- All material and waste quantities will be converted into tonnes or cubic metres, from the design information
 provided, using conversion rates from Atkins Carbon Knowledgebase (materials) or the Waste and
 Resources Action Programme's (WRAP) Site Waste Management Plan template (waste),
- All materials and wastes will be grouped according to main types, and
- No hazardous waste has been identified at this stage, but this will be confirmed via a Ground Investigation as the Scheme progresses.
- 12.42. Every effort will be made to base the assessment on Scheme's specific information but in some cases information from previous, similar projects or industry baselines (i.e. for recycled content) may need to be used.
- 12.43. The following limitations have been identified for the assessment:
 - The material assets and waste baselines presented in this chapter use publicly available data,
 - The material assets and waste baselines use the most recently published data; however, this is sometimes two to three years old, so does not reflect the exact current quantities, and
 - Indirect impacts, such as those from the offsite manufacture of products or extraction of minerals, are
 outside the scope of the assessment, as it is not possible at this stage to determine where products will be
 manufactured, or minerals extracted.
- 12.44. These limitations and/or assumptions will not affect the ability to undertake the assessment, nor the conclusions that will be reported.

13. Climate vulnerability

- 13.1. Rising concentrations of carbon dioxide (CO2) and other greenhouse gases in the atmosphere mean that climate change is now inevitable. It is expected to have significant implications for infrastructure assets, particularly those with long operational lifetimes. This makes them sensitive, not only to the existing climate at the time of their construction, but also to climate variations over the decades of their use.
- 13.2. In this report the scoping of potential climate impacts has been spit across two Chapters as follows:
 - The likely effects of the Scheme on climate, in particular the magnitude of greenhouse gases (GHGs) emissions emitted during both construction and operation is scoped in Chapter 14, and
 - The vulnerability of the Scheme to climate change, including extreme weather caused by climate change, during operation and construction is scoped in this Chapter.

Legislation and policy

International

Paris agreement

13.3. The Paris Agreement⁷³ is a legally binding agreement within the United Nations Framework Convention on Climate Change (UNFCCC) dealing with greenhouse gas (GHG) emissions mitigation, adaptation and finance starting in the year 2020. Under Article 7 of the Paris Agreement the agreement requires all signatories are required to engage in adaptation planning and implementation. It requires all signatories to set a target, known as a nationally determined contribution (NDC) and to strengthen their climate change mitigation efforts to keep global warming to well below 2°C this century and to pursue efforts to limit global warming to 1.5°C.

EIA directive 2011/52/EU (as amended)

13.4. The EIA Directive 2011/52/EU⁷⁴ sets out the requirement to undertake an Environmental Impact Assessment (EIA). Directive 2011/52/EU was amended by Directive 2014/92/EU5. The amendments included the introduction of an express requirement to assess the vulnerability of the Proposed Development to climate change. The EIA Directive still applies to UK law through the Environmental Assessments and Miscellaneous Planning (Amendment) (EU Exit) Regulations 2018 (SI 2018/1232).

⁷³ UNFCCC (2016). Conference of the Parties, Report of the Conference of the Parties on its twenty-first session, held in Paris from 30 November to 13 December 2015. FCCC/CP/2015/10 (online). Available at:

https://unfccc.int/sites/default/files/resource/docs/2015/cop21/eng/10a01.pdf

⁷⁴ EIA Directive 2011/52/EU (as amended) Available at: https://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=celex%3A32014L0052

National

Town and country planning environmental impact assessment (EIA) regulations 2017 (as amended)

13.5. The EIA Regulations⁷⁵ set out the requirement to undertake an EIA, implementing the EIA Directive as discussed above. Amendments included the introduction of a requirement to describe the likely significant effects resulting from the impact of a Proposed Development on climate and the vulnerability of a Proposed Development to climate change.

Infrastructure planning - environmental impact assessment regulations (2017)⁷⁶

13.6. The Regulations require: "A description of the likely significant effects of the project on climate (for example the nature and magnitude of GHG emissions) and the vulnerability of the project to climate change."

Climate change act 2008 (2050 target amendment) order 2019

- 13.7. The UK passed legislation that introduced the world's first long term legally binding framework to tackle the risks posed by climate change. The Climate Change Act 2008⁷⁷ (hereafter referred to as the 'Act') created a new approach to managing and responding to climate change in the UK, by:
 - Setting ambitious, legally binding reduction targets,
 - Taking powers to help meet those targets,
 - Strengthening the institutional framework,
 - Enhancing the UK's ability to adapt to the impacts of climate change, and
 - Establishing clear and regular accountability to the UK Parliament and to the developed legislatures.
- 13.8. The Act requires the UK Government to produce a UK Climate Change Risk Assessment (CCRA) every five years that sets out the UK Governments position on current and future risks to and opportunities for the UK from climate change. The latest CCRA, 2022⁷⁸, states that: "The government accepts that climate hazards will cause increasing threats to our supply chains through our infrastructure and transport routes. Consideration will need to be given to the potential vulnerabilities for the transport system including rail, roads, ports and airports." (Priority risk area 5, page 31).
- 13.9. In addition to the CCRA, the Climate Change Act also requires the UK government to produce a National Adaptation Programme (NAP). The NAP covers England, while the devolved administrations produce their own programmes and policies. The Act also gives powers to the UK Government to require certain organisations, public bodies and statutory undertakers, to report on how they are adapting to climate change. The Adaptation Sub-Committee of the Climate Change Committee provides advice to, and scrutiny of, the Government's adaptation work.

⁷⁵ Town and Country Planning Environmental Impact Assessment (EIA) Regulations 2017 (as amended) Available at: https://www.legislation.gov.uk/uksi/2017/571/contents/made

⁷⁶ https://www.legislation.gov.uk/uksi/2017/572/regulation/1/made

⁷⁷ UK Government (2008). Climate Change Act 2008 (online). Available at: http://www.legislation.gov.uk/ukpga/2008/27/contents

⁷⁸ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1047003/climate-change-risk-assessment-2022.pdf

National planning policy framework

- 13.10. At a national level, the UK Government published an update to the National Planning Policy Framework (NPPF) in September 2023⁷⁹. The NPPF supersedes previous national planning policy guidance (PPGs) and planning policy statements (PPSs). The NPPF summarises in a single document the Government planning policies that contribute to radical reductions in GHG emissions, minimise vulnerability and improve resilience.
- 13.11. The NPPF states that "Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure" (paragraph 153).

Regional and local

Cambridgeshire county council's climate change and environment strategy (2022⁸⁰)

- 13.12. Cambridgeshire County Council declared a Climate Emergency in 2019. This strategy document sets out actions that answer how the Council must tackle the climate emergency. It provides a framework to enable the inclusive, dynamic and largescale change needed in Cambridgeshire in the coming years.
- 13.13. A key part of the vision for the strategy is to make communities more resilient to the impacts of climate change and the strategy specifically includes an objective to create "resilient infrastructure that works in adverse weather and protects our communities by 2045".

Greater Cambridge local plan⁸¹

13.14. South Cambridgeshire District Council declared a climate emergency in November 2019⁸². In this they pledged to ensure the new Greater Cambridge Local Plan fulfilled its role in ensuring new development can adapt to the changing climate. The first proposals for the plan which is yet to be published in full include an aim to ensure development is resilient to current and future climate risks.

Other relevant policy, standards and guidance

- 13.15. The principal standard followed by this scoping report is National Highways DMRB Guidance LA 114 for assessing climate in sustainability and environmental appraisal⁸³. This sets out the requirements for assessing and reporting the effects of climate on highways (climate change resilience and adaptation), and the effect on climate of greenhouse gas from construction, operation and maintenance projects.
- 13.16. Other guidance that has been considered is listed below:

⁷⁹ Department for Levelling Up, Housing & Communities (2023) National Planning Policy Framework (NPPF). Available at:

https://assets.publishing.service.gov.uk/media/65a11af7e8f5ec000f1f8c46/NPPF_December_2023.pdf

⁸⁰ https://www.cambridgeshire.gov.uk/residents/climate-change-energy-and-environment/climate-change-and-environment-strategy

⁸¹ https://consultations.greatercambridgeplanning.org/greater-cambridge-local-plan-preferred-options/greater-cambridge-2041

⁸² https://www.scambs.gov.uk/climate-emergency-and-nature/policy-and-strategies/what-we-are-doing-to-tackle-climate-change-in-south-cambs/

⁸³ National Highways, (2021). Design Manual for Roads and Bridges (DMRB) LA114-Climate. Available at:

https://standardsforhighways.co.uk/search/d1ec82f3-834b-4d5f-89c6-d7d7d299dce0

- National Highways, Preparing for Climate Change on the Strategic Road Network third adaptation report under the Climate Change Act (2022)⁸⁴. The report identifies key areas of risk along with associated standards, guidance, monitoring, data, pilot projects and research to address them,
- National Highways Environmental Sustainability Strategy (2023)⁸⁵,
- BSI, PAS 2080 Carbon Management in Infrastructure⁸⁶,
- European Commission Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment⁸⁷,
- European Commission Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report⁸⁸, and
- IEMA, (2020); Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation⁸⁹.

Scoping assessment methodology

Study area

13.17. In accordance with Section 3.25 of DMRB LA 114, the study area for the climate vulnerability assessment incorporates the construction footprint of the Proposed Scheme and all potential environmental receptors that could be impacted by the Proposed Scheme. The temporal scope of the study is, in accordance with Section 3.31 of DMRB LA 114, taken as the lifespan of the project (60 years).

Assessment method

13.18. The scoping assessment for climate vulnerability follows the methods set out in DMRB LA114.

Data sources

- 13.19. The climate vulnerability assessment presented in the ES will use information from the Meteorological Office (Met Office) to describe the current climate in the River Basin in which the proposed development is situated. Specifically, the Met Office's standard average data tables will be used, they show the latest set of 30-year averages covering the period 1981-2010. Context to this will be provided by including comparison to the equivalent national dataset (UK minimum, average and maximum temperatures). Data will also be presented from the closest long running meteorological station (met station) to describe the current climate.
- 13.20. Climate projections will be presented in the ES from the United Kingdom Climate Projections 2018 (UKCP18). These projections have been developed by the Met Office Hadley Centre Climate Programme which is supported by the Department of Business, Energy and Industrial Strategy (BEIS)

andmedia/insights/brochures/pas_2080.pdf

⁸⁴ https://nationalhighways.co.uk/media/z1ndodqx/preparing-for-climate-change-on-the-strategic-road-network.pdf

⁸⁵ https://nationalhighways.co.uk/media/g5yfcl3m/nh-environmental-sustainability-strategy_final_020523.pdf

⁸⁶ BSI, PAS 2080 Carbon Management in Infrastructure. Available at: https://www.bsigroup.com/siteassets/pdf/en/insights-

⁸⁷ European Commission (2013). Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment. Available at: https://ec.europa.eu/environment/eia/pdf/EIA%20Guidance.pdf

⁸⁸ European Commission (2017). Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report. Available at: https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf

⁸⁹ IEMA (2020). Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation. Available at:

https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020

and the DEFRA. In accordance with LA114 the scenario presented will be Representative Concentration Pathway (RCP) 8.5, a high emissions scenario. This is a Greenhouse Gas (GHG) concentration trajectory under which it is assumed that emissions continue to rise throughout the 21st Century. There is considerable uncertainty regarding if, how far and how quickly emissions will be reduced in the future. This precautionary approach ensures that the mitigation proposed will be robust even if greenhouse gas emissions do not reduce.

Assumptions and limitations

- 13.21. The climate vulnerability assessment will provide a broad, high-level indication of the potential impacts of climate change on the Proposed Development based on professional judgement.
- 13.22. The climate projections used will be from UKCP18. The UKCP18 projections do not provide a single precise prediction of how weather and climate will change years into the future. Instead UKCP18 provides ranges that aim to capture a spread of possible climate responses. This better represents the uncertainty of climate prediction science. It should also be noted that the level of uncertainty of the projections is dependent on the climate variable, for example, there is greater confidence around changes in temperature than there is in wind. In the climate vulnerability assessment this is considered when assessing the likelihood of impacts.
- 13.23. Other key caveats and limitations of UKCP18 data are presented on the Met Office website⁹⁰.

Baseline conditions

Current climate

- 13.24. The Met office regional climate summary for Eastern England⁹¹ is summarised below.
- 13.25. The mean annual temperature over Eastern England varies from around 9.5 °C to just over 10.5 °C. Variations in temperature depend on both altitudes, with a decrease of about 0.5 °C for each 100 metres increase in altitude, and proximity to the coast. Over the UK the mean annual temperature ranges from about 7 °C in Shetland to over 11 °C in the extreme south-west of England and the Channel Islands.
- 13.26. January and February are the coldest months with mean daily minimum temperatures across the region close to 1 °C. They range from just above 0 °C on the Wolds to 2 °C or a little higher near the coast.
- 13.27. 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. A noteworthy feature is that many of the UK maximum temperature records are held by met stations in Eastern England. The highest known temperature recorded in the area was 37.3 °C at Cavendish on 10 August 2003 and 36.9 °C was recorded that day at Cambridge Botanic Garden and 36.5 °C there on 3 August 1990. The highest UK temperature stands at 40.3 °C at Coningsby (Lincolnshire) (approx. 75 miles north of the Site).
- 13.28. Across most Eastern England 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 Wolds. Although rainfall is generally low, there have been

⁹⁰ http://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-guidance---caveats-and-limitations.pdf

⁹¹ https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/weather/regional-climates/eastern-england_climate-met-office.pdf

some noteworthy severe storms. These include 25 to 26 August 1912 when over 100mm was recorded in Norfolk causing damage to roads and bridges, with a maximum of 205mm at Brundall, east of Norwich. On 1 September 1994, 147mm was recorded in only a few hours at Ditchingham near Bungay in Suffolk, causing transport disruption and significant flooding. The highest recorded daily rainfall total in the UK was 279mm at Martinstown in Dorset on 18 July 1955.

13.29. Eastern England is one of the more sheltered parts of the UK, since the windiest areas are to the north and west, closer to the track of Atlantic storms. Much of East Anglia and Lincolnshire has no more than 2 days of gale each year, but exposed coasts average about 5 gales each year. Coastal areas of east Yorkshire and Humberside average about 10 days of gale a year. Two particularly noteworthy gale events occurred in January 1976 and October 1987. On 2 January 1976 a depression moved across Scotland to the North Sea causing storm force winds that particularly affected the north, east and Midland areas of England. Gusts exceeding 90 knots were reported in East Anglia and sea walls were breached at Walcott in Norfolk and Cleethorpes on Humberside causing extensive damage. The 'Great Storm' of 15-16 October 1987 caused widespread damage across south-east England. The strongest gust recorded in Eastern England was 87 knots at Shoeburyness (Landwick) in Essex.

Projected climate

- 13.30. The Intergovernmental Panel on Climate Change (IPCC) has confirmed in its Assessment Reports that the anthropogenic influence on the climate system is clear and growing, with impacts observed across all continents and oceans.
- 13.31. According to an ongoing temperature analysis by NASA⁹², Earth's temperature has risen by an average of 0.06°C per decade since 1850, with the rate of warming since 1982 occurring three times as fast at 0.20 °C per decade. The ten warmest years in historical record have all occurred between 2014 and 2023, with 2023 being the warmest year since global records began in 1850.
- 13.32. UKCP18 projects greater chance of hotter, drier summers and warmer, wetter winters with more extreme weather and rising sea levels. A detailed future baseline specific to the study area will be presented in the ES as described in Section 13.2.3.

Potential impacts

Construction

- 13.33. The climate of the study area has already changed from its natural state, as a result of climate change. However, the Proposed Scheme's construction is not expected to be so far in the future that the climate will notably change further prior to construction. The construction of the proposed development is therefore not expected to be affected by slow onset changes to the study areas average baseline climate conditions.
- 13.34. If construction coincides with extreme weather event(s) such as drought or storms there may potentially be construction impacts, for example extreme weather could create unsafe working conditions that delay the construction programme (e.g. stopping or slowing construction activities/processes), preventing or reducing access to the site (e.g. due to flooding) or disrupting supply chains.

⁹² NOAA. (2023) *Climate change: Global Temperature* Available at: https://www.climate.gov/news-features/understandingclimate/climate-change-globaltemperature#:~:text=According%20to%20NOAA's%202020%20Annual,more%20than%20twice%20that%20rate

Operation

- 13.35. Changes to the climate could affect the Proposed Development, for example damaging assets that are exposed to climate hazards (flooding, drought, storms etc.) or changing the way the development operates (e.g. creating dangerous driving conditions).
- 13.36. Projected changes to the study area's climate could also impact (e.g. intensify) the effects considered by the other topics in this scoping report resulting in additional or worse effects than considered in the other topic assessments.

Proposed scope of ES

Scoped in

- 13.37. Potential operational impacts on asset receptors (including their operation, maintenance and refurbishment) and end users (e.g. members of the public, commercial operators etc.) that are scoped in for further assessment include:
 - Hotter summers could damage materials (rutting, shrinkage and expansion) increasing maintenance requirements and associated traffic disruption,
 - Hotter summers could reduce the asset lives of structures (over expansion and buckling) increasing maintenance requirements and associated traffic disruption,
 - Drier summers could cause soil instability (intensify and extend soil moisture deficits and impact groundwater levels and earth pressures) increasing maintenance requirements and associated traffic disruption,
 - Hotter temperatures could dry out soils and so increase erosion. This may cause sedimentation within the Scheme's drainage infrastructure which reduces its drainage capacity, therefore increasing the risk of flooding causing traffic disruption. Additional maintenance work to prevent flooding may also cause traffic disruption, and
 - Drier summers could damage the Scheme's landscaping. Moreover, hotter drier summers could more regularly create wildfire conditions. Fires would primarily affect landscaping but could potentially also affect other scheme assets e.g., roadside furniture. Emergency responses and more regular preventative maintenance may cause traffic disruption.
- 13.38. The frequency of extreme weather impacts on electrical equipment may increase, for example lightning strikes may become more regular and extreme, humidity increases and/or hot temperatures become more common causing thermal over loading of circuits. Repair and maintenance may cause traffic disruption.
- 13.39. In addition to the above listed impacts that are scoped in for a risk assessment an In-combination Climate Change Impacts Assessment (ICCI) that will consider the extent to which climate change could exacerbate or ameliorate the proposed developments potential effects on environmental receptors that are scoped in by each of the other disciplines in this report is also scoped in.

Scoped out

Construction

13.40. All climate vulnerability impacts during construction are scoped out of further assessment. They would instead be managed through the CEMP and addressed as required by the relevant topics within the EIAR. Appropriate construction controls will therefore be identified by other topics to deal with any

potential construction climate vulnerabilities, e.g. the water chapter considers flood risk during construction with consideration of extreme weather.

Operation

- 13.41. The following climate vulnerability impacts are scoped out as they would affect the regional road network with or without the proposed Scheme:
 - Warmer winters could reduce winter maintenance and associated traffic disruption (less road salting and freeze thaw damage),
 - Heavier rain and wetter winters could cause potholes (by weakening the soil beneath the carriageway) increasing maintenance requirements and associated traffic disruption,
 - Milder winters could reduce freeze thaw erosion which could damage underground assets, this reduces maintenance requirements and associated traffic disruption,
 - Warmer winters could improve winter driver safety and so reduce traffic disruption caused by accidents,
 - Hotter summers could increase vehicle breakdowns and so increase the traffic disruption they cause, and associated accidents,
 - Hotter summers could increase accident rates and so increase traffic disruption,
 - More heavy rain and wetter winters could reduce driver safety and so increase traffic disruption associated with accidents, and
 - Storms and high winds could reduce driver safety and so increase traffic disruption associated with accidents.
- 13.42. The following impacts are scoped out of further assessment in the Climate Vulnerability Chapter of the EIAR because they are already scoped in for further assessment, that will include consideration of climate change, by other chapters in this Scoping Report:
- 13.43. Heavier rain, wetter winters and sea level rise increase the risk of flooding. Flooding and additional maintenance requirements both cause traffic disruption.

Assessment method

- 13.44. Where the climate change impact on project receptors is potentially significant, a risk assessment will be undertaken in the ES. The method for this assessment will follow the guidance set out in DMRB LA 114 and will be informed by best practice climate assessment approaches, literature and professional judgement.
- 13.45. In summary, there will be four stages to the climate vulnerability assessment:
 - Stage 1 Identify the hazards and receptors,
 - Stage 2 Assess the likelihood of impacts on each receptor,
 - Stage 3 Assess the consequence of impacts for each receptor and
 - Stage 4 Determine the significance of each impact based on a combination of the likelihood of an impact occurring and the consequences of that impact.

14. Climate effects

Legislation and policy

- 14.1. This assessment has been undertaken with consideration of the requirements of key legislative and policy documents. A summary of the relevant legislation, planning policy and technical guidance relevant to air quality, is provided below.
 - National Planning Policy Framework (NPPF) 2023,
 - UK Net Zero Strategy,
 - Construction 2025 (UK Government, 2013),
 - Cambridgeshire County Council (CCC) Climate Change and Environment Strategy 2022,
 - South Cambridgeshire District Council Zero Carbon Strategy,
 - South Cambridgeshire District Council Local Plan,
 - Paris Agreement (2015),
 - Climate Change Act (2008) as amended in 2019,
 - IEMA 'Assessing Greenhouse Gas Emissions and Evaluating their Significance (GHG Guidance) (2022), and
 - PAS 2080:202314 Carbon Management in Buildings and Infrastructure.

Scoping assessment methodology

14.2. A desk-based scoping assessment has been carried out. The study area comprises the emission of GHG resulting from the Scheme in its construction and operation phases. The study area is not limited to the geographic extent of the Scheme itself, as many emissions will result from upstream, downstream, and off-site activities such as materials production. In operation, the study area is consistent with the affected road network defined in the traffic model.

Baseline conditions

- 14.3. This chapter provides an assessment of the effects of the Scheme on climate. It addresses the climate change requirements outlined in the EIA Regulations, which state that the assessment should consider the impact of the project on climate by the emission of greenhouse gases.
- 14.4. The scope of analysis used to identify the climate effects of the Scheme comprises an assessment of the construction and operation phases. It identifies the study area, describes the methodology, presents baseline conditions, identifies potential impacts on climate, and presents suggested mitigation measures during construction and operation. The approach taken aligns with the guidance set out in PAS 2080:2023 Carbon Management in Buildings and Infrastructure and IEMA Guide: Assessing Greenhouse Gas Emissions and Evaluating their Significance.
- 14.5. The Scheme has the potential to affect the Earth's climate by increasing the emissions of greenhouse gases (GHGs) into the atmosphere, during construction and throughout its operational life. The Earth absorbs energy from the sun and re-emits it as thermal infrared radiation. GHGs in the atmosphere absorb this radiation, preventing it from escaping into space. The higher the concentration of GHGs, the more heat energy is retained, and the higher global temperatures become. Due to human activities, the

concentration of GHGs in the atmosphere has increased dramatically, with carbon dioxide (CO₂) concentrations now exceeding 400 parts per million1, leading to global warming. This leads to myriad indirect impacts as the climate responds to the increased atmospheric temperature.

- 14.6. The UK has made commitments to tackle the root cause of climate change by reducing GHG emissions, as well as to increase the resilience of development and infrastructure to the changing climate. The Climate Change Act 2008 (as amended in 2019) sets a target to reduce net GHG emissions by at least 100% from 1990 levels by the year 2050.
- 14.7. The effective assessment and management of impacts on climate offers the opportunity to reduce the impact of projects on climate by minimising the magnitude of GHG emissions as far as possible.
- 14.8. The UK's total GHG emission for the year 2022 is 406.2 million tonnes of CO2e, 3.5% less than 2021. The transport sector was the largest emitting sector of UK greenhouse gas emissions in 2022, emitting 28% of all emissions. Provisional figures have been released for 2023 where the UK has emitted 384.2 million tonnes of CO2e, 5.4% less than 2022.
- 14.9. The UK has in place carbon budgets for five-year periods up to 2037. The UK is currently in the fourth carbon budgetary period (2023-2027), the budget for which is 1,950 MtCO2e. The UK cannot legally emit more greenhouse gases than this within the budgetary period. The carbon budget for the 2028–2032 budgetary period is 1,725 MtCO2e, and the budget for 2033-2037 is 965 MtCO2e. Whilst budgets are not set beyond this, there is a legal requirement for the UK to reach 0 MtCO2e by 2050 relative to the 1990 baseline. The UK also has obligations under the Paris Agreement and consideration will be given to whether the Scheme will have any effect on the UK's legal obligation in respect of its declared net contribution under the Paris Agreement.
- 14.10. Scheme-specific baseline emissions equate to emissions in the Opening Year (2026) and Design Year (2041) assuming the Proposed Scheme was not constructed (the Do-Minimum scenario). There are no construction emissions associated with the Do-Minimum scenario. Scheme-specific baseline emissions data are not currently available, however will be presented in the ES. At present, the project and surrounding area used for agricultural activities, emissions from the agricultural activities are less than the emissions from the transportation, as per the 2022 UK emissions it is half of the transport emissions.

UK carbon budget period	UK carbon budget level
1st carbon budget (2008 to 2012)	3,018 MtCO ₂ e
2nd carbon budget (2013 to 2017)	2,782 MtCO ₂ e
3rd carbon budget (2018 to 2022)	2,544 MtCO ₂ e
4th carbon budget (2023 to 2027)	1,950 MtCO ₂ e
5th carbon budget (2028 to 2032)	1,725 MtCO ₂ e
6th carbon budget (2033 to 2037)	965 MtCO ₂ e

Table 14-1 - UK government carbon budgets

Potential impacts

14.11. The Scheme will generate emissions during the construction period. These will be predicted and assessed against the trajectory to net zero advised by the IEMA guidance. It is not expected that these would give rise to any likely significant effects on climate

- 14.12. During operation, there is the potential for an increase or a decrease in emissions, depending on the balance between additional vehicles which may be added to the road network compared with improvements in traffic flow. However, it is likely that these will contribute only a small percentage of the UK's overall carbon budgets and it is therefore unlikely that any of the options would generate a significant effect on climate.
- 14.13. However, mitigating effects on climate is still an important issue, and the Scheme design will take climate effects into consideration.

Project stage	Lifecycle stage	Potential sources of GHG emissions (not exhaustive)	Included within assessment?
Construction A1-3 materials Embodied emissions from the S extraction and processing of raw materials		Scoped in	
	A4 Transportation	Activities from transportation of materials and staff to site.	Scoped in – Material transportation. Scoped out – Staff travel. Limited information is known about the number of staff required on site during construction and where they will travel from.
	A5 Construction processes	Emissions from the use of plant and machinery on site.	Scoped in
	Land use change	Emissions from the loss of vegetation, habitats and soil.	Scoped in
Operation	B1 Use	Emissions from the use of vehicles across the Scheme.	Quantitative assessment of road user emissions derived from traffic modelling, in line with LA 105.
	B2 – 5 Maintenance, repair, replacement, refurbishment	Emissions from the replacement of worn and damaged materials	Scoped in
	B6 Operational Energy use	Emissions from street lighting, heating and lighting in buildings.	Scoped in
	B7 Operational Water use	Emissions from the consumption of water in buildings.	Scoped out – Operational water consumption is anticipated to be negligible.
	Land use and forestry	Ongoing land use emissions, sequestration from new or improved habitats.	Scoped in

Table 14-2 - Sources and lifecycle stages for scheme GHG emissions

Proposed scope of ES

Scoped in

14.14. Table 14-2 states the potential impacts that will be scoped in for further assessment.

Scoped out

14.15. Table 14-2 states the potential impacts that have been scoped out for further assessment.

Assessment method

Construction phase emissions

- 14.16. Construction emissions calculations will be carried out by multiplying activity data by an emission factor associated with the activity being measured. Activity data is a quantitative measure of an activity that results in emissions during a given period of time, (e.g. kilometres driven, kWh electricity consumed, tonnes of waste sent to landfill). An emission factor is a measure of the mass of emissions relative to a unit of activity.
- 14.17. Proposed Scheme emissions will be quantified by calculation, using project data and material quantities from the design for the Proposed Scheme and relevant carbon conversion factors.
- 14.18. AtkinsRéalis' Carbon Knowledgebase tool (hereafter referred to as the 'Carbon Tool') will be used to calculate the construction phase emissions. The Carbon Tool contains a detailed library of calculation formulae and over 1,000 emissions factors from authoritative sources such as the Inventory of Carbon and Energy (ICE, versions 1.6(a), 2.0 and 3.0), the Department for Energy Security and Net Zero Greenhouse Gas Reporting Conversion Factors 2023, and the EMEP/CORINAIR Emission Inventory Guidebook.
- 14.19. The Carbon Tool uses a range of pre-programmed materials data (e.g. mass) and carbon factors to calculate an itemised and overall emissions total. Materials emissions factors are sourced from the Bath Inventory of Carbon and Energy (ICE) database v2 and v3. These factors are given as tonnes of CO2e per tonne of material (written as tCO2e/t). All energy and waste factors are taken from Government Carbon Factors 2021. Where an input unit is not required as a mass, such as numbers or metres of a product, a conversion factor is applied. This is based upon the mass of a product calculated using suppliers' specifications and technical drawings.

Operational phase emissions

14.20. Operational emissions are calculated separately from the Carbon Tool, which is focused specifically on construction phase emissions. Road user carbon emissions have been calculated using the National Highways speed band emissions factors based on Defra's Emissions Factors Toolkit (v11) November 2021. These emission rates were the latest available at the time the emissions modelling was undertaken and include assumptions about future fleet mixes. The calculations used traffic data from the Scheme specific traffic model and considered the full road network included in this traffic model, for the opening and design years (2026 and 2041 respectively), and over the 60-year appraisal period. The operational data is split into 'Direct' and 'Indirect' data. Direct data is associated with the road user carbon of the roads and the vehicles using it, whereas indirect road user is associated with the charging of batteries for the electric fleet.

- 14.21. The anticipated operational energy requirements of the Proposed Scheme will be acquired from the proposed design of both the street lighting and energy required at the Park & Ride hub. The anticipated energy requirements will be modelled over the 60-year appraisal period using the Greenbook's18 predicted carbon factors for energy consumption. This provides the anticipated emissions from energy generation and consumption across the UK up until 2100.
- 14.22. The Proposed Scheme will require maintenance due to standard wear and tear from operational use (road-users) as well as possible damage from road traffic collisions and external events (e.g. flooding). Whilst it is not possible to identify when the latter occurs, a regular maintenance programme will take place to manage the former. Information from the design will be used to identify the anticipated replacement and maintenance of the Proposed Scheme over a 60-year period to calculate the anticipated emissions. Emissions from design elements that will require partial or full replacement will be calculated via the same method used to calculate those elements during the construction phase.

Calculating Land-Use Change (LUC) emissions and removals

- 14.23. LUC plays an important role in the balance and transfer of carbon through global carbon cycles. Carbon is stored in and exchanged between the atmosphere and biosphere, which includes plants and soils. When humans alter land-use, they impact the carbon stocks held within the biosphere and the exchange of carbon with the atmosphere. These changes can have adverse climate change impacts, but also provide key mitigation opportunities by removing carbon from the atmosphere and storing it in terrestrial biospheres.
- 14.24. The construction and operation of the Scheme has the potential to:

Change and disturb land-uses, leading to the release of carbon dioxide (CO²) into the atmosphere from loss of vegetation and changes to soils.

Create and enhance carbon stocks in vegetation and soils, encouraging increased removals of greenhouse gases from the atmosphere.

- 14.25. Baseline calculations have been calculated by establishing annual sequestration or emission rates per hectare of each habitat present on site, sourced from literature. These rates were then multiplied by the total area for each habitat, derived from the Phase 1 habitat survey, which provided the area of land-use type which would be lost or disturbed by construction work for Scheme. The results provided the annual sequestration or emission rate of each habitat, assuming it remains the same in future. The totals for each habitat type were then summed to give the total emissions, and multiplied by 60 (number of years), to produce the total for the operational appraisal period.
- 14.26. The same data were used to derive the emissions for the operational assessment as a result of the lost sequestration over the 60-year period. It should be noted that this is a conservative approach, as it assumes that land-uses would continue to sequester carbon in their current state. In reality, once a land-use is established (this takes different lengths of time depending on the land-use and management methods), it is likely to be neutral in terms of its emissions / removals, i.e., the two will balance each other out in any given year. A conservative approach of including projected sequestration for existing land-uses has been taken to prevent an under-estimation of the impact of any of the route options. Habitat replacement/ creation as part of the Scheme may mitigate any lost sequestration from the removal of habitat over the 60-years period.
- 14.27. Carbon stock lost during construction as a result of the removal of habitats and have been calculated by estimating the change in carbon stocks held within the different land-use types within the study area for the Scheme, using the information derived from the Phase 1 habitat survey. These areas were multiplied by typical carbon stocks per hectare for that land-use type to give a total carbon stock loss (in tonnes of carbon). This loss in carbon was converted into emissions of CO2 (multiplying tCO2 by (44/12) to give tCO2).

14.28. A 'value-transfer' approach was taken to ascribing carbon stock data, whereby data from existing studies into similar land-use types were applied to the study area. Based on the habitats present, the data sources used included the following:

Natural England (2021) Carbon storage and sequestration by habitat: a review of the evidence (second edition), Natural England Research Report NERR094.

Assessment of significance

- 14.29. The emissions calculated for the Do Something scenario of the Proposed Scheme will be compared against the Do Minimum scenario baseline for the assessment years. The difference between these emissions can be considered to be the impact of the Proposed Scheme.
- 14.30. The method of assessment of whether the calculated GHG emissions from the Proposed Scheme will have a significant effect on climate will be determined in accordance with IEMA's 2022 guidance. There is no legal limit for GHG emissions for any one development. The guidance suggests that the level of significance should be related to how a project contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050, as stated in section 6.2 of the guidance: "The crux of significance...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 (or other date as defined in targets for devolved administrations)."
- 14.31. The IEMA 2022 guidance document notes that practitioners need to consider whether project GHG emissions are aligned to achieving net zero by 2050, using the science based 1.5°C trajectory. Where this is not the case, then the effects are judged to be moderate adverse or major adverse, and thus can be classed as a significant effect. Projects that are compatible with the trajectory can have their effects classed as minor adverse, or where the project achieves GHG emission mitigation that goes beyond the trajectory, negligible. In both cases, the effects are not considered to be significant. Projects that result in GHG emissions being avoided or removed from the atmosphere can be considered to have a significant beneficial effect. The IEMA 2022 guidance notes that the UK 2050 target for net zero and interim carbon budgets are considered by the UK Climate Change Committee to be compatible with the required trajectory.
- 14.32. The percentage contribution of the Proposed Scheme to the national carbon budgets will be determined in accordance with IEMA 2022 guidance on significance. Although the IEMA guidance suggests that, for context, it would be good practice to consider a project's GHG emissions in relation to sector-based targets, there are currently no sector budgets for highways or any other sector provided by the UK Climate Change Committee, the body responsible for developing the UK and devolved administrations' carbon budgets. Sector-based targets are therefore not considered in accordance with current UK legislation.

Mitigation measures

14.33. Design and mitigation should be carried out in line with the principles set out in PAS 2080:2023 'Carbon Management in Buildings and Infrastructure'. Emissions should be mitigated by applying PAS 2080:2023 carbon reduction hierarchy: Avoid, Switch and Improve. As a project progresses, the opportunity to make significant carbon reductions reduces, and the cost and disruption associated with those changes increases. It is therefore important to plan to integrate these opportunities from this early project stage.

Avoid / prevent

- 14.34. The opportunity for the greatest reduction in carbon emissions is typically found right at the beginning of a project, when the strategy for meeting objectives is decided. Materials and construction processes can be reduced to great effect by changing the approach to the problem and reducing the amount of hard engineering required.
 - Maximise potential for re-using and / or refurbishing existing assets to reduce the extent of new construction required,
 - Explore alternative lower carbon options to deliver the project objectives (i.e. shorter route options with smaller construction footprints).\,
 - Give particular consideration to how materials which are key emission sources can be reduced. Note that if reducing these materials would increase use of another, it will be important to assess whether the net effect is a carbon benefit,
 - Avoid disturbance / removal of existing vegetation and soils as far as possible, to reduce loss of carbon to the atmosphere, and
 - Avoid materials which come in disposable packaging, particularly that which cannot be recycled. Work with supply chain to develop alternative packaging and delivery options.

Switch

- 14.35. During design, there is opportunity to use smart engineering solutions to reduce carbon. Key things to consider will be the use of innovative low-carbon materials, and how to set the Scheme up for efficient delivery by design interventions.
 - Apply low carbon solutions (including technologies, materials and products) to minimise resource consumption during the construction, operation, user's use of the project, and at end-of-life,
 - Construct efficiently, using techniques (e.g. during construction and operation) that reduce resource consumption over the life cycle of the project,
 - Specify the use of recycled materials rather than virgin alternatives, for example: recycled aggregate, or
 recycled plastic materials. Note that the benefits of using recycled materials should be weighed against
 potential carbon costs. For example, local virgin material may have a lower overall carbon impact than
 recycled material sourced from a great distance. Design for zero carbon operation. The Scheme should be
 passive (non-energy consuming) where possible, with renewable technologies to supply energy needs
 where not,
 - Design for low-carbon maintenance. Preferentially select long-life options which will require as little maintenance and infrequent replacement as possible,
 - Design with deconstruction in mind, taking a 'circular' approach where all elements could be disassembled and materials reused at end of life. Consider the Scheme as a 'material bank' which will be a source of materials rather than waste at the end of its life,
 - Work with the supply chain to understand the carbon impact of products / materials and challenge them to reduce this,
 - Recycle waste rather than sending to landfill,
 - Specify materials sourced as locally as possible, to reduce transport. During design, consider whether elements which cannot be sourced locally can be designed out or a different solution used,
 - Use more sustainable means of transporting materials to site,
 - Use local workforce to reduce emissions from commuting and business travel. Make use of video conferencing and other digital technologies to reduce vehicle trips,
 - Mandate preparation of a construction workforce travel plan which maximises vehicle sharing and reduces trip numbers. Encourage the contractor to make use of smart scheduling software,
 - Use renewable energy onsite, for example solar lighting, and fuel cell electric welfare units,

- Mandate use of electric and other low-carbon construction plant as standard on the Scheme. To make best
 effect of this measure, plant should be charged from renewable sources. Diesel should be used as a last
 resort when no renewable option is available, and
- Mandate use of electric vehicles (EVs) to transport workers and provide EV charging points at site. As with construction plant, electricity should be generated from renewable sources.

Improve

- 14.36. After addressing the two steps above, the project will identify, assess and integrate measures to further reduce carbon through offsetting or sequestration, on-site or off-site.
 - Maximise vegetation cover to enhance carbon sequestration. Give careful thought to the species selected, as sequestration rates vary, and also to how vegetation will be managed on an ongoing basis. Vegetation which requires frequent intervention (grass cutting, hedge trimming) may generate more emissions than it sequesters,
 - Install renewable energy technologies which exceed the consumption requirements of the Scheme and feed into the National Grid to offset emissions, and
 - Use wood for permanent design elements. This can provide a long-term store for carbon in the built environment. Sustainable procured wood from local sources should be procured where possible.
 - Once opportunity to reduce and sequester carbon emissions within the development boundary has been maximised, consideration may need to be given to financing third-party projects. In order of preference, these could be:
 - Collaborative approach: Work with the local Wildlife Trust, nature partnerships and other groups trying to achieve similar goals, to support local projects by incorporating them into the development,
 - Green funds: Provide funding for local third-party landowners to plant and manage woodland and other beneficial land-uses for sequestration and implement renewable energy technologies, and
 - External offset: Purchased through external offset companies, these might include renewable energy projects, energy efficiency projects, landfill gas recovery, and community projects.

15. Major accidents and hazards

Introduction

- 15.1. Schedule 4, paragraph 8 of the EIA Regs requires the ES to include:
- 15.2. '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...'

Potential for major accidents and hazards

15.3. IEMA guidance⁹³ provides a useful method for scoping major accidents and disasters in or out of EIA through the use of a process flow diagram. The process starts by asking the three questions set out in Table 15-1. If any of the responses are "yes", then the assessment proceeds to the next stage in the

⁹³ Institute of Environmental Management and Assessment (IEMA), 2020, Major accidents and disasters in EIA, A primer,

process flow. If the responses are "no" to all of the three questions, then accidents and major disasters can be scoped out of the EIA because there is no potential for significant effects to arise.

Process flow questions	Responses specifically for the Scheme
Is the Scheme a source of hazard that could result in a major accident and / or disaster?	No
Does the Scheme interact with any external sources of hazard?	No
If an external man-made or natural hazard occurred, would the presence of the Scheme increase the risk of significant environmental effect to an environmental receptor occurring?	No

15.4. As the responses for the Scheme against each of the initial questions in the process flow are negative, there is no potential for significant environmental effects arising in relation to accidents and major disasters. It is proposed to scope accidents and major disasters out of the EIA.

16. Cumulative effects

Introduction

- 16.1. The cumulative effects assessment considers the environmental effects of the Scheme in combination with the environmental effects of other development projects. A cumulative effect could arise where these other developments are predicted to impact the same environmental receptors as could be impacted by the Scheme.
- 16.2. As the scoping assessment has identified the potential for significant environmental effects to arise from the Scheme, there is a potential for significant cumulative effects. It is therefore proposed to scope in cumulative effects for detailed assessment in the EIA.

Planned projects

- 16.3. The applicant is aware of a number of permitted projects which have either been consented, or are planned, but are yet to be consented, and there is a potential for cumulative effects to arise. These include the following:
 - A10 junctions and dualling project,
 - Mere Way,
 - New Town North of Waterbeach (up to 11,000 homes),
 - North East Cambridge (up to 17,000 new homes and 14,000 new jobs) which includes:
 - Redevelopment and intensification of existing employment centres in NEC (Cambridge Science Park, Cambridge Business Park, Trinity Hall Industrial Estate, St John's Innovation Park).
 - Cambridge Research Park (retail and employment expansion).

16.4. It is requested that CCC confirms this list of projects and identify any other projects they are aware of that could result in significant cumulative effects in the Scoping Opinion.

Proposed ES method

- 16.5. There is no published guidance on undertaking cumulative effects in EIA. Cumulative effects relating to changes in traffic flows across the highway network are normally excluded from the cumulative effects assessment because the traffic modelling already takes these into account, so any air quality and noise modelling is a cumulative effects assessment by default.
- 16.6. The cumulative effects assessment is therefore a qualitative assessment based on professional judgement and reasoned opinion. The assessment is also dependent on the availability of information for the other developments being assessed. If the other developments are consented EIA projects, then sufficient information should be available to undertake a reasonably detailed analysis. However, if the other developments are at an earlier stage in the process (e.g. feasibility studies), or are not EIA developments, information on the environmental effects of the other project could be limited and the cumulative effects assessment will be based on broad assumptions.
- 16.7. The cumulative effects assessment will also consider any in-combination effects on individual environmental receptors from multiple impacts from the Scheme that have been assessed separately in different assessment chapters. This will not include an assessment on human receptors as this assessment will already have been undertaken in the population and human health assessment.

17. Summary of scoping assessment

This section sets out the potential impacts during the construction and operation phase and the details are tabulated in Table 17-1.

Environmental aspects	Phase	Potential impacts	Scoped in or scoped out
Population and	Construction	Impacts to agricultural activities.	Scoped in
Human Health		Impacts to residents due to access blockages.	Scoped in
		Impact to walkway, cycling and equestrian routes due to temporary and permanent diversions.	Scoped in
		Health impacts due to diet and Nutrition due to impacts on agricultural activities.	Scoped out
		Potential health impacts due to construction activities.	
		Relocation due to construction and related health impacts.	Scoped out

Table 17-1 -	Summary	of impacts	and scoping	assessment
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Environmental aspects	Phase	Potential impacts	Scoped in or scoped out
		Health impacts due to climate change and radiation.	Scoped out
		Impacts on community identity, culture, resilience and influence.	Scoped out
			Scoped out
	Operation	New walking and cycling provision & public transport access and improved connectivity.	Scoped in
		Health benefits due to increased employment and improved physical activity due to walking and cycling provision.	Scoped in
		Increase employment in wider are due to a more reliable route.	
		Relocation due to operation and related health impacts.	Scoped in
		Health impacts due to diet and Nutrition due to impacts on agricultural activities.	Scoped out.
		Health impacts due to climate change and radiation during operation.	Scoped out
		Impacts on community identity, culture, resilience and influence.	Scoped out
		Impacts on health and social care services.	
			Scoped out
			Scoped out
Ecology	Construction &	Impacts on sites of international importance.	Scoped in

Ecology	Construction &	Impacts on sites of international importance.	Scoped in
	operation	Impacts on priority plant species within or adjacent to the Site.	Scoped in
		Effects on badgers, bats, breeding & nesting birds, reptiles, great crested newt and other priority mammals.	Scoped in
		Sites of national importance	
		Sites of local importance	Scoped out

Environmental aspects	Phase	Potential impacts	Scoped in or scoped out
		Non-statutory designated sites for nature conservation	Scoped out
		Irreplaceable habitats Hazel dormouse	Scoped out
		Terrestrial invertebrates	Scoped out
			Scoped out
			Scoped out
Landscape	Construction & operation	Impact on openness of greenbelt, effects to landscape and visual amenity	Scoped in
Cultural	Construction & operation	Impacts on the Scheduled Monument, four Listed Buildings and Landbeach Conservation Area.	Scoped in
		Impacts to non-designated assets such as cropmarks during construction.	Scoped in
		Impacts to unknown buried archaeological remains	
		Impacts on the designated assets other than the Scheduled Monument, four Listed Buildings and Landbeach Conservation Area.	Scoped in
		Impacts from direct damage or loss to designated assets within the study area, due to distance offset.	Scoped out
		Impacts to non-designated assets such as cropmarks during operation.	Scoped out

			Scoped out
Water Environment Construction and operation	Construction and	Impacts on surface water quality	Scoped in
	Impacts on surface water hydromorphology	Scoped in	
		Impacts on groundwater levels	Scoped in
		Impacts of works on flood risk	Scoped in

Environmental aspects	Phase	Potential impacts	Scoped in or scoped out
Noise and vibration	Construction	Noise and vibration impact from construction activities	Scoped in
		Noise impacts due to change in traffic flow during construction	Scoped in
	Operation	Noises impacts from the buses traveling along the guided busway	Scoped in
		Noise impacts from the change in traffic flow on the surrounding road network	Scoped in
		Operational vibration from the Scheme	
			Scoped out
Traffic and movement	Construction and operation	Impacts due to construction on Severance, amenities, delay, intimidation, ambience, safety and public transport accessibility.	Scoped in
		Movement and effects due to hazardous loads and their spillage.	Scoped out
Air quality	Construction and operation	Impacts due to the construction dust and construction vehicle emissions.	Scoped in
		Impacts due to the operational vehicle emissions.	Scoped in
Soil, geology and contaminated land	Construction and operation	Temporary and permanent disturbance/ loss of soil during construction	Scoped in
		Effects on bedrock geology and superficial deposits.	Scoped out
		Effects on sensitive or valuable geological features	Scoped out
		Effects from existing sources of land contamination and introduction of new sources of land contamination from the Scheme.	Scoped out
Material resources and waste	Construction and operation	Impacts of the Scheme against the sale of material assets.	Scoped in
		Impacts of wastes arising out of the Scheme against regional waste infrastructure.	Scoped in

operational demand for material assets and operational waste arising.	
Climate Construction and Operational impacts on environmental and Scoped in operation asset receptors and end users, with the exception of potential impacts that would affect the regional road network with or without the proposed Scheme.	
All climate vulnerability impacts during construction.	
Scoped out	
Climate effectsConstruction and operationConstruction and operational emissions due to raw material extraction, transportation, plant and machinery usage, land use change, Scheme maintenance due to damage and operational energy.Scoped inEmissions due to operational water use	

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APPENDICES

Appendix A. Indicative Lighting Locations

A.1. Proposed Lighting Provision Sheet 1 of 4



A.2. Proposed Lighting Provision Sheet 2 of 4



A.3. Proposed Lighting Provision Sheet 3 of 4





A.4. Proposed Lighting Provision Sheet 4 of 4

Appendix B. Cultural Heritage Asset Gazetteer

B.1. Asset Gazetteer

Reference	Name	Designation	Description
1302189	Milestone Half Mile South of Green End Junction and Goose Hall at NGR 484 664	Grade II Listed Building	Milestone. c.1763. Limestone tapering block, painted white with black painted inscription.
1127385	Parish Church of All Saints	Grade II* Listed Building	Parish Church. C13 chancel extended mid C14 and west tower rebuilt, spire late C14, nave arcades and aisle C14.
1178950	The Old Rectory	Grade II* Listed Building	House, formerly the rectory. Early C16, incorporating part of original C14 or early C15 building redesigned with additions in C18 and C19.
1331298	Milton Cottage; Oak Cottage; Plough Cottage	Grade II Listed Building	Three dwellings, formerly a farmhouse. Early C16 and C17. Timber framed and plastered with weather boarding and painted brick. Thatched roofs.
1127382	Tithe Barn, east of number 14 (The Old Rectory)	Grade II Listed Building	Small, thatched timber-framed aisled barn, thought to be late C15 or early C16 date, which has undergone incremental alteration and adaptation in the C18 and C19. Now undergoing roofing repairs.
1006870	Shrunken medieval village of Landbeach	Scheduled Monument	Multi-phase settlement site.
MCR10621	Iron Age to Roman cropmark site, Landbeach	Non-designated Asset	A settlement and trackways of probable Iron Age/Romano-British date are visible on historic aerial photographs as cropmarks and were mapped as part of the East Cambridgeshire Aerial Investigation and Mapping project.
MCR9973	Cropmarks of settlement site, Lime Farm, Landbeach	Non-designated Asset	A settlement site of Iron Age/Romano British date is visible on historic aerial photographs as cropmarks and was mapped as part of the East Cambridgeshire Aerial Investigation and Mapping project.

MCR22591	Former ridge and furrow, Impington	Non-designated Asset	An area of former ridge and furrow was identified during the SW Cambridgeshire NAIS project in 2014. The area extends over an area of c.800m.
MCR15155	RAF Waterbeach	Non-designated Asset	A Second World War Royal Air Force satellite camp is visible on historic aerial photographs and was mapped as part of the East Cambridgeshire Aerial Investigation and Mapping project.
MCR14254	Impington Hall park and garden, Impington	Non-designated Asset	Park and garden, now surviving as farmland once associated with the C16 Impington Hall.
MCR6530	Fossilized bison horn and Palaeolithic axe, Waterbeach	Non-designated Asset	Fossilized bison horn found 4m deep in gault clay, beneath gravel. Other bones also reported. Site revealed when lake was being created for military training.
MCR17527	WWII vehicle depot, Trinity Farm, Milton	Non-designated Asset	A significant part of Trinity Farm was used as a tank storage and servicing depot during WWII, recorded on a 1940 Luftwaffe and 1944 US Army Air Force aerial photographs.

Appendix C. WFD Assessment

18.2. Separate PDF.

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