

# A2AT Gate Two Submission

**Environmental Assessment**

**Anglian Water & Affinity Water**

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Environmental Assessment

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# 1. Introduction

## Purpose of this Report

- 1.1 This Environment Assessment Report (EAR) supports the gate two submission report to the Regulators' Alliance for Progressing Infrastructure Development (RAPID) for the Anglian Water to Affinity Water Transfer (A2AT) Strategic Regional Option (SRO).
- 1.2 The aim of the A2AT scheme is to address long term water deficits in Affinity Water's Central region, with the objective of abstracting available raw water from the Anglian Water region, treating it to potable water standards and delivering to Affinity Water customers in Water Resource Zone 5 (WRZ5). The source of raw water is the proposed South Lincolnshire Reservoir and treated water would be delivered from a starting point at Etton Service Reservoir to the proposed Sibleys Service Reservoir, a new hub in WRZ5.
- 1.3 At gate two, RAPID will make recommendations to Ofwat based on whether the A2AT scheme (and which of its options) should progress through the gated process and, as part of the analysis, RAPID will consider the environmental impacts of the scheme. The purpose of this report is to present the evidence to enable RAPID to reach a conclusion in respect of the environmental impacts and it forms part of a suite of documents supporting the gate two submission.
- 1.4 This report, prepared in line with the gate two guidance issued by RAPID<sup>1</sup>, reviews the environmental assessment work done at gate one and then moves on to describe the development of the preferred option that was selected at gate one into the scheme now submitted for gate two. The report assesses the impact of this A2AT scheme against a variety of environmental factors and also provides reports required by the regulatory process as appendices.

## Environmental Assessment at Gate Two

- 1.5 According to RAPID's guidance, at gate two, the submission should be supported by an annexed initial environment appraisal report that addresses the following:
  - An update of the gate one work where relevant
  - The environmental appraisal work undertaken to date – likely to be at a strategic scale
  - Baseline and analysis – this might include results of monitoring, modelling, environmental surveys, etc.
  - Options assessment, with sufficient detail to allow comparison of options within the solution and identify potential effects (positive and negative) and opportunities
  - Assessment of the effects of the solution, an evaluation of their significance and any cumulative or in-combination effects

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<sup>1</sup> Regulators' Alliance for Progressing Infrastructure Development, April 2022, *Strategic regional water resource solutions guidance for gate two*

- Clear justification as to options within the solution discounted, those taken forward, and the preferred option selected. Where the preferred option is identified, potential environmental effects and opportunities should be discussed
- The appraisal work should include consideration of resilience (e.g., climate change)
- A description of the connection to other assessments (e.g., biodiversity net gain, WFD, natural capital, carbon) and demonstrate how they have been considered within this initial appraisal work
- Development of mitigation and enhancement opportunities
- Any future monitoring requirements of the identified environmental effects and efficacy of any included mitigation measures
- A plan to address uncertainties and data gaps

1.6 Appendices to the report include:

- A Water Framework Directive Assessment
- An Informal Habitats Regulations Assessment
- A Biodiversity Net Gain Assessment
- A Natural Capital Assessment

1.7 The report has been prepared by AECOM Ltd on behalf of Affinity Water and Anglian Water, and also draws on some material from the environmental assessment work completed by Mott MacDonald for gate one and the Concept Design Report<sup>2</sup> prepared by Arup for gate two.

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<sup>2</sup> Anglian Water to Affinity Water Strategic Transfer SRO – A2AT Concept Design Report – July 2022 (Arup).

## 2. Summary of Gate One Assessment

### Introduction

- 2.1 Mott MacDonald undertook the environmental assessment for submission at gate one and the following material is summarised from their report: *Anglian to Affinity Transfer Strategic Regional Option - A2AT Environment Assessment Report*.

### RAPID Gate One Submission

- 2.2 Four options were assessed for the gate one submission. The options are the following:

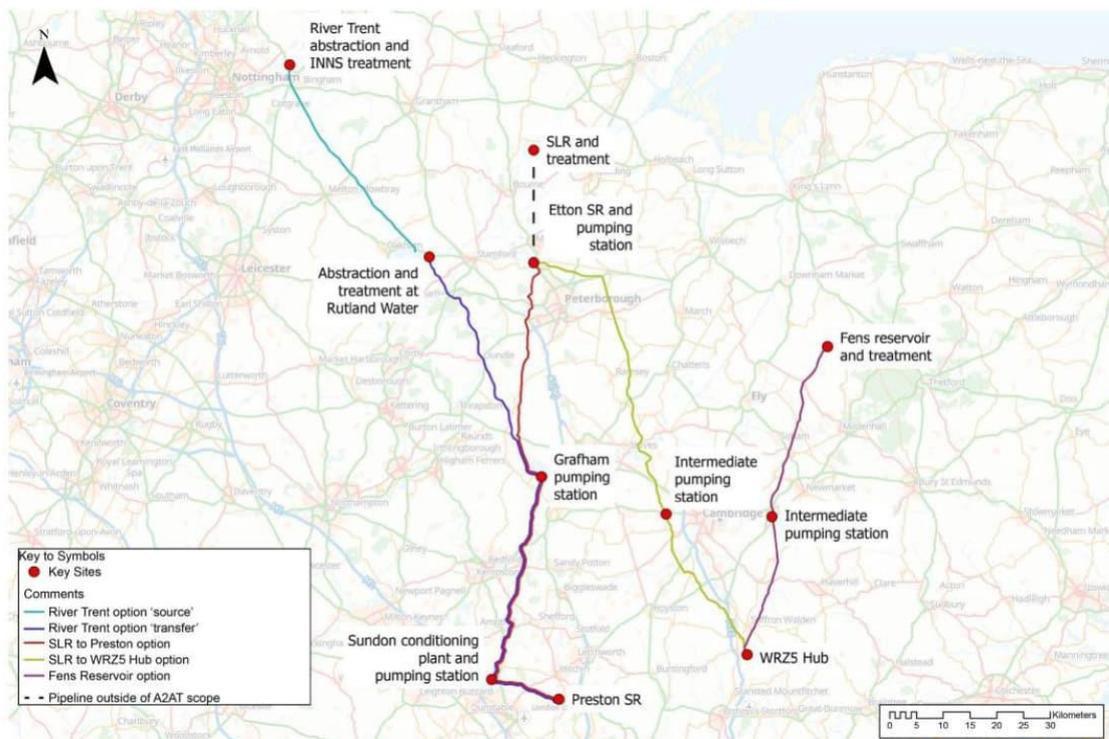
- Fens Reservoir option
- The South Lincolnshire Reservoir (SLR) to Preston option
- The SLR to WRZ5 Hub option
- The River Trent option.

- 2.3 These options are described in more detail in Table 2-1 and illustrated in Figure 2-1.

**Table 2-1. A2AT Options**

Option Name	Overview
Fens Reservoir	Abstraction of raw water from the proposed Fens Reservoir, and treatment at a new WTW. The treated water would then be pumped, via a break tank and intermediate pumping station, to a conditioning plant in WRZ5 – Stort (henceforth called WRZ5 Hub). The treated water would feed a new SR servicing supply zone WRZ5, Stort, in the Affinity Water network.
SLR to Preston	Abstraction of raw water from the proposed South Lincolnshire Reservoir where it would be treated at a new WTW and transferred to a break tank and pumping station near Etton Service Reservoir. The potable water would then be pumped, via an intermediate break tank and pumping station, to Sundon WTW for conditioning. From Sundon, the water would be transferred to Preston SR in WRZ3 for further distribution into the Affinity network.
SLR to WRZ5 Hub	Abstraction of raw water from the proposed South Lincolnshire Reservoir, and conveyance to a new SLR WTW. The treated water would then be pumped, via a break tank and intermediate pumping station, to a conditioning plant in WRZ5 – Stort (henceforth called WRZ5 Hub). The treated water would feed a new SR servicing supply zone WRZ5, Stort, in the Affinity Water network.
River Trent	Abstraction of raw water from the River Trent in the vicinity of East Bridgford, where it would be partially treated to prevent Invasive Non-Native Species (INNS) transfer. The partially treated water would then be transferred via a pipeline to Rutland Water. A new draw-off arrangement and WTW at Rutland Water would abstract, treat, and pump water from Rutland Water to Sundon WTW for conditioning, via an intermediate break tank and pumping station near Grafham. From Sundon, the water would be transferred to Preston SR in WRZ3 for further distribution into the Affinity network.

Source: Mott MacDonald



**Figure 2-1. A2AT Route Options (source: gate one submission)**

- 2.4 These options would enable the transfer water from the east Midlands/East Anglia region to either Preston or the Uttlesford area, in the Affinity Region.
- 2.5 Three regulatory assessments were completed for the A2AT options:
- Habitats Regulations Assessment (HRA)
  - Water Framework Directive Assessment (WFD)
  - Strategic Environmental Assessment (SEA).
- 2.6 The regulatory assessments are summarised in the next section. In addition to the regulatory assessments, the four options were assessed in respect of:
- Invasive Non-Native Species risk assessment
  - Natural Capital and Biodiversity Net Gain
  - Wider benefits
  - Opportunities for net zero carbon contributions

# Regulatory Assessments

## Habitats Regulations Assessment

- 2.7 The HRA Appropriate Assessment undertaken for the **Fens Reservoir option** did not identify any transmission pathways by which a Likely Significant Effect could reasonably occur. No key risks to Habitats Sites were identified during construction or operation of this option.
- 2.8 The Appropriate Assessment undertaken for the **SLR to Preston option** identified a transmission pathway to the Ouse Washes SPA/Ramsar site/SAC where the pipeline is required to cross the River Great Ouse but concluded that no significant adverse effects on the integrity of the Habitats Site are foreseeable if the identified mitigation measures are observed.
- 2.9 For the **River Trent option**, significant adverse effects have been identified on the Humber Estuary Ramsar site/SAC: the potential reduction in flows on the River Trent, as a result of the new licenced abstraction at East Bridgford, would likely affect the behaviour of river and sea lamprey.
- 2.10 The assessment stated that further hydrological modelling was required to understand the impact of abstraction on surface water levels and flows, and a full investigation into the indirect impacts on migratory fish behaviour was required. Other significant adverse effects were identified on Rutland Water SPA/Ramsar site: residual effects would occur during construction of the pipeline, pumping station and new WTW in and directly adjacent to the reservoir. The assessment concluded that further noise and hydrogeological investigations to ensure construction-related effects are negated would be required.
- 2.11 Relocating the pumping station and WTW at least 500m from the boundary of Rutland Water was recommended to reduce the significance of construction-related disturbance, especially from visual and noise impacts. A hydrological modelling assessment was also recommended to understand the impact of the alteration in abstraction regime on surface water levels in the reservoir and the indirect impact this will have on usable habitat to qualifying bird species.
- 2.12 For the **SLR to WRZ5 Hub option**, the Appropriate Assessment identified the potential for significant adverse effects on the Nene Washes SPA/Ramsar site/SAC which could not be fully excluded at that stage. The effects relate to the location of the pipeline corridor within the boundary of the designated site. The consequential impacts on habitats and qualifying bird and fish species as a result of construction activities and potential pollution events during operation were deemed certain. In order to avoid onerous further assessment where there is uncertainty in the outcome, it was recommended that consideration be given to rerouting the pipeline corridor to avoid the Nene Washes altogether at this stage. If this is not possible, further investigation of the impacts through a detailed project-stage HRA, informed by baseline surveys, and further hydrological and noise assessments was recommended.

## Water Framework Directive Assessment

- 2.13 The Level 1 WFD assessment completed on all options indicated that the Fens Reservoir, SLR to Preston and the SLR to WRZ5 Hub options are anticipated to have very low risks of being non-compliant with WFD objectives, therefore a further WFD assessment was not recommended for these options.
- 2.14 A Level 2 WFD assessment was completed for components of the River Trent option. For this option, further WFD assessment would be required; the areas for future focus include consultation with the Environment Agency, data collation and review of Heavily Modified Waterbody (HMWB) measures and baseline data concerning WFD biological, physiochemical and hydromorphological elements, development of a conceptual model, and further information on the design and operation of the options.

## Strategic Environmental Assessment

- 2.15 Based on the SEA outputs for residual effects (post mitigation), the options rated the same across the SEA objectives, with the following exceptions:
- **Biodiversity:** construction of the Fens Reservoir and SLR to Preston options would result in moderate negative residual effects while construction of the SLR to WRZ5 Hub and River Trent options would result in major negative residual effects on biodiversity. Operation of the SLR to Preston, SLR to WRZ5 Hub and River Trent options would result in moderate negative residual effects while operation of the Fens Reservoir option would not impact on biodiversity.
  - **Water:** while all options would result in minor negative residual effects on resilience and flood risk during construction, only the Fens Reservoir option would result in minor negative residual effects during operation. Regarding the impact of the options on water quality and water resources, the River Trent option is the only option which would likely result in negative residual effects (moderate negative effects during construction and neutral effects during operation); none of the other options would have an adverse effect on water resources.
  - **Climatic factors:** while construction of all options would result in minor negative residual effects on carbon emissions, operation of the Fens Reservoir, SLR to Preston and SLR to WRZ5 Hub options would result in moderate negative residual effects on carbon emissions while operation of the River Trent option would result in major negative residual effects. Regarding the vulnerability to climate change risks, there are no residual effects expected from any of the options during construction. However, operation of the SLR to WRZ5 Hub and River Trent options would result in minor negative residual effects, while the Fens Reservoir and SLR to Preston options would not impact on the vulnerability to climate change.
  - **Landscape:** construction of all options would result in minor negative residual effects on the landscape and visual amenity. Operation of the SLR to Preston, SLR to WRZ5 Hub and River Trent options would result in minor negative residual effects while operation of the Fens Reservoir option would not impact on landscape and visual amenity.
- 2.16 The SEA findings and additional assessment show potential residual impact for all options, with the Fens Reservoir option performing slightly better and the River Trent option performing worse.

## Invasive Non-Native Species Risk Assessment

- 2.17 An Invasive Non-Native Species (INNS) risk assessment was undertaken to screen, at a high level, and conduct an initial assessment of the INNS risk for the A2AT raw water transfer options, prior to applying mitigation, as the transfer of raw water from one location to another may increase the risk of spreading INNS. The introduction of INNS to a waterbody can have a significant detrimental effect on ecosystem structure and function, as well as jeopardising compliance with environmental legislation. Additionally, the presence of INNS in water company assets may compromise the supply of drinking water and the safe return of treated wastewater to the environment. The requirement to conduct an INNS risk assessment relates only to raw water transfers.
- 2.18 Of the four proposed A2AT options, only the River Trent option involves the transfer of raw water. The results from both the high-level screening and risk assessment tool components of the assessment suggested that there was a significant INNS risk associated with raw water transfer between the River Trent and Rutland Water. Mitigation measures would have to be developed to eliminate or minimise the INNS risk if this option were selected.
- 2.19 Note that in response to the INNS risk assessment the River Trent option included an INNS treatment plant at the River Trent intake including clarification and rapid gravity filters to minimise the risk of INNS transfer.

## Natural Capital and Biodiversity Net Gain

2.20 High-level Biodiversity Net Gain (BNG) and Natural Capital (NC) assessments were undertaken on the proposed pipeline routes and locations for all options. For each option, an assessment of the potential impact of construction and operation of the option on each NC stock was undertaken, using the BNG metric. The BNG metrics were then quantified as ecosystem services in order to provide monetised values for NC benefit or loss. The assessments identified the following:

- NC: all options were likely to generate a temporary loss of arable farmland stocks.
- BNG: all options were likely to result in a loss of BNG habitat units due to the removal of habitats during construction.
- Ecosystem services: all options were likely to generate the permanent loss of NC stocks associated with the provision of several ecosystem services, namely carbon storage, natural hazard management and food production. However, construction was not expected to affect the future value as stocks were expected to be reinstated.

## Wider Benefits

2.21 Potential social benefits of the A2AT scheme were examined to identify the potential social benefits of water transfer schemes as well as scheme options and details potential mitigation. For customers and communities, these benefits could include the opportunity to develop plans that avoid water use restrictions without damaging the environment. For the region, the benefits could include the chance to balance the supply and demand of water, to promote the cooperate working between two water companies and to contribute to the efficient use of water resources. For local communities, the benefits might include the possibility to implement programmes and initiatives, to promote job and training and the opportunity for the companies in the supply chain to provide social value.

## Opportunities for Net Zero Carbon Contributions

2.22 A high-level carbon assessment was undertaken to review and summarise the net zero considerations for the A2AT options. The assessment proposed measures to mitigate capital carbon emissions and operational carbon emissions. It also indicated how residual emissions could be tackled to get to net zero carbon emissions.

2.23 The assessment noted that embedded carbon footprint was the lowest for the Fens Reservoir option and the greatest for the River Trent option. The operational carbon footprint, which would be more significant than embedded carbon over the life of the scheme, was broadly similar across the SLR to Preston, SLR to WRZ5 Hub and Fens Reservoir options, with a greater footprint for the River Trent option. It was recommended a robust carbon management process is embedded into the scheme development plan to ensure ideas are developed into opportunities.

2.24 The combination of these assessments and studies showed that while positive benefits were likely to result from operation of the scheme through the scheme improving water transfer, water resource management and resilience of water supply; and the scheme providing protection against future drought scenarios, construction of the scheme would be likely to result in some negative effects, even with mitigation applied.

# 3. The Preferred Option

## Introduction

- 3.1 This chapter explains the process of decision-making that went into choosing the preferred option and the results of an environmental assessment of the four options.

## Identification of the Preferred Option

- 3.2 Building on the gate one process, the preferred option was identified from the four options remaining at gate one. An appraisal of environmental constraints was undertaken with a focus on ecology, heritage, and flood risk constraints, on the basis that these are the environmental aspects most relevant to the pipeline routing process. Environmental constraints and flood risk maps were produced identifying constraints within a 1km buffer surrounding the potential routes, to facilitate a broad area for the consideration of route amendments.

- 3.3 This used a red-amber-green rating to assess each of the shortlisted options against the following criteria (see Table 3-1):

- Scheme complexity in terms of funding, ownership of assets etc.
- Invasive Non-Native Species (INNS) risk
- Flood risk
- Financial cost
- Strategic value, for example in terms of resilience, compatibility with other infrastructure in development or utility for growth areas
- Habitats Regulation Assessment outcomes
- Carbon cost

- 3.4 This concluded that the order in which priority should be given to developing detailed concept design for the shortlisted options for A2AT were as follows:

1. SLR to WRZ5 Hub
2. SLR to Preston (WRZ3)
3. Fenland Reservoir to WRZ5 Hub
4. River Trent Abstraction to Preston (WRZ3)

- 3.5 It was recommended that number three (Fenland Reservoir) and number four (the River Trent Abstraction to Preston) in the priority list above should not be progressed to detailed concept design. This was based on the rationale that they each received one or more red scores.

- 3.6 The River Trent Abstraction option appeared to have a disproportionate number of items for further consideration in comparison with the SLR related options which appeared to be much more attractive based on the gate one and initial gate two findings. A particular issue was the significant INNS risk associated with

raw water transfer between the River Trent and Rutland Water that was identified in the HRA and the overall length of the option which would lead to higher embodied carbon costs than the other options.

- 3.7 Similarly, the Fenland Reservoir has greater scheme complexity and scheme cost than the two SLR related options, and although it scores better than both on the HRA item, there are mitigations in place through more detailed concept design which could help improve the two SLR related A2AT options. Therefore, any option with a red score was not taken to detailed concept design stage.
- 3.8 Of the two SLR related options, the SLR to WRZ5 Hub was deemed to be the preferred option. This is owing to the fact that it offers Affinity Water greater resilience and strategic value, as well as being lower cost, when in comparison to the SLR to Preston option.

## Environmental Assessment of Options

- 3.9 The options assessment uses a red-amber-green scale to consider the relative merits of the four options. The assessment draws on the findings of the gate one report and on work done at the initial stages of gate two. The options assessment is documented in Table 3-1 below.

Table 3-1. Environmental Assessment of A2AT Options

Environmental Factor	Fens Reservoir	SLR to Preston	SLR to WRZ5 Hub	River Trent
Population & Human Health	Assessed as the same for all options.	Assessed as the same for all options.	Assessed as the same for all options.	Assessed as the same for all options.
Biodiversity	No transmission pathways identified in HRA.	One transmission pathway identified in HRA but no significant adverse effects if mitigation applied.	Significant adverse effects on Nene Washes SPA / SAC identified in HRA which cannot be excluded at this stage but no significant adverse effects with mitigation applied.	Significant INNS risk associated with raw water transfer between the River Trent and Rutland Water.  Significant adverse effects identified in HRA which cannot be excluded at this stage.
Land & Soil	Route requires land from ALC Grades 1 and 2 but mitigation is possible.	Route mainly through ALC Grade 2 and 3 land.	Route requires land from ALC Grades 1 and 2 but mitigation is possible.	Route mainly through ALC Grade 2 and 3 land.
Water	Low risk of WFD non-compliance.	Low risk of WFD non-compliance.	Low risk of WFD non-compliance.	Water Framework Directive complex, further assessment needed.
Air	Insufficient information at gate one to carry out an appraisal.	Insufficient information at gate one to carry out an appraisal.	Insufficient information at gate one to carry out an appraisal.	Insufficient information at gate one to carry out an appraisal.
Climate	Embodied carbon footprint lowest among options; operational carbon similar for first three options.	Embodied Carbon similar to SLR to WRZ5 Hub; operational carbon similar for first three options.	Embodied Carbon similar to SLR to Preston; operational carbon similar for first three options.	Embodied carbon footprint highest among options; operational carbon also highest.
Material Assets	Requires measures to avoid impacts on infrastructure such as roads and railways.	Requires measures to avoid impacts on infrastructure such as roads and railways.	Requires measures to avoid impacts on infrastructure such as roads and railways.	Longer route would require more extensive measures to avoid impacts on infrastructure such as roads and railways. Also requires more pumping and treatment infrastructure than other options.

Environmental Factor	Fens Reservoir	SLR to Preston	SLR to WRZ5 Hub	River Trent
Cultural Heritage	The option is insufficiently defined to confirm whether receptors such as listed buildings or scheduled monuments would be impacted physically or in their setting but mitigation through avoidance should be possible where this is the case.	The option is insufficiently defined to confirm whether receptors such as listed buildings or scheduled monuments would be impacted physically or in their setting but mitigation through avoidance should be possible where this is the case.	The option is insufficiently defined to confirm whether receptors such as listed buildings or scheduled monuments would be impacted physically or in their setting but mitigation through avoidance should be possible where this is the case.	The option is insufficiently defined to confirm whether receptors such as listed buildings or scheduled monuments would be impacted physically or in their setting but mitigation through avoidance should be possible where this is the case.
Landscape	Avoids Areas of Outstanding Natural Beauty and National Parks.	Passes through Chiltern Area of Outstanding Natural Beauty and would likely require mitigation during construction for loss of vegetation.	Avoids Areas of Outstanding Natural Beauty and National Parks.	Passes through Chiltern Area of Outstanding Natural Beauty and would likely require mitigation during construction for loss of vegetation.

## 4. Scheme Description

### Introduction

- 4.1 This chapter describes how the preferred option emerging from the initial appraisal stage in gate two was further optimised through the gate two process.

### Preferred Option

- 4.2 The preferred option that emerged from the initial appraisal stage at gate two was the SLR to WRZ5 option that emerged from gate one. The SLR to WRZ5 option interfaces with the SLR scheme at the existing Etton Service Reservoir. A new break tank and pumping station at Etton Service Reservoir are designed to transfer the flow via a new pipeline to another new break tank and pumping station at an intermediate point along the route. From here, the water would be pumped via a new pipeline to a new conditioning plant and service reservoir in the Affinity Water resource zone WRZ5 at Sibleys Service Reservoir.
- 4.3 During the design process, the project team considered an additional route between SLR and WRZ5. This variant, known as the 'Western Route', takes the route via Grafham Water and offers additional operational flexibility to Anglian Water. The original SLR to WRZ5 route was named the 'Eastern Route' for clarity. Both routes are considered in this report as part of the same SLR to WRZ5 preferred option.

### Eastern Route

- 4.4 Gate one work on the SLR to WRZ5 option identified that it would cross the Nene Washes SPA / SAC and that mitigation to overcome the impacts would be necessary, through a commitment to using trenchless techniques, where boring or tunnelling facilitates subterranean construction without the need for open trenches to be cut. Further investigation during the gate two optioneering stage determined that the measures required (routing it through the existing road corridor north of Whittlesley) would be technically complex.
- 4.5 Instead, it was decided to avoid this impact altogether by routing the Eastern Route to the west of Peterborough, hence it runs from Etton Service Reservoir southwards towards Washingley and Folksworth. It then turns eastwards to join the original gate one SLR to WRZ5 route just north-west of Woodhurst. The pipeline route continues to a proposed intermediate pumping station located south-west of Duxord before continuing to the termination point at the existing Sibleys Service Reservoir.
- 4.6 An additional advantage of this re-routing is that it avoids an area of high flood risk along much of the original route to the east of Peterborough. Furthermore, it also avoids a possible impact on Ancient Woodland at Park Wood.

### Western Route

- 4.7 The Western Route initially follows the same corridor as the Eastern Route, passing west of Peterborough, towards Washingley and Folksworth. From this point the route continues southwards towards Anglian Water's existing Grafham Water site, passing through approximately 1km to the east. From Grafham Water, the route continues south then south eastward to an intermediate pumping station near East Hatley and a break pressure tank near Langley Park Rally School before terminating to the southeast at the existing Sibleys Service Reservoir.

4.8 The preferred option, with both the Eastern Route and Western Route variants, is shown in Figure 4-1, below.

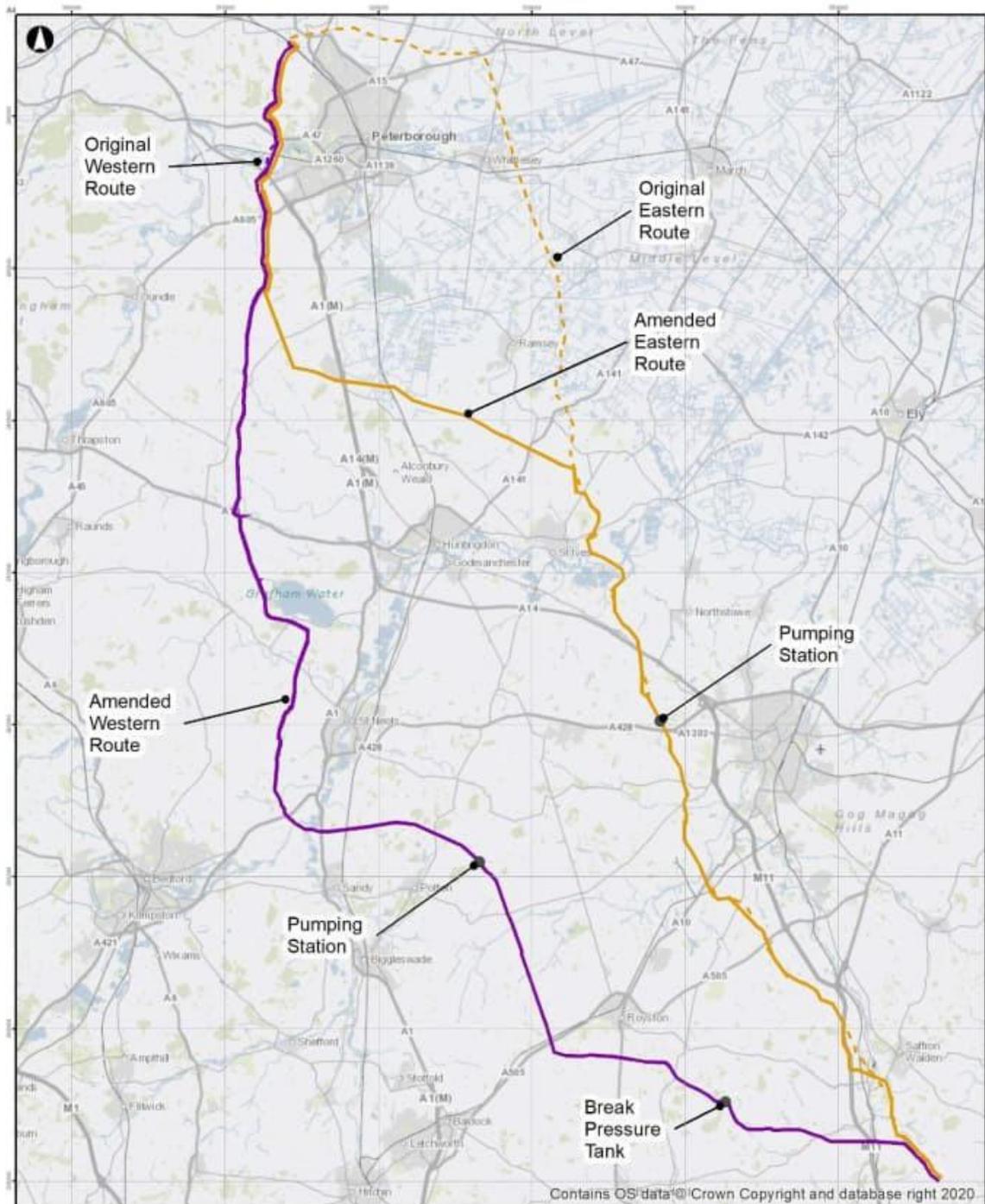


Figure 4-1. A2AT Eastern and Western Routes (source: Arup, Concept Design Report)

# 5. Environmental Assessment

## Introduction

- 5.1 This chapter introduces the environmental assessment that was carried out for the gate two preferred option. The assessment considers the likely environmental effects of the Eastern and Western Routes was undertaken with reference to the environmental factors set out in the European Union's Environmental Impact Assessment (EIA) Directive (2014/52/EU).
- 5.2 Although the UK has left the European Union, the requirements of the Directive are still implemented in England through a variety of regulations. Given the scale of the A2AT scheme, it is inevitable that an EIA would be required if it were to be taken forward and permission sought to construct it. In this way, it is hoped, the maximum value can be gained from the gate two environmental assessment which could be used to help define the scope of any future EIA.
- 5.3 The environmental factors listed in the EIA Directive are:
- Population & Human Health
  - Biodiversity
  - Land & Soils
  - Water
  - Air
  - Climate
  - Material Assets
  - Cultural Heritage
  - Landscape
- 5.4 There are limits to what such an assessment can achieve given the relatively early stage of development of the A2AT scheme. Therefore, the assessments are proportionate at this stage but should be refined if and when the scheme progresses through the next phases of investigations. The conclusions identify uncertainty, where it exists, around potential environmental impacts identified and the likelihood of them occurring. The methodologies used are consistent with relevant legislation, guidance and follow best practice as recommended by the RAPID guidance<sup>3</sup>.
- 5.5 The chapters that follow set out the methodologies proposed for the assessment and the findings of those assessments. These should be read in conjunction with the Appendices, which contain methodologies<sup>4</sup> for

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<sup>3</sup> Regulators' Alliance for Progressing Infrastructure Development, April 2022, *Strategic regional water resource solutions guidance for gate two*

<sup>4</sup> In general, the terminology employed uses the term 'impact' to mean a change in the environmental variable and 'effect' to describe the significance of the change following mitigation (a residual effect)

the regulatory assessments required at gate two. Most technical chapters (Chapters 6 to 14) are structured as follows:

- Introduction
- Methodology
- Assessment of Effects
- Mitigation
- Conclusions

5.6 A final chapter summarising the main findings, addressing the potential for cumulative / in-combination impacts and discussing next steps completes this report.

# 6. Population & Human Health

## Introduction

- 6.1 This chapter sets out an assessment of the socio-economic and health impacts that could arise from the A2AT scheme.

## Assessment Methodology

- 6.2 This chapter outlines the potential socio-economic receptor groups that could be impacted by the A2AT scheme. It does not aim to identify all individual receptors but provides a review of the potential receptors that could be impacted within 500m of the Eastern and Western Routes (as they exist at the concept design stage), as a basis for a future more detailed technical assessment.
- 6.3 Key socio-economic, health and social value impacts are set out below, and a Red Amber Green (RAG) assessment has been carried out for each of the routes, based on a high-level review of their potential significant impacts.
- 6.4 In the assessment, red is used to highlight any significant adverse effects that can be identified at gate two, given the information available in the concept design. Conversely, green is used to highlight effects that are likely to be beneficial or neutral. Amber is used to highlight effects that may be adverse and may require some form of mitigation (to be confirmed at a later gate stage).
- 6.5 The RAG assessment considers the following impacts on sensitive socio-economic, health and social value receptors:
- Potential land take impacts
  - Potential amenity impacts
  - Potential severance impacts
  - Potential human health and wellbeing impacts (including drawing on the work of wider technical teams where health effects could arise from wider environmental impacts)
  - Potential social value impacts
- 6.6 The chapter also sets out details of socio-economic and health mitigation/ avoidance/ compensation strategies, building on the details set out in the gate one assessment

## Assessment of Effects

### Gate One Assessment

- 6.7 The gate one A2AT submission outlined the likely socio-economic, human health and social value impacts of the project:
- Potential benefits arising from efficient water supply for individuals and communities
  - Potential benefits arising from direct job opportunities and potential to implement initiatives and programmes promoting jobs and training, and supply chain opportunities

- Potential impacts on community facilities, open space and/or recreational routes arising from temporary or permanent land take
  - Potential amenity impacts on local communities and/or community facilities, arising from noise, air quality or visual amenity impacts during the construction phase
  - Potential severance impacts on communities arising from accessibility impacts during the construction phase
- 6.8 The submission set out that the design of the A2AT routes have sought to minimise adverse socio-economic effects by avoiding existing residential areas and community facilities where possible and not prejudicing plans for future planned residential or commercial development.
- 6.9 It outlined that mitigation will be implemented to minimise potential adverse socio-economic effects, including engagement with local communities, specific measures to minimise amenity effects with respect to air quality and noise, particularly close to community facilities; and maintenance or diversion of key public rights of way and recreational routes.
- 6.10 Potential wider social value opportunities were set out including opportunities through existing Affinity Water and Anglian Water Social Responsibility programmes.

## Socio-economic and Health Environmental Constraints

### *Socio-economic and Health Baseline: Eastern Route*

- 6.11 The Eastern Route passes through the following local authority districts: Peterborough; Huntingdonshire; South Cambridgeshire; and Uttlesford. The most recent Office for National Statistics (ONS) Population Estimates<sup>5</sup> indicate there were 635,274 people living across these districts in 2020, 61% of whom were working-age (aged 16-64) which is in line with the average proportion of the population of England who are working-age (62%). There are 242,745 residential dwellings recorded<sup>6,7</sup> within these local authority areas.
- 6.12 The Eastern Route is characterised by a high economic activity rate, particularly in South Cambridgeshire and Uttlesford where it exceeds the regional rate. Similarly, the unemployment rate in the Eastern Route local authority areas is largely below the regional rate, with the exception of South Cambridgeshire. Typically, those in employment are employed in senior, professional and technical occupations. Although working-age residents exhibit a higher prevalence of degree level qualifications than is typical for the region, this is spatially variable: South Cambridgeshire and Uttlesford far exceed the regional attainment rate, but Peterborough and Huntingdonshire fall below it. Further socio-economics metrics within the study area are shown in Table 6-1.

**Table 6-1: Socio-economic Metrics, Eastern Route**

Socio-economics indicator	Peterborough	Huntingdonshire	South Cambridgeshire	Uttlesford	Eastern Route local authorities	East of England region
Economic activity rate	76.8	79.0	84.9	83.3	80.3	81.0

<sup>5</sup> ONS, (2021). Mid Year Population Estimates, 2020.

<sup>6</sup> At the time of the most recent census for which data is currently available.

<sup>7</sup> ONS, (2012); Census 2011.

(aged 16 to 64) (%)

Employment rate (aged 16 to 64) (%)	74.9	77.4	81.2	81.0	78.0	77.9
Unemployment rate (aged 16 to 64) (%)	2.5	2.0	4.4	2.8	2.9	3.9
% of those in employment who have senior, professional or associate professional and technical occupations <sup>8</sup>	42.4	45.3	64.9	58.8	51.3	48.2
% of those in employment who have administrative, skilled trades and service occupations <sup>9</sup>	26.0	34.6	20.8	27.7	27.3	30.0
% of those in employment in customer service, machine operative, and elementary occupations <sup>10</sup>	31.0	20.1	14.4	11.6	16.1	21.7
% with an NVQ4+ qualification (aged 16 to 64)	36.0	37.6	62.7	55.3	45.7	39.5
% with no NVQ qualification (aged 16 to 64)	6.6	6.6	3.2	n/a	4.8	5.7

<sup>8</sup> Comprised of ONS SOC2010 classifications: 1 – managers, directors and senior officials, 2 – professional occupations and 3 – associate professional and technical occupations.

<sup>9</sup> Comprised of ONS SOC2010 classifications: 4 – administrative and secretarial occupations, 5 – skilled trades occupations, 6 – caring, leisure and other service occupations.

<sup>10</sup> Comprised of ONS SOC2010 classifications: 7 – sales and customer services occupations, 8 – process, plant and machine operative occupations, 9 – elementary occupations.

Source: ONS, (2022); Annual Population Survey – January to December 2021

- 6.13 In terms of deprivation<sup>11</sup>, the Eastern Route exhibits very low levels of deprivation overall: only 13% of LSOAs<sup>12</sup> are ranked amongst the 20% most deprived nationally, contributed primarily by LSOAs within the urban setting of Peterborough. Accordingly, 49% of LSOAs are ranked within the 30% least deprived LSOAs nationally.
- 6.14 A number of health indicators are presented in Table 6-2, derived from Office for Health Improvement and Disparity data<sup>13</sup>. It is shown that, broadly, life expectancy at birth for males and females is greater in the Eastern Route local authorities than is typical for the region. In terms of mortality rates from all causes, from cardiovascular disease, and from cancer, outcomes are better than is typical for the region in all local authorities of the Eastern Route, with the exception of Peterborough, where in all instances outcomes are worse. Similarly, across all local authorities except Peterborough, there is a lower prevalence of smoking in adults and a higher percentage of physically active adults than is typical for the region. The percentage of adults classified as overweight is broadly in line with, or below, the regional rate. The estimated prevalence of Chronic Obstructive Pulmonary Disease (COPD) is also broadly below the national rate.

**Table 6-2: Health Indicators, Eastern Route**

Health indicator	Unit	Peterborough	Huntingdonshire	South Cambridgeshire	Uttlesford	East of England region
Life expectancy at birth (male)	Years	78.6	81.0	83.1	82.6	80.2
Life expectancy at birth (female)	Years	82.5	84.1	85.9	85.4	82.5
Under 75 mortality rate from all causes	Per 100,000	375.7	270.7	221.5	227.4	303.5
Under 75 mortality rate from all cardiovascular diseases	Per 100,000	93.1	48.8	44.7	47.4	62.9
Under 75 mortality rate from cancer	Per 100,000	139.4	111.7	107.5	100.8	122.6
Smoking prevalence in adults	%	18.8%	9.9%	7.2%	13.0%	13.7%

<sup>11</sup> Ministry of Housing, Communities and Local Government, (2019); English indices of deprivation 2019.

<sup>12</sup> Lower Super Output Areas (LSOAs) are small geographical units with broadly comparable population sizes, used for the reporting of statistics.

<sup>13</sup> Office for Health Improvement and Disparities, (2022); Local Authority Health Profiles.

Percentage of physically active adults	%	57.4%	68.6%	73.4%	71.2%	65.7%
Percentage of adults classified as overweight or obese	%	60.7%	65.3%	58.3%	64.3%	64.0%
Estimated prevalence of COPD	%	3.0%	2.60%	2.40%	2.30%	n/a (England = 3.0%)

### *Socio-economic and Health Baseline: Western Route*

- 6.15 The Western Route passes through the following local authority districts: Peterborough; North Northamptonshire; Huntingdonshire; Bedford; Central Bedfordshire; South Cambridgeshire; North Hertfordshire; East Hertfordshire; and Uttlesford. The most recent ONS Population Estimates indicate there were 1,739,754 people living across these districts in 2020, 61% of whom are working-age (aged 16-64) which is also in line with the average proportion across England (62%). There are 670,124 residential dwellings recorded within these local authority areas.
- 6.16 The Western Route passes through the Eastern Route local authorities (Peterborough, Huntingdonshire, South Cambridgeshire, and Uttlesford), and therefore shares many of the socio-economic and health characteristics of the Eastern Route. However, as the Western Route passes through additional local authority areas, the overall characteristics are slightly different.
- 6.17 The Western Route passes through local authority areas that exhibit economic activity rates that are broadly in line with or above the regional rate. However, this is not true of all local authorities. Peterborough, Huntingdonshire, North Northamptonshire, and Bedford exhibit lower economic activity rates and employment rates than are typical for the region. This means that overall that the Western Route local authorities as a whole exhibit a marginally lower economic activity rate than is recorded across the region. Typically, those who are in employment are employed in senior, professional and technical occupations, and there is a lower prevalence of customer service, machine operative and elementary occupations than is typical for the region, with the exception of Peterborough and North Northamptonshire. The Western Route local authority areas exhibit strong attainment levels, with a higher proportion of the population holding degree level qualifications than is typical for the region, except in Peterborough, Huntingdonshire, and North Northamptonshire. Further information on socio-economics metrics within the relevant local authorities is shown in Table 6-3.

**Table 6-3: Socio-economic Metrics, Western Route**

Socio-economics indicator	Peterborough	Huntingdonshire	South Cambridgeshire	Uttlesford	North Northamptonshire	Bedford	Central Bedfordshire	North Hertfordshire	East Hertfordshire	Western Route local authorities	East of England region
Economic activity rate (aged 16 to 64) (%)	76.8	79.0	84.9	83.3	80.3	76.0	81.6	86.3	83.1	80.8	81.0
Employment rate (aged 16 to 64) (%)	74.9	77.4	81.2	81.0	77.4	73.0	80.7	82.5	81.1	78.5	77.9

Unemployment rate (aged 16 to 64) (%)	2.5	2.0	4.4	2.8	3.6	4.0	1.1	4.4	2.4	2.9	3.9
% of those in employment who have senior, professional or associate professional and technical occupations <sup>14</sup>	42.4	45.3	64.9	58.8	38.6	56.3	57.5	56.8	62.4	51.8	48.2
% of those in employment who have administrative, skilled trades and service occupations <sup>15</sup>	26.0	34.6	20.8	27.7	29.6	26.4	25.8	25.7	21.2	26.7	30.0
% of those in employment in customer service, machine operative, and elementary occupations <sup>16</sup>	31.0	20.1	14.4	11.6	31.9	17.2	16.4	17.1	16.6	16.0	21.7
% with an NVQ4+ qualification (aged 16 to 64)	36.0	37.6	62.7	55.3	29.4	49.5	41.9	59.9	49.8	43.6	39.5
% with no NVQ qualification (aged 16 to 64)	6.6	6.6	3.2	n/a	5.5	5.3	5.5	n/a	4.5	4.7	5.7

Source: ONS, (2022); Annual Population Survey – January to December 2021

- 6.18 In terms of deprivation<sup>17</sup>, overall the Western Route local authorities exhibit extremely low levels. Only 10% of the LSOAs within the local authority areas are ranked amongst the 20% most deprived nationally; however, it is notable that the vast majority of these LSOAs are located in Peterborough, North Northamptonshire, and Bedford.

<sup>14</sup> Comprised of ONS SOC2010 classifications: 1 – managers, directors and senior officials, 2 – professional occupations and 3 – associate professional and technical occupations.

<sup>15</sup> Comprised of ONS SOC2010 classifications: 4 – administrative and secretarial occupations, 5 – skilled trades occupations, 6 – caring, leisure and other service occupations.

<sup>16</sup> Comprised of ONS SOC2010 classifications: 7 – sales and customer services occupations, 8 – process, plant and machine operative occupations, 9 – elementary occupations.

<sup>17</sup> Ministry of Housing, Communities and Local Government, (2019); English indices of deprivation 2019.

- 6.19 A number of health indicators are identified in Table 6-4 derived from Office for Health Improvement and Disparities data<sup>18</sup>. It is shown that with the exception of Peterborough and Bedford, male life expectancy at birth is greater across the local authorities of the Western Route than is typical for the region. The female life expectancy at birth exceeds the regional expectancy across all local authority areas. In terms of mortality rates from all causes and from all cardiovascular diseases, outcomes are better than is typical for the region in all of the local authority areas except Peterborough and Bedford. In terms of behavioural determinants of health, the prevalence of smoking is lower (more preferable) than is recorded across the region in all local authorities except Peterborough and North Northamptonshire. Similarly, it is only in Peterborough where the percentage of physically active adults is below the regional rate. The incidence of COPD is also lower than is recorded across England as a whole across the majority of local authority areas.

**Table 6-4: Health Indicators, Western Route**

Socio-economics indicator		Peterborough	Huntingdonshire	South Cambridgeshire	Utilesford	North Northamptonshire	Bedford	Central Bedfordshire	North Hertfordshire	East Hertfordshire	Western Route local authorities	East of England region
Life expectancy at birth (male)	Years	78.6	81	83.1	82.6	n/a	79.2	80.7	81.1	81.6	80.2	
Life expectancy at birth (female)	Years	82.5	84.1	85.9	85.4	n/a	83.2	84.0	84.2	85.0	82.5	
Under 75 mortality rate from all causes	Per 100,000	375.7	270.7	221.5	227.4	n/a	335.3	298.5	261.2	239.3	303.5	
Under 75 mortality rate from all cardiovascular diseases	Per 100,000	93.1	48.8	44.7	47.4	72.9	70.2	56.7	58	49.7	62.9	
Under 75 mortality rate from cancer	Per 100,000	139.4	111.7	107.5	100.8	139.2	119.5	123.5	112.4	108.7	122.6	
Smoking prevalence in adults	%	18.8%	9.9%	7.2%	13.0%	18.7%	10.8%	13.7%	9.4%	8.6%	13.7%	
Percentage of physically active adults	%	57.4%	68.6%	73.4%	71.2%	n/a	68.1%	68.9%	70.7%	74.2%	65.7%	
Percentage of adults classified as overweight or obese	%	60.7%	65.3%	58.3%	64.3%	n/a	63.3%	65.8%	55.5%	63.4%	64.0%	

<sup>18</sup> Office for Health Improvement and Disparities, (2022); Local Authority Health Profiles.

Estimated prevalence of COPD	%	3.0%	2.60%	2.40%	2.30%	3.1%	2.70%	2.40%	2.60%	2.20%	n/a (England = 3.0%)
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Source: OHID, (2022); Local Authority Health Profiles; OHID, (2022); Modelled Prevalence Estimates 2015.

## Gate Two Assessment: Potential Socio-Economic and Health Impacts

6.20 Table 6-1 sets out the scope of potential constraints likely to be of relevance to the assessment of the socio-economic and health impacts of the A2AT scheme.

**Table 6-5: Socio-economic and Health Impacts**

Potential Impact	Scope	Eastern Route	Western Route
Potential employment and training impacts, and construction related GVA arising from the construction phase	Potential generation of construction employment and training opportunities	Both routes will generate construction-related and employment opportunities, and construction-related GVA during the construction phase.	
Potential land take impacts arising from the construction and operational phases	<ul style="list-style-type: none"> <li>a. - Existing community facilities</li> <li>b. - Existing residential properties</li> <li>c. - Existing businesses</li> <li>d. - Existing open spaces</li> <li>e. - Existing visitor attractions</li> <li>f. - Allocated development land or sites with planning permission for future development</li> </ul>	<p>The route has been designed to avoid land take to existing community facilities, residential properties, businesses, public open spaces, visitor attractions, and allocated development sites.</p> <p>The 500m buffer contains residential properties: to the east of Castor; to the west of Chesterton and Alwalton; to the south of Sawtry; around Needingworth, including Holywell; to the west of Bar Hill; to the west of Haslingfield; to the east of Foxton; to the east of Thriplow and west of Heathfield; and to the north of Wendens Ambo.</p>	<p>The route has been designed to avoid land take to existing community facilities, residential properties, businesses, public open spaces, visitor attractions, and allocated development sites.</p> <p>The 500m buffer contains residential properties: to the east of Castor; to the west of Chesterton and Alwalton; in Great Gidding; in Leighton Bromswold; in Perry; in Gamlingay; in Tadlow; to the north of Clavering and south of Wicken Bonhunt; and to the south of Newport.</p>
Potential amenity impacts arising from the construction and operational phases	Potential noise, air quality, landscape and visual or accessibility impacts	<p>Potential amenity impacts could arise from the construction of both routes.</p> <p>In terms of air quality, it is assessed in Chapter 10, that although the routes pass through AQMAs, it is unlikely given the distance of receptors from the routes that significant air quality impacts would result. This would depend on the amount of vehicle movements required for construction.</p> <p>In terms of landscape, Chapter 14 notes that routes do not pass through any Areas of Outstanding Natural Beauty or National Parks, and although the scheme has the potential to impact on landscape character, it is likely that these impacts could be mitigated.</p> <p>Mitigation measures would be put in place to minimise adverse noise, air quality, landscape and visual and accessibility environmental effects.</p>	

Potential Impact	Scope	Eastern Route	Western Route
Potential severance impacts arising from the construction and operational phases	Potential temporary or permanent closure or re-rerouting of Public Rights of Way (PRoW) or recreational routes, leading to severance of existing communities from community services and facilities	The A2AT scheme is likely to traverse or pass close by to a number of PRoW and recreation routes. Measures will be put in place to minimise disruption to users as far as possible, however some temporary closures or diversions may be necessary which could impact on accessibility to local services.	
Potential human health and wellbeing impacts (including drawing on the work of wider technical teams where health impacts could arise from wider environmental impacts)	<p>Potential health impacts arising from:</p> <ul style="list-style-type: none"> <li>a. Air quality and noise impacts arising from construction works</li> <li>b. Potential accessibility impacts on PRoW, recreational routes</li> <li>c. Potential community cohesion impacts</li> <li>d. Potential climate change impacts</li> <li>e. Potential employment and training impacts</li> </ul>	<p>The construction and operational phases of the A2AT scheme could have health impacts on local residents, workers and visitors to the area.</p> <p>The health and wellbeing of individuals is determined by a broad range of individual constitutional and behavioural factors, as well as broader environmental, social and economic factors.</p> <p>Both routes could result in impacts on human health, dependent on existing health of the resident population and the magnitude of impact that the Route chosen has on the range of factors that constitute good health.</p>	<p>The Eastern Route passes through an area primarily characterised by good health outcomes and favourable behavioural determinants of health. The residents of the area are broadly in better health, according to these metrics, than is typical for the region, indicating that they are less vulnerable to potential adverse health impacts. The aligned portion of the route does however pass through the Peterborough local authority area which according to most indicators exhibits worse health outcomes and behavioural determinants of health than is typical for the region.</p> <p>The Western Route passes through an area primarily characterised by good health outcomes and favourable behavioural determinants of health. The residents of the area are broadly in better health, according to these metrics, than is typical for the region. The route does however pass through three local authority areas (Peterborough, North Northamptonshire and Bedford) which according to most indicators exhibit worse health outcomes and behavioural determinants of health than is typical for the region. Given the vulnerability of the population of these three local authorities, it is considered that overall the Eastern Route is preferable to the Western Route with regard to potential health impacts.</p>
Potential social value impacts	<ul style="list-style-type: none"> <li>f. Potential benefits arising from efficient water supply for individuals and communities</li> <li>g. Potential employment and training</li> </ul>	<p>The construction phase of the A2AT scheme could have beneficial impacts on local residents arising from community engagement impacts; and/or potential employment and training opportunities generated by the Scheme.</p> <p>Both routes could generate social value impacts within the local communities in which they are located. There could be opportunities to maximise the social value of the A2AT scheme, for example through the implementation of local employment and training strategies.</p>	

Potential Impact	Scope	Eastern Route	Western Route
	opportunities, including local employment and training schemes	The Eastern Route exhibits low levels of deprivation, with the majority contributed by areas in Peterborough.	The Western Route exhibits low levels of deprivation overall. However Peterborough, North Northamptonshire and Bedford exhibit high deprivation and the potential benefits of employment and training opportunities for local people are therefore greater.

- 6.21 The potential socio-economic and health effects associated with the A2AT scheme are broadly consistent across both routes, although some differences are identified. The Western Route goes through more local authority areas which exhibit poor resident health (increasing vulnerability to adverse health outcomes as a result of the scheme) and higher incidences of deprivation (increasing the potential for social value benefits), although the levels of health and deprivation are low compared to other parts of the UK. There is opportunity for the implementation of design and mitigation measures that could support the minimisation of potential adverse effects, and support potential beneficial effects with respect to socio-economics, health and social value

## Mitigation

- 6.22 Measures to compensate for localised socio-economic or health impacts could include provision of training and apprenticeship opportunities; provision of engagement and information on local supply chain opportunities; provision of temporary or permanent rerouting and/or reprovision of PRowS and public open spaces; and measures to compensate for private assets impacted by the scheme. The information needed to identify specific impacts and to assess what is needed to address them is not available at this stage and will need to be gathered at a later stage.

## Conclusions

- 6.23 This chapter sets out the key socio-economic, health and social value impacts likely to arise from the A2AT scheme, including an assessment of the two routes - Eastern and Western Routes.
- 6.24 The potential socio-economic and health effects associated with the A2AT scheme are consistent across both routes. There is opportunity for the implementation of design and mitigation measures that could support the minimisation of potential adverse effects, and support potential beneficial effects with respect to socio-economics, health and social value

# 7. Biodiversity

## Introduction

- 7.1 The biodiversity assessment in this environmental assessment defines the baseline in terms of designated sites and considers the potential for impact as a result of construction of the A2AT scheme. It also summarises the informal Habitats Regulations Assessment, which is presented in full as Appendix B and the Biodiversity Net Gain Assessment, to be found in Appendix C.

### Habitats Regulations Assessment

- 7.2 Internationally important wildlife sites, also known as European sites for simplicity, constitute either Special Areas of Conservation (SACs) which are designated for habitats and non-avian fauna, Special Protection Areas (SPAs) which are designated for birds, or Ramsar sites which are wetlands of international importance and can also be SACs or SPAs. The informal Habitats Regulations Assessment examines the likelihood of significant effects on such European sites.

### Biodiversity Net Gain Assessment

- 7.3 DEFRA's 25-year Environment Plan seeks to 'embed an environmental net gain principle for development, including housing and infrastructure' it is also government policy that planning decisions should seek to minimise impacts on, and provide net gains for, biodiversity. The Environment Act 2021 includes provisions to mandate the delivery of Biodiversity Net Gain in England. Secondary legislation, anticipated in late 2023, will require all relevant developments to achieve a minimum 10% net gain in biodiversity units relative to the site's baseline biodiversity value. A Biodiversity Net Gain Assessment has been undertaken for the A2AT gate two environmental assessment to identify the likely need for net gain if either of the options is implemented.

## Methodology

### Designated Sites

- 7.4 Designated sites within 500m of the A2AT scheme were identified using DEFRA's Magic Map online tool. 500m chosen on the basis of professional judgement as being a reasonable distance beyond which impacts on designated sites (for example disturbance, habitat loss or dust deposition) were all unlikely. The potential for direct impact or impact through hydrological connectivity during construction was considered and the potential need for mitigation noted where this appeared likely to be necessary.

### Habitats Regulations Assessment

- 7.5 The informal HRA begins with a Test of Likely Significant Effects which considers the qualifying interest features of the European sites. Potential impact pathways that could affect the qualifying interest features are identified and their likely impact assessed.
- 7.6 Information to inform Appropriate Assessment, which considers whether the ability of the European sites to achieve their conservation objectives will be impaired by the scheme either alone or in combination with other plans and projects, is provided. Where insufficient information exists to enable a meaningful appropriate assessment to be undertaken, recommendations are made for any additional work that would be needed for gate three in order to undertake an Appropriate Assessment.
- 7.7 A 2.5km buffer either side of the gate two concept design route for both the Eastern and Western Routes was used to identify European sites that might be affected by the A2AT scheme, or linear features that might

provide connectivity to more distant European sites. A wider buffer was used compared with other designated site as the threshold for significant effects is more stringent in HRA.

## Biodiversity Net Gain Assessment

- 7.8 The assessment is undertaken using DEFRA's Biodiversity Metric 3.1, in accordance with the metrics accompanying guidance and industry accepted best practice principles. Details of this methodology are set out in Appendix C.

# Assessment of Effects

## Designated Sites - Western Route

- 7.9 Defra's MAGIC map online describes the designated sites within the study area of the Western Route.

### Surface Water

- 7.10 There are no Special Area of Conservation (SAC), Special Protection Area (SPA) or Ramsar sites within the 500m study area of the Western Route.
- 7.11 Castor Flood Meadows Site of Special Scientific Interest (SSSI) is located on the western outskirts of Peterborough and is 41.8 ha in size. Castor Flood Meadows SSSI is on the edge of the 500m study area of the Western Route (approximately 400m northwest of the pipeline); it is upstream of where the Western Route crosses Back Dike and the River Nene and is therefore an unlikely hydrological receptor. Over half of the SSSI unit is in Favourable condition, with less than half is in Unfavourable – Recovering condition. This site is on the banks of the River Nene is a remnant of formerly extensive flood Meadows. A number of different grassland types are present, and they represent an example of the kind of vegetation which was once widespread in similar flood plain situations in south, central and eastern England. The River Nene and associated water bodies provide additional areas of value to wildlife generally. There are extensive stands of yellow waterlily *Nuphar lutea* and the local species arrowhead *Sagittaria sagittifolia* is also present.
- 7.12 Grafham Water SSSI is a 808 ha site, located north of Perry, Huntingdonshire and is in Favourable condition. The southwest section of Grafham Water SSSI is located within the study area, with parts being within 100 m proximity of the Western Route. The Western Route crosses unnamed watercourses at Ch. 39150 and Ch. 39650 which appear to be hydrologically connected to Grafham Water. In recent years this site has held nationally important numbers of wintering great crested grebe *Podiceps cristatus*, tufted duck *Aythya fuligula* and coot *Fulica atra*. The site is also of national importance for the numbers of moulting mute swan *Cygnus olor* present in late summer. Additionally, it is one of the most important sites for diversity of passage migrants and wintering species of birds in the East Midlands.
- 7.13 Perry Woods SSSI is located to the south of the Western Route, opposite Grafham Water SSSI. Perry Woods SSSI is made up of three units (Perry Wood, Perry West Wood and Ash Wood) and is 67.94 ha in size. Parts of the site are within the schemes study area, with one of the three units located approximately 75 m from the Western Route. Over 75% of the site is in Favourable condition, and the remainder is in Unfavourable – Recovering condition. The site is of the ash-maple ancient woodland type characteristic of the heavy Oxford and Boulder Clays. It represents a habitat type which has become increasingly scarce in the county and over its natural range in lowland England. Perry Woods SSSI does not appear to be hydrologically connected to the scheme.
- 7.14 Weaverly and Sand Woods SSSI and Gamlingay Wood SSSI are located north of Gamlingay and are 62 ha and 48.43 ha in area respectively. They are also approximately 120m away from the Western Route. Weaverly and Sand Woods SSSI is made up of two units, both of which are in Favourable condition. The woodland is ancient in origin and of the ash-maple type which is a declining habitat. The site is of additional interest for the influence and range of the underlying geology. It straddles a number of geological formations from ill-drained boulder clay and Jurassic clays to free-draining Lower Greensand. Few other ancient woods in Cambridgeshire possess this variation in terms of geology. the Western Route crosses two unnamed

watercourses at Ch. 64800 and Ch. 65000 (Figure 9-1) which appear to flow northeast into the SSSI; this provides a potential flow pathway for downstream effects during construction.

- 7.15 Gamlingay Wood SSSI is in Unfavourable – Recovering condition. This is a woodland of ancient origin which consequently holds well developed plant and animal communities. It is of the ash-maple woodland type and represents a habitat which has now become relatively scarce throughout its natural range over lowland England. Gamlingay Wood SSSI is not hydrologically connected to the Western Route, although lies in close proximity (<100 m).
- 7.16 Buff Wood SSSI is in Unfavourable – Recovering condition. Buff Wood is a woodland with a primary core and adjacent later (secondary) additions which were planted from the Middle Ages onwards. It is primarily of value as a good representative of wet ash-maple and pedunculate oak-hazel/ash woodland which contains both oxlip *Primula elatior* and primrose *P. vulgaris*, woodland types which are of restricted distribution in the British Isles. The site is additionally of value for containing varied stands of elm (largely *Ulmus minor*), a woodland type which is particularly characteristic of this area but relatively uncommon over the remainder of Britain. Buff Wood SSSI is not hydrologically connected to the Western Route.
- 7.17 There are no LNRs or NNRs within the study area of the Western Route.

#### *Groundwater*

- 7.18 Based on an initial review Castor Flood Meadows SSSI may contain habitats that have the potential to relate to shallow groundwater and saturated soils where the Western Route will cut through the same geology.
- 7.19 Castor Flood Meadows SSSI is a remnant of the once extensive species-rich alluvial grasslands within the flood plain of the River Nene. The variety of grassland types present is largely influenced by the water content of the soil. The Western Route would pass approximately 500m from the boundary of the SSSI within the shallow geology related to the designated habitats.

### **Designated Sites – Eastern Route**

- 7.20 Defra's MAGIC map online describes the designated sites within the study area of the Eastern Route.

#### *Surface Water*

- 7.21 There are no Special Area of Conservation (SAC), Special Protection Area (SPA) or Ramsar sites within the 500m study area of the Eastern Route.
- 7.22 The Eastern Route follows the same course as the Western Route from Peterborough to the area between Yaxley and Huntingdon and therefore Castor Flood Meadows SSSI is located within the study area of the Eastern Route.
- 7.23 Aversley Wood SSSI is of the ash-maple woodland type which occurs on the heavy clay soils of lowland England. The site is of ancient origin, much of it having been under woodland since before the Middle Ages. As such the plant and animal communities it supports are well established and much richer than in more recent woodlands. It is made up of 3 units, totalling 62.3 ha in size and is located approximately 2.1 km from the Eastern Route. Two thirds are in Unfavourable – Recovering condition, and the remaining third is in Unfavourable – No Change condition. The Eastern Route crosses an unnamed watercourse, a tributary of Middle Level Catchwater Drain however flows from Aversley Wood SSSI in a northeast direction; therefore, Aversley Wood is upstream of the scheme and is therefore unlikely to be hydrological receptor.
- 7.24 Barrington Chalk Pit SSSI is 97.23 ha in size, located southwest of Cambridge and is in Favourable condition. This large quarry has long been noted as the last remaining exposure of the famous Cretaceous 'Cambridge Greensand'. The Greensand comprises rolled phosphatic nodules and fossils in a glauconitic chalky matrix. The fauna at Barrington includes brachiopods and fish teeth. Although located only 0.1 km south west of the Eastern Route, this SSSI will not be directly impacted from the scheme, due to having no hydrological connection and is therefore unlikely to be hydrological receptor.

- 7.25 Thriplow Meadows SSSI supports species-rich neutral pasture of variable drainage characteristics, ranging from dry with calcareous influences, to marshy areas containing many uncommon plants. The habitats represented are geographically a lowland England type, examples of which are now scarce and occur mainly as scattered and fragmented sites. It is 3.3 ha and is in Favourable condition. Thriplow Meadows SSSI is approximately 150 m to the southwest of the Eastern Route. An unnamed watercourse runs adjacent to the south easterly side of the site, which flows through the Eastern Route, towards Hoffer Brook. As the site is upstream of the scheme, there are unlikely to be hydrological impacts to the upstream Thriplow Meadows SSSI.
- 7.26 Debden Water SSSI is located east of Newport and is 20.9 ha in size. Debden Water is a small freshwater stream which runs through a narrow, sheltered valley on the Chalky Boulder Clay of north-east Essex and forms a tributary to the River Cam at Newport. The surrounding land has a varied topography and supports a range of habitat types including tall fen vegetation within the flood plain, unimproved neutral grassland, broad-leaved woodland, species-rich calcareous grassland on the valley slopes, and sandy areas surrounding a number of small disused gravel pits. Debden Water SSSI is almost crossed by the Eastern Route (between 1-5m away); the Eastern Route is located between the two units of Debden Water SSSI, and therefore crosses Debden Water watercourse itself. Debden Water is a tributary of the River Cam, and so any impacts from the scheme could be conveyed downstream to the second unit of the SSSI via Debden Water.
- 7.27 Mare Fen LNR (reference: 1009020) is located within the 500 m study area of the Eastern Route, between Swaversy and Over. There are no other LNRs within the study area of the Eastern Route.
- 7.28 There are no NNRs located within the 500m study area of the Eastern Route.

#### *Groundwater*

- 7.29 Sites where the designated habitats upon an initial review have the potential to relate to shallow groundwater and saturated soils where the Eastern Route will cut through the same geology are:
- Castor Flood Meadows SSSI. A remnant of the once extensive species-rich alluvial grasslands within the flood plain of the River Nene. The variety of grassland types present is largely influenced by the water content of the soil. The Eastern Route would pass approximately 500m from the boundary of the SSSI within the shallow geology related to the designated habitats.
  - Castor Hanglands SSSI. Lowland grassland and woodland, boggy areas. The Eastern Route would pass approximately 1km from the boundary of the SSSI within the shallow geology related to the designated habitats.
  - Woodwalton Fen SSSI is part of Fenland SAC and is situated approximately 1.5km north of the Eastern Route centreline. It comprises open fen and swamp. The network of ditches on the site contains many uncommon British plant species and two meres have been dug which are also valuable for aquatic plants. Further habitats of significance include marshy grassland, birch and alder woodland and fen carr. The Eastern Route would pass along the boundary of the SSSI/SAC within the shallow geology related to the fenland water features and habitats.
  - Thriplow Peat Holes SSSI has rare alder carr and fen habitats which have a wide variety of invertebrates, which is enhanced by ditches and ponds. The Eastern Route would pass approximately 500m from the site boundary within the shallow geology related to the designated habitats.
- 7.30 Some designated nature conservation sites have been identified to be hydrologically connected to watercourses which the Eastern and Western Routes cross. Areas of Grafham Water SSSI are within 100 m proximity of the Western Route, which crosses two unnamed watercourses which appear to flow to Grafham water. Similarly, the Western Route crosses two unnamed watercourses which appear to flow into Waverly and Sands Woods SSSI providing a potential flow pathway for downstream effects during construction. These designated sites must therefore be taken into account when the importance of the potentially impacted watercourse is determined.

- 7.31 Debden Water SSSI is almost crossed by the Eastern Route (no more than 5 m away) and the Eastern Route lies between the two units of Debden Water SSSI, and therefore crosses Debden Water itself. Any impacts from the scheme could be conveyed downstream to the second unit of the SSSI via Debden Water, within the shallow geology related to the designated habitats. The Eastern Route would also pass along the boundary of the Woodwalton Fen SSSI (which is formed on peat and may be sensitive to changes in hydrology) and Fenland SAC within the shallow geology related to the fenland water features and habitats. It is important that any potential hydrological impact on these sites is considered at subsequent assessment stages and the effects reported (either in the ecological or water environment assessments, but not both to avoid duplication).
- 7.32 Designated sites may be affected by turbidity where the pipeline route crosses a hydraulically connected aquifer with shallow groundwater. This is anticipated to be the case in the Nene valley near Castor Meadows SSSI (Eastern and Western Route), Woodwalton SSSI (the Eastern Route), and Debden Water (the Eastern Route).
- 7.33 Turbidity is considered to be a risk at Castor Meadows SSSI and Debden Water SSSI where the trench will intercept a high permeability aquifer linked to the SSSI water features. However, based on the distance to the designated features it is considered to be a low risk, and the impact will be localised and temporary and can be minimised through implementation of a CEMP and best practices.
- 7.34 Woodwalton SSSI may not be affected by turbidity if groundwater investigations determine there to be no hydraulic connection (i.e., if the trench is not in the peat deposits associated with the SSSI). If groundwater investigations determine that the trench is in the peat deposits, then the low permeability should prevent the migration of suspended solids to surface water features.

## Habitats Regulations Assessment

### *Hydrology and Water Quality*

- 7.35 The Test of Likely Significant Effects identified that the route corridors for both routes will traverse the River Great Ouse upstream of Portholme SAC, the Ouse Washes SAC/SPA/Ramsar site and the River Nene upstream of the Nene Washes SAC/SPA/Ramsar site. Both route corridors could have hydrological and water quality effects on these European sites without suitable construction methods and pollution prevention controls. Additionally, in the UK, there is an obligation for construction projects to consider water quality impacts, regardless of whether a European site is affected or not.

### *Protected Species*

- 7.36 Eversden & Wimpole Woods SAC in South Cambridgeshire is internationally important for its breeding colony of barbastelle bat. The trees within Wimpole Woods 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, and some of the woodland is also used as a flight path when bats forage outside the site.
- 7.37 The Bat Conservation Trust's Survey Guidelines define the general Core Sustenance Zone for Barbastelle bats as a species as being 6km, based on evidence gathered from three studies of 69 bats. A CSZ refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost.
- 7.38 The 2.5km buffer for both routes lies c. 2km from the Eversden & Wimpole Woods SAC but well within the 5km Impact Risk Zone for the SAC. As such, if the construction of either route resulted in the removal of hedgerows or treelines, or the temporary blocking of any small watercourses for anything other than the shortest duration (i.e., a few days at most in each case) during the active season (c. March to September) it could result in a break in the ability of barbastelle bats to traverse the landscape. This could in turn result in SAC bats failing to gain sufficient sustenance to maintain the population or require them to make detours which would add to energetic expenditure and reduce the health or increase the foraging needs of the barbastelle population of the SAC

*Other Plans and Projects*

- 7.39 For all European sites the mitigation measures identified in the assessment of the A2AT scheme alone would be sufficient (subject to further detail and design at later stage of SRO development) to ensure that no effect arose on any European sites 'in combination' with other projects and plans.

**Biodiversity Net Gain Assessment**

- 7.40 For the purposes of the gate two assessment BNG was calculated for both the Western and Eastern Routes. To identify habitats potentially impacted by the development proposals each corridor was buffered by 250 m. Both SRO options are currently predicted to result in a biodiversity net loss of between -24.88% and -30.42%. These calculations and the assumptions behind them are explained fully in Appendix C.

**Mitigation****Designated Sites**

- 7.41 A CEMP will be developed to implement measures *inter alia* to reduce fine sediment in surface runoff, through various means. Given the size and important nature of the River Nene and River Great Ouse it is likely that these watercourses would be traversed by horizontal direct drilling rather than open cut trenching, which would significantly reduce the risk of any pollution event affect the watercourses. Mitigation measures to be included in the CEMP are discussed in detail in Chapter 9: Water. Please refer to that chapter for details.

**Habitats Regulations Assessment***Hydrology and Water Quality*

- 7.42 To conform with requirements regarding both fine sediment runoff and toxic spillages / leaks, a range of standard measures can be deployed during the construction period, which would normally be set out in a Construction Environmental Management Plan (CEMP). For example, measures to reduce fine sediment in surface runoff may include the usage of temporary lagoons, tanks and fabric silt fences / silt screens. Furthermore, a temporary drainage system maybe developed to adequately treat runoff before it enters surface waterbodies, involving features such as drain covers, earth bunds, geotextile silt screens and proprietary treatment. Given the size and important nature of the River Nene and River Great Ouse it is very likely that these watercourses would be traversed by Horizontal Direct Drilling rather than open cut trenching. Such an approach would itself significantly minimise any risk of pollution events entering the rivers even if they did arise.

*Protected Species*

- 7.43 In order to ensure no effect on barbastelle bats the following will be required for the two routes, the Eastern Route in particular (which is closest to the Eversden & Wimpole Woods SAC):
- Bat surveys in line with Bat Conservation Trust Guidance must be undertaken of all hedgerows and treelines and ditches to be crossed by the scheme;
  - Any crossings of such features should be undertaken as far as possible, by horizontal directional drilling or pipe jacking thus leaving the feature intact, and should be undertaken during daylight hours;
  - Where it is not possible to retain a feature in situ the material from the feature (e.g., hedge and tree boles) should be retained and restored/replaced immediately after works. Any removal of such features should take place during October to February when bats are generally inactive.
- 7.44 It is also strongly recommended that the pipeline route is located a minimum of 1km from the SAC boundary (as the 2.5 km zone around the route currently includes the SAC).

## Biodiversity Net Gain Assessment

- 7.45 It is recommended that at gate three the Strategic Significance for each habitat type/parcel should be further refined using an 'opportunity mapping' approach. Using a combination of open-source habitat datasets alongside Local Planning Policy and any mapped Local Nature Recovery / Biodiversity Opportunity Areas.
- 7.46 It is also recommended that the presence of irreplaceable habitats, including ancient woodland, should also be identified, clearly defined to the project team and avoidance strategies developed.
- 7.47 Surveys to 'ground truth' the BNG assessment should be undertaken prior to the Gate three assessment to allow for the BNG Assessment to be refined, habitat classifications to be refined, habitat conditions to be updated and for mitigation and/or enhancement opportunities fully developed.
- 7.48 The final strategic significance scores for each site/habitat and strategies for mitigation and enhancement should be agreed following a series of stakeholder engagement sessions and presented at Gate three submission.

## Conclusions

### Designated Sites

- 7.49 Many designated sites have been identified to be hydrologically connected to watercourses which the Eastern and Western Routes cross. Designated sites may be affected by turbidity where the pipeline route crosses a hydraulically connected aquifer with shallow groundwater. This may be the case in the Nene valley near Castor Meadows SSSI (Eastern and Western Route), Woodwalton SSSI (the Eastern Route), and Debden Water (the Eastern Route).
- 7.50 A CEMP will be developed to implement measures *inter alia* to reduce fine sediment in surface runoff, through various means. Given the size and important nature of the River Nene and River Great Ouse it is likely that these watercourses would be traversed by horizontal direct drilling rather than open cut trenching, which would significantly reduce the risk of any pollution event affect the watercourses.

### Habitats Regulations Assessment

#### *Hydrology and Water Quality*

- 7.51 A definitive conclusion would be premature at gate two given that significant further work is to be undertaken. However, where the route corridors cross the Rivers Great Ouse and Nene upstream of the European sites it is likely that measures can be devised during later stages of scheme design to avoid an adverse effect on integrity.

#### *Protected Species*

- 7.52 A definitive conclusion would be premature at gate two given that significant further work is to be undertaken. However, where the route corridors cross linear habitat features within 5km of Eversden & Wimpole Woods SAC it is likely that measures can be devised to avoid an adverse effect on integrity.

### Biodiversity Net Gain Assessment

- 7.53 For the gate two assessment, both SRO options are predicted to result in a biodiversity net loss of between -24.88% and -30.42%.
- 7.54 It is recommended that at gate three the Strategic Significance for each habitat type/parcel should be further refined using an 'opportunity mapping' approach. It is also recommended that the presence of irreplaceable habitats, including ancient woodland, should also be identified, clearly defined to the project team and avoidance strategies developed.

- 7.55 Surveys to 'ground truth' the BNG assessment should be undertaken prior to the gate three assessment to allow for the BNG Assessment to be refined, habitat classifications to be refined, habitat conditions to be updated and for mitigation and/or enhancement opportunities fully developed.
- 7.56 The final strategic significance scores for each site/habitat and strategies for mitigation and enhancement should be agreed following a series of stakeholder engagement sessions and presented at gate three submission.

## 8. Land & Soil

### Introduction

- 8.1 This chapter provides an assessment of the extent of agricultural land lost to the A2AT scheme. The land take is reported with reference to Natural England's Agricultural Land Classification dataset<sup>19</sup>, with the focus on potential loss of the Best and Most Versatile (BMV) agricultural land.
- 8.2 An important caveat to the assessment is that the calculation of BMV agricultural land 'lost' to the construction of the A2AT scheme, will in the main be temporary during construction. In many places, the pipeline is likely to be constructed at a depth sufficient to allow agriculture to continue on the surface once construction works are complete. There will be opportunities at a later stage in design development to optimise the route to avoid permanent impacts and this would be done in consultation with local landowners.

### Methodology

#### Assessment Methodology

- 8.3 The quality of agricultural land in England & Wales is assessed according to the Agricultural Land Classification (ALC) system<sup>20</sup>, which classifies agricultural land into five grades from Grade 1 land (excellent quality) to Grade 5 land (very poor quality). Grade 3 is subdivided into Subgrades 3a and 3b. This is shown in Table 8-1.

**Table 8-1. Agricultural Land Classification (source: Natural England)**

ALC Grade	Description
1	<p><b>excellent quality agricultural land</b></p> <p>Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.</p>
2	<p><b>very good quality agricultural land</b></p> <p>Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.</p>
3	<p><b>good to moderate quality agricultural land</b></p> <p>Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.</p>

<sup>19</sup> <https://naturalengland-defra.opendata.arcgis.com/datasets/Defra::provisional-agricultural-land-classification-alc-england/about>

<sup>20</sup> Ministry of Agriculture, Fisheries and Food (1988), Agricultural Land Classification of England and Wales – Revised guidelines and criteria for grading the quality of agricultural land

ALC Grade	Description
Sub-grade 3a	<b>good quality agricultural land</b> Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.
Sub-grade 3b	<b>moderate quality agricultural land</b> Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.
4	<b>poor quality agricultural land</b> Land with severe limitations which significantly restrict the range of crops and/or level of yields. It is mainly suited to grass with occasional arable crops (e.g., cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.
5	<b>very poor quality agricultural land</b> Land with very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

8.4 BMV agricultural land is considered to be the land most valuable for agriculture and, as a finite resource, should be preserved for this use where possible and not lost to development.

8.5 For the purposes of the environmental assessment, the proportion of land in each grade was identified using a Geographical Information System (GIS) and expressed both as a percentage of the total length of each route and as an absolute distance. A 10m wide corridor was assumed to enable a calculation of the area of land required for each of the routes to be made.

## Data Sources

8.6 The dataset used in this assessment is the Provisional Agricultural Land Classification, updated 2019.

## Limitations

8.7 The available ALC dataset does not distinguish between Grade 3a and Grade 3b. The former is considered BMV land whereas the latter is not, which means that an exact calculation of the extent of BMV land lost is not possible. Instead, the amount of Grade 1 and Grade 2 land within the footprint is reported as is the amount of Grades 1, 2, and 3 land. The amount of BMV land within the option footprints will be somewhere between the two.

8.8 The footprint of non-pipeline infrastructure such as pumping stations is not included in the assessment. There are four pumping stations and break pressure tanks currently anticipated to be required to support the A2AT scheme (for either route). The footprint of these is not known but they do appear to be located within BMV land and would thus likely lead to a permanent loss of this land.

## Assessment of Effects

8.9 The ALC classification of land within the footprint of the A2AT scheme is shown in Figure 8-1. From a simple visual inspection of this Figure, it is immediately apparent that the deletion of the northern section of the gate one SLR to WRZ5 option has removed the route from the largest concentration of Grade 1 agricultural land in the study area and thereby prevented much of the loss, or temporary loss, of the very best agricultural

land that would otherwise have occurred. The amount of agricultural land lost to the Eastern Route is set out in Table 8-2.

**Table 8-2. A2AT Eastern Route**

ALC Grade	Percentage of Route Length	Total Distance (km)	Total Area (ha) (Assuming 10m Corridor)
1	None	n/a	None
2	51%	52.69	52.69
3	47%	47.84	47.84
4	2%	1.79	1.79
5	None	n/a	None

- 8.10 The Eastern Route therefore requires between 52.69 and 100.53 hectares of BMV agricultural land for its construction. (Note that as 1 hectare equals 10,000m<sup>2</sup>, the assumption of a 10m corridor leads to the distance in km and the area in hectares being the same figure.)

**Table 8-3. A2AT Western Route**

ALC Grade	Percentage of Route Length <sup>21</sup>	Total Distance (km)	Total Area (ha) (Assuming 10m Corridor)
1	1%	0.98	0.98
2	54%	60.09	60.09
3	42%	46.49	46.49
4	3%	3.37	3.37
5	1%	0.84	0.84
Non-agricultural	1%	0.98	0.98

- 8.11 Thus, the Western Route requires between 61.07 and 107.56 hectares of BMV agricultural land for its construction.
- 8.12 Both routes pass through substantial areas of BMV agricultural land, which is not surprising as the region through with the A2AT scheme would be constructed is among the most productive agricultural areas in the UK<sup>22</sup>. On the face of it the Western Route appears to require more BMV and for its construction. However, as explained in the methodology, the exact figure for the routes cannot be readily determined from the data available, so it is possible that the Western Route might require less Grade 3a than the Eastern Route and so conceivable that the total BMV required for the Western Route is less than for the Eastern Route.

<sup>21</sup> Total not 100% owing to rounding

<sup>22</sup>

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/972103/regionalstatistics\\_overview\\_23mar21.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/972103/regionalstatistics_overview_23mar21.pdf)

## Mitigation

- 8.13 During construction soils will be protected through best practice soil management techniques such as those set out in DEFRA's Code of Practice for the Sustainable Use of Soils<sup>23</sup>. This will ensure, through careful handling of topsoil stripped for construction, that the valuable soil resource is not inadvertently harmed during the construction and soil storage process.
- 8.14 Further consideration could be given in gate three to the location of pumping stations and break pressure tanks to avoid BMV agricultural land if this is possible.

## Conclusions

- 8.15 The A2AT scheme is likely to require a relatively large amount of BMV agricultural land for its construction since the region through which it passes is contains a high proportion of such land. However, much of the loss would likely be temporary and during construction only, with best practice mitigation employed.
- 8.16 Development of the A2AT scheme since gate one has eliminated the loss of Grade 1 land which would have occurred in the gate one SLR to WRZ5 option, albeit that this loss would have been largely temporary.
- 8.17 It is not possible to be certain which route, Eastern or Western, would involve least loss of BMV agricultural land because the available data does not distinguish between the Sub-grade Grade 3a land (BMV) and Sub-grade 3b land (non-BMV). The calculated ranges suggest that the Eastern Route might perform better but this cannot be confirmed.

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<sup>23</sup> Defra (2009), Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.

# 9. Water Environment

## Introduction

- 9.1 This chapter of the EAR presents an initial baseline for the water environment and land drainage characteristics, identifies potential impacts from the construction, operation and decommissioning of the A2AT scheme, and highlights what mitigation may be needed to ameliorate potential adverse effects. For the purpose of this assessment, the water environment is defined as all surface and groundwater bodies including water quality, resources, and physical form and function. In addition, at this stage of scheme development, the water environment assessment is focused on fluvial flood risk. Other forms of flood risk will need to be considered as the scheme progresses.
- 9.2 Baseline information has been presented on Figure 9.1 (Water bodies and their attributes) and Figure 9.2 (Flood Risk). Appendix A includes a Water Framework Directive (WFD) Assessment. No Flood Risk Assessment (FRA) has been undertaken at this stage.

## Methodology

### Assessment Methodology

- 9.3 The following tasks were undertaken:
- Review of background information available from the gate one assessments and relevant legislation and planning policy, including the gate one Strategic Flood Risk Assessment / Preliminary Flood Risk Assessment.
  - Gap analysis of existing water environment / flood risk baseline and where necessary carried out further desk study of readily available online data sources. Baseline assessment has been supported by GIS analysis and presentation of key receptors on figures.
  - Initial determination of the importance of each water body and receptor that may be impacted by the construction or operation of the proposed water transfer pipeline with reference to best practice guidance.
  - Assessment of resulting effects.
- 9.4 A 500m study area either side of the pipeline's centre-line was considered within which water bodies that may be directly impacted by the A2AT scheme were identified. The 500m buffer was chosen, on the basis of professional judgement, as a reasonable distance from water receptors beyond which significant effects are unlikely.

### Data Reviewed

- 9.5 Relevant online data has been obtained and critically evaluated as part of developing a robust water environment baseline. To establish baseline information, a review of the following data sources has also been undertaken:

- Met Office Website<sup>24 25</sup>
- British Geological Survey (BGS) Geoindex website<sup>26</sup>
- EA Catchment Data Explorer website<sup>27</sup>
- EA Flood Map for Planning website<sup>28</sup>
- Cranfield Soil and ArgriFood Institute Soilscales Viewer<sup>29</sup>
- Topographical Data<sup>30</sup>
- Surface water flow data<sup>31</sup>
- Online Ordnance Survey (OS) and aerial maps<sup>32</sup>
- Defra MAGIC maps<sup>33</sup>
- Association of Drainage Authorities (ADA) Internal Drainage Boards Map<sup>34</sup>

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<sup>24</sup> Met Office (2022). Met Office Historic station data. (Online) Available at: [Historic station data - Met Office](#)

<sup>25</sup> Met Office (2022). Met Office UK and regional series. (online) Available at: Met Office (2022). Met Office Historic station data. (Online) Available at: [Historic station data - Met Office](#)

<sup>26</sup> British Geological Society (n.d.). Onshore 'GeoIndex' [Online]. Available at: <http://mapapps2.bgs.ac.uk/geoindex/home.html>

<sup>27</sup> Environment Agency (n.d.a). Catchment Data Explorer [Online]. Available at: <http://environment.data.gov.uk/catchment-planning/>

<sup>28</sup> Environment Agency (n.d.b). Flood Risk Maps for Planning [Online]. Available at: <https://flood-map-for-planning.service.gov.uk/>

<sup>29</sup> Cranfield Soil and AgriFood Institute (CSAI) (2022). Soilscales Viewer. (Online) Available at: [Soilscales soil types viewer - National Soil Resources Institute. Cranfield University \(landis.org.uk\)](#)

<sup>30</sup> Topographic-map.com (2022). [Online]. Available at: [United Kingdom topographic map, elevation, relief \(topographic-map.com\)](#)

<sup>31</sup> National River Flow Archive [Online]. Available at: <https://nrfa.ceh.ac.uk/>

<sup>32</sup> [www.ordnancesurvey.co.uk](http://www.ordnancesurvey.co.uk)

<sup>33</sup> Defra Multi-agency Geographic Information for the Countryside (MAGIC) map (Online) Available at: <https://magic.defra.gov.uk/magicmap.aspx>

<sup>34</sup> Association of Drainage Authorities (ADA) Representing Drainage Water Level and Flood Risk Management Authorities (2022). Internal Drainage Boards Map [Online]. Available at: [Internal Drainage Boards Map - Association of Drainage Authorities \(ada.org.uk\)](#)

## Importance and Impact Assessment Criteria

- 9.6 The importance of surface and groundwater bodies has been determined based on the criteria in Table 9-1.

**Table 9-1 Evaluating the importance for surface water and groundwater**

Importance	Type of Receptor			
	Groundwater	Surface Water	Morphology	Flood Risk
<b>Very High</b>	Principal aquifer providing a regionally important resource and/or supporting a site protected under European Commission (EC) and UK legislation Ecology and Nature Conservation. Groundwater locally supports Groundwater Dependent Terrestrial Ecosystems (GWDTE). Source Protection Zone (SPZ) 1.	Watercourse having a WFD classification shown in a RBMP and $Q95 \geq 1.0 \text{ m}^3/\text{s}$ . Sites protected/designated under EC or UK legislation (SAC, SPA, SSSI, Ramsar, salmonid water) / Species protected by EC legislation Ecology and Nature Conservation	Unmodified, near to or pristine conditions, with well-developed and diverse geomorphic forms and processes characteristic of river type	Essential infrastructure or highly vulnerable Development.
<b>High</b>	Principal aquifer providing locally important resource or supporting river ecosystem. Groundwater supports a GWDTE. SPZ2	Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ . Species protected under EC or UK legislation. Ecology and Nature Conservation	Conforms closely to natural, unaltered state and would often exhibit well developed and diverse geomorphic forms and processes characteristic of river type, with abundant bank side vegetation. Deviates from natural conditions due to direct and/or indirect channel, floodplain, and/or catchment development pressures	More vulnerable development.
<b>Medium</b>	Aquifer providing water for agriculture or industrial use with limited connection to surface water. SPZ3	Watercourses not having a WFD classification shown in a RBMP and $Q95 > 0.001 \text{ m}^3/\text{s}$	Shows signs of previous alteration and/ or minor flow regulation but still retains some natural features, or may be recovering toward conditions indicative of the higher category	Less vulnerable development.
<b>Low</b>	Unproductive strata	Watercourses not having a WFD classification shown in a RBMP and $Q95 < 0.001 \text{ m}^3/\text{s}$	Substantially modified by past land use, previous engineering works or flow regulation and likely to possess an artificial cross-section (e.g. trapezoidal) and would probably be deficient in bedforms and bankside vegetation. Could be realigned or channelised with hard bank protection, or culverted and enclosed. May be significantly impounded or abstracted for water resources use. Could be impacted by navigation, with	Water compatible development.

associated high degree of flow regulation and bank protection, and probable strategic need for maintenance dredging. Artificial and minor drains and ditches would fall into this category.

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Professional judgement is applied when assigning an importance category to all water features.

All controlled waters are protected from pollution under the Environmental Permitting (England and Wales) Regulation 2016 and the Water Resources Act 1991 (as amended), and future WFD targets also need to be considered.

Based on the water body 'Reach Conservation Status' developed from EA conservation status guidance as DMRB guidance does not currently provide any importance criteria for morphology.

- 9.7 Potential impacts have been considered as adverse or beneficial, short term or long term, likely or unlikely. The magnitude of each impact is based on the following criteria reflecting EIA best practice for the water environment:
- **Major Adverse:** Results in the loss of attribute and/ or quality and integrity of the attribute.
  - **Moderate Adverse:** Results in effect on integrity of attribute, or loss of part of attribute.
  - **Minor Adverse:** Results in some measurable changes in attributes quality or vulnerability.
  - **Negligible:** Results in effect on attribute, but of insufficient magnitude to affect the use or integrity.
  - **Minor Beneficial:** Results in some beneficial impact on attribute or a reduced risk of negative effect occurring.
  - **Moderate Beneficial:** Results in moderate improvement of attribute quality.
  - **Major Beneficial:** Results in major improvement of attribute quality.
- 9.8 At this stage in the project development impacts have been based on an issue basis rather than on an individual water body basis nor has the significance of effects been reported. The reasonable worst case is predicted based on professional judgement and taking into account the likely effectiveness of mitigation measures. This approach is commensurate to the level of scheme information.

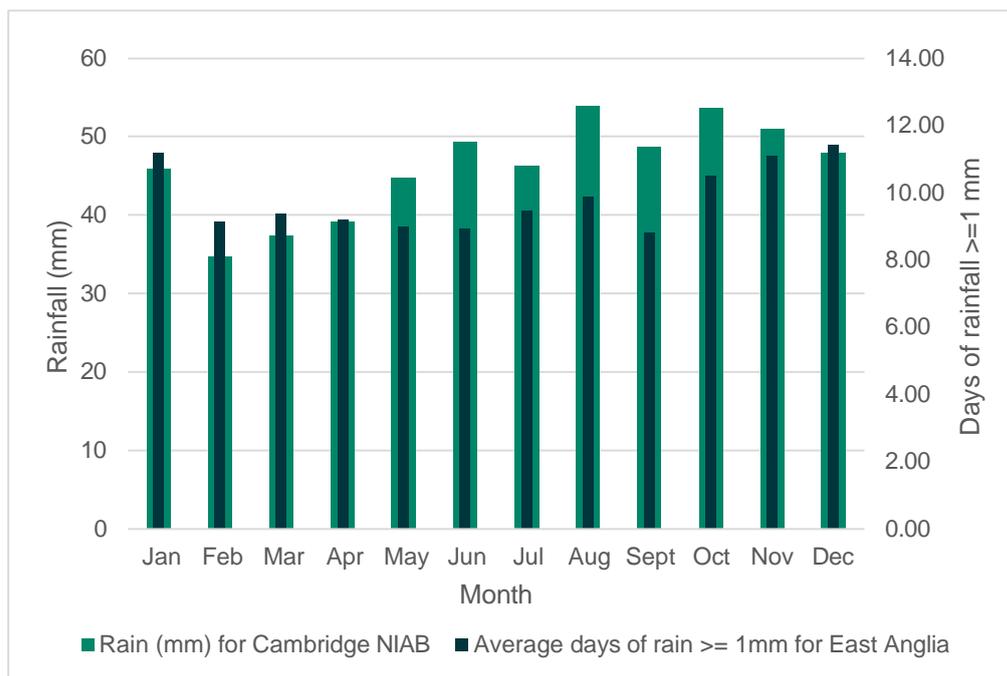
## Assumptions and Limitations

- 9.9 The following assumptions and limitations apply to this Level 2 Water Environment impact assessment of the two scheme options:
- Only a concept design has been undertaken and thus the availability of scheme information limits the level of detail and the confidence in the environmental assessment. Generally, a precautionary assessment has been undertaken based on reasonable worst-case assumptions, although in some cases it is simply not possible to carry out any meaningful impact assessment at this stage. In particular, there is no scheme information on water sources and the quality of that water, construction methods, layout of AGIs such as pumping stations or drainage strategies for them, hydrostatic testing, maintenance and any emergency situations that may require the pipe to be drained and disinfected.
  - The assessment is based on a baseline determined through desk study alone. No site visits, field investigations or water quality / flow monitoring of watercourses has been undertaken. The baseline is also based on a 500 m study area either side of the two route alignments, and this may need to be expanded at future assessment stages to take into account downstream attributes along watercourses where it is considered that the risk of significant adverse effects may be greater than 500 m.

# Assessment of Effects

## Climate

9.10 The climate of the Eastern and Western routes have been considered together. The nearest Met office weather monitoring station with historic data is Cambridge NIAB, which is located approximately 270 m east of the pipeline, at national grid reference (NGR) TL 43500 60600. Based on the available data from this weather station (1961-2021), it is estimated that this area is likely to receive an average of 545 mm of rainfall per year. Rainfall is highest from mid-autumn (October) to mid-winter (January) and generally peaks in August and October, with the least rainfall falling in February on average (Figure 1). Data for the average days of rainfall equal to or greater than 1mm is reported from the Met office UK and regional series for East Anglia from 1891 to 2021 and is represented on Graph 9-1. On average, there are 118 days per year with precipitation amount equal to or greater than 1 mm for East Anglia.



**Graph 9-1 Average monthly rainfall at Cambridge NIAB weather station and days of rainfall >= 1 mm in East Anglia**

## Western Route

### Topography and Land Use

9.11 The topography of the study area varies along the pipeline route, beginning at 9 m Above Ordnance Datum (AOD) towards the north of the scheme, increasing to between 40 mAOD and 68 mAOD where the scheme goes south beyond Chesterton towards Great Gidding. The elevation decreases to 30 mAOD west of St Neots and then the study area heads east, where the elevation increases to between 30 m and 60 mAOD (past Gamlingay) towards Hatley St George where heights of up to 80 mAOD are found. Continuing south, the topography varies between 30 mAOD and 65 mAOD before going eastwards under Royston where the elevation increases to 100 mAOD. Continuing southeast, the study area elevation increases again, up to heights of 140 mAOD near Langley Upper Green. The remaining study area (to the southern end of the scheme) remains around 100 mAOD.

- 9.12 The land use within the study area of the Western Route is predominantly agricultural. A mosaic of arable farmland and pasture with small patches of woodland and drains are scattered across the area. The route crosses many A-roads: A47, A1, A605, A14, A421, A505 and A10, as well as the M11 at the southern end of the route. The study area does not intersect any major urban towns or villages; however, many local access roads will be crossed. The small village of Perry adjacent to Grafham Water is within the study area, as well as Gamlingay and the southern tip of Newport. The study area crosses multiple railway lines, firstly at Peterborough then the East Coast Main Line near Tempsford, Hitchin-Cambridge Line near Royston, and finally the West Anglian Main Line at Newport at the south end of the scheme.

## Geology and Hydrogeology

- 9.13 An overview of the geological and hydrological units along the Western Route from north to south, what their aquifer classification is, and whether the route passes through sensitive groundwater related designations, such as Drinking Water Safeguard Zones and SPZ is provided in Appendix E.

### WFD Groundwater Bodies

- 9.14 The study area of the Western Route falls within five WFD groundwater bodies. The beginning of the Western Route, east of Peterborough falls within the Nene Mid Lower Jurassic Unit groundwater body (GB40502G402400) and the Northampton Sands groundwater body (GB40501G445500). South of St Neots, at Gamlingay, the study area falls within the Upper Bedford Ouse Woburn Sands groundwater body (GB40501G402200). The majority of the remainder of the Western Route falls within the Cam and Ely Ouse Chalk groundwater body (GB40501G400500) while the North Essex Chalk groundwater body (GB40501G400700) is within the study area, at the very end of the Western Route. Please refer to Appendix E for further information.

## Surface Water Features and their Attributes

- 9.15 The study area of the Western Route falls within six WFD water body management catchments: Welland, Nene, Cam and Ely Ouse, Ouse Upper and Bedford, Old Bedford and Middle Level, and Lee Upper. In total, the Western Route crosses 28 WFD waterbodies. These are described in Table 9-2 A WFD waterbody which is not crossed by the Western Route but is within the schemes 500m study area is Grafham Water (GB30538310). This water body is designated artificial and has a surface area of 6.316 km<sup>2</sup>. Graham Water under the WFD Cycle 2 classifications (2019) is classified as Moderate Status overall and is failing to meet Good Chemical Status.

**Table 9-2 WFD Surface Water Bodies Crossed by the Western Route**

Waterbody	Ecological Status / Potential	Chemical Status	Overall Target Objective	Hydromorphological Designation	Designated Reach
<b>Welland Management Catchment</b>					
Brook Drain (including Marholm Brook) (GB105031050595)	Poor ecological status	Fail	Moderate (2015)	Heavily modified	12.669 km
<b>Nene Management Catchment</b>					
Billing Brook (GB105032050330)	Bad ecological status	Fail	Good (2015)	Not designated artificial or heavily modified	8.333 km
Stanground Lode (GB105032050340)	Moderate ecological status	Fail	Good (2027)	Heavily modified	7.884 km
Nene - Islip to tidal (GB105032050381)	Moderate ecological status	Fail	Moderate (2015)	Heavily modified	67.246 km



Waterbody	Ecological Status / Potential	Chemical Status	Overall Target Objective	Hydromorphological Designation	Designated Reach
Debden Water (GB105033037490)	Moderate ecological status	Fail	Good (2027)	Heavily modified	2.693
Wicken Water (GB105033037540)	Moderate ecological status	Fail	Moderate (2015)	Not designated artificial or heavily modified	1.853 km
Cam (Newport to Audley End) (GB105033037550)	Moderate ecological status	Fail	Good (2027)	Heavily modified	5.166 km
Wendon Brook (GB105033037560)	Good ecological status	Fail	Good (2015)	Heavily modified	9.209 km
Rhee (DS Wendy) (GB105033037610)	Moderate ecological status	Fail	Moderate (2015)	Heavily modified	18.903 km
Whaddon Brook (GB105033038020)	Moderate ecological status	Fail	Moderate (2015)	Heavily modified	3.817 km
Mill River (GB105033038030)	Poor ecological status	Fail	Poor (2015)	not designated artificial or heavily modified	6.928 km
Mel (GB105033038060)	Moderate ecological status	Fail	Good (2027)	Heavily modified	4.668 km
Rhee (US Wendy) GB105033038100	Moderate ecological status	Fail	Good (2027)	Heavily modified	16.978 km
<b>Ouse Upper and Bedford Management Catchment</b>					
Millbridge and Potton Brooks (GB105033037820)	Moderate ecological status	Fail	Moderate (2015)	Heavily modified	15.565 km
Stone Brook (GB105033038190)	Moderate ecological status	Fail	Moderate (2015)	Heavily modified	7.962 km
Cock Brook (GB105033042810)	Moderate ecological status	Fail	Moderate (2015)	Heavily modified	17.774 km
Alconbury Brook (GB105033042810)	Moderate ecological status	Fail	Moderate (2015)	Heavily modified	22.548 km
Ellington Brook (Trib) (GB105033042820)	Moderate ecological status	Fail	Moderate (2015)	Heavily modified	3.418 km
Ellington Brook (GB105033042830)	status		(2015)		
(GB105033042870)	status		(2015)		
Colmworth Brook (GB105033043220)	Poor ecological status	Fail	Poor (2015)	not designated artificial or heavily modified	7.415 km

A2AT Gate Two Submission Begwary Brook (GB105033043230)	Moderate ecological status	Fail	Good (2015)	Project reference: A2A Transfer Heavily modified Project number: 60681402	6.509 km
Abbotsley and Hen Brook (GB105033043240)	Moderate ecological status	Fail	Moderate (2015)	Heavily modified	12.915 km
Duloe Brook (GB105033043260)	Moderate ecological status	Fail	Moderate (2015)	not designated artificial or heavily modified	2.563 km
Kym (GB105033043270)	Moderate ecological status	Fail	Moderate (2015)	Heavily modified	13.952 km
Diddington Brook (GB105033043310)	Good ecological status	Fail	Moderate (2015)	Heavily modified	5.577 km

Waterbody	Ecological Status / Potential	Chemical Status	Overall Target Objective	Hydromorphological Designation	Designated Reach
Ouse (Roxton to Earith) (GB105033047921)	Moderate ecological status	Fail	Moderate (2015)	Heavily modified	49.298 km
<b>Old Bedford and Middle Level Management Catchment</b>					
Middle Level (GB205033000050)	Moderate ecological status	Fail	Good (2027)	Artificial	191.506 km
<b>Lee Upper Management Catchment</b>					
Stort (at Clavering) (GB106038040130)	Moderate ecological status	Fail	Moderate (2015)	not designated artificial or heavily modified	15.707 km

## Water Resources

- 9.16 The Defra MAGIC Map indicates that there are four Drinking Water Safeguard Zones within the study area of the Western Route. Drinking Water Safeguard Zones (Surface Water) are catchment areas that influence the water quality for their respective Drinking Water Protected Area (Surface Water), which are at risk of failing the drinking water protection objectives. These non-statutory Safeguard Zones are where action to address water contamination will be targeted, so that extra treatment by water companies can be avoided.
- 9.17 There is a small Drinking Water Safeguard Zone (Surface Water) located within the study area at Grafham Water. The designation code for this zone is SWSGZ1011 and the area is at risk from pesticides (metaldehyde and propyzamide).
- 9.18 A stretch of the pipeline from Stow Longa to Hatley St George is within Drinking Water Safeguard Zone (Surface Water) SWSGZ1012 and is at risk from pesticides (carbetamide, metaldehyde, propyzamide, and quinmerac). This Drinking Water Safeguard Zone is also within the study area where the pipeline travels eastwards, south of Royston.
- 9.19 A stretch of the study area from Kelshall and Therfield, to Clavering is within Drinking Water Safeguard Zone SWSGZ4006. This zone is at risk from pesticides (Carbetamide, Chlorthal. Chlorotoluron, Clopyralid, Metaldehyde and Propyzamide).
- 9.20 The study area for the final stretch of the pipeline for the Western Route is located in Drinking Water Safeguard Zone SWSGZ1029. This zone is at risk from Nitrates, and pesticides (Carbetamide, Clopyralid, Metaldehyde and Propyzamide).
- 9.21 The entire study area is within a Nitrate Vulnerable Zone (NVZ), crossing over six separate, designated NVZs. NVZs are areas designated as being at risk from agricultural nitrate pollution. The designations are made in accordance with the Nitrate Pollution Prevention Regulations 2015. Waters are defined within the Nitrates Directive as polluted if they contain or could contain, if preventative action is not taken, nitrate concentrations greater than 50mg/l. These are the River Welland NVZ, River Nene NVZ, Middle Level NVZ, Great Ouse NVZ, Ely Ouse and Cut-off channel NVZ and Lee NVZ.

## Flood Risk

- 9.22 The main risk of fluvial flooding in the study area of the Western Route arises from the River Nene, the River Great Ouse, River Rhee (near Tadlow) and the River Granta.
- 9.23 The Environment Agency's Long Term Flood Risk Mapping shows the study area is primarily located in Flood Zone 1 (less than 0.1% (1 in 1000-year) annual exceedance probability (AEP) in any given year). The



(<1% (less than 1 in 100 year) AEP) at the following locations (Figure 9-1 indicates the chainage location from GIS):

- Around Howe Drain and Ram Dike (Ch.0 – Ch.1150);
- Where the scheme crosses the River Nene and Back Dike (Ch.9650);
- Where the pipeline runs adjacent to Billing Brook from Oundle Road to Peterborough Transmitting Station;
- At Great Gidding resulting from Alconbury Brook (Ch.24000);
- At Winick resulting from an unnamed watercourse (Ch. 26700);
- At points north and south of Leighton Bromswold resulting from 2 un-named watercourses (Ch. 30700 and Ch. 32200);
- West of Spaldwick from an unnamed watercourse (Ch.34750);
- Where the scheme crosses the River Kym (Ch.45400);
- At points north and south of Upper Staploe resulting from Duloe Brook (Ch. 49300) and Honeydon Brook (C.51100);
- Where the scheme crosses Colmworth Brook (Ch.52550);
- Where the scheme crosses a tributary of South Brook, and South Brook itself near Colesden (Ch. 54000 and Ch. 54850);
- Where the scheme crosses the River Great Ouse and the River Ivel at Tempsford (Ch. 57750);
- Where the scheme crosses the East Coast Main Line near Little Biggin Wood (Ch. 60250);
- Where the scheme crosses Millbridge Brook near Gaminglay (Ch. 68500);
- Where the scheme crosses the River Cam (Ch. 74650);
- Where the scheme crosses Running Ditch (Ch. 76500);
- Where the scheme crosses Cheney Water (Ch. 78200);
- At Ducks Nest (Ch. 90700);
- Where the scheme crosses the River Stort (Ch. 97950);
- Where the scheme crosses a tributary of the River Stort (Ch. 100650); and
- Where the scheme crosses the River Cam / Granta at Newport (Ch.106350 & Ch. 110050).

## Internal Drainage Boards

- 9.24 Internal Drainage Boards (IDBs) are a type of local public authority that manages water levels in England where there is a special need for drainage. IDBs undertake works to reduce flood risk to people and property and manage water levels for agricultural and environmental needs within their district.

- 9.25 Under the Land Drainage Act 1991, Drainage Boards have a duty to exercise a general supervision over all matters relating to the drainage of land within its district. Also contained within this Act are the various permissive legal powers (i.e., they are not a requirement on the Board) that permit a Board to undertake the operation, maintenance and improvement of any watercourse within its area. (Main Rivers are excluded from this power).
- 9.26 The Western Route crosses four IDB's in total. Areas of IDBs have been provided where available.
- 9.27 At the beginning of the Western Route there is the Welland and Deepings IDB which covers an area of 32,400 ha from Peterborough and Stamford in the south to Fosdyke and Kirton in the north.
- 9.28 The Western Route crosses the Conington and Holme IDB west of Folksworth until just north of Great Gidding. Conington and Holme IDB covers an area of 1113 ha.
- 9.29 As the Western Route continues south towards Grafham Water, the route crosses the Alconbury and Ellington IDB which covers sporadic areas from Hamerton to Leighton Bromswold, across to Alconbury Weald and Offord Cluny.
- 9.30 At Roxton, the Western Route crosses through the Bedfordshire and River Ivel IDB and continues to do so until west of Gamlingay.

## Eastern Route

### Topography and Land Use

- 9.31 The topography of the study area varies along the Eastern Route, beginning at 9 mAOD towards the north of the scheme, increasing to between 40 mAOD and 68 mAOD where the scheme goes south beyond Chesterton towards Great Gidding. As the scheme goes east past Sawtry and towards Little Raverley, heights decrease to between 4 mAOD and 15 mAOD before increasing to heights of up to 36 mAOD near Old Hurst. The study area continues southwards, between St Ives and Needingworth where the elevation decreases to a minimum height of 6 mAOD. Between Bar Hill and Hardwick, heights between 30 mAOD and 60 mAOD are found before decreasing to 17 mAOD near Haslingfield. There is minimal variation in the topography of the study area between Barton and Thriplow where elevations are between 17 mAOD and 25mAOD. Elevation increases to around 60 mAOD near Great Chesterford, before increasing again to over 100 mAOD near Littlebury. The remainder of the study area has heights between 50m and 125m as it continues south.
- 9.32 The land use within the study area of the Eastern Route is predominantly agricultural, mostly consisting of arable farmland and pasture with patches of woodland and drains scattered across the area. The Eastern Route crosses many A-roads: A47, A1, A605, A141, A1123, A14, A428, A603, A10, A605 as well as the M11 at the southern end of the route. The study area does not intersect any major urban towns or villages, although many local access roads will be crossed. Some parts of local towns and villages of Sawtry, Needingworth, St Ives, Swaversy, Bar Hill, Haslingfield, Foxton, Thriplow and Wendens Ambo are within the study area. Many railway lines cross the study area, including one at Peterborough, the East Coast Main Line near Woodwalton, the Cambridge Line at Foxton, and the Benthall Green and King's Lynn Line near Wendens Ambo. The study area includes one airfield, near Duxford interchange, Duxford Airfield.

### Geology and Hydrogeology

- 9.33 Appendix E presents the geological and hydrogeological units along the Eastern Route, what their aquifer classification is, and whether the Eastern Route passes through sensitive groundwater related designations, such as Drinking Water Protected Areas, Drinking Water Safeguard Zones and Source Protection Zones.

#### *WFD Groundwater Bodies*

- 9.34 The study area of the Eastern Route falls within five WFD groundwater bodies. The Eastern Route follows the same course as the Western Route from Peterborough to the area between Yaxley and Huntingdon and

therefore falls within the same two WFD groundwater bodies (GB40502G402400 and GB40501G445500) as the Western Route which are described in Table 9-2. Northwest of Cambridge, the study area of the Eastern Route falls within the Cam and Ely Ouse Woburn Sands groundwater body (GB40501G445700). The Cam and Ely Ouse Woburn Sands covers a total area of 9527.594 ha and under the WFD Cycle 2 classifications (2019), was classified as being at Good Status overall, quantitatively and chemically. The WFD groundwater bodies falling within the remainder of the study area of the Eastern Route are that of the Western Route (GB40501G400500 and GB40501G400700). Please refer to Appendix E for further information.

## Surface Water Features and their Attributes

9.35 The study area of the Eastern Route falls within five management catchments: Welland, Nene, Cam and Ely Ouse, Ouse Upper and Bedford, and Old Bedford and Middle Level. the Eastern Route crosses 21 WFD surface water bodies. Table 9-3 provides details for each waterbody which the Eastern Route crosses, however, excludes the following watercourses which are already included in Table 9-2 as they cross both the Western Route and the Eastern Route.

- Brook Drain (including Marholm Brook);
- Billing Brook;
- Stanground Lode;
- Nene - Islip to tidal;
- Debden Water;
- Cam (Newport to Audley End);
- Rhee (DS Wendy); and
- Middle Level

**Table 9-3 WFD Surface Water Bodies Crossing the Eastern Route (only waterbodies not already described in Table 9-2 are included)**

Waterbody	Ecological Status / Potential	Chemical Status	Overall Target Objective (by)	Hydromorphological Designation	Designated Reach
<b>Cam and Ely Ouse Management Catchment</b>					
Tributary of Cam (GB105033037570)	Moderate ecological status	Fail	Moderate (2015)	Heavily modified	5.049 km
Cam (Audley End to Stapleford) (GB105033037590)	Poor ecological status	Fail	Moderate (2015)	Heavily modified	19.912 km
Hoffer Brook	Moderate	Fail	Good	Heavily modified	2.778 km
Bin Brook (GB105033038120)	Moderate ecological status	Fail	Good (2015)	Heavily modified	9.747 km
Bourn Brook	Moderate	Fail	Moderate	Heavily modified	25.839 km
Old West River (GB105033042680)	Moderate ecological status	Fail	Moderate (2027)	Heavily modified	40.949 km
(GB105033042690)	ecological status		(2015)		



Waterbody	Ecological Status / Potential	Chemical Status	Overall Target Objective (by)	Hydromorphological Designation	Designated Reach
<b>Ouse Upper and Bedford Management Catchment</b>					
Fen Drayton Drain (GB105033042740)	Good ecological status	Fail	Good (2021)	Heavily modified	3.79 km
Swavesey Drain (GB105033042770)	Poor ecological status	Fail	Poor (2015)	not designated artificial or heavily modified	9.564 km
Marley Gap Brook (GB105033042800)	Moderate ecological status	Fail	Moderate (2015)	Heavily modified	8.365
Alconbury Brook (GB105033042820)	Moderate ecological status	Fail	Moderate (2015)	Heavily modified	22.548 km
Ouse (Roxton to Earith) (GB105033047921)	Moderate ecological status	Fail	Moderate (2015)	Heavily modified	49.298 km
<b>Middle Level Management Catchment</b>					
Bury Brook (GB105033043140)	Moderate ecological potential	Fail	Good (2027)	Heavily modified	13.812 km
<b>Old Bedford and Middle Level Management Catchment</b>					
Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain) (GB205033000010)	Moderate ecological status	Fail	Good (2027)	Artificial	18.777 km

## Water Resources

- 9.36 The Defra MAGIC Map indicates that there is one Drinking Water Safeguard Zone within the study area of the Eastern Route. Drinking Water Safeguard Zones (Surface Water) are catchment areas that influence the water quality for their respective Drinking Water Protected Area (Surface Water), which are at risk of failing the drinking water protection objectives. These non-statutory Safeguard Zones are where action to address water contamination will be targeted, so that extra treatment by water companies can be avoided.
- 9.37 The final stretch of the pipeline for the Eastern Route is located in the same Drinking Water Safeguard Zone as the Western Route (designation code: SWSGZ1029). This zone is at risk from Nitrates, and pesticides (Carbetamide, Clopyralid, Metaldehyde and Propyzamide).
- 9.38 The entire study area is within a Nitrate Vulnerable Zone (NVZ), crossing over five separate, designated NVZs. NVZs are areas designated as being at risk from agricultural nitrate pollution. The designations are made in accordance with the Nitrate Pollution Prevention Regulations 2015. Waters are defined within the Nitrates Directive as polluted if they contain or could contain, if preventative action is not taken, nitrate concentrations greater than 50mg/l. These are the River Welland NVZ, River Nene NVZ, Middle Level NVZ, Counter drain and 100 ft. drain NVZ and Ely Ouse and Cut-off channel NVZ.

## Flood Risk

9.39 The main risk of fluvial flooding in the study area of the Eastern Route arises from the River Nene and the River Great Ouse.

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9.40 The Environment Agency's Long Term Flood Risk Mapping shows the study area is primarily located in Flood Zone 1 (less than 0.1% (1 in 1000-year) annual exceedance probability (AEP) in any given year). The scheme itself passes into Flood Zone 2 (0.1% – 1% (1 in 1000 – 1 in 100 year) AEP) and Flood Zone 3 (<1% (less than 1 in 100 year) AEP) at the following locations (see Figure 9-2):

- Around Howe Drain and Ram Dike (Ch. 0 – Ch.1150);
- Where the scheme crosses the River Nene and Back Dike (Ch. 9650);
- Where the pipeline runs adjacent to Billing Brook from Oundle Road to Peterborough Transmitting Station;
- At Sawtry, resulting from Middle Level Catchwater Drain and Dukes Drain;
- At Broughton from an unnamed watercourse;
- Where the scheme crosses the River Great Ouse, resulting from the river itself, and multiple drains and tributaries (C.51550);
- Where the scheme crosses the A14 near Cambridge Services, resulting from unnamed watercourses (Ch. 57700);
- At two unnamed watercourses running north and south of Bar Hill (Ch. 59250 and Ch. 60900).
- Where the scheme crosses Bin Brook (Ch. 65000);
- Where the Tit Brook and Long Brook adjoin Bourn Brook south of Wimpole Road (Ch. 69100)
- Where the scheme crosses the River Cam (Ch. 73950);
- Where the scheme runs adjacent to Hoffer Brook (Ch. 75700);
- Where the scheme crosses a tributary of Hoffer Brook near Thriplow (Ch. 78100);
- Where the scheme crosses two unnamed watercourses west of Great Chesterford (Ch.84550 and Ch. 86050);
- Where the scheme crosses Chestnut Avenue, resulting from an unnamed watercourse (Ch. 90100);
- At Wendens Ambo where the scheme crosses the River Cam (Ch.92950);
- Where the scheme crosses Debden Water (C. 96250); and
- Where the scheme crosses the River Cam (C. 99950).

### **Internal Drainage Boards**

9.41 The purpose and duties of IDB's are outlined in Paragraphs 9.24 and 9.25. The Eastern Route crosses five IDBs in total. Areas of IDBs have been provided where available.

9.42 The Eastern Route follows the same course as the Western Route from Peterborough to the area between Yaxley and Huntingdon and therefore crosses Welland and Deepings IDB and the Conington and Holme IDB.

- 9.43 Where the Eastern Route goes east towards Sawtry and Woodwalton, it crosses Sawtry IDB. It covers an area of 1420 ha. The Eastern Route crosses Bluntisham IDB at Needingworth, east of St Ives. Shortly after at Swaversy, Swaversy IDB is located within the study area of the Eastern Route. These IDB's cover 417 ha and 462 ha respectively.

## Importance of Water Bodies

- 9.44 An initial assessment of water body importance based on the available data and information is presented in Table 9-4.

**Table 9-4 Initial determination of water body importance**

Water body	Summary of baseline	Importance <sup>^</sup>	Western Route, Eastern Route or both
Brook Drain (including Marholm Brook)	No flow data. Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High	Both
Billing Brook	No flow data. Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High*	Both
Stanground Lode	No flow data. Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High*	Both
Nene - Islip to tidal	Watercourse having a WFD classification shown in a RBMP and Q95≥1.0 m <sup>3</sup> /s.	Very High	Both
Debden Water	Debden Water is protected/designated under EC or UK legislation (SSSI).	Very High	Both
Wicken Water	No flow data. Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High*	Western Route
Cam (Newport to Audley End)	Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High	Both
Wendon Brook	No flow data. Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High*	Western Route
Rhee (DS Wendy)	Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High*	Both
Millbridge and Potton Brooks	No flow data. Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High*	Western Route
Whaddon Brook	Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High	Western Route
Mill River	No flow data. Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High*	Western Route
Mel	No flow data. Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High*	Western Route
Rhee (US Wendy)	Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High	Western Route

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		Project reference: A2A Transfer High*	Western Route Project number: 60681402
Stone Brook	No flow data. Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.		
Cock Brook	No flow data. Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High*	Western Route
Alconbury Brook	Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High	Both

Ellington Brook (Trib)	No flow data. Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High*	Western Route
Ellington Brook	Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High	Western Route
Colmworth Brook	No flow data. Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High*	Western Route
Begwary Brook	No flow data. Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High*	Western Route
Abbotsley and Hen Brook	No flow data. Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High*	Western Route
Duloe Brook	No flow data. Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High*	Western Route
Kym	Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High	Western Route
Diddington Brook	No flow data. Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High*	Western Route
Ouse (Roxton to Earith)	Watercourse having a WFD classification shown in a RBMP and $Q95 \geq 1.0 \text{ m}^3/\text{s}$ .	Very High	Both
Middle Level	No flow data. Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High*	Both
Stort (at Clavering)	No flow data. Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High*	Western Route
Tributary of Cam	No flow data. Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High*	Eastern Route
Cam (Audley End to Stapleford)	Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High	Eastern Route
Hoffer Brook	No flow data. Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High*	Eastern Route
Bin Brook	No flow data. Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High*	Eastern Route
Bourn Brook	No flow data. Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High*	Eastern Route
Fen Drayton Drain	No flow data. Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High*	Eastern Route
Swavesey Drain	No flow data. Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$ .	High*	Eastern Route
Marley Gap Brook	Counter Drain (Sutton and	No flow data. Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0$	

m<sup>3</sup>/s. A2AT Gate Two Submission

High\*

Eastern Route

Project reference: A2A Transfer

Project number: 60681402

No flow data.  
Watercourse having  
a WFD classification

Mepal IDB incl. Cranbrook Drain)	shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High*	Eastern Route
Bury Brook	No flow data. Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High*	Eastern Route
Old West River	No flow data. Watercourse having a WFD classification shown in a RBMP and Q95<1.0 m <sup>3</sup> /s.	High*	Eastern Route

Nene Mid Lower Jurassic Unit	Important for river baseflow and abstraction. Presence of Principal aquifer and SPZ1.	Very High	Both
Upper Bedford Ouse Woburn Sands	Important for river baseflow and abstraction. Presence of Principal aquifer and SPZ1.	Very High	Western Route
Cam and Ely Ouse Woburn Sands	Important for river baseflow and abstraction. Presence of Principal aquifer.	High	Eastern Route
Cam and Ely Ouse Chalk	Important for river baseflow and abstraction. Presence of Principal aquifer and SPZ1.	Very High	Both
North Essex Chalk	Important for river baseflow and abstraction. Presence of Principal aquifer and SPZ1.	Very High	Both

*Note ^ The initial importance score is a combined surface water quality and morphology score as at this stage it is not possible to determine the hydromorphology score as no site surveys have been undertaken.*

*Note \* The importance has been assumed due to no available flow data.*

- 9.45 At a future stage in the scheme design, it will be necessary to review the above scores and to take account of water body attributes that are downstream. The important of land affected by the scheme in terms of different forms of flood risk will also need to be considered.
- 9.46 The importance category for flood risk is based on the land use within the areas affected by a specific flood risk and relate to the vulnerability classifications defined in Annex 3 Of the National Planning Policy Framework (Department for Levelling Up, Housing and Communities (2012). Much of the study area is agricultural, thus would be classed as less vulnerable to flood risk and therefore of medium importance for flood risk. However, the presence of dwellings and other buildings/facilities would be more vulnerable and/or highly vulnerable. Water transmission infrastructure including pumping stations are considered to be water-compatible and would be of low importance in terms of flood risk. Finally, water treatment works that need to remain operational during times of flood are considered to be essential infrastructure and would be considered as a very high important receptor to changes in flood risk.

## Assessment of Effects - Construction

### Potential Surface Water Impacts

- 9.47 A number of activities during the construction phase are likely to generate impacts, which have the potential to lead to the contamination of watercourses and / or water supplies, or physical impacts to the form and function of watercourses, if unmitigated. However, these impacts tend to be short term, temporary, and in the case of a significant chemical spillage, unlikely. There are also effective methods that can be applied during construction works to manage the risk and mitigate the potential for adverse impacts.
- 9.48 Construction works will require vegetation clearance, topsoil and subsoil stripping, excavations, movement and storage of earth that will expose the ground to rainfall and make it more vulnerable to erosion. This can be compounded by the movement of heavy plant that may compact the ground reducing infiltration and encouraging runoff, which when on a gradient can lead to further erosion of fine sediments. The movement of plant on bare earth may also lead to rutting that can also become preferential pathways for site runoff which will entrain loose fine sediment as it flows downslope. Other sources of water and site runoff may include the need to dewater excavations, wash plant and vehicles, sweep roads at site entrance and exit points, and dampen down bare earth or haul roads during dry weather to control the generation of dust.
- 9.49 Although not an exclusive list, these points are indicative of the wide range of activities on construction sites for laying new pipelines or constructing above ground facilities that can encourage surface water runoff, that may also be characterised by high levels of fine sediments.

- 9.50 Site runoff containing high quantities of fine sediment can result in adverse impacts on water quality, flora and fauna. It may smother macrophytes, invertebrates and substrate important for fish and invertebrates (particularly fish spawning gravels). Fine sediments in runoff may also be associated with chemical pollutants or could increase flood risk where it builds up in sufficient quantities, and these points are discussed later. There may also be licenced or unlicensed water abstractions (i.e. PWS) that may be temporarily affected during the works. Once site runoff potentially containing high quantities of fine sediment reach a watercourse, the risk to the watercourse depends on the flow regime, the size of the watercourse, the fauna and flora that it supports, in addition to the concentration of fine sediment, the volume and rate of the discharge, and how continuous it is.
- 9.51 A range of chemical substances will be stored and used on site either for the construction works themselves (e.g., cement, paints, and other adhesives and sealants) or within plant and hand tools that are being used (such as fuel and hydraulic oils). Minor leaks or a more significant spillage could occur that may contaminate site runoff, which if not contained could lead to pollution of a nearby watercourse. Alternatively, works within or adjacent to a watercourse could lead to a direct chemical spill into that water body. Where groundwater ingress into the excavation is possible, assuming there may be sufficiently high groundwater levels (given the pipeline excavation would be relatively shallow), it is possible that this water may itself be contaminated from past land uses, and thus its discharge from the excavation to a nearby watercourse could be another pathway for chemical pollutants to reach a watercourse.
- 9.52 Contamination of surface waters may reduce water quality and impact aquatic fauna and flora. For example, pollution from oils can have an adverse effect on the water environment, as it spreads over the surface in a thin layer that stops oxygen getting to the plants and animals that live in the water. Concrete and cement products are highly alkaline and may affect the pH balance if released into a water body. Additional impacts from concrete/ cement fines are similar to those of other fine sediments, but may also cause damage to fish gill lamella, leading to fish suffocation and mortality.
- 9.53 The scheme includes the construction of a pipeline route which will necessitate the crossing of watercourses and drainage ditches in the area. The installation of a pipeline across a watercourse has the potential to result in both temporary and permanent modifications if not designed and constructed properly. To avoid adverse physical impacts to the watercourse it is recommended that the pipeline is installed beneath the bed using a non-intrusive technique that does not require an open excavation through the channel. However, there may be situations where an open-cut 'intrusive' crossing is necessary, although this is more likely for smaller drainage ditches and watercourses. Please note that at this stage no details of how each watercourse would be crossed by the pipeline is available.
- 9.54 There are a variety of options for non-intrusive pipeline crossings of watercourses including horizontal directional drill (HDD), boring and micro-tunnelling that will all avoid any direct impact on the channel, providing the pipeline is installed at sufficient depth beneath the bed as to ensure that it will not become exposed by bed scour in the future (typically a minimum depth of 1.5 m below the bed is required). These options also avoid construction works being close to the riverbanks as launch and receiving pits will invariably have to be set back from the channel to achieve the desired pipe depth and profile. However, dewatering of additional excavations may be required and drilling options will likely require the use of a drilling fluid such as bentonite. This is a 'mud' consisting of water and a naturally occurring mineral (i.e., clay) that enables the drilling fluid to have sufficient viscosity to carry the cutting chips back to the surface machine whilst lubricating and keeping the drilling bit cool. However, during drilling there is a risk that bentonite may 'frack-out' into the riverbed above. Although bentonite clay is water based, similar impacts to the release of site runoff containing a lot of fine sediment may occur where a 'frack-out' occurs.
- 9.55 Due to the rural study area, access to the working strip may require new field accesses where existing access is not available. It is possible that works to improve existing accesses or the construction of new temporary ones may require works to watercourses (e.g., installing temporary crossings or widening existing crossings). This may result in a temporary adverse impact on the channel, the significance of which will depend on the size and character of the watercourse being traversed. Any works required for the crossing of watercourses for access or other requirement at new above ground installations, are considered under the 'operation phase' as these would be permanent changes.

- 9.56 Prior to the new pipeline becoming operational it is best practice to test the integrity of the pipeline to identify and rectify any potential leaks. This is typically done using water pumped into the pipeline under pressure. At this stage, it is not known how much 'hydrostatic test water' would be required as it is expected that the pipeline would be tested in stages and the water recycled in between. It is also not known where the water would be sourced, although it is likely that this may be already treated water from the Eton Service Reservoir. If this is the case, it is possible that there would not be the need for any addition of biocides to the water to prevent organic growth in the pipeline after testing. At this stage, it is assumed that any water used for hydrostatic testing would be returned into the water treatment process and would not be discharged to a watercourse. It is also not known at this stage whether there would be a requirement for any additional pre-washing or disinfection of the new pipeline prior to it becoming operational.

## Potential Groundwater Impacts

- 9.57 Potential effects on groundwater receptors are:
- Turbidity affecting groundwater abstractions;
  - Pollution of aquifer and impact on abstractions and designated sites resulting from chemical spills; and
  - Disruption of groundwater flow to abstractions, baseflow to watercourses and potentially designated sites.
- 9.58 Trench excavation and excavation for the launch and receiving pits, and foundations of the pumping stations may cause siltation of groundwater. This has the potential to cause impacts where the route passes within SPZ1 for a groundwater abstraction. This occurs at three locations along both routes: in the northwest of Peterborough (Eastern and Western Route), west of Royston (Western Route), and at Wendens Ambo (the Eastern Route).
- 9.59 The routes are not expected to encounter groundwater in the SPZ1s northwest of Peterborough and west of Royston. Groundwater is anticipated to be at shallow depth at Wendens Ambo. There is a risk that groundwater turbidity will increase during the construction period. However, the impact will be localised and temporary and can be minimised through implementation of a CEMP and best practices as described later.
- 9.60 Pumping stations and a pressure tank are located west of Cambridge and at Hatley St George on Oadby Member Till deposits overlying Gault Formation clay, and Langley Upper Green on Lowestoft Formation Till deposits. Therefore, the foundation construction will be situated on unproductive geology or secondary aquifers with limited groundwater resource. No abstractions or designated site are connected with these strata and therefore no significant impacts are expected.
- 9.61 Designated sites may be affected by turbidity where the pipeline route crosses a hydraulically connected aquifer with shallow groundwater. This is anticipated to be the case in the Nene valley near Castor Meadows SSSI (Eastern and Western Route), Woodwalton SSSI (the Eastern Route), and Debden Water (the Eastern Route).
- 9.62 Turbidity is considered to be a risk at Castor Meadows SSSI and Debden Water SSSI where the trench will intercept a high permeability aquifer linked to the SSSI water features. However, based on the distance to the designated features it is considered to be a low risk, and the impact will be localised and temporary and can be minimised through implementation of a CEMP and best practices.
- 9.63 Woodwalton SSSI may not be affected by turbidity if groundwater investigations determine there to be no hydraulic connection (i.e., if the trench is not in the peat deposits associated with the SSSI). If groundwater investigations determine that the trench is in the peat deposits, then the low permeability should prevent the migration of suspended solids to surface water features.
- 9.64 Pollution risks from chemical spills will be minimised through implementation of a CEMP and best practices. Large parts of the routes are not underlain by aquifers of high importance, with Principal aquifers being situated near the start and end of the routes with very limited exposure to SPZ1s. Extensive areas of

unproductive geology of low importance underlie the routes. Therefore, only limited parts of the route are considered to be highly sensitive to pollution spills. The risk is considered to be low and the impact will be localised and temporary.

- 9.65 Trenching may draw groundwater into the excavation thus affecting groundwater levels and diverting groundwater flow from the in-situ conditions. The impact will be minimised through implementation of a CEMP and best practices and will be localised and temporary.

### **Potential Flood Risk Impacts**

- 9.66 Site clearance and compaction of the ground from plant movement may increase the rate and volume of surface water runoff that may lead to increased surface water flooding on the site and flows in the receiving watercourse.
- 9.67 Should a large fluvial flood event occur during the construction period, out of bank flows may erode bare surfaces that have been stripped of vegetation or earth and other material stockpiles and potentially transport this material back into the watercourse as the flood water recedes. This material plus any woody debris from site clearance or other equipment may then be re-deposited further downstream within the channel, or lead to further blockages of culverts, which may result in further adverse impacts downstream.
- 9.68 In addition, it is also possible that flood waters will enter excavations and will become trapped and thus will need to be pumped out and discharged with appropriate pollution management measures. Temporary impoundments may also result in localised flooding if these are left in place during a flood event.
- 9.69 Ancillary infrastructure during the construction phase, such as site compounds, haulage routes, and soil stockpiling are yet to be specified and so it is not possible to undertake any assessment at this stage. These sites may be susceptible to flood damage and be temporary flood risk receptors in their own right. They may also temporarily occupy flood plain storage areas, and compensation may be required. These matters will need to be considered at future assessment stages.

### **Surface Water Mitigation**

- 9.70 During the construction phase, all works would be carried out in accordance with the mitigation measures set out in a CEMP. The implementation of standard mitigation measures would avoid or reduce any potential adverse effects on surface water receptors (quality and flow) during construction. Best practice guidance would be referred to including Guidance on Pollution Prevention notes, British Standards, and advice from the Construction Industries Research and Information Association.
- 9.71 The CEMP would comprise good practice methods that are established and effective measures to which the development would be committed to implementing through its planning permission. The measures within the document would focus on managing the risk of pollution to surface waters and the groundwater environment. It would also consider the management of activities within floodplain areas (i.e. kept to a minimum and with temporary land take required for construction to be located out of the floodplain as far as reasonably practicable).
- 9.72 It will be important to manage the construction works to minimise the risk to the water environment from construction site runoff and chemical spillages. Impacts can be avoided and reduced by minimising vegetation clearance, earthworks, working in wet weather, and reseeding as soon as possible. A temporary drainage system using sustainable drainage measures (e.g., storage lagoons) or proprietary measures (e.g. sand bags, straw bales, lamella clarifiers etc.) will be required. Plant should be clean, well maintained, fitted with spill kits and drip trays and plant nappies when stationary. Fuel and other chemicals must be stored securely in compounds on impermeable hard standing and away from watercourses, with staff trained in how to refuel plant and equipment safely. The use of fabric silt fences and maintaining riparian buffers along watercourses can help prevent uncontrolled site runoff reaching a watercourse. Overall, there are a wide variety of techniques that the Contractor can adopt to manage the risk effectively and no significant impacts should occur if this is done properly.

- 9.73 At this stage it is assumed that crossings of watercourses would be by using a non-intrusive trenchless technique (e.g., HDD) at a suitable depth beneath the bed level. Where this is undertaken it is anticipated that no significant adverse impacts on the morphology or function of the watercourse would occur. However, if an open-cut crossing is required, this should be justified and agreed with the Environment Agency and potentially the LLFA or IDB if the watercourse is Ordinary. Water in the channel will need to be diverted, flumed or over-pumped around the working area, and this may require a licence from the Environment Agency. It is also recommended that a pre-works ecology and hydromorphological survey is carried out to provide specific baseline information required to inform the reinstated channel once the pipeline has been installed. Reinstatement should be an enhancement on the existing baseline conditions and cover the working area as a minimum. However, as this is likely to be a relatively narrow reach, it is recommended that consideration be given to extending enhancement works for a short distance upstream and downstream, with landowner permission.
- 9.74 Where temporary access is required during construction works, vehicular crossing should be of a clear-span design. Where this is not possible, and a temporary pipe culvert is proposed, the pipes should be laid on a suitable geotextile so that they and any aggregate used can be fully removed from the channel upon completion of the works. Bags filled with clean pea sized gravel as opposed to sand should be used for the parapets of the temporary crossing. The location will need to be reinstated as found and thus a pre-works survey would be required.
- 9.75 The need for any water quality monitoring during the works would be established at a later stage. If required, the scope of monitoring is most likely to involve frequent visual and olfactory observations of watercourses affected by the works, at locations upstream and downstream of the area of activity (to allow comparison). The use of a calibrated hand-held water quality meter with sondes for parameters such as temperature, turbidity, pH and conductivity may also be useful for identifying adverse changes in water quality and the possibility that the flow has been contaminated. It may also be prudent for the Contractor to collect some baseline samples for laboratory analysis and to visit the locations of works before they start, in order to prepare a robust baseline.
- 9.76 HDD, or other trenchless watercourse crossing techniques, would be undertaken by a specialist contractor and the water column above the drill path would be continuously monitored during drilling for any signs that a 'frack-out' is occurring, noting that drill fluid leakage into a watercourse is not a common problem and a risk assessment can be undertaken in advance and an appropriate crossing method selected. However, where any leakage of bentonite water is observed in the watercourse or there is an increased perceived risk (i.e., lack of drilling mud returns) the HDD operation could be suspended, remediation action implemented, and subsequently the methodology for that crossing re-evaluated. It may be that the excavation, or boring, in that area must take place at a deeper depth than the minimum 1.5 m below the bed of the watercourse.
- 9.77 Various water related permissions may be required for the construction and permanent aspects of the scheme. The need for water permissions will need to be determined fully at a later stage but may include:
- Land Drainage Consent(s) under Section 23 of the Land Drainage Act 1991 (as amended) for works affecting the flow in Ordinary Watercourses;
  - Flood risk activity permit(s) from the Environment Agency under the Environmental Permitting Regulations (England and Wales) 2016 for temporary/permanent works in, over, under and within 8 m (or 16 m where planning permission not required) of a Main River;
  - Water activity permit(s) from the Environment Agency under the Environmental Permitting Regulations (England and Wales) 2016 during construction;
  - Full or temporary water abstraction licence under Section 24 of the Water Resources Act 1991 (if more than 20 m<sup>3</sup>/d is to be dewatered / over-pumped and exemptions do not apply);
  - Temporary water impoundment licence under Section 25 of the Water Resources Act 1991 where intrusive cable laying techniques may be required, and water needs to be over-pumped/diverted;

- Approvals from the IDBs (Land Drainage Byelaw consents); and
- Trade Effluent Consent under the Water Industry Act 1991 for the purposes of discharging trade effluent from welfare facilities during construction.

## Groundwater Mitigation

- 9.78 Mitigation to manage the risk to groundwater during construction works will be similar as described for the surface water environment above. Providing all works are carried out in accordance with a CEMP in keeping with best practice guidance then potential impacts to groundwater can be avoided and reduced and no significant effects are likely to occur.
- 9.79 Depending on the volumes of water that may flow into excavations from groundwater, and the proximity to watercourses and if it provides a baseflow, it may be necessary to return a portion of the groundwater that is dewatered back into the affected channel to augment flow. This can be assessed on a 'site by site' basis taking into account the duration of the works (which it is anticipated will not be very long). If mitigation is required to compensate for any loss of flow this can be agreed with the Environment Agency.

## Flood Risk Mitigation

- 9.80 During construction it is recommended that the following measures are adopted to manage the risk from flooding:
- Earth moving, in channel works, and excavations should, where possible, be undertaken during the drier months of the year (typically spring to early autumn);
  - Areas of vegetation clearance and top-soil strip should be limited as much as practicable. Where possible, vegetation clearance across the scheme will be phased to minimise the areas of exposed ground and reduce the potential risk for runoff;
  - The location of earth or other material stockpiles or other potentially higher risk activities (e.g. compounds or pipe lay down areas etc.) are to be located in as low a flood risk area as is possible by the site and works constraints;
  - An Emergency Response Plan will be implemented;
  - Spare pumps should be kept on site should additional pumping capacity be required;
  - Temporary dams along watercourses for open-cut crossings are not to be left wholly in place at the end of shifts;
  - Where relevant flood warning alerts will be set up with the Environment Agency. Safety of site workers is to take precedence over implementation of pollution prevention measures should a significant flood event occur; and
  - Where there are shallow excavations or more widespread site clearance these should be constructed during the drier months of the year and seeded with grass as soon as possible to bind soil and reduce risk of erosion during a flood event.

## Assessment of Effects - Operation

### Potential Surface Water Impacts – Eastern and Western Routes

- 9.81 During the operational phase, there is the possibility of adverse impacts on water quality in watercourses from run-off and spillages from new above ground installations and potentially maintenance activities. A new conditioning plant and service reservoir in the Affinity Water resource zone WRZ5 at Sibleys Service

Reservoir will store sodium hydroxide and sodium hypochlorite. Sodium hydroxide and sodium hypochlorite will be stored on site in volumes c. 100-250 m<sup>3</sup> and 25-75 m<sup>3</sup> respectively (depending on transfer flow option) and thus there is a spillage risk that will need to be managed accordingly through design and site operation.

- 9.82 There is also the possibility of water being transferred in the pipeline to leak to local watercourses that reside in different river catchments, which could lead to water quality impacts and potentially cross contamination by non-native invasive species. However, water being transferred would have first been treated therefore the risk to any receiving watercourses would be low. The impact would also be temporary, short term and unlikely to occur with proper maintenance of the pipeline
- 9.83 With regards to the pipeline itself, this will be below ground and a passive structure that will not have any long term impact on surface water quality or hydrology. As described earlier, the water passing through the pipeline will have already been treated and thus there will be not potential for catchment transfer impacts.
- 9.84 In terms of hydromorphology, there is the potential for permanent impacts to watercourses where new access is required across watercourses. However, at this stage no locations are confirmed and thus it is not possible assess the impact in any detail.

### **Potential Groundwater Impacts – Western Route**

- 9.85 The route will cut a trench, lay the pipeline, and it is assumed it will be infilled with permeable material as ballast (e.g., gravel) in bedrock where there are no superficial deposits, and elsewhere in superficial deposits. This has the potential to impede groundwater flow, or divert groundwater flow along the trench fill, or drain groundwater depending on the nature of the surrounding aquifers.
- 9.86 The pipeline route crosses sandstone and limestone bedrock geology on the western side of Peterborough. These units are classified as principal aquifers. Groundwater monitoring data is not available in this area. Groundwater is anticipated to flow south easterly toward the River Nene and discharge as baseflow. The route is elevated above the Nene valley and therefore a water table deeper than the pipeline and trench (approximately 2 m depth) is expected. Therefore, the pipeline is not expected to affect groundwater flow in these aquifers west of Peterborough, and as such groundwater abstraction in the source protection zones 1 and 2 will also not be affected.
- 9.87 In the Nene valley the pipeline is anticipated to intercept groundwater in the superficial deposits aquifer, but due to the limited profile of the pipeline and anticipated permeability of fill material being similar to the surrounding superficial deposits, no significant changes to groundwater flow and baseflow to the River Nene is expected.
- 9.88 West of the route centreline along the Nene Valley are the Castor Flood Meadows SSSI. As the route trench will be located at a distance in excess of 100 m, and the limited profile of the pipeline and anticipated permeability of fill material being similar to the surrounding superficial deposits, no significant changes to groundwater flow at the SSSIs is anticipated.
- 9.89 South of the Nene valley to where the Eastern and Western Routes deviate near Lutton the pipeline will be set within Oxford Clay bedrock or Till of the Oadby Member superficial deposits. These deposits are classified as unproductive and secondary aquifers respectively. These are anticipated to contain limited quantities of groundwater and therefore the pipeline may not encounter groundwater and is not anticipated to affect groundwater flow.
- 9.90 Heading south the trench will be within Oxford Clay bedrock or Till of the Oadby Member superficial deposits. The pipeline may encounter small areas of river terrace deposits. East of Great Staughton are alluvium deposits associated with the River Kym. Groundwater is anticipated to be encountered at shallow depth in the trench in the alluvium deposits.
- 9.91 Due to the limited profile of the pipeline and anticipated permeability of fill material being similar to the surrounding superficial deposits, no significant changes to groundwater flow and baseflow to the River Kym is expected.

- 9.92 The Western Route turns south easterly at Tempsford and crosses extensive river terrace deposits associated with the rivers Great Ouse and Ivel confluence. Groundwater is anticipated to be encountered at shallow depth in the trench in the river terrace deposits.
- 9.93 Due to the limited profile of the pipeline and anticipated permeability of fill material being similar to the surrounding superficial deposits, no significant changes to groundwater flow and baseflow to the rivers Great Ouse and Ivel is expected.
- 9.94 East toward Gamlingay, the route passes through the Kellaways Formation and Oxford Clay Formation, and West Walton Formation, Ampthill Clay Formation and Kimmeridge Clay Formation bedrock, which are all classified as unproductive aquifers. These are anticipated to contain limited quantities of groundwater and therefore the pipeline may not encounter groundwater and is not anticipated to affect groundwater flow.
- 9.95 Around Gamlingay the route then passes through a small outcrop area of Lower Greensand, classified as a Principal Aquifer, before passing onto Gault Formation clay. Groundwaters is anticipated to be at depth below the pipeline trench and therefore the pipeline may not encounter groundwater and is not anticipated to affect groundwater flow in this aquifer.
- 9.96 Southeast toward Royston the route passes over Till deposits of the Oadby Member where limited quantities of groundwater are anticipated in the trench. A pumping station will be located at Hatley St George on Oadby Member Till deposits overlying Gault Formation clay. Therefore, the foundation construction will be situated on a secondary aquifer overlying unproductive geology. The Oadby Member Till deposits are expected to contain limited groundwater and therefore the foundations will cause no significant changes to groundwater flow.
- 9.97 The route then passes onto a series of Chalk formations, classified as Principal aquifers. Groundwaters is anticipated to be at depth below the pipeline trench and therefore the pipeline may not encounter groundwater and is not anticipated to affect groundwater flow in this aquifer.
- 9.98 The Melbourn Rock is crossed in this area and is known as a preferential flow horizon and therefore there is the potential to encounter groundwater in the trench here. The Melbourn Rock outcrop is narrow and as the permeability of fill material is anticipated to be similar to the surrounding chalk, no significant changes to groundwater flow are expected, and as such groundwater abstraction in the source protection zones or Drinking Water Safeguard Zone will also not be affected. There are no designated sites in this area related to preferential flow along the Melbourn Rock. Note that although it is a preferential flow horizon the water table may still be at depth below the trench.
- 9.99 Southeast of Royston the trench will pass through additional chalk units, classified as principal aquifers. Groundwater is anticipated to be at depth below the pipeline trench and therefore the pipeline may not encounter groundwater and is not anticipated to affect groundwater flow in this aquifer. There are narrow outcrops of Head deposits overlying the Chalk associated with small streams such as Wicken Water that may encounter groundwater at shallow depth. As a secondary aquifer it is anticipated to contain limited quantities of groundwater.
- 9.100 The Chalk Rock is crossed between Barkway and Barley and is known as a preferential flow horizon and therefore there is the potential to encounter groundwater in the trench here. The Formation outcrop is narrow and as the permeability of fill material is anticipated to be similar to the surrounding chalk, no significant changes to groundwater flow are expected. There are no designated sites in this area related to preferential flow along the Chalk Rock. Note that although it is a preferential flow horizon the water table may still be at depth below the trench. Till deposits of the Lowestoft Formation outcrop in parts of this area and may overlie the Chalk Rock, in which case the trench is not anticipated to encounter significant quantities of groundwater.
- 9.101 Southeast toward Newport the route passes over Till deposits of the Lowestoft Formation forming a secondary (undifferentiated) aquifer where limited quantities of groundwater are anticipated in the trench. A break pressure tank will be located at Langley Upper Green on Lowestoft Formation Till deposits. Therefore, the foundation construction will be situated on a secondary aquifer that is expected to contain limited groundwater and therefore the foundations will cause no significant changes to groundwater flow.

- 9.102 Glacial Sand and Gravel deposits are present in the valley of the River Granta forming a secondary A aquifer. Shallow groundwater is expected to be encountered in the trench. As the trench is set in Till deposits overlying chalk, no changes to groundwater flow in the Chalk aquifer are expected, and as such groundwater abstraction in the source protection zones near Widdington will also not be affected.
- 9.103 Near Newport Debden Water SSSI is situated in excess of 1 km from the route. Groundwater is anticipated to be at depth below the pipeline trench and therefore the pipeline may not encounter groundwater and is not anticipated to affect groundwater flow. Due to the limited profile of the pipeline and anticipated permeability of fill material being similar to the surrounding superficial deposits, no significant changes to groundwater flow and baseflow to the River Granta is expected.

### **Potential Groundwater Impacts – Eastern Route**

- 9.104 The route will cut a trench, lay the pipeline, and it is assumed it will be infilled with permeable material as ballast (e.g., gravel) in bedrock where there are no superficial deposits, and elsewhere in superficial deposits. This has the potential to impede groundwater flow, or divert groundwater flow along the trench fill, or drain groundwater depending on the nature of the surrounding aquifers.
- 9.105 The pipeline route crosses sandstone and limestone bedrock geology on the western side of Peterborough. These units are classified as Principal aquifers. Groundwater monitoring data is not available in this area. Groundwater is anticipated to flow south easterly toward the River Nene and discharge as baseflow. The route is elevated above the Nene valley and therefore a water table deeper than the pipeline and trench (approximately 2 m depth) is expected. Therefore, the pipeline is not expected to affect groundwater flow in these aquifers west of Peterborough, and as such groundwater abstraction in the source protection zones 1 and 2 will also not be affected.
- 9.106 In the Nene valley the pipeline is anticipated to intercept groundwater in the superficial deposits aquifer but due to the limited profile of the pipeline and anticipated permeability of fill material being similar to the surrounding superficial deposits, no significant changes to groundwater flow and baseflow to the River Nene is expected.
- 9.107 West of the route centreline along the Nene Valley are the Castor Flood Meadows SSSI. As the route trench will be located at a distance in excess of 100 m, and the limited profile of the pipeline and anticipated permeability of fill material being similar to the surrounding superficial deposits, no significant changes to groundwater flow at the SSSIs is anticipated.
- 9.108 South of the Nene valley to where the Eastern and Western Routes deviate near Luton the pipeline will be set within Oxford Clay bedrock or Till of the Oadby Member superficial deposits. These deposits are classified as unproductive and secondary aquifers respectively. These are anticipated to contain limited quantities of groundwater and therefore the pipeline may not encounter groundwater and is not anticipated to affect groundwater flow.
- 9.109 South eastwards toward St Ives the route will cut through Oadby Member Till deposits and occasional Kellaways Formation and Oxford Clay Formation where the Till is absent. These deposits are classified as unproductive and secondary aquifers respectively. These are anticipated to contain limited quantities of groundwater and therefore the pipeline may not encounter groundwater and is not anticipated to affect groundwater flow.
- 9.110 At Woodwalton the route will pass near the margins of peat deposits. These deposits are associated with water features of Woodwalton SSSI (part of the Fenland SAC). The peat deposits are classified as unproductive aquifers however are expected to be saturated which support the fenland water features. As the permeability of trench fill material is anticipated to be much higher than the surrounding peat there is a risk that the peat is drained locally, which may lead to a deteriorating condition in the Woodwalton SSSI part of the Fenland SAC.
- 9.111 The centreline of the route is approximately 1km south of the peat outcrop however limited boreholes in this area mean that the exact margin of the peat is not well defined. Therefore, at this stage due to the sensitivity

and status of Fenland SAC the route is considered to present a risk and ground investigations would need to confirm that the route will not encounter peat.

- 9.112 Southeast of St Ives the route passes through superficial deposits of Alluvium and River Terrace Deposits associated with the River Great Ouse. Groundwater is expected at shallow depths. The route crosses the River Great Ouse also passes adjacent the northeast and eastern boundary of an extensive lake network of the Fen Drayton Nature Reserve in this area. River and lakes are expected to be supported by baseflow in the River Terrace Deposits. The trench will be in excess of 200 m from the lakes and as the permeability of fill material is anticipated to be similar to the surrounding River Terrace Deposits, no significant changes to groundwater flow and baseflow to the River Great Ouse and Fen Drayton Nature Reserve lakes are expected.
- 9.113 South of the River Great Ouse valley the route is underlain by West Walton Formation, Ampthill Clay Formation and Kimmeridge Clay Formation bedrock units. From Boxworth to Comberton the route trench will cut into Oadby Member Till deposits. In both bedrock and superficial deposits limited groundwater is expected to be encountered.
- 9.114 West of Cambridge the route south crosses over bedrock with limited superficial deposits. The trench will cut through Lower Greensand then Gault Formation. Groundwater is not anticipated at shallow depth in the trench in the Lower Greensand principal aquifer. Limited groundwater is expected to be present in the Gault Formation clays. Therefore, the pipeline may not encounter groundwater and is not anticipated to affect groundwater flow. The SPZ in this area is for a confined Lower Greensand abstraction, protected by overlying Gault clay, and therefore no changes to groundwater flow associated with the SPZ are expected.
- 9.115 A pumping station will be located west of Cambridge on Oadby Member Till deposits overlying Gault Formation clay. Therefore, the foundation construction will be situated on a secondary aquifer overlying unproductive geology. The Oadby Member Till deposits are expected to contain limited groundwater and therefore the foundations will cause no significant changes to groundwater flow.
- 9.116 Where River Terrace Deposits are crossed groundwater is expected at shallow depths. River Terrace Deposits are associated with Bourn Brook near Barton. As the permeability of fill material is anticipated to be similar to the surrounding River Terrace Deposits, no significant changes to groundwater flow and baseflow to Bourn Brook are expected.
- 9.117 the Eastern Route crosses the River Cam north of Wendens Ambo. The trench will be cut through Alluvium and Head Deposits, underlain by Chalk units. The trench may encounter Chalk Rock depending on the thickness of superficial deposits. Chalk Rock is known as a preferential flow horizon and therefore there is the potential to encounter Chalk groundwater in the trench here. The Chalk Rock outcrop is narrow and as the permeability of fill material is anticipated to be similar to the surrounding chalk, no significant changes to groundwater flow and baseflow to the River Cam are expected, and as such no significant change in flow within the SPZ1 in this area is expected.
- 9.118 Near Newport Debden Water SSSI is situated within 200 m from the route centreline. Groundwater is anticipated to be at shallow depth within Alluvium, Head and Glaciofluvial deposits in the pipeline trench. Chalk bedrock may also be encountered, and Chalk groundwater is also anticipated to be at shallow depth. Due to the limited profile of the pipeline and anticipated permeability of fill material being similar to the surrounding superficial deposits and Chalk, no significant changes to groundwater flow and baseflow to Debden Water is expected.

## Potential Flood Risk Impacts

- 9.119 Potential adverse impacts of the scheme on existing flood risk and receptors include:
- Constrictions in flow and afflux due to permanent new structures across watercourses (if required);
  - Impacts on flood risk from increased runoff from new impervious areas at above ground facilities for the scheme;

- Potential impacts on hydrology as a result of the scheme by changing the way water infiltrates into the ground and groundwater flow paths; and
- Permanent loss of floodplain within areas classified as Flood Zone 2 and 3 (if above ground installations need to be located in these areas).

9.120 A site-specific flood risk assessment will be required for the proposed scheme in this route, due to the size of the scheme, its intersection with Flood Zones 2 and 3, and the probability that it will be affected by other types of flood risk aside from fluvial events. The site-specific flood risk assessment will need to demonstrate that:

- Any development is appropriate and in line with flood risk guidance within Flood Zones 2 and 3;
- The pipeline and associated assets are safe from flooding for the design life (to be confirmed with client). The definition of safe from flooding is typically to a standard of a 1 in 100 (1%) annual exceedance event, plus an allowance for climate change, plus a freeboard allowance for uncertainty, however, this should be agreed with the client and the Environment Agency and other stakeholders as relevant;
- Future climate change and sea level rise has been accounted for; and
- Flood risk to other receptors in the area is not exacerbated by the new development; impacts of the proposed scheme may need assessing to 1 in 1000 (0.1%) annual exceedance probability flood if highly vulnerable receptors could be impacted nearby.

9.121 The site-specific flood risk assessment will also need to demonstrate that the requirements of the Sequential test have been met, including demonstrating how site selection has sought to avoid areas of greatest flood risk.

## Surface Water Mitigation

9.122 During the operational phase, good industry practice would be applied, and maintenance works would comply with environmental legislation through the application of an Operation Environmental Management Plan (OEMP).

9.123 The design of the scheme will also need to consider the design of any permanent crossings of watercourses that may be required for the development of above ground installations and providing access to them. No crossings may be needed. However, if there are, these should look to be of a clear-span design with the abutments set back from the top of the banks. For minor watercourses and where clear-span structures are not viable, culverts may be considered if agreed with the Environment Agency, relevant LLFA and/or IDB. Box culverts are preferable to pipe designs, with the diameter sufficiently wide to accommodate predicted flood flows but also commensurate with the width of the channel. Straightening of the channel (and the need for upstream and downstream diversions) should be avoided and the culvert length kept to a minimum. The culvert should have a sunken invert so a naturalised bed can form, avoiding any step changes in bed gradient.

9.124 There remains the possibility that site drainage from new above ground installations (i.e., pumping stations) require new surface water outfalls to watercourses if not allowed to infiltrate to ground. Wherever possible, surface water should be discharged to the existing waterway network using a new ditchcourse as this will avoid the need for an engineered outfall. Where this is not possible, the outfall should be of minimum size, angled downstream, and carefully micro-sited to minimise adverse impacts to the bed and banks. The need for scour protection should be avoided where possible. It may also be possible to recess the outfall and to create a short length of ditch to make the final connection to the natural watercourse. However, depending on the final design and the importance of the watercourse there could be localised but significant adverse impacts.

- 9.125 A surface water drainage strategy for each above ground installation would be required and this will need to be supported by a suitable water quality risk assessment. This will determine the risk from diffuse urban water pollution to the receiving watercourse (or ground if infiltration proposed) and what sustainable drainage techniques to manage this risk may be appropriate. The Simple Index Approach described in the SuDS Manual (2<sup>nd</sup> edition) (CIRIA, 2015) would be one way in which this may be investigated.
- 9.126 It is unclear at this stage what maintenance is required of the pipeline, but it is assumed that any flows would be drained, and any cleaning water or chemicals prevented from being discharged into the water environment without appropriate treatment.

## Groundwater Mitigation

- 9.127 If the pipeline trench is to be set within peat deposits near Woodwalton SSSI on the Eastern Route following confirmation from ground investigations, then the trench fill material should be altered from the standard fill to a low permeability clay material to ensure that there is no significant permeability contrast with the peat. This will ensure that groundwater does not drain from the peat and existing groundwater flow and support to water features in the SSSI/Fenland SAC is maintained.
- 9.128 The use of a permeable backfill will limit the contrast between the surrounding aquifer and the trench, and therefore minimise the potential for the trench to act as a preferential pathway diverting groundwater flow where the trench is situated in deposits designated as Principal and Secondary aquifers.

## Flood Risk Mitigation

- 9.129 All above ground installations should have a drainage system designed in accordance with best practice and using sustainable drainage system to manage the rate and volume of site runoff, as well as diffuse urban pollution. The drainage system will need to be maintained in perpetuity for the life-time of the development.
- 9.130 As sections of the scheme are within Flood Zone 3 and the development area is >1ha, a FRA will be required following NPPF. The FRA will review the current and future flood risk to the study area from all sources (including tidal and fluvial, surface water, groundwater, and artificial sources), in accordance with National Planning Policy (NPPF) guidance, to inform the scheme design and set out any proposed mitigation requirements that are to be addressed. This may include the need to avoid placing stockpiled earth on the floodplain, or of this is required by providing gaps for flood water to flow through and potentially temporary floodplain compensation. For above ground installations, these should be located in as low a flood risk area as is possible in keeping with the sequential approach. A Surface Water Drainage Strategy will also be required to set out how surface water runoff will be managed.
- 9.131 Pipeline routes are not generally considered in long term flood risk terms, other than temporary works during installation, as they are buried with for the most part no above ground installation required to impact flood risk in the long term. However, this would need to be agreed with the Environment Agency (i.e. there is the possibility that the pipeline might be considered essential infrastructure and this will need to be clarified). Pumping stations are classified as 'water-compatible' infrastructure and are appropriate in all flood zones, although it would be prudent to place them in the lowest flood risk zone where possible. Water treatment works that need to remain operation during times of flood are classed as 'essential infrastructure' and are appropriate in Flood Zones 1 and 2, and potentially Flood Zone 3 subject to the Exception Test. Water treatment works that do not need to remain operation during times of flood are classed as 'less vulnerable' and are appropriate in Flood Zones 1, 2 and 3a but not Flood Zone 3b (i.e., functional floodplain) unless the Exception Test is passed. There are constraints on the start and end point of the water transfer pipeline, and in the case of the start, the Etton Service Reservoir and pumping station is an existing site.
- 9.132 Overall, the approach to any FRA will need to be agreed with the Environment Agency, LLFAs and IDBs as required. Where development is to take place within areas at risk of flooding, there may be a requirement for fluvial modelling and flood compensation or mitigation measures to ensure no detrimental effect to flooding potential within or from the affected

## Conclusions

- 9.133 This chapter of the EAR presents an initial baseline for the water environment and land drainage characteristics, identifies potential impacts from the construction, operation and decommissioning of the proposed scheme, and highlights what mitigation may be needed to ameliorate potential adverse effects.
- 9.134 An assessment of existing baseline conditions describes the general environmental conditions (topography, climate, land use, geology and soils) while identifying key surface water and groundwater receptors, their attributes and flood risk (all from desk study only). The Western Route crosses five WFD groundwater bodies, and 28 WFD waterbodies. The Eastern Route crosses five WFD groundwater bodies, and 21 WFD waterbodies. The main risk of fluvial flooding (Flood Zones 2 and 3) for the Western Route arises from the River Nene, the River Great Ouse, River Rhee (near Tadlow) and the River Granta. For the Eastern Route, the River Nene and the River Great Ouse pose the greatest risk for fluvial flooding.
- 9.135 Waterbody importance was determined using the importance and impact assessment criteria which identified three WFD waterbodies to be of Very High Importance; Ouse (Roxton to Earith), Nene – Islip to tidal, and Debden water are crossed by both the Eastern and Western Routes. All other surface waterbodies are identified as having High Importance or assumed to be of High Importance where there is no flow data available. These are provisional ratings and as further baseline data comes available will be reviewed. In addition, following future site surveys it will be possible to provide a separate importance rating for hydromorphology, which may sometimes differ from water quality.
- 9.136 Potential impacts from construction have been identified for surface water (including hydromorphology), groundwater, and flood risk. Surface water impacts from sediment and site run off, construction chemicals and pollution, watercourse crossings and access crossings are all likely to generate impacts and lead to the contamination of watercourses and / or water supplies, or physical impacts to the form and function of watercourses, if unmitigated. To mitigate these impacts from the construction phase, it is recommended that all works are carried out in accordance with the mitigation measures set out in a CEMP. Construction works could be effectively managed through a variety of measures to minimise the risk to the water environment from construction site runoff and chemical spillages, such as temporary drainage systems, proprietary measures and ensuring plant is well maintained. Where waterbodies are crossed, it is recommended that non-intrusive design options are used, but where this is not possible open cut crossings need to be agreed with EA, LLFA and IDB where appropriate and additional mitigation applied. Temporary crossings for access should be of clear span design, but where this is not possible, temporary pipe culverts may be used if appropriately mitigated (and agreed with the relevant regulators). If required, baseline water quality conditions could be established from a water quality monitoring programme, to support ongoing monitoring during construction if required.
- 9.137 Potential impacts to flood risk may arise from an increased rate and volume of surface water runoff from site clearance and ground compaction. Material may also be transported to watercourses during large fluvial flood events causing blockages of culverts, leading to downstream impacts. Mitigation measures may include undertaking certain works during drier months of the year to implementing an Emergency Response Plan and ensuring spare pumps are kept onsite.
- 9.138 Groundwater impacts include turbidity affecting groundwater abstractions, pollution of aquifers and impact on abstractions and designated sites resulting from chemical spills and disruption of groundwater flow to abstractions, baseflow to watercourses and potentially designated sites. Mitigation to manage the risk to groundwater during construction works will be similar as described for the surface water environment.
- 9.139 There are some uncertainties relating to the scheme, including details of how watercourses are to be crossed, the proposed maintenance of the scheme, where the water would be sourced if hydrostatic testing was to occur or whether there would be a requirement for any additional pre-washing or disinfection of the new pipeline prior to it becoming operational. These uncertainties will need exploring further to ensure appropriate and sufficient mitigation of impacts are implemented.

## Water Framework Directive Assessment

- 9.140 Appendix A provides detail on the methodology and an overview of the results of the Level 1 WFD screening assessment for the two pipeline options for the A2AT scheme under consideration at gate two. The outcomes of the screening assessment are that all of the water bodies passed the assessment for both pipeline options, meaning they have a low risk of being non-compliant with the objectives of the WFD, subject to the appropriate development of the design and implementation of mitigation measures.
- 9.141 However, at the time of assessment, relatively little information is available about the design of the transfer scheme and how it will be constructed and maintained. Therefore, professional judgement has been made as to the likely activities associated to the scheme that could result in impacts on water bodies, and assumptions have been made of the potential construction methods, which are generally assumed to follow best practices. It is therefore likely that the Level 1 assessment may require updates following receipt of such information as the scheme progresses, especially where the design and construction methods may differ from those made in this assessment. These updates may trigger the requirement for Level 2 assessments to be carried out.

# 10. Air

## Introduction

- 10.1 This chapter assesses the air quality impacts of the A2AT scheme. Given that the design is still at the concept stage it is not possible to provide a quantified air quality impact assessment; however, it is possible to identify the sensitive receptors close to the two routes and carry out qualitative assessments of dust and construction traffic emissions.

## Methodology

### Method of Assessment

- 10.2 The methodology followed includes:
- Identification of nearest air quality related receptors (i.e., dust sensitive receptors and proximity to route, including residential properties, commercial premises, schools and medical facilities, and nature conservation sites including LWS, ancient woodlands, SSSIs, and Natura 2000 sites).
  - A review of the nearest Air Quality Management Areas and designated nature conservation sites to the route and consideration of potential for construction phase traffic emissions to impact on receptors within them.
  - A qualitative assessment of construction dust impacts based on what construction information is available at this time and the number, proximity and sensitivity of construction dust sensitive receptors.
  - A qualitative assessment of construction traffic emissions impacts, based on what project-related traffic data is available at this time, the likely location of construction compounds and the presence of receptors relative to construction traffic routes.

## Assessment of Effects

### Identification of Air Quality Receptors

- 10.3 This section identifies areas adjacent to each route where the sensitivity and density of receptors could be a constraint to the A2AT scheme's construction. The Institute of Air Quality Management<sup>35</sup> describes the sensitivity of an area as a function of the receptor type (e.g., residential property), number of receptors and the proximity of those present to the source of construction dust emissions. Dust impacts are considered for all dust sensitive amenity and human health receptors located within 350m of a source of construction dust and within 50m of a public road used by construction traffic that is within 500m of a construction egress point, and all dust sensitive habitats within 50m of a source of construction dust and within 50m of a public road used by construction traffic that is within 500m of a construction egress point.

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<sup>35</sup> Holman et al (2014). IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London. [www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf](http://www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf)

*Eastern Route*

- 10.4 Within the **City of Peterborough**, key sensitive areas identified within 350m of the of the Eastern Route include:
- Residential properties at the east of Ailsworth
  - Isolated properties, typically farms, within 50m of the route
- 10.5 Within the **Huntingdon District**, key sensitive areas identified within 350m of the of the Eastern Route include:
- Residential properties at the west of Needingworth
  - Residential properties at the north of Holywell
  - Residential properties at the south of Sawtry
  - Residential properties at the west of Chesterton
  - Aversley Wood Site of Special Scientific Interest
  - Residential properties at the north of Old Hurst
  - Residential properties at the west of Needingworth
  - Residential properties at the north of Holywell
  - Isolated properties within 50m of the route
- 10.6 Within the **South Cambridgeshire District**, key sensitive areas identified within 350m of the of the Eastern Route include:
- Residential properties at the west of Bar Hill
  - Residential properties at the east of Hardwick
  - Residential properties between Comberton and Barton
  - Residential properties at the south west of Barton
  - Residential properties at the west of Haslingfield
  - Residential properties at the east of Thriplow
  - Residential properties at the west of Duxford Airfield
  - Thriplow Meadows Site of Special Scientific Interest
  - Barrington Chalk Pit Site of Special Scientific Interest
  - Isolated properties, typically farmsteads, within 50m of the route
- 10.7 Within the **Uttlesford District**, key sensitive areas identified within 350m of the of the Eastern Route include:

- Residential properties at the east of Wendens Ambo
- Debden Water Site of Special Scientific Interest
- Isolated properties, typically farms, within 50m of the route

*Western Route*

10.8 Within the **City of Peterborough**, key sensitive areas identified within 350m of the of the Western Route include:

- Residential properties at the east of Ailsworth
- Isolated properties, typically farms, within 50m of the route

10.9 Within the **Huntingdonshire District**, key sensitive areas identified within 350m of the of the Western Route include:

- Residential properties at the west of Chesterton
- Residential properties at the west of Chapel End
- Grafham Water Site of Special Scientific Interest
- Residential properties at the south of Perry
- Perry Woods Site of Special Scientific Interest
- Weaveley and Sand Woods Site of Special Scientific Interest
- Isolated properties, typically farms, within 50m of the route

10.10 Within the **North Northamptonshire District**, key sensitive areas identified within 350m of the of the Western Route include:

- Isolated properties, typically farms, within 50m of the route

10.11 Within **Bedford Borough**, key sensitive areas identified within 350m of the of the Western Route include:

- Isolated properties, typically farmsteads, within 50m of the route

10.12 Within the Central Bedfordshire District, key sensitive areas identified within 350m of the of the Western route option include:

- Residential properties at the north of Church End
- Isolated properties, typically farmsteads, within 50m of the route

10.13 Within the South Cambridgeshire District, key sensitive areas identified within 350m of the of the Western Route include:

- Gamlingay Wood Site of Special Scientific Interest
- Residential properties at the north of Gamlingay

- Buff Wood Site of Special Scientific Interest
- Isolated properties, typically farms, within 50m of the route

10.14 Within the **North Hertfordshire District**, key sensitive areas identified within 350m of the of the Western Route include:

- Isolated properties, typically farms

10.15 Within Uttlesford District, key sensitive areas identified within 350m of the of the Western Route include:

- Residential properties at the west of Lower Green
- Residential properties at the south of Arksden
- Residential properties at the north and east of Hill Green
- Residential properties at the south of Newport
- Residential properties at the east of Widdington
- Residential properties at the north east of Henham
- Isolated properties, typically farms

## Air Quality Management Areas

10.16 This section provides a summary of existing air quality constraints identified by local authorities under their Local Air Quality Management responsibilities. Local Authorities are required to review and monitor air quality within their administrative area and, where any pollutant concentrations are found to be elevated close to or above an air quality objective value, declare Air Quality Management Areas (AQMA).

10.17 The presence of an AQMA close to the A2AT scheme or on a route used by the A2AT construction traffic could be potential constraint. IAQM and Environmental Protection UK air quality planning guidance<sup>36</sup> suggests that 25 or more two-way Heavy Duty Vehicle movements per average day could be sufficient to cause a significant effect within an AQMA.

10.18 The following subsections describe the location of the nearest AQMAs and monitoring data to the A2AT scheme. At this stage construction traffic routes and construction compound areas are not known, but construction traffic is likely to use the larger roads in the area that can most easily accommodate HDV vehicles.

### *City of Peterborough*

10.19 Both routes begin to the northwest of Peterborough. Peterborough City Council has declared a single AQMA within its administrative area, due to elevated sulphur dioxide (SO<sub>2</sub>) concentrations from industrial activity<sup>37</sup>.

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<sup>36</sup> Moorcroft and Barrowcliffe. et al. (2017), Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London.

<sup>37</sup> Department for Environment Food & Rural Affairs, AQMA Details, Peterborough Council. URL: [https://uk-air.defra.gov.uk/aqma/details?aqma\\_ref=500](https://uk-air.defra.gov.uk/aqma/details?aqma_ref=500)

The A2AT scheme will not be a source of SO<sub>2</sub> and therefore the presence of the AQMA is not considered to be a constraint.

- 10.20 The nearest air quality monitoring undertaken by the Council<sup>38</sup> to both the Eastern and Western Routes is approximately 2.5km away (diffusion tube PT03) and in 2019 measured an annual mean NO<sub>2</sub> concentration of 15 µg/m<sup>3</sup>, which is well below the 40 µg/m<sup>3</sup> air quality objective. The nearest air quality monitoring undertaken by the Council to the Eastern route option is approximately 4km away (diffusion tube PT132) and in 2019 measured an annual mean NO<sub>2</sub> concentration of 27.9 µg/m<sup>3</sup>.

#### *Huntingdonshire District*

- 10.21 Both routes pass through Huntingdonshire District. Huntingdonshire Council has declared four AQMAs within their administrative area. The nearest AQMA to the Eastern Route is at Huntingdon, which is approximately 8km away and was also declared due to elevated concentrations of NO<sub>2</sub>. This could be a potential constraint to the A2AT scheme if construction traffic is anticipated to use the A14 through Huntingdon. The nearest AQMA to the Western Route is at St Neots, which is approximately 4 km away and was also declared due to elevated concentrations of NO<sub>2</sub>. This could be a potential constraint to the A2AT scheme if construction traffic is anticipated to use the B1428 through St Neots.
- 10.22 The nearest air quality monitoring to the Eastern Route is located approximately 1km away (diffusion tube Sawtry 1) and measured 18.0 µg/m<sup>3</sup> in 2019<sup>39</sup>. The nearest air quality monitoring to the Western Route is located approximately 350m away (diffusion tube Catworth 1) and measured 16.4 µg/m<sup>3</sup> in 2019.

#### *Bedford Borough*

- 10.23 Only the Western Route passes through Bedford Borough. Bedford Council currently has a single AQMA, which is located in Bedford Town Centre and was declared due to elevated concentrations of NO<sub>2</sub>. The AQMA is approximately 8km from the nearest section of the Western Route and is only likely to be a constraint if construction traffic uses the main roads through Bedford town centre.
- 10.24 The nearest air quality monitoring undertaken by the Council<sup>40</sup> to the Western Route is located approximately 8km away (diffusion tube DT29), within the AQMA, and measured an annual mean NO<sub>2</sub> concentration of 36 µg/m<sup>3</sup> in 2019.

#### *Central Bedfordshire.*

- 10.25 Only the Western Route passes through the Central Bedfordshire district. Central Bedfordshire Council currently has three AQMAs declared, the nearest of which is at Sandy, approximately 3km away, which was declared due to elevated concentrations of NO<sub>2</sub>. This could potentially be a constraint to the A2AT scheme if construction traffic uses the A1 at Sandy.

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<sup>38</sup> 2020 Air Quality Annual Status Report, Peterborough City Council, March 2022. URL: <https://www.peterborough.gov.uk/asset-library/air-quality-report-2020.pdf>

<sup>39</sup> 2020 Air Quality Annual Status Report, Huntingdonshire District Council, June 2020. URL: <https://www.huntingdonshire.gov.uk/media/4668/2019-air-quality-annual-status-report.pdf>

<sup>40</sup> 2020 Air Quality Annual Status Report, Bedford Borough Council, September 2020. URL: <https://bbcdevwebfiles.blob.core.windows.net/webfiles/Environmental%20Issues/Noise%20Nuisances%20and%20Pollution/2020%20Air%20Quality%20Annual%20Status%20Report.pdf>

- 10.26 The nearest air quality monitoring undertaken by the Council<sup>41</sup> are approximately 3km away (diffusion tube N6, N16-18, N20, N25 and N30) and measured an annual mean NO<sub>2</sub> concentrations ranging from 29.4 µg/m<sup>3</sup> to 45.1 µg/m<sup>3</sup>.

*South Cambridgeshire District*

- 10.27 Both routes pass through South Cambridgeshire District. South Cambridgeshire Council currently has no AQMAs declared.
- 10.28 The nearest air quality monitoring to the Western Route undertaken by the Council<sup>42</sup>, is approximately 350m from the A2AT scheme (diffusion tube DT7) and measured an annual NO<sub>2</sub> mean concentration of 10.2 µg/m<sup>3</sup> in 2019. The nearest air quality monitoring to the Eastern Route undertaken by the Council, is approximately 1.6km from the A2AT scheme (diffusion tube DT19) and measured an annual NO<sub>2</sub> mean concentration of 20.3 µg/m<sup>3</sup> in 2019.

*North Hertfordshire District*

- 10.29 Only the Western Route passes through the North Hertfordshire District. North Hertfordshire Council currently has two AQMAs declared, the nearest of which is at Paynes Park Roundabout, Hitchin, approximately 19.5km from the route option. The AQMA was declared due to elevated concentrations of NO<sub>2</sub>.
- 10.30 The nearest air quality monitoring to the West route undertaken by the Council<sup>43</sup> is approximately 5km away (diffusion tube NH120) and measured an annual mean NO<sub>2</sub> concentration of 12.1 µg/m<sup>3</sup> in 2019.

*East Hertfordshire District*

- 10.31 Only the Western Route passes through the East Hertfordshire District. East Hertfordshire currently has three AQMAs declared, the nearest of which is at Bishops Stortford, approximately 13.5km away and declared due to elevated concentrations of NO<sub>2</sub>.
- 10.32 The nearest air quality monitoring to the West route undertaken by the Council<sup>44</sup> is approximately 9km away (diffusion tube EH70) and measured an annual mean NO<sub>2</sub> concentration of 24.1 µg/m<sup>3</sup> in 2019.

*Uttlesford District*

- 10.33 Both routes end in Uttlesford district. Uttlesford Council currently has one AQMA within their administrative area. This is located at Saffron Walden, which is approximately 1.5km away from the Eastern Route and 4.5km away from the Western Route. The AQMA was declared due to elevated concentrations of NO<sub>2</sub> and this could be a constraint to the A2AT scheme if construction traffic is to use roads through Saffron Walden.

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<sup>41</sup> 2020 Air Quality Annual Status Report, Central Bedfordshire Council, December 2021. URL: <https://centralbedfordshire.app.box.com/s/4e2nh76efssykyoynugk23gznjjj2mv5>

<sup>42</sup> 2020 Air Quality Annual Status Report, South Cambridgeshire District Council, August 2020. URL: <https://www.scambs.gov.uk/media/16106/2020-air-quality-annual-status-report-asr-august-2020.pdf>

<sup>43</sup> 2020 Air Quality Annual Status Report (ASR), North Hertfordshire District Council, June 2020. URL: <https://www.north-herts.gov.uk/sites/default/files/Air%20quality%20annual%20status%20report%202020.pdf>

<sup>44</sup> 2020 Air Quality Annual Status Report for East Herts: latest analysis, East Hertfordshire District Council. URL: <https://cdn-eastherts.onwebcurl.com/s3fs-public/2021-01/Air%20Quality%20Annual%20Status%20Report%20%28ASR%29%20for%20East%20Herts%202020.pdf>

- 10.34 The nearest air quality monitoring to the East Route undertaken by the Council<sup>45</sup> is approximately 2.5km away (diffusion tube UT040) and measured an annual mean NO<sub>2</sub> concentration of 20.5 µg/m<sup>3</sup> in 2019. The nearest air quality monitoring to the Western Route is approximately 850m away (diffusion tube UT041) and measured an annual mean NO<sub>2</sub> concentration of 19.2 µg/m<sup>3</sup> in 2019.

## Construction Traffic Emissions Assessment

- 10.35 According to the IAQM (Moorcroft and Barrowcliffe, 2017), an increase of 500 two-way LDV or 100 two-way HDV movements away from an AQMA, or an increase of 100 two-way LDV or 25 two-way HDV movements within or adjacent to an AQMA, could have a significant effect on local air quality and should be investigated.
- 10.36 It is anticipated that construction traffic impacts will be highest on roads used to access construction compounds. The location of construction compounds is currently unknown as is the number of construction vehicles.
- 10.37 Should traffic impacts exceed the IAQM screening criteria, either within or away from an AQMA, then a detailed air quality assessment is likely to be required to confirm whether or not the effect is significant.

## Mitigation

### Construction Dust

- 10.38 The IAQM construction dust guidance (Holman et al., 2014) determines the risk of dust impacts occurring based on the scale of construction activities proposed and the sensitivity, number and proximity of receptors to the works. It then suggests the mitigation measures required to adequately control emissions to the extent that the effect is not significant.
- 10.39 Based on the scale of the A2AT scheme and the number and sensitivity of receptors that could be impacted (as identified above), it is likely that there will be some localised areas where there is a high risk of dust impacts occurring, although for the majority of the scheme, a lower risk is likely.
- 10.40 Where there is a high risk of dust impacts occurring, the mitigation measures recommended by the IAQM are listed as follows:

#### *Communication*

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.

#### *Dust Management - Site Management*

- Develop and implement the Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should

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<sup>45</sup> 2021 Air Quality Annual Status Report (ASR), Uttlesford District Council, August 2021. URL: <https://www.uttlesford.gov.uk/media/11129/2021-Air-Quality-Annual-Status-Report-ASR/pdf/Uttlesford-2021-ASRA.pdf?m=637701755131270000>

include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, real-time PM<sub>10</sub> continuous monitoring and/or visual inspections.

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a time.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on-or off-site, and the action taken to resolve the situation in the logbook.
- Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.

#### *Dust Management - Monitoring*

- Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars, and windowsills within 100m of site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition, dust flux, or real-time PM<sub>10</sub> continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks, and construction.

#### *Dust Management - Preparing and maintaining the site*

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff or water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed, or fence stockpiles to prevent wind whipping.

*Dust Management - Operating vehicle/machinery and sustainable travel*

- Ensure all vehicles and plant comply with relevant emission standards.
- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourage sustainable travel (public transport, cycling, walking, and car-sharing).

*Dust Management - Operations*

- Only use cutting, grinding, or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cutting methods.

*Dust Management - Waste Management*

- Avoid bonfires and burning of waste materials.

*Earthworks*

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

*Construction*

- Avoid scabbing (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.

- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.

#### *Trackout*

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site logbook.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

## **Construction Traffic Emissions Assessment**

- 10.41 It is recommended that the location of construction compounds and construction vehicle routes are considered with potential air quality impacts in mind. The aim of which would be to minimise traffic impacts within AQMAs as much as possible

## **Conclusions**

- 10.42 Along the majority of the route corridors receptors will have limited exposure to dust impacts, although there are pockets of higher sensitivity areas where routes pass closer to several populated areas and designated habitats.
- 10.43 The level of mitigation recommended by the IAQM to control impacts associated with high-risk dust sites would be sufficient to control dust impacts to the extent that the effect is not significant.
- 10.44 Both routes pass through AQMAs, which are most sensitive to air quality impacts due to elevated concentrations of NO<sub>2</sub>, although the nearest air quality monitoring data to both routes suggest that there are no existing air quality issues in the immediate vicinity.
- 10.45 There is the potential that construction traffic could have a significant effect on local air quality, subject to the number of additional vehicle movements on any given road link. This would most likely be a constraint where there was an increase in vehicle movements within an AQMA as a result of the A2AT scheme. Should

this occur, a detailed assessment of air quality impacts may be required to confirm whether or not the effect is significant.

- 10.46 It is recommended that when planning the location of construction compounds and construction traffic routes, that consideration is given to potential air quality impacts. In particular, an increase in vehicle movements on roads within or adjacent to an AQMA should be avoided if possible.
- 10.47 The preliminary conclusion therefore is that no significant effects on air quality as a result of the A2AT scheme, but further work will be required to confirm this finding at subsequent stages in the scheme design.

# 11. Climate

## Introduction

11.1 This chapter of the report contains a lifecycle greenhouse gas assessment and a climate change resilience assessment. The lifecycle greenhouse gas assessment was carried out by Arup and for further information on the lifecycle assessment please see the Concept Design Report.

## Lifecycle Greenhouse Gas Assessment

### Methodology

11.2 A whole life carbon assessment was carried out for the A2AT scheme, using BS EN 15978: 2011 lifecycle stages (see Figure 11-1 below).

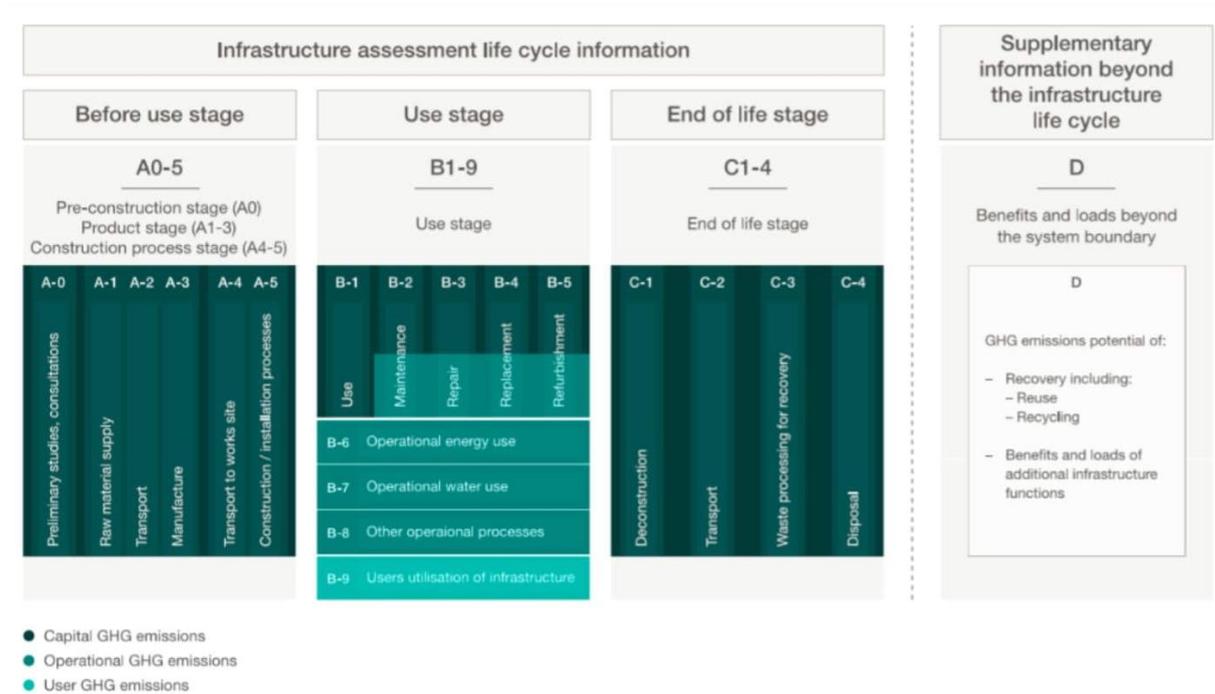


Figure 11-1: Lifecycle stages, part of modular approach to asset lifecycles (BS EN 15978 PAS2080: 2011)

*Interrogate the whole life carbon baseline for the selected pipeline route*

- 11.3 A carbon assessment of both the Eastern and Western Routes was undertaken, using a bespoke calculator, based on publicly available Environmental Product Declarations (EPDs), ICE v3.0<sup>46</sup> and UK government conversion factors<sup>47</sup>.

*Low carbon opportunities*

- 11.4 A virtual workshop was attended by Affinity Water, Anglian Water and representatives from the Environment Agency and Natural England. The purpose was to gauge views on low carbon opportunities. The outputs of the workshop were intended to be used to short-list low carbon, renewable and carbon sequestration opportunities. These fed into the recommendations discussed later in this report.

*Identify carbon considerations*

- 11.5 Carbon considerations for inclusion into the procurement, construction, and operation phases were identified. Hotspots for carbon reduction were identified in collaboration with the design team. Assumptions were made for the construction and operation of the pipeline, to inform carbon considerations.

*Potential for embedding renewables and sequestering carbon*

- 11.6 A review the potential for embedding renewables and sequestering carbon into the design of the proposed solution was undertaken, using results from the carbon baseline calculation and workshops with the design team. A list of recommendations (including carbon sequestration) was made using the Carbon Reduction Curve principles<sup>48</sup>, which stress that the greatest opportunities for carbon reduction are found early in the design process.

## Assumptions and Limitations

- 11.7 This section outlines any gaps in the data, aspects omitted or scoped out, and any assumptions that have been made to overcome such issues.

**Table 11-1: List of assumptions applied to gate two carbon assessments (source: Arup)**

Lifecycle Stage	Component	Assumption
Embodied (A1-A4)	Pipe material	Ductile iron
	Pipe diameter (mm)	50 ML/d: 900 mm 100 ML/d: 1200 mm
	Pipe lengths (m)	Eastern Route: 105,000 Western Route: 115,000
	Butterfly valves and chambers	Every 2km
	Break tanks (including Etton)	Eastern Route: 2 no Western Route: 3 no

<sup>46</sup> Embodied Carbon - The ICE Database. Available at: <https://circularecology.com/embodied-carbon-footprint-database.html>

<sup>47</sup> UK Government conversion factors for company reporting of greenhouse gas emissions. Available at: <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

<sup>48</sup>

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/260710/infrastructure\\_carbon\\_review\\_251113.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/260710/infrastructure_carbon_review_251113.pdf)

		Reinforced concrete tanks at 500mm wall thickness
	Thrust blocks	Every 1 km Reinforced concrete 2m x 2m x 2m each
	Surge vessels	Eastern Route: 18 no Western Route: 14 no Each 100 m3 constructed of steel carbon
Construction (A5)	Construction method	Open cut excavation
	Trench width and cover depth	Width: pipe diameter + 300 mm either side Cover depth: 0.9 m
	Percentage of excavated material going to landfill / hazardous waste (%)	10
	Vehicle movements	HGVs, and rigid vehicles travelling 50 km/day
	Construction timeline (years)	5
Operational (B1-B7)	Deployable output (%)	112
	Power source	UK Grid electricity
	kgCO <sub>2</sub> e per kWh based on UK Gov 2021	0.21233
	kgCO <sub>2</sub> e per kWh for Transmission & Distribution based on UK Gov 2021	0.01879
	Chemicals for treatment required	Sodium hydroxide, CO <sub>2</sub> gas, Sodium hypochlorite and chloramines
	Vehicle movements	Hybrid car travelling 50 km/day
End of Life (C1-C4)	Pipe will remain in situ and no deconstruction works are associated with decommissioning.	

11.8 For operational energy carbon emissions, these were calculated for a 20-year period as this is the assumed asset life for pumping infrastructure. It is assumed that all energy provided for operation of the pipeline will be from the UK energy grid (see discussion of renewable energy supplies in Appendix B).

11.9 Further exclusions have been made for details unknown at this stage of design. These should be accounted for in next stage carbon assessments. This includes:

- Air valves and washout valves
- Pipe bends
- Tunnel boring of the pipeline
- Pumping equipment associated with chemical treatments
- Power requirements associated with chemical treatments
- Pump station building
- Roads and access to the pump stations and treatment works
- Employee travel to site during construction and operation
- Site accommodation and welfare during construction
- Mechanical plant during construction for excavation

- 11.10 Several of these items may have considerable CO<sub>2</sub>-equivalent contributions to the GHG assessment – in particular, the earthworks required in excavations (e.g., tunnel boring), and operational energy for certain components (e.g., power needs for chemical treatments).

## Potential Impacts

- 11.11 Table 11-1 below outlines the quantified carbon emissions for each of the lifecycle stages assessed. Table 11-1 then provides a further breakdown of the embodied carbon emissions.

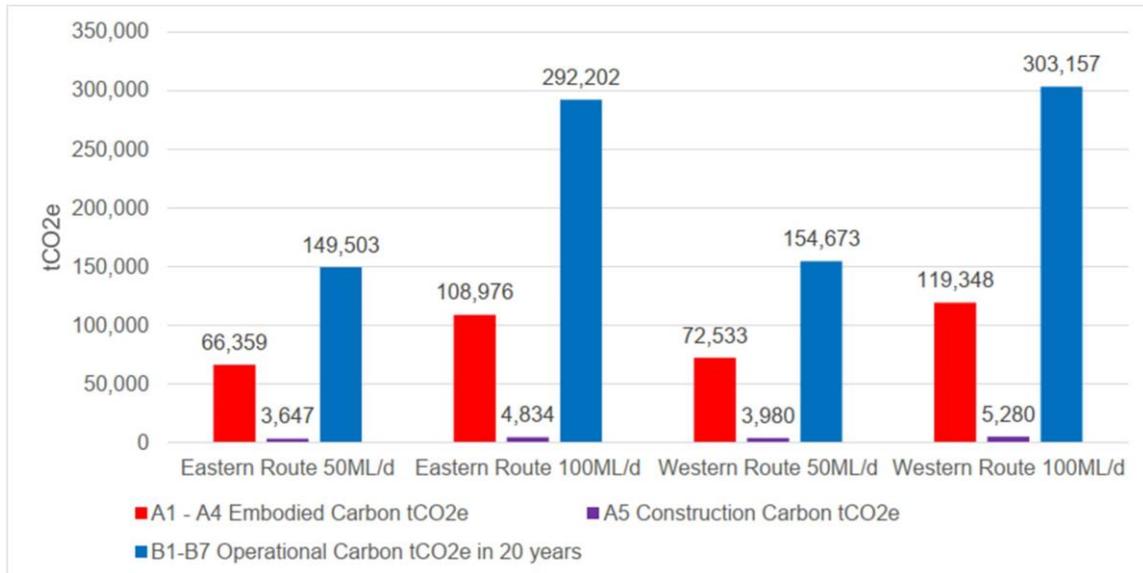
**Table 11-2. Carbon emissions broken down by lifecycle stage**

Lifecycle stage	EASTERN ROUTE		WESTERN ROUTE	
	Whole life carbon estimates (tCO <sub>2</sub> e)		Whole life carbon estimates (tCO <sub>2</sub> e)	
	50 ML/d	100 ML/d	50 ML/d	100 ML/d
A1-4 – Product Carbon Emissions	66,359	108,976	72,533	119,348
A5 – Construction Carbon	3,647	4,834	3,980	5,280
B1-B7 – Operational Carbon over 20 years	149,503	292,202	154,673	303,157
<b>Total</b>	<b>219,509</b>	<b>406,012</b>	<b>231,186</b>	<b>427,785</b>

## Analysis of results

### *Embodied Carbon*

- 11.12 The vast majority (97%) of the embodied carbon emissions for all options assessed is associated with the iron pipework required. Therefore, the most efficient means of reducing the embodied carbon of the scheme will be in reducing the mass of pipework involved, i.e., shortening the pipeline route, reducing pipe thickness or diameter.
- 11.13 Overall, the Eastern Route (at both capacities assessed) is just under 10% lower in embodied carbon emissions, 9% lower in construction carbon and 5% lower in operational carbon than the Western Route (see Figure 11-2).



**Figure 11-2: Whole life carbon estimates for Eastern and Western routes (both 50 ML/d and 100 ML/d capacities) (source: Arup)**

*Construction Carbon*

11.14 Much of the detail surrounding construction duration, processes and phasing is not known at this stage of the design. For this carbon assessment, assumptions have been made regarding the construction methodology, timeframes, vehicle movements, and excavation works required. However, it is recommended that these calculations be repeated once further details of the construction works entailed are known.

*Operational Carbon*

11.15 The operational carbon included in this assessment is primarily associated with water pumping and chemical treatment. It has been assumed that all energy will be sourced from the UK Grid during the operational lifespan assessed (note, emission factors used do not take into account any decarbonisation of the Grid).



**Figure 11-3: Operational carbon for Eastern and Western routes (both 50 ML/d and 100 ML/d capacities) (source: Arup)**

## Recommendations for Carbon Reduction

11.16 Following a review of the carbon emissions identified in Table 11-1 and Table 11-2 consideration of the following carbon reduction opportunities is recommended. To increase carbon reduction, it is important to implement a wide range of carbon reduction measures, across each of the four key categories below.

### 1. Specification of lower carbon materials

- Procuring iron from suppliers utilising new less-carbon-intensive processing and smelting techniques (e.g., direct reduced iron to electric arc furnace) and energy sources to power industrial processing (e.g., biomass replacements, syngas – as opposed to traditional coal products).
- Specification of concrete with cement replacements (e.g. Pulverised Fuel Ash (PFA), Ground Granulated Blast-furnace Slag (GGBS)), or products with cement alternatives such as Cemfree, to reduce the carbon content of concrete.
- Procuring steel with a higher-than-average recycled content where possible (e.g. OLE structures) to reduce embodied carbon emissions associated with producing virgin steel
- Use recycled aggregates (e.g. for concrete structures) where feasible.

### 2. Innovative design

- Smart design to reduce material requirements – In this case, the routing of the pipeline will be a key opportunity to minimise material use (iron pipework), which makes up the bulk of embodied carbon emissions. Other measures can also enhance efficient use of materials and minimise associated emissions; for instance, prioritising wider spacing for structures (e.g. gantries, cantilevers and sleepers) where feasible, thus reducing material consumption.

- Design for Manufacture and Assembly (DFMA) - maximise potential for offsite/ modular fabrication. This is particularly relevant for components of the pipeline, which is expected to require repairs and upgrades (e.g., new pumping systems after 20-year service life).
- Extend the design life of project components where possible to reduce future embodied carbon and emissions associated with maintenance activities.
- Retain temporary works as permanent features/ assets where possible (e.g., haul roads retained as access roads).

### 3. Lean construction techniques

- Reuse excavated soil within projects (backfilling, landscaping, nuisance attenuation etc.) This is particularly significant given the volumes of excavation involved in undergrounding this pipeline.
- Stagger construction periods to allow for reuse of temporary materials at different sites.
- Use electric/ hybrid plant, HGVs, site vehicles and worker transport where feasible.
- Avoid diesel generators; use on-site renewables or grid electricity wherever possible

### 4. Renewable energy to power the pipeline

- Incorporating renewable energy sources (potentially linking in with new developments or building a novel renewable system specifically for pipeline use) to power the pipeline's pumping energy requirements would significantly reduce the projected carbon costs of the project. Options for this include solar photovoltaic arrays, wind farms, in-pipe and in-stream hydroelectricity, and energy storage options (see Appendix B for further discussion of these options, from client workshop with the Environment Agency<sup>49</sup>).

11.17 It is recommended that a carbon workshop should be arranged at the beginning of the outline design phase, to explore the feasibility and build upon the recommendations listed above. The workshop should include members of the project team covering a wide range of disciplines, to maximise the number of opportunities identified and drive carbon reduction across the whole project lifecycle.

## Climate Change Resilience Review (CCR)

### Methodology

11.18 The CCR review considers the impact of climate on the whole of the A2AT scheme by identifying likely changes to the climate and potential climate hazards over the lifecycle of the A2AT scheme. The baseline describes the current climate, whilst the project-scenario describes the forecast climate during the project-phases.

11.19 The climate baseline has been developed using historic Met Office data obtained from a meteorological station closest to the scheme area for the period 1981-2010. The climate data for this period is the latest set of 30-year averages for the UK and forms the baseline for the Met Office's UK Climate Project Data, i.e., projections of change are modelled from this baseline.

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<sup>49</sup> Anglian Water to Affinity Water Strategic Transfer SRO – A2AT Concept Design Report – July 2022 (Arup).

11.20 The receptor for the CCR review is the A2AT scheme itself. The changes in climate from baseline to the future project-environment inform the requirements for incorporated environmental design and management measures.

11.21 Climate change projections for the scheme area during the four-year construction phase have been examined against receptors (including the A2AT scheme itself) during this stage. The following climate parameters have been scoped into the CCR:

- Extreme weather events
- Sea level rise
- Temperature change
- Rainfall change
- Wind change

## Limitations

11.22 Limitations associated with the approach taken for the CCR review relate to uncertainties inherent within UK Climate Projections (UKCP18 data).

11.23 UKCP18 projections are the leading climate change projections for the UK, resulting from over seven years work by the Met Office's Hadley Centre, and over thirty years of work from other contributing organisations.

## Baseline

### *Historic Baseline*

11.24 The baseline for the CCR review was established using historic climate and weather data for the scheme area, obtained from the nearest historic weather station, based in Cambridge. Details of the UK current climate can be found on the Met office website.<sup>50</sup>

**Table 11-3; Historic Climate Data 1981-2010**

<b>Climatic Variable</b>	<b>Month</b>	<b>Value</b>
Average annual maximum daily temperature (°C)	-	14.2
Warmest month on average (°C)	July	22.1
Coldest month on average (°C)	February	4.3
Mean annual rainfall levels (mm)	-	553.6
Wettest month on average (mm)	August and October	98.2
Driest month on average (mm)	February and March	11.1

<sup>50</sup> Met Office: UK Climate. Available at: [UK climate - Met Office](#) [Accessed 23 June 2022]

### Future Baseline

11.25 The future baseline for the CCR review is based on future UK Climate Projections (UKCP18) data from the Met Office for the East of England region (which includes Essex, Hertfordshire, Suffolk, Norfolk, Cambridgeshire, and Bedfordshire) in which the A2AT scheme is primarily located. This climate projection data provides a probabilistic indication of how global climate change is likely to affect the scheme area using defined climate variables and time periods. Projected temperature and precipitation variables are presented in Table 11-4 and Table 11-5, respectively. These figures are expressed as temperature/precipitation anomalies in relation to the 1981-2010 baseline.

**Table 11-4: Projected Changes in Temperature Variables (°C), 50% Probability (10% and 90% Probability in Parenthesis)**

Climatic Parameter	Time Period		
	2010-2039	2040-2069	2070-2099
Mean annual air temperature anomaly at 1.5 m (°C)	+0.8 (+0.3, +1.3)	+1.9 (+1.0, +2.9)	+3.6 (+2.1, +5.4)
Mean summer air temperature anomaly at 1.5 m (°C)	+1.0 (+0.4, +1.6)	+2.4 (+1.1, +3.7)	+4.7 (+2.3, +7.1)
Mean winter air temperature anomaly at 1.5 m (°C)	+0.7 (+0.02, +1.4)	+1.7 (+0.5, +3.0)	+3.1 (+1.2, +5.1)
Maximum summer air temperature anomaly at 1.5 m (°C)	+1.1 (+0.3, +2.0)	+2.6 (+1.0, +4.4)	+5.2 (+2.4, +8.3)
Minimum winter air temperature anomaly at 1.5 m (°C)	+0.6 (-0.02, +1.4)	+1.7 (+0.4, +3.2)	+3.1 (+1.1, +5.6)

**Table 11-5: Projected Changes in Precipitation Variables (%), 50% Probability (10% and 90% Probability in Parenthesis)**

Climatic Parameter	Time Period		
	2010-2039	2040-2069	2070-2099
Annual precipitation rate anomaly (%)	+0.5 (-4.6, +5.7)	-3.4 (-11.3, +4.1)	-2.3 (-13.3, +8.3)
Summer precipitation rate anomaly (%)	-7.4 (-20.6, +6.3)	-21.0 (-45.6, +3.0)	-34.5 (-67.0, -3.2)
Winter precipitation rate anomaly (%)	+3.9 (-4.5, +13.0)	+8.2 (-4.4, +22.8)	+19.1 (-1.7, +43.7)

## Impacts and Mitigation Measures

11.26 The key potential climate change impacts on the A2AT scheme and the adaptation methods to increase the resilience of the A2AT scheme are detailed in Table 11-6. These are primarily about the operational scheme but may have relevance to construction as well, depending on when this takes place.

**Table 11-6: Potential Climate Change Impacts and Relevant Adaptation / Resilience Measures**

Potential Climate Changes	Potential Impacts on the Scheme	Adaptation / Resilience measures
<p>Increased summer and winter temperatures</p> <p>Decreased summer precipitation</p>	<p>Increased demand, potentially diminished water supply at sources for pipeline.</p> <p>Heat stress to maintenance workers, deterioration of materials and assets, overheating of electrical equipment (e.g., pumping equipment).</p>	<p>Install water-level monitoring equipment, potentially integrated into smart systems controls, to ensure water assets at pipeline source is managed (i.e., pumping ceases if water supply insufficient).</p> <p>Ensure pumphouses and associated infrastructure are heat-proofed, well-ventilated, with cooling / HVAC systems installed if necessary. Passive thermal-resistance design should be applied wherever possible (e.g., double-thick insulated walls of buildings housing equipment).</p>
<p>Increased summer precipitation</p>	<p>Surface water flooding and standing waters, overwhelming pipeline-associated infrastructure at source.</p>	<p>Risk of flooding in reservoirs at source of pipeline can be mitigated with flood prevention plans and infrastructure (e.g., retention ponds, overflow gates), and managed with use of monitoring equipment.</p>

# 12. Material Assets

## Introduction

- 12.1 In Directive 2011/92/EU this factor included architectural and archaeological heritage, but Directive 2014/52/EU includes those heritage aspects as components of cultural heritage, so clearly what the European Commission means by 'material assets' has evolved. The UK guidance on EIA offers no definition but practitioners normally regard it as covering waste, traffic and built services such as gas, electricity and water. The Irish Environmental Protection Agency states that "*material assets can now be taken to mean built services and infrastructure*" in the latest version of its guidance<sup>51</sup>.
- 12.2 Therefore, for the purposes of this assessment, the focus is on infrastructure: namely, roads and railways as these are mostly easily identified from publicly available data. Services such as gas pipelines are not straightforward to identify from public datasets, so have not been considered. Insufficient information on traffic generated or wastes produced by the A2AT scheme is available at the current stage of design to enable a meaningful assessment of these matters to be undertaken.

## Methodology

### Method of Assessment

- 12.3 The assessment comprises the identification of material assets likely to be affected by the construction of the A2AT scheme.
- 12.4 Infrastructure including road and rail were counted for both Routes using the ArcGIS Mapping Tool. For roads this included Motorways to unclassified local roads. For rail, all track crossings were identified.

## Limitations

- 12.5 As stated in the introduction, other linear infrastructure has not been identified as part of the assessment, and waste generated by the A2AT scheme cannot be calculated at this stage. Impacts on traffic cannot be assessed in detail at this stage either, although the importance of the roads and railways being crossed are identified and can be used to gain a sense of the impact that construction might have.

## Assessment of Effects

### Eastern Route

- 12.6 The Eastern Route crosses a total of 70 roads, one of which is a motorway, eight are A-roads, and eight are B-roads. The route also crosses five rail routes. See Table 12-1 below for more detail

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<sup>51</sup> *Guidelines on the information to be contained in Environmental Impact Assessment Reports*, EPA, 2022.

## Western Route

- 12.7 The Western Route crosses a total of 67 roads, two of which are a motorway, thirteen are A-roads, and seven are B-roads. The route also crosses five rail routes. See Table 12 1 below for more detail.

**Table 12-1: Comparison of material assets between the Eastern and Western Routes**

Western Route	Eastern Route
<b>Motorways</b>	
1. M11	1. A1 ((M) Sawtry Interchange) 2. M11
<b>A-roads</b>	
1. A47 2. A1 3. A605 4. A14 5. A421 (Great Barford Bypass) 6. A1 7. A10 8. A505	1. A47 2. A1 3. A605 4. A141 5. A1123 6. A1307 7. A14 (Huntington Rd.) 8. A428 9. A603 (Wimpole Rd.) 10. A10 11. A505
<b>B-roads</b>	
1. B660 (Warwick Rd) 2. B661 3. B645 4. B1040 5. B1042 6. B1368 (Cambridge Rd.) 7. B1038 8. B1383	1. B660 (Infield Rd.) 2. B1043 3. B1040 4. B1046 (Comberton Rd.) 5. B1368 6. B1383 7. B1052
<b>Unclassified Roads</b>	
1. Woodcroft Road 2. Stamford Road 3. Love's Hill 4. Oundle Road 5. Haddon Road 6. Unnamed road west of Morbourne 7. Bullock Rd. 8. Gypsy Lane 9. Hemington Lodge Rd. 10. Luddington Rd 11. Hamerton Rd. 12. High Street (Old Weston) 13. The Avenue (Leightton Bromswold) 14. Chatworth Farm Lane 15. Cock Way Lane 16. Stow Rd. 17. Stocking Lane 18. Unnamed road to dwelling near Huntingdon gas compressor station	1. Woodcroft Road 2. Stamford Road 3. Love's Hill 4. Oundle Road 5. Haddon Road 6. Unnamed road west of Morbourne 7. Bullock Rd. 8. Caldecote Rd. 9. High Hayden Rd. 10. Gidding Rd. 11. Unnamed road off St. Juddiths Lane 12. Toll Bar Way 13. Unnamed lane off Woodwalton Lane 14. New Rd. 15. Raveley Rd. 16. Huntingdon Rd. 17. Mill Rd. 18. Ilings Lane 19. Broughton Lane

19. The Drive	20. Unnamed road between 'The Lane' and 'Oldhurst Rd'
20. Crow Spinney Lane	21. Wheatsheaf Rd.
21. Unnamed road leading to Bassmead Manor	22. Bluntisham Rd.
22. Bassmead Manor Lane	23. Mill Way
23. Bushmead Road	24. Guided Busway Bridleway
24. Manor farm lane	25. Mow Fen Drove
25. Godwick Drive	26. Hale Rd.
26. Mill Road	27. Fen Drayton Rd.
27. Colesden Rd.	28. Rose and Crown Rd.
28. Woodend Lane	29. Scotland Drove
29. Bedford Road	30. Bucking Way Rd.
30. Church Street	31. Utton's Drove
31. Tempsford Rd. x3	32. Robin's Lane
32. Tetworth Hill	33. Scotland Rd.
33. Drove Rd.	34. St Neots Rd.
34. Long Lane	35. Jack's Way
35. Hatley Rd.	36. Harlton Rd.
36. Bar Lane	37. Chapel Hill
37. Buff Lane	38. Brook Rd.
38. Flecks Lane	39. The drift
39. Littleington Rd.	40. Grange Rd.
40. Ashwell Street	41. Abbey's Street
41. Therfield Rd.	42. Quickset Rd.
42. Icknield Way	43. Wenden Rd.
43. Royston Rd.	44. Debden Rd.
44. Bogmoor Rd.	45. Water Lane
45. Unnamed road near Triggs Grove	46. Green Croft Lane
46. Ropers Lane	47. Chickney Road
47. Waterwill Hill	
48. Park Lane	
49. Valance Rd.	
50. Clavering Rd.	
51. Rickling Rd.	
52. Green Croft Lane	
53. Chickney Road	

### Railway Crossings

1. East Coast Main Line x2	1. East Coast Main Line x2
2. Unnamed railway near Water Newton	2. Unnamed railway
3. Hitchin Cambridge Line	3. Cambridge Line
4. Rail line near Newport	4. Bethnal Green and King's Lynn Line

## Mitigation

- 12.8 At gate two insufficient information is available to enable an impact assessment to be undertaken and thus mitigation measures cannot be specified. Further work will be required at gate three to determine what the measures will be needed to offset / prevent environmental impacts.
- 12.9 A first step will be to consult the relevant statutory bodies on the likely requirements for design of the crossings and mitigation. This would entail discussion with Highways England for motorways and other trunk routes, with the local highways authorities being consulted for other roads. Network Rail will need to be consulted for any work in the vicinity of railway lines and consents for working on railways (track possessions and wayleaves), particularly for busy mainline routes, can take some time to obtain. In all cases, early consultation is advised to identify the necessary consents required and procedures to be followed.
- 12.10 Early consultation with other statutory bodies should also be undertaken. These would include National Grid for major gas and electricity infrastructure, and the relevant local distribution companies where lower capacity networks are affected. Assets owned by Anglian Water and Affinity Water themselves should also be identified.

## Conclusions

- 12.11 Both routes cross a large number of roads (Eastern Route 67, Western Route 70) and five railway lines. However, at this stage insufficient information is available to enable an impact assessment to be undertaken.

# 13. Cultural Heritage

## Introduction

- 13.1 This chapter reports the findings of an assessment of the likely effects impacts on cultural heritage as a result of the proposed A2AT scheme. It identifies the location, type and significance of cultural heritage assets and reports on the predicted impacts of the A2AT scheme on this resource.
- 13.2 Heritage assets are defined within the National Planning Policy Framework (NPPF)<sup>52</sup> as "A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest". Heritage assets include those that are designated under legislation (such as listed buildings and scheduled monuments) as well as those that are undesignated. The latter are assets that are considered to have a degree of local interest or significance usually recognised by Local Planning Authorities, either by their inclusion within the local Historic Environment Record (HER) or by local listing.

## Methodology

### National Planning Policy Framework

- 13.3 A core principle of the NPPF is that the planning system should conserve heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of current and future generations.
- 13.4 The NPPF acknowledges the importance of assessing the significance of heritage assets potentially harmed or lost through alteration or destruction or through development within their setting. It also sets out the considerations that local planning authorities should have when determining applications.
- 13.5 The requirements of the NPPF have been accounted for in the assessment, with particular regard given to establishing the significance of designated and undesignated assets and their settings to inform decision making.
- 13.6 The NPPF defines the significance of heritage assets as "The value of a heritage asset to this and future generations because of its heritage interest. Significance derives not only from a heritage asset's physical presence, but also from its setting." It also sets out criteria which should be considered when assessing the significance of cultural heritage assets, which include archaeological, architectural, artistic and historic values.

### Assessment Methodology

- 13.7 Certain types of heritage asset have a level of significance that justify official designation, such as scheduled monuments and listed buildings; however, the absence of designation does not necessarily mean heritage assets are of lower value or significance.

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<sup>52</sup> MCHLG 2021. Revised National Planning Policy Framework (NPPF). Section 16: Conserving and enhancing the historic environment. Ministry of Communities, Housing and Local Government. [available online] URL: <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

- 13.8 Professional judgement has been used to identify the value and significance of assets guided by legislation<sup>53 54</sup>, national planning policy<sup>55 56</sup>, standards, official designations, and the assessment criteria contained in the guidance<sup>57</sup> (reproduced in Table 13-1).

**Table 13-1. Definition of Sensitivity of Heritage Asset Receptors**

Sensitivity of Receptor	Definition
Very High	Very high importance and rarity, international scale, and very limited potential for substitution
High	High importance and rarity, national scale, and limited potential for substitution
Medium	High or medium importance and rarity, regional scale, limited potential for substitution
Low (or lower)	Low or medium importance and rarity, local scale
Negligible	Very low importance and rarity, local scale

### Magnitude of Impact Criteria

- 13.9 Impacts have been identified by reviewing the identified sites, features and areas within the defined study areas against the form and extent of the A2AT scheme, in order to establish which assets could be affected by its construction and operation, assuming that the route corridor remains as defined in gate two.
- 13.10 Impacts identified in the assessment relate to the predicted changes to key elements of an asset and/or its setting. These can, for example, derive from temporary or permanent actions such as the physical destruction of buried archaeology during construction works, and the introduction of new highway infrastructure into the historic setting of a building.
- 13.11 The magnitude of impact has been assessed using the criteria in Table 13-2.

<sup>53</sup> Ancient Monuments and Archaeological Areas Act 1979. HMSO (1979).  
<https://www.legislation.gov.uk/ukpga/1979/46>

<sup>54</sup> Planning (Listed Buildings and Conservation Areas) Act 1990. The Stationery Office (1990).  
<https://www.legislation.gov.uk/ukpga/1990/9/contents>

<sup>55</sup> National Policy Statement for National Networks. Department for Transport (2014).  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/387223/npsnn-web.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf)

<sup>56</sup> National Planning Policy Framework. Ministry of Housing, Communities and Local Government (2019).  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/810197/NPPF\\_Feb\\_2019\\_revised.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf)

<sup>57</sup> Planning Practice Guidance: Historic environment. Ministry of Housing, Communities and Local Government (2019).  
<https://www.gov.uk/guidance/conserving-and-enhancing-the-historic-environment>

**Table 13-2. Definition of Magnitude of Change**

Magnitude of Change		Typical Descriptors
Major	Adverse	Loss of resource and/ or quality and integrity of resource; severe damage to key characteristics, features, or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration or enhancement; 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.
	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.
	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	Low or medium importance and rarity, local scale.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features, or elements.
No Change		No loss or alteration of characteristics, features, or elements; no observable impact in either direction.

## Data Sources

- 13.12 To inform the baseline, data, information and records relating to cultural heritage were obtained from the Historic Environment Record (HER) for all of the local authority areas through which the pipeline corridors run through. This has allowed for the identification of archaeological and built heritage sites, both designated and non-designated.
- 13.13 This document contains the tabulated results of a high-level constraints assessment for the pipeline scheme as it runs along two alternative corridors. Both corridors commence in the same location to the west of the City of Peterborough and run along the same route until they diverge on the boundary between North Northamptonshire and Cambridgeshire. The two corridors realign again at the southern end of the scheme in Essex.
- 13.14 The eastern and western corridors run through a number of local authority areas: City of Peterborough, North Northamptonshire, Cambridgeshire, Bedford Borough, Central Bedfordshire, Hertfordshire and Essex.
- 13.15 The following chapters are organised according to local authority area. Each table contains columns for map page number, HER number, record type, site name, monument type, evidence, and constraints risk.
- 13.16 A study area comprising a buffer of 250m on either side of the pipeline routes was adopted.

13.17 The avoidance criteria used by Arup in the design of the A2AT scheme have been adopted for the high-level constraints assessment. The constraints risk column is colour coded in the following manner:

- Amber: mitigation not required between 50m and 250m from pipeline if there are no intrusive works.
- Yellow: Mitigation required within 50m of pipeline. If the pipeline is routed within 50m of the asset it will be necessary to provide mitigation.
- Red: Avoidance Recommended. The gate two route may directly impact an asset or pass close enough to impact any related features that may exist (certain classes of heritage asset are likely to have unknown but associated remains beyond their known extent).

13.18 Each of these tables is accompanied by maps derived from GIS data supplied by the respective HER office in each local authority area.

13.19 The tables and the maps are designed to assist in the avoidance of known cultural heritage constraints and to inform the potential requirement for mitigation where avoidance is not possible.

## Assessment of Effects

13.20 Impacts on archaeological and built heritage assets are comparable on both the Eastern and Western schemes – 21 heritage sites are identified on both corridors as sites where avoidance is recommended. These comprise mostly non-designated archaeological sites of prehistoric and medieval date, whose nature and form would suggest the presence of significant and extensive archaeological sub-surface remains through which the pipeline would cross through. There are also a small number of designated archaeological and built heritage assets which would also be directly impacted by the construction of a pipeline.

13.21 On the eastern corridor within Cambridgeshire, the following archaeological sites would be directly impacted by the pipeline. These are as follows: an Iron Age to Roman banjo enclosure (MCB29615), a possible barrow cropmark at Thriplow (MCB5201), a World War II era pillbox also at Thriplow (MCB29714), a Roman villa at Hoffers Brook Farm (MCB5063), cropmarks of possible mounds at Swavesey (MDB18222), and soilmarks recorded north of All Saints Church (MCB25514), barrows at Holywell cum Needingworth (MCB9489).

13.22 The eastern pipeline also runs in close vicinity of deserted medieval villages at Lulworth (MCB4303) and Wood Walton (MCB3592), and designated assets – All Saints Church at Lulworth (DCB6346) and Sawly Abbey (DCB223). The nature of such settlements means that archaeological remains associated with these sites often are more extensive than current known site boundaries.

13.23 On the western corridor within Cambridgeshire, the pipeline would directly impact upon Horse Croft Hovel at Morborne (MCB31651), Iron Age to Roman enclosures at Old Weston (MCB29787), a post-medieval tree avenue running between West Perry and east of Gaynes Hall (MCB20016), a medieval ditched enclosure or moat at Kimbolton (MCB594), Tadlow Towers (MCB2873), an undated ring ditch near Morden Green (MCB25863), and a possible moated manor north of Steeple Morden (MCB1561). Also, on the western corridor within Bedford Borough, there is a possible moat at Begwary (MBD3304), a deserted medieval village and a probable moated site at Colesden (MBD5210; MBD17098; MBD22202), an Iron Age / Romano-British / early medieval settlement (MBB21904), as well as cropmarks and Roman occupation north of Roxton Road (MBD482) which would be directly impacted by the current western pipeline alignment.

13.24 Also, on the western corridor within Cambridgeshire, the pipeline runs in close proximity to an Iron Age to Roman enclosure at Kimbolton (MCB29969), and a scheduled monument, the Roman fort and town of *Durobrivae* at Water Newtown (DCB7846). Again, the nature of such settlements means that archaeological remains associated with these sites often are more extensive than current known site boundaries.

13.25 The full impact assessment is to be found in Appendix F.

## Mitigation

- 13.26 Each heritage receptor will need to be individually assessed and any mitigation required will need to be agreed with the relevant authorities (usually the county archaeologist and, for more sensitive receptors, Historic England). However, three broad classes of mitigation measure are recommended in the assessment tables, and these are discussed in more detail below, the intention being to give an indication of the sorts of mitigation that might be appropriate for the potential impacts identified.
- 13.27 Generally speaking, avoidance is the preferred method of mitigation for all receptors but for some receptors it is the only appropriate response.

## Avoidance Recommended

- 13.28 Throughout the design process, avoidance of heritage assets by refinement of the pipeline alignment should be undertaken. These changes should be made to take account of heritage assets which are already known, and also buried archaeology which may be newly discovered during the field work undertaken for this project.

## Mitigation Required within 50m of Pipeline

- 13.29 In respect of archaeological remains within the footprint of the scheme, a programme of archaeological fieldwork and recording would be implemented. This would be proportionate to the level of impact and the value of the assets affected.
- 13.30 Measures to avoid or minimise potential physical impacts arising from construction activities would include locating construction compounds to avoid designated heritage assets and where possible to avoid non-designated heritage assets. Exclusion areas, to protect particular archaeological sites, could be adopted. The layouts of the construction compounds could also be designed to reduce temporary impacts on the settings of heritage assets. This could include the concealing of compound buildings behind existing hedges which would be retained. Compounds, temporary road diversions and haul roads could be built under a 'no dig' solution, wherever possible, with topsoil retained in situ and geotextile laid before road stone and temporary road surface.
- 13.31 Archaeological fieldwork would include reporting, publication and dissemination to local communities, the wider general public and academics.
- 13.32 The principal techniques used in archaeological fieldwork are as follows:
- Preservation of archaeological remains
  - Archaeological recording
  - Archaeological Excavation and Recording
  - Strip, Map and Record
  - Archaeological Monitoring and Recording
  - Ploughzone artefact collection (fieldwalking and topsoil test pitting)
  - Trial Trench Evaluation
  - Geo-archaeological and palaeo-environmental investigation

- Archaeological Topographic survey
- Archaeological Photographic recording
- Publication and dissemination

13.33 The majority of the archaeological fieldwork and recording works could be completed during a preliminary works stage, prior to the main works. Some areas may still remain to be archaeologically investigated at construction stage such as areas of the compound that require topsoil removal.

## **Mitigation Not Required Between 50m and 250m From Pipeline (if there are no intrusive works)**

- 13.34 Measures to avoid and minimise potential physical impacts arising from construction activities as detailed in previous section would still be required if intrusive works are required within this zone.
- 13.35 Prior to the start of construction, the Main Contractor could prepare a scheme-wide heritage plan indicating how the historic environment is to be protected in a consistent and integrated manner, coordinated with all other relevant environmental topics. The plan could set out procedures for the protection of heritage assets and archaeological sites during construction including buffer zones, protective membranes and fill materials, protective fencing and appropriate signage, security measures, control of noise and dust etc.

## **Conclusions**

- 13.36 Unmitigated impacts on archaeological and built heritage assets are comparable on both the Eastern and Western schemes – 21 heritage sites are identified on both corridors as sites where avoidance is recommended. These comprise mostly non-designated archaeological sites of prehistoric and medieval date, whose nature and form would suggest the presence of significant and extensive archaeological sub-surface remains through which the pipeline would cross through. There are also a small number of designated archaeological and built heritage assets which would also be directly impacted by the construction of a pipeline. In these cases, rerouting to avoid the sites may become necessary but further work will be required at subsequent gate stages to confirm this.

# 14. Landscape

## Introduction

- 14.1 This chapter identifies the effects of the A2AT scheme on landscape character. Effects on landscape character relate to direct physical changes to the fabric and individual elements of the landscape. They also relate to the potential indirect changes to the wider patterns of land use, land cover and the arrangement of landscape features which determine the character, the aesthetic, and the perceptual qualities of the landscape. As defined in GLVIA3, the term landscape also encompasses urban landscape, often referred to as townscape. For the purpose of this scoping report the term landscape is adopted and may include areas of townscape.
- 14.2 There are likely to be some overlaps between landscape effects in relation to other disciplines such as Cultural Heritage or Ecology. The potential effects on these aspects of the environment are reported in separate chapters and are also referenced in the landscape character chapter where relevant.

## Methodology

### Method of Assessment

- 14.3 This chapter has been prepared with reference to the Guidelines for Landscape and Visual Impact Assessment 3rd Edition (GLVIA), 2013.
- 14.4 The assessment is informed by baseline studies, proportionate to the context of the project at this stage. The landscape baseline establishes the relative value of the landscape, either as whole or individual components that contribute to its character.
- 14.5 The following potential impacts may be associated with the preferred option:
- Temporary changes to landscape character from sensitive receptors in the vicinity of the A2AT scheme during construction and decommissioning; and
  - Permanent changes to landscape character from sensitive receptors in the vicinity of the A2AT scheme during operation.
- 14.6 The proposed method of the assessment has been devised to address the specific effects likely to result from a development based on its scale and nature. The methodology draws upon the following established best practice guidance:
- 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA3) (IEMA, 2013);
  - Natural England, An Approach to Landscape Character Assessment (2014);
  - Landscape Institute Technical Guidance Note 04/20: Infrastructure;
  - Landscape Institute Technical Information Note 01/17: Tranquillity;
  - Landscape Institute Technical Guidance Note 02/19: Residential Visual Amenity Assessment; and
  - Landscape Institute Technical Guidance Note 02/21: Assessing landscape value outside national designations.

## Assumptions and Limitations

- 14.7 The identified effects relate to landscape effects only. There is a potential for visual effects, for example temporary visual impacts during construction, or longer lasting intrusions into views owing to loss of vegetation such as trees or hedgerows, but the level of detail available at gate two is insufficient to allow the exact route to be identified and any visual effects to be identified.
- 14.8 The identified potential significant effects are based on the concept design available at gate two and may need adjustment, should the designs change considerably.

## Study Area

- 14.9 The study area has been established by a combination of potential visibility of the A2AT scheme and professional judgement. Based on these criteria a study area of 1km from the edge of each of the considered options has been used in this chapter.
- 14.10 Beyond the extent of the study area, it is considered that the A2AT scheme will unlikely give rise to any significant effects on landscape and visual receptors due to distance and presence of screening features.

## Baseline

### Published Landscape Character Assessments

- 14.11 Landscape baseline conditions were established by desktop studies with the purpose of identifying landscape elements and receptors that may be significantly affected by the A2AT scheme. Landscape character assessment is hierarchical from the national, regional, local and site or scheme specific level.
- 14.12 The A2AT scheme falls within seven National Character Areas (NCA). Each NCA identifies landscape characteristics and defines local distinctiveness.
- Bedfordshire and Cambridgeshire Claylands (NCA) 88, a broad, gently undulating, lowland plateau dissected by shallow river valleys that gradually widen as they approach The Fens NCA in the east.
  - The Kesteven Uplands (NCA) 75 is a gently rolling, mixed farming landscape dissected by the rivers Witham and the East and West Glen.
  - Rockingham Forest (NCA) 92 is essentially a broad, low, undulating ridge which falls away from a prominent, steep northern scarp overlooking the Well and Valley. Large areas of woodland remain a significant feature of the landscape.
  - East Anglian Chalk (NCA) 87 is a visually simple and uninterrupted landscape of smooth, rolling chalkland hills with large regular fields.
  - Northamptonshire Vales (NCA) 89, consists of a series of low-lying clay vales and river valleys, including the valleys of the rivers Nene and Welland and their tributaries. The area is 10 per cent urban, and settlement is often visually dominant.
  - South Suffolk and North Essex Clayland (NCA) 86, is made up of undulating countryside, incised by small river valleys flowing east to the North Sea, with sporadic but narrow interfluvial plateaux. This is an area of chalky boulder clay (glacial till).
  - Greensand Ridge (NCA) 90, is a narrow ridge running north-east, south-west, rising out of – and entirely surrounded by – the Bedfordshire and Cambridgeshire Claylands NCA. It is a distinctive ridge

with a north-west-facing scarp slope, formed by the underlying sandstone geology which has shaped the landscape and industry of the Ridge. Its historic landscapes, including the farmland, parklands and historic architecture, combined with small settlements, greenbelt and woodlands.

## Assessment of Effects

- 14.13 Both routes traverse six of the NCAs, namely Kesteven Uplands, Rockingham Forest, Northamptonshire Vales, Bedfordshire and Cambridgeshire Claylands, East Anglian Chalk and South Suffolk and North Essex Clayland. A section of the Western Route traverses Bedfordshire Greensand Ridge national character area.
- 14.14 No National Parks or Areas of Outstanding Natural Beauty are affected by the A2AT scheme.

## Assessment of Effect on National Character Areas

**Table 14-1. Preliminary Assessment of Effect**

Landscape Character Type	Route	National Park	Area of Outstanding Natural Beauty
NCA75 Kesteven Uplands	Eastern / Western	None	None
NCA 92 Rockingham Forest	Eastern / Western	None	None
NCA 89 Northamptonshire Vales	Eastern / Western	None	None
NCA 88 Bedfordshire and Cambridgeshire Claylands	Eastern / Western	None	None
NCA 90 Bedfordshire Greensand Ridge	Western only	None	None
NCA 87 East Anglian Chalk	Eastern / Western	None	None
NCA 86 South Suffolk and North Essex Clayland	Eastern / Western	None	None

- 14.15 Both the Eastern and Western Routes have the potential to impact the landscape during construction and operation. Construction effects on the landscape might include loss of sensitive landscape features along the route of the pipeline, although the concept design developed for gate two deliberately avoids ancient woodland and other stands of mature vegetation that might be considered sensitive in the landscape context as well as in their own right. However, given the linear nature of the scheme complete avoidance of any landscape features, most notably hedgerows, is not possible. It is likely that partial loss of such features will occur along both routes, although in many cases the loss may be temporary.
- 14.16 Operational effects would mainly be limited to above ground infrastructure associated with the A2AT scheme, in particular the pumping stations required to operate it. There will likely be some post-construction landscape impacts in the years after the scheme opens although these would be expected to diminish over time as vegetation recovers from any losses.
- 14.17 Therefore, it is clear that there will be impacts on the landscape as a result of the A2AT scheme, but this does not take account of the opportunities to mitigate through detailed routeing and further avoidance of sensitive features as well as landscape reinstatement or enhancement. A preliminary conclusion, therefore, is that there are unlikely to be significant effects on landscape. Further work will be required to confirm this finding at subsequent stages in the scheme design.

## Mitigation

- 14.18 If consideration is given to the key features which contribute to the landscape including wetlands, woodland, hedgerows and ridgelines, it is considered that a pipeline route could be developed without substantially altering its landscape character in the long term. However, this would require more detailed landscape reinstatement or enhancement to be identified at future gate stages.

## Conclusions

- 14.19 Although there is potential for significantly adverse landscape effects during the construction of the pipeline and during its operation, long term significant effects on the landscape character can be prevented for both the routes with appropriate mitigation.

# 15. Summary and Next Steps

## Introduction

- 15.1 Early work on the Eastern Route identified that it would cross the Nene Washes SPA / SAC and that mitigation to overcome the impacts would be necessary. Further investigation determined that the measures required (routing it through the existing road corridor north of Whittlesley) would be technically complex.
- 15.2 Instead, it was decided to avoid this impact altogether by removing the northern section of the route altogether and instead routing it to the west of Peterborough along the same corridor as the Western Route. The revised Eastern and Western Routes diverge to the South of Peterborough and then follow different corridors to the WRZ5 end point.
- 15.3 The decision to route the Western Route to WRZ5 instead of Preston Service Reservoir entailed further work to optimise the route south of Grafham.

## Population & Human Health

### Assessment Summary

- 15.4 Potential socio-economic and health impacts of the A2AT scheme are consistent across both routes, with the possibility of land take, amenity and severance affecting communities along the route. There is also the possibility of health effects in specific locations along the route during construction where activities are intense. It is likely that construction of the A2AT scheme will provide a limited economic boost to the region through which it passes owing to the employment of construction workers. However, none of these impacts can be identified at gate two and further work will be required to determine if they arise and what mitigation is possible.

### Mitigation

- 15.5 There is the opportunity for the implementation and design of mitigation measures not only to offset adverse impacts but also to enhance beneficial economic, employment, health and social value impacts.

## Biodiversity

### Assessment Summary

- 15.6 Many designated sites have been identified to be hydrologically connected to watercourses which the Eastern and Western Routes cross. Areas of Grafham Water SSSI are within 100 m proximity of the Western Route, which crosses two unnamed watercourses which appear to flow to Grafham Water. Similarly, the Western Route crosses two unnamed watercourses which appear to flow into Waverly and Sands Woods SSSI providing a potential flow pathway for downstream effects during construction.
- 15.7 Debden Water SSSI is almost crossed by the Eastern Route (no more than 5 m away) and the Eastern Route lies between the two units of Debden Water SSSI, and therefore crosses Debden Water itself. Any impacts from the scheme could be conveyed downstream to the second unit of the SSSI via Debden Water, within the shallow geology related to the designated habitats. The Eastern Route would also pass along the boundary of the Woodwalton Fen SSSI (which is formed on peat and may be sensitive to changes in hydrology) and Fenland SAC within the shallow geology related to the fenland water features and habitats.

- 15.8 Designated sites may be affected by turbidity where the pipeline route crosses a hydraulically connected aquifer with shallow groundwater. This may be the case in the Nene valley near Castor Meadows SSSI (Eastern and Western Route), Woodwalton SSSI (the Eastern Route), and Debden Water (the Eastern Route).

## Mitigation

- 15.9 A CEMP will be developed to implement measures *inter alia* to reduce fine sediment in surface runoff, through various means. Given the size and important nature of the River Nene and River Great Ouse it is likely that these watercourses would be traversed by horizontal direct drilling rather than open cut trenching, which would significantly reduce the risk of any pollution event affect the watercourses.

## Land & Soils

### Assessment Summary

- 15.10 The A2AT scheme is likely to require a relatively large amount of BMV agricultural land for its construction since the region through which it passes is contains a high proportion of such land. However, much of the loss would likely be temporary and during construction only, with best practice mitigation employed.

## Mitigation

- 15.11 During construction soils will be protected through best practice soil management techniques such as those set out in DEFRA's Code of Practice for the Sustainable Use of Soils. This will ensure, through careful handling of topsoil stripped for construction, that the valuable soil resource is not inadvertently harmed during the construction and soil storage process.
- 15.12 Further consideration could be given in gate three to the location of pumping stations and break pressure tanks to avoid BMV agricultural land if this is possible.

## Water

### Assessment Summary

- 15.13 An assessment of existing baseline conditions describes the general environmental conditions (topography, climate, land use, geology and soils) while identifying key surface water and groundwater receptors, their attributes and flood risk (all from desk study only). The Western Route crosses five WFD groundwater bodies, and 28 WFD waterbodies. The Eastern Route crosses five WFD groundwater bodies, and 21 WFD waterbodies. The main risk of fluvial flooding (Flood Zones 2 and 3) for the Western Route arises from the River Nene, the River Great Ouse, River Rhee (near Tadlow) and the River Granta. For the Eastern Route, the River Nene and the River Great Ouse pose the greatest risk for fluvial flooding.
- 15.14 Waterbody importance was determined using the importance and impact assessment criteria which identified three WFD waterbodies to be of Very High Importance; Ouse (Roxton to Earith), Nene - Islip to tidal, and Debden Water are crossed by both the Eastern and Western Routes. All other surface waterbodies are identified as having High Importance or assumed to be of High Importance where there is no flow data available. These are provisional ratings and as further baseline data comes available will be reviewed. In addition, following future site surveys it will be possible to provide a separate importance rating for hydromorphology, which may sometimes differ from water quality.
- 15.15 Potential impacts from construction have been identified for surface water (including hydromorphology), groundwater, and flood risk. Surface water impacts from sediment and site run off, construction chemicals and pollution, watercourse crossings and access crossings are all likely to generate impacts and lead to the

contamination of watercourses and / or water supplies, or physical impacts to the form and function of watercourses, if unmitigated.

## Mitigation

- 15.16 To mitigate these impacts from the construction phase, it is recommended that all works are carried out in accordance with the mitigation measures set out in a CEMP. Construction works could be effectively managed through a variety of measures to minimise the risk to the water environment from construction site runoff and chemical spillages, such as temporary drainage systems, proprietary measures and ensuring plant is well maintained. Where waterbodies are crossed, it is recommended that non-intrusive design options are used, but where this is not possible open cut crossings need to be agreed with EA, LLFA and IDB where appropriate and additional mitigation applied. Temporary crossings for access should be of clear span design, but where this is not possible, temporary pipe culverts may be used if appropriately mitigated (and agreed with the relevant regulators). If required, baseline water quality conditions could be established from a water quality monitoring programme, to support ongoing monitoring during construction if required.
- 15.17 Potential impacts to flood risk may arise from an increased rate and volume of surface water runoff from site clearance and ground compaction. Material may also be transported to watercourses during large fluvial flood events causing blockages of culverts, leading to downstream impacts. Mitigation measures may include undertaking certain works during drier months of the year to implementing an Emergency Response Plan and ensuring spare pumps are kept onsite.
- 15.18 Groundwater impacts include turbidity affecting groundwater abstractions, pollution of aquifers and impact on abstractions and designated sites resulting from chemical spills and disruption of groundwater flow to abstractions, baseflow to watercourses and potentially designated sites. Mitigation to manage the risk to groundwater during construction works will be similar as described for the surface water environment.
- 15.19 There are some uncertainties relating to the scheme, including details of how watercourses are to be crossed, the proposed maintenance of the scheme, where the water would be sourced if hydrostatic testing was to occur or whether there would be a requirement for any additional pre-washing or disinfection of the new pipeline prior to it becoming operational. These uncertainties will need exploring further to ensure appropriate and sufficient mitigation of impacts are implemented

## Air Quality

### Assessment Summary

- 15.20 Along the majority of the route corridors receptors will have limited exposure to dust impacts, although there are pockets of higher sensitivity areas where routes pass closer to several populated areas and designated habitats. The level of mitigation recommended by the IAQM to control impacts associated with high-risk dust sites would be sufficient to control dust impacts to the extent that the effect is not significant.
- 15.21 There is the potential that construction traffic could have a significant effect on local air quality, subject to the number of additional vehicle movements on any given road link. This would most likely be a constraint where there was an increase in vehicle movements within an AQMA as a result of the A2AT scheme.

## Mitigation

- 15.22 A detailed assessment of air quality impacts may be required to confirm whether or not the effects identified are significant, and various measures have been identified that can be incorporated in a CEMP to control construction dust impacts.

- 15.23 It is recommended that when planning the location of construction compounds and construction traffic routes, that consideration is given to potential air quality impacts. An increase in vehicle movements on roads within or adjacent to an AQMA should be avoided if possible.

## Climate

### Embodied Carbon

- 15.24 The vast majority (97%) of the embodied carbon emissions for all options assessed is associated with the iron pipework required. Therefore, the most efficient means of reducing the embodied carbon of the scheme will be in reducing the mass of pipework involved, i.e., shortening the pipeline route, reducing pipe thickness or diameter.
- 15.25 Overall, the Eastern Route (at both capacities assessed) is just under 10% lower in embodied carbon emissions, 9% lower in construction carbon and 5% lower in operational carbon than the Western Route.

### Construction Carbon

- 15.26 Much of the detail surrounding construction duration, processes and phasing is not known at this stage of the design. For this carbon assessment, assumptions have been made regarding the construction methodology, timeframes, vehicle movements, and excavation works required. However, it is recommended that these calculations be repeated once further details of the construction works entailed are known.

### Operational Carbon

- 15.27 The operational carbon included in this assessment is primarily associated with water pumping and chemical treatment. It has been assumed that all energy will be sourced from the UK Grid during the operational lifespan assessed (note, emission factors used do not take into account any decarbonisation of the Grid).

## Mitigation

- 15.28 A wide range of carbon reduction measures are recommended under four broad categories:

- Specification of lower carbon materials
- Innovative design
- Lean construction techniques
- Renewable energy to power the pipeline

- 15.29 It is recommended that a carbon workshop should be arranged at the beginning of the outline design phase, to explore the feasibility and build upon the recommendations listed above.

## Material Assets

### Assessment Summary

- 15.30 Both routes cross a large number of roads (Eastern Route 67, Western Route 70) and five railway lines. However, at this stage insufficient information is available to enable an impact assessment to be undertaken.

## Mitigation

- 15.31 Early consultation with statutory bodies should be undertaken, both to establish the requirements for the design and construction of crossings and to minimise environmental impacts:
- Highways England for motorways and other trunk routes
  - Local highways authorities for non-trunk roads
  - Network Rail for any work in the vicinity of railway lines and consents for working on railways
  - National Grid for major gas and electricity infrastructure, and the relevant local distribution companies where lower capacity networks are affected
  - Assets owned by Anglian Water and Affinity Water themselves should also be identified

## Cultural Heritage

### Assessment Summary

- 15.32 Unmitigated impacts on archaeological and built heritage assets are comparable on both the Eastern and Western schemes – 21 heritage sites are identified on both corridors as sites where avoidance is recommended. These comprise mostly non-designated archaeological sites of prehistoric and medieval date, whose nature and form would suggest the presence of significant and extensive archaeological sub-surface remains through which the pipeline would cross through. There are also a small number of designated archaeological and built heritage assets which would also be directly impacted by the construction of a pipeline.

## Mitigation

- 15.33 Where remains have been identified within 50m of the pipeline route, a programme of archaeological fieldwork and recording would be implemented. Rerouting to avoid the 21 sites identified above may become necessary but further work will be required at subsequent gate stages to confirm this. If the route passes within 250m of identified remains, fieldwork may also be required if intrusive works are planned.

## Landscape

### Assessment Summary

- 15.34 Although there is potential for significantly adverse landscape effects during the construction of the pipeline and during its operation, long term significant effects on the landscape character can be prevented for both the routes with appropriate mitigation. The preliminary conclusion therefore is that no significant effects as a result of the A2AT scheme, but further work will be required to confirm this finding at subsequent stages in the scheme design

## Mitigation

- 15.35 If consideration is given to the key features which contribute to the landscape including wetlands, woodland, hedgerows and ridgelines, it is considered that a pipeline route could be developed without substantially altering its landscape character in the long term. However, this would require more detailed landscape reinstatement or enhancement to be identified at future gate stages.

## Cumulative and In-Combination Effects

- 15.36 Cumulative effects are those that could arise from the A2AT scheme as a consequence of interactions with other, third-party schemes. For example, the impact of construction noise on sensitive environmental receptors such as nearby residents or protected species from A2AT might not be considered significant in itself but could in principle be exacerbated if another construction scheme was occurring nearby. However, in practice it is not possible to provide a robust assessment of any cumulative effects at gate two given the likely timescales for construction of A2AT. It is anticipated that supply from SLR would become available in the period 2039-41 and, assuming construction and commissioning of A2AT were to take place three to five years earlier, it would not begin until 2034 at the earliest. Typically planning permissions will be granted for five years and will usually have to be implemented during this period or will lapse, therefore meaning that there are no schemes that could interact cumulatively with A2AT that can be identified at the time of writing in 2022.
- 15.37 In-combination effects, sometimes called synergistic effects, are defined as those from multiple impacts – again not significant in themselves – arising from the same scheme. An example would be if construction noise and dust affected local residents, who at the same time were finding their views interrupted by the presence of construction plant and also experiencing severance of local footpaths or roads. These impacts might not be significant individually but in-combination the amenity effect could be considered significant. There are practical problems with undertaking an in-combination assessment of A2AT at the concept design stage however, since the detail needed to make meaningful statements about the magnitude of the individual effects is not available. Nevertheless, it is possible to highlight that in-combination effects are likely to arise only during the construction phase of A2AT because, once operational, analogy with other below ground linear infrastructure suggests that the scheme is unlikely to cause any environmental impact other than in an emergency situation, such as a leak.
- 15.38 During the construction phase potential for in-combination effects is most likely to occur around construction compounds where a combination of vehicle movements, dust, noise and lighting could lead to amenity effects or to disturbance of wildlife. In general, works away from compounds are likely to be completed relatively speedily, with the pipeline laid in a given locality and construction moving elsewhere which would limit the duration of any in-combination effects. More complex sections of the route, such as those crossing major roads or railways, could involve more prolonged exposure to a variety of impacts which could lead to in-combination effects if also located close to sensitive receptors.
- 15.39 As noted in Chapter 12: Material Assets, mitigation for such potential impacts would involve consultation with statutory authorities to plan the works most effectively to limit environmental effects. Chapter 10: Air notes that the location of construction compounds should be decided with their possible environmental impact in mind. Otherwise, the application of best-practice measures for construction site management set out in a construction environmental management plan will normally limit individual impacts which, in turn, will lower any resulting in-combination effect.

## Next Steps

- 15.40 There are a number of recommended actions to be undertaken in order to advance the A2AT scheme and an outline implementation plan is set out below. The implementation plan assumes that the supply from SLR becomes available in the period 2039-41 and that construction of the scheme would therefore commence no earlier than 2034.

## Outline Implementation Plan

- 15.41 The following actions are recommended prior to 2025:

- Statutory activities for incorporation of A2AT into Anglian and Affinity Water WRMPs as necessary

15.42 The following actions should be undertaken in the period approximately 2025-2030 to allow for refinement of the A2AT scheme, including a decision on which route (Eastern or Western) should be adopted and to ensure environmental mitigation is embedded in the scheme design where possible. Key considerations would include:

- Consultation with landowners and other stakeholders such as local councils
- Consultation with the relevant statutory organisations such as Network Rail, Highways England, Local Highways Authorities and National Grid on design of, and environmental mitigation for, transport and other infrastructure crossings
- Consultation with the Environment Agency on design of, and environmental mitigation for, river crossings
- Consultation with Natural England on environmental mitigation where designated sites may be affected
- Archaeological fieldwork to be agreed with county archaeologists and Heritage England and undertaken as appropriate to ensure the need for mitigation by avoidance has been investigated where this is likely to be necessary
- Review of the location of above ground infrastructure to ensure that the maximum opportunity has been taken to mitigate the permanent loss of BMV agricultural land and limit and landscape / visual impacts that may occur

15.43 Once the A2AT scheme has been refined, the following actions will need to be concluded in the period approximately post-2030 but prior to commencement of construction (assumed to be 2034):

- Preparation of a consenting strategy and identification of licences and consents to be obtained prior to a planning application and prior to commencement of construction
- Identification of all surveys required for consents purposes and scheduling of same (ecological surveys should be undertaken within two-years of the planning submission to ensure their currency)
- Request for an EIA Scoping Opinion from the Planning Inspectorate or local planning authorities, depending on the consenting route required
- Preparation of a Preliminary Environmental Information Report (PIER) and / or an Environmental Statement, depending on whether consent is to be obtained via Development Consent Order (DCO) or a traditional planning application
- Submission of DCO or planning application no later than 2032 if construction is to begin in 2034, to allow time for further information requests, discharge of pre-commencement conditions etc. An earlier submission date may be desirable to allow time for the risk of appeals, inquiries, judicial review etc.

15.44 Note that legislation to revise the existing EIA regime and environmental law more generally is currently passing through Parliament. If this enters into statute it is likely that there will be significant changes to the consenting procedures outlined above and therefore this implementation plan will need to be kept under review.

# Appendix A Water Framework Directive Assessment

# Appendix B Informal Habitats Regulations Assessment

# Appendix C Biodiversity Net Gain

# Appendix D Natural Capital Assessment

# Appendix E Water Baseline Data

## Western Route

### Geology and Hydrogeology

This section gives an overview of the geological and hydrogeological units along the the Western Route from north to south, what their aquifer classification is, and whether the route passes through sensitive groundwater related designations, such as Drinking Water Safeguard Zones and SPZ.

#### WFD Groundwater bodies

The study area of the Western Route falls within five WFD groundwater bodies. The beginning of the Western Route, east of Peterborough falls within the Nene Mid Lower Jurassic Unit groundwater body (GB40502G402400) and the Northampton Sands groundwater body (GB40501G445500). South of St Neots, at Gamlingay, the study area falls within the Upper Bedford Ouse Woburn Sands groundwater body (GB40501G402200). The majority of the remainder of the Western Route falls within the Cam and Ely Ouse Chalk groundwater body (GB40501G400500) while the North Essex Chalk groundwater body (GB40501G400700) is within the study area, at the very end of the Western Route. The WFD classifications from 2019 Cycle 2 and reasons for not achieving good status (RNAG) are provided in Table 1.

**Table 1 the Western Route WFD Groundwater bodies**

Name	ID	Area (ha)	Overall Status	Chemical Status	RNAG
Nene Mid Lower Jurassic Unit	GB40502G402400	99590.18	Good	Good	n/a
Northampton Sands	GB40501G445500	16697.853	Good	Good	n/a
Upper Bedford Ouse Woburn Sands	GB40501G402200	22094.557	Poor	Good	Poor nutrient management from agriculture and rural land management.
Cam and Ely Ouse Chalk	GB40501G400500	299577.401	Poor	Poor	Poor nutrient management from agriculture and rural land management. Transport drainage from industrial activity. Sewage discharge from domestic general public and water industry. Groundwater abstraction for agriculture.
North Essex Chalk	GB40501G400700	70676.799	Poor	Poor	Poor nutrient management and poor livestock management from agriculture and rural land management.

#### Bedrock Geology

The bedrock geology along the route is presented in Plate 1.



Secondary A aquifers comprise permeable layers that can support local water supplies and may form an important source of baseflow to rivers.

Secondary B aquifers comprise are predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

The dominant underlying bedrock along the Western Route from Peterborough to northeast of Sandy, is the Kellaways Formation and Oxford Clay Formation. The Kellaways Formation is formed of mudstone, with beds of calcareous siltstone and sandstone towards the upper part. The Oxford Clay Formation is overlaying the Kellaways Formation. The Oxford Clay Formation is formed of silicate mudstone, with argillaceous limestone nodules. The Kellaways Formation and Oxford Clay Formation are classified as unproductive strata (i.e., not significantly water bearing).

The Western Route turns east between St Neots and Sandy and crosses the West Walton Formation and Ampthill Clay Formation. The West Walton Formation is described as calcareous mudstone, silty mudstone, and siltstone, with subordinate fine-grained sandstones and argillaceous limestone. The overlying Ampthill Clay Formation is formed of Mudstone with argillaceous limestone nodules. The West Walton Formation and Ampthill Clay Formation are classified as unproductive.

From Sandy the Western Route is then underlain by the Lower Greensand to Gamlingay. The Lower Greensand is formed mainly of sands and sandstones, with silts and clays in some intervals. The Lower Greensand is classified as a Principal Aquifer.

The Western Route travels south to Tadlow, where the bedrock is Gault Formation. The Gault Formation is a sequence of clays, mudstone, and thin siltstones with bands of phosphatic nodules. The Gault Formation is classified as unproductive.

The Western Route then passes onto Chalk north of Basingbourn consisting of the West Melbury Marly Chalk Formation, Totternhoe Stone Member, and Zig Zag Chalk Formation, part of the Grey Chalk Group which is predominantly formed of clayey chalk without flint.

Toward Royston, the Western Route overlies Melbourn Rock Member, Holywell Nodular Chalk Formation. The toward Great Chishill the New Pit Chalk Formation, Chalk Rock Member, Lewes Nodular Chalk Formation and Seaford Chalk Formation.

In the Royston area the Western Route passes through a drinking water abstraction SPZ2. There is also groundwater Drinking Water Safeguard Zone in the area southwest and east of Royston through which the Western Route passes (see Figure 9.1).

Drinking Water Groundwater Safeguard Zones are required under the Water Framework Directive (WFD Article 7.1) to provide public water supplies with the necessary protection from pollution (WFD Article 7.3) with the aim of avoiding deterioration in their quality in order to reduce the level of purification treatment required. They are defined around public water supplies where additional pollution control measures are needed.

From Royston to the southern end of the scheme, the Western Route is underlain by the Lewes Nodular Chalk Formation and Seaford Chalk Formation. These units are part of the White Chalk Subgroup is formed of Chalk with flints. There are discrete marl seams in the group.

The Chalk formations are all classified as a Principal Aquifer.

In the Widdington area, the Western Route passes within a drinking water abstraction SPZ2, and close to the SPZ1.

### Superficial Geology

The British Geological Society Geoindex describes the superficial geology beneath the Western Route.

The majority of the Western Route is underlain by Till and Peat. There are areas along the Western Route that do not have any superficial deposits. In the Nene valley near Peterborough and the Great Ouse valley south of St Neots are River Terrace Deposits, and Alluvium.

South of Peterborough the Oadby Member comprises till deposits of a mixture of clay, sand, gravel, and boulders. Glaciolacustrine Deposits comprising clay, silt and sand.

Peat is a partially decomposed mass of semi-carbonized vegetation which has grown under waterlogged, anaerobic conditions, usually in bogs or swamps.

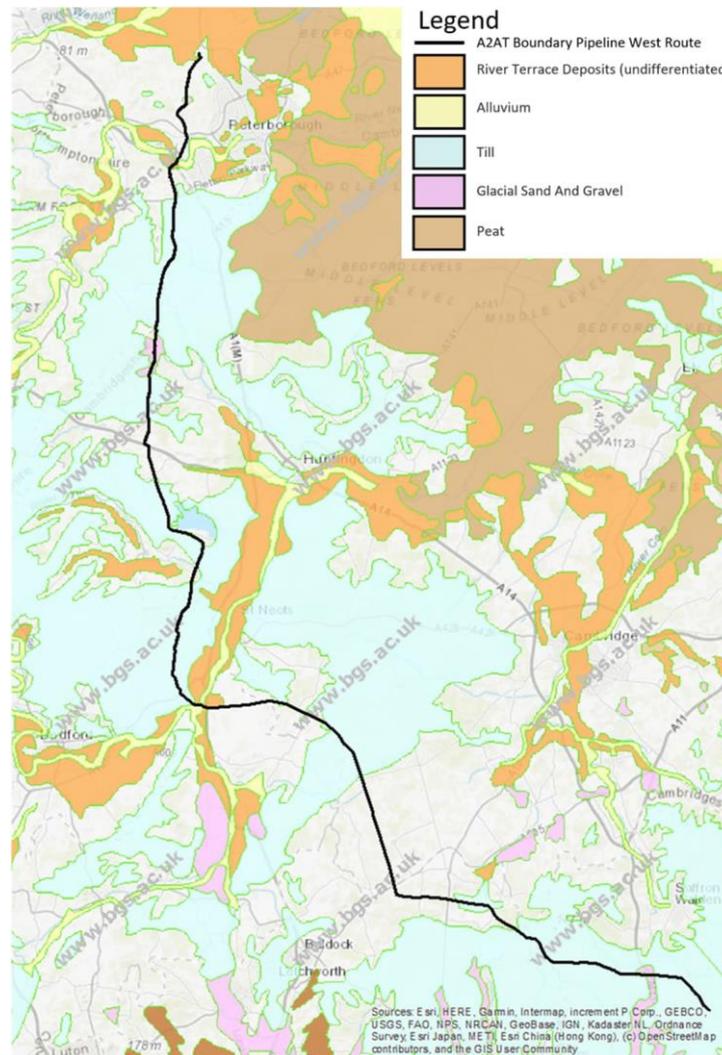
The River Terrace Deposits consist of sand and gravel, with locally with lenses of silt, clay, or peat. Alluvium along the Western Route is formed of clay, silt, sand, and gravel.

The alluvium and River Terrace Deposits form a Secondary A aquifer. The peat deposits are classified as unproductive. However, their saturation is important for maintaining a range of peatland habitats such as wetlands, bogs, and fens.

The Oadby Member and Glaciolacustrine Deposits form a Secondary (undifferentiated) aquifer.

Near the end of the Western Route are Glacial Sand and Gravel deposits forming a Secondary A aquifer, with Lowestoft Formation Till from here to Great Chishill forming a Secondary (undifferentiated) aquifer.

The superficial geology along the Western Route is presented in Plate 2.



**Plate 2 Superficial Geology - the Western Route**

## Soils

The Soilsmapes map viewer describes the soils beneath the Western Route.

From where the Western Route begins above Werrington, down towards where the Western Route crosses the River Nene, the soils beneath the pipeline are a mix of freely draining lime-rich loamy soils, slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, loamy soils with naturally high groundwater, shallow lime-rich soils over chalk or limestone and freely draining slightly acid but base-rich soils.

The Western Route is underlain by shallow lime-rich soils over chalk or limestone at Chesterton, and then Lime-rich loamy and clayey soils with impeded drainage until the Western Route reaches Roxton and Tempsford.

Where the Western Route crosses the River Great Ouse and River Iver, the study area is underlain by freely draining slightly acid loamy soils and loamy and clayey floodplain soils with naturally high groundwater.

Where the Western Route continues east towards Gamlingay, the study area is underlain by lime-rich loamy and clayey soils with impeded drainage and freely draining slightly acid loamy soils.

Around Royston, the study area is underlain by a mix of restored soils mostly from quarry and opencast spoil, shallow lime-rich soils over chalk or limestone, freely draining lime-rich loamy soils, shallow lime-rich soils over chalk or limestone and lime-rich loamy and clayey soils with impeded drainage.

The remainder of the study area is underlain by freely draining slightly acid but base-rich soils and lime-rich loamy and clayey soils with impeded drainage.

## Eastern Route

### Geology and Hydrogeology

This section gives an overview of the geological and hydrogeological units along the Eastern Route, what their aquifer classification is, and whether the Eastern Route passes through sensitive groundwater related designations, such as Drinking Water Protected Areas, Drinking Water Safeguard Zones and Source Protection Zones.

#### WFD Groundwater bodies

The study area of the Eastern Route falls within five WFD groundwater bodies. The Eastern Route follows the same course as the Western Route from Peterborough to the area between Yaxley and Huntingdon and therefore falls within the same two WFD groundwater bodies (GB40502G402400 and GB40501G445500) as the Western Route. Northwest of Cambridge, the study area of the Eastern Route falls within the Cam and Ely Ouse Woburn Sands groundwater body (GB40501G445700). The Cam and Ely Ouse Woburn Sands covers a total area of 9527.594 ha and under the WFD Cycle 2 classifications (2019), was classified as being at Good Status overall, quantitatively and chemically. The WFD groundwater bodies falling within the remainder of the study area of the Eastern Route are that of the Western Route (GB40501G400500 and GB40501G400700).

#### Bedrock geology

The British Geological Society Geotitles describes the bedrock geology beneath the Eastern Route.

The Eastern Route follows the same course as the Western Route from Peterborough to the area between Yaxley and Huntingdon.

The dominant underlying bedrock along the Eastern Route from the Yaxley area southeast toward St Ives is the Kellaways Formation and Oxford Clay Formation.

The Kellaways Formation is formed of mudstone, with beds of calcareous siltstone and sandstone towards the upper part. The Oxford Clay Formation is overlying the Kellaways Formation. The Oxford Clay Formation is formed of silicate mudstone, with argillaceous limestone nodules.

The Kellaways Formation and Oxford Clay Formation are classified as unproductive.

The Eastern Route continues southeast from St Ives, overlying the West Walton Formation and Ampthill Clay Formation. The West Walton Formation is described as Calcareous mudstone, silty mudstone, and siltstone, with subordinate fine-grained sandstones and argillaceous limestone. The overlying Ampthill Clay Formation is formed of Mudstone with argillaceous limestone nodules.

The West Walton Formation and Ampthill Clay Formation are classified as unproductive.

The Eastern Route is then underlain by the Lower Greensand to the northwest of Cambridge. The Lower Greensand is formed mainly of sands and sandstones, with silts and clays in some intervals.

The Lower Greensand is classified as a Principal Aquifer.

West of Cambridge the Eastern Route is underlain by Gault Formation. The Gault Formation is a sequence of clays, mudstone, and thin siltstones with bands of phosphatic nodules.

North of Harlton the Eastern Route passes close by a groundwater abstraction SPZ1 and SPZ2. These designations relate to abstraction in the Lower Greensand Principal aquifer, which is protected by overlying clay formations.

There are outcrops of West Melbury Marly Chalk Formation surrounded by Gault Formation in the Coton area. The Eastern Route then passes onto Chalk near Trumpington consisting of the West Melbury Marly Chalk Formation, Totternhoe Stone Member, and Zig Zag Chalk Formation, part of the Grey Chalk Group which is predominantly formed of clayey chalk without flint.

There is a groundwater Drinking Water Safeguard Zone in the area between Fowlmere and Thriplow Heath. South of Thriplow Heath the Eastern Route passes through SPZ2 for two groundwater abstractions, with the Eastern Route passing through one of the abstraction's SPZ1.

Toward Sawston the Eastern Route overlies Melbourn Rock Member, Holywell Nodular Chalk Formation. From Great Chesterton the Eastern Route overlies New Pit Chalk Formation, Chalk Rock Member, and Lewes Nodular Chalk Formation.

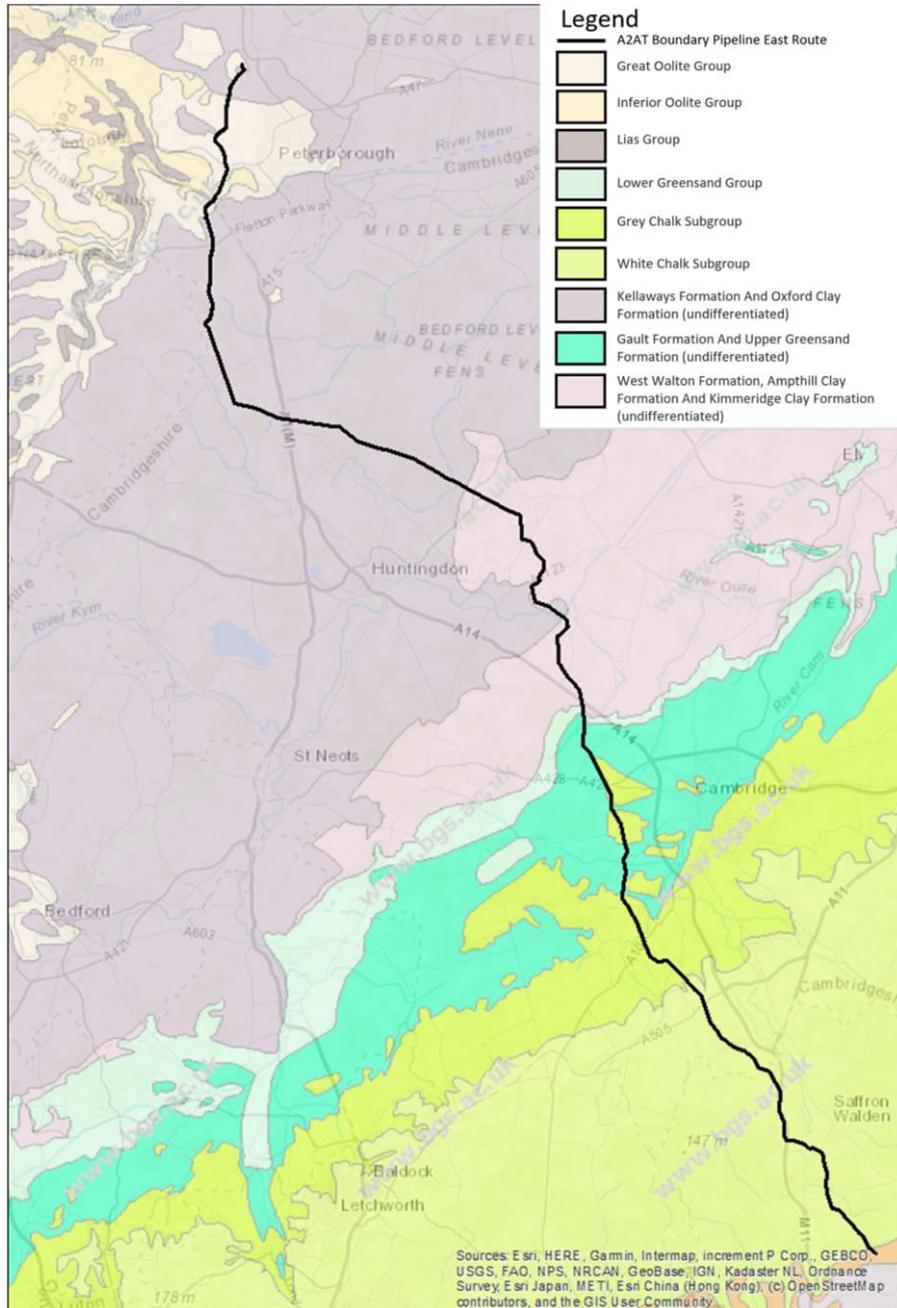
In the Heathfield area and Saffron Walden area the Eastern Route passes within a groundwater abstraction SPZ1 and SPZ2.

From here to the end of the Eastern Route is underlain Lewes Nodular Chalk Formation and Seaford Chalk Formation. These units are part of the White Chalk Subgroup is formed of Chalk with flints. There are discrete marl seams in the group.

The Chalk formations are all classified as a Principal Aquifer.

In the Widdington area the Eastern Route passes within a groundwater abstraction SPZ1 and SPZ2.

The bedrock geology is presented in Plate 3.



**Plate 3 Bedrock Geology – the Eastern Route**

**Superficial geology**

The British Geological Society Geindex describes the superficial geology beneath the Eastern Route.

The majority of the Eastern Route are underlain by Till and Peat. There are areas along the Eastern Route that do not have any superficial deposits. In the Nene valley near Peterborough are River Terrace Deposits and Alluvium.

The River Terrace Deposits consist of sand and gravel, with locally with lenses of silt, clay, or peat. Alluvium along the Eastern Route is formed of clay, silt, sand, and gravel.

Peat is a partially decomposed mass of semi-carbonized vegetation which has grown under waterlogged, anaerobic conditions, usually in bogs or swamps.

The alluvium and River Terrace Deposits form a Secondary A aquifer.

South of Peterborough the Oadby Member comprises till deposits of a mixture of clay, sand, gravel, and boulders. Glaciolacustrine Deposits comprising clay, silt and sand.

The Oadby Member and Glaciolacustrine Deposits form a Secondary (undifferentiated) aquifer.

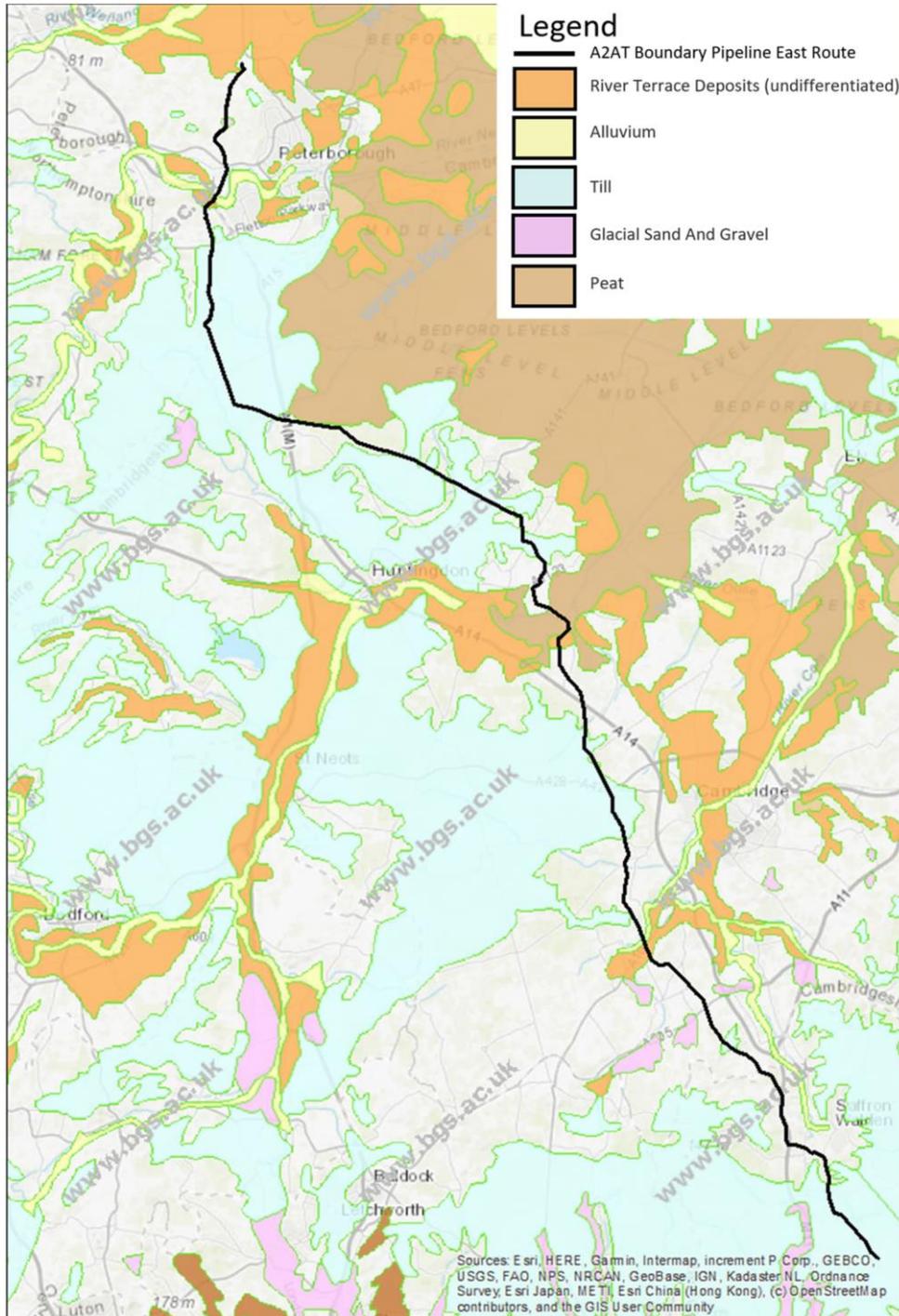
The peat deposits are classified as unproductive.

West of Cambridge there are outcrops of Head Deposits comprising Clay, Silt, Sand and Gravel.

River Terrace Deposits are also found in the Cam valley from the Trumpington area to Little Chesterford.

South to Saffron Walden to the end of the Eastern Route is Lowestoft Formation Till with small areas of Head deposits forming a Secondary (undifferentiated) aquifer.

The superficial geology along the Eastern Route is presented in Plate 4.



**Plate 4 Superficial Geology – Eastern Route**

**Soils**

The Soilsmap viewer describes the soils beneath the Eastern Route.

From where the Eastern Route begins above Werrington, down towards where the Eastern Route crosses the River Nene, the soils beneath the pipeline are a mix of freely draining lime-rich loamy soils, slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, loamy soils with naturally high groundwater, shallow lime-rich soils over chalk or limestone and freely draining slightly acid but base-rich soils.

The Eastern Route is underlain by shallow lime-rich soils over chalk or limestone at Chesterton, and then Lime-rich loamy and clayey soils with impeded drainage until the Eastern Route reaches Sawtry.

The study area for the Eastern Route remains underlain by lime-rich loamy and clayey soils with impeded drainage until Needingworth. Then, the soil types comprise of freely draining slightly acid loamy soils and loamy, clayey floodplain soils with naturally high groundwater, freely draining lime-rich loamy soils and Lime-rich loamy and clayey soils with impeded drainage around Swaversy.

East of Comberton, the soils are shallow lime-rich soils over chalk or limestone. Hereafter, the soils are a mix of Lime-rich loamy and clayey soils with impeded drainage and shallow lime-rich soils over chalk or limestone until the Eastern Route travels to the southwest of Harston, towards Thirplow; here, restored soils mostly from quarry and opencast spoil, loamy and clayey floodplain soils with naturally high groundwater and freely draining lime-rich loamy soils underlain the study area.

Where the Eastern Route passes north of Wendens Ambo, the soils comprise of freely draining slightly acid but base-rich soils and lime-rich loamy and clayey soils with impeded drainage.

The remainder of the study area is underlain by lime-rich loamy and clayey soils with impeded drainage.

# Appendix F Cultural Heritage Assessments

## F.1 Peterborough

Table 1. Peterborough, figure B, page 1 of 3

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
1	MPB5489	ND	None	DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MPB2920	ND	Nortborough-Etton Watermain, Section 4: A15 to Etton Water Works	DITCH	No further information	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MPB4459	ND	Silk Willoughby to Peterborough Gas Pipeline	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MPB1610	ND	Etton Roman pottery	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

1	MPB949	ND	Etton ridge and furrow, ditches, enclosures, field system	FIELD SYSTEM	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MPB1645	ND	None	SETTLEMENT (Roman)	No further information	Mitigation required within 50m of pipeline
1	MPB947	ND	None	DITCH; ENCLOSURE; PIT ALIGNMENT; TRACKWAY	CROPMARKS	Mitigation required within 50m of pipeline
1	MPB1656	ND	None	PARISH BOUNDARY	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

**Table 2. Peterborough, figure B, page 2 of 3**

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
2	MPB1657	ND	None	BARROW	EARTHWORK	Mitigation required within 50m of pipeline
2	MPB993	ND	None	POSSIBLE HENGE	AERIAL PHOTO	Mitigation required within 50m of pipeline
2	MPB945	ND	None	RING DITCH	CROPMARK	Mitigation not required between 50m and 250m

						from pipeline if there are no intrusive works
2	MPB4264	ND	None	DITCH; ENCLOSURE; PIT ALIGNMENT; TRACKWAY	CROPMARKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MPB992	ND	Peakirk Area, Area E	FIELD SYSTEM	AERIAL PHOTO	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MPB4587	ND	Transco Gas Pipeline, Site 2, Section 3, Plot 18	DITCH; FINDSPOT; PIT; POSTHOLE	GEOPHYSICAL SURVEY	Mitigation required within 50m of pipeline
2	MPB4265	ND	Transco Gas Pipeline, Site 27, Section 3, Plot 19	PIT	EXCAVATION	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MPB4266	ND	Transco Gas Pipeline, Site 28, Section 3, Plot 19	POST HOLE	EXCAVATION	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MPB4267	ND	Transco Gas Pipeline, Site 29, Section 3, Plot 19	FINDSPOT; PIT (Early Iron Age to Roman)	EXCAVATION	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MPB1088	ND	None	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

2	MPB1744	ND	None	PIT ALIGNMENT	CROPMARK	Mitigation required within 50m of pipeline
2	MPB1724	ND	None	FINDSPOT (Iron Age pottery)	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MPB1089	ND	None	ENCLOSURE; RING DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MPB1093	ND	None	FINDSPOT (Bronze Age axe)	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MPB1091	ND	None	DITCH; ENCLOSURE; ROAD; SETTLEMENT	CROPMARK	Mitigation required within 50m of pipeline
2	MPB1092	ND	None	RING DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MPB1085	ND	None	ENCLOSURE; SETTLEMENT	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MPB1894	ND	None	SLAG HEAP	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

2	MPB903	ND	None	RING DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MPB1779	ND	None	SLAG HEAP	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MPB4373	ND	None	FINDSPOT (early medieval copper alloy scabbard chape)	FIND	Mitigation required within 50m of pipeline

**Table 3. Peterborough, figure B, page 3 of 3**

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
3	MPB2203	ND	None	FINDSPOT (James I silver penny)	FIND	Mitigation required within 50m of pipeline
3	MPB5192	ND	None	RING DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

3	MPB5190	ND	None	BUILDING (Roman)	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MPB5188	ND	None	RING DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MPB5185	ND	None	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MPB5193	ND	None	RING DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MPB2090	ND	None	FINDSPOT (Roman pottery)	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MPB4650	ND	Mill Field	SITE	PLACENAME; DOCUMENTARY	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MPB1683	ND	Settlement W of Boathouse, River Nene	DITCH; EARTHWORK; ENCLOSURE; PIT ALIGNMENT; SETTLEMENT; TRACKWAY	CROPMARK; EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

3	DPB16	SM	Settlement W of boathouse, River Nene	SETTLEMENT		Setting assessment required
3	MPB6229	ND	The Old Mill, Mill Lane, Castor	BARN; GRILLE; HEAD RACE; MILL POND; SACK HOIST; SLUICE; WATERWHEEL; WORKSHOP; MILL	EXTANT BUILDING; EARTHWORK; MACHINERY	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	DPB202	SM	Castor Mill	No details provided		Setting assessment required
3	MPB4214	ND	Castor Water Mill, Mill Lane	DATESTONE; HOUSE; WATERMILL	EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	DPB203 / MPB4233	ND	Castor Windmill, Footpath off Mill Lane	TOWER MILL; WINDMILL	DOCUMENTARY EVIDENCE; RUINED BUILDING	Setting assessment required
3	MPB5179	ND	None	RING DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MPB5181	ND	None	ROAD (Roman)	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MPB5861	ND	East Holmes: medieval/post medieval meadow strips, Nene Park Heritage Audit and Landscape Assessment, Area 7	MEADOW	CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

3	MPB4313	ND	Alwalton Boat Club	FINDSPOT (Roman finds)	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MPB1696	ND	None	FINDSPOT (Roman brooch)	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

## F.2 Cambridgeshire

Table 4. Cambridgeshire, figure D, page 1 of 20

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
1	DCB7846	SM	The fort and Roman walled town of Durobrivae and its south, west and east suburbs, immediately south and east of Water Newtown Village	FORT; ROMAN WALLED TOWN	EARTHWORKS; CROPMARKS	8. Avoidance recommended
1	MCB17584	ND	Ring ditch, N of Great North Road, Chesterton	RING DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB10900	ND	Durobrivae Cropmarks N of the Great North Road.	RING DITCH; ENCLOSURE; FIELD SYSTEM; PIT ALIGNMENT; LINEAR FEATURE; DITCH	CROPMARK	Mitigation not required between 50m and 250m from

							pipeline if there are no intrusive works
1	MCB2055	ND	Roman metalwork, Manor Farm, Chesterton	FINDSPOT	UNSTRATIFIED FIND		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB16964	ND	Pottery kiln, Alwalton	POTTERY KILN; ARTEFACT SCATTER	FIND; FIND		5. Mitigation required within 50m of pipeline
1	MCB2423	ND	Ring ditch, Alwalton	RING DITCH	CROPMARK		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB17590	ND	Roman remains, Alwalton Boat Club	FINDSPOT	FIND		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB31513	ND	Canal lock, River Nene	CANAL LOCK	EXTANT STRUCTURE		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB16970	ND	Roman pottery scatters and possible kiln site, Alwalton and Chesterton	FINDSPOT; KILN?	ARTEFACT SCATTER		Mitigation required within 50m of pipeline
1	MCB1221	ND	Roman coin, Manor Farm, Chesterton	FINDSPOT	UNSTRATIFIED FIND		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB31215	ND	Geophysical evidence of ridge and furrow, Haddon	RIDGE AND FURROW	SUB SURFACE DEPOSIT		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

1	MCB2640	ND	Roman buildings S of Great North Road	BUILDING; TRACKWAY	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB25028	ND	Smithy, Chesterton	BLACKSMITHS WORKSHOP	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB2681	ND	Roman brooch find, River Nene	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB14173	ND	Rectory Gardens, Chesterton	GARDEN	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB18110	ND	Medieval ewer spout, Chesterton	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB2054	ND	Moat, Chesterton	MOAT	EARTHWORK	Avoidance recommended
1	MCB30250	ND	Possible enclosures and ridge and furrow, Haddon, Cambridgeshire	RIDGE AND FURROW; LINEAR FEATURE; RECTILINEAR ENCLOSURE	SUB SURFACE DEPOSIT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB17579	ND	Ring ditch, Chesterton	RING DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

1	MCB2053	ND	Earthwork remains of ridge and furrow, Chesterton	RIDGE AND FURROW	EARTHWORK	Mitigation required within 50m of pipeline
1	MCB10494	ND	Former remains of ridge and furrow, Chesterton	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB2056	ND	Cropmark remains of medieval earthworks ridge and furrow, Chesterton	RIDGE AND FURROW	CROPMARK	Mitigation required within 50m of pipeline
1	MCB10979	ND	Roman road, Chesterton	ROAD?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB15034	ND	Ermine Street Roman Road	ROAD	DOCUMENTARY EVIDENCE; SUB SURFACE DEPOSIT; CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB31379	ND	Stilton Turnpike Trust (Alconbury to Wansford)	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MCB10889	ND	Cropmarks, Chesterton	RING DITCH; ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

**Table 5. Cambridgeshire, figure D, page 2 of 20**

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risks
2	MCB23364	ND	Medieval to post medieval ridge and furrow east of Field Farm, Folksworth	RIDGE AND FURROW	EARTHWORK; DOCUMENTARY EVIDENCE	Mitigation required within 50m of pipeline
2	MCB17654	ND	Possible enclosure, Folksworth and Washingley	RIDGE AND FURROW; CIRCULAR ENCLOSURE?	EARTHWORK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MCB29410	ND	undated settlement complex, Folksworth	RECTILINEAR ENCLOSURE; SETTLEMENT; FARMSTEAD; VILLA	CROPMARK;	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MCB16644	ND	Telecommunications antenna masts, Morborne	BROADCASTING TRANSMITTER	STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MCB31651	ND	Horse Croft Hovel, Morborne	HOUSE	DOCUMENTARY EVIDENCE	Avoidance recommended
2	DCB104 / MCB1895	SM	Deserted Medieval village N of Washingley Park	DESERTED SETTLEMENT; MOAT; CASTLE; FISHPOND; MOUND; HOLLOW WAY; RIDGE AND FURROW; BRIDGE; MOTTE AND BAILEY	EARTHWORK;	Setting assessment required
2	MCB14351	ND	Washingley Park	PARK; FISHPOND; WALK; MOAT; LODGE	DOCUMENTARY EVIDENCE; BOTANICAL FEATURE;	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

2	MCB13672	ND	Earthwork remains of ridge and furrow, Morborne	RIDGE AND FURROW	EARTHWORK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MCB13672	ND	Earthwork remains of ridge and furrow, Morborne	RIDGE AND FURROW	EARTHWORK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MCB15034	ND	Ermine Street Roman Road	ROAD	DOCUMENTARY EVIDENCE; SUB SURFACE DEPOSIT; CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MCB31379	ND	Stilton Turnpike Trust (Alconbury to Wansford)	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	DCB3385	Grade II listed building	Belle Vue, Cottage formerly a pair, Late C18 with C19 and later alterations	COTTAGE	LISTED BUILDING	Setting assessment required
2	MCB17653	ND	Two circular features, Folksworth and Washingley	RIDGE AND FURROW; RING DITCH	CROPMARK; EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MCB12470	ND	Cropmark remains of ridge and furrow, Morborne	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MCB13659	ND	Cropmark remains of ridge and furrow, Glatton	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if

2	MCB12466	ND	Cropmark remains of ridge and furrow, Denton and Caldecote	RIDGE AND FURROW	CROPMARK	there are no intrusive works Mitigation required within 50m of pipeline
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**Table 6. Cambridgeshire, figure D, page 3 of 20**

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risks
3	MCB14660	ND	Late Iron age and Roman remains, Manor Site Farm, Great Gidding	DITCHED ENCLOSURE; RECTILINEAR ENCLOSURE; FIELD SYSTEM; PIT; RING DITCH; GULLY; DITCH	SUB SURFACE DEPOSIT	Mitigation not required between 50m and 250m from pipeline if

3	MCB29706	ND	Ex situ Medieval cross base, Great Gidding	CROSS		there are no intrusive works Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB29591	ND	Undated enclosures, Great Gidding	CURVILINEAR ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB18219	ND	Romano-British ditches, Great Gidding	DITCH	SUB SURFACE DEPOSIT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB29592	ND	Undated enclosures, Great Gidding	CURVILINEAR ENCLOSURE; D SHAPED ENCLOSURE; RECTILINEAR ENCLOSURE; TRACKWAY	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB1181	ND	Medieval earthworks, Great Gidding	EARTHWORK; DESERTED SETTLEMENT; RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB17969	ND	Possible Romano-British building or kiln, Great Gidding	BUILDING?; WALL; KILN?	SUB SURFACE DEPOSIT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

3	MCB14661	ND	Iron Age features, Lower Farm, Great Gidding	DITCH; GULLY	SUB SURFACE DEPOSIT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB14662	ND	Iron Age ditch, Winwick Road, Great Gidding	DITCH	SUB SURFACE DEPOSIT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB29590	ND	Undated enclosures, Great Gidding	RIDGE AND FURROW; ENCLOSURE	CROPMARK	Mitigation required within 50m of pipeline
3	MCB15123	ND	Bombing decoy, Little Gidding	Q SITE; BLOCKHOUSE; BOMBING DECOY	STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB22052	ND	Former brickworks, Great Gidding	BRICKWORKS	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB14668	ND	Neolithic flints, Manor Site Farm, Great Gidding	FINDSPOT	ARTEFACT SCATTER	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB1178	ND	Bone figurine, Saint Michael's Church churchyard, Great Gidding	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if

						there are no intrusive works
3	DCB2464 / MCB1179	Grade II* listed building	Saint Michael's Church, Great Gidding	CHURCH; CHANCEL; DOORWAY; PISCINA; SEDILIA; BELLCOTE; TOWER; AISLE; PORCH; NAVE; PARAPET; SPIRE; PANEL; ALTAR RAIL; ALTAR; SUNDIAL; WALL PAINTING	EXTANT BUILDING; EXTANT STRUCTURE	Setting assessment required
3	MCB1865	ND	Prehistoric hammer and lithic implement, Sawtry Fen	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
3	MCB13670	ND	Archaeological evidence of ridge and furrow, Sawtry	RIDGE AND FURROW; DITCH	CROPMARK; EXCAVATED FEATURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB21909	ND	Hill Top Farm, now Wood End Farm, Sawtry	FARMHOUSE	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB29713	ND	Possible farmstead site, High Holborn Hill, Sawtry	ENCLOSURE; TRACKWAY; FARMSTEAD	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB29615	ND	Iron Age to Roman banjo enclosure, Sawtry	BANJO ENCLOSURE	CROPMARK	Avoidance recommended
3	MCB1864	ND	Roman cult object, Sawtry	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
3	MCB13667	ND	Former remains of ridge and furrow, Great Gidding	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline

3	MCB1282	ND	Medieval moat, Great Gidding	MOAT	EARTHWORK; STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB13669	ND	Earthwork remains of Ridge and furrow, Great Gidding	RIDGE AND FURROW	EARTHWORK; CROPMARK	Mitigation required within 50m of pipeline
3	MCB21212	ND	Cropmark remains of ridge and furrow, Great Gidding	RIDGE AND FURROW	CROPMARK	Mitigation required within 50m of pipeline
3	MCB15034	ND	Ermine Street Roman Road	ROAD	DOCUMENTARY EVIDENCE; SUB SURFACE DEPOSIT; CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB31379	ND	Stilton Turnpike Trust (Alconbury to Wansford)	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB31435	ND	Cropmark remains of ridge and furrow, Winwick	RIDGE AND FURROW	CROPMARK	Mitigation required within 50m of pipeline
3	MCB12481	ND	Earthwork remains of ridge and furrow, Sawtry	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB13659	ND	Cropmark remains of ridge and furrow, Glatton	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if

						there are no intrusive works
3	MCB29703	ND	Possible prehistoric to Roman settlement site, Lodge Farm, Sawtry	FIELD BOUNDARY; RING DITCH; TRACKWAY	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB12480	ND	Cropmark remains of ridge and furrow, Sawtry	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB12481	ND	Earthwork remains of ridge and furrow, Sawtry	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB30518	ND	Former remains of ridge and furrow, Sawtry	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MCB10485	ND	Earthwork remains of ridge and furrow, Glatton	RIDGE AND FURROW	EARTHWORK	Mitigation required within 50m of pipeline
3	MCB31667	ND	Glatton Lodge			Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

Table 7. Cambridgeshire, figure D, page 4 of 20

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risks
4	MCB29740	ND	Enclosures, north of High Street Farm, Old Weston	RECTILINEAR ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MCB14663	ND	Iron Age and Roman remains, Grove Farm, Hamerton	DITCHED ENCLOSURE; RING DITCH; LINEAR FEATURE; GULLY; TRACKWAY; FIELD SYSTEM; BOUNDARY DITCH	SUB SURFACE DEPOSIT	Mitigation required within 50m of pipeline
4	MCB14669	ND	Recorded remains of ridge and furrow, Grove Farm, Hamerton	RIDGE AND FURROW	SUB SURFACE DEPOSIT	Mitigation required within 50m of pipeline
4	MCB31653	ND	High Street Farm, Old Weston	HOUSE	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MCB13783	ND	Pottery scatter, Hamerton	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m

						from pipeline if there are no intrusive works
4	MCB29787	ND	Iron Age to Roman enclosures, Old Weston	D SHAPED ENCLOSURE; RECTILINEAR ENCLOSURE	CROPMARK	Avoidance recommended
4	MCB11915	ND	Cropmarks, Hamerton	DITCH; LINEAR FEATURE; ENCLOSURE?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MCB13665	ND	Ridge and furrow, Winwick	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MCB923	ND	Earthwork remains of Ridge and furrow, Leighton Bromswold	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MCB587	ND	Cropmark remains of ridge and furrow, Leighton Bromswold	RIDGE AND FURROW	CROPMARK	Mitigation required within 50m of pipeline
4	MCB919	ND	Earthworks southwest of church, Leighton Bromswold (fields 43, 44, 60, 64)	SHRUNKEN VILLAGE; HOUSE PLATFORM; HOLLOW WAY	EARTHWORK; DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MCB30156	ND	Possible Roman Road, Huntingdon to Leicester (Gartree Road)	ROAD	CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if

4	MCB12730	ND	Enclosures, Hamerton	ENCLOSURE	CROPMARK	there are no intrusive works Mitigation required within 50m of pipeline
4	DCB2472	Grade II listed building	The Green Man Public House, C17 with later alterations and C19 addition	PUBLIC HOUSE	LISTED BUILDING	Setting assessment required

**Table 8. Cambridgeshire, figure D, page 5 of 20**

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
5	MCB14666	ND	Late Iron Age – Roman settlement remains, Manor Farm, Stow Longa	GULLY; RING DITCH; HOUSE; DITCH; SETTLEMENT	SUB SURFACE DEPOSIT	Mitigation required within 50m of pipeline
5	MCB592	ND	Flint implement, Kimbolton	FINDSPOT	ARTEFACT SCATTER	Mitigation required within 50m of pipeline

5	MCB14670	ND	Ridge and furrow, Kimbolton Airfield	RIDGE AND FURROW	SUB SURFACE DEPOSIT	Mitigation required within 50m of pipeline
5	MCB29886	ND	Undated enclosure complex, Spaldwick	RECTANGULAR ENCLOSURE; RING DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MCB29810	ND	Rectilinear enclosure, west of Saltwells, Leighton	ENCLOSURE; CURVILINEAR ENCLOSURE; RECTILINEAR ENCLOSURE	CROPMARK; DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MCB31654	ND	Catworth Farm, Catworth	HOUSE	DOCUMENTARY EVIDENCE	Mitigation required within 50m of pipeline
5	MCB29971	ND	Cropmark remains of ridge and furrow, Stow Longa	RIDGE AND FURROW	CROPMARK	Mitigation required within 50m of pipeline
5	MCB11676	ND	Cropmark remains of ridge and furrow, Catworth	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MCB906	ND	Stow Park	PARK	DOCUMENTARY EVIDENCE	Mitigation not required

						between 50m and 250m from pipeline if there are no intrusive works
5	MCB23479	ND	Rectilinear enclosure, 600m northwest of Saltwell, Leighton	ENCLOSURE	CROPMARK; DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MCB919	ND	Earthworks southwest of church, Leighton Bromswold (fields 43, 44, 60, 64)	SHRUNKEN VILLAGE; HOUSE PLATFORM; HOLLOW WAY	EARTHWORK; DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MCB31659	ND	Stow Brickworks, Stow Longa	BRICKWORKS; KILN; QUARRY; STRUCTURE; PUMP	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MCB11816	ND	Cropmark enclosures, Stow Longa	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

5	MCB10463	ND	Earthwork remains of ridge and furrow, Catworth	RIDGE AND FURROW	EARTHWORK	Mitigation required within 50m of pipeline
5	MCB896	ND	Thrapston to Huntingdon railway (dismantled)	RAILWAY	EARTHWORK; STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MCB31656	ND	Undated earthwork enclosure, Stow Longa	SQUARE ENCLOSURE	EARTHWORK	Mitigation required within 50m of pipeline
5	MCB11816	ND	Cropmark enclosures, Stow Longa	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MCB29972	ND	Former remains of ridge and furrow, Stow Longa	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
5	MCB587	ND	Cropmark remains of ridge and furrow, Leighton Bromswold	RIDGE AND FURROW	CROPMARK	Mitigation required within 50m of pipeline
5	MCB25132	ND	Undated enclosures 700m east of Manor Farm, Spaldwick	CURVILINEAR ENCLOSURE; RECTILINEAR ENCLOSURE	CROPMARK	Avoidance recommended

5	MCB31624	ND	Market Harborough & Brampton Turnpike Trust	TOLL ROAD		Mitigation required within 50m of pipeline
5	MCB10831	ND	Former ridge and furrow, Leighton Bromswold	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
5	MCB923	ND	Earthwork remains of Ridge and furrow, Leighton Bromswold	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

**Table 9. Cambridgeshire, figure D, page 6 of 20**

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
6	DCB3134	Grade II listed building	Tree Top Cottage, Late C16 or early C17, High Street, Perry	COTTAGE	LISTED BUILDING	Setting assessment required

6	DCB3020	Grade II listed building	K6 Telephone Kiosk, High Street, Great Staughton	TELEPHONE HIOSK	LISTED BUILDING	Setting assessment required
6	DCB3981	Grade II listed building	Late C18 cottage, High Street, Perry	COTTAGE	LISTED BUILDING	Setting assessment required
6	DCB3711	Grade II listed building	Manor Farmhouse, Late C16 L-plan farmhouse	FARMHOUSE	LISTED BUILDING	Setting assessment required
6	DCB3012	Grade II listed building	Late C17 cottage, High Street, Perry	COTTAGE	LISTED BUILDING	Setting assessment required
6	MCB20016	ND	Post Medieval tree avenue running between West Perry and east of Gaynes Hall	TREE AVENUE?	CROPMARK	Avoidance recommended
6	MCB29969	ND	Iron Age to Roman enclosure, Kimbolton	ENCLOSURE; RECTANGULAR ENCLOSURE; DITCHED ENCLOSURE		Avoidance recommended
6	MCB13833	ND	Roman metalwork, Great Staughton	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
6	MCB632	ND	Roughly cut stone, East Perry	STONE	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB639	ND	Earthworks, Perry	EARTHWORK	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB618	ND	Possible icehouse, Lymage Farm	MOUND; ICEHOUSE?	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if

6	MCB631	ND	Manor Farm, Perry	MOAT; DITCH; POND; HOUSE	EXTANT BUILDING; EARTHWORK	there are no intrusive works Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB13839	ND	Post-medieval metalwork, Perry	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
6	MCB13371	ND	Earthworks, Crow Spinney, Perry	FIELD BOUNDARY; RIDGE AND FURROW	EARTHWORK	Mitigation required within 50m of pipeline
6	MCB6982	ND	Bronze Age ring ditch, Great Staughton	RING DITCH	CROPMARK	Mitigation required within 50m of pipeline
6	MCB641	ND	C19 decoy earthwork, Crow Spinney	DECOY POND	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB13836	ND	Roman metalwork, Perry	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB29345	ND	Perry Valley Farm, Perry	FARMHOUSE	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

6	MCB13837	ND	Saxon strap-fitting, Perry	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
6	MCB29346	ND	Former school, West Perry	SCHOOL	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB20017	ND	Post medieval boundary ditch to the west and south of Honey Hill Plantation, Great Staughton	BOUNDARY DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB13834	ND	Medieval coin, Great Staughton	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
6	MCB29343	ND	Highpark Farm, Kimbolton	FARMHOUSE	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB13835	ND	Post medieval metalwork, Great Staughton	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
6	MCB20015	ND	Extensive military complex East of Gaynes Hall, Perry	MILITARY SITE; BUILDING; BLAST WALL; SEWAGE WORKS	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB13838	ND	Edward I long cross penny, Perry	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline

6	MCB616	ND	Deserted settlement, Lymage Farm	DESERTED SETTLEMENT; MANOR	EARTHWORK; DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB13832	ND	Bronze Age spear, Great Staughton	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
6	MCB638	ND	Flint flakes, Perry	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB19591	ND	Cropmarks at Grafham Resilience Project	RIDGE AND FURROW; PIT; FIELD BOUNDARY; MOAT; TRACKWAY; AVENUE (LANDSCAPE FEATURE); POND; DITCH; DRAIN	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB29347	ND	Gaynes Lodge Farm, Great Staughton	FARMHOUSE	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB14224	ND	Gaynes Park, Great Staughton	PARK; WALLED GARDEN; FISHPOND; STABLE; BARN; ISLAND; PERGOLA; TENNIS COURT	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB13646	ND	Earthwork remains of ridge and furrow, Perry	RIDGE AND FURROW	EARTHWORK	Mitigation required within 50m of pipeline

6	MCB10795	ND	Former remains of ridge and furrow, Great Staughton	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
6	MCB29308	ND	Undated enclosure, Littless Wood, Kimbolton	MOAT; BANK (EARTHWORK); DITCHED ENCLOSURE; ENCLOSURE	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB31323	ND	Possible Roman Road, Dorchester-on-Thames to Alconbury.	ROAD	CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB18738	ND	Possible ditches and pits, Great Staughton	DITCH?; PIT?	CROPMARK	Mitigation required within 50m of pipeline
6	MCB31381	ND	Biggleswade to Alconbury Hill Trust	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB549	ND	Earthwork remains of Ridge and furrow, Great Staughton	RIDGE AND FURROW	EARTHWORK	Mitigation required within 50m of pipeline
6	MCB12758	ND	Earthwork remains of ridge and furrow, Kimbolton	RIDGE AND FURROW	EARTHWORK	Mitigation required within 50m of pipeline
6	MCB18710	ND	Former ridge and furrow, Perry	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

6	MCB18641	ND	Former ridge and furrow, Kimbolton	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
6	MCB29309	ND	Undated enclosure, Perry Wood	ENCLOSURE	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB896	ND	Thrapston to Huntingdon railway (dismantled)	RAILWAY	EARTHWORK; STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB18710	ND	Former ridge and furrow, Perry	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB617	ND	Fragmentary moat remains, Lymage Farm	MOAT; DITCH	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB18710	ND	Former ridge and furrow, Perry	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB18710	ND	Former ridge and furrow, Perry	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

						there are no intrusive works
6	MCB13643	ND	Former remains of ridge and furrow, Hail Weston	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB11927	ND	Cropmark enclosures and linear features, Kimbolton	ENCLOSURE; LINEAR FEATURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB18759	ND	Former ridge and furrow, Southoe and Midloe	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB18710	ND	Former ridge and furrow, Perry	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MCB594	ND	Medieval ditched enclosure or moat, Kimbolton	ENCLOSURE; MOAT?; BANK (EARTHWORK); BOUNDARY DITCH; DITCHED ENCLOSURE; HOMESTEAD; HOUSE PLATFORM; MOUND; PIT; TRAPEZOIDAL ENCLOSURE; RIDGE AND FURROW; DITCH; BOUNDARY BANK	CROPMARK	Avoidance recommended
6	MCB18710	ND	Former ridge and furrow, Perry	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if

6	MCB13370	ND	Medieval earthworks, Perry	RIDGE AND FURROW; HOLLOW WAY; DITCH; PIT	EARTHWORK; CROPMARK	there are no intrusive works Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
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**Table 10. Cambridgeshire, figure D, page 7 of 20**

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
7	MCB18737	ND	Possible ditches, Great Staughton	DITCH?	CROPMARK	Mitigation required within 50m of pipeline
7	MCB13387	ND	Medieval earthworks, Hail Weston	ENCLOSURE; DITCH	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
7	MCB29348	ND	Weston Pastures, Hail Weston	FARMHOUSE	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
7	MCB18721	ND	Enclosure, Hail Weston	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
7	MCB29426	ND	River Great Ouse Navigation	RIVER NAVIGATION	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
7	MCB30152	ND	Probable Roman Road, Cambridge to Bolnhurst (modern A428)	ROAD	CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
7	MCB19076	ND	Cropmark enclosure, Hail Weston	ENCLOSURE; DITCH	CROPMARK; CROPMARK	Mitigation not required between 50m and 250m

7	MCB31323	ND	Possible Roman Road, Dorchester-on-Thames to Alconbury.	ROAD	CONJECTURAL EVIDENCE	from pipeline if there are no intrusive works Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
7	MCB31381	ND	Biggleswade to Alconbury Hill Trust	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
7	MCB13363	ND	Earthwork remains of ridge and furrow, Hail Weston	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
7	MCB13643	ND	Former remains of ridge and furrow, Hail Weston	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline

**Table 11. Cambridgeshire, figure D, page 8 of 20**

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
8	DCB4848	Grade II listed building	Cottage, C19, renovated. Gamlingay, Church End	COTTAGE	LISTED BUILDING	Setting assessment required
8	DCB6127	Grade II listed building	Old Bull House, Mid to Late C17 extended at rear C19. Gamlingay, Church End	HOUSE	LISTED BUILDING	Setting assessment required
8	DCB6244	Grade II listed building	Cottage, C18 to C19, Gamlingay, Church End	COTTAGE	LISTED BUILDING	Setting assessment required
8	DCB5874	Grade II listed building	Cottage, C17 to C18, renovated C20. Gamlingay, Church End	COTTAGE	LISTED BUILDING	Setting assessment required
8	DCB6609	Grade II listed building	Kitchens Farmhouse. Mid C17, extended C18 at rear	FARMHOUSE	LISTED BUILDING	Setting assessment required
8	MCB28031	ND	Undated cropmarks east of Gillrags copse, Waresley	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
8	MCB28026	ND	Undated enclosures, 550m north of Merton Farm, Gamlingay	RECTILINEAR ENCLOSURE	CROPMARK	Mitigation required within 50m of pipeline
8	MCB13396	ND	Medieval field system, Gamlingay	RIDGE AND FURROW; FIELD SYSTEM?	CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

8	MCB28030	ND	Undated cropmarks northwest of Tetworth Hall	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
8	MCB23988	ND	Site of former sand pit, Gamlingay Cinques	SAND PIT	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
8	MCB4142	ND	Sandy to Cambridge railway	RAILWAY	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
8	MCB4142	ND	Sandy to Cambridge railway	RAILWAY	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
8	MCB13640	ND	Cropmark remains of former ridge and furrow, Waresley	RIDGE AND FURROW	CROPMARK	Mitigation required within 50m of pipeline
8	MCB2913	ND	Former evidence of ridge and furrow, Gamlingay	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required

8	MCB18943	ND	Earthwork remains of ridge and furrow, Gamlingay	RIDGE AND FURROW	EARTHWORK	within 50m of pipeline Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
8	MCB15411	ND	Weaveley Park	PARK	DOCUMENTARY EVIDENCE	Mitigation required within 50m of pipeline
8	MCB17569	ND	Sandy to Godmanchester Roman road	ROAD	EARTHWORK; DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
8	MCB31406	ND	Bury and Stratton Turnpike Trust	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
8	MCB14212	ND	Merton Grange, Gamlingay	AVENUE (LANDSCAPE FEATURE); GATE LODGE; TOPIARY AVENUE; HA HA; PARK; STABLE; GATE; LAWN; SWIMMING POOL; ORCHARD; ROSE GARDEN; GARDEN; GARDEN	DOCUMENTARY EVIDENCE; BOTANICAL FEATURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

8	MCB13395	ND	Former Ridge and furrow, Waresley	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
8	MCB6561	ND	Possible enclosure complex, Tetworth	DITCH; ENCLOSURE; LINEAR FEATURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
8	MCB13399	ND	Earthwork remains of medieval to post medieval ridge and furrow, Waresley	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
8	MCB31381	ND	Biggleswade to Alconbury Hill Trust	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

**Table 12. Cambridgeshire, figure D, 9 of 20**

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
9	DCB4828	Grade II listed building	Berries, cottage, late C17, renovated and extended late C20	COTTAGE	LISTED BUILDING	Setting assessment required
9	MCB2948	ND	Possible buildings, Dutter End	BUILDING?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
9	MCB319	ND	Arrowheads, Gamlingay	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
9	MCB2873	ND	Tadlow Towers	GRANARY; TOWER; HOUSE	DOCUMENTARY EVIDENCE	Avoidance recommended
9	MCB2913	ND	Former evidence of ridge and furrow, Gamlingay	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline

9	MCB17101	ND	Anti-aircraft battery, Gamlingay	ANTI AIRCRAFT BATTERY	STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
9	MCB27777	ND	Possible banjo enclosure, Tadlow	BANJO ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
9	MCB20421	ND	Prehistoric to modern finds, Allotment Site, Long Lane	FINDSPOT	ARTEFACT SCATTER	Mitigation required within 50m of pipeline
9	MCB10019	ND	Axehead, Gamlingay	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
9	MCB2569	ND	Arrowheads, Gamlingay	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
9	MCB10021	ND	Lithic implements, Gamlingay	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required

						between 50m and 250m from pipeline if there are no intrusive works
9	MCB18865	ND	Enclosure, Gamlingay	RECTANGULAR ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
9	MCB2947	ND	Mesolithic flint finds, Dutter End	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
9	MCB5653	ND	The Bull, Gamlingay	INN; TIMBER FRAMED BUILDING	EXTANT BUILDING; EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
9	MCB1477	ND	Moated site at Dutter End, Gamlingay	MOAT; FISHPOND	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

9	MCB18864	ND	Enclosure, Gamlingay	ENCLOSURE	CROPMARK	Mitigation required within 50m of pipeline
9	MCB32	ND	Flint knife, Gamlingay	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
9	MCB9922	ND	Lithic implements, Gamlingay	FINDSPOT	ARTEFACT SCATTER	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
9	MCB3031	ND	Roman coins, Hatley	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
9	MCB18860	ND	Possible enclosure, Hatley	ENCLOSURE?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
9	MCB2953	ND	Park Farm, Dower House	FARMHOUSE	EXTANT BUILDING	Mitigation not required

						between 50m and 250m from pipeline if there are no intrusive works
9	MCB18861	ND	Group of enclosures, Hatley	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
9	DCB5312 / MCB2918	Grade II* listed building	Hatley Park House, C17 core, but mainly early and mid C18	HOUSE	LISTED BUILDING	Setting assessment required
9	DCB492	Registered Park or Garden	Hatley Park	GARDEN	REGISTERED GARDEN	Setting assessment required
9	DCB 4816 / MCB2952	Grade II* listed building	Saint George's Church, Hatley	CHURCH; NAVE; CHANCEL ARCH; TOWER; VESTRY; CHANCEL	LISTED BUILDING	Setting assessment required
9	DCB5457	Grade II listed building	The Dower House, C16, and C19 alterations to exterior	HOUSE	LISTED BUILDING	Setting assessment required
9	DCB4817	Grade II listed building	Stable block 20 yards west of Hatley Park. Early C18 but mainly c.1879	STABLE BLOCK	LISTED BUILDING	Setting assessment required
9	MCB17298	ND	Post Medieval brick-making site, Gamlingay	BRICKWORKS	PLACENAME EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

9	MCB18857	ND	Former boundaries, Hatley	BOUNDARY	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
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**Table 13. Cambridgeshire, figure D, page 10 of 20**

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
10	DCB6770	Grade II listed building	Flecks Lane Farmhouse, late C17 or early C18, C20 renovation	FARMHOUSE	LISTED BUILDING	Setting assessment required
10	MCB25865	ND	Coprolite workings, Steeple Morden	COPROLITE WORKINGS	CROPMARK	Mitigation required within 50m of pipeline

10	MCB17103	ND	Military site, Steeple Morden	WAR MEMORIAL	STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
10	MCB27822	ND	Linear boundary bank, Litlington	BOUNDARY BANK	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
10	MCB27692	ND	Former ridge and furrow, Abington Pigotts	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
10	MCB1555	ND	Moat House, Tadlow	MOAT; MANOR	EARTHWORK; DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
10	MCB2886	ND	Former ridge and furrow, Steeple Morden	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
10	MCB27301	ND	Furlong boundaries in the parish of Abington Pigotts	FURLONG BOUNDARY	EARTHWORK	Mitigation required within 50m of pipeline
10	MCB31453	ND	Earthwork enclosure, Steeple Morden	ENCLOSURE; MOAT	EARTHWORK	Mitigation required

						within 50m of pipeline
10	MCB27297	ND	Furlong boundaries in the parish of Steeple Morden	FURLONG BOUNDARY	EARTHWORK	Mitigation required within 50m of pipeline
10	MCB30146	ND	Possible Roman Road, Newnham to Thriplow	ROAD	CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
10	MCB25835	ND	WWII Camp and Bomb Store, Litlington	BOMB STORE; MILITARY ROAD; MILITARY BUILDING	EARTHWORK; DEMOLISHED STRUCTURE; DEMOLISHED BUILDING	Mitigation required within 50m of pipeline
10	MCB2884	ND	Former remains of ridge and furrow, Tadlow	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
10	MCB21115	ND	Rectilinear enclosures, Steeple Morden	ENCLOSURE	CROPMARK	Mitigation required within 50m of pipeline
10	MCB21292	ND	Post medieval coprolite workings, Abington Piggotts	COPROLITE WORKINGS	CROPMARK	Mitigation required within 50m of pipeline
10	MCB15152	ND	RAF Steeple Morden Airfield	MILITARY AIRFIELD; MILITARY BUILDING; PILLBOX; AIR RAID SHELTER; HANGAR; RUNWAY; BARBED WIRE OBSTRUCTION; MILITARY ROAD; EMERGENCY WATER SUPPLY; FIRING RANGE; TRENCH; BOMB STORE	DESTROYED MONUMENT; DEMOLISHED STRUCTURE; LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no

							intrusive works
10	MCB31245	ND	Arrington Turnpike Trust	TOLL ROAD			Mitigation required within 50m of pipeline
10	MCB7567	ND	Cropmark enclosure, Running Ditch, Steeple Morden	RECTANGULAR ENCLOSURE	CROPMARK		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
10	MCB30145	ND	Possible Roman Road, Little Brickill to Arrington Bridge	ROAD	CONJECTURAL EVIDENCE		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
10	MCB27275	ND	Two possible enclosures, Steeple Morden	RECTILINEAR ENCLOSURE	EARTHWORK; CROPMARK		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
10	MCB25863	ND	Undated ring ditch, 750 east of Hillside Farm, Morden Green	CURVILINEAR ENCLOSURE; DITCH	CROPMARK; CROPMARK		Avoidance recommended
10	MCB19147	ND	Avenell Way	TRACKWAY?; LINEAR FEATURE; TRACKWAY	CROPMARK; SUB SURFACE DEPOSIT; EXCAVATED FEATURE		Mitigation not required between 50m and 250m from pipeline

10	MCB27273	ND	Medieval to post medieval hollow way, Abington Pigotts	HOLLOW WAY	EARTHWORK	if there are no intrusive works Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
10	MCB1561	ND	Possible moated manor, Steeple Morden	MOAT; MANOR	CROPMARK; CROPMARK	Avoidance recommended
10	MCB13406	ND	Former ridge and furrow, Croydon	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
10	MCB15034	ND	Ermine Street Roman Road	ROAD	DOCUMENTARY EVIDENCE; SUBSURFACE DEPOSIT; CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

Table 14. Cambridgeshire, figure D, page 11 of 20

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
11	MCB11258	ND	Cropmarks west of Thrift Farm, Steeple Morden	RING DITCH; ENCLOSURE	CROPMARK; CROPMARK	Avoidance recommended
11	MCB11259	ND	Barrows east of Morden Grange Plantation, Steeple Morden	ROUND BARROW; RING DITCH	CROPMARK; CROPMARK	Avoidance recommended
11	MCB21143	ND	Linear features 500m northeast of Morden Grange Farm, Steeple Morden	DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
11	MCB24042	ND	Great Eastern Railway (Shepreth Branch)	RAILWAY	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
11	MCB27822	ND	Linear boundary bank, Litlington	BOUNDARY BANK	EARTHWORK	Mitigation not required

						between 50m and 250m from pipeline if there are no intrusive works
11	MCB21087	ND	Holloway or trackway of Roman to medieval date, Litlington	HOLLOW WAY	SOILMARK	Mitigation required within 50m of pipeline
11	MCB21142	ND	Ring ditch, 530m east of Morden Grange Farm, Steeple Morden	RING DITCH	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
11	MCB27297	ND	Furlong boundaries in the parish of Steeple Morden	FURLONG BOUNDARY	EARTHWORK	Mitigation required within 50m of pipeline
11	MCB30146	ND	Possible Roman Road, Newnham to Thriplow	ROAD	CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
11	MCB11260	ND	Cropmark SE of Morden Grange Plantation, Steeple Morden	LINEAR FEATURE; BOUNDARY DITCH?; HOLLOW WAY	CROPMARK; CROPMARK; SUB SURFACE DEPOSIT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

11	MCB24042	ND	Great Eastern Railway (Shepreth Branch)	RAILWAY	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
11	MCB2886	ND	Former ridge and furrow, Steeple Morden	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
11	MCB15152	ND	RAF Steeple Morden Airfield	MILITARY AIRFIELD; MILITARY BUILDING; PILLBOX; AIR RAID SHELTER; HANGAR; RUNWAY; BARBED WIRE OBSTRUCTION; MILITARY ROAD; EMERGENCY WATER SUPPLY; FIRING RANGE; TRENCH; BOMB STORE	DESTROYED MONUMENT; DEMOLISHED STRUCTURE; LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
11	MCB11266	ND	Enclosure crop marks, Steeple Morden	ENCLOSURE; DITCH	CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
11	MCB12062	ND	Cropmark enclosures and ditches, Steeple Morden	DITCH; ENCLOSURE; LINEAR FEATURE	CROPMARK; CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no

11	MCB19147	ND	Avenell Way	TRACKWAY?; LINEAR FEATURE; TRACKWAY	CROPMARK; SUB SURFACE DEPOSIT; EXCAVATED FEATURE	intrusive works Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
11	MCB21141	ND	Ring ditch, 280m north of Morden Grange Farm, Steeple Morden	RING DITCH	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

Table 15. Cambridgeshire, figure D, page 12 of 20

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risks
12	DCB6618	Grade II listed building	Pump c.6m south of Nos 5 and 7, Church Street, Thriplow	PUMP	LISTED BUILDING	Setting assessment required
12	DCB6536	Grade II listed building	Anno Domini Cottage, early C17, Church Street, Thriplow	COTTAGE	LISTED BUILDING	Setting assessment required
12	DCB5883	Grade II listed building	C18 or early C19 cottage, Church Street, Thriplow	COTTAGE	LISTED BUILDING	Setting assessment required
12	DCB5485	Grade II listed building	Pair of cottages, Nos. 6 and 8, Church Street, Thriplow	COTTAGES	LISTED BUILDING	Setting assessment required
12	DCB6431	Grade II listed building	Barn to west of Bacon's Farmhouse, C18, Church Street, Thriplow	BARM	LISTED BUILDING	Setting assessment required
12	DCB4765	Grade II listed building	Honeysuckle Cottage, C17, Church Street, Thriplow	COTTAGE	LISTED BUILDING	Setting assessment required
12	DCB6860	Grade II listed building	Cottage, C18, Church Street, Thriplow	COTTAGE	LISTED BUILDING	Setting assessment required
12	DCB6100	Grade II listed building	Pump to west of No. 47	PUMP	LISTED BUILDING	Setting assessment required
12	MCB17710	ND	Roman enclosure, Thriplow	SUBRECTANGULAR ENCLOSURE; POST HOLE	SUB SURFACE DEPOSIT; SUB SURFACE DEPOSIT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB18133	ND	Iron drainage pipes, S of School Lane, Thriplow	WATER PIPE?	SUB SURFACE DEPOSIT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB22567	ND	Fox Inn, Thriplow	INN	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and

						250m from pipeline if there are no intrusive works
12	MCB22688	ND	Cropmarks, Thriplow	ENCLOSURE; LINEAR FEATURE	CROPMARK	Mitigation required within 50m of pipeline
12	MCB4955	ND	Neolithic flint implements, Duxford	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
12	MCB5198	ND	Peterborough ware sherd, Thriplow	FINDSPOT	FIND	Mitigation required within 50m of pipeline
12	MCB16724	ND	Pottery scatter, Thriplow	ARTEFACT SCATTER	ARTEFACT SCATTER	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB12413	ND	Bacons Farm dovecote (site of), Thriplow	DOVECOTE	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB5200	ND	Roman finds, Thriplow	FINDSPOT	ARTEFACT SCATTER	Mitigation required within 50m of pipeline
12	MCB28914	ND	Possible World War II pillbox, Thriplow	PILLBOX	EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB13935	ND	Thriplow	MEETING PLACE?	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB28306	ND	Former clunch pit, Ickleton	Clunch pit	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

12	MCB5244	ND	Pit, Ickleton	PIT	SUB SURFACE DEPOSIT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB4956	ND	Duxford (flint implements)	FINDSPOT	ARTEFACT SCATTER	Mitigation required within 50m of pipeline
12	MCB5201	ND	Possible barrow (cropmark), Thriplow	BARROW?	CROPMARK	Avoidance recommended
12	MCB19191	ND	Two Early Prehistoric pits	PIT	SUB SURFACE DEPOSIT	Mitigation required within 50m of pipeline
12	MCB5199	ND	Iron Age midden, Thriplow	MIDDEN	EXCAVATED FEATURE	Mitigation required within 50m of pipeline
12	MCB5121	ND	Tumuli, Thriplow	ROUND BARROW; CREMATION	CROPMARK; SUB SURFACE DEPOSIT	Avoidance recommended
12	MCB12909	ND	Palaeolithic handaxe, Thriplow-Whittlesford track	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB5122	ND	Circular cropmark, Thriplow	BARROW?	CROPMARK	Avoidance recommended
12	MCB28305	ND	Former clunch pit, Ickleton	Clunch pit	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB4954	ND	Flint flake, Duxford	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB5197	ND	Barrow SE of Saint George's Church, Thriplow	ROUND BARROW; INHUMATION; CREMATION; DITCH	CROPMARK; SUB SURFACE DEPOSIT	Avoidance recommended

12	MCB22566	ND	Thriplow School, Thriplow	SCHOOL	DOCUMENTARY EVIDENCE; EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	DCB4773 / MCB28922	Grade II listed building	Valance Farmhouse, Ickleton	FARMHOUSE; BARN	LISTED BUILDING	Setting assessment required
12	DCB6751	Grade II listed building	Brewery to north of Valance Farmhouse, c.1825	BREWERY	LISTED BUILDING	Setting assessment required
12	DCB6440	Grade II listed building	Barn to north-east of Vallance Farmhouse	BARN	LISTED BUILDING	Setting assessment required
12	MCB25158	ND	Undated rectilinear enclosures 420m northeast of Halfmoon Plantation, Duxford	RECTILINEAR ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB29714	ND	Pillbox, Thriplow	PILLBOX	EXTANT STRUCTURE	Avoidance recommended
12	MCB31444	ND	Earthwork remains of ridge and furrow, Ickleton	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB14913	ND	Saint George's Church, Thriplow	FONT; TRANSEPT; CHURCH; CHANCEL; CROSSING; TOWER; NAVE; VESTRY	EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB4953	ND	Old Common field system, Duxford	FIELD SYSTEM	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB31422	ND	Earthwork remains of ridge and furrow, Duxford	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if

12	MCB31305	ND	Hauxton and Dunsbridge Turnpike Trust	TOLL ROAD		there are no intrusive works Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB10375	ND	Rectilinear enclosure system, Thriplow	RECTILINEAR ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
12	MCB13944	ND	RAF Duxford	BARRACKS; MILITARY BUILDING; AIRCRAFT HANGAR; GUN EMPLACEMENT; MILITARY AIRFIELD; MILITARY AIRFIELD; PILLBOX; CONTROL TOWER; STANTON SHELTER; LOOPHOLED WALL; DISPERSAL; ALLAN WILLIAMS TURRET; MUSEUM	EXTANT BUILDING; STRUCTURE; DOCUMENTARY EVIDENCE; EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

Table 16. Cambridgeshire, figure D, page 13 of 20

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
13	MCB5268	ND	Finds, Haslingfield	FINDSPOT	ARTEFACT SCATTER	Mitigation required within 50m of pipeline
13	MCB5700	ND	Mare Way (prehistoric trackway), Haslingfield	TRACKWAY	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB28906	ND	Linear cropmarks, Newton	ENCLOSURE; LINEAR FEATURE	CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB5265	ND	Roman amphora, glass vessel, spindle whorls and fibula, Haslingfield	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
13	MCB16723	ND	Neolithic flint axe, Thriplow	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB10360	ND	Ring ditch, Newton	RING DITCH	CROPMARK	Mitigation not required between

						50m and 250m from pipeline if there are no intrusive works
13	MCB5266	ND	Bronze Age dagger, Haslingfield	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
13	MCB28420	ND	Medieval to post medieval field boundaries, Harston	BOUNDARY DITCH	CROPMARK	Mitigation required within 50m of pipeline
13	MCB5263	ND	Saxon brooch, Haslingfield	FINDSPOT	FIND	Mitigation required within 50m of pipeline
13	MCB5701	ND	Roman coin, Haslingfield	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB16178	ND	Flint scatter, Haslingfield	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
13	MCB23602	ND	Anti-aircraft battery, Barrington and Haslingfield	HEAVY ANTI AIRCRAFT BATTERY	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB20499	ND	Pottery finds from fieldwalking within Haslingfield parish, Field 1			Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB20513	ND	Saxon pits, Test Pitting in Haslingfield Parish	PIT?; MIDDEN?; HEARTH	EXCAVATED FEATURE; EXCAVATED FEATURE	Mitigation not required between 50m and 250m

							from pipeline if there are no intrusive works
13	MCB18452	ND	Late Bronze Age/Early Iron Age enclosure, E of Thriplow church	ENCLOSURE; TRACKWAY; STAKE HOLE	CROPMARK; SUB SURFACE DEPOSIT; CROPMARK; SUB SURFACE DEPOSIT		Mitigation required within 50m of pipeline
13	MCB5264	ND	Saxon disc brooches, Haslingfield	FINDSPOT	FIND		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB5267	ND	Iron Age weaving comb, Haslingfield	FINDSPOT	UNSTRATIFIED FIND		Mitigation required within 50m of pipeline
13	MCB28389	ND	Medieval to post medieval field boundaries, Foxton	FIELD BOUNDARY	EARTHWORK		Mitigation required within 50m of pipeline
13	MCB20216	ND	Trackway and field system at Thriplow	TRACKWAY; DITCH; FIELD SYSTEM?	SUB SURFACE DEPOSIT		Mitigation required within 50m of pipeline
13	MCB28140	ND	Iron Age pottery and possible cremation, Haslingfield	FINDSPOT; CREMATION?	DOCUMENTARY EVIDENCE		Mitigation required within 50m of pipeline
13	MCB23596	ND	Site of former clunch pit at Haslingfield	EXTRACTIVE PIT	DOCUMENTARY EVIDENCE		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB17495	ND	Medieval jetton find, Manor Farm, Harlton	FINDSPOT	FIND		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

13	MCB18068	ND	Milestone, Cambridge Road, Foxton	MILESTONE	EXTANT STRUCTURE	Mitigation required within 50m of pipeline
13	MCB22264	ND	Possible water meadows, south of river Cam, Foxton	DITCH; WATER MEADOW	EARTHWORK; CONJECTURAL EVIDENCE	Mitigation required within 50m of pipeline
13	MCB10708	ND	Ring ditch, Thriplow	RING DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB5262	ND	Neolithic flints, Chapel Hill, Haslingfield	FINDSPOT	ARTEFACT SCATTER	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB9983	ND	Commonwealth penny, Foxton	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB22266	ND	Medieval to post medieval field boundaries, Foxton	DITCH; FIELD BOUNDARY	LEVELLED EARTHWORK; LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
13	MCB5474	ND	Iron Age remains, Haslingfield	FINDSPOT	FIND	Mitigation required within 50m of pipeline
13	MCB24808	ND	Former evidence of ridge and furrow, Foxton	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
13	MCB5123	ND	Roman enclosure site and nearby ring ditch, Harston	ENCLOSURE; RING DITCH	CROPMARK; FIND; CROPMARK	Mitigation not required between 50m and 250m from pipeline if

						there are no intrusive works
13	MCB11476	ND	Settlement system with double ring-ditch, Haslingfield	TRACKWAY; ROUND HOUSE (DOMESTIC)?; CURVILINEAR ENCLOSURE; RECTILINEAR ENCLOSURE; SETTLEMENT; RING DITCH	CROPMARK;	Mitigation required within 50m of pipeline
13	MCB13199	ND	Former ridge and furrow, Barrington	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
13	MCB24411	ND	Former field boundaries, Iron Age to Roman 200m east of Mortimers Farm, Foxton	DITCH	CROPMARK	Mitigation required within 50m of pipeline
13	MCB4905	ND	Enclosure cropmarks south of the Cambridge Road, Foxton	ENCLOSURE; LINEAR FEATURE	CROPMARK; FIND; CROPMARK; FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB10731	ND	Cropmark enclosure, Barrington	CURVILINEAR ENCLOSURE; ENCLOSURE; ENCLOSURE; TRACKWAY	CROPMARK; CROPMARK; CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB27307	ND	Furlong boundaries in the parish of Foxton	FURLONG BOUNDARY	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB30342	ND	Undated enclosure 380m west of Dairy Farm, Newton	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

13	MCB13199	ND	Former ridge and furrow, Barrington	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB20942	ND	Enclosure cropmarks, Foxton	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB14913	ND	Saint George's Church, Thriplow	FONT; TRANSEPT; CHURCH; CHANCEL; CROSSING; TOWER; NAVE; VESTRY	EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB10354	ND	Enclosure cropmarks, north of Cambridge Road, Foxton	TRACKWAY; BOUNDARY; ENCLOSURE; RING DITCH	CROPMARK; CROPMARK; CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB20946	ND	Enclosures on land east of Foxton	ENCLOSURE; CURVILINEAR ENCLOSURE; RECTILINEAR ENCLOSURE	CROPMARK; CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB6178	ND	Former remains of Ridge and furrow, Haslingfield	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
13	MCB24042	ND	Great Eastern Railway (Shepreth Branch)	RAILWAY	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if

						there are no intrusive works
13	MCB22265	ND	Post medieval field boundaries, south of river Cam, Foxton	DITCH; FIELD BOUNDARY	DOCUMENTARY EVIDENCE; DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB10361	ND	Rectilinear enclosure and linear features, Harston	LINEAR FEATURE; RECTILINEAR ENCLOSURE	CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB30149	ND	Possible Roman Road, Red Cross to Hauxton	ROAD	CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB22269	ND	Iron Age to Roman enclosure remains, Foxton	RECTILINEAR ENCLOSURE; DITCH; PIT	CROPMARK; CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB31305	ND	Hauxton and Dunsbridge Turnpike Trust	TOLL ROAD		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB10731	ND	Cropmark enclosure, Barrington	CURVILINEAR ENCLOSURE; ENCLOSURE; ENCLOSURE; TRACKWAY	CROPMARK; CROPMARK; CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

13	MCB27306	ND	Furlong boundaries in the parish of Foxton	FURLONG BOUNDARY	EARTHWORK	Mitigation required within 50m of pipeline
13	MCB10354	ND	Enclosure cropmarks, north of Cambridge Road, Foxton	TRACKWAY; BOUNDARY; ENCLOSURE; RING DITCH	CROPMARK; CROPMARK; CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB4905	ND	Enclosure cropmarks south of the Cambridge Road, Foxton	ENCLOSURE; LINEAR FEATURE	CROPMARK; FIND; CROPMARK; FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB10724	ND	Cropmark remains of ridge and furrow, Barrington and Haslingfield	RIDGE AND FURROW	CROPMARK	Mitigation required within 50m of pipeline
13	MCB10354	ND	Enclosure cropmarks, north of Cambridge Road, Foxton	TRACKWAY; BOUNDARY; ENCLOSURE; RING DITCH	CROPMARK; CROPMARK; CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB27316	ND	Furlong boundaries in the parishes of Harlton & Haslingfield	FURLONG BOUNDARY	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB5063	ND	Roman villa, Hoffers Brook Farm	VILLA; ENCLOSURE; POST HOLE; DITCH	CROPMARK; FIND	Avoidance recommended
13	MCB10375	ND	Rectilinear enclosure system, Thriplow	RECTILINEAR ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if

							there are no intrusive works
13	MCB4905	ND	Enclosure cropmarks south of the Cambridge Road, Foxton	ENCLOSURE; LINEAR FEATURE	CROPMARK; FIND; CROPMARK; FIND		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB6178	ND	Former remains of Ridge and furrow, Haslingfield	RIDGE AND FURROW	LEVELLED EARTHWORK		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB10372	ND	Cropmarks of enclosures and trackway, Thriplow	ENCLOSURE; TRACKWAY	CROPMARK		Mitigation required within 50m of pipeline
13	MCB10354	ND	Enclosure cropmarks, north of Cambridge Road, Foxton	TRACKWAY; BOUNDARY; ENCLOSURE; RING DITCH	CROPMARK		Mitigation required within 50m of pipeline
13	DCB6706	Grade II listed building	Milestone	MILESTONE	LISTED BUILDING		Avoidance recommended
13	MCB1619	ND	Moated site at Mortimers Farm	MOAT	EARTHWORK; DOCUMENTARY EVIDENCE		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB20946	ND	Enclosures on land east of Foxton	ENCLOSURE; CURVILINEAR ENCLOSURE; RECTILINEAR ENCLOSURE	CROPMARK; CROPMARK; CROPMARK		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB20947	ND	Trackway feature, Foxton	TRACKWAY	CROPMARK		Mitigation not required between

						50m and 250m from pipeline if there are no intrusive works
13	MCB4905	ND	Enclosure cropmarks south of the Cambridge Road, Foxton	ENCLOSURE; LINEAR FEATURE	CROPMARK; FIND; CROPMARK; FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB5699	ND	Bronze Age barrow, Money Hill, Haslingfield	ROUND BARROW; RING DITCH	EARTHWORK; CROPMARK; EARTHWORK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
13	MCB24042	ND	Great Eastern Railway (Shepreth Branch)	RAILWAY	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

**Table 17. Cambridgeshire, figure D, page 14 of 20**

Map Page Number	HER Number	Record Type	Site Names	Monument Type	Evidence	Constraints Risk
14	MCB10032	ND	Dubious site, Haslingfield	SITE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB21304	ND	Medieval to post medieval house platforms and road, north of Foxbourne, Comberton	ROAD; HOUSE PLATFORM	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	DCB6158 / MCB5936	Grade II listed building	Brook Farm, Haslingfield	LATE C18 OR EARLY C19 FARMHOUSE	EXTANT BUILDING	Avoidance recommended
14	MCB25629	ND	Plough headland 215m southeast of Sewage Pumping Station, Barton	PLOUGH HEADLAND	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB25531	ND	Possible Iron Age or Roman enclosures north of Wimpole Road, Comberton	FIELD BOUNDARY; ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB16557	ND	Merlin Radio Telescope, Haslingfield	RADIO TELESCOPE	STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB20511	ND	Results of Fieldwalking in Field 13, Haslingfield			Mitigation not required between

14	MCB5276	ND	Roman bronze bull, Barton	FINDSPOT	UNSTRATIFIED FIND	50m and 250m from pipeline if there are no intrusive works Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB25619	ND	Medieval and post medieval field boundary banks north and west of Barton	FIELD BOUNDARY	EARTHWORK	Mitigation required within 50m of pipeline
14	MCB25728	ND	Probable post medieval boundary ditches, Haslingfield	FIELD BOUNDARY	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB9388	ND	Roman figurine, Barton	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB11397	ND	Enclosures, Barton	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB4119	ND	Lords Bridge, Barton, nr Hey Hill tumulus	SETTLEMENT; CREMATION	FIN	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB28481	ND	Bombing decoys, Barton (southern site)	BOMBING DECOY; STARFISH SITE	DESTROYED MONUMENT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

14	MCB11395	ND	Medieval earthworks, Comberton	LINEAR FEATURE; RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB25728	ND	Probable post medieval boundary ditches, Haslingfield	FIELD BOUNDARY	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB6198	ND	Saxon finds, Barton	FINDSPOT	ARTEFACT SCATTER	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB6178	ND	Former remains of Ridge and furrow, Haslingfield	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB4199	ND	Former remains of Ridge and furrow, Comberton	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
14	MCB27315	ND	Furlong boundaries in the parishes of Barton & Comberton	FURLONG BOUNDARY	EARTHWORK	Mitigation required within 50m of pipeline
14	MCB4142	ND	Sandy to Cambridge railway	RAILWAY	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB5277	ND	Earthwork remains of ridge and furrow around Barton village	RIDGE AND FURROW	EARTHWORK	Mitigation required within 50m of pipeline
14	MCB5275	ND	Former Ridge and furrow, Barton	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from

						pipeline if there are no intrusive works
14	MCB4177	ND	Romano-British settlement, Townsend Farm, Comberton	SETTLEMENT; PIT; RECTILINEAR ENCLOSURE; FIELD BOUNDARY; CURVILINEAR ENCLOSURE; TRACKWAY; PIT	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB27316	ND	Furlong boundaries in the parishes of Harlton & Haslingfield	FURLONG BOUNDARY	EARTHWORK	Mitigation required within 50m of pipeline
14	MCB10729	ND	Trackway and Enclosures north of Spring Hall Farm, Haslingfield	FIELD SYSTEM; TRACKWAY; ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB30149	ND	Possible Roman Road, Red Cross to Hauxton	ROAD	CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB31305	ND	Hauxton and Dunsbridge Turnpike Trust	TOLL ROAD		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB10717	ND	Linear feature, Haslingfield	FIELD BOUNDARY; TRACKWAY; RECTILINEAR ENCLOSURE; LINEAR FEATURE	CROPMARK	Mitigation required within 50m of pipeline
14	MCB25720	ND	Cropmark of a trackway 220m west of Spring Hall Farm, Haslingfield	TRACKWAY	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB6178	ND	Former remains of Ridge and furrow, Haslingfield	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from

						pipeline if there are no intrusive works
14	DCB408	SM	Settlement site W of Townsend Farm	ROMANO-BRITISH SETTLEMENT	NONE RECORDED	Setting assessment required
14	MCB25617	ND	Probable Medieval boundary ditches 400m south of Comberton Road, Barton	BOUNDARY DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB21322	ND	Iron Age to Roman enclosures, Haslingfield	RECTILINEAR ENCLOSURE; DITCH	CROPMARK	Mitigation required within 50m of pipeline
14	MCB25532	ND	Boundary bank earthwork, Barton, Comberton and Hardwick	BOUNDARY BANK	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB15138	ND	Lords Bridge airfield and Observatory, Harlton	MILITARY AIRFIELD; MILITARY BUILDING; AMMUNITION DUMP; WEAPONS PIT; SEWAGE WORKS; BARBED WIRE OBSTRUCTION; AIR RAID SHELTER; MILITARY ROAD; TRENCH; PILLBOX; RAILWAY; OBSERVATORY	STRUCTURE; EARTHWORK; DEMOLISHED STRUCTURE; EXTANT STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB11401	ND	Cropmark remains of Ridge and furrow, Barton	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB28262	ND	Roman Road Arrington to Cambridge	ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

14	MCB25628	ND	Post medieval extraction pit and earthwork bank north of Wimpole Road, Barton	BANK (EARTHWORK); EXTRACTIVE PIT	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB11477	ND	Enclosure complex, Haslingfield	ENCLOSURE; FIELD BOUNDARY; CURVILINEAR ENCLOSURE; RECTILINEAR ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB15118	ND	Bombing decoy, Barton (northern site)	BOMBING DECOY; STARFISH SITE	DESTROYED MONUMENT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
14	MCB25529	ND	Iron Age to Roman cropmark enclosure 350m east of Long Road, Comberton	ENCLOSURE	CROPMARK	Mitigation required within 50m of pipeline
14	MCB4142	ND	Sandy to Cambridge railway	RAILWAY	DOCUMENTARY EVIDENCE	Mitigation required within 50m of pipeline

**Table 18. Cambridgeshire, figure D, page 15 of 20**

Map Page Number	HER Number	Record Type	Site Names	Monument Type	Evidence	Constraint Risks
15	MCB600	ND	Roman coins, Dry Drayton	FINDSPOT	ARTEFACT SCATTER	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB28568	ND	Post medieval earthwork boundary, Comberton	DITCH	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB11400	ND	Geophysical evidence of ridge and furrow, Comberton	RIDGE AND FURROW; FIELD BOUNDARY; DITCH?	CROPMARK; SUB SURFACE DEPOSIT; SUB SURFACE DEPOSIT; EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

15	MCB20890	ND	Former site of a Milepost, St Neots Road, Comberton	MILEPOST	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB669	ND	Roman pottery, Madingley	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB20875	ND	Site of former Park Farm, Park Farm, Madingley	FARM; FARM BUILDING	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB363	ND	Roman remains, Madingley	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB28615	ND	Linear pit alignments, Madingley	PIT; TREE AVENUE?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB11990	ND	Medieval earthworks, W of Madingley Hall	RIDGE AND FURROW; HOUSE PLATFORM; ENCLOSURE; FARMSTEAD?	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB4378	ND	Roman pottery, Madingley Hall	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB11381	ND	Medieval earthworks, Madingley	HOUSE PLATFORM; FARMSTEAD?	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB20874	ND	Former site of Redhouse Farm, St Neots Road, Hardwick	FARM; FARM BUILDING	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

15	MCB15734	ND	Reused medieval stonework, Madingley Hall	BUILDING	EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB391	ND	Cropmark remains of ridge and furrow, Dry Drayton	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB4199	ND	Former remains of Ridge and furrow, Comberton	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
15	MCB4326	ND	Earthwork remains of ridge and furrow, Madingley	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB11495	ND	Former Ridge and furrow, Lolworth	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
15	MCB4197	ND	Earthwork remains of ridge and furrow, Comberton	RIDGE AND FURROW	EARTHWORK	Mitigation required within 50m of pipeline
15	MCB21437	ND	Earthwork remains of ridge and furrow, Dry Drayton	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB30152	ND	Probable Roman Road, Cambridge to Bolnhurst (modern A428)	ROAD	CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB28614	ND	Medieval to post medieval field boundaries, Madingley	FIELD BOUNDARY; DITCH	EARTHWORK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB28584	ND	Earthwork remains of ridge and furrow, Lolworth	RIDGE AND FURROW	EARTHWORK	Mitigation required within 50m of pipeline
15	MCB27320	ND	Furlong boundaries in the parishes of Dry Drayton, Childerley & Lolworth	FURLONG BOUNDARY	EARTHWORK	Mitigation required within 50m of pipeline
15	MCB11392	ND	Former ridge and furrow, Dry Drayton	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline

15	DCB6720	Grade II listed building	Icehouse, at Madingley Hall	ICEHOUSE	LISTED BUILDING	Setting assessment required
15	MCB4379	ND	Madingley Park	PARK; LOGGIA; PARTERRE; AVENUE (LANDSCAPE FEATURE); WALK; ORCHARD; FOUNTAIN; ORNAMENTAL CANAL; ORNAMENTAL LAKE; ORNAMENTAL BRIDGE; LAWN; HA HA; TERRACE; FOUNTAIN; POOL; FORMAL GARDEN; KITCHEN GARDEN	DOCUMENTARY EVIDENCE; STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	DCB5559	Grade II listed building	Statue of Albert, Prince Consort, at Madingley Hall	STATUE	LISTED BUILDING	Setting assessment required
15	MCB11393	ND	Former Ridge and furrow, Madingley	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
15	MCB9602	ND	Worsted Street (Via Devana) Roman road	ROAD	EARTHWORK; SUB SURFACE DEPOSIT; CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB31244	ND	Godmanchester to Cambridge Turnpike Trust	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB28635	ND	Former ridge and furrow, Bar Hill	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB10715	ND	Cropmarks Enclosures, Madingley	RECTILINEAR ENCLOSURE; LINEAR FEATURE; TRACKWAY; DITCH; CURVILINEAR ENCLOSURE	CROPMARK;	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB31122	ND	Roman settlement, Long Road, Comberton	BOUNDARY DITCH; ENCLOSURE; MIDDEN; PIT	EXCAVATED FEATURE;	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

15	MCB11495	ND	Former Ridge and furrow, Lolworth	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB24834	ND	Iron Age to Roman features, 470m east of Red House Farm, Comberton	CURVILINEAR ENCLOSURE	CROPMARK	Mitigation required within 50m of pipeline
15	MCB31312	ND	St Neots to Cambridge Turnpike Trust	TOLL ROAD		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB28614	ND	Medieval to post medieval field boundaries, Madingley	FIELD BOUNDARY; DITCH	EARTHWORK; CROPMARK;	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB4240	ND	Former ridge and furrow, Hardwick	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB24833	ND	Iron Age to Roman features, 350m west of Park Farm, Madingley	CURVILINEAR ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB28613	ND	Medieval to post medieval field boundaries, Dry Drayton	FIELD BOUNDARY; DITCH	EARTHWORK; CROPMARK;	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB21302	ND	Cropmark remains of ridge and furrow, Hardwick	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB21424	ND	Iron Age to Roman enclosure, 400m west of Red House Farm, Hardwick	CURVILINEAR ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
15	MCB25535	ND	Medieval field boundaries 220m northeast of Hardwick Primary School, Hardwick	FIELD BOUNDARY	EARTHWORK	Mitigation not required between 50m and 250m

15	MCB553	ND	Cropmark remains of ridge and furrow, Madingley	RIDGE AND FURROW; FIELD BOUNDARY	CROPMARK	from pipeline if there are no intrusive works Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
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**Table 19. Cambridgeshire, figure D, page 16 of 20**

Map Page Number	HER Number	Record Type	Site Names	Monument Type	Evidence	Constraint Risk
16	MCB4281	ND	Windmill, Swavesey	WINDMILL	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
16	MCB18222	ND	Possible mounds, Swavesey	BARROW?; MOUND?	CROPMARK; CROPMARK	Avoidance recommended
16	MCB17551	ND	Roman enclosures and droveways, Covells Drain, Swavesey	FINDSPOT; FEATURE?; FIELD SYSTEM; ENCLOSURE; ROUND HOUSE (DOMESTIC)?; DROVE ROAD	SUB SURFACE DEPOSIT	Mitigation not required between 50m and 250m from pipeline if there

						are no intrusive works
16	DCB6346 / MCB1656	ND	All Saints' Church, Lolworth	CHURCH; CROSS; WALL PAINTING; CHANCEL; NAVE; TOWER	EXTANT BUILDING	Avoidance recommended
16	MCB4275	ND	Black Bank earthwork, Swavesey	BANK (EARTHWORK)	EARTHWORK	Mitigation required within 50m of pipeline
16	DCB5118 / MCB18495	ND	Lolworth Grange	DETACHED HOUSE; GATE PIER	EXTANT STRUCTURE	Avoidance recommended
16	MCB4303	ND	Lolworth DMV	SHRUNKEN VILLAGE; RIDGE AND FURROW; VILLAGE GREEN	DOCUMENTARY EVIDENCE	Avoidance recommended
16	MCB4245	ND	Mesolithic long axe, Lolworth	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
16	MCB4244	ND	Medieval gravestone, All Saints' Church, Lolworth	GRAVESTONE	STRUCTURE	Avoidance recommended
16	MCB25514	ND	Soilmarks north of All Saints Church, Lolworth	SETTLEMENT; TRACKWAY	SOILMARK; SOILMARK	Avoidance recommended
16	MCB4332	ND	Excavated evidence of ridge and furrow, E of College Farm, Lolworth	RIDGE AND FURROW	DOCUMENTARY EVIDENCE	Mitigation required within 50m of pipeline
16	MCB18179	ND	Lolworth Rectory	VICARAGE; DOVECOTE	EXTANT BUILDING; DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
16	MCB4286	ND	Roman finds, Mill Way, Swavesey	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there

						are no intrusive works
16	DCB5229 / MCB393	ND	Hale Windmill, Swavesey	WINDMILL	EXTANT BUILDING	Avoidance recommended
16	MCB25030	ND	Freezeland Farm, Swavesey	HOUSE	DOCUMENTARY EVIDENCE	Mitigation required within 50m of pipeline
16	MCB13447	ND	Former ridge and furrow, Swavesey	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
16	MCB11495	ND	Former Ridge and furrow, Lolworth	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
16	MCB19611	ND	Dismantled Railway: Cambridge and St Ives Branch	RAILWAY	STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
16	MCB28584	ND	Earthwork remains of ridge and furrow, Lolworth	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
16	MCB27325	ND	Furlong boundaries in the parish of Swavesey	FURLONG BOUNDARY	EARTHWORK	Mitigation required within 50m of pipeline
16	MCB27324	ND	Furlong boundaries in the parish of Fen Drayton	FURLONG BOUNDARY	EARTHWORK	Mitigation not required between 50m

						and 250m from pipeline if there are no intrusive works
16	MCB20971	ND	Cropmark remains of ridge and furrow, Swavesey	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
16	MCB21457	ND	Earthwork remains of ridge and furrow, Swavesey	RIDGE AND FURROW	EARTHWORK	Mitigation required within 50m of pipeline
16	MCB14281	ND	Gardens, Lolworth Grange	RIDGE AND FURROW; LOGGIA; FORMAL GARDEN; GARDEN PATH	EXTANT STRUCTURE; BOTANICAL FEATURE; EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
16	MCB9602	ND	Worsted Street (Via Devana) Roman road	ROAD	EARTHWORK; SUB SURFACE DEPOSIT; CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
16	MCB27320	ND	Furlong boundaries in the parishes of Dry Drayton, Childerley & Lolworth	FURLONG BOUNDARY	EARTHWORK	Mitigation required within 50m of pipeline
16	MCB10921	ND	Rectilinear enclosures, Swavesey	ENCLOSURE; FIELD SYSTEM	CROPMARK	Mitigation required within 50m of pipeline
16	MCB31244	ND	Godmanchester to Cambridge Turnpike Trust	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m

16	MCB11495	ND	Former Ridge and furrow, Lolworth	RIDGE AND FURROW	LEVELLED EARTHWORK	and 250m from pipeline if there are no intrusive works Mitigation required within 50m of pipeline
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**Table 20. Cambridgeshire, figure D, page 17 of 20**

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risk
17	MCB31644	ND	Gravel pits, Holywell	GRAVEL PIT	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB16192	ND	Palaeolithic flint scatter, Needingworth	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB20690	ND	Site of Cottage Farm, off Lowndes Drove, Holywell cum Needingworth	FARM	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB2277	ND	Iron Age beaker, Holywell cum Needingworth	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

17	MCB4556	ND	Roman pottery finds, Woodhurst	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
17	MCB4783	ND	Moyne's Hall	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB24341	ND	Rectilinear enclosures 380m west of Millers Crossing, Needingworth	RECTILINEAR ENCLOSURE	CROPMARK	Mitigation required within 50m of pipeline
17	MCB20687	ND	Former site of Bluntisham Heath Farm, Somersham Road, Bluntisham	FARM	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB2292	ND	Flint implements, Holywell cum Needingworth	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB4456	ND	Iron Age pottery, Holywell cum Needingworth	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB9488	ND	Bronze Age finds, Holywell cum Needingworth	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
17	MCB2179	ND	Flint implements, Holywell cum Needingworth	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB4570	ND	Roman pottery, Holywell cum Needingworth	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	DCB2769	Grade II listed building	Moyne's Hall	C17 FARMHOUSE	LISTED BUILDING	Avoidance recommended
17	DCB4109	Grade II listed building	Shed and Barn to the south of Moyne's Hall Farmhouse	SHED AND BARN	LISTED BUILDING	Avoidance recommended
17	MCB4781	ND	Moat at Moyne's Hall	MOAT; ARCHITECTURAL FRAGMENT	EARTHWORK; FIND; ARCHITECTURAL	Mitigation not required between 50m and 250m

					COMPONENT; ARCHITECTURAL COMPONENT	from pipeline if there are no intrusive works
17	MCB4524	ND	Human remains, Holywell cum Needingworth	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB10983	ND	Rectilinear enclosures, Holywell cum Needingworth	ENCLOSURE	CROPMARK	Mitigation required within 50m of pipeline
17	MCB4457	ND	Roman pottery, Holywell cum Needingworth	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB4610	ND	Roman finds, Holywell cum Needingworth	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
17	MCB9489	ND	Bronze Age barrows, Holywell cum Needingworth	BARROW	EARTHWORK	Avoidance recommended
17	MCB14762	ND	Metal detecting finds, Holywell cum Needingworth	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB21784	ND	Site of former pump, Swavesey	PUMP	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB2297	ND	Neolithic perforated object, Coldham Field	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB4782	ND	Moyne's Hall	BARN; HOUSE; WALL	FIND; EXTANT BUILDING; FIND; EXTANT BUILDING; FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB20709	ND	Former site of Heath Barn, Holywell cum Needingworth	BARN	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m

17	MCB29426	ND	River Great Ouse Navigation	RIVER NAVIGATION	DOCUMENTARY EVIDENCE	from pipeline if there are no intrusive works
17	MCB23253	ND	Enclosures and boundaries, Holywell-cum-Needingworth	ENCLOSURE; LINEAR FEATURE; BOUNDARY DITCH	CROPMARK; CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB9927	ND	Earthwork remains of ridge and furrow, Holywell cum Needingworth	RIDGE AND FURROW	EARTHWORK	Mitigation required within 50m of pipeline
17	MCB19611	ND	Dismantled Railway: Cambridge and St Ives Branch	RAILWAY	STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB10922	ND	New Dock Field, Swavesey	LINEAR FEATURE; ROAD	CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB4528	ND	Great Northern and Great Eastern Joint Railway, March to St Ives	RAILWAY	STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB28598	ND	Ely And St Ives Railway	RAILWAY	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB23255	ND	Cropmark remains of ridge and furrow, Holywell-cum-Needingworth	RIDGE AND FURROW	CROPMARK	Mitigation required within 50m of pipeline
17	MCB9927	ND	Earthwork remains of ridge and furrow, Holywell cum Needingworth	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

17	MCB9930	ND	Enclosures, Holywell cum Needingworth	ENCLOSURE; SETTLEMENT	CROPMARK; CROPMARK	Mitigation required within 50m of pipeline
17	MCB9927	ND	Earthwork remains of ridge and furrow, Holywell cum Needingworth	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB31484	ND	Somersham Turnpike Trust	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB29539	ND	Rectilinear enclosures, Holywell	RECTILINEAR ENCLOSURE; RING DITCH	CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB31650	ND	Earthwork remains of rectilinear enclosures, Holywell	ENCLOSURE; PIT	EARTHWORK; EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB9927	ND	Earthwork remains of ridge and furrow, Holywell cum Needingworth	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
17	MCB31406	ND	Bury and Stratton Turnpike Trust	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

**Table 21. Cambridgeshire, figure D, page 18 of 20**

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risk
18	MCB30421	ND	Undated cropmark enclosure, Old Hurst	RECTILINEAR ENCLOSURE; RING DITCH	CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
18	MCB30418	ND	Undated cropmark enclosures, Old Hurst	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
18	MCB30419	ND	Undated cropmark enclosures, Old Hurst	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
18	MCB30422	ND	Undated cropmark enclosure, Woodhurst	RECTILINEAR ENCLOSURE	CROPMARK	Mitigation required within 50m of pipeline
18	MCB30420	ND	Undated cropmark enclosures, Old Hurst	ENCLOSURE	CROPMARK	Mitigation required within 50m of pipeline
18	MCB27851	ND	Undated ring ditch or circular enclosure, Pidley cum Fenton	ENCLOSURE; RING DITCH	CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

18	MCB31647	ND	Carpenters Arms beerhouse, Warboys	BEER HOUSE	DOCUMENTARY EVIDENCE	Mitigation required within 50m of pipeline
18	MCB31646	ND	Padgett's Barn, Pidley	HOUSE	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
18	MCB14569	ND	Late Roman features, Woodhurst water pipeline	ARTEFACT SCATTER; ENCLOSURE	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
18	MCB31485	ND	Hartford Turnpike Trust	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
18	MCB4528	ND	Great Northern and Great Eastern Joint Railway, March to St Ives	RAILWAY	STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
18	MCB25125	ND	Cropmark remains of ridge and furrow, Woodhurst	RIDGE AND FURROW	CROPMARK	Mitigation required within 50m of pipeline
18	MCB13679	ND	Earthwork remains of ridge and furrow, Pidley	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

18	MCB13676	ND	Former ridge and furrow, Pidley cum Fenton	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
18	MCB31484	ND	Somersham Turnpike Trust	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
18	MCB25125	ND	Cropmark remains of ridge and furrow, Woodhurst	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
18	MCB4526	ND	Great Eastern Joint Railway, Ramsey-Somersham	RAILWAY	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
18	MCB19526	ND	Late prehistoric enclosures and concentric ring ditches, Pidley cum Fenton	ENCLOSURE; RING DITCH	CROPMARK; CROPMARK	Mitigation not required between 50m and 250m from pipeline if there

						are no intrusive works
18	MCB31485	ND	Hartford Turnpike Trust	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
18	MCB25125	ND	Cropmark remains of ridge and furrow, Woodhurst	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
18	MCB10989	ND	Former ridge and furrow, Old Hurst	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
18	MCB25125	ND	Cropmark remains of ridge and furrow, Woodhurst	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

Table 22. Cambridgeshire, figure D, page 19 of 20

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
19	DCB3610	Grade II listed building	Porch House, Upwood and Little Raveley, Mid to Late C17 with C19 roof raise	HOUSE	LISTED BUILDING	Setting assessment required
19	DCB3376	Grade II listed building	The Manor, late C17 origin, but with rebuilding in late C18	HOUSE	LISTED BUILDING	Setting assessment required
19	MCB30373	ND	Enclosure, Little Raveley	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
19	MCB25135	ND	Undated enclosures, 600m north of Illings Farm Warboys	ENCLOSURE; LINEAR FEATURE	CROPMARK	Mitigation required within 50m of pipeline
19	MCB3310	ND	Roman coffin, Broughton	COFFIN	FIND	Mitigation not required between

						50m and 250m from pipeline if there are no intrusive works
19	MCB31662	ND	Top Barn, Upwood	HOUSE	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
19	MCB25127	ND	Undated rectilinear enclosure 500m south of Calcroft Close's Farm, Warboys	RECTILINEAR ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
19	MCB31663	ND	Lodge Farm, Upwood	HOUSE	DOCUMENTARY EVIDENCE	Mitigation required within 50m of pipeline
19	MCB12262	ND	Neolithic axe, Old Hurst	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
19	MCB3311	ND	Medieval coffin lid, Broughton	COFFIN	FIND	Mitigation not required between 50m and 250m from pipeline if

19	MCB31660	ND	Holborn Farm, Warboys	HOUSE	DOCUMENTARY EVIDENCE	there are no intrusive works Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
19	MCB30377	ND	Ring ditch west of Holborn Farm	RING DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
19	MCB5196	ND	Saxon settlement, Broughton	SETTLEMENT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
19	DCB2479 / MCB3384	Grade II* listed building	Saint James' Church, Little Raveley	CHURCH; CHANCEL; PISCINA; NAVE; FONT; CHANCEL ARCH	LISTED BUILDING	Setting assessment required
19	MCB30143	ND	Rectilinear enclosure west of The Dairy	RECTILINEAR ENCLOSURE	CROPMARK	Mitigation required

19	MCB30372	ND	Sub-circular enclosure, Little Raveley	ENCLOSURE	CROPMARK	within 50m of pipeline Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
19	MCB23673	ND	Enclosure, Warboys	ENCLOSURE; LINEAR FEATURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
19	MCB31664	ND	Villa Cottage, Upwood	HOUSE	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
19	MCB30144	ND	Rectilinear enclosure east of The Dairy	RECTILINEAR ENCLOSURE; RING DITCH; DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

19	MCB31485	ND	Hartford Turnpike Trust	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
19	MCB31406	ND	Bury and Stratton Turnpike Trust	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
19	MCB25124	ND	Cropmark remains of ridge and furrow, Old Hurst	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
19	MCB13677	ND	Earthwork remains of ridge and furrow, Old Hurst	RIDGE AND FURROW	EARTHWORK	Mitigation required within 50m of pipeline
19	MCB3584	ND	Cropmark remains of ridge and furrow, Warboys	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no

19	MCB13682	ND	Earthwork remains of ridge and furrow, Warboys	RIDGE AND FURROW	EARTHWORK	intrusive works Mitigation required within 50m of pipeline
19	MCB23670	ND	Cropmark remains of ridge and furrow, Broughton	RIDGE AND FURROW	CROPMARK	Mitigation required within 50m of pipeline
19	MCB31456	ND	Cropmark remains of ridge and furrow, Wistow	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
19	MCB10989	ND	Former ridge and furrow, Old Hurst	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
19	MCB15154	ND	RAF Warboys	MILITARY AIRFIELD; MISSILE BASE; GUARDHOUSE; AIR RAID SHELTER; WATER TANK; BATTLE HEADQUARTERS; RADAR STATION; MILITARY BUILDING; PILLBOX; BLOODHOUND MISSILE SITE	STRUCTURE; EXTANT BUILDING	Mitigation required within 50m of pipeline
19	MCB3581	ND	Earthwork remains of ridge and furrow, Upwood	RIDGE AND FURROW	EARTHWORK	Mitigation not required between

50m and  
250m from  
pipeline if  
there are no  
intrusive  
works

**Table 23. Cambridgeshire, figure D, page 20 of 20**

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
20	DCB4162	Grade II listed building	St Bosworths House, late C17, extended on south, late C20	HOUSE	LISTED BUILDING	Setting assessment required
20	DCB4163	Grade II listed building	Barn about 20 yards east of Manor House Farmhouse, C17 to C18	BARN	LISTED BUILDING	Setting assessment required
20	DCB2738	Grade II* listed building	Manor House Farmhouse, late C16 and 1672	FARMHOUSE	LISTED BUILDING	Setting assessment required
20	MCB20781	ND	Former site of a School, School House, Wood Walton	SCHOOL	DOCUMENTARY EVIDENCE	Mitigation required within 50m of pipeline

20	MCB16127	ND	Judith Sawtry deserted village	DESERTED SETTLEMENT?	FIND; CONJECTURAL EVIDENCE	Mitigation required within 50m of pipeline
20	MCB3559	ND	Roman coin, Wood Walton	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
20	MCB31665	ND	Ede's lodge, Sawtry	HOUSE	DOCUMENTARY EVIDENCE	Mitigation required within 50m of pipeline
20	MCB2226	ND	Discoidal flint knife, Castle Hill, Wood Walton	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
20	MCB1235	ND	Abbey Farm, Sawtry (possible site of parochial church of St. Mary)	CHURCH	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	MCB30083	ND	Undated ring ditch, Sawtry	RING DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	DCB2480 / MCB3554	Grade II* listed building	Saint Andrew's Church, Wood Walton	CHURCH; NAVE; CHANCEL; ARCADE; AISLE; TOWER	LISTED BUILDING	Setting assessment required

20	MCB2235	ND	Flint implements, Wood Walton	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
20	MCB2458	ND	Chipped flint axehead, Riddy Garden, Wood Walton	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
20	MCB30084	ND	Abbey Farm, Sawtry	FARMHOUSE	EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	MCB3258	ND	Chalk weight from Saint Andrew's Church churchyard, Wood Walton	FINDSPOT	UNSTRATIFIED FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	MCB3557	ND	Barbed and tanged arrowhead, Wood Walton	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
20	MCB6879	ND	Roman site, Wood Walton	SETTLEMENT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	MCB9444	ND	Roman pottery and quern stones, Wood Walton	ARTEFACT SCATTER	FIND	Mitigation not required

						between 50m and 250m from pipeline if there are no intrusive works
20	MCB31666	ND	Toll Bar Cottages, Sawtry	HOUSE; TOLL GATE	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	MCB1720	ND	Manor Farm, Sawtry	FARMHOUSE	EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	MCB2241	ND	Mesolithic findspot, Stump Ground, Wood Walton	FINDSPOT	UNSTRATIFIED FIND	Mitigation required within 50m of pipeline
20	MCB30082	ND	Undated linear settlement complex, northeast of Ede's Lodge, Sawtry	ENCLOSURE; TRACKWAY	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	MCB3555	ND	C12th gravestone, Wood Walton	GRAVESTONE	STRUCTURE	Mitigation not required between 50m and 250m

						from pipeline if there are no intrusive works
20	MCB16124	ND	Roman, Saxon and Medieval finds, Sawtry	FINDSPOT	ARTEFACT SCATTER	Mitigation required within 50m of pipeline
20	MCB30140	ND	Rectilinear enclosure east of Raveley Road	ENCLOSURE; DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	MCB30141	ND	Rectilinear enclosure west of Little Wills Farm	ENCLOSURE; DITCH	CROPMARK	Mitigation required within 50m of pipeline
20	MCB2631	ND	Post-medieval remains, Wood Walton	STRUCTURE	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	MCB3592	ND	Deserted medieval settlement and cultivation remains, Wood Walton	DESERTED SETTLEMENT	CROPMARK	Avoidance recommended
20	MCB20780	ND	Former site of a Rectory, Wood Walton	VICARAGE	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no

20	MCB11655	ND	Mound, Milne Close, Sawtry	MOUND	DOCUMENTARY EVIDENCE	intrusive works Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	MCB15034	ND	Ermine Street Roman Road	ROAD	DOCUMENTARY EVIDENCE; SUB SURFACE DEPOSIT; CONJECTURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	MCB31379	ND	Stilton Turnpike Trust (Alconbury to Wansford)	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	MCB12480	ND	Cropmark remains of ridge and furrow, Sawtry	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	MCB20853	ND	Great Northern Railway	RAILWAY	EXTANT STRUCTURE	Mitigation required within 50m of pipeline

20	MCB13675	ND	Cropmark remains of ridge and furrow, Upwood	RIDGE AND FURROW	CROPMARK	Mitigation required within 50m of pipeline
20	MCB12480	ND	Cropmark remains of ridge and furrow, Sawtry	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	DCB223 / MCB15419	ND	Sawtry Abbey	STABLE; ABBEY; GATEHOUSE; CHURCH; BUILDING; FISHPOND; LEAT; POND; BARN; STOREHOUSE; DITCH; ENCLOSURE; PILLOW MOUND; WINDMILL; SETTLEMENT; CLAY PIT	EARTHWORK; DOCUMENTARY EVIDENCE; FIND; DOCUMENTARY EVIDENCE; DESTROYED MONUMENT; EARTHWORK; FIND; STRUCTURE	Avoidance recommended & setting assessment required
20	MCB28331	ND	Cropmark remains of ridge and furrow, Wood Walton	RIDGE AND FURROW	CROPMARK	Mitigation required within 50m of pipeline
20	MCB30515	ND	Cropmark remains of enclosures and tracks, possible deserted settlement of Judith Sawtry	ENCLOSURE; TRACKWAY; POND; PIT	CROPMARK	Mitigation required within 50m of pipeline
20	MCB30519	ND	Earthwork remains of ridge and furrow, Wood Walton	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	MCB3603	ND	Former remains of ridge and furrow, Wood Walton	RIDGE AND FURROW	LEVELLED EARTHWORK	Mitigation not required between 50m

						and 250m from pipeline if there are no intrusive works
20	MCB12480	ND	Cropmark remains of ridge and furrow, Sawtry	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
20	MCB12480	ND	Cropmark remains of ridge and furrow, Sawtry	RIDGE AND FURROW	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

## **F.3 Northamptonshire**

**Table 24. Northamptonshire, figure E, page 1 of 3<sup>58</sup>**

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
1	MNN4037	ND	Possible prehistoric/Roman site, west of Lutton Lodge	SITE	CROPMARKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MNN6756	ND	Possible prehistoric site, north-west of High Holborn Farm	SITE	CROPMARKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MNN20262	ND	Possible prehistoric/Roman enclosure	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MNN127529	ND	Possible prehistoric enclosure (aerial archaeology interpretation)	ENCLOSURE?; LINEAR FEATURE?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MNN127530	ND	Possible prehistoric ditch (aerial archaeology interpretation)	DITCH?; LINEAR FEATURE?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

<sup>58</sup> No additional heritage constraints located on pages 2 and 3 of figure E.

1	MNN127531	ND	Possible prehistoric ditch (aerial archaeology interpretation)	DITCH?; LINEAR FEATURE?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MNN127532	ND	Possible prehistoric/Roman ditch (aerial archaeology interpretation)	DITCH?; LINEAR FEATURE?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MNN127534	ND	Possible prehistoric/Roman enclosure (aerial archaeology interpretation)	ENCLOSURE?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MNN127535	ND	Possible prehistoric/Roman enclosure (aerial archaeology interpretation)	OVAL ENCLOSURE?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MNN127536	ND	Possible prehistoric/Roman rectangular enclosure (aerial archaeology)	ENCLOSURE?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MNN127537	ND	Possible prehistoric round house (aerial archaeology)	HUT CIRCLE?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MNN133548	ND	Open Fields Project: Areas of Survival of Ridge & Furrow	RIDGE AND FURROW?	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

## F.4 Bedford Borough

Table 25. Bedford Borough, figure H, page 1 of 3

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risk
1	MBD581	ND	Moat in the Hermitage	HERMITAGE; MOAT	PLACENAME EVIDENCE; CROPMARK	Mitigation required within 50m of pipeline
1	MBD16718	ND	Cropmark, N of Woodhouse Farm	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB8581	ND	The Hermitage	HERMITAGE	DEMOLISHED STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB496	ND	Cropmarks & Roman occupation, NE of Basmead Manor	LINEAR FEATURE; RECTILINEAR ENCLOSURE; SETTLEMENT; DITCH; OCCUPATION SITE; PIT; POLYGONAL ENCLOSURE	CROPMARKS; EXCAVATED FEATURES	Mitigation required within 50m of pipeline

1	MBB20221	ND	Post-Medieval buckle	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB20222	ND	Post-Medieval buckle	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB20223	ND	Roman Coin	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB20224	ND	Roman Coin	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB20225	ND	Roman Coin	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB20840	ND	Victorian Mount	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB20841	ND	Roman Coin	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

1	MBB20842	ND	Roman Coin	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB20843	ND	Roman Coin	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB20844	ND	Roman Coin	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB20845	ND	Roman Coin	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB20846	ND	Roman Coin	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB20848	ND	Medieval Coin	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB20849	ND	Medieval Coin	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

1	MBD736	ND	Roman Road (Viatores no. 231)	ROAD	EARTHWORK; SURFACE DEPOSIT; CONJECTURAL EVIDENCE	Mitigation required within 50m of pipeline
1	MBD7046	ND	Landscaped Grounds, Basmead	LANDSCAPE PARK	EXTANT STRUCTURE; DOCUMENTARY EVIDENCE	Mitigation required within 50m of pipeline
1	MBD8600	ND	Buildings, (site of) Fisher's Green	FARMHOUSE	DEMOLISHED BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBD8601	ND	Green Lane between Staploe & Basmead via Fisher's Green	ROAD (Medieval)	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBD20226	ND	Anglo-Saxon chatelaine	FINDSPOT	FIND	Mitigation required within 50m of pipeline
1	MBD869	ND	Basmead Park Cottage (Danver's Thatch)	BUILDING (17 <sup>th</sup> century)	EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBD767	ND	Earthworks, west of Staploe	BUILDING	DEMOLISHED BUILDING; EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBD9653	ND	Earthworks, west of Staploe	DESERTED SETTLEMENT (medieval)	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

1	MBD14058	ND	Iron Age / Romano-British settlement cropmarks; E of Cate's Wood	CURVILINEAR ENCLOSURE; RECTILINEAR ENCLOSURE; SETTLEMENT	CROPMARKS	Mitigation required within 50m of pipeline
1	MBD20219	ND	Medieval Coin	FINDSPOT	FIND	Mitigation required within 50m of pipeline
1	MBD12491	ND	Lodge to Basmead Manor, Staploe	ATTIC; BAY WINDOW; CHIMNEY STACK; GABLED ROOF; GATE LODGE; PORCH	EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB20220	ND	Post-Medieval Buckle	FINDSPOT	FIND	Mitigation required within 50m of pipeline
1	MBD8607	ND	Building (site of), south of Cates Wood	BUILDING	DEMOLISHED BUILDING	Mitigation required within 50m of pipeline
1	MBD8570	ND	Curvilinear enclosure cropmarks; S of Cate's Wood	SETTLEMENT	TRACKWAY	Mitigation required within 50m of pipeline
1	MBD8723	ND	Cropmarks	NATURAL FEATURE?	CROPMARK	Mitigation required within 50m of pipeline
1	MBB22420	ND	Ridge and Furrow; Staploe parish	BOUNDARY BANK; BOUNDARY DITCH; RIDGE AND FURROW	EARTHWORKS	Mitigation required within 50m of pipeline

1	MBD8623	ND	Earthworks; Priory Meadow, Upper Staploe	BOUNDARY DITCH; FIELD BOUNDARY; MOAT; RECTILINEAR ENCLOSURE	CROPMARKS; EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBD17099	ND	Upper Staploe medieval settlement	DESERTED SETTLEMENT	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB22328	ND	Curved feature cropmarks; S of Duke's Spinney	DITCH; LINEAR FEATURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBB22327	ND	Curvilinear enclosure cropmarks; SW of Upper Staploe	CURVILINEAR ENCLOSURE; D SHAPED ENCLOSURE; EXTRACTIVE PIT	CROPMARK	Mitigation required within 50m of pipeline
1	MBD8724	ND	Cropmarks, north of Honeydon	FIELD BOUNDARY	CROPMARK	Mitigation required within 50m of pipeline
1	MBD17100	ND	Honeydon medieval settlement	DESERTED SETTLEMENT	EARTHWORK	Mitigation required within 50m of pipeline
1	MBD8596	ND	Cropmarks, Honeydon	BOUNDARY	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBD8626	ND	Wesleyan Chapel, Honeydon	WESLEYAN ASSOCIATION CHAPEL	EXTANT BUILDING?	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

1	MBD8578	ND	Sand Pit Close	SAND PIT	LEVELLED EARTHWORK	Mitigation required within 50m of pipeline
1	MBD5962	ND	Goodwick Farm	BUILDING (17 <sup>th</sup> to 18 <sup>th</sup> century)	EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MBD3414	ND	Pond and ditch; Goodwick Farm	CLAY PIT; MOAT; POND	EARTHWORKS	Mitigation required within 50m of pipeline
1	MBD8592	ND	Cropmarks, Goodwick Green	RECTILINEAR ENCLOSURE?; VILLAGE GREEN?	CROPMARKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

**Table 26. Bedford Borough, figure H, page 2 of 3**

Map Page Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risk
2	MBD3304	ND	?Moat, Begwary	MOAT	LEVELLED EARTHWORK	Avoidance recommended
2	MBD10117	ND	Brook Farm, Begwary	ANIMAL SHED; BARN; BREWERY; DAIRY; FARMSTEAD; STABLE	EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MBD1795	ND	Medieval settlement earthworks / cropmarks. Sudbury.	RIDGE AND FURROW; DESERTED SETTLEMENT; FIELD BOUNDARY; POND; STREAM	CROPMARKS; EARTHWORK	Mitigation required within 50m of pipeline
2	MBD8624	ND	Beggary Green	VILLAGE GREEN	DOCUMNETARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MBD8612	ND	Building (site of), Beggary	BUILDING	DEMOLISHED BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

2	MBD5210	ND	Colesden deserted medieval village	DESERTED SETTLEMENT; MOAT; BUILDING; POND; VILLAGE GREEN; WOOD	CROPMARK; EARTHWORKS; DEMOLISHED BUILDING; DOCUMENTARY EVIDENCE	Avoidance recommended
2	MBD22202	ND	Probable moated site; E of Colesden Grange Farm	BOUNDARY DITCH; DRAIN; FARMSTEAD; FIELD BOUNDARY; SETTLEMENT	CROPMARKS	Avoidance recommended
2	MBD17098	ND	Colesden medieval settlement	VILLAGE	DOCUMENTARY EVIDENCE	Avoidance recommended
2	MBB21136	ND	Medieval coin	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MBB22201	ND	Medieval / Post-Medieval boundary earthworks; S of Laburnham Cottage	BOUNDARY DITCH; FIELD BOUNDARY; POND; RIDGE AND FURROW	EARTHWORKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MBB22421	ND	Ridge and furrow; Wyboston, Chawston and Colesden parish	FURLONG BOUNDARY; PLOUGH HEADLAND; RIDGE AND FURROW	EARTHWORKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MBD483	ND	Anglo-Saxon / Medieval (&?Roman) pottery	FINDSPOT	FIND	Mitigation required within 50m of pipeline
2	MBB21904	ND	Iron Age / Romano-British and early medieval settlement cropmarks; NE of High Barns Farm	CURVILINEAR ENCLOSURE; LINEAR FEATURE; SETTLEMENT	CROPMARKS	Avoidance recommended

2	MBD14410	ND	Medieval settlement, Wood End	DESERTED SETTLEMENT	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MBB21905	ND	Iron Age / Roman-British settlement cropmarks; NE of High Barns Farm, Roxton	HUT CIRCLES; RING DITCHES; SETTLEMENT; SUB RECTANGULAR ENCLOSURES	CROPMARKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

**Table 27. Bedford Borough, figure H, page 3 of 3**

Map Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risk
3	MBD482	ND	Cropmarks & Roman occupation; N of the Bungalow, Roxton Road	PIT; OCCUPATION SITE; BUILDING; DITCH; INHUMATION; ENCLOSURE; CREMATION; POTTERY KILN	EXCAVATED FEATURES; CROPMARK; FINDS	Avoidance recommended
3	MBD11928	ND	Bedford-Great North Road / Turnpike	TOLL ROAD		Mitigation required within 50m of pipeline

3	MBD7346	ND	Roxton Toll House (site of)	TOLL HOUSE	DEMOLISHED BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MBD11439	ND	Milepost (site of)	MILEPOST	DEMOLISHED BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MBD16740	ND	Cropmarks, south of Roxton Park	LINEAR FEATURE; RECTLINEAR ENCLOSURE; SETTLEMENT	CROPMARKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MBD3573	ND	Ring ditch, east of Roxton Hill House	RING DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MBB22001	ND	20 <sup>th</sup> century gravel pit; SE of Roxton Hill House, Great Barford	EXTRACTIVE PIT; GRAVEL PIT		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

## F.5 Central Bedfordshire

**Table 28. Central Bedfordshire, figure J, page 1 of 2**

Map Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risk
1	DBD457 / 761	SM	Gannocks Castle moated sit	DITCH	PIT?; MOAT; RIDGE AND FURROW?	Setting assessment required
1	DBD3022 / 5979	Grade II listed building	15 Church Street (Gannocks)	BUILDING	EXTANT BUILDING	Setting assessment required
1	DBD333 / 5976	Grade II listed building	30 Church Street	BUILDINGS	EXTANT BUILDING	Setting assessment required
1	DBD334 / 7143	Grade II listed building	32 and 34 Church Street (Church End)	CASEMENT; CHIMNEY STACK; HOUSE; SASH WINDOW; STOREY	EXTANT BUILDING	Setting assessment required
1	DBD1741 / 5977	Grade II listed building	36 & 38 Church Street	BUILDING	EXTANT BUILDING	Setting assessment required
1	DBD3021 / 5978	Grade II listed building	42 Church Street (The Wheatsheaf)	BUILDING	EXTANT BUILDING	Setting assessment required
1	DBD330 / 5975	Grade II listed building	Brewhouse and outbuilding at Church Farm	BREWHOUSE; OUTBUILDING; BUILDING; BARGE BOARD	EXTANT BUILDING	Setting assessment required

1	DBD329 / 5973	Grade II listed building	Church Farmhouse and No 28	BUILDING	EXTANT BUILDING	Setting assessment required
1	DBD3023 / 1136	Grade II* listed building	Church of St Peter	PARISH CHURCH; PLAQUE; COMMEMORATIVE BRASS; WARE MEMORIALS		Setting assessment required
1	DBD3025 / 5990	Grade II listed building	Cottage Farmhouse	BUILDING	EXTANT BUILDING	Setting assessment required
1	DBD3571 / 15127	Grade II listed building	K6 Telephone Kiosk adjacent to No 32	TELEPHONE BOX	EXTANT BUILDING	Setting assessment required
1	DBD3026 / 5993	Grade II listed building	Ouse Farmhouse	BUILDING	EXTANT BUILDING	Setting assessment required
1	DBD3024 / 803	Grade II listed building	Remains of cross approx 25m N of Church of St Peter	MEMORIAL	EXTANT BUILDING	Setting assessment required
1	DBD2895 / 5972	Grade II listed building	The Old Rectory, formerly listed as The Rectory	BUILDING	EXTANT BUILDING	Setting assessment required
1	DBD2896 / 5989	Grade II listed building	4 Mill Lane	BUILDING	EXTANT BUILDING	Setting assessment required

1	DBD6476 / 7001	Conservation Area	Tempsford Hall Park	LANDSCAPE PARK	EARTHWORK; DOCUMENTARY EVIDENCE; EXTANT STRUCTURE	Setting assessment required
1	505	ND	Baldock-Sandy-Godmanchester Roman road (Viatores Road 22	ROAD		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	615	ND	Cropmarks, Ham Barn	RING DITCH; ROUNDBARROW; RECTILINEAR ENCLOSURE	CROPMARK; EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	1137	ND	Watermill	WATERMILL	EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	1380	ND	Prehistoric ring-ditches	RING DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	1776	ND	Ring ditches, south-west of Tempsford Church End	PIT; PIT ALIGNMENT; RING DITCH; RIDGE AND FURROW	CROPMARKS; EARTHWORKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	3204	ND	Ridge and furrow, Tempsford parish	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	3232	ND	Cropmark	RECORD OF CROPMARK, NO FURTHER REFS	CROPMARK	Mitigation required within 50m of pipeline

1	3539	ND	Earthworks, Church End	DESERTED SETTLEMENT; BUILDING	EARTHWORKS	Mitigation required within 50m of pipeline
1	5974	ND	Barn, Church Farm, Church Street	AISLED BARN	EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	8654	ND	11-13 Church Street	HOUSE	UNCERTAIN EVIDENCE; DEMOLISHED BUILDING?	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	8979	ND	ST PETER'S PARISH CHURCHYARD	CHURCHYARD	DESIGNED LANDSCAPE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	9729	ND	Milestone	MILESTONE	EXTANT STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	9731	ND	Osier Bed	OSIER BED	LEVELLED EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	9733	ND	Cottages (site of)	HOUSE	DEMOLISHED BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	9773	ND	Barn, North of Blunham	BARN	EXTANT BUILDING	Mitigation not required between 50m and 250m

							from pipeline if there are no intrusive works
1	9859	ND	The Chantry House	HOUSE	DEMOLISHED BUILDING		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	9860	ND	Tempsford Little Staunch	STAUNCH	DEMOLISHED STRUCTURE		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	9861	ND	Tempsford Lock	LOCK	DEMOLISHED STRUCTURE		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	9862	ND	Woodbury Low Farm (site of)	FARMSTEAD	DEMOLISHED BUILDING		Mitigation required within 50m of pipeline
1	9865	ND	Tempsford Workhouse	WORKHOUSE	DEMOLISHED BUILDING		Mitigation required within 50m of pipeline
1	9866	ND	The Elms, Tempsford Park	HIPPED ROOF; HOUSE	EXTANT BUILDING		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	9867	ND	Lime House, Coal Wharf	WHARF	DEMOLISHED STRUCTURE?		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	9873	ND	Little Green/Mill Green	VILLAGE GREEN	PLACENAME EVIDENCE		Mitigation not required between 50m and 250m

							from pipeline if there are no intrusive works
1	11862	ND	Former Great Northern Railway Line, now East Coast Mainline	RAILWAY	DOCUMENTARY EVIDENCE; EXTANT STRUCTURE		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	13224	ND	Cockayne Hatley Wood, Ancient Woodland	WOOD	EXTANT STRUCTURE		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	13621	ND	BURNT GROUND (fieldname)	OCCUPATION SITE	DOCUMENTARY EVIDENCE		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	13632	ND	ALLEGED CROPMARKS	SITE	CROPMARK		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	14473	ND	40 CHURCH STREET	BUILDING; CASEMENT WINDOW; SASH WINDOW?	EXTANT BUILDING		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	15183	ND	REBUILT BARN at MILL LANE, formerly at Church Farm	BARN	MOVED BUILDING		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	15320	ND	LINEAR EARTHWORK, south of Tempsford Park	ROAD	EARTHWORK		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

1	16190	ND	POST-MEDIEVAL FINDS, Church End, Tempsford	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	16798	ND	CROPMARKS, east of Church Farm	RECTILINEAR ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	16806	ND	POSSIBLE CROPMARK, east of Woodbury Cottages	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	16819	ND	CROPMARKS, south of Woodbury Low Farm	CURVILINEAR ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	16820	ND	CROPMARKS, East of Woodbury Low Farm	CURVILINEAR ENCLOSURE; ENCLOSURE; RECTILINEAR ENCLOSURE; SQUARE ENCLOSURE	CROPMARKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	17155	ND	CHURCH END HISTORIC SETTLEMENT CORE, Tempsford	LINEAR SETTLEMENT, VILLAGE	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	19368	ND	ANGLO-SAXON STRAP END, Ouse Farm	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

1	19692	ND	THE CASTLE, northern edge of Blunham Parish	CASTLE?; D SHAPED ENCLOSURE?; LINEAR FEATURE	PLACENAME EVIDENCE; DOCUMENTARY EVIDENCE; SUB SURFACE DEPOSIT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	20158	ND	ONION DRYING SHED, Church Farm	ONION DRYING SHED	EXTANT BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	20567	ND	TURNPIKE ROAD, Biggleswade to Alconbury Hill	TOLL ROAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	21059	ND	ENTRANCE LODGE TO TEMPSFORD HALL (Site of)	GATE LODGE	DOCUMENTARY EVIDENCE; EXTANT STRUCTURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	21142	ND	HALFPENNY OF JOHN I, south of Ouse Farm	FINDSPOT	FIND	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	21168	ND	PRISONER OF WAR CAMP, Playing Field, Church Street	PRISONER OF WAR CAMP	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	21233	ND	WWII AIRCRAFT CRASH SITE, Tempsford	AIRCRAFT CRASH SITE	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

1	21255	ND	MEDIEVAL SETTLEMENT EARTHWORKS, north of Mill Lane	POND?; SETTLEMENT?	EARTHWORKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	21439	ND	RIVER GREAT OUSE NAVIGATION	RIVER NAVIGATION	DOCUMENTARY EVIDENCE; NATURAL EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	21983	ND	RIDGE AND FURROW, west of Gannocks Castle	RIDGE AND FURROW	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	21987	ND	MEDIEVAL BOUNDARY BANK	BANK (EARTHWORK)	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	21998	ND	POST MEDIEVAL DRAINAGE DITCHES, west of Tempsford Airfield	DRAINAGE DITCH	LEVELLED EARTHWORK; DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

**Table 29. Central Bedfordshire, figure J, page 2 of 2**

Map Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risk
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2	9269	ND	TEMPSFORD AIRFIELD	MILITARY AIRFIELD; WAR MEMORIAL	DOCUMENTARY EVIDENCE; EXTANT STRUCTURE	Mitigation required within 50m of pipeline
2	9869	ND	Earthworks, Ponds Meadow	MOAT	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	9973	ND	Woodbury Low Farm	FARMHOUSE	DEMOLISHED BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	16744					Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	18344					Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	18354					Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

## F.6 Hertfordshire

Table 30. Hertfordshire, figure L, page 1 of 4

Map Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
1	DHT7433 / MHT15399	Grade II listed building	King James' Stable House, Baldock Road, Therfield	DETACHED HOUSE; RACING STABLE; STABLE	EXTANT BUILDING; DOCUMENTARY EVIDENCE	Setting assessment required
1	MHT2490	ND	Cropmark of a ring ditch, Kelshall	RING DITCH; ROUND BARROW?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MHT7401	ND	Cropmark of rectangular enclosure, Thrift Hill, Kelshall	PALAEOCHANNEL; RECTANGULAR ENCLOSURE	CROPMARK; DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MHT7824	ND	Cropmarks of two parallel linear ditches, near Thrift Hill, Kelshall	DITCH	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MHT2449	ND	Cropmark of ring ditch, near Thrift Hill, Kelshall	RING DITCH; ROUND BARROW?	CROPMARKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MHT18797	ND	Probable causewayed enclosure, Thrift Hill, Kelshall	DITCH; CAUSEWAYED ENCLOSURE?	CROPMARK	Mitigation not required between 50m and 250m

						from pipeline if there are no intrusive works
1	MHT2491	ND	Cropmarks of a rectangular enclosure, Therfield	RECTANGULAR ENCLOSURE (Unknown date)	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MHT6415	ND	Probable barrow cemetery, Kelshall	BARROW CEMETERY	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MHT2450	ND	Cropmark of a ring ditch, near Thrift Hill, Kelshall	RING DITCH; ROUND BARROW?	CROPMARK	Mitigation required within 50m of pipeline
1	MHT2451	ND	Cropmark of a ring ditch, near Thrift Hill, Kelshall	RING DITCH; ROUND BARROW?	CROPMARK	Mitigation required within 50m of pipeline
1	MHT2461	ND	Cropmark of a ring ditch, near Thrift Hill, Kelshall	RING DITCH; ROUND BARROW?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MHT2396	ND	Cropmark of a ring ditch, Hitches Valley, Kelshall	RING DITCH; ROUND BARROW?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MHT18726	ND	Site of Hitches Valley, Therfield	FARMSTEAD	DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MHT2559	ND	Cropmarks of enclosures and linear ditches, Therfield	CURVILINEAR ENCLOSURE; LINEAR FEATURE;	CROPMARKS	Mitigation required within 50m of pipeline

				RECTANGULAR ENCLOSURE		
1	MHT7838	ND	Cropmarks of enclosure and ditch complex, Therfield	FIELD SYSTEM; PIT; RECTILINEAR ENCLOSURE; TRACKWAY	CROPMARKS	Mitigation required within 50m of pipeline
1	MHT7831	ND	Cropmarks of ridge and furrow, Therfield	RIDGE AND FURROW	CROPMARKS	Mitigation required within 50m of pipeline
1	MHT17019	ND	Cropmarks of possible enclosure ditches and pits, west of Mile End Farm, Therfield	DITCH; ENCLOSURE?; PIT	CROPMARKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

**Table 31. Hertfordshire, figure L, page 2 of 4**

Map Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
2	MHT17018	ND	Cropmark of linear ditch and bank, west of Mile End Farm, Therfield	BOUNDARY DITCH?, LINEAR FEATURE; TRACKWAY?	CROPMARKS	Mitigation required within 50m of pipeline
2	MHT7778	ND	Cropmarks of field system and trackway, west of Ermine Street, Therfield	FIELD SYTEM; TRACKWAY	CROPMARKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

2	MHT7779	ND	Cropmark of a ring ditch, Therfield	RING DITCH; ROUND BARROW?	CROPMARKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MHT4716	ND	Cropmark of ring ditch, Mile End Farm, Reed	RING DITCH; ROUND BARROW?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MHT2349	ND	Cropmark of a ring ditch, Mile End Farm, Reed	RING DITCH; ROUND BARROW?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MHT6147	ND	Cropmark of a sub-circular enclosure, Reed	ENCLOSURE	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MHT4772	ND	Cropmarks of rectilinear enclosures, Reed	ENCLOSURE; FIELD SYSTEM; LINEAR SYSTEM; RING DITCH	CROPMARKS	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MHT2346	ND	Cropmark of a ring ditch, Reed	RING DITCH; ROUND BARROW?	CROPMARK	Mitigation required within 50m of pipeline
2	MHT2314	ND	Cropmark of a ring ditch, Reed	RING DITCH; ROUND BARROW?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MHT7790	ND	Cropmark of ring ditch, probable round barrow, Reed	RING DITCH; ROUND BARROW?	CROPMARK	Mitigation not required between 50m and 250m

						from pipeline if there are no intrusive works
2	MHT9097	ND	Cropmark of a ring ditch, Reed	RING DITCH; ROUND BARROW?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MHT9098	ND	Cropmark of a ring ditch, Reed	RING DITCH; ROUND BARROW?	CROPMARK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MHT11438	ND	Four undated postholes and gully, Barkway	DITCH; POSTHOLES	EXCAVATION	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MHT16778	ND	Ridge and Furrow, Newsells Barn Farm, Barkway	RIDGE AND FURROW	EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	DHT6749 / MHT5058	Grade II listed building	Milestone, Cambridge Road, Newsells Park, Barkway	MILEPOST	STRUCTURE	Setting assessment required
2	MHT1831	ND	Newsells Park, Barkway	DESERTED SETTLEMENT?; LANDSCAPE PARK	DOCUMENTARY EVIDENCE; CONJECTURAL EVIDENCE; EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

**Table 32. Hertfordshire, figure L, page 3 of 4**

Map number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
3	MHT7322	ND	Cokenach, formal garden and parkland, Barkway	ORNAMENTAL GARDEN; PARK; WATER GARDEN	DESIGNED LANDSCAPE; EARTHWORK	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MHT17007	ND	Cropmarks of parallel linear ditches and ridge & furrow, east of Nuthampstead	DITCH; RIDGE AND FURROW	CROPMARKS	Mitigation required within 50m of pipeline

**Table 33. Hertfordshire, figure L, page 4 of 4**

Map Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
4	MHT9207	ND	World War II airfield, Scales Wood, Nuthampstead	AIRFIELD	EARTHWORK; DOCUMENTARY EVIDENCE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

## F.7 Essex

Table 34. Essex, figure N, page 1 of 7

Map Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraints Risk
1	MEX42615	ND	Strip lynchets on Coploe Hill	STRIP LYNCHET		Mitigation required within 50m of pipeline
1	MEX42595	ND	Cropmarks at Strethall Field	RING DITCH		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX42597	ND	Cropmark of a ring-ditch on Strethall Field	RING DITCH		Mitigation required within 50m of pipeline
1	MEX42561	ND	Cropmarks on Heavy Hill	LINEAR FEATURE; ENCLOSURE; POST MILL		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX42618	ND	Soilmarks on Strethall Field	TRACKWAY; LYNCHET		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX14385	ND	Howe Wood	TRACKWAY; LINEAR FEATURE; PIT; FIELD		Mitigation required within 50m of pipeline

					BOUNDARY; ENCLOSURE	
1	MEX16534	ND	Hollow way / Roman road	ROAD		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX16674	ND	Northwest of Littlebury	FINDSPOT		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX16668	ND	Northwest of Littlebury	RING DITCH		Mitigation required within 50m of pipeline
1	MEX16996	ND	M11 routeway- possible flint scatter	FINDSPOT		Mitigation required within 50m of pipeline
1	MEX1486	ND	M11 topsoil stripping	FINDSPOT		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX1478	ND	Howe Wood – dark patches in clay with Iron Age pottery	HEARTH; PIT; POST HOLE; MIDDEN		Mitigation required within 50m of pipeline
1	MEX22190	ND	Howe Wood – probable Iron Age settlement site	FINDSPOT		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX1488	ND	M11 Routeway – medieval pottery, fieldwalking	FINDSPOT		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

1	MEX43147	ND	M11 Widening Site 8 – ditches and pits with Iron Age pottery	DITCH; PIT	Mitigation required within 50m of pipeline
1	MEX1034309	ND	Site 2 - Cambridge - Epping gas pipeline fieldwalking 1990 – flint scatter	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX1490	ND	M11 Routeway – post-medieval pottery, fieldwalking	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX1491	ND	M11 Routeway – flint scatter, fieldwalking	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX1492	ND	M11 Routeway – three potboilers, fieldwalking	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX22191	ND	East of Howe Wood – Roman occupation	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX1526	ND	M11 Routeway – post-medieval, fieldwalking	FINDSPOT	Mitigation required within 50m of pipeline
1	MEX1527	ND	M11 Routeway – flints, fieldwalking	FINDSPOT	Mitigation required within 50m of pipeline

1	MEX1528	ND	M11 Routeway – five flint potboilers, fieldwalking	FINDSPOT	Mitigation required within 50m of pipeline
1	MEX1039726	ND	Littlebury Green Road – cropmarks of field boundaries	FIELD BOUNDARY	Mitigation required within 50m of pipeline
1	MEX1493	ND	West side M11 Routeway – post medieval pottery, fieldwalking	FINDSPOT	Mitigation required within 50m of pipeline
1	MEX1494	ND	M11 Routeway – medieval pottery, fieldwalking	FINDSPOT	Mitigation required within 50m of pipeline
1	MEX1495	ND	West of M11 Routeway - one worked flint, fieldwalking	FINDSPOT	Mitigation required within 50m of pipeline
1	MEX1513	ND	M11 Routeway – medieval pottery, fieldwalking	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX1514	ND	M11 Routeway – medieval pottery, fieldwalking	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX1515	ND	M11 Routeway – flint, fieldwalking	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX1516	ND	M11 Routeway – Roman sherd	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

1	MEX1517	ND	M11 Routeway – post-medieval pottery	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX1518	ND	M11 Routeway – four flint potboilers, fieldwalking	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX1519	ND	M11 Routeway – worked flint, fieldwalking	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
1	MEX1520	ND	M11 Routeway – four flint potboilers, fieldwalking	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

**Table 35. Essex, figure N, page 2 of 7**

Map Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risk
2	MEX1040837	ND	Chapel Green Lane – extensive cropmarks	TRACKWAY; ENCLOSURE; PIT		Mitigation required within 50m of pipeline
2	MEX1652	ND	South of Littlebury – occupation scatter, unspecified date	SETTLEMENT		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MEX1641	ND	next to M11, North of Wendons Ambo – Roman occupation	SETTLEMENT		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MEX43403	ND	Cropmarks next to M11, incomplete rectangular enclosure	RECTANGULAR ENCLOSURE		Mitigation required within 50m of pipeline
2	MEX43145	ND	M11 widening, fieldwalking segment S7K, LBA/EIA pottery & worked flint, fieldwalking	FINDSPOT		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MEX31746	ND	Pillbox, W of railway cutting, Wendens Ambo	PILLBOX (TYPE FW3/24)		Mitigation required within 50m of pipeline
2	MEX31747	ND	Pillbox, N of Sir Joshua's Bridge, Wendens Ambo	PILLBOX		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

2	MEX1037054	ND	Cropmarks-Saffron Walden – field boundaries and possible ridge & furrow	RIDGE AND FURROW; RING DITCH	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MEX31748	ND	Pillbox, by Sir Joshua's Bridge	PILLBOX (TYPE FW3/28A)	Mitigation required within 50m of pipeline
2	MEX31749	ND	Bridge Barrier (destroyed), Sir Joshua's Bridge, Wendens Amb	ROAD BARRIER	Mitigation required within 50m of pipeline
2	MEX31958	ND	Pillbox (destroyed), S of Sir Joshua's Bridge, Wendens Ambo	PILLBOX	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MEX2006	ND	Diversion of the River Cam at Audley End for the Railway in 1864	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MEX23869	ND	Near Walden Road – cropmarks of linear features & ring dtch	RING DITCH; LINEAR FEATURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MEX1037128	ND	Saffron Walden Branch Line Culvert	CULVERT	Mitigation required within 50m of pipeline
2	MEX1625	ND	Near Walden Road, rectilinear cropmarks	RECTILINEAR ENCLOSURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

2	MEX960	ND	Sparrows End - cropmark of a rectangular enclosure	SPARROWS END	Mitigation required within 50m of pipeline
2	MEX1049488	ND	Butlers Field, Sparrows End Hill, Iron Age, Roman and post medieval material, fieldwalking and metal detecting		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MEX2007	ND	Cutting for railway over the River Cam at Audley End		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MEX1662	ND	Saffron Walden Railway	RAILWAY	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
2	MEX1037056	ND	Cropmarks-Wendens Amb – possibly strip fields	LINEAR FEATURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

**Table 36. Essex, figure N, page 3 of 7**

Map Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risk
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3	MEX1038590	ND	Lime Kiln within Lime Kiln Plantation, Shortgrove Estate	LIME KILN	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MEX1299	ND	Northeast of Shortgrove Park, Neolithic lithic working site	LITHIC WORKING SITE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MEX1021	ND	Shortgrove Hall, moat	MOAT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MEX1033461	ND	Hempstead supply main - Find Spot 4, worked flint	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MEX1672	ND	Relict strip fields at Widdington	LYNCHET	Mitigation required within 50m of pipeline
3	MEX1033462	ND	Hempstead supply main - Find Spot 5, worked flint, fieldwalking	FINDSPOT	Mitigation required within 50m of pipeline
3	MEX1033464	ND	Hempstead supply main - worked flint, fieldwalking	FINDSPOT	Mitigation required within 50m of pipeline
3	MEX1036866	ND	Bromley Lane, Debden – cropmarks, field boundaries and ring ditch	RING DITCH?; FIELD BOUNDARY	Mitigation required within 50m of pipeline
3	MEX31994	ND	Pillbox, S of Debden Water, Newport.	PILLBOX (TYPE FW3/24)	Mitigation required within 50m of pipeline

3	MEX1041291	ND	Pillbox, woods, S of Debden Water, Newport	PILLBOX (TYPE FW3/24)	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MEX1036861	ND	Ringer's Barn, Widdington, cropmarks of old field boundaries	FIELD BOUNDARY	Mitigation required within 50m of pipeline
3	MEX1653	ND	Ringers Farm - old dovecote	DOVECOTE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
3	MEX1616	ND	Ringers Farm – Roman ditches excavated	DITCH	Mitigation required within 50m of pipeline

**Table 37. Essex, figure N, page 4 of 7**

Map Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risk
4	MEX1056	ND	Waldegraves – angular drainage ditches	DRAINAGE DITCH		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX1036809	ND	Cambridge to Matching Green pipeline- Site 105 – possible Iron Age features	DITCH; PIT		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX1036810	ND	Cambridge to Matching Green pipeline- Site 106 – Roman ditches	DITCH		Mitigation required within 50m of pipeline
4	MEX1036029	ND	Cambridge- Matching Green Pipeline - site 17 – dense scatter of Roman artefacts	FINDSPOT		Mitigation required within 50m of pipeline
4	MEX1036095	ND	Cambridge to Matching Green pipeline- Site 46 - medieval or later ceramic building material, fieldwalking	LINEAR FEATURE		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX1036867	ND	Park Wood, Widdington – cropmarks of field boundaries	FIELD BOUNDARY		Mitigation required within 50m of pipeline
4	MEX1011228	Grade II listed building	20 Rook End - C18 timber framed house (NHLE 1170979)	TIMBER FRAMED HOUSE		Setting assessment required
4	MEX1011229	Grade II listed building	21 Rook End - C18 timber framed house (NHLE 1322478)	TIMBER FRAMED HOUSE		Setting assessment required

4	MEX1036042	ND	Cambridge to Matching Green Pipeline- Site 4 Rook End - Prehistoric Circular enclosure and Roman ditches	PIT; DITCH	Mitigation required within 50m of pipeline
4	MEX1036789	ND	Cambridge to Matching Green pipeline- Site 47 – Roman features	GULLY; DITCH; PIT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX1036811	ND	Cambridge to Matching Green pipeline- Site 107 – prehistoric deposits	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX1036072	ND	Cambridge to Matching Green pipeline- Site 48 WWII Pillbox	PILLBOX	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX1038970	ND	Rook End – cropmarks of field boundaries and enclosure	ENCLOSURE; FIELD BOUNDARY	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX1036812	ND	Cambridge to Matching Green pipeline- Site 108 – single undated ditch	DITCH	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX1036790	ND	Cambridge to Matching Green pipeline- Site 49 – modern field boundaries	FIELD BOUNDARY; DITCH	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX32008	ND	Pillbox, field S of Rook End	PILLBOX (TYPE FW3/24)	Mitigation not required between 50m and 250m

					from pipeline if there are no intrusive works
4	MEX32009	ND	Pillbox (destroyed), NE of Mole Hall	PILLBOX	Mitigation required within 50m of pipeline
4	MEX32011	ND	Pillbox (destroyed), E of Mole Hall	PILLBOX (TYPE FW3/24)	Mitigation required within 50m of pipeline
4	MEX32013	ND	Pillbox (destroyed), E of Mole Hall	PILLBOX	Mitigation required within 50m of pipeline
4	MEX32014	ND	Pillbox, Thistley Hall, Widdington	PILLBOX (TYPE FW3/24)	Mitigation required within 50m of pipeline
4	MEX1011170	Grade II* listed building	Thistley Hall (NHLE 1112403)	HOUSE	Setting assessment required
4	MEX1011171	Grade II listed building	Barn to E of Thistley Hall (NHLE 1170813)	TIMBER FRAMED BARN	Setting assessment required
4	MEX1036073	ND	Cambridge to Matching Green pipeline- Site 50 WWII Pillbox	PILLBOX	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX1032351	ND	South Debden and Widdington Woods – cropmarks, field boundaries	FIELD BOUNDARY; NATURAL FEATURE	Mitigation required within 50m of pipeline
4	MEX1036100	ND	Cambridge to Matching Green pipeline- Site 51 – Iron Age pottery, fieldwalking	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

4	MEX1036187	ND	Cambridge to Matching Green pipeline- Site 90 – 2 prehistoric pits	PIT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX32020	ND	Pillbox (destroyed), adj. New Amberden Hall	PILLBOX	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX1034315	ND	Site 9 Cambridge - Epping gas pipeline fieldwalking 1990 Amberden Hall – Iron Age or early Roman settlement	DITCH; SETTLEMENT	Mitigation required within 50m of pipeline
4	MEX1011184	Grade II* listed building	New Amberden Hall – late C17 red brick house (NHLE 1112407)	HOUSE	Avoidance and setting assessment recommended
4	MEX32021	ND	Pillbox, on track E of New Amberden Hall	PILLBOX (TYPE FW3/24)	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX1036100	ND	Cambridge to Matching Green pipeline- Site 51 – Iron Age pottery sherds, fieldwalking	FINDSPOT	Mitigation required within 50m of pipeline
4	MEX1036044	ND	Cambridge to Matching Green Pipeline-Site 5 Hamperden End – Iron Age / Romano-British enclosure complex & roundhouses	ENCLOSURE; HOUSE; DITCH	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX32019	ND	Pillbox (destroyed), Field No. 41, New Amberden Hall	PILLBOX	Mitigation required within 50m of pipeline

4	MEX1038965	ND	Hand Post Cottage – cropmarks of field boundaries	FIELD BOUNDARY	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX32027	ND	Pillbox, disused railway embankment, Hamperden End	PILLBOX (TYPE FW3/24)	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX1040247	ND	Embankment on Elsenham and Thaxted Light Railway	EMBANKMENT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX1667	ND	Elsenham and Thaxted Light Railway	RAILWAY	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX1035106	ND	Sibleys Water Tower 1930s	WATER TOWER	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
4	MEX32017	ND	Pillbox (destroyed), Field No. OS 14, New Amberden Hall	PILLBOX	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

**Table 38. Essex, figure N, page 5 of 7**

Map Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risk
5	MEX1036040	ND	Cambridge to Matching Green Pipeline-Site 3 Newport – Romano British burial ground	ENCLOSURE; CREMATION; DITCH; ENCLOSURE; PIT		Mitigation required within 50m of pipeline
5	MEX1338	ND	Southeast of Newport – Neolithic lithic working site	LITHIC WORKING SITE		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MEX1345	ND	Southeast of Newport - a barbed and tanged arrowhead	FINDSPOT		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MEX1036183	ND	Cambridge to Matching Green pipeline- Site 43 – hollow, may former stream meander	EARTHWORK		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MEX1033378	ND	Brickfields, Newport	BRICKEARTH PIT		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MEX1603	ND	M11 Routeway – post-medieval pottery, fieldwalking	FINDPOT		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MEX1604	ND	M11 Routeway Site 33 – post medieval pottery	FINDSPOT		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

5	MEX1597	ND	M11 Routeway	DITCH; PIT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MEX1036084	ND	Cambridge to Matching Green pipeline- Site 42 – medieval or later tile, fieldwalking	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MEX1038918	ND	Long Croft Spring, field boundary cropmark	FIELD BOUNDARY	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MEX1038923	ND	St. Helen's Chapel, cropmarks of field boundaries and enclosure	FIELD BOUNDARY; ENCLOSURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MEX1693	ND	Near Newport, seal of Papal bull of Boniface or Pope Pius IX	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MEX1036135	ND	Cambridge to Matching Green pipeline- Site 41 – linear geophysical anomaly	LINEAR FEATURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MEX1036808	ND	Cambridge to Matching Green pipeline- Site 104 – a possible medieval trackway	TRACKWAY	Mitigation required within 50m of pipeline
5	MEX1034313	ND	Cambridge to Epping gas pipeline - Site 7 1990 and cropmarks –	RECTILINEAR ENCLOSURE; RECTANGULAR	Mitigation not required between 50m and 250m

			Late Iron Age / Roman rectilinear enclosure	ENCLOSURE; LINEAR FEATURE; RING DITCH; FIELD BOUNDARY	from pipeline if there are no intrusive works
5	MEX1036075	ND	Cambridge to Matching Green pipeline- Site 16 – prehistoric flint scatter and geophysical anomalies	PIT; FIELD BOUNDARY	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MEX1012294	ND	Pilgrim Cottage, C17/C18 timber framed house	TIMBER FRAMED HOUSE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MEX13181	ND	Wickham Water, Arkesden, ivory ball	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
5	MEX13044	ND	Near Wickham Bonhunt, early Saxon? ring type spindle whorl	FINDSPOT	Mitigation required within 50m of pipeline
5	MEX1036860	ND	Clavering, cropmarks	FIELD BOUNDARY	Mitigation required within 50m of pipeline

**Table 39. Essex, figure N, page 6 of 7**

Map Number	HER Number	Record Type	Site Name and Description	Monument Type	Evidence	Constraint Risk
6	MEX1011091	Grade II listed building	The Cottage – C17 timber framed house (NHLE 1306064)	TIMBER FRAMED HOUSE		Setting assessment required
6	MEX1011166	Grade II listed building	Ruttels – C17/C18 timber framed house (NHLE 112402)	TIMBER FRAMED HOUSE		Avoidance recommended
6	MEX1011167	Grade II listed building	Thurrocks – late C16 timber framed house (NHLE 1305904)	TIMBER FRAMED HOUSE		Setting assessment required
6	MEX1036855	ND	Mill View, Clavering – cropmarks of enclosure, pit, ditch?	ENCLOSURE; PIT; DITCH?; LINEAR FEATURE		Mitigation required within 50m of pipeline

6	MEX1036859	ND	Roast Green, Clavering – field boundary, cropmarks	FIELD BOUNDARY	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MEX1036860	ND	Clavering – field boundary, cropmarks	FIELD BOUNDARY	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MEX1037070	ND	Cropmark- Keepers Cottage – field boundary; garden feature	FIELD BOUNDARY; GARDEN FEATURE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MEX1037083	ND	Langley – field boundary, cropmarks	FIELD BOUNDARY	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MEX1037084	ND	Nancy's Lane – field boundary, cropmarks	FIELD BOUNDARY	Mitigation required within 50m of pipeline
6	MEX1038896	ND	Clavering Court, field boundary, cropmarks	FIELD BOUNDARY	Mitigation required within 50m of pipeline
6	MEX1038912	ND	Thurrocks Farm – enclosure, cropmarks	ENCLOSURE	Mitigation required within 50m of pipeline
6	MEX13994	ND	Roman road from Cosh's Farm to Rumbery Hill	ROAD; DITCH	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MEX14028	ND	Wood Hall - moat	MOAT	Mitigation not required between 50m and 250m

					from pipeline if there are no intrusive works
6	MEX14031	ND	Wood Hall – C16 house, garden wall	HOUSE; GARDEN WALL	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MEX14155	ND	Thurrocks Farm moat	MOAT; BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MEX14163	ND	Thurrocks Farm – C16 / C17 house	HOUSE; BARN; BUILDING	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MEX1050198		Wood Hall, Arkesden		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
6	MEX1050237		Land at Woodhall, Wood Hall, Arkesden	DITCH	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

**Table 40. Essex, figure N, page 7 of 7**

Map Number	HER Number	Record Type	Site Name	Monument Type	Evidence	Constraint Risk
7	MEX1010985	Grade II listed building	Fleetcot – C18 timber framed house (NHLE 1231156)	TIMBER FRAMED HOUSE		Setting assessment required
7	MEX1010986	Grade II listed building	The Crest and Crockers Cottage – C18 timber framed house (NHLE 1231157)	TIMBER FRAMED HOUSE		Setting assessment required
7	MEX1037083	ND	Langley – Cropmarks of field boundaries	FIELD BOUNDARIES		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
7	MEX1037085	ND	Langley Lawn – Cropmark of Sub circular enclosure with an entrance to the south	ENCLOSURE		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
7	MEX1037086	ND	South of Ropers Lane – Cropmarks of field boundaries some on 1 <sup>st</sup> ed OS.	FIELD BOUNDARY		Mitigation required within 50m of pipeline
7	MEX1037088	ND	The Straws – Cropmarks of field boundaries	FIELD BOUNDARY		Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
7	MEX1049206	None recorded	Scales Wood, Nuthampstead WWII Airfield  This WWII airfield is mostly in Nuthampstead Hertfordshire. Only	MILITARY AIRFIELD		Mitigation required within 50m of pipeline

			the eastern edge is in Langley, Essex		
7	MEX22046	ND	South of Lower Green of Roman pottery – 40 sherds – on light chalk.	Minor scatter FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
7	MEX22047	ND	Near Lower Green – Shrunken medieval settlement, St Neots ware pottery.	SHRUNKEN VILLAGE	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
7	MEX22051	ND	West of Lower Green – Roman settlement, on light clay, findspot.	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works
7	MEX22054	ND	Langley – Langley Lawns, Grass- tempered pottery, findspot.	FINDSPOT	Mitigation not required between 50m and 250m from pipeline if there are no intrusive works

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