Environmental Update Report

Non-statutory consultation

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1. East West Rail and the environment

1.1 Introduction

1.1.1 The Department for Transport created the East West Railway Company (EWR Co) in 2017 to develop plans for a new railway between Oxford and Cambridge. EWR Co is responsible for developing, designing and delivering the new railway, known as East West Rail.

1.1.2 The new railway would open up new journeys, cut travel times, ease congestion on local roads and bring more jobs within reach of people living locally. The Oxford to Cambridge region is viewed as an economic artery that would support the UK as a global leader in life sciences, technology and innovation, with the potential to create jobs, drive growth and attract investment for the country, further unlocking the area's potential and enabling sustainable growth.

1.1.3 The infrastructure proposals for East West Rail comprise a new rail link that would connect communities between Oxford, Milton Keynes, Bedford and Cambridge. The proposals include the construction of a new railway between Bedford and Cambridge and associated works to upgrade the existing railway between Oxford and Bedford. Together these comprise the 'project'.

1.1.4 This Environmental Update Report (EUR) has been prepared to inform this non-statutory consultation on the proposals for the project. The Environmental Impact Assessment (EIA) for the project is underway and the EUR provides the initial environmental information based on the work carried out to date.

1.1.5 This EUR is one of a series of documents that has been published to support this consultation. These include:

- The Consultation Document, providing an overview of our proposals and the benefits they would bring. It also explains how you can give feedback.
- A Guide to Consultation, providing guidance on how to navigate the Consultation Document and respond.
- A Technical Report setting out more detailed information on our proposals and how they have been developed.
- This document, an Environmental Update Report providing initial information about potential environmental impacts.
- A Transport Update Report which contains initial information about the potential transport impacts from the project.
- Route section maps.

- Drawings showing the proposed railway from the top and side.
- A feedback form which will be available online and on paper.
- Factsheets which are short explainer documents on key elements of the project.
- Frequently Asked Questions (FAQs).

1.1.6 This EUR has been prepared to inform the public and other stakeholders about how environmental considerations have been, and will continue to be, reflected in the evolving design of the proposals. This EUR highlights the key sensitivities and potential environmental impacts of the project, as well as opportunities for mitigating these impacts and effects.

1.2 East West Rail consultations

1.2.1 The proposed new railway between Bedford and Cambridge is a project of national significance. This means EWR Co will apply to the Secretary of State for a Development Consent Order (DCO), which would grant consent to build and operate the new railway and the other elements that form the project.

1.2.2 The purpose of this non-statutory consultation is to obtain feedback on the preliminary design concepts for the project, including some areas where alternative options are being considered. EWR Co encourages people to respond to the consultation. The public consultation materials – including the feedback form – are available on the East West Rail website.

1.2.3 EWR Co will take account of feedback from this consultation as it continues to develop the designs in more detail and select preferred options. Feedback from this consultation will also be used to inform the plans that are being developed to mitigate the impacts of the new railway.

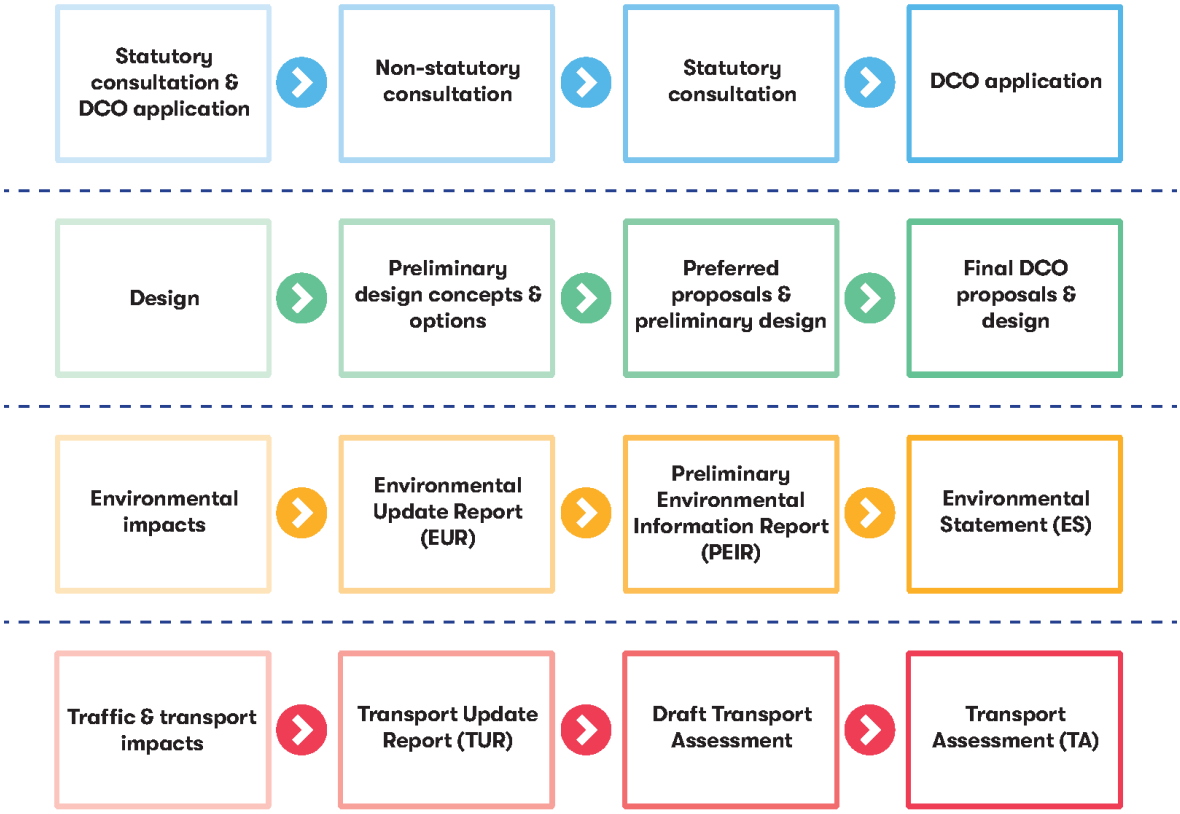
1.2.4 After this non-statutory consultation, EWR Co will carry out further design and environmental work which, along with feedback from the consultation, will help the development of a preferred design for the project.

1.2.5 EWR Co will present this design at the statutory consultation, along with more detailed information about the proposals. This information will include the preferred solutions for the design options presented during this consultation and proposed mitigation measures for environmental and transport impacts.

1.2.6 The documents for the statutory consultation will include more detailed preliminary environmental information about predicted impacts and likely significant effects and proposals for environmental mitigation.

1.2.7 After the statutory consultation, EWR Co will consider feedback alongside the further environmental assessment work as it finalises the proposals for the project ahead of submission of the DCO application.

Figure 1-1: Consultation stages through to DCO application – an overview of the development of key design, environmental and transport content at each stage



Stages of East West Rail

1.2.8 To help local communities to benefit from access to faster public transport links as quickly as possible, East West Rail is being promoted and brought into use in three phases, known as 'connection stages':

- **Connection Stage 1** enables services to run between Oxford and Milton Keynes. The first part of this stage, the link between Oxford and Bicester, is already in place. The work to extend services further north and east to Bletchley and Milton Keynes was given planning consent in 2020 by an order made by the Secretary of State under the Transport and Works Act 1992. Construction is well under way and passenger services will start running from 2025.

- **Connection Stage 2** work is ongoing to bring forward services between Oxford and Bedford from 2030. Planning consent for these works was also granted by the Transport and Works Act order in 2020.

- **Connection Stage 3** would complete East West Rail and enable passenger services to operate between Oxford and Cambridge via Bletchley and Bedford. To complete this work, we will need to apply for a Development Consent Order (DCO), which would grant consent to build the new railway between Bedford and Cambridge, as well as the other upgrades between Oxford and Bedford to deliver the full proposed EWR service.

1.2.9 Connectivity to Aylesbury remains a longer-term aspiration, but is not currently within the scope of East West Rail and is not included in the proposals set out in this public consultation.

Accelerating Connection Stage 2

1.2.10 The accelerated Connection Stage 2 works will affect nine Marston Vale Line (MVL) level crossings previously consented under the Transport and Works Act order (TWAO) which came into force on 25 February 2020. These are to be delivered alongside Network Rail works to replace Marston Road and Manor Road (Kempston Hardwick) level crossings with road bridges consented by the same TWAO. They also include track renewals and supporting works along the MVL which would be disruptive to the new service if delivered later, as well as minor safety and accessibility improvements at stations.

1.2.11 With the release of this accelerated funding, EWR Co is now progressing the infrastructure design work to the next level of detail to confirm the scope and construction timeline, as well as where the new service will call.

1.2.12 Whilst these works will bring forward an initial train service between Oxford and Bedford, there is further work in that area that will be needed to enable the operation of trains between Oxford and Cambridge as proposed for Connection Stage 3.

1.3 Scope of the project

1.3.1 To deliver Connection Stage 3, EWR Co proposes to build a new railway between Bedford and Cambridge. Upgrade and refurbishment of the existing railway infrastructure between Oxford and Bedford is also needed to enable East West Rail passenger services to operate along the whole route between Oxford and Cambridge.

1.3.2 The project includes the following proposed works:

- Construction of a new railway between Bedford and Cambridge, including the construction of new stations at Tempsford and Cambourne.
- Improvements to the existing railway between Oxford and Bedford and the approach into Cambridge.
- Works to upgrade existing stations along the route to ensure they can accommodate increased passenger numbers, including:

  - Remodelling Bedford station.
  - The potential consolidation or upgrade of stations on the Marston Vale Line.
  - Relocating Bedford St Johns station.
  - Works at Cambridge station.

- Building new infrastructure and upgrading existing structures, including viaducts, tunnels, bridges, cuttings and embankments.
- Improvements to or closure of level crossings and the provision of suitable replacement crossings.
- Works to enable the full or discontinuous electrification of the railway including the installation of overhead lines, substations and grid connections.
- Work to manage interfaces between the railway and existing highways, Public Rights of Way, watercourses and utilities apparatus.
- Work to reduce the environmental impacts of our proposals, as well as to enhance and improve the environment in line with our commitment to biodiversity net gain.

1.4 How proposals have developed

1.4.1 Environment has been a key consideration for EWR Co at each stage of the planning and development of the proposals, as outlined in Chapter 3 of the ***Technical Report***.

1.4.2 In 2019, EWR Co consulted on five proposed route options (a wide area that the railway could run through) for the new railway between Bedford and Cambridge. The feedback from communities and stakeholders was central to the decision to recommend what was referred to as 'Route Option E' as the preferred route option. This route option, linking existing stations in Bedford and Cambridge with communities in Cambourne and the area north of Sandy, south of St. Neots, received the most support from respondents.

1.4.3 This decision meant EWR Co could consult on more refined potential route alignment options (the exact line along which the railway would run) for the proposed new railway between Bedford and Cambridge and on other aspects of the wider project between Oxford and Cambridge in the 2021 non-statutory consultation. Almost 10,000 responses and, within these, over 160,000 individual matters were raised in response to the proposals put forward, which included environmental considerations such as noise, visual impacts and ecology.

1.4.4 The responses to these two non-statutory public consultations informed the route update announcement in 2023. More detail on how EWR Co has considered the environmental impacts of the project at each stage of the development is described in Appendix A of this report.

1.4.5 Since the route update announcement, the designs have been developed to inform this non-statutory consultation. The design development has taken into account a range of factors including stakeholder feedback, environmental considerations, accessibility and inclusion, traffic assessments, safety and door-to-door connectivity.

1.4.6 In some areas, alternative options are being presented for feedback, and in each case, these have been evaluated through the application of a series of Assessment Factors. The Assessment Factors and their role in evaluating options are explained in Chapter 4 of the ***Technical Report.***

1.5 Structure and context of the EUR

1.5.1 Work undertaken to date and presented in this EUR represents an early stage in the EIA process and reflects EWR Co's commitment to avoiding, reducing and mitigating potential environmental impacts.

1.5.2 The EIA is addressing a number of environment topics. In this EUR these have been grouped as follows:

- People and communities, which includes:
  - Agriculture.
  - Air quality.
  - Communities.
  - Health and wellbeing.
  - Land quality (including contamination).
  - Socio-economics.
  - Sound, noise and vibration.
  - Traffic and transport (addressing journeys and access).
  - Visual amenity (excluding landscape which is addressed under landscape and historic environment).
- The natural environment, which includes:
  - Ecology and biodiversity (including arboriculture).
  - Flooding.
  - Water resources.

- Landscape and the historic environment, which includes:
  - Historic environment (including built heritage and archaeology).
  - Landscape (excluding visual amenity which is addressed under people and communities).

1.5.3 By grouping these topics together, EWR Co seeks to provide consultees with an overview of the potential impacts of the proposals, as well as potential mitigation, in a way that best relates to the communities and their likely concerns.

1.5.4 In addition, consideration of carbon, material and waste, strategic socio-economic issues and strategic transport issues are addressed from a route-wide perspective, as are certain topics for which the combination of local impacts can also be viewed from a route-wide perspective.

Structure of the EUR

1.5.5 The information provided in this EUR is presented as follows:

- Chapter 2 provides an overview of the proposals and environmental context.
- Chapter 3 describes EWR Co's approach to mitigating impacts.
- Chapter 4 describes EWR Co's approach to the EIA.
- Chapters 5-12 provide an early view on potential environmental impacts and mitigation for each route section. Each chapter provides a brief description of the project proposals in that route section, followed by preliminary environmental information covering potential environmental impacts and mitigation. Where proposals include different options, a comparison of the key environmental considerations is provided.
- Chapter 13 describes the route-wide and combined effects.

1.5.6 A summary of the evolution of East West Rail and of the project, including the alternatives considered, is provided in Appendix A. This summary covers the project up to the 2023 route update announcement. Information on the project's development since the route update announcement is provided within the Technical Report, including the use of Assessment Factors to compare options.

Other assessments

1.5.7 In addition to the EIA, the project will be subject to a number of other regulatory regimes, including the Habitats Regulations and the Water Framework Directive. Further information on these assessments will be provided at the statutory consultation and the DCO application will be accompanied by the relevant details of these assessments.

2. The project proposals

2.1 The operational project

Overview of the new infrastructure

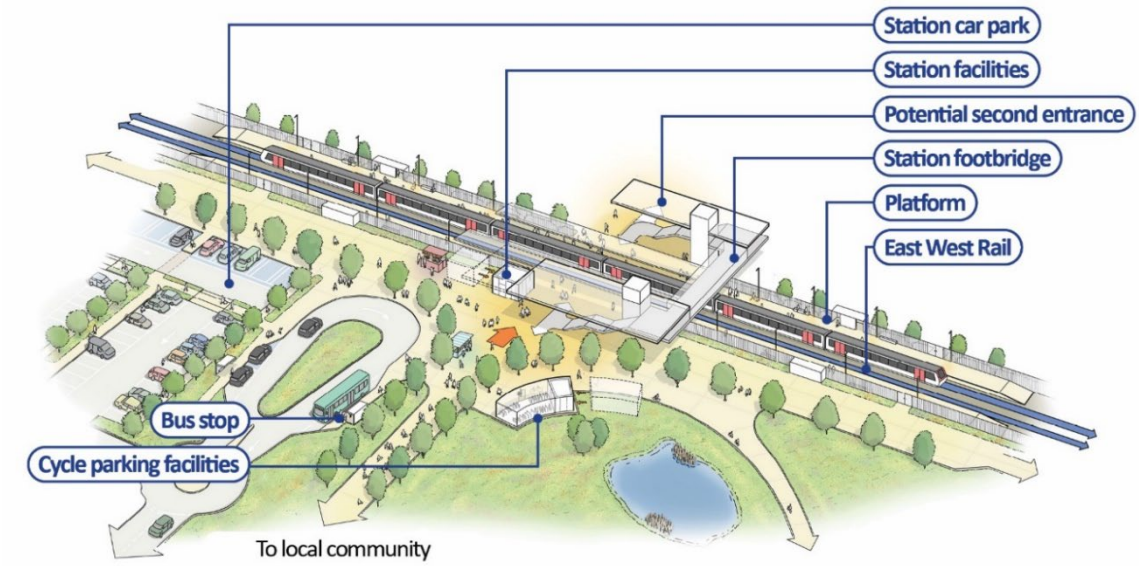
2.1.1 Between Oxford and Bedford, East West Rail services would use the existing railway, albeit with a number of upgrades and improvements to accommodate the new service. Between Bedford and Cambridge East West Rail services would require an entirely new railway.

2.1.2 Where East West Rail services use the existing railway the increased number of train services would lengthen wait times at level crossings. Some of these crossings would be retained; others would be replaced with new road bridges over or under the railway, or they would be closed and routes potentially diverted via new crossing points.

2.1.3 Some of the existing stations between Oxford and Bedford would need to be modified, with platforms widened and extended and new and improved access provided along with other new facilities such as expanded car parking. On the Marston Vale Line between Bletchley and Bedford, existing stations would be consolidated or upgraded.

2.1.4 Along the route East West Rail would intersect with other railways and train services.

Figure 2-1: Illustration of a typical new build East West Rail station



2.1.5 Between Bedford and Cambridge, the new railway would create a new transport corridor. While partly running at-grade (along the surface of the land) the project would require engineered structures such as embankments, viaducts, cuttings and tunnels to carry the railway across the undulating landform, rivers and roads. Where the route crosses existing roads, tracks and paths, access would be maintained using new bridges over or

under the railway or using diversions to other crossing points. New stations would be constructed at Tempsford (south of St Neots) and Cambourne, and works would be required to upgrade existing station facilities in Bedford and Cambridge.

2.1.6 At several locations, East West Rail would require new tracks and track infrastructure such as passing loops (to allow faster trains to overtake slower ones), turnbacks (where trains can reverse for return journeys), turnouts and crossovers (points where trains can change tracks), stabling facilities (for temporary parking of trains) and maintenance depots. To increase service capacity, the addition of one or more new operational lines alongside the existing tracks would be required in some locations, including certain sections in Bletchley (Fenny Stratford), Bedford and Cambridge.

2.1.7 East West Rail's traction power system could require changes to road bridges along the existing line between Oxford and Bedford to make room for overhead electrification. It would be necessary to upgrade existing railway systems for signalling, railway telecommunications (including masts) and power supply.

2.1.8 Works throughout the route would also necessitate diversion of utilities including overhead transmission lines and underground gas, power, telecoms, water and sewerage infrastructure.

East West Rail services

2.1.9 As East West Rail develops through each of its three connections stages, new rail services would be gradually introduced, firstly between Oxford and Milton Keynes with Connection Stage 1 in 2025; then between Oxford and Bedford with Connection Stage 2; and lastly the full Oxford – Cambridge service with Connection Stage 3. The service patterns that are expected for each stage are set out below.

Table 2.1: Proposed train services for each Connection Stage

Connection stage	Service pattern with MVL Existing Stations Option
Connection Stage 1 Oxford to Milton Keynes passenger services introduced from 2025	2 x Oxford to Milton Keynes services in each direction per hour
Connection Stage 2 Oxford to Bedford passenger services introduced from 2030	2 x Oxford to Milton Keynes services in each direction per hour 1 x Oxford to Bedford service in each direction per hour 1 x Bletchley to Bedford service in each direction per hour (existing)

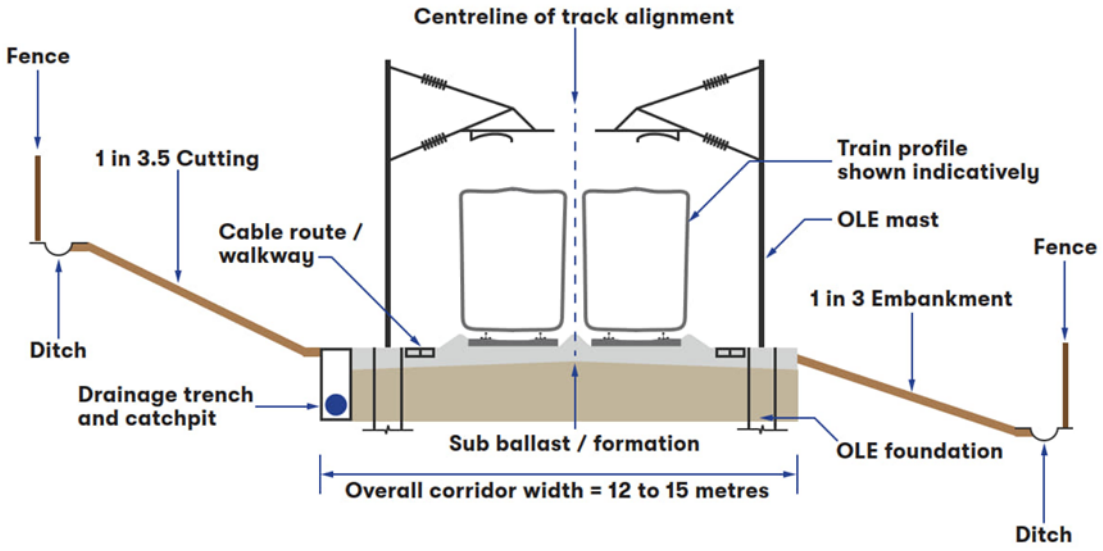
Connection stage	Service pattern with MVL Existing Stations Option
Connection Stage 3 Oxford to Cambridge passenger services introduced by mid-2030s	*Assuming the Existing Stations for MVL stations:* 2 x Oxford to Milton Keynes services in each direction per hour 2 x Oxford to Cambridge services in each direction per hour 2 x Stewartby to Cambridge service in each direction per hour 1 x Bletchley to Bedford service in either direction per hour
Connection stage	**Service pattern with MVL Consolidated Stations Option**
Connection Stage 1 Oxford to Milton Keynes passenger services introduced from 2025	2 x Oxford to Milton Keynes services in each direction per hour
Connection Stage 2 Oxford to Bedford passenger services introduced from 2030	2 x Oxford to Milton Keynes services in each direction per hour 1 x Oxford to Bedford service in each direction per hour 1 x Bletchley to Bedford service in each direction per hour (existing)
Connection Stage 3 Oxford to Cambridge passenger services introduced by mid-2030s	*Assuming the Consolidated Stations for MVL stations:* 2 x Oxford to Milton Keynes services in each direction per hour 2 x Oxford to Cambridge services in each direction per hour 1 x Stewartby to Cambridge service in each direction per hour 1 x Bletchley to Cambridge service in each direction per hour

Powering the trains

2.1.10 EWR Co has a strategic objective to enable net zero passenger journeys in line with the UK's commitments. The proposals included in this consultation set out EWR Co's preference to use a system known as 'discontinuous electrification' combined with hybrid battery-electric trains. Further work is needed to confirm the suitability of discontinuous electrification for the route rather than full electrification, and the draft Order Limits presented at this stage would allow for full electrification should this be identified as necessary during the next stages of design.

2.1.11 Discontinuous electrification uses a combination of electrification (through overhead line equipment, or OLE) along sections of the route, and batteries onboard the trains to provide traction power along section where there is no OLE. This approach could provide a sustainable and cost-effective solution which would support the ambition of zero emission passenger railway services along the East West Rail route.

Figure 2-2: General cross section showing overhead line equipment along new railway



2.1.12 In providing an overhead electrification system, incoming power supplies would need to be provided from existing electricity grid supply points. These supplies would feed substations situated adjacent to the railway, which would then distribute power along the railway via the OLE. Indicative locations for these substations and associated utility works are included in the draft Order Limits, although a range of options for traction power compounds are being considered at this stage.

2.1.13 In the short-term, some diesel-powered trains will run between Oxford and Bletchley/Milton Keynes when this section of the railway starts operating. EWR Co are working to accelerate the introduction of services from Oxford to Bedford before the railway to Cambridge is operational and OLE has been installed. As a result diesel-powered passenger trains may run on this section until all construction through to Cambridge is completed. This temporary solution would mean passenger services can start as soon as these sections of the line are built and deliver benefits to communities sooner.

2.1.14 The decision to adopt either a full or discontinuous overhead electrification system for East West Rail influences the choice of trains (rolling stock). EWR Co's current preference for discontinuous electrification would require hybrid battery-electric traction rolling stock. Full electrification of the route would mean a different type of rolling stock would be used.

Operational facilities

2.1.15 To support the operation of East West Rail, a variety of facilities and buildings would be needed across the route, including stabling and sidings for trains, depots to maintain trains, and areas that can be used to store material needed for maintaining the track and systems themselves. Staff car parking and welfare facilities would also be required at various locations.

2.1.16 The locations for these facilities are still being evaluated and the areas currently under consideration are presented as part of this consultation. The proposals will be confirmed at the statutory consultation, after taking account of feedback received and following further design development.

Passing loops

2.1.17 A passing loop is an additional section of track laid parallel to the main line, with signalling and points that allow a train to enter and exit the loop at either end. East West Rail requires passing loops to enable trains of different length, type and speed to pass each other and to allow trains to be held whilst they are integrating with the busy national network routes. Passing loops also provide resilience for an operational railway, so that incidents or periods of delay can be managed.

2.1.18 The project would include passing loops at a number of locations between Oxford and Cambridge, with some optionality remaining in the Ridgmont and Stewartby area.

Level crossings

2.1.19 Level crossings inevitably present a higher risk than bridge or underpass crossings for people crossing the line. They also result in delays for road users when barriers are down, and these would only increase at existing crossings as a result of the additional East West Rail services.

2.1.20 For existing sections of railway, EWR Co has carried out risk assessments to determine whether existing level crossings along the route can remain open (and if they can what works are required to upgrade them) or whether they need to be closed and, if they do, whether replacement crossings are needed.

2.1.21 The proposals for each level crossing along the route have been updated. More details are set out later in this EUR with respect to specific crossings, as well as in the ***Technical Report.***

Freight

2.1.22 East West Rail's primary purpose is to provide connectivity between communities and support economic growth as a passenger railway. Alongside this, and noting that freight already runs on sections of the route, the previous government asked EWR Co to consider how the railway can maintain existing freight services that already run through commuter hubs including Oxford, Bicester, the Marston Vale and Bedford, and plan for increased future freight demand to enable wider economic growth.

2.1.23 EWR Co will continue to develop the proposals, considering potential freight demand and requirements for non-passenger services to inform the way forward and the overall assessment of the project.

2.2 Construction

Overview

2.2.1 The proposals being presented as part of this consultation outline how the project would be constructed. EWR Co is at a very early stage of developing the construction approach. In developing the design for the project and its construction, EWR Co has focused on key principles including connectivity along the route and access to and between new items of infrastructure. As designs progress, more detailed construction methods will be developed and opportunities identified to complete the works quicker and more efficiently.

2.2.2 To deliver the project, a series of temporary construction compounds would be established along the route. Main compounds and satellite compounds of various sizes would be used. Potential locations for temporary main construction compounds are identified on the plans provided as part of this consultation. These have been located to allow both for efficient construction but also to lessen potential environmental impacts and disturbance to local people. For each compound the land usage, traffic route and access provisions will be carefully considered and further information presented at the statutory consultation.

2.2.3 Industry best practices to control noise, dust, vibration and light pollution at each compound would be applied and controlled through the Code of Construction Practice (CoCP). For further information about the draft CoCP, see Chapter 3 of this report.

2.2.4 At the statutory consultation details will be provided on matters including the construction delivery programme, the strategic approach to managing and moving bulk earthworks material (mass haul), construction traffic routes, workforce numbers, and the general specification of construction equipment and working methods.

Timing and construction sequence

2.2.5 Construction works would start after the necessary approvals have been secured. Each of the route sections would have principal construction activities and dependencies that would drive the overall programme duration; these are described in Chapters 5-12 of this EUR, which outline the project and describe its potential environmental impacts and mitigation.

2.2.6 The general sequence of construction would be as follows:

- Site clearance and habitat protection works followed by archaeological investigations where needed, as well as early environmental mitigation works such as species relocations and early habitat creation.
- Creation of site compounds and undertaking of utility diversions if required.

- Construction of the main structures including embankments, cuttings, bridges, viaducts and drainage.
- For the sections of new railway, installation of track and rail systems would be undertaken in coordination across all route sections before the testing of the trains and systems.
- For existing railway, this testing would be done in stages throughout construction where modifications are made to enable the continued operation of the railway for existing train services.

Construction planning and logistics

2.2.7 Construction routes will be carefully assessed, and local highway and planning authorities consulted on logistics proposals. During design development, construction traffic will be assessed at each proposed compound and the impact on both the local and strategic road network would be reviewed.

2.2.8 To enable the efficient and safe construction of some elements of the new railway, it may be necessary to temporarily divert or close public highways and public rights of way (PRoW). EWR Co will take account of the needs of all users and consult and communicate proposals with the local authorities, National Highways and the emergency services, as well as with local communities to check that suitable options have been considered. This would include arrangements at any affected level crossings, which would be managed in conjunction with Network Rail.

2.2.9 EWR Co will develop a detailed mass haul strategy which would integrate with the design of the major earthworks and the proposed temporary haul routes. To support this, haul routes would be constructed alongside the proposed rail corridor where possible to reduce disruption to surrounding roads. The mass haul strategy would seek to balance the quantities of earthwork materials needed for embankments with materials excavated from cuttings and tunnel structures both to reduce construction traffic on the roads and for efficient use of materials.

2.2.10 To enable a more efficient construction programme and reduce environmental impacts associated with construction traffic, locations for a temporary logistics hub with a connection to the East Coast Main Line are being considered. The temporary logistics hub would enable materials to be delivered by rail to support the construction of the track and railway systems elements between Bedford and Cambridge. Further information on the proposed logistics hub can be found in Chapter 9 of this EUR.

Working on the existing railway

2.2.11 The project would interface with and impact several sections of the existing operational railway, as well as a number of stations. Works would be planned in consultation with Network Rail and the existing station operators to allow for continued safe access and to

limit inconvenience for the travelling public. Where construction works would directly impact public areas and cannot be segregated, works may be undertaken outside station operational hours. This would generally take place at night or over weekends.

2.2.12 The project would interface with several existing rail lines, including the Cherwell Valley Line at Oxford, West Coast Main Line at Bletchley, Midland Main Line at Bedford, East Coast Main Line at Tempsford, and Shepreth Branch Royston Line (to London, King's Cross) and the West Anglia Main Line (to London, Liverpool Street) at Cambridge. At each of these interfaces, works would be required that would impact existing rail assets and require some level of disruptive access to the railway.

2.2.13 Access to the existing operational railway would generally be during non-operational hours or in planned possessions or blockades (when the railway, or parts of it, is closed to passenger services).

2.3 Environmental context and route sections

2.3.1 The environmental characteristics of the area through which the project would pass represent different challenges and opportunities. These are likely to be most acute for the proposed new railway through and east of Bedford, but certain local interventions along the existing rail corridor between Oxford and Bedford, such as new stations and depots, would also need to take account of local environmental sensitivities. Additionally, throughout the route corridor, construction activities have the potential to cause concerns for local people and would need to be carefully managed.

2.3.2 The project has been divided into eight route sections that represent areas of distinct identity and coherent types of proposed works, as well as containing discrete elements of new infrastructure. These comprise:

- Route section 1 – Oxford to Bletchley.
- Route section 2 – Fenny Stratford to Kempston (the Marston Vale Line).
- Route section 3 – Bedford.
- Route section 4 – Clapham Green to Colesden.
- Route section 5 – Roxton to east of St Neots.
- Route section 6 – Croxton to Toft.
- Route section 7 – Comberton to Shelford.
- Route section 8 – Cambridge.

2.3.3 The remainder of this chapter provides an overview of the environment that is crossed by the project, drawing extensively from Natural England's national character area profiles

(National Character Area Profiles). The overview focuses on the route as a whole. Project descriptions, more detailed coverage of the environmental context and preliminary information on potential environmental impacts and mitigation for each route section are presented in Chapters 5 -12 of this report.

2.3.4 Between Oxford and Bicester the route along the existing rail corridor would cross low-lying flat fields created within the floodplains of the Cherwell and Ray rivers and their tributaries. The open landscape would allow extensive views of any new structures, although the area is quite sparsely populated.

2.3.5 The area falls within Natural England's Upper Thames Clay Vales National Character Area (NCA Profile:108 Upper Thames Clay Vales - NE570 (naturalengland.org.uk)) which describes the areas consisting "of open, gently undulating lowland farmland … underlain by an expanse of heavy blue-grey Oxford Clay and Kimmeridge Clay. In many places, the clay is covered locally by gravel deposits marked by extensive workings and flooded pits. The rivers Coln, Ray and Cherwell flow through the area, and the associated open flood plain landscapes consist of a regular and well-ordered field pattern, with willow pollards and reedbeds along the watercourses".

2.3.6 East of Bicester the route rises across the low-lying northern Chiltern foothills past Poundon, March Gibbon and the Claydons, crossing a network of narrow lanes and footpaths as the land rises gradually eastwards.

2.3.7 Through Bletchley and east of Milton Keynes the route would use the existing Marston Vale Line (MVL) passing through built-up areas at the edge of Milton Keynes and along the M1 corridor. East of the M1, transport infrastructure remains prevalent within prominent road (A421) and rail (MVL and Midland Main Line) corridors, which converge in Bedford. The River Great Ouse meanders prominently through Bedford and is crossed three times by the route as it passes north through and out of the town.

2.3.8 The area from Milton Keynes through to Cambridge falls within Natural England's Bedfordshire and Cambridgeshire Claylands National Character Area (NCA Profile: 88 Bedfordshire and Cambridgeshire Claylands - NE555 (naturalengland.org.uk)), the profile for which includes the following description (paraphrased).

While predominantly an arable and commercially farmed landscape, a wide diversity of semi natural habitats are also present … The River Great Ouse and its tributaries meander slowly and gently across the landscape. The Marston Vale … areas have been subject to extensive clay extraction for brick making. Subsequent restoration has provided opportunities for recreation and biodiversity aided by new woodland planting and other green infrastructure initiatives. Extensive quarrying of sand and gravel within the river valleys has also left its mark with a series of restored and flooded waterbodies that benefit biodiversity and recreation. The majority of the … NCA is sparsely populated. Settlements are generally located along the river valleys and more recently along major road and rail corridors. A feeling of urbanisation is brought by the numerous large towns, including Milton Keynes, Bedford [and] Cambridge, and major transport routes, including the M1, A1 and A14 and the Midlands and East Coast mainline railways.

2.3.9 North and east of Bedford, hills mark an ascent out of the town. The undulating but low-lying landscape is dominated by arable farmland though with scattered woodlands often crowning the horizon in long views across the level fields (Bedford Borough & Central Bedfordshire Landscape Character Assessment, October 2020). A number of tributaries of the River Great Ouse run west-east and north-south, their valleys forming a focus for settlement and tree cover. This is a quiet, rural area with a dispersed but regular pattern of scattered farmsteads and small villages with frequent historic earthworks and tall stone churches. Settlements are connected by a network of quiet rural lanes and rights of way.

2.3.10 The route would descend into the Great Ouse Valley, a broad valley with open, gentle slopes and large-scale arable fields. The valley includes large areas of open water, the legacy of mineral extraction, now used for leisure and often with enclosing woodland. The course of the river is marked by narrow woodland belts and willow trees. There are smaller pastoral fields along the valley floor with historic parklands sited on the valley side slopes at Little Barford with scattered parkland trees and small woods.

2.3.11 Emerging east from the Great Ouse Valley the route would align with the existing transport corridor of the new A421 dual carriageway currently being constructed by National Highways as part of the A428 Black Cat to Caxton improvements scheme, but would remain in an essentially rural landscape that rises onto the low rolling gault clay ridge that extends east from St Neots towards Cambridge. The East of England Character (East of England Wooded Village Farmlands) typology prepared by Landscape East describes this as “a gently rolling, elevated landscape with ancient woodland blocks and small, nuclear villages … often [forming] an open landscape with long distance views, although woodland contains views particularly around settlements”.

2.3.12 As the route bears south beneath the A428, it would continue across undulating farmed and sparsely wooded landscape, descending from the ridge into the broad valleys and lower lying land that have been eroded by the main rivers west of Cambridge, including the Cam, Granta, Rhee and Bourn Brook. Landscape East describes the area as “low lying, but gently rolling arable landscape … dissected by small streams and [with] a distinctive pattern of nucleated villages and patchwork of woodlands and shelterbelts”.

2.3.13 The approach into Cambridge takes the route past the villages that have developed along the A10, such as Harston and Shelford, which have expanded, leading to a more suburban context on the approaches to the city through this area. The route joins existing rail corridors that enter the city passing by Addenbrooke’s and Royal Papworth hospitals and the Cambridge Biomedical Campus.

3. Mitigating impacts through design and construction

3.1 General principles

3.1.1 Integrating environmental considerations into the design has been a tenet of the development of the project proposals. Since 2021, the government has published a new policy setting out its environmental goals, and in response East West Railway Company (EWR Co) has set out an Environmental Sustainability Strategy. Central to this are six environmental sustainability pillars, and each pillar has an associated ambition and definition. These set EWR Co's environmental aspirations and the legacy EWR Co aims to leave. More information on EWR Co's Environmental Sustainability Strategy is available on the East West Rail Website.

3.1.2 As part of this, EWR Co aims to deliver biodiversity net gain and is taking a proactive approach to avoiding, reducing and mitigating adverse environmental impacts to deliver a sustainable railway. Environment and sustainability factors have been considered in developing the proposals and comparing different options. This focus on environment and sustainability factors will remain central through successive stages of design development.

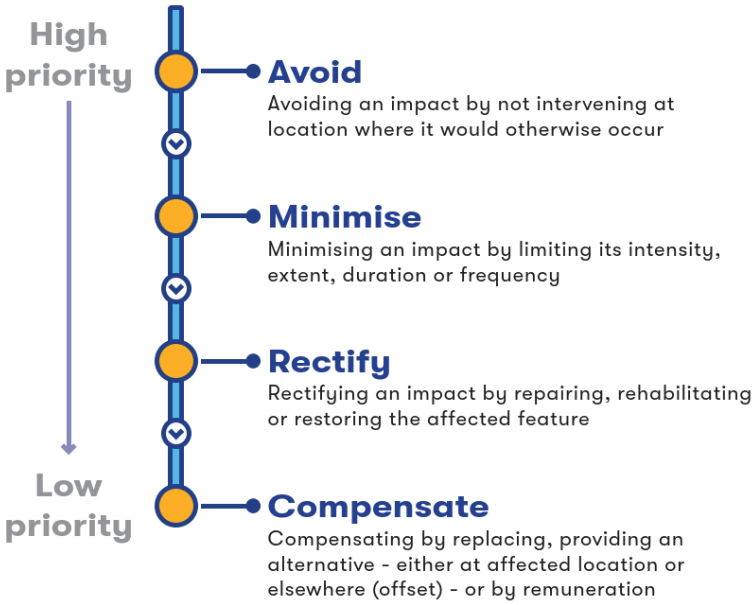
3.1.3 A wider focus on sustainability is also fundamental to the development of the project. This includes realising enhancements for local communities and the natural and built environment where possible, as well as mitigating potentially adverse environmental effects.

3.1.4 To help with this approach, a team of environmental advisers has worked alongside the project's engineers, and are themselves supported by the environmental specialists responsible for the various environmental topic assessments that inform the EIA.

3.2 The mitigation hierarchy

3.2.1 The mitigation of potential adverse environmental impacts and effects is fundamental to successful environmental assessment and the delivery of EWR Co's objectives. The Mitigation Hierarchy represents the sequence that is being followed, in order of priority, in the design and later construction of the project to eliminate and lessen potentially adverse environmental effects. The Mitigation Hierarchy is explained in Figure 3-1.

Figure 3-1: Mitigation Hierarchy



3.2.2 Opportunities to avoid potential impacts arise in the early stages of a project, when alternative proposals are developed, compared and evaluated. More detail on how EWR Co has considered the environmental impacts of the project at each stage of development is described in Appendix A of this report.

3.2.3 Through subsequent stages of the project lifecycle – from concept design, detailed design and through to implementation – opportunities to avoid and minimise adverse effects become fewer, and the emphasis shifts to rectifying and compensating.

3.2.4 Where the potential for a likely significant environmental effect has been identified during the course of the assessment, a mitigation measure is proposed where possible that would lessen the effect and ideally render it non-significant. If the measure is deemed feasible, practicable and effective, it would most likely be adopted within the design and at this point it is referred to as embedded mitigation.

3.2.5 The proposals described in the Environmental Statement (ES) for the project will assume embedded mitigation as an integral part of the project, and its impacts will be assessed on this basis. To ensure that these measures are retained through subsequent stages of design and implementation, they will be set out explicitly within the ES, which will be submitted as part of the DCO application. The implementation of those measures would then be secured through provisions included in the DCO as appropriate.

3.2.6 The design that is the subject of this consultation includes many features that have been adopted to mitigate potential environmental impacts; for example, south-west of Haslingfield the use of the tunnel beneath Chapel Hill would avoid or limit potential impacts on landscape, heritage and ecology. As another example, in the countryside west

of Cambridge, proposals for block planting and hedgerow connectivity seek to integrate the linear project elements into the landscape. These early mitigation principles are described in the ***Technical Report*** and are summarised in Chapters 5-12 of this report.

3.3 Code of Construction Practice

3.3.1 A draft *Code of Construction Practice* (CoCP) will be developed and submitted as part of the DCO application. This will support the responsible delivery of the new railway, manage expectations, and set a consistent approach to avoiding or minimising construction impacts.

3.3.2 The draft CoCP will specify the reasonable and practicable measures, practices and standards of work that would be applied during construction of the project so that its potential significant adverse environmental effects on people and on natural and historic assets are avoided so far as possible.

3.3.3 In general terms, the draft CoCP will include:

- Provisions needed to effectively plan, manage and control construction activities to mitigate potentially adverse environmental impacts and effects.
- Requirements for monitoring of construction activities and their impacts, and implementation of corrective measures where appropriate.
- Mechanisms to engage with the local community and their representatives throughout the construction period.

3.3.4 The draft CoCP will contain general provisions related to:

- Community relations and keeping people informed.
- Training and competence of the workforce.
- Working hours.
- Construction site layout and good housekeeping standards.
- Pollution prevention.
- Lighting and security.
- Hoarding, fencing and screening.
- Emergency preparedness and fire prevention.
- Extreme weather events.
- Demolitions.

3.3.5 The environmental assessments for each topic will assume as a minimum that these measures would be implemented, as such measures represent a general best practice approach. The draft CoCP may also include some additional measures specific to the requirements of the project.

3.3.6 The draft CoCP will form one of the DCO application documents. After obtaining consent, the appointed construction contractors would use the measures outlined in the draft CoCP as the foundation for developing more detailed measures. These measures would take account of the detailed designs and of the specific approach to construction that they support, accommodating local and specific sensitivities where necessary.

3.3.7 The draft CoCP will continue to be developed in consultation with local authorities and relevant stakeholders, and further information will be presented at the statutory consultation. At this stage, the key elements and measures likely to be included in the draft CoCP are set out in Appendix B of this report.

4. EIA principles and techniques

4.1 Context

4.1.1 Environmental Impact Assessment (EIA) is a process required for certain projects by virtue of their size, activities, location, and potential to give rise to significant effects on the environment. The information required as part of the EIA process will be presented within an ES.

4.1.2 The ES will describe the outcome of the environmental assessment process and will be used to inform decision makers in exercising their responsibilities regarding the environmental effects of the proposals, in particular the effects that are deemed to be both likely and significant. The ES for the project is a key document that will be submitted as part of the DCO application.

4.1.3 The EIA will address the specific environmental topics listed in Section 1.5 of this report, identifying and assessing potential impacts and evaluating their effects. As effects are determined, the assessment team will work with the engineers to propose measures to mitigate the effects, which will become embedded in the project proposals.

4.2 Requirements for EIA

4.2.1 The procedural requirements for applications for orders granting development consent are set out in the Planning Act 2008 (as amended) and related secondary legislation. The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations), contain provisions relating to: screening and scoping; notification and consultation; matters related to the production of Preliminary Environmental Information; and the preparation of ES's. The Planning Inspectorate's Advice Note 7 - Environmental impact assessment: process, preliminary environmental information and environmental statements (NSIP Advice Note 7) provides guidance on the process and the legal requirements.

4.2.2 The EIA Regulations provide that ES's must be prepared by competent experts. EWR Co as the Applicant has appointed suitably qualified consultants to undertake this work. Mott MacDonald and WSP, as a joint venture, are responsible for the coordination, compilation and procedural review of all environmental information prepared in support of the EIA. Both Mott MacDonald and WSP are registered under the EIA Quality Mark operated by the Institute of Environmental Management and Assessment (IEMA) which recognises their commitment to excellence in EIA activities.

4.3 Assessment techniques

4.3.1 The EIA process is concerned with determining and evaluating environmental change. It is important therefore to first establish the environmental and social characteristics that will be subject to change as a consequence of the project. These characteristics are referred to as the 'baseline environment' and consideration is given to how this may evolve in the absence of the project.

4.3.2 One focus of the EIA process to date has been on characterising the environmental baseline. This has relied on different techniques for different assessment topics. Much of it involves collecting information and data from various existing sources through desk research. Where this information is missing or incomplete, site visits and surveys are used to obtain it and survey work to date is summarised below.

4.3.3 Some EIA topics use computer models to forecast how environmental change would occur, both as a prevailing change and as a result of the project. This includes models to predict how road traffic would change and how drivers would behave in response to different factors. These transport models are particularly important where they help inform other assessments, notably air quality and noise. Modelling of flooding is also important, as it would help determine, amongst other things, the vertical profile and footprint of the proposed railway and works, with implications for several EIA topics.

4.4 Cumulative impacts and effects

4.4.1 As well as the assessment of the project in its own right, the EIA is required to take account of cumulative impacts of the construction and operation of the project with other reasonably foreseeable projects in the area.

4.4.2 The approach to the cumulative assessment will follow the guidance within The Planning Inspectorate's *Advice Note 17, cumulative effects assessment relevant to nationally significant infrastructure projects* (NSIP Advice on Cumulative Effects Assessment). *Advice Note 17* describes a staged approach to the cumulative effects assessment that involves identifying a long list of other projects to be considered, reducing this to a shortlist, gathering information and then assessing the cumulative effects. The list of other projects will be developed in consultation with local authorities and other stakeholders.

4.4.3 The other projects will include those projects which have been approved and where construction may or may not have started, projects for which an application has been submitted but not determined, and potentially other known projects in earlier phases of development.

4.4.4 The longlist of other projects will be identified based on theoretical zones of influence of different types of impact, such as construction dust or visual impact. A number of factors, such as the timing of the construction and operational phases, the scale and nature of other projects, and the sensitivity of the environment will be used to shortlist projects for

further assessment. Information on these projects will be gathered from sources such as the documents provided in the planning applications. The outcome of the assessment will be presented in the ES, submitted as part of the DCO application.

4.4.5 The types of other projects which would be considered include other major transport projects such as the various projects under the Greater Cambridge Partnership's City Access programme (City Access Programme), which includes several sustainable travel projects, such as the Cambourne to Cambridge scheme as well as housing development and other applications submitted to local planning authorities.

4.4.6 Projects such as the new A421 dual carriageway, construction of which is underway as part of the A428 Black Cat to Caxton Gibbet improvements scheme and is likely to be built before the start of construction for East West Rail, will be considered as part of the future baseline for the EIA of East West Rail and not included in the cumulative effects assessment.

4.5 Defining the environmental baseline

Overview

4.5.1 Establishing and characterising the environmental baseline conditions is a critical step in the EIA process and is achieved through gathering information from a number of sources. Initially, desk-based resources are used to establish key aspects of the baseline. Where there are gaps in information, or more detailed or accurate information is necessary, site visits and surveys are undertaken to ensure precise and robust data is obtained.

4.5.2 Surveys are conducted throughout the year and, depending on the type of survey, sometimes multiple times to ensure the gathered data are robust. Surveys can be either intrusive (requiring excavation of boreholes and trenches, for example) or non-intrusive, but most require landowner access to be agreed.

4.5.3 Approximately 6,450 surveys and site visits have been completed since 2020 to support the development of the proposals and inform the ongoing EIA process. Further surveys have taken place during 2024 and will continue through 2025.

Desk-based information

4.5.4 Desk-based information can be gathered from a wide-range of sources. This includes publicly available information from local authorities and other government agencies, such as data relating to air quality management areas, local ecological and historical records, and protected sites. Understanding the location of sensitive environmental features is essential to the application of the Mitigation Hierarchy and is fundamental as a first stage in informing what further study is required.

4.5.5 Other information that is gathered includes high-resolution satellite imagery, geological data and topography models. This information is used for a number of topics and is sometimes as the basis for detailed modelling, such as for noise or visibility impacts.

4.5.6 EWR Co has also worked with other projects, such as National Highways' A428 Black Cat to Caxton Gibbet improvements scheme (with the new A421 dual carriageway currently under construction) and the Greater Cambridge Partnership's Cambourne to Cambridge guided busway and active travel projects, to share information gathered from surveys and studies undertaken.

People-focused surveys

4.5.7 There are several EIA topics that need information collected through surveys to enable an understanding of the project and its relationship to the people living and working along the route and surrounding area.

4.5.8 As well as having collected existing air quality data from local authorities, NOx monitoring to understand the baseline air quality conditions has been undertaken at approximately 65 locations. The results will be analysed and fed into impact modelling presented in the ES.

4.5.9 For traffic and transport, surveys include traffic count surveys (both automatic and manual) to record road use, car parking surveys of current patronage, and monitoring of usage of public rights of way (PRoW) to inform impact assessment and diversion needs. So far approximately 1080 surveys relating to traffic have been completed across the route.

4.5.10 Baseline noise surveys are used to establish the existing noise levels and around 60 noise surveys have been completed to date. Some background vibration monitoring may also be needed for certain sensitive users along the route.

4.5.11 Farm business interviews are currently underway to understand how the project and its construction could impact farming practices. Both soil resource surveys and Agricultural Land Classification surveys will be carried out to understand soil types and the quality of farmland affected by the project. Much of this can rely on existing survey data undertaken for other projects, with further surveys planned.

Nature-focused surveys

4.5.12 Surveys of ecological receptors are required to characterise the status and distribution of habitats and certain species or groups of animals. These include aquatic surveys, habitat mapping, and fauna surveys for bats, badgers, otters and others. Bird surveys record species present, and walkovers inspect for insects and other terrestrial invertebrates and veteran trees will be recorded across the route.

4.5.13 Since 2020 approximately 4,500 ecological surveys have been carried out with further surveys planned.

4.5.14 These surveys are continuing to provide additional data on the likely presence and distribution of protected and notable habitats and species. As more information becomes available, and as the project design and construction phasing plans develop, mitigation plans will evolve, following the Mitigation Hierarchy. Further information about the Mitigation Hierarchy can be found in Chapter 3 of this report.

4.5.15 Water and flood risk surveys will be used to identify groundwater dependent terrestrial ecosystems and identify private water supplies across the study area, whilst Water Framework Directive (WFD) surveys will consider the river morphology, and river and ditch conditions for watercourses across the route. The majority of these surveys will be undertaken in 2024 and 2025.

4.5.16 In addition, the project will undertake ground investigation to include contamination testing of soils, groundwater and surface water to confirm the ground conditions, groundwater regime and any surface water groundwater interaction.

Landscape and historic environment surveys

4.5.17 Landscape surveys are required to help understand the character of the landscape or townscape, identifying key features that contribute to character. Photographs are used to illustrate the landscape and visual baseline assessment and to establish the likely visibility of the project. The surveys will be informed by desk-based research using published landscape character assessment, mapping and aerial photography. Since 2020, around 900 surveys have been completed.

4.5.18 The majority of locations selected for the field surveys are on PRoW and other publicly accessible places such as public roads, footways, car parks and open space. In inaccessible areas where access cannot be agreed with the landowner, the land or premises are private, or there are no nearby suitable PRoW, professional judgement is used to describe the likely landscape/townscape character of the area or the likely view from these locations.

4.5.19 For the historic environment, an evaluation phase has started to establish an enhanced understanding of the historic character and development along the route. The evaluation phase will include a range of desk-based investigation and analysis and field surveys. The results of archaeological, geoarchaeological, historic landscape, and built environment surveys will be brought together to develop a fuller understanding of the historic environment as a whole and allow for a combined approach to the assessment.

4.5.20 A range of field surveys supported by desk-based investigation will be undertaken to understand the potential for surviving archaeology and how important that archaeology is likely to be in contributing to wider knowledge of the area. Some surveys have already started, with geophysics and remote sensing surveys in progress in some areas. Following these surveys and additional desk-based research, a suite of targeted intrusive surveys, including trial trenching, will be developed in collaboration with stakeholders to allow for a detailed and robust baseline to inform the assessment and design development.

4.5.21 Geoarchaeological character will be investigated by using existing borehole data and data gained from ground investigation surveys carried out for the project to develop a deposit model.

4.5.22 Surveys will be undertaken to understand the historic environment along the route. These surveys will be informed by desk-based research using online and archive materials. Walkover surveys will also be carried out to identify key heritage assets, both designated and non-designated, and to get an understanding of the varied historic character along the route and its level of survival.

4.5.23 The assessment is continuing to investigate and understand the historic development of the area crossed by the project to inform the EIA work and to help manage the historic and cultural environment as part of design and mitigation work. The approach to this assessment is set out in the *Approach to Historic Environment* factsheet.

Modelling

Transport modelling

4.5.24 The East West Rail Strategic Highway Model (EWRSHM) has been developed and used as an interim tool to assess traffic impacts. The preliminary results are presented in the ***Transport Update Report*** (TUR). The model has provided information on baseline and future traffic flows, providing predictions on how these could change with the introduction of the project construction traffic and then consequently as a result of the operation of the new East West Rail services. Further information is available in the TUR.

4.5.25 Following this consultation additional transport modelling will be undertaken using a new and bespoke corridor-wide model, before the proposals for the project are finalised, and the results presented in a *Transport Assessment* (TA) to accompany the DCO application.

Flood modelling

4.5.26 Flood models are developed to reflect baseline conditions as closely as possible before potential impacts of new infrastructure can be modelled and the effects understood, which can then be used to inform approach to avoid impacts, manage impacts or mitigate them.

4.5.27 Initial development of existing baseline flood models was undertaken in 2021 to support earlier stages of the project development. These addressed 11 watercourses crossed by the proposed new alignment between Bedford and Cambridge.

4.5.28 Further development of these models, as well as others between Oxford and Bedford, is underway and will utilise existing Environment Agency models, new survey data and models and models developed for the new A421 dual carriageway.

4.5.29 As the project design develops, further modelling will be undertaken where required to inform flood risk assessments that support the project. This modelling will be undertaken

in consultation with the Environment Agency (responsible for flood risk management activities on Main Rivers), Lead Local Flood Authorities (responsible for managing local flood risks from surface water, ordinary watercourses and groundwater) and other risk management authorities as appropriate.

5. Oxford to Bletchley

5.1 Project description

Summary

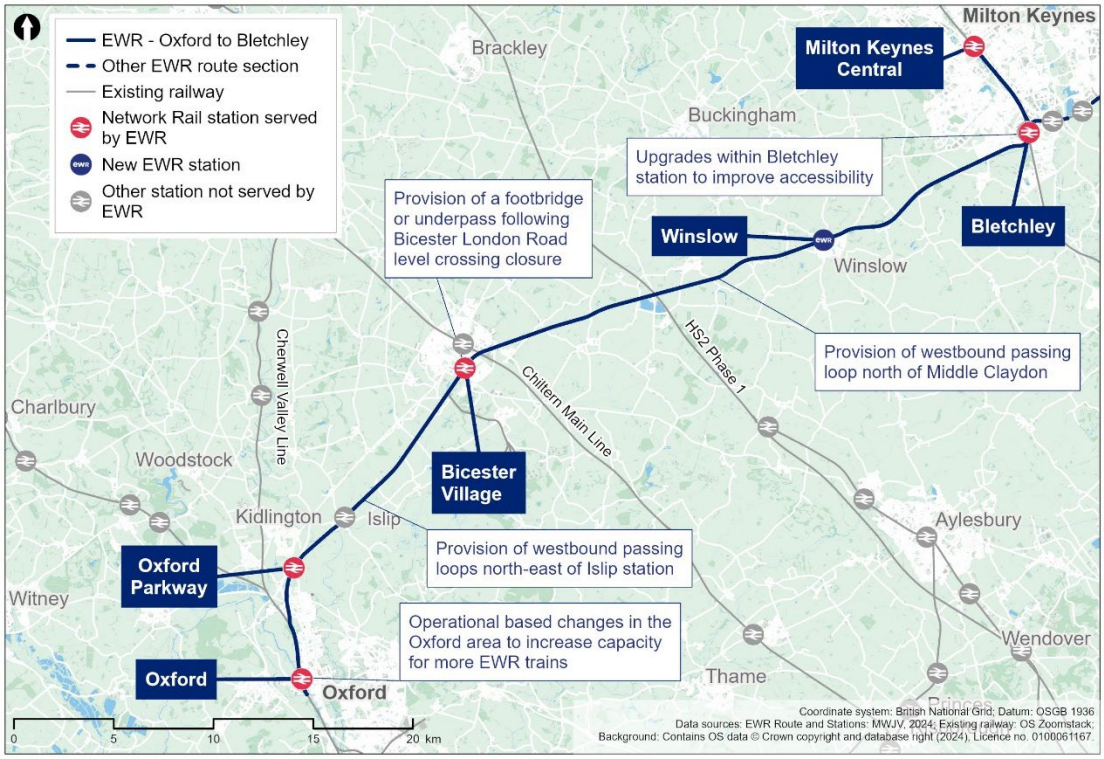
5.1.1 The project between Oxford and Bletchley would use the existing railway. Services already operate between Oxford and Bicester, and the upgrade of the section from Bicester to Bletchley is currently under construction as part of East West Rail Connection Stage 1, which will introduce a passenger service between Oxford and Milton Keynes in late 2025. To accommodate the full East West Rail passenger service and freight services, alongside existing services, further works are required along this 48km (30 mile) section of railway.

5.1.2 The proposed works are summarised below:

- Track upgrades at Oxford.
- Potential alterations and upgrades at Oxford, Oxford Parkway, Bicester Village, Winslow, and Bletchley stations to accommodate increased East West Rail passenger numbers. The changes required would depend on the results of passenger demand forecasting and pedestrian modelling, as well as other future operational requirements.
- Closure of the level crossing at Bicester London Road and the construction of an accessible replacement crossing for pedestrians, cyclists and other users of the crossing, either via a footbridge or an underpass.
- Widening of the rail corridor to the east of Islip and at Middle Claydon to create passing loops, resulting in the demolition and reprovision of existing footbridges at both locations to maintain public rights of way (PRoW).
- Utility and traction power works to accommodate overhead line equipment (OLE) across the route, with the largest two diversions to electrical infrastructure at Oxford Parkway station and Verney junction.
- Connections with the Quainton substation or the East Claydon substation, to provide power for East West Rail trains.

5.1.3 Under the full East West Rail service, this section would accommodate four passenger trains per hour and one freight train per hour in each direction. These services would be in addition to the existing two trains per hour in each direction on Chiltern services between Oxford and Bicester (continuing to London Marylebone).

Figure 5-1: Proposed route of the project between Oxford and Bletchley



Project proposals

Oxford

5.1.4 The East West Rail alignment would start south of Oxford station, heading north on existing tracks. To accommodate the full East West Rail services it is likely that a combination of changes to the track layout, such as crossovers or turnbacks, along with operational changes would be required. Ongoing discussions with Network Rail and other rail industry stakeholders will help determine the appropriate solution.

5.1.5 To accommodate increased passenger numbers, alterations may be required at Oxford station. These may include changes to the station layout, such as to stairways and platform access.

Oxford Parkway

5.1.6 To accommodate increased passenger numbers, alterations may be required at Oxford Parkway station. These may include minor changes to the station layout, such as changes to the gate barriers and entrance ways, the potential enlargement of the station car park and associated upgrade to the car park entry junction on Oxford Road. New and larger drainage ponds would also need to be provided.

5.1.7 Options are currently being considered regarding how best to power trains. If the route between Oxford and Bletchley is electrified with OLE, diversion of an existing 33kV overhead power line to the north of North Oxford Golf Club may be required.

5.1.8 A new train crew facility would be required in the Oxford area for use by East West Rail staff. EWR Co is still identifying the best location for this and will provide further details at the statutory consultation.

Islip

5.1.9 East West Rail services are not planned to call at the existing Islip station and so no works are proposed here. To enable faster passenger trains to overtake slower moving freight trains a westbound passing loop is required. This would comprise approximately 870m of new track located to the north-east of the existing station immediately south of the existing railway lines. New signalling, modifications to earthworks and drainage, the demolition of a footbridge and its replacement with a new longer footbridge at the same location would also be required, along with a re-routed footpath.

Bicester

5.1.10 It was determined that with a full East West Rail service, the barrier down time at Bicester London Road level crossing would increase, resulting in increased wait time. This, together with the safety risk from potential misuse of the crossing, warrants closure of the level crossing. Road traffic would be re-routed via the existing road network, and a replacement accessible crossing would be provided for pedestrians, cyclists and other users of the crossing. The replacement crossing would either be a new footbridge or an underpass.

5.1.11 Minor alterations may be required at Bicester Village station. This may include changes to the station layout and enlargement of the station car park.

Middle Claydon

5.1.12 To enable faster passenger trains to overtake slower moving freight trains, a westbound passing loop is required at Middle Claydon. This would require approximately 870m of new track, as well as new track signalling, earthworks and drainage and the demolition of an existing footbridge and provision of a new longer footbridge at the same location, to maintain the existing PRoW.

Verney Junction

5.1.13 Options are currently being considered regarding how best to power trains and a number of options are being considered for this section, with an we are considering options for new substation compounds in either Quainton or East Claydon on the East West Rail route. If Quainton is selected, power would come from the existing site (at Quainton) via

a new East West Rail substation, approximately 6km (4miles) from the East West Rail route.

5.1.14 As an alternative to Quainton, power could come from the existing site at East Claydon, via a new East West Rail substation, that is situated 1.5km (1 mile) from the East West Rail route beside the disused Metropolitan Railway line south of Verney Junction. This option would also require the diversion of high voltage power lines.

Winslow

5.1.15 Winslow station is a new East West Rail station being developed as part of Connection Stage 1 that will come into service in 2025. With the introduction of new East West Rail services between Oxford and Cambridge, minor alterations may be required at Winslow station. These may include changes to the gate line and stairwells to better accommodate the increased number of passengers and reduce potential crowding. As part of ongoing design development, EWR Co will also consider if any upgrades are needed to the station or car park.

Bletchley

5.1.16 Alterations may be required at Bletchley station. These may include changes to the station layout, such as an expanded west ticket hall, staircase alterations, widening of platform 6 and a new platform 6 lift, potential extension of platforms and extensions or widening of the existing footbridge.

5.1.17 If the route between Oxford and Bletchley is electrified with OLE, several existing utilities passing over the railway would also need to be lifted or diverted, along with a number of underground electricity and telecoms utilities. Where these coincide with existing designated sites or ecological compensation sites delivered by the East West Rail Alliance, these will be refined to avoid direct impacts, where practicable.

Options

5.1.18 The table below shows where there remain options for proposals in the Oxford to Bletchley route section. Further work is required to determine which option is most suitable.

Table 5.1: Oxford to Bletchley route section proposed interventions and options

Proposed intervention	Option 1a	Option 1b
London Road level crossing, Bicester	Footbridge non-motorised user crossing	Underpass non-motorised user crossing

5.1.19 The main environmental differences between the London Road level crossing options are presented later in Table 5-2, which summarises the environmental information that was used in the Assessment Factor process (see Chapter 6 of the ***Technical Report*** for further information).

5.2 Initial environmental information

People and communities

Context

5.2.1 East West Rail would provide new journey opportunities for residents and businesses between Oxford and Bletchley. The mixed (urban and rural) environment between Oxford and Bletchley would see various works and upgrades to enable the proposed East West Rail services. However, works would be localised along this route section and given the presence of the existing railway and its services, impacts would be relatively limited.

5.2.2 With the proposed station improvements and the new journey opportunities offered by East West Rail, there would be benefits to local people. Other changes would have few long-term impacts, although the widened rail corridor for the passing loops near Islip and Middle Claydon would result in additional land take beyond the current railway corridor.

5.2.3 A review of the potential impacts to people's wellbeing and amenity – both positive and negative – that would result from the operation of the new railway and its facilities is set out below, along with initial proposals for mitigating potential adverse effects. Potential disruption during construction is addressed separately, with explanation of how it could be mitigated where practicable.

Potential impacts and mitigation

5.2.4 East West Rail would introduce new journey opportunities, with people using stations along the route able to gain better access to jobs and to leisure, health and community facilities using the new service. This could mean some changes to local travel patterns to access stations, which may have impacts on the local road network. Potential impacts will be assessed through ongoing traffic modelling, with mitigation proposed where necessary. The upgraded stations and other potential improvements at Oxford, Oxford Parkway, Bicester Village, Winslow, and Bletchley could result in widespread socio-economic benefits.

5.2.5 Rail noise is already characteristic along this route section. The area would see a change in noise levels with the introduction of the East West Rail train service, which would increase to four trains per hour. The contribution of rail noise to the character and level of background noise depends on other noise sources, such as roads and industry, as well as temporary contributions such as construction activity. Existing noise levels would be relatively high through the urban settlements due to road traffic, and so impacts from East West Rail would be expected to be limited. The increase in number of trains per hour, as well as changes in station layout could result in noise impacts for residents in these settlements.

5.2.6 Operation of the passing loops, including idling freight trains, could also have local noise impacts. Noise mitigation requirements would be identified through noise modelling.

Mitigation could take the form of acoustic screening or operational station changes such as quieter station announcements and train speed restrictions. Noise mitigation may be required on the north side of the existing railway at Middle Claydon to address a potential increase in noise from freight being held on the passing loop.

5.2.7 Particular changes which could impact the community include the proposed car park extension at Oxford Parkway station, how to best provide a new London Road crossing for pedestrians, cyclists and other users in Bicester (where the existing level crossing would be closed), and the changes being made to various stations along this section and the impact of those on nearby residents.

5.2.8 Removal of vegetation along the existing railway, such as at Oxford Parkway, around Islip, Middle Claydon, Verney Junction, west of Winslow and close to utility diversions, could open up views of the currently well-screened railway from residential properties and the surrounding landscape. There would be changes to views resulting from the extension of existing platforms and reconfiguration of station buildings, as well as from expansion of car parks, diverted utilities, changes to road and footpath alignments, and provision of new infrastructure to support the railway.

5.2.9 Potential expansion of the car park at Oxford Parkway, utility diversions and a new drainage pond would result in a change to views from residential properties and PRoW in the area around the station. Woodland planting, strengthening of existing hedgerows and reducing light intrusion where possible in the new parking area would help mitigate these impacts.

5.2.10 The new pedestrian bridge or underpass (Options 1a and 1b respectively) required to maintain connectivity at the London Road level crossing in Bicester would be prominent additions to views in the town. Planting and careful design of the new structures and public realm would contribute to improving the public space and minimise adverse visual impacts. The changes to Bletchley station may be visible from the area near the station.

5.2.11 The project would require the permanent acquisition and temporary use of certain land and property. Depending on whether a footbridge or underpass option is selected for the London Road crossing, the project would affect five or seven businesses properties respectively across the route section as a whole. Both options would require permanent acquisition from a petrol station, with the underpass also requiring permanent acquisition from two further business properties. Elsewhere, temporary use would be required from land at a golf course near Oxford Parkway station, a car park at Bicester Village station, a depot at Bletchley and a removals company east of Bicester.

5.2.12 EWR Co recognises the effects these impacts would have and will be working with affected parties as the designs are further developed, seeking to agree measures to reduce the impacts of the proposals where possible and enter into agreements with property owners where property would need to be acquired or used. Further information is provided in the *Guide to Compulsory Acquisition and Compensation* on the East West Rail website.

5.2.13 Desk-based research shows that agricultural land would lie within the draft Order Limits in this route section. Around half of this is expected to be Grade 3 (good to moderate quality land), which may be classified as best and most versatile (BMV) depending on future survey results. The remaining land is not expected to be considered BMV. Ongoing design development will take agricultural land and farm holdings into consideration to reduce impacts.

Temporary construction impacts

5.2.14 The construction programme for Oxford to Bletchley would be driven by the track modifications required around Oxford and the installation of the proposed passing loops. It would also be driven by the closure of the London Road level crossing in Bicester and introduction of new foot bridge or underpass (Options 1a and 1b respectively).

5.2.15 To support station upgrades, construction compounds would generally be located at or near to the affected stations, proposed utility diversions, or traction power compounds. The proposed Oxford track interventions and upgrades would be constructed within the existing rail corridor, with one compound located north of Oxford station. For the passing loops, most materials would be delivered by rail. The east of Islip loop would be serviced from a compound at Islip station. The Middle Claydon loop would be serviced from a compound linking to Queen Catherine Road.

5.2.16 Where practicable, construction heavy goods vehicles (HGVs) would take the shortest suitable route between compounds and the strategic road network and try to avoid travelling in peak periods. The majority of construction HGV movements would use A41/A43 London Road to access the M40 at junction 9 or junction 10, while some construction traffic in and around Oxford would access the A34. A small number of compounds in Bletchley would be accessed via the A5. The presence of construction traffic on the highway network could mean temporary localised congestion, journey delay or severance, requiring a range of potential mitigation measures.

5.2.17 Potential impacts from construction, such as increased noise, worsened air quality and increased dust would be controlled through various good practice measures set out in the draft CoCP, which would be enforced through contract arrangements and closely monitored throughout construction. Details on the sequencing of construction and the types of activities associated with this would be determined, allowing for the assessment of noise and vibration impacts. The scale of impacts would depend on the overall duration and frequency of noisy construction activities in relation to nearby receptors.

5.2.18 Construction works at stations could temporarily affect station car parking and access for passengers. This would be controlled by provisions set out within the construction traffic management plan, coordinated with train operating companies where access to train services could be affected. Road and footpath crossings could be similarly affected and equally require similar management to allow for continuity of access.

5.2.19 Some construction activities may require temporary suspension of rail services. Alternative transport would be provided in consultation with train operating companies, but this may mean delays to journeys.

5.2.20 Following completion of construction works, the land at the construction compound would be reinstated to its previous use.

The natural environment

Context

5.2.21 The Thames floodplain through Oxford supports a collection of protected wetland, woodland and neutral grassland nature conservation sites, which are all outside the draft Order Limits but in close proximity to the project. Immediately adjacent to the project is the Oxford Meadows Special Area of Conservation (SAC), which also includes the Port Meadow with Wolvercote Common and Green Site of Special Scientific Interest (SSSI). The Oxford Canal and the existing railway bisect the Hook Meadow and The Trap Grounds SSSI west of St Edwards School near Wolvercote before the project leaves Oxford.

5.2.22 To the west, east and south of this location are several other protected sites. These include: the wetlands of Cothill Fen SAC and SSSI at the head of the River Ock; Iffley Meadows SSSI to the south in the Thames floodplain; and Wytham Woods SSSI located on the elevated western valley side. New Marston Meadows and Magdaline Grove SSSIs are agriculturally unimproved neutral meadows on the floodplain of the River Cherwell and form a natural corridor through the centre of Oxford.

5.2.23 The River Cherwell and its tributaries (particularly the River Ray) form an important wildlife floodplain corridor south of Islip and north of the large Otmoor SSSI. In the upper River Cherwell and Ray valley is the Wendlebury Meads and Mansmoor Close SSSI – which are bisected by the existing railway – and a large area of floodplain grazing marsh immediately adjacent to the project at Wendlebury. The SSSI meadows are amongst the few surviving examples of calcareous clay pasture communities which were once widespread throughout southern England.

5.2.24 There are at least seven Water Framework Directive (WFD) surface water catchments potentially impacted in this route section, namely Thames (Evenlode to Thame), Cherwell (Bletchingdon to Ray), Gallos Brook, Langford Brook (Bicester to Ray inc. Gagle Brook), Langford Brook (source to downstream A41), Summerstown Ditch and Launton and Cutters Brook, and Claydon Brook (DS Granborough).

5.2.25 The wetland areas of the Thames and Cherwell valleys, including the low-lying Vale of Aylesbury and large waterbodies at Calvert, attract characteristic bird species, in particular large regionally important numbers of snipe, redshank, curlew and lapwing and during winter floods, pochard, wigeon and snipe. The river valleys and waterbodies are also known to support water vole and otter, and in the wider farmed countryside brown

hare and badger are found. A number of bat species are located in the buildings and trees in this landscape and within built-up areas.

5.2.26 A collection of protected sites, waterbodies and ancient woodland are found in a triangle between the villages of Calvert, Kingswood and Botolph Claydon to the south-east of the project. All occur outside the draft Order Limits but some are located immediately adjacent. The large Sheephouse Wood SSSI and Grendon and Doddershall Woods SSSI east of Charndon are the more substantial ancient woodlands in this area, which support a diverse invertebrate fauna including white admiral, purple hairstreak and black hairstreak butterflies, the latter being a nationally restricted species largely confined to relics of ancient forest on the clay belt running through Oxfordshire and Buckinghamshire to the East Midlands. Sheephouse Wood has recently been identified as being of importance in providing supporting habitat for several bat species, including the nationally rare Bechstein's bat.

5.2.27 A network of smaller ancient and broadleaved woodlands (habitat of principal importance; HPI) is found in a swathe of land from north-west of the project near Addington through to Mursley to the south-east of the project. All occur outside the draft Order Limits but many are immediately adjacent to the existing rail line. In addition, two large areas of ancient woodlands occur immediately adjacent to the project east of Bletchley.

Potential impacts and mitigation

5.2.28 Direct impacts on ancient woodland and other key habitats located adjacent to the project would be avoided. Protection from indirect impacts on the network of ancient woodlands and other retained habitats (including HPI), will be a key consideration for design and mitigation proposals, including management through the CoCP to address risks of air pollution, as well as mitigating against habitat fragmentation and disruption of habitat connectivity. The need for habitat replacement areas would be determined as part of the EIA.

5.2.29 To ensure legal compliance with relevant wildlife legislation, appropriate mitigation strategies for legally protected species found to be present will be developed in consultation with Natural England as the ecology baseline for the project evolves.

5.2.30 The potential for impacts and effects on the qualifying interests and conservation objectives of the Oxford Meadows SAC will be considered through the Habitats Regulation Assessment. Further information can be found in the *Approach to Habitats Regulation Assessment* factsheet. As mitigation needs become clear, options that deliver wider benefits for other species and habitats will be devised wherever possible.

5.2.31 The project would intersect ditches and aquifers that are integral to the broader network of water bodies safeguarded and assessed under the WFD. There are at least seven WFD surface water catchments potentially impacted in this route section, which are listed earlier in this section (see 5.3.24). Assessments will be undertaken to demonstrate that

the project would not deteriorate the status of any WFD element or prevent the attainment of surface water and groundwater body objectives. Necessary mitigations could include riparian planting and reinstatement of natural bed and bank materials.

5.2.32 With respect to flood risk, fluvial hydraulic modelling at specific locations will be undertaken to assess in detail the impacts and develop flood mitigation measures. The Oxford Meadows SAC will be a key consideration in this respect. In all other locations where flood risk is minimal, desktop assessment will be undertaken on all sources of flood risk.

5.2.33 A balancing pond would be provided to the north-east of the proposed new Oxford Parkway car park area to attenuate rainfall runoff from the new car park. A grassland habitat would be created around the balancing pond to replace the loss of grassland in the corner of the existing station car park. This would improve landscape and habitat connectivity and integration. There will also be further woodland habitat creation in the form of strips running from the north-east to the south of Oxford Parkway station and car park.

5.2.34 Habitat creation is proposed in the form of scrub to replace lineside vegetation and provide connectivity with the ecological compensation sites delivered by the East West Rail Alliance. These will also provide landscape connectivity along the south side of the east of Islip passing loop and the south side of the Middle Claydon passing loop.

Landscape and the historic environment

Context

5.2.35 Between Oxford and Winslow, the project would pass through a broad belt of open, gently undulating lowland farmland, with livestock farming and enclosed pasture on low-lying land and arable cultivation on higher land. Woodland cover is scarce but hedges, hedgerow trees and field trees are a common sight. Oxford, Bicester and Bletchley have an urbanising influence on the surrounding landscape. These settlements and the major transport infrastructure crossing the landscape – including railways and main roads – reduce tranquillity and contribute to light pollution.

5.2.36 The Oxford to Bletchley route section is characterised by post-medieval rural fields scattered with small settlements in an area of generally low-lying land with scattered hills dotted across the landscape. The land rises into the Chiltern Hills to the east once it leaves the City of Oxford. Small tributary rivers, including the Cherwell and Ouzel, affect the broad floodplain landscape.

5.2.37 The landscape around the route reveals little evidence of human activity until the Neolithic period when people began to settle, and farming became more widespread. Rural settlements grew during the Iron Age and evidence of groups of roundhouses and enclosures from these periods is scattered across the landscape. There is also a heavy

Roman influence with road networks running through the project. Remains of Roman villas and smaller farmsteads are present.

5.2.38 The Domesday Book notes Oxford to be a large settlement area, with various small settlements scattered throughout the surrounding landscape. This general historical character remains unchanged, although the rural landscape is now characterised by post-medieval fields. The landscape has also been changed by the growth of the large-scale extractive industries, including brick, clay and tile production. The railways' arrival in the 19th century had a profound influence in both Oxford and Bletchley and the landscape in between. Both towns expanded rapidly with Oxford becoming more industrial and Bletchley losing its small village size. Over the course of the 19th and 20th centuries major transport infrastructure was introduced, supporting the movement of people, raw materials and manufactured goods. These networks still exist today.

Potential impacts and mitigation

5.2.39 The existing railway has a fairly discreet presence in the landscape currently, being mainly lined by vegetation and being at ground level. Removal of vegetation during construction would make the railway infrastructure more prominent in places, but new and replacement planting would gradually reintegrate it into the landscape. Careful design of the public realm at the new and expanded stations would limit urbanising effects on the landscape and historic environment by day and night. Construction activity in the railway corridor north of Oxford station would be visible from Port Meadow, which is one of the views constituting Oxford's historic skyline.

5.2.40 The proposed changes to the stations and along the railway corridor would not fundamentally change the character of the landscape in this route section since they would take place along an existing railway corridor. Woodland habitat creation to the eastern extent of Oxford Parkway station would improve landscape and woodland connectivity and provide visual screening. There would also be further woodland habitat creation to provide new woodland planting and visual screening to realigned roads. These would take the form of strips which run from the north-east to the south of Oxford Parkway station and car park.

5.2.41 A balancing pond would be provided to the north-east of the proposed new Oxford Parkway car park area to attenuate rainfall runoff from the new car park. A grassland habitat would be created around the balancing pond to replace the loss of grassland in the corner of the existing station car park. This would improve landscape and habitat connectivity and integration.

5.2.42 The scheduled monument of Rewley Abbey lies close to Oxford station, although little remains above ground of the Abbey, and its setting has been significantly altered since its closure in 1536. There is a cluster of listed buildings to the east of Beckett Street including Grade II listed St Thomas Church. The possible turnback south of Oxford station has the potential to change the setting of these listed buildings and Rewley Abbey scheduled

monument. These heritage assets and their settings will be investigated to understand how their surroundings contribute to their historic interest and to what extent the proposed works would impact this. Where historic value may be lost, mitigation measures will be developed. EWR Co would also look at ways of sharing any new information in celebrating the importance of these buildings and their history.

5.2.43 The setting of Islip Mill, a listed building, and its associated buildings would be affected temporarily by a construction compound and permanently by the construction of an electricity substation. Mitigation will be explored to reduce impacts both during and after construction. Similarly, the setting of the Grade II listed Station House approximately 15m north-west of the London Road level crossing could be changed by the proposed new footbridge. However, the impacts are likely to be minor given the historic relationship between the building and the railway. Opportunities to mitigate any impacts or better reveal the heritage value of the building will be investigated.

5.2.44 The scheduled Roman site of Alchester, south of Bicester, is bisected by the current railway, with two existing utilities running through this site. If the route between Oxford and Bletchley is electrified with OLE, these utilities would need to be diverted and/or the cables lifted to accommodate the trains. The impact of the utilities work would need to be managed carefully with appropriate surveys and investigation to fully understand the effect on the historic importance of the monument and its remains. From this, impacts could be managed either through design mitigation or through appropriately designed archaeological works.

5.3 Option comparison

5.3.1 The main environmental differences between the respective footbridge and underpass crossing at London Road are presented in Table 5-2, which summarise the environmental information that was used in the Assessment Factor process. Chapter 6 of the Technical Report provides more detailed information on the assessment process and the other factors considered when comparing these options.

Table 5.2: Comparison of the key environmental considerations between Options 1a and 1b for London Road level crossing

Topic	Option 1a (Footbridge at London Road)	Option 1b (Underpass at London Road)
People and communities	The bridge would provide an unsympathetic modern addition to the railway setting of Station House when viewed from along London Road from the south. Given the scale and type of structure it has the potential to dominate views both in the foreground and as the backdrop to Station House. Greater potential to reduce temporary use of land, as construction requirements for a footbridge are likely to be less than for an underpass.	Potential for greater construction impacts, such as noise and vibration and greenhouse gas, due to increased construction work and duration. Demolition of two buildings (Edmonson Electrics and Bodyshop). Removes access to existing station car park and drop off area, which impacts local people. May also impact the bus stop and car parking spaces at the front of Bicester Village station. Perceived safety concerns for people using an underpass. During construction, more visually intrusive as the construction of the pedestrian underpass would affect a larger area and be closer to receptors and there would be less screening by intervening buildings. During operation, less visually intrusive than a footbridge. More waste expected, but difference between options is relatively small.
The natural environment	No key issues.	Potential surface water flood impacts associated with an underpass.
The historic and cultural environment	No key issues.	No key issues.

6. Fenny Stratford to Kempston

6.1 Project description

Summary

6.1.1 This route section covers approximately 23km (14 miles) of the existing Marston Vale Line (MVL) between Saxon Street dual carriageway and Ampthill Road in Kempston. The MVL, which runs between Bletchley and Bedford, is currently used by London Northwestern Railway passenger trains and freight trains and includes nine existing stations.

6.1.2 Two alternative options for the stations along the MBL are being presented at this consultation as summarised in the table below:

Table 6.1: MVL station options

Concept 2 (Consolidated Stations Option)	Concept 1a (Existing Stations Option)
The nine existing stations between Fenny Stratford to Kempston would be consolidated into four new stations (Woburn Sands, Ridgmont, Lidlington and Stewartby). The other five would be closed.	All nine of the existing stations will be retained with minor enhancements and upgrades as necessary.

6.1.3 The initial environmental information in this route section is based on the Consolidated Stations Option as this would have potentially larger environmental impacts than the Existing Stations Option due to associated landtake, introduction of structures and activities.

6.1.4 A commentary on the likely environmental impacts associated with the Existing Stations Option is provided in section 6.4. A more detailed comparative analysis of the environmental and other considerations associated with the alternative options is set out in Chapter 7 of the Technical Report. This also includes a hybrid option which combined elements of the other two options which has also been considered by EWR Co.

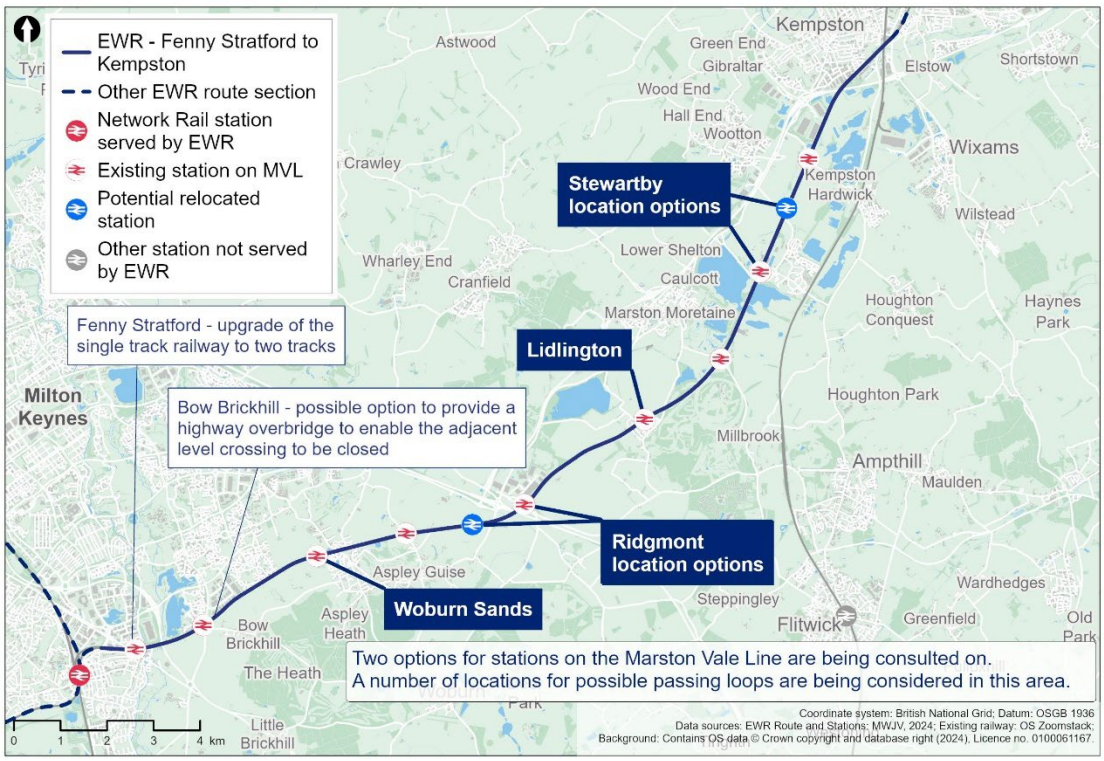
6.1.5 The proposed works for the Consolidated Stations Option are summarised below:

- Existing stations at Woburn Sands, Ridgmont, Lidlington and Stewartby would be replaced by four new enlarged stations to accommodate East West Rail services.
- Five existing stations at Fenny Stratford, Bow Brickhill, Aspley Guise, Millbrook and Kempston Hardwick would be closed.
- Upgrading the existing single track to two track over about 1.7km (1 mile) approximately between Saxon Street and the A5.

- Improved or new access roads for track maintenance at various locations across the route section.
- Changes to level crossings in this area which would be: retained; upgraded; closed and diverted; closed and replaced by bridge crossings and associated diversions of rights of way; or closed without alternative provision.
- Installation of various drainage and water storage ponds (referred too as balancing ponds) along the route section.
- Various utility diversions including overhead power lines and below ground gas pipes.
- Upgrades to existing railway signalling, telecommunications and traction power facilities.
- Passing loops to allow faster passenger trains to overtake slower trains (see Table 6.1).

6.1.6 The proposed East West Rail passenger train service pattern between Bletchley and Bedford would be three trains per hour in each direction. Line speed would increase from 60mph to 75mph for passenger trains under the Consolidated Stations Option.

Figure 6-1: Proposed route of the project between Fenny Stratford and Kempston



Project proposals

Fenny Stratford

6.1.7 The existing railway runs east from Saxon Street and through Fenny Stratford station on a single track. An additional track, mostly within the existing railway corridor, is proposed as part of the project to accommodate the new East West Rail services. The new track would start just west of Saxon Street bridge and join the railway just east of the A5, from where it would then join the existing two-track alignment. To accommodate two tracks, the southern bridge that carries the railway over Saxon Street would be demolished and replaced with a wider bridge and the current level crossing on Simpson Road would be widened. The northern bridge over Saxon Street would remain. The railway embankment between Bletchley station and Saxon Street would also need to be widened on the south side of the railway. Between Saxon Street and Watling Street retaining walls may be required between the railway and commercial properties to the north and south to avoid impacts to existing buildings.

6.1.8 Under the Existing Stations Option, Fenny Stratford would be trained, with minor enhancements including construction of a second platform.

6.1.9 Under the Consolidated Stations Option, Fenny Stratford station would be closed. The existing level crossing on Simpson Road would be widened to accommodate both tracks. East of the existing station, minor modifications to the existing Grand Union Canal bridge to allow for the additional track and additional structures would be required to support the two tracks over the River Ouzel and the A5.

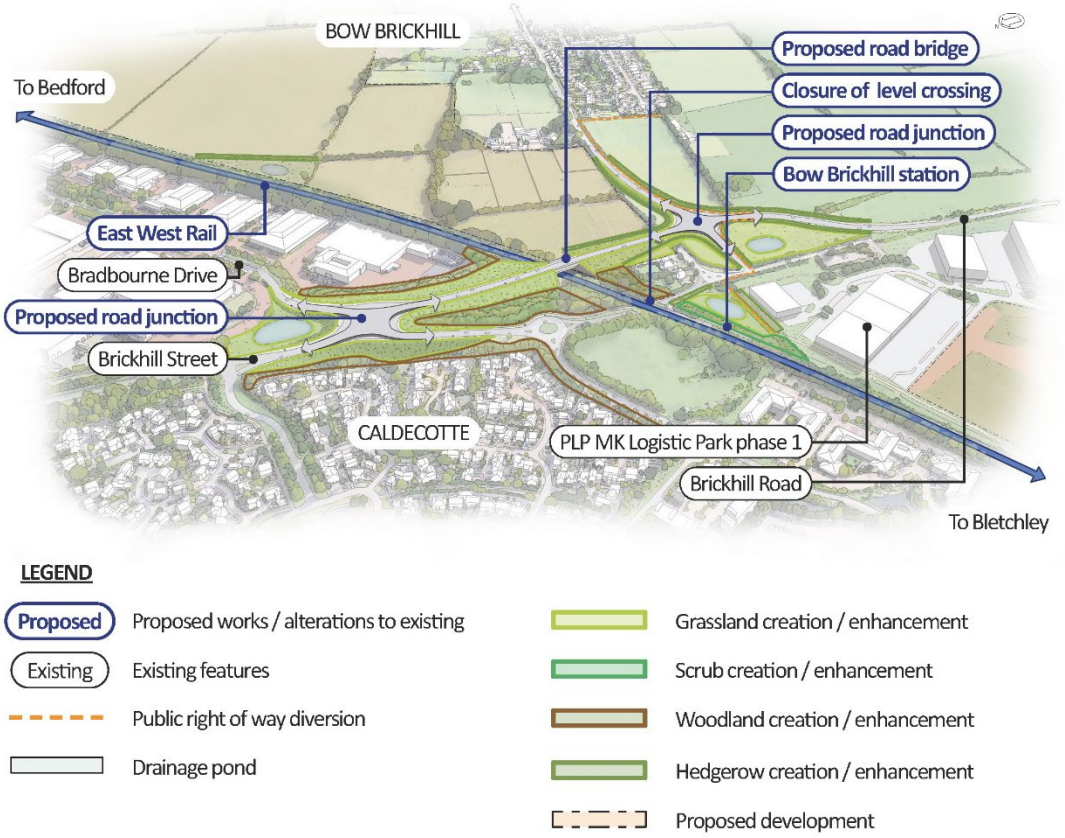
Bow Brickhill

6.1.10 Under the Existing Stations Option, Bow Brickhill would be retained, with minor enhancements.

6.1.11 Under the Consolidated Stations Option, Bow Brickhill station would be closed. The level crossing may need to be closed and replaced with a new highway overbridge to the east of the crossing (see Figure 6-2).

6.1.12 Browns Wood footpath level crossing would be closed, with users diverted onto a new section of public footpath south of the railway to the Pony bridleway level crossing to the east. The Pony bridleway level crossing would be upgraded to include a miniature stop light to improve safety.

Figure 6-2: Indicative illustration of Bow Brickhill level crossing closure and new bridge crossing



Woburn Sands

6.1.13 Under the Existing Stations Option, Woburn Sands station would be retained in its location, and the platforms extended for the EWR service.

6.1.14 Under the Consolidated Stations Option, the existing Woburn Sands station would be closed and a new station to replace it constructed to the west of its current location. The station and car park would be located north of the railway within the area of the South East Milton Keynes Strategic Urban Extension proposal (SEMK). The existing level crossing at Station Road/Newport Road would remain open. The other four level crossings in this area would be closed:

- Woodleys Farm, a private track and level crossing would be closed with access to be discussed with the relevant landowners.
- Fisherman's Path footpath level crossing would be closed and users diverted via Drayhorse Crescent south of the railway and the proposed new station access road north of the railway to Woburn Sands level crossing.
- Mill Farm footpath level crossing would be closed and users diverted via existing footpaths to Woburn Sands level crossing.

- Sewage Farm footpath level crossing would be closed and users diverted via a section of new footpath between Mill Farm and Sewage Farm crossings to the south of the railway to Woburn Sands level crossing, creating a circular walking route.

Aspley Guise

6.1.15 Under the Existing Stations Option, Aspley Guise would be retained, with minor enhancements.

6.1.16 Under the Consolidated Stations Option, Aspley Guise station would be closed. The level crossing on Salford Road would remain open. The other three level crossings in this area would be closed:

- Old Manor Farm footpath level crossing to the east of Aspley Guise would be closed with users diverted to the Aspley Guise level crossing along a new access track and footpath that would be built on the north side of the railway.
- Berry Lane level crossing, a private user-operated crossing located east of Old Manor Farm, would be closed and users diverted to Aspley Guise level crossing using the access track on the north side of the railway.
- Long Leys level crossing, a private farm crossing, would be closed and users diverted to Aspley Guise (Station Road) level crossing using the access track and footpath on the north side of the railway and via Berry Lane south of the railway.

Ridgmont

6.1.17 Under the Existing Stations Option, Ridgmont would be retained, with minor enhancements and platform extensions.

6.1.18 Under the Consolidated Stations Option, Ridgmont station would be redeveloped, although the location is still to be determined (see Table 6-1). The Bedford Borough Council Local Plan 2030 includes a proposal for a waterway between Bedford and Milton Keynes, which would run alongside the railway in this area. If Option 1 for the station is built, the proposed route of the waterway would need to be diverted around the station area.

6.1.19 The station option chosen would affect the level crossings in this area, so two options are still under consideration for Station Road level crossing (see Table 6-1). An access track between Berry Lane and Bedford Road would be constructed, and would provide access to the new western station, if chosen.

Table 6.2: Ridgmont Station options

Proposed intervention	Option 1	Option 2
Ridgmont station and level crossing	New station to the west of Bedford Road with station and car park located to the north of the railway. Level crossing to be retained.	Upgrade station in its current location with a new car park south of the railway. Station Road level crossing to be closed, with traffic re-routed.

6.1.20 Three level crossings in the area would be closed:

- Husborne Crawley 6 footpath level crossing would be closed and users diverted via Ridgmont station footbridge (with station Option 1) or via Bedford Road (with station Option 2).
- Matey Boys level crossing, a private farm crossing, would be closed with no diversion.
- Husborne Crawley 10 footpath level crossing would be closed and the footpath extinguished north and south of the railway. An alternative route for existing users is available via Mill Road with users diverted via Ridgmont level crossing (with station Option 1) or via Ridgmont station footbridge (with station Option 2).

6.1.21 Depending on which option is selected for Ridgmont station, a passing loop is proposed with new tracks either side of the railway between Aspley Guise and Ridgmont stations. The chosen options for the passing loops are still to be determined (see Table 6-1).

Lidlington and Millbrook

6.1.22 Under the Existing Stations Option, Lidlington would be retained, with minor enhancements and platform extensions.

6.1.23 Under the Consolidated Stations Option, Lidlington station would be replaced with a new station east of its current location into an area of land to the north of the village that is part of the Marston Valley development. Access to the station would be from the north via a new road between Station Road and Marston Road.

6.1.24 Under the Existing Stations Option, Millbrook would be retained and given minor enhancements.

6.1.25 Under the Consolidated Stations option, Millbrook station would be closed.

6.1.26 There are seven level crossings in this area. Three of them would be closed with diversions provided to alternative crossings. These are each described below:

- Broughton End footpath level crossing and the adjacent Forty Steps footpath level crossing (both public rights of way; PRoW) would both be closed. Users would be diverted to the existing Playing Field footpath level crossing (via a new footpath between Forty Steps and Playing Field to the north of the railway), which would remain open and be upgraded with a miniature stop light system.
- The existing level crossing at Lidlington on Station Road/Church Street would remain open.
- Piling Farm South footpath level crossing would be closed and the path diverted to the new Lidlington station footbridge.
- The level crossing on Marston Road is assumed to be closed by Network Rail with a new overbridge. If this does not happen, it would be kept open and upgraded to a full barrier crossing.
- Millbrook (Station Lane) level crossing by Millbrook station would remain open.

Stewartby

6.1.27 Under the Existing Stations option, a third platform would be required at Stewartby station to accommodate the two proposed services that would operate between Stewartby and Cambridge under this option. Because of this, under this option, Stewartby station may need to move from is existing location. Further work is required to confirm this.

6.1.28 The existing Stewartby station would be replaced with a new station. The preferred location of the new station is still to be determined (see Table 6-1). The road and adjacent level crossing at Green Lane would remain open, as well as the level crossing further north at Wooton Broadmead (Broadmead Road).

Table 6.3: Stewartby station options

Proposed intervention	Option 1	Option 2
Stewartby station	New station option north of Green Lane with the station and car park located to the east of the railway and access via Green Lane.	New station option north of Broadmead Road with the station and car park to the east of the railway and access via Broadmead Road.

6.1.29 Stewartby Brickworks level crossing, used as a PRoW and formerly by users of the brickworks, would close with no alternative provided.

6.1.30 Four passing loop options are proposed in the vicinity of Stewartby and Kempston Hardwick stations (see Table 6-1), with the preferred option still to be determined. The passing loop location would depend on the location of the new station.

Kempston Hardwick and Kempston (Bedford)

6.1.31 Under the Existing Stations option, Kempston Hardwick would be retained and given minor enhancements.

6.1.32 Under the Consolidated Stations option, Kempston Hardwick station would be closed. Wootton Village footpath level crossing would be closed and users diverted by new paths east and west of the railway to the level crossing at Kempston Hardwick (Manor Road). The level crossing on Manor Road is assumed to be closed by Network Rail and replaced by a new overbridge. If this does not happen, it would be kept open and upgraded to a full barrier crossing. The Woburn Road footpath level crossing is assumed to be closed by Network Rail and replaced by a new footbridge. If this does not happen, it would be kept open and upgraded with a miniature stop light system.

Options

6.1.33 Table 6.4 shows where options remain for passing loops in the Fenny Stratford to Kempston route section. For each intervention, one of the options would be selected. Further technical work will be carried out alongside consideration of consultation feedback to determine which option is most suitable.

Table 6.4: Fenny Stratford to Kempston route section passing loop options

Proposed intervention	Option 1	Option 2	Option 3
Passing loops westbound	North of the railway, between Berry Lane level crossing and Bedford Road overbridge.	West of the railway, south of Green Lane.	West of the railway, north of Broadmead Road.
Passing loops eastbound	South of the railway, between Berry Lane level crossing and Bedford Road overbridge.	East of the railway, south of Broadmead Road and opposite the former brickworks sidings.	East of the railway, north of Broadmead Road.

6.2 Initial environmental information

People and communities

Context

6.2.1 East West Rail would introduce an important new rail service along the existing railway, providing new journey opportunities for residents and businesses between Fenny Stratford and Kempston, with benefits for the economy of local areas and the amenity of the population. Upgrades introduced by East West Rail to the existing MVL are aimed at meeting the needs of the future communities along the route.

6.2.2 Under the Consolidated Stations Option, the more substantial works in this route section would take place at the locations of the four new/relocated stations. Given the existing presence of the railway and its services, impacts from new infrastructure would be relatively limited and localised. The operation of new services would bring about overall journey improvements, although this would require changes for existing passengers where stations are to be closed.

6.2.3 There are currently 30 level crossings along this route section that would be subject to a range of proposed interventions, as described previously in this section.

6.2.4 A review of the potential impacts to people's wellbeing and amenity – both positive and negative – that would result from the operation of the new railway and its facilities is set out below, along with initial proposals for mitigating potential adverse effects. Potential disruption during construction is addressed separately, with explanation of how it could be mitigated where practicable.

Potential impacts and mitigation

6.2.5 Although works along this route section are generally limited, the MVL passes some populated areas, including Fenny Stratford, Woburn Sands, Aspley Guise, Lidlington and the southern outskirts of Bedford in Kempston.

6.2.6 In residential areas, the existing noise levels include a contribution from the existing railway, along with other infrastructure, including roads, industry and construction activities or general noise associated with local residential activities. The East West Rail service would use an existing line, so the railway and trains are a familiar aspect to people's environment and experience. However, under the Consolidated Stations Option, new stations, line upgrades and other works would represent changes to sound and views that may need to be considered for mitigation if and where significant effects are envisaged. Noise mitigation may be required at Lidlington and Woburn Sands subject to the findings of the sound noise and vibration assessment.

6.2.7 The Transport Assessment will examine how changes to the nine stations (under each alternative operational scenario) that currently serve people along this route section of the MVL will affect current and future passengers. The Consolidated Stations Option proposals are for replacement stations at Woburn Sands, Ridgmont, Lidlington and Stewartby, with the new stations offering various improvements over those they would replace. Existing stations at Fenny Stratford, Bow Brickhill, Aspley Guise, Millbrook and Kempston Hardwick would close under this option.

6.2.8 The new stations would result in visual impacts. These would mainly affect residents and users of PRoW close to the new stations. The new stations, generally to be located on farmland, would be new features in rural views. In time, planting mitigation around the new stations and replacement planting along the line would screen the new structures. New access, public realm and lighting around the new stations would be designed to minimise their urbanising influence and impacts on night-time views. Proposals for

extensive residential and commercial development along the route of East West Rail between Fenny Stratford and Kempston would, if implemented, give rise to new visual receptors and would change the character of existing views from rural to urban.

6.2.9 Although there is an opportunity to improve existing open space around Caldecotte Lake, north of the railway, the potential for local concerns about impacts here would require close working with local stakeholders to help establish a design that includes suitable environmental mitigation. There is also an opportunity to enhance open space at Lidlington community woodland, south of the railway.

6.2.10 There are various proposals for the 30 level crossings along this route section that have been described previously in this section. The Transport Assessment will describe how the impacts from the different railway crossing solutions will affect local access. The potential new overbridge at Bow Brickhill would be a prominent new structure in views over the mainly rural landscape.

6.2.11 The passing loops would involve widening the rail corridor over a length of about 1km (0.6 miles). Potential impacts would affect local views through the expansion of the rail corridor and removal of existing trackside vegetation. There may be an increase in noise levels, although the close alignment of the passing loop alongside the main MVL would limit this. Planting along the railway corridor and other mitigation measures would greatly limit the risk of significant adverse effects.

6.2.12 Desk-based research has identified agricultural land within the draft Order Limits in this route section. Most of this is expected to be Grade 3 (good to moderate quality land), which may be classified as best and most versatile (BMV) depending on future survey results. A large proportion of this agricultural land is identified within committed developments or is allocated for future development under local plan policy. Ongoing design development will take agricultural land and farm holdings into consideration to reduce impacts.

6.2.13 Under the Consolidated Stations Option, the project would require the permanent acquisition and temporary use of certain land and property. It is currently estimated that 61 residential properties would be subject to permanent acquisition or temporary use. These, as well as other potential permanent and temporary impacts, are summarised below:

- **Fenny Stratford** – Acquisition from one property on Watling Street (rear garden), temporary use from 20 residential properties at The Sidings on Simpson Road (parking spaces), demolition of two commercial units on Tavistock Street, and temporary loss of parking for five businesses.

- **Bow Brickhill** – Demolition to stables and loss of parking facilities for Red Bull Racing on Bradbourne Drive and a car park on Brickhill Street.

- **Woburn Sands** – Temporary use of one residential property on Summerlin Drive (rear garden).

- **Aspley Guise** – Permanent acquisition from one residential property (rear garden) and temporary use of ten residential properties on Salford Road (front gardens/driveways).
- **Ridgmont** – Temporary use of a café, and permanent acquisition from railway infrastructure including the existing station car park. The option to redevelop the existing station would require permanent acquisition from three commercial facilities including the station café and heritage centre.
- **Lidlington** – Permanent acquisition from two residential properties on Lombard Street (rear gardens) and temporary use of four residential properties at Sheeptick End (gardens).
- **Millbrook** – Temporary use of three residential properties on Station Lane (gardens), and acquisition from two commercial facilities.
- **Marston Moretaine** – Temporary use of 18 residential properties on Great Beanhills, Ford Piece and Great Holmes (car parking).
- **Kempston** – Acquisition from a joint residential and commercial property on Ampthill Road (rear garden and parking) and acquisition from one commercial property (parking).

6.2.14 EWR Co recognises the effects these impacts would have and will work with affected parties as the designs are further developed, to seek to agree measures to reduce the impacts of the proposals where possible and enter into agreements with property owners where property would need to be acquired or used. Further information is provided in the *Guide to Compulsory Acquisition and Compensation*.

Temporary construction impacts

6.2.15 The construction programme would be driven by the Fenny Stratford twin tracking and associated bridge works. The overall duration would be dependent on gaining access to the existing railway whilst reducing impact on current services. The main construction compound would be sited off Tavistock Street on the existing site of a builders' merchant.

6.2.16 Otherwise, construction compounds would be mostly located at new stations or at locations requiring new or replacement structures. Works at stations could affect station users due to reduced parking and access, and careful management of these potential impacts would be necessary. The construction of the passing loops would also require a dedicated construction compound. Works would generally be quite limited and delivered relatively quickly, compared with sections of new line further east.

6.2.17 Construction heavy goods vehicles (HGVs) would take the shortest suitable route between compounds and the strategic road network. The majority of HGVs would use Bletcham Way to access the A5 in Bletchley or the A421 and A507 to access the M1 at junction 13 east of Bletchley. Some construction traffic at the eastern end of the section

would access the A421 at Beancroft Road or Woburn Road using Bedford Road or Woburn Road.

6.2.18 All construction compounds between Fenny Stratford and Kempston are expected to generate low or medium levels of construction HGV traffic. However, tranquillity could be reduced due to the noise and activity generated by construction.

6.2.19 Work affecting road level crossings would mean traffic diversions would be required. The potential bridge replacement at Bow Brickhill (if required) would be built in advance of the level crossing closure where practicable. Where diversions are required, these would also be implemented prior to level crossing closure if practicable. PRoW crossings could be similarly affected and equally require similar management to allow for continuity of access.

6.2.20 The residential areas around the train line of Fenny Stratford's High Street and Tavistock Street have been identified as key areas for potential temporary sound, noise and vibration (SNV) impacts as a result of construction. Similarly, risks of temporary SNV impacts are identified for businesses and properties for Lake Business Park, Caldecotte, properties between Bernstein Close and Beethoven Close, Old Farm Park, Woburn Sands, Aspley Guise, Lidlington, Marston Moretaine and south Bedford.

6.2.21 Potential impacts from construction, such as increased noise, poor air quality and increased dust would be controlled through various good practice measures set out in the draft CoCP, which would be mandated through contract arrangements and closely monitored throughout construction.

The natural environment

Context

6.2.22 The Fenny Stratford to Kempston route section commences through a green urban corridor at Bletchley and Fenny Stratford, which is wide in places and comprises woodland habitat of principal importance (HPI) and a mosaic of woodland and grassland at the Grand Union Canal and River Ouzel end. The rail corridor between Bletchley and Woburn Sands is classified as wildlife corridor by Milton Keynes City Council.

6.2.23 Both the Grand Union Canal and the River Ouzel floodplain, where the project would cross, are also part of the Milton Keynes Wet Wildlife Corridor, and Caldecotte Lake has been designated as a county wildlife site.

6.2.24 To the south of the project, the elevated Greensand Ridge above the low-lying claylands supports characteristic heathland and woodland habitats around Wavendon and Apsley Heaths. These are some distance from the project (closest point 1km) but form a significant habitat complex in the locality.

6.2.25 The majority of the route section beyond Woburn Sands passes through a predominantly arable and commercially farmed landscape. There is a patchwork of semi-natural habitats

present in this landscape, with networks of small areas of broadleaved woodland east of Woburn Sands and north-east of Lidlington, the latter associated with the extensive Millbrook vehicle testing centre.

6.2.26 Immediately north of the Millbrook vehicle testing centre several county wildlife sites straddle the existing line, including Stewartby Lake, Rookery Clay Pit, Coronation Pit, Quest Pit and the Kempston Hardwick Pit. These comprise a characteristic post-industrial landscape which has been restored to form a collection of important wildlife sites immediately adjacent to the project.

6.2.27 There is a variety of semi-natural habitats in the low-lying claylands along the route section that are suitable for a range of species associated with ancient woodland, grassland and wetland sites. These may be important for waterbirds, great crested newt, water vole and otter. In the wider farmed landscape, brown hare and badger are likely to be present and a number of bat species are located in the buildings and trees in this landscape and within the built-up areas, as well as foraging over the numerous waterbodies.

6.2.28 The crossings of the Grand Union Canal and River Ouzel east of Bletchley, Broughton Brook alongside the M1, and Elstow Brook on the outskirts of Bedford are each associated with high flood risk Flood Zone 3, as is the county wildlife site complex around Stewartby Lake. Records of otter and water vole are associated with these water features. There are at least three Water Framework Directive (WFD) surface water catchments in this route section, namely Elstow Brook, Broughton Brook, and Ouzel (US Caldecotte Mill).

Potential impacts and mitigation

6.2.29 Surface and groundwater bodies adjacent to this route section are vulnerable to changes in ecology, water quality and other hydrological and hydrogeological characteristics. However, given the extent and nature of the proposed works, and that the project follows the existing railway, the potential for impacts and effects is limited.

6.2.30 The project would intersect ditches and aquifers that are integral to the broader network of water bodies safeguarded and assessed under the WFD, with at least three WFD surface water catchments potentially impacted in this route section (see 6.3.28). Assessments will be undertaken to demonstrate that the project would not deteriorate the status of any WFD element or prevent the attainment of surface water and groundwater body objectives. Necessary mitigations could include riparian planting and reinstatement of natural bed and bank materials. Additional mitigation measures may also be required where the route intersects or passes close to former landfill sites, such as at Stewartby.

6.2.31 Direct impacts on ancient woodland and other key habitats located adjacent to the project would be avoided. Protection from indirect impacts on the network of ancient woodlands, and other retained habitats (including HPI), will be a key consideration for design and mitigation proposals, including management through the draft CoCP to

address risks of water and air pollution, as well as mitigating against habitat fragmentation and disruption of habitat connectivity. The need for habitat replacement areas would be determined as part of the EIA.

6.2.32 To ensure legal compliance with relevant wildlife legislation, appropriate mitigation strategies for legally protected species found to be present will be developed in consultation with Natural England as the ecology baseline for the project evolves.

6.2.33 Planting and landscaping either side of the railway and at new stations and around balancing ponds would include woodland, grassland, scrub and hedgerow habitat creation. At Ridgmont and Woburn Sands hedgerow habitat creation would be used to restore field boundaries.

Landscape and the historic environment

Context

6.2.34 The majority of the route between Fenny Stratford and Kempston passes through a gently undulating lowland plateau, divided by shallow river valleys. Intensive arable farming is the predominant land use but in places, business and technology parks and new housing developments have had an urbanising influence on the countryside. The area has an extensive network of footpaths. Proposals for extensive residential and commercial development along the East West Rail route between Fenny Stratford and Kempston, if implemented, would further diminish the rural character of the landscape.

6.2.35 The route section has yielded various archaeological finds related to early use by Mesolithic hunter-gatherers around a former riverbed, within what was an otherwise largely wooded environment during this period. During the Neolithic and Bronze Age periods the forested areas were cleared and farmed. This is visible around the Ouse and Ouzel valleys as ring ditches, with settlement seen at Bancroft. The Iron Age witnessed centralised settlement, and crop marks west of the project between Brogborough and Marston Moretaine provide evidence of settlement from this period.

6.2.36 Major Roman settlements are found in the area, but away from the proposed works. The evidence of rural settlement is extensive in this route section, with various farmsteads scattered through the landscape. Roman roads cross the proposed route with one running from Marston Moretaine to Kempston.

6.2.37 There are no known medieval villages within the draft Order Limits, although a scheduled medieval moated site is located north of Lidlington, along with the Grade II listed Thrupp End Farmhouse.

6.2.38 During the medieval and post-medieval period, the majority of the proposed route was under agricultural cultivation, firstly as medieval open fields with the characteristic ridge and furrow, then as an enclosure landscape. Within the landscape there is also Woburn Abbey, the seat of the Dukes of Bedford, with its Grade I registered park and garden.

Whilst the site dates from the 12th century when an abbey was established, the gardens mainly date to the 18th and 19th centuries, using the 17th century garden layout as their base. The rural landscape was interrupted by the opening of the MVL in 1846. The 7th Duke of Bedford had great influence over how stations and crossing cottages within his land (Fenny Stratford, Woburn Sands, Ridgmont, Millbrook and a heavily altered Lidlington survive) were built, using a half-timbered style. Apart from Lidlington, these are all Grade II listed buildings.

6.2.39 Although development within the northern part of the route section is less widespread, Stewartby Brickworks became the largest brickworks in the world during the 20th century. Grade II listed kilns remain at the site and their industrial setting, including water storage tanks and industrial sheds, contributes to understanding their historic importance.

Potential impacts and mitigation

6.2.40 The introduction of new stations (under the Consolidated Stations Option) and railway corridor would not fundamentally change the character of the landscape in this route section as they would be situated along an existing railway corridor. The existing railway has a fairly discreet presence in the landscape, being mainly at grade and the railway corridor lined by vegetation. Removal of vegetation would make the railway infrastructure more prominent but new and replacement planting would gradually reintegrate it into the landscape. Careful design of the public realm and consideration of lighting at the new and expanded stations, and of new bridges and of road realignments would limit urbanising effects on the landscape by day and night.

6.2.41 Planting and landscaping either side of the railway would include woodland, grassland, scrub and hedgerow. At Fenny Stratford improvements are proposed to the existing open space at Caldecotte Lake, to the north of the railway. The implementation of balancing ponds in Fenny Stratford, Bow Brickhill, Woburn Sands, Ridgmont, Lidlington and Stewartby would provide opportunities for woodland and grassland habitat creation. Proposals for new stations at Woburn Sands and Stewartby (Option 1) would include woodland, grassland and scrub habitat creation. Scrub and hedgerow habitat would be created surrounding the proposed Brickhill Road overbridge. Further woodland creation is proposed to the north of the railway at Millward Drive Park in Fenny Stratford, Bow Brickhill, south of Lidlington, and trackside at Stewartby.

6.2.42 An Iron Age or Roman settlement may be impacted to the west of Woburn Sands due construction of the new station. A programme of archaeological investigation, including geophysics and trial trenching, will inform the understanding of how this landscape has developed and been used over time. This will help with the design and development of appropriate mitigation which reflects the historic importance of what is found, as well as wider landscape priorities.

6.2.43 The setting of both the scheduled medieval moated site north of Lidlington, and the Grade II listed Thrupp End Farmhouse would be impacted by the relocation of Lidlington station and utility diversions. Mitigation will be developed to integrate the station development into the wider landscape, including woodland creation and hedgerow planting, which in turn would reduce the impact of the project on the setting of the moated site and the farmhouse.

6.2.44 There would be changes affecting the Grade II listed buildings associated with the Woburn Estate. The listed station buildings are largely outside the draft Order Limits and are used for residential or commercial uses unrelated to the railway. However, there would be changes to their settings, mainly through station relocations under the Consolidated Stations Option. This would reduce the ability to understand their historic function and importance. For these stations, work will be undertaken to fully understand the contribution setting makes to their heritage value. Mitigation proposals will be developed which reflect their importance, potentially through landscape design, design of East West Rail railway structures or interpretation of the history of the stations and the railway. The option to redevelop Ridgmont station in its current location requires draft Order Limits that include the listed structure. Further work will be undertaken to fully understand the impacts on the listed building and the current occupants that use it as a heritage centre and tea rooms.

6.2.45 Construction works and permanent changes would need to recognise and accommodate the sensitivity of the Grade II structures of Stewartby Brickworks and their setting, reflecting and revealing their important industrial history.

6.3 Environmental considerations for Ridgemont and Stewartby station alternatives (Consolidated Station Option) options

6.3.1 As noted above, the Consolidated Station Option includes alternative proposals for location of Ridgmont Station and level crossing, and Stewartby station. The main environmental differences between these options are presented in Tables 6.5 and 6.6, which summarise the environmental information that was used in the Assessment Factor process. Chapter 7 of the Technical Report provides more detailed information on the assessment process and the other factors considered when comparing these options within the overall Consolidated Station option. An appraisal of the passing loop options has not been completed at this stage, as they are dependent on the outcome of preferences for Ridgmont and Stewartby stations.

Table 6.5: Comparison of the key environmental considerations between Options 1 and 2 for Ridgmont station and level crossing

Topic	Option 1 (new station west of Bedford Road; level crossing retained)	Option 2 (redevelop existing station; close Station Road level crossing)
People and communities	Locates station further away from current community, so reduced convenience for local residents and businesses. Greater loss of agricultural land.	Likely permanent loss of two business premises and temporary impacts on another. Closure of level crossing will adversely affect current users, although this is yet to be fully explored.
The natural environment	No key differences between options.	No key differences between options.
The historic and cultural environment	Grade II listed station building removed from the station setting that is part of its value.	Grade II listed station building remains within the station setting.

Table 6.6: Comparison of the key environmental considerations between Options 1 and 2 for Stewartby station

Topic	Option 1 (new station north of Green Lane)	Option 2 (new station north of Broadmead Road)
People and communities	No key issues.	Locates station further away from current community so reduced convenience for local residents and businesses.
The natural environment	Located on a brownfield site.	Located on a greenfield site. Loss of HPI.
The historic and cultural environment	Potential impacts to Grade II listed Stewartby Brickworks and Stewartby Conservation Area.	No key issues.

6.4 Existing stations option

6.4.1 As described in 6.1.2, two options are being considered for the stations along the MVL. The likely environmental impacts described in this chapter are based on the Consolidated Station Option as this would have potentially larger environmental impacts than Existing Station Option due to the associated landtake and introduction of new structures and activities.

6.4.2 The Existing Stations Option would involve relatively minor upgrades to all existing stations for safety and accessibility purposes. More substantial works would be required

at Stewartby station. Platform extensions would be required to accommodate longer East West Rail trains at Woburn Sands, Ridgmont, Stewartby and Lidlington, whilst some minor platform extensions might also be required at other stations for safety purposes.

6.4.3 The table below provides a summary of the likely environmental impacts associated with the Existing Stations Option.

Table 6.7: Comparison of the key environmental considerations between the three MVL station options

Considerations	**Concept 1a (Existing Stations Option)**
People and communities	All stations will remain open for access to public transport. But some existing stations are not well located for access by foot and many do not have existing parking spaces or vehicular drop off areas. Some connectivity benefits from new train services Some disruption on local roads and public rights of way for station upgrades. Parking facilities at some stations is constrained, which could result in increased on-street parking and traffic around stations. Platform extensions and minor enhancements at all nine stations will create some additional construction impacts and potential addition landtake. These works would have an impact on residential properties (Aspley Guise and Millbrook), and farms and development land (Kempston Hardwick). Some noise and vibration likely during station upgrades. Operational noise along the MVL may be higher due to more station stops, when compared to trains stopping at fewer stations.
The natural environment	Some vegetation removal for station upgrades and enhancements. Landscape will not change. While station upgrades require some new infrastructure, the construction and operation of which is unlikely to impact water resources and increase local flooding.
The historic and cultural environment	Station upgrade works would have limited impact on the Grade II listed station buildings at Fenny Stratford, Ridgmont, Woburn Sands and Millbrook stations.

7. Bedford

7.1 Project description

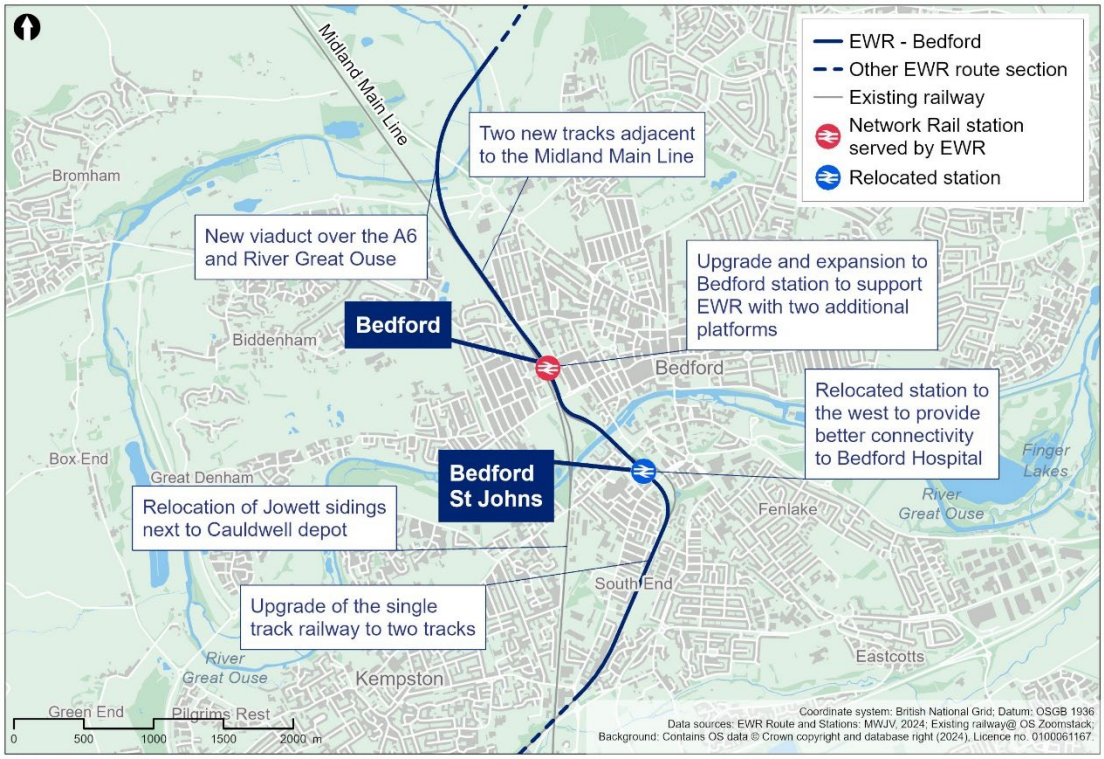
Summary

7.1.1 The proposed route through Bedford is approximately 5.4km (3.4 miles) long, extending north between Ampthill Road in Kempston, and Clapham Road south-east of Clapham village, next to the River Great Ouse. The proposed works include:

- New two-track railway to be constructed in the existing rail corridor between the Sandhurst Road footbridge and Bedford station that would remove the existing single MVL track between these two points (see Figure 7-1).
- New relocated station at Bedford St Johns closer to Bedford Hospital to replace the existing station, which would be removed.
- New sidings at Cauldwell Walk to replace those displaced at Jowett Sidings to make space for the railway tracks as they approach Bedford station.
- New railway infrastructure at Bedford station to allow East West Rail passengers to interchange with other train services, such as a new station plaza, new footbridges and replacement car parking.
- Two new tracks alongside the Midland Main Line (MML) north from Bedford station, which would then diverge east to follow a new rail corridor using a new viaduct over Paula Radcliffe Way and the River Great Ouse.
- Works to roads in the area to enable the railway to be built and operated, including the realignment of Ampthill Road, Cauldwell Street, Ford End Road, Bromham Road and A6 Great Ouse Way.
- Drainage and water storage ponds (referred to as balancing ponds) along the route section.
- Diversions of various utilities, including overhead power lines.

7.1.2 Depending on which East West Rail passenger train service pattern is taken forward as outlined in Section 2.1.9, Bedford will see up to five trains per hour per direction from the south, and four trains an hour per direction from the north. This is in addition to current and future freight services. i

Figure 7-1: Proposed route of the project through Bedford



Project proposals

South Bedford and Bedford St Johns

7.1.3 The project requires the construction of a new two-track section of railway starting at Sandhurst Road footbridge and continuing through a new and relocated two platform station at Bedford St Johns. The existing Marston Vale Line (MVL) would be realigned to the south-west to allow for the new tracks and station. The existing Ampthill Road and Cauldwell Street overbridges, respectively south and north of Bedford St Johns station, may need to be raised to accommodate required clearances for overhead line equipment (OLE). To reduce the extent of highways improvements in this area, the tracks may also need to be lowered. Minor modifications are also proposed to Britannia Street and Prebend Street due to the realignment of Cauldwell Street.

7.1.4 The new tracks would join the existing MVL north of Cauldwell Street before crossing over the Great Ouse on an existing bridge. The track would pass through Jowett Sidings and under Ford End Road, requiring removal of five stabling sidings and reconfiguration of three maintenance sidings. At the adjacent Bedford carriage sidings, track realignments and junction modifications would also be required.

7.1.5 Operation of the existing crossing under Ford End Road, where access to the sidings is currently provided, would be impaired by the increased number of trains. It is proposed

to introduce a new at-grade crossing of the proposed new railway within the Jowett Sidings site.

7.1.6 The existing Cauldwell Sidings on the MML south of Kempston Road would be enlarged to replace the stabling sidings displaced at Jowett Sidings, resulting in the acquisition of businesses at Cauldwell Walk.

Bedford station

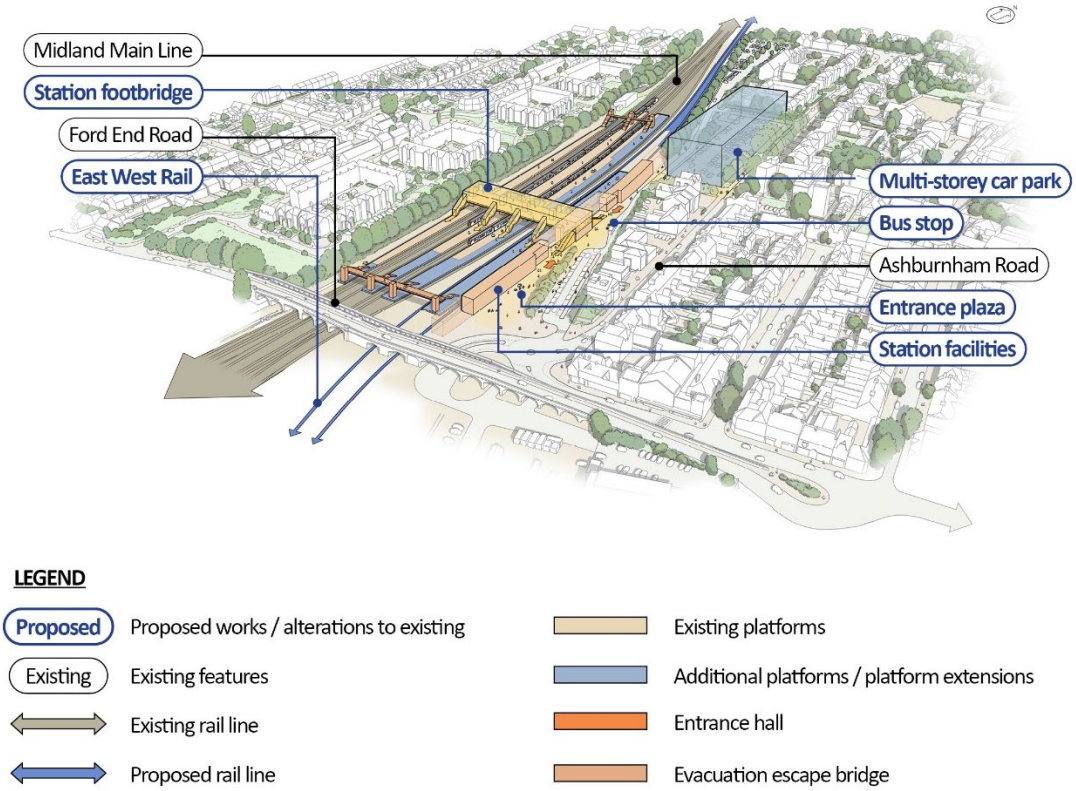
7.1.7 The existing Bedford Station would be remodelled to include two new platforms to the east of the current platforms. The two new platforms would be approximately 200m long and accommodate through-services. Under normal operation 106m of the platform would be in use, however the longer length is proposed to ensure that in scenarios where services are disrupted trains can be split and joined. The existing platform 1A would be widened and lengthened to create a platform for Thameslink.

7.1.8 The new station building would be constructed at ground level on the existing Ashburnham Road car park and would be accessible both from the south via Midland Road, and from the proposed car park to the north.

7.1.9 A new footbridge would be constructed to provide access to and circulation between the new EWR platforms and the existing platforms at the station. An additional footbridge at the south end of the existing platforms is proposed to enhance interchange opportunities and passenger connectivity between platforms whilst also providing a secondary means of escape in emergency situations. A further footbridge to provide a secondary means of escape is proposed at the northern end of the existing platforms.

7.1.10 A new multi-storey car park would be provided on Ashburnham Road above the current station car park, along with provision for taxi and public transport connections. A pedestrian plaza would be located in front of the station entrance.

Figure 7-2: Indicative illustration of Bedford station



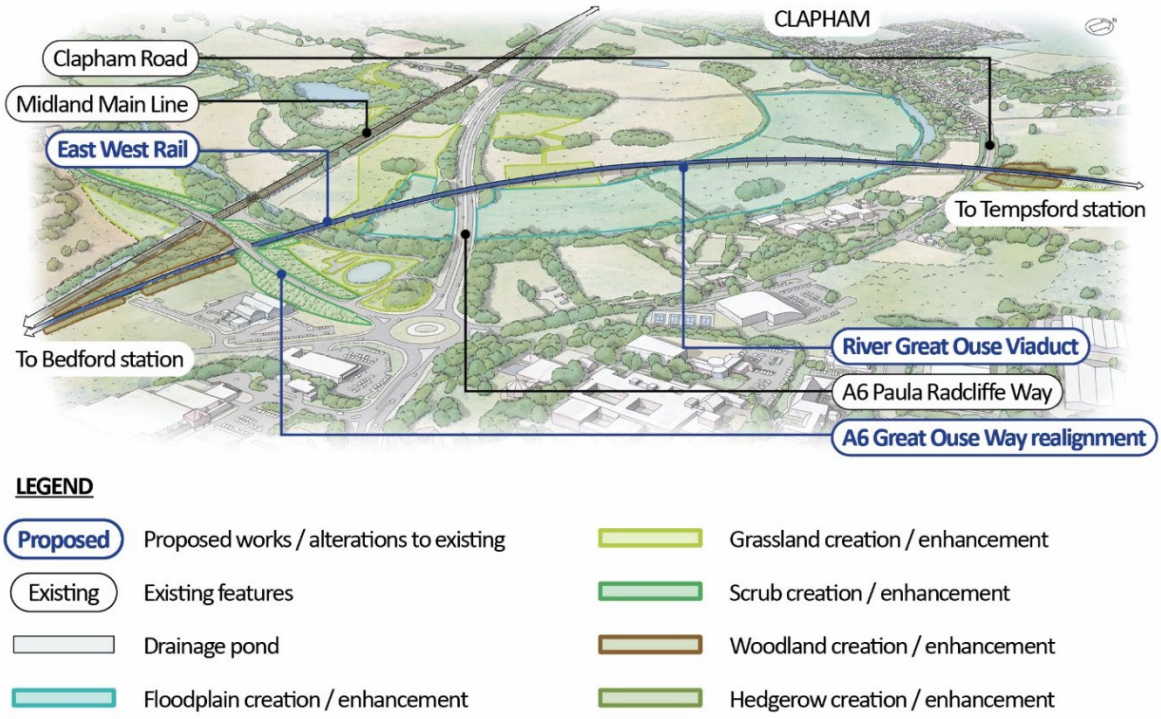
North Bedford

7.1.11 North of Bedford station the new two-track railway would continue up to Bromham Road and pass beneath the road. From here the new railway would run parallel with the existing four-track MML, creating a six-track corridor for approximately 900m through the Poets areas as far as Cut Throat Lane. Works to extend the existing Bromham Road overbridge would be carried out to the east to allow for the two additional new tracks to pass underneath.

7.1.12 The proposed works to widen the existing rail corridor in this area include highway works on Chaucer Road, Spenser Road, Milton Road, Sidney Road, Milne Row and Chesterton Mews. These works are expected to require the acquisition and/or demolition of several residential and commercial properties in this area (see Section 7.2 of this report for further information).

7.1.13 The new two-track railway would diverge from the MML at the UK Power Networks substation on Cut Throat Lane before passing under the A6 Great Ouse Way. The A6 Great Ouse Way would require realignment to separate the railway and the A6. Once north of the A6 Great Ouse Way, the railway could continue to rise on a new 1.1km long viaduct to cross twice over the River Great Ouse and its flood plain, as well as the A6 Paula Radcliffe Way. The existing electricity transmission lines would be re-routed.

Figure 7-3: Indicative illustration of River Great Ouse viaduct



7.2 Initial environmental information

People and communities

Context

7.2.1 The project would introduce an important new rail connection providing new journey opportunities for residents and businesses in Bedford, with benefits for the economy of the town and the amenity of the population. However, in this largely urban environment, the works to the rail corridor through the town, would directly impact homes, businesses and facilities located alongside the railway. As well as requiring land, there would be risks of increased noise, vibration and other disturbance during construction, as well as changes to the visual appearance and noise impacts from the new infrastructure and operation of East West Rail services.

7.2.2 Impacts on property would occur at a number of locations and would require the acquisition and/or use of land.

7.2.3 Existing housing is concentrated close to the rail corridor in Kempston between the MVL and Ampthill Road in the southern part of the route section. Dense housing is also located surrounding and north of Bedford station in the Queen's Park area and in central Bedford. There are commercial and business premises alongside the rail corridor, and a number of community facilities. Potential impacts affecting specific areas of housing, commerce and community facilities are described below.

7.2.4 A review of the potential long-term impacts to people's wellbeing and amenity – both positive and negative – that would result from the project is set out below, along with initial proposals for mitigating potential adverse effects. Potential disruption during construction is addressed separately, with explanation of how it could be mitigated where practicable.

Potential impacts and mitigation

7.2.5 At the beginning of the route section near Elstow Road, impacts would be few, due to the limited scope of works to the MVL. Increased train frequency could result in noise impacts which will be fully assessed as part of the noise assessment.

7.2.6 The new two-track section of railway between the existing Sandhurst Road footbridge and Ampthill Road overbridge will likely result in permanent noise impacts to the residential properties and community facilities to the east of the track due to the radius of the curve in this section. Noise mitigation has been proposed in this area. Further opportunities to lessen these impacts will be explored through ongoing assessment. This section of railway will also likely require temporary use of the open space. Initial proposals to mitigate the environmental impacts show potential open space and habitat improvements to the east of the railway. Further opportunities will be explored through ongoing assessment.

7.2.7 The project would require the permanent acquisition and temporary use of certain land and property. The gardens of two properties on Palgrave Road would be temporarily acquired to facilitate the widening of the rail corridor. Works to Cauldwell Street bridge may require the demolition of a care home off Britannia Street.

7.2.8 Further north, the new/relocated Bedford St Johns station would include a multi-storey car park west of the new station that would potentially affect the surrounding views and result in a loss of trees, as well as noise impacts for nearby properties. Opportunities to lessen these impacts will be explored through ongoing assessment.

7.2.9 The new stabling tracks at Cauldwell sidings would displace approximately 20 businesses. The acquisition and use of land in this area may have wider effects on business operations and/or result in reduced amenity for remaining businesses.

7.2.10 At Bedford station, the new multi-storey carpark and other station upgrades would potentially affect views and result in noise impacts for residential properties, including those on Ashburnham Road. The noise assessment will determine the extent of any predicted impacts and the potential for providing mitigation through installing noise screening or through secondary noise insulation in properties. The new car park would require the acquisition of land from the Dom Polski Polish Club.

7.2.11 Removal of existing vegetation on railway land immediately north of the River Great Ouse would open up views of the railway corridor and Bedford station from the residential development on the southern bank of the river. The design of the new public realm,

planting and lighting around Bedford station and new Bedford St John station would have the potential to enhance views. It would be designed to minimise impacts on night-time views from the surrounding areas.

7.2.12 North of Bedford station an estimated 37 residential properties would be subject to demolition due to the widened rail corridor, with 37 residential properties and one commercial property identified to be partially acquired and/or demolished. Affected properties are all within the Poets area; the predicted property impacts are shown in Table 7-1.

Table 7.1: Poets area property impacts

Topic	**No. properties impacted**
Residential properties likely to be demolished	37
Residential properties which may require acquisition (including loss of gardens and parking area)	37
Commercial properties likely to be demolished	1
Total number of properties likely to be acquired/ demolished	**75**

7.2.13 EWR Co recognises the effects these impacts would have and will be working with affected parties as the designs are further developed, seeking to agree measures to reduce the impacts of the proposals where possible and enter into agreements with property owners where we property would need to be acquired or used. Further information is provided in the Guide to Compulsory Acquisition and Compensation.

7.2.14 The works in the Poets area north of Bedford station would affect the views of residents with loss of trees, lineside vegetation and buildings opening up views of the railway. The two new tracks would bring trains closer to properties which would potentially result in operational noise impacts, especially where demolitions newly expose properties to the railway. Noise mitigation is proposed alongside the track in the Poets area. Ongoing assessment will evaluate noise impacts and mitigation options will be discussed with affected residents.

7.2.15 Immediately north, the widened rail corridor would result in permanent acquisition of grounds at the western edge of the Alexander Sports Centre, part of the University of Bedfordshire, although the operation of the sports centre would continue.

7.2.16 The area between the Great Ouse Way and the river is subject to several planning applications including housing and leisure facilities. There are extensive works for the project proposed in this area, associated with the realignment of the Great Ouse Way. These would have implications in terms of land acquisition, as well as other environmental impacts, such as noise or visual intrusion, potentially affecting future residents and others in this area.

7.2.17 The new viaduct crossing of the River Great Ouse would be a prominent structure in the wide and open valley landscape. This would affect views along and across the river corridor. Although belts of trees screen views from many places, the viaduct would be a noticeable addition to the view from footpaths in the area, the river, properties overlooking the river floodplain and nearby roads such as the Paula Radcliffe Way, which would pass underneath. People living close to the route as it diverges from the MML corridor and begins to rise onto viaduct would be similarly affected.

7.2.18 The majority of the land is urban with minimal agricultural land affected. Desk-based research shows that agricultural land would lie within the draft Order Limits in this route section. Most of this is expected to be Grade 3, which may be classified as best and most versatile (BMV) depending on future survey results. A few small grassland holdings would potentially be affected at the northern end of the section. Ongoing design development will take agricultural land and farm holdings into consideration to reduce impacts.

Temporary construction impacts

7.2.19 In Bedford the construction programme would be driven by the requirements to undertake alterations to existing highways structures sequentially in a way that would limit traffic disruption. It would also be driven by the relocation of Jowett Sidings and the remodelling of the new Bedford station building, platforms, track works and facilities.

7.2.20 Construction compounds would be located at the town's two stations and further north where they are required to support widening the MML north of Bedford station and to construct the viaduct towards Clapham. These would be partly interconnected by on-site construction routes that would allow some construction traffic to operate without using the public highway network.

7.2.21 Construction heavy goods vehicles (HGVs) would take the shortest suitable route between compounds and the strategic road network. The majority of HGV movements in this section would use the A6 to access the A421 south-west of Bedford. Some HGVs would also use Ampthill Road and Bromham Road to and from the station compounds.

7.2.22 Due to bridge works being carried out in central Bedford, which are likely to require bridge closures at different times, some HGVs may use A4280 Goldington Road to and from the A421 south-east of Bedford to avoid travelling through Bedford town centre. Any bridge closures would be programmed so that they do not coincide.

7.2.23 During construction, it is likely that some or all of the open space between Ossory Way and the railway would be used temporarily to facilitate construction activities. EWR Co would seek to ensure the playground continues to be accessible to the community during the construction works. Following the completion of construction, works would be carried out to reinstate and improve the existing open space and the land to the east of the new railway alignment.

7.2.24 Works at both of the stations would affect car parking and access for passengers. Impacts would be controlled by provisions within the draft CoCP and later, within the appointed contractors' more detailed management plans, and coordinated with train operating companies where access to train services is expected to be impacted. Some construction activities may require temporary suspension of rail services. Alternative transport would be provided in consultation with train operating companies.

7.2.25 Potential impacts from construction, such as noise and dust would be controlled through good practice measures set out in the draft CoCP. The implementation of these measures would be secured through the DCO and closely monitored throughout construction. Noise impacts may still arise for limited periods, associated with certain activities. The impacts on air quality from construction traffic and from any road diversions would be assessed once information on traffic routes and volumes is confirmed. Impacts would be in the context of the mostly very good air quality in Bedford borough, which is reported by the local authority (Bedford Borough Council AQ Report 2022) to be improving, although Bedford Town Centre has been designated an Air Quality Management Area since 2009 due to high levels of NO2.

7.2.26 The extensive works in the Great Ouse Valley would result in noise and visual effects for recreational users, including those at Bromham Lake local nature reserve.

The natural environment

Context

7.2.27 The route section crosses a largely urban built-up landscape with few semi-natural habitats present, apart from in the central and northern part of this route section where a wide meander of the Great Ouse is crossed. The Great Ouse comprises the main biodiversity asset. In addition to being a county wildlife site (CWS) itself, the Great Ouse has hydrological connectivity to other CWSs designated within this route section.

7.2.28 Parts of the route through the built-up area of Bedford, as well as sections of the existing rail line, supports a green corridor with broadleaved deciduous woodland located on its western fringe. Much of the eastern side of the existing rail line is built-up and offers few biodiversity sensitivities or opportunities, but there are areas of priority habitats scattered along the route section. There is also CWS located to the east of the railway between Sandhurst Road footbridge and Ampthill Road overbridge.

7.2.29 At the route's southern-most crossing of the Great Ouse near Cauldwell, there are areas of deciduous woodland priority habitat. South of the Ampthill Road crossing, the alignment widens, encompassing broad areas of trees and scrub and includes the boundary of the St Johns CWS.

7.2.30 The viaduct bears north out of Bedford passing over the Great Ouse at two points on a further meander bend before moving out into the gently undulating farmed landscape of the Bedfordshire Claylands. At the first crossing point broadleaved deciduous woodland

priority habitat is found. Floodplain grazing marsh priority habitat and the Bromham Lake Local Nature Reserve are located to the west of the route at the A6 Paula Radcliffe Way.

7.2.31 The railway embankments of the green corridor through the built-up areas of Bedford provide suitable habitat for nesting birds, badger and common reptile species, and records exist for badger and common nesting birds along this part of the route. The River Great Ouse is likely to be associated with river dwelling mammals including otter, records of which are prevalent along the river of the northern-most crossings.

7.2.32 Along this section there are structures with suitability to support roosting bats and desk study information has shown that similar structures have supported bat roosts in the past.

Potential impacts and mitigation

7.2.33 Direct impacts on woodland and other key habitats of principal importance (HPIs) located adjacent to and within the draft Order Limits would be avoided or minimised as far as possible. Protection from indirect impacts to retained habitats (including HPI) will be a key consideration for design and mitigation proposals, including management through the draft CoCP to address risks of air pollution, as well as mitigating against habitat fragmentation and disruption of habitat connectivity. The need for habitat replacement areas would be determined as part of the EIA.

7.2.34 Land acquisition could result in impacts on pockets of habitat at various locations within this route section, such as the CWSs, but the project also offers the potential for habitat enhancement.

7.2.35 At Bedford St Johns there are opportunities for improvement to the habitats east of the railway along the curve, including grassland, woodland, and wetland creation to create wider visual and ecological linkages with the existing CWS. Planting along the railway boundary and south of the proposed Ampthill Road overbridge including tree and hedgerow planting and grassland creation would create open space, habitat enhancements and visually screen project elements. Scrub habitats would be improved at Jowett Sidings, south of Ford End Road.

7.2.36 Woodland habitat creation is proposed at Bedford Station to the west of the MML, south of the proposed station carpark, and woodland planting west of the route would reinstate and enhance habitat connectivity as well as providing visual screening.

7.2.37 The project would intersect with rivers, ditches and aquifers that are integral to the broader network of water bodies safeguarded and assessed under the Water Framework Directive (WFD), including the Ouse (Newport Pagnell to Roxton) WFD surface water catchment. Assessments will be undertaken to demonstrate that the project would not deteriorate the status of any WFD element or prevent the attainment of surface water and groundwater body objectives.

7.2.38 In North Bedford, proposed mitigation includes:

- Tree planting, hedgerow and grassland habitat creation east of the project to create open space, habitat enhancements and to provide visual screening.
- Planting either side of the railway including hedgerow, grassland and woodland to create wider visual and ecological linkages to existing habitats.
- A mixture of woodland, scrub, grassland and wetland habitat creation associated with the A6 Great Ouse Way realignment, the overbridge and balancing pond to integrate scheme elements into the wider landscape and to create ecological links to existing habitats.

Landscape and the historic environment

Context

7.2.39 Although Bedford has grown rapidly over the last 100 years it is historically an agricultural town. The Great Ouse attracted early prehistoric inhabitants and early farming communities of the Neolithic period are evident in the archaeological record around the Ouse Valley, with the river acting as a focus of settlement and ceremonial activity. Areas of possible archaeology alongside the viaduct within the meander of the river are indicated by faded cropmarks.

7.2.40 Other historic interest within Bedford relates to its much later development from the post-medieval period onwards, when the town used its position on the Great Ouse to trade grain, timber and coal which became the main industries within the town. Its population grew during the early 19th century, along with the development of the railways. This industrialisation altered its appearance and character.

7.2.41 The Bedford conservation area is located north and east of Bedford station and includes the Poets area. The conservation area includes the historic market town, and its surviving medieval street patterns reflects the area's historic relationship with the River Great Ouse. Other areas of quality historic architecture and public spaces reflect the town's 19th century expansion. As such, the conservation area represents the heritage value of Bedford over several historic periods of development.

The MML and MVL have influenced the townscape character of Bedford, with multiple bridge crossings and separation of the town into two parts, east and west of the route. However large areas of vacant railway land, particularly south of Bedford station and along the River Great Ouse corridor, provide a green corridor through the town. The railway is mainly screened from the predominantly residential areas it passes through by vegetation or development but is more visible where it crosses the river. Noise and activity generated by the railway and road network result in low levels of tranquillity.

Potential impacts and mitigation

7.2.42 The changes resulting from the proposed relocation of Bedford St Johns station, the improvements at Bedford station, and construction of other rail infrastructure would largely take place within the existing rail corridor. They would therefore not fundamentally change the character of the townscape, but loss of vegetation and residential properties would diminish it. Careful design of the new public realm at the stations and the replacement of planting removed during construction would restore and could potentially enhance townscape character.

7.2.43 Works at Bromham Road and Ashburnham Road would encroach upon the Bedford conservation area. The majority of listed buildings and the three scheduled monuments within it are focused on the medieval heart of the town and river and have little or no historic relationship with the area directly affected by the proposed works. The listed buildings and scheduled monuments would also be screened from the proposed works by intervening urban development and are unlikely to be impacted.

7.2.44 Five properties within the Poets area which are at risk of permanent acquisition or demolition have the potential to be non-designated heritage assets of local importance. They may also form part of the setting of the conservation area, which contributes to its character. Properties and other non-designated assets will be investigated to understand their historic value and where necessary, mitigation measures will be developed.

7.2.45 The cropmarks north of Bedford identified within the meander of the river emphasise the need for focused investigation at this location to inform an understanding of the history of the area and help the assessment, then to direct required mitigation, prior to any construction.

8. Clapham Green to Colesden

8.1 Project description

Summary

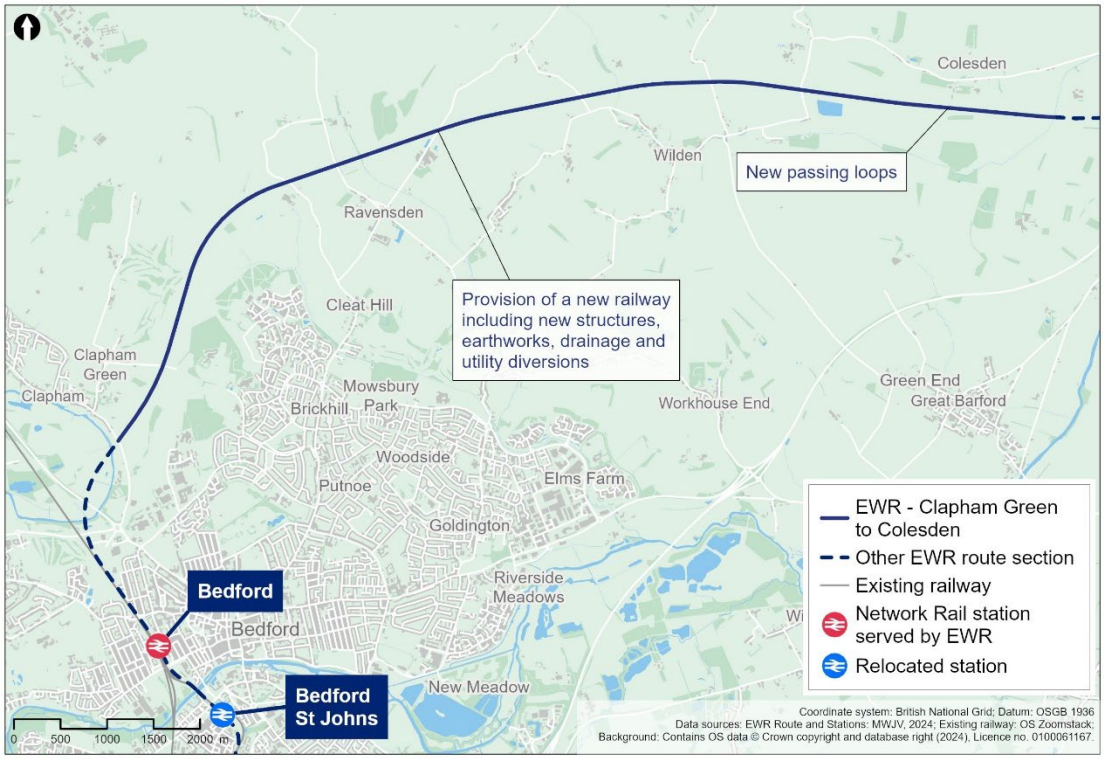
8.1.1 Between Clapham on the northern edge of Bedford and Colesden west of Wyboston, a new section of railway and associated infrastructure would be constructed. Along this 12km (7 mile) route section the railway would cross the rolling countryside north and east of Bedford using a mixture of new embankments, cuttings and short viaducts.

8.1.2 The proposed works include:

- New two-track railway with associated embankments, cuttings, viaducts and track infrastructure.
- New overbridges and underbridges for road, track and path crossings, culverts and overbridges for watercourses, and associated diversions where necessary.
- Two passing loops near Colesden so that faster passenger trains could overtake slower trains.
- Provision of drainage and water storage ponds (referred to as balancing ponds) to manage flood risk.
- Utility diversions along the route, including overhead electricity transmission lines.

8.1.3 The passenger train service pattern between Bedford and Cambridge stations would be four trains per hour in each direction.

Figure 8-1: Proposed route of the project between Clapham Green and Colesden



Project proposals

Clapham, Ravensden and Wilden

8.1.4 The railway route in this section would bear north and east from Bedford on a new viaduct. Crossing Clapham Road south of the villages of Clapham and Clapham Green, the new railway would continue from this viaduct onto an embankment up to around 10m high. It would enter a cutting and cross beneath Carriage Drive between Clapham Green and Clapham Park, continuing in cutting up to about 14m deep to the east of the Bedford and County golf club. Several public rights of way (PRoW) would be diverted onto new bridges over the route, including Carriage Drive, Clapham Footpaths 5 and 6 and Brickhill Bridleway 54. Clapham Footpath 9 would be closed with users diverted to Clapham Footpaths 8 and 24.

8.1.5 The new railway would pass to the north of Brickhill in cutting before turning east past Highfield Farm and Gray's Hill Farm, crossing over a stream which would be culverted beneath. Graze Hill Road would require a new road bridge to pass over the railway. Continuing on embankment, the railway would pass over a realigned Thurleigh Road and Ravensden Brook on new bridges. There are several PRoW in the Graze Hill and Thurleigh Road area which are proposed to be modified to maintain connectivity, comprising Ravensden Bridleway 4, and Ravensden Footpaths 5, 46 and 47.

8.1.6 A series of embankments and cuttings would be needed as the railway passes to the north of Ravensden. The railway would pass in cutting with Sunderland Hill Road north of Grange Farm requiring a new bridge over the railway on a similar alignment to the existing road.

8.1.7 The new railway would rise onto embankment as it continues eastwards over Shrubbery Lane. It would pass over the narrow valley of South Brook West on a short (approximately 250m) viaduct before entering cutting through Chequers Hill north of Wilden.

8.1.8 Several existing PRoW would be diverted across the new railway on new bridges or underpasses beneath the railway to maintain connectivity. The impacted PRoW would be Ravensden Byway 61, Ravensden Footpath 35, and Wilden Footpaths 16, 22 and 33. The North Bedfordshire Heritage Trail long distance path (Wilden Footpath 27) would pass over the route on a new footbridge. An additional farm access track would also be provided in this area.

8.1.9 The new railway would continue in cutting passing beneath Chequers Hill and Colesden Road. A new bridge would be constructed to take Chequers Hill over the railway and accommodate a diversion of Wilden Footpath 24. Colesden Road would also be diverted to take it over the railway.

Colesden

8.1.10 To the east of the Colesden Road bridge, the new railway would continue on a series of embankments across the western edge of the River Great Ouse Valley. Two new passing loops would be constructed in the Colesden area. A new overbridge would be built south of Colesden Road to accommodate diversions to several bridleways, PRoW and a farm access track. The railway would cross over South Brook on a short viaduct, where this route section ends.

8.2 Initial environmental information

People and communities

Context

8.2.1 In the Clapham Green to Colesden route section, the project would introduce entirely new infrastructure into a rural environment. The railway would pass several villages, hamlets and isolated settlements, including Clapham Green, Ravensden, Wilden, and Colesden, with other communities centred around farm holdings along the length of the route.

8.2.2 Although the population is relatively sparse in this area, the change resulting from the project would heighten the risk of visual and noise impacts in particular, and present a risk of severance. The way that the project is integrated into the landform, the comprehensive use of sensitive landscaping and other mitigation, and the overall design

principles that are applied between Clapham and Colesden would be fundamental to limiting adverse impacts on people and communities.

8.2.3 A review of the potential impacts to people's wellbeing and amenity – both positive and negative – that would result from the introduction and operation of the new railway and its facilities is set out below, along with initial proposals for mitigating potential adverse effects. Potential disruption during construction is addressed separately, with an explanation of how it could be mitigated where practicable.

Potential impacts and mitigation

8.2.4 The project would require earthworks to carry the railway through the undulating landscape north-east of Bedford. Commencing from Clapham Road, south of the Clapham and Clapham Green, the railway would be prominent as it drops from viaduct onto an embankment up to around 10m high and then passing into a cutting up to 14m deep. Proposed blocks of woodland as well as landform would be important in limiting the extent of visibility, but visual impacts from the earthworks are expected from several nearby roads and footpaths, as well as from some locations within the Bedford and County golf club to its west and North Brickhill country park to its east.

8.2.5 Existing views from residential properties and PRoW in this route section are often limited by the undulating topography, woodland belts and vegetation lining country roads and property boundaries. However, they are more expansive north-east of Clapham Green where the landscape is more open and the large-scale new structures – such as the new embankments, viaducts and overbridges – would be prominent additions to views. Removal of vegetation along roads and field boundaries would further open up views but replacement planting and mitigation planting would, in time, fully or partially screen the new structures.

8.2.6 Baseline noise levels are generally low, characterised by typical rural sources such as roads, agricultural activity and the natural sounds of the countryside. The B660 Sunderland Hill north of Ravensden is a busier road; otherwise, all roads are minor ones and expected to be lightly used. The need for any noise mitigation through barriers and bunds will be determined as the EIA progresses.

8.2.7 The avoidance of community severance and isolation would need careful design and planning through maintenance of good access across the alignment, for example for Ravensden, Wilden, Sevick End and East End south of the alignment, and Colmworth, Channel's End and Colesden north of the alignment, as well as for numerous more isolated farms and houses. The proposals in this route section include a number of crossings for existing roads and PRoWs to maintain connectivity in the area. The design of these crossings considers how the visual continuity and access between communities could be secured and will be subject to further development.

8.2.8 Desk-based research has identified agricultural land within the draft Order Limits in this route section. Most of this is expected to be Grade 2, which would be classified as best

and most versatile (BMV). The remainder is expected to be Grade 3, which may be classified as BMV depending on future survey results. Ongoing design development will take agricultural land and farm holdings into consideration to reduce impacts.

8.2.9 In terms of land management, arable cropping dominates, with large, highly mechanised farms. Livestock operations are also present including large, indoor poultry and/or pig production units. Initial studies indicate that some 15 holdings of various sizes would be affected.

8.2.10 The project would require the permanent acquisition and temporary use of certain land and property. In this route section, it would require the demolition of a barn structure within a field off Thurleigh Road and a structure within a field south of Colesden Lodge Farm. In addition, acquisition of land from four residential properties off Ravensden Road and Colesden Road would be required. Land from one business property, a recycling services, off Sunderland Hill would also need to be acquired.

8.2.11 EWR Co recognises the effects these impacts would have and will be working with affected parties as the designs are further developed, seeking to agree measures to reduce the impacts of the proposals where possible and enter into agreements with property owners where property would need to be acquired or used. Further information is provided in the *Guide to Compulsory Acquisition and Compensation*.

Temporary construction impacts

8.2.12 There would be four main construction compounds proposed in the Clapham Green to Colesden route section: at the interface with the Paula Radcliffe Way and River Great Ouse viaduct; adjacent to Sunderland Hill; off Chequers Hill (supporting the new viaduct construction in the Wilden area); and adjacent to Colesden Road (supporting the passing loops construction).

8.2.13 Construction compounds would be partly interconnected by on-site construction routes that would run alongside the new rail corridor and enable some construction traffic to avoid the public highway network. Where heavy goods vehicles (HGVs) would be required to use local roads, they would take the shortest suitable route between compounds and the strategic road network. HGVs would access the area from the A6. For compounds on the west side of this route section, construction traffic is expected to use the A6. The construction compounds close to Thurleigh Road and further to the east side of this route section would use either the A421 or the A1. Tranquillity would be reduced along the route section due to the noise and activity generated by construction and construction traffic.

8.2.14 All routes crossed by the project and requiring new connections over or under the railway would be maintained through provision of alternative access for the duration of construction, with the aim of maintaining current levels of access. This would apply equally to footpath and bridleway crossings, where temporary diversions may be required.

8.2.15 Potential impacts from construction, such as increased noise, reduced air quality and increased dust would be controlled through various good practice measures set out in the draft CoCP, which would be mandated through contract arrangements and closely monitored throughout construction. Noise impacts may still arise for limited periods, associated with certain construction activities.

The natural environment

Context

8.2.16 On leaving Bedford the project would move from the Great Ouse floodplain to the open, largely arable countryside of the Bedfordshire Claylands, which extend through to Colesden. The fields are bordered by ditches and streams – all draining south into the Great Ouse – and hedgerows, which are the predominant habitats along the route in this section.

8.2.17 There are no statutory or non-statutory designated sites within the draft Order Limits, although four county wildlife sites (Clapham Park Wood, Great and Little Woods, Ravensden, Lady Wood and Palace Yard Wood) are located adjacent to the project, which form important parcels of ancient woodland and habitats of principal importance (HPI) alongside the project.

8.2.18 Further semi-natural habitats beyond these are sparse compared with other route sections, although there are parcels of ancient woodland and other woodland HPIs present in the area. Further east and south of Rectory Farm near Wilden, the broader valley of South Brook supports occasional lowland meadows and pastures priority habitat, but these are over 1.5km (0.9 miles) from the project.

8.2.19 The open arable countryside provides suitable habitat for badger, brown hare and farmland birds such as lapwing and skylark. The extensive network of hedgerows, ditches and arable margins link the woodlands adjacent to the route and are key to supporting the biodiversity interests in this route section.

8.2.20 Several ponds are located within the draft Order Limits, which may offer more notable habitats and species. There is at least one Water Framework Directive (WFD) surface water catchment potentially impacted, namely the Ouse (Newport Pagnell to Roxton). The route would cross three ordinary watercourses: Ravensden Brook, South Brook and a tributary of Renhold Brook.

Potential impacts and mitigation

8.2.21 Direct impacts on ancient woodland through habitat loss would be avoided. Protection from indirect impacts on the network of ancient woodlands and other retained habitats (including HPI) will be a key consideration for design and mitigation proposals, including management through the draft CoCP to address risks of air pollution, as well as mitigating

against habitat fragmentation and disruption of habitat connectivity. The need for habitat replacement areas will be determined as part of the EIA.

8.2.22 Retention and conservation of HPIs and the safeguarding of the protected species they may support will be a key consideration for the project design and mitigation. Protective measures, as set out in the draft CoCP, would be implemented during construction to avoid direct and indirect impacts to protected habitats and species.

8.2.23 To ensure legal compliance with relevant wildlife legislation, appropriate mitigation strategies for legally protected species found to be present will be developed in consultation with Natural England as the ecology baseline for the project evolves.

8.2.24 Assessments will be undertaken to demonstrate that the project would not deteriorate the status of the Ouse (Newport Pagnell to Roxton) WFD surface water catchment that is crossed, or prevent the attainment of surface water and groundwater body objectives. Necessary mitigations could include riparian planting and reinstatement of natural bed and bank materials.

8.2.25 Protective measures for surface water and groundwater bodies in the area would be needed to mitigate potential impacts on ecology, water quality and other hydrological and hydrogeological characteristics. These measures will be set out in the draft CoCP and prescribe measures that protect surface water and groundwater resources, including impacts to the hydrological or groundwater regime or water quality. With appropriate design and mitigation in place, an assessment of each crossing will demonstrate how fluvial flood risk would not be increased by the project. The assessment will also seek to address the risks of and mitigation for surface water and groundwater flood risk.

Landscape and the historic environment

Context

8.2.26 The undulating landscape around Clapham and Clapham Green, with extensive woodland and small-scale fields bordered by hedgerows and hedgerow trees, has an enclosed character. Rural roads link settlements in the area but large areas of the landscape are only accessible by tracks and footpaths. North-east of Clapham Green, the land along the route rises to a plateau and the landscape becomes more open, with expansive fields in arable production and sparse or gappy hedgerows.

8.2.27 The river terraces of the Great Ouse north of Bedford and south of St Neots attracted early prehistoric activity as evidenced by dense flint scatters from Palaeolithic and Mesolithic periods. Hengiform monuments at the confluence of watercourses within Biddenham Loop, north-east of Bedford, date to the Neolithic period and suggest the area was of significant spiritual importance. There is evidence of Iron Age settlement of small unenclosed and enclosed farmsteads visible in cropmarks. By the Roman period, the area between Clapham and Colesden was a landscape of farmsteads and small hamlets,

enclosed fields, open grazing and woodland, connected by a network of local tracks and long-distance routeways.

8.2.28 During the medieval period many of the villages along the route were established, including associated moated manors, such as at Birchfield and Palaceyard Wood to the south of Colesden, which are both scheduled monuments. The majority of the route section was under agricultural cultivation, initially as medieval open fields with the characteristic ridge and furrow, and later as an enclosure landscape of small field and hedgerow field boundaries.

8.2.29 During the 20th century, the landscape saw the intensification of food production, resulting in the removal of hedgerow field boundaries, and this character has largely remained up to now. The small settlements of Ravensden and Wilsden outside of the main settlement of Bedford have remained small and the only major change is the development of the A421 Great Barford Bypass to the south of St Neots.

8.2.30 The few listed structures along this route section include the Grade II listed The Lodge to Clapham Park, a non-designated historic landscape. There are also isolated farmsteads related to the enclosure landscape including: the Grade II listed Gray's Hill Farm House; Shrubbery Farmhouse and Top Farmhouse near Ravensden; the Grade II listed Manor Farmhouse and associated cottages at Wood End; and the Grade II listed Bell Farmhouse and associated barn near Colesden.

Potential impacts and mitigation

8.2.31 The project would introduce large-scale structures, including embankments, viaducts, cuttings and bridges into the countryside, changing its character especially where the landscape is more open. Noise and movement generated by the passing trains on embankment or viaduct could reduce the tranquillity of the landscape.

8.2.32 Landscape mitigation earthworks and planting either side of the railway, including woodland, hedgerows and scrub planting together with grassland and wetland habitat creation would help integrate the raised structures into the landscape and, in time, partially restore the wooded character of the area and create visual screening in the longer term. This would include a mixture of woodland and grassland habitat creation either side of the railway and planting to reinstate and enhance habitat connectivity, notably to existing woodland blocks.

8.2.33 Other survey work will be undertaken to understand the layers of history visible in the landscape with a view to mitigating impacts through landscape design, integrating the route into the historic landscape where possible. There may be opportunities to reinstate or reinforce historic landscape character, for example replanting lost hedgerows and filtering or framing views through tree planting.

8.2.34 The listed buildings would experience temporary impacts to their setting from construction of the proposed works, including from the location of construction

compounds and stockpiles. They would also experience permanent impacts from the severance of the rural landscape by the proposed works, reducing the ability to understand their historic context as part of the wider agricultural landscape. Mitigation would rely on an understanding of setting and its contribution to a building's significance within the landscape. Sensitive integration of the route into this landscape setting would be key, for example through screening, reinstating or reinforcing historic and existing landscape character, or opening up views which allow the buildings to be better understood in their wider landscape.

9. Roxton to east of St Neots

9.1 Project description

Summary

9.1.1 This section of the project comprises the construction of a new railway over approximately 10km (6.2 miles), between South Brook west of Roxton, and where the B1428 Cambridge Road joins the existing A428 at the roundabout east of St Neots.

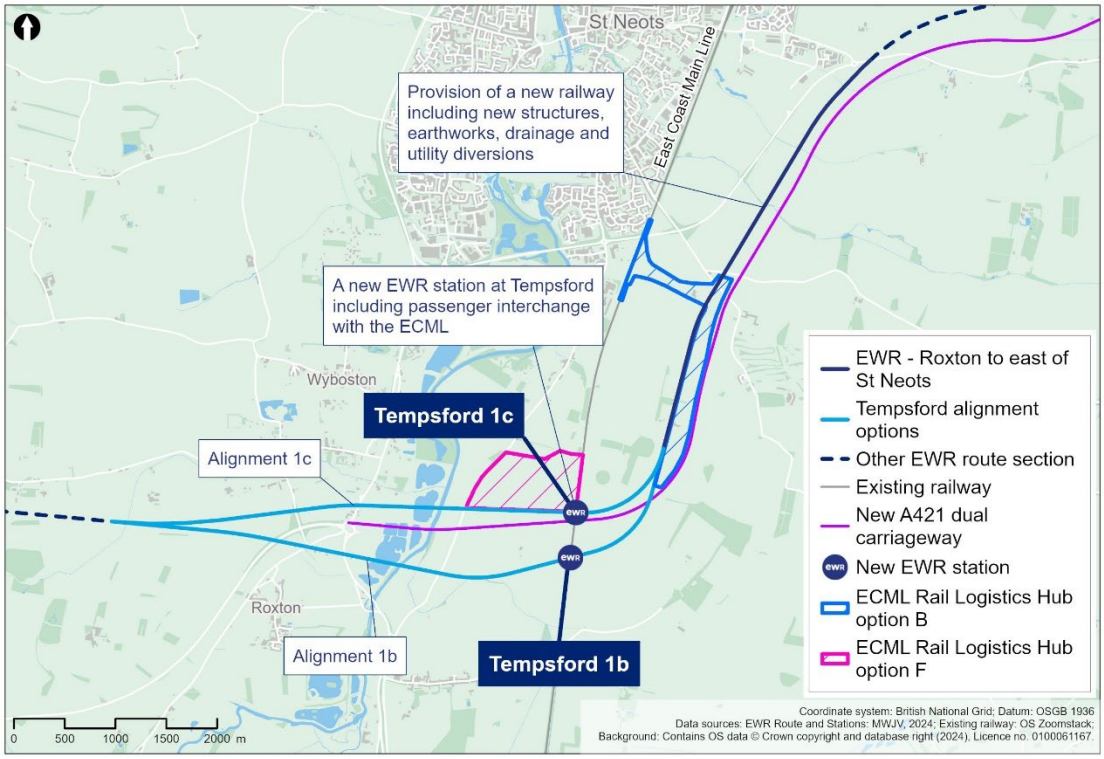
9.1.2 The proposed works include:

- New two-track railway and associated infrastructure, including two possible alignments to cross the Great Ouse valley, each comprising long viaducts linked by embankment, as described separately below.
- A new station at Tempsford that would provide an interchange with the East Coast Main Line (ECML) and serve existing communities and new communities within potential new developments south of St Neots and in the Tempsford area.
- Two options for a temporary logistics hub connecting with the proposed East West Rail alignment and the ECML to be used to support construction, with land reinstated post-construction. The two options being considered for the logistics hub are described below.
- New overbridges and underbridges to support the railway as it crosses roads, tracks and paths, culverts and overbridges for watercourses, and associated diversions where necessary.
- Provision of drainage and water storage ponds (referred to as balancing ponds) along the route section.
- Utility diversions along the route including overhead electricity transmission lines.

9.1.3 The passenger train service pattern between Bedford and Cambridge stations would be four trains per hour in each direction.

9.1.4 This route section would interact with the new A421 dual carriageway, currently being constructed by National Highways as part of the A428 Black Cat to Caxton improvements scheme at the time of writing and due to open in 2027.

Figure 9-1: Proposed route of the project between Roxton to the east of St Neots



Project proposals

Ouse Valley

9.1.5 To the east of South Brook, the railway would remain on embankment using one of two alignments, as described below.

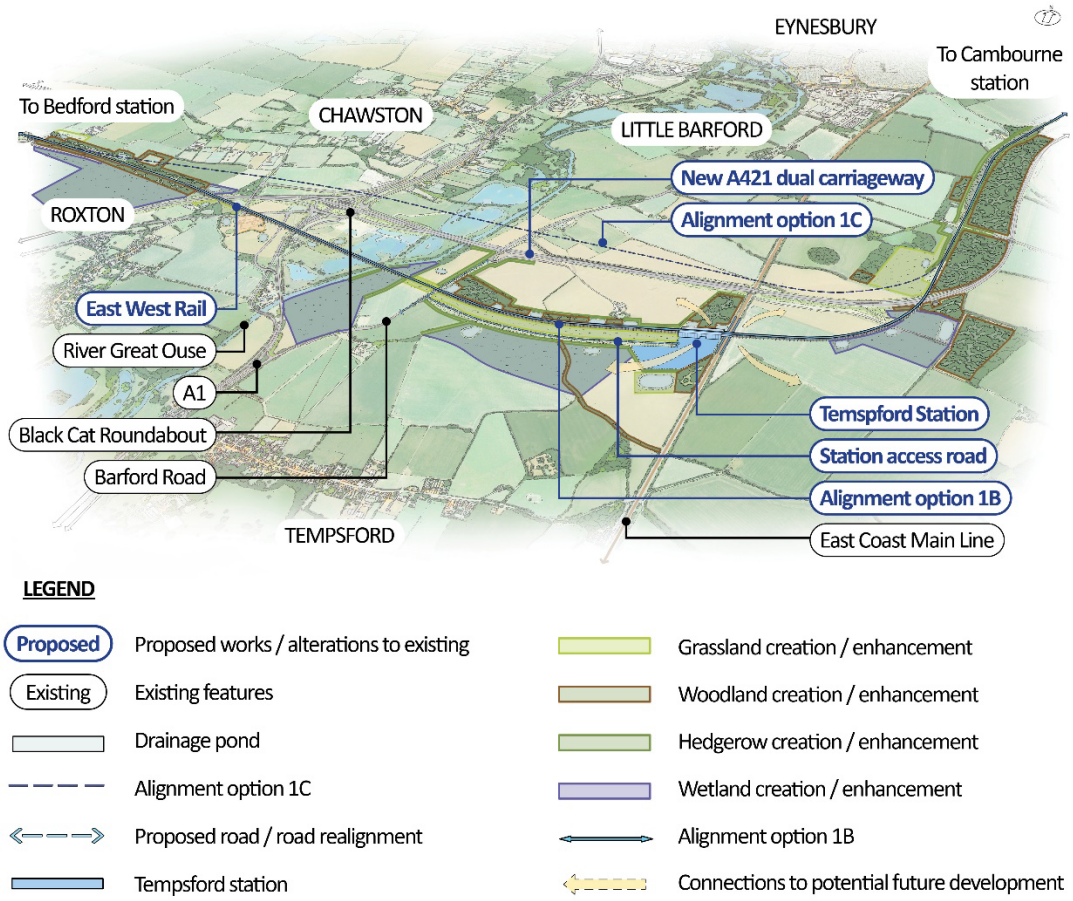
Alignment 1b

9.1.6 This alignment option runs to the south of the Black Cat roundabout and the existing and the new A421 dual carriageway. It would continue on embankment up to 17m high until it reaches the A421, which it would cross on a viaduct. It would remain on viaduct to cross over Bedford Road to the north of Roxton and the A1 Great North Road, south of Black Cat roundabout. It would pass over or close to Roxton Garden Centre, a residential property (Green Acres) and a scrap yard. The railway would continue over the River Great Ouse on viaduct before continuing on embankment beneath the electricity transmission line, which would be diverted.

9.1.7 It would then resume on viaduct over Barford Road, which would be realigned beneath the new railway. The viaduct would continue south-eastwards, passing over the ECML where Tempsford station would be constructed. The railway would then head north-east over the new A421 dual carriageway and onto embankment. The new A421 dual

carriageway would be on embankment approximately 9m above ground level at this point, requiring the East West Rail railway to be up to 24m high.

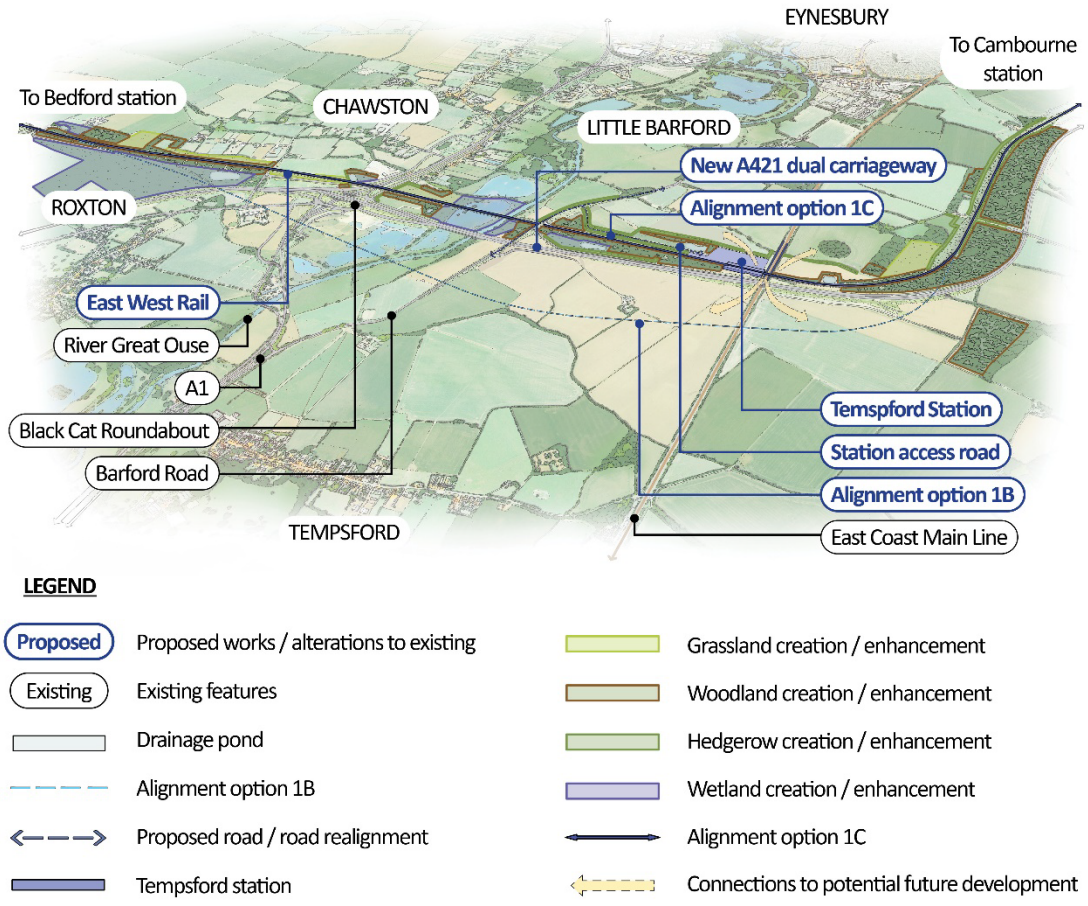
Figure 9-2: Indicative illustration of Tempsford Alignment 1b



Alignment 1c

9.1.8 This alignment option would run to the north of the Black Cat roundabout, the existing A421 and the new A421 dual carriageway. It would continue on embankment up to 15m high until it reaches Roxton Road, which it would cross on a viaduct up to around 15m high. The Wyboston Chawston and Colesden Footpath 10 (linked to Footpath A10) would be diverted around the embankment and under the viaduct at this point. The railway would remain on viaduct to cross over the A1 to the north of Black Cat roundabout and the River Great Ouse, parallel with the new A421 dual carriageway, before crossing under a raised Barford Road close to ground level. It would rise on an embankment up to a height of around 8m before returning to a viaduct around 10m high to accommodate the new Tempsford station and crossing of the ECML before returning to embankment and heading north. EWR Co are considering options for this alignment.

Figure 9-3: Indicative illustration of Tempsford Alignment 1c



Tempsford station

9.1.9 Both proposed railway Alignments 1b and 1c would include a new station to serve existing communities and potential future development in the Tempsford area. The station would include two East West Rail platforms and two ECML platforms, with a station building and passenger connections between the two railways. Step free access would be provided throughout the station, along with an active travel hub including cycling facilities, bus facilities and a car park.

9.1.10 For both proposed alignments, the railway tracks would be elevated on a new viaduct in the location of the proposed station. The proposed station associated with Alignment 1b would be approximately 22m above ground level and the station associated with Alignment 1c would be approximately 9m above ground level. In both options the station would be accessed from a realigned Barford Road.

East Coast Main Line construction logistics hub

9.1.11 A temporary logistics hub would be introduced between the proposed route alignment and the ECML to support the construction of the new railway. The proximity of the ECML would enable ballast, sleepers and track to arrive by rail and be distributed along the

route. This would make the delivery of construction materials more efficient and lessen the potential impacts from heavy goods vehicle (HGV) traffic on the environment and communities. The location and connection with the ECML is relatively central and so could support work on the project towards both Bedford and Cambridge. The hub would include sidings, facilities for bulk storage of track ballast, and various construction plant and trains for delivering and installing sleepers, ballast and steel rail.

9.1.12 There are two locations currently being considered for the hub, both of which support Alignment option 1c:

- Option B – East of Little Barford and the ECML, which would support either Alignment 1b or 1c.
- Option F – On the north side of the new A421 dual carriageway and west of the ECML, which would support Alignment 1c only.

9.1.13 The site for Option B would be approximately 1.5km (0.9 miles) long and 150m wide with connections to the ECML via the southbound slow line. Highway access would be provided to the north of the site via the newly diverted B1046 St Neots Road. The site for Option F would be approximately 1km (0.7 miles) long and 500m (0.3 miles) wide with connection to the ECML via the northbound slow line. Highway access would be provided to the west of the site via Barford Road.

Tempsford to east of St Neots

9.1.14 Across the Ouse Valley, Alignments 1b and 1c would both run along the western side of the new A421 dual carriageway past Little Barford, initially on embankment before entering cutting. A traction power connection would be made between Little Barford power station and the railway.

9.1.15 In a cutting around 9m deep, the railway would pass beneath the B1046 St Neots Road, which would require a new bridge over the railway (replacing the one currently being constructed over the new A421 dual carriageway), though it would remain close to existing ground level.

9.1.16 Continuing north, the route would rise onto a viaduct over Hen Brook, followed by a short embankment and a new bridge to cross the tributary of Fox Brook before going into a shallow cutting beneath a new footpath overbridge. The railway would continue in cutting beneath Cambridge Road that links with the new A421 dual carriageway. Cambridge Road would be diverted slightly to the north.

9.2 Initial environmental information

Introduction

9.2.1 The main environmental differences between the options for the alignment across the River Great Ouse and for the temporary logistics hub are presented in Tables 9-1 and 9-2, which summarise the environmental information that was used in the Assessment Factor process (see Chapter 10 of the ***Technical Report*** for further information). Unless otherwise stated, the descriptions of the environmental impacts in this route section apply regardless of which options are progressed.

People and communities

Context

9.2.2 The project would introduce an important new rail connection providing new journey opportunities for residents and businesses between Roxton and St Neots, with benefits for the economy of local areas and the amenity of the population.

9.2.3 The Roxton to St Neots route section is centred on the River Great Ouse and its wide valley. It is quite sparsely settled, especially as the route passes east from Colesden, with large open agricultural fields and an expansive landscape permitting wide visibility. The topography has made the area suitable as a corridor for growth and development. The A1 and A421 are important highways and, with the ECML, they establish a major transport corridor that runs parallels to the river. The new A421 dual carriageway is being constructed at the time of writing, running east from the Black Cat roundabout and running west of and parallel with the project alignment. Electricity transmission lines augment the linear and developed character of the landscape near the river. Communities are located relatively close to the route within villages such as Roxton, Chawston, Little Barford and Tempsford, as well as in the town of St Neots which is passed by the new railway to the south and east. Development in the Tempsford area is expected over coming years.

9.2.4 Impacts on people living and working in the area around St Neots would depend on the alignment that is chosen, which has implications for the locations and configuration of the new Tempsford station and the logistics hub. Both Alignment 1b and Alignment 1c would require long viaducts linked by embankment. The project would therefore be prominent in both alignments, affecting communities and different groups of people, but within the context of an already developed area where railways, roads and other infrastructure are increasingly conspicuous.

9.2.5 A review of the potential impacts to people's wellbeing and amenity – both positive and negative – that would result from the introduction and operation of the new railway and its facilities is set out below, along with initial proposals for mitigating potential adverse

effects. Potential disruption during construction is addressed separately, with an explanation of how it could be mitigated where practicable.

Potential impacts and mitigation

9.2.6 The project would introduce new infrastructure into the landscape south and east of St Neots. The embankments, bridges and viaducts required to cross the existing roads, river and railway would be substantial new structures in local views. They would potentially be visible from parts of Chawston and Roxton, west of the River Great Ouse, and from Tempsford, Little Barford, Eynesbury and isolated farms and public rights of way (PRoW), to the east of the river. Recreational users of the river would have clear views of the viaduct. The design of the new bridges and viaducts could maintain views across the landscape and careful design of the new elevated Tempsford station could minimise adverse effects on views by day and night.

9.2.7 The new Tempsford station would create important journey opportunities for current and future residents living near St Neots and Tempsford, enabling improved access to jobs, schools and health facilities. The interchange with the ECML would also be important in expanding journey possibilities.

9.2.8 The new railway and the station could bring increased noise levels to the area, although in the context of the existing transport corridor (ECML, the A1 and A428 roads), existing noise levels are expected to be high. However, the potential for increases in maximum noise levels where noise comes from multiple sources will be an important consideration of the noise assessment. The need for specific noise mitigation will be established through ongoing assessment and modelling.

9.2.9 Existing local air quality would also be strongly affected by the prevalence of road traffic in the area. Although the electric-powered East West Rail trains would not be a source of future air pollution, any changes in road traffic accessing the new station could result in both air quality and noise impacts. Both will be assessed as part of the EIA.

9.2.10 Road and path connectivity across the railway would be maintained. Proposed new routes would be designed to keep journey times much as they are now, with access maintained for all users. There are several paths between St Neots and Hail Lane west of Caldecote Manor; there may be an opportunity to consolidate these into a smaller number across the railway.

9.2.11 Desk-based research has identified agricultural land within the draft Order Limits in this route section. Most of this is expected (and could be confirmed by future survey) to be best and most versatile (BMV) land, including Grades 1, 2 and Subgrade 3a. A small amount of Grade 4 land is expected to be present. A proportion of this agricultural land is allocated for committed development or has been identified for future development in the relevant local plan. Ongoing design will take land quality into consideration, as well as potential impacts on farm holdings.

9.2.12 Large arable holdings predominate in this route section, albeit interspersed with smaller livestock holdings to the south of St Neots. Initial studies indicate that for both options some 15-20 holdings of various sizes would be affected.

9.2.13 The project would require the permanent acquisition and temporary use of certain land and property. Both Alignment 1b and Alignment 1c would require the demolition of two residential properties near Potton Road. Both options would also require the demolition of a farm structure in the field south of Colesden Lodge Farm.

9.2.14 Alignment 1b would result in the acquisition of two residential properties. Alignment 1c would require temporary use of land of three residential properties off Spinney Road. Alignment 1b would result in the demolition four business properties off Bedford Road.

9.2.15 Option B for the temporary logistics hub would also require the demolition of buildings at Rectory Farm. Option F for the temporary logistics hub would require temporary use of land from one property off Barford Road.

9.2.16 EWR Co recognises the effects these impacts would have and will work with affected parties as the designs are further developed, to seek to agree measures to reduce the impacts of the proposals where possible and enter into agreements with property owners where property would need to be acquired or used. Further information is provided in the *Guide to Compulsory Acquisition and Compensation*.

Temporary construction impacts

9.2.17 For both Alignment 1b and Alignment 1c, construction of the new viaducts and associated earthworks would be undertaken first, followed by construction of the track and rail systems. Alignment 1b and 1c would each require two main construction compounds at the east and west ends of the viaducts. Alignment 1b would also require compounds to support the existing and new A421 crossings.

9.2.18 Construction compounds would be partly interconnected by access along the line of the new railway, allowing much construction traffic, particularly mass haul movements, to operate without using the public highway network. Construction traffic would take the shortest suitable route between compounds and the strategic road network. Where heavy goods vehicles (HGVs) are required along the road network, they would generally use either the new A421 dual carriageway or the existing A428 route, accessing the A1 at Black Cat roundabout. Compounds around Tempsford would use Barford Road or existing direct access onto the A1 Black Cat roundabout to access the A1.

9.2.19 All roads crossed by the project and requiring new connections over or under it, would be maintained through provision of alternative access for the duration of construction with the aim of maintaining current levels of access. This would apply where practicable for footpath and bridleway crossings, although temporary diversions may be required.

9.2.20 Potential impacts from construction, such as noise, air quality, dust and agricultural landtake would be controlled as far as practicable through various good practice

measures set out in the draft CoCP, which would be mandated through contract arrangements and closely monitored throughout construction. Noise impacts may still arise for limited periods, associated with certain activities, such as piling. Details on the sequencing of construction and the types of activities associated will inform the assessment. The significance of consequential changes would depend on the overall duration and frequency of noisy activities in relation to nearby receptors. Tranquillity could be reduced along the proposed route due to the noise and activity generated by construction and construction traffic.

9.2.21 Temporary visual impacts would occur around construction sites, and while they could be screened at ground level, the high elevation of the majority of the works means they would be clearly visible from many places. The proximity of some houses to construction, as well as the qualitative changes to many views over the construction period, are likely to result in adverse visual effects.

9.2.22 Removal of vegetation during construction would open up views of the new railway but replacement and mitigation planting would partially screen the new structures.

The natural environment

Context

9.2.23 The route crosses the Great Ouse and its floodplain near Tempsford, where a post-industrial landscape of restored sand and gravel and clay workings provides a complex of open waterbodies and wetland habitats. The Great Ouse is fundamental to the remaining natural character of the route section, though the exploitation of its valley as a transport corridor and for mineral extraction has depleted much habitat aside from the river itself. The Great Ouse and the floodplain near Tempsford form the main nature conservation interest close to the route in this section.

9.2.24 The Great Ouse is classified as a county wildlife site (CWS) where the project intersects it and is recognised as providing commuting routes for otter and bats. The associated wetland areas likely provide further habitat for otter and bats in addition to supporting characteristic riparian animals such as water birds and water voles.

9.2.25 The route crosses the Great Ouse, Fox Brook and Hen Brook (Environment Agency designated Main Rivers) and the South Brook, Rectory Brook and Rockham Ditch (designated as ordinary watercourses). There are at least two Water Framework Directive (WFD) surface water catchments potentially impacted in this route section, namely Ouse (Roxton to Earith) and Abbotsley and Hen Brooks.

9.2.26 There is a network of woodland habitat of principal importance (HPI) and ancient woodland areas in the Great Ouse floodplain extending in a swathe to the east adjacent to and outside the draft Order Limits, which links functionally with a larger woodland network further to the east, including the Eversden and Wimpole Special Area of Conservation (SAC)/Site of Special Scientific Interest (SSSI). Small pockets of deciduous

woodland priority habitat, including some veteran trees, are scattered outside the draft Order Limits as the proposed route bears north past St Neots.

9.2.27 The St Neots area may offer an important landscape for commuting and foraging barbastelle bats which are a qualifying feature of the Eversden and Wimpole SAC/SSSI. This is discussed in more detail in Chapter 10 for the Croxton to Toft route section.

Potential impacts and mitigation

9.2.28 The project would cross the Great Ouse and intersect with rivers, ditches and aquifers that are integral to the broader network of water bodies safeguarded and assessed under the WFD. Assessments will be undertaken to demonstrate that the project would not deteriorate the status of any WFD element. Necessary mitigations could include riparian planting and reinstatement of natural bed and bank materials. Other mitigation would include wetland and wet grassland habitat creation, particularly in the area surrounding the River Great Ouse and other watercourses as well as areas associated with balancing ponds.

9.2.29 Protection of the waterbodies during construction would be needed to mitigate potential impacts to ecology, water quality and other hydrological characteristics. Measures that seek to protect the quality of surface water, including impacts to the hydrological regime will be set out in the draft CoCP. With appropriate design and mitigation in place, an assessment of each crossing will demonstrate how fluvial flood risk would not be increased by the project.

9.2.30 Direct impacts on ancient woodlands adjacent to the project through habitat loss would be avoided. Protection from indirect impacts on the network of ancient woodlands and other retained habitats (including HPI) will be a key consideration for design and mitigation proposals, including management through the draft CoCP to address risks of air pollution, as well as mitigating against habitat fragmentation and disruption of habitat connectivity. The need for habitat replacement areas if required will be determined as part of the assessment.

9.2.31 To ensure legal compliance with relevant wildlife legislation, appropriate mitigation strategies for legally protected species found to be present will be developed in consultation with Natural England as the ecology baseline for the project evolves.

9.2.32 The potential for impacts on barbastelle bats associated with the Eversden and Wimpole SAC and the associated network of ancient woodland to the east of the draft Order Limits will also be considered through the Habitats Regulation Assessment. Any required mitigation which is developed to reduce or remove the risk of effects on barbastelle bats will also be designed to benefit other species wherever possible.

9.2.33 Planting will be designed to reinstate landscape pattern and enhance visual and ecological linkages, notably to existing woodland blocks. This would create visual screening in the longer term.

The historic and cultural environment

Context

9.2.34 The Roxton to east of St Neots route section crosses the river terrace within the valley of the River Great Ouse and Hen Brook. The new A421 dual carriageway will reinforce the built form that already prevails in the Great Ouse Valley, but which contrasts the mostly agricultural landscape along its remainder. As part of the EIA for the new A421 dual carriageway, a large-scale programme of archaeological geophysical survey, trial trenching and open excavation has provided an important understanding to the area's history.

9.2.35 The importance of the Great Ouse Valley as a focus for settlement, communication and trade over thousands of years has been described for the preceding route section, from Clapham Green to Colesden, in Section 8.3 of this report. The river terrace of the Great Ouse, located to the east of Roxton, attracted early prehistoric activity. Dense flint scatters dating to the Palaeolithic and the Mesolithic period, as well as hand axes, blades and arrowheads used for hunting, have been discovered, illustrating historic settlement patterns dating to the early prehistoric periods. These discoveries indicate that this area may have been a significant Neolithic landscape and that the inhabitants of the Neolithic period regarded these areas as a place of importance. Evidence of activity dating to the Iron Age is also prevalent through the landscape, including settlements of small enclosed and unenclosed farmsteads.

9.2.36 From the medieval period the landscape would have been largely agricultural, initially with the open field system and its characteristic ridge and furrow, then an enclosure landscape with small fields and hedgerow field boundaries. Into the 20th century this enclosure character started to be eroded through intensification of food production requiring larger fields and the removal of hedgerows. Extractive industries also changed the landscape, particularly south of St Neots, along with new transport infrastructure including the Varsity Line (now dismantled), the Great Northern Railway, the A421 and the A1.

9.2.37 The landscape character of the shallow, tree-lined valley of the River Great Ouse has been modified by development, sand and gravel extraction and A1, A428 and A421 and ECML. These have an urbanising influence on the area and detract from tranquillity. East of St Neots, the land rises up to a clay plateau landscape which is more open, with large arable fields. Here the A428 is well-screened by roadside vegetation and has a more discreet presence in the landscape. South of St Neots, street lighting reduces the darkness of the night sky, but it is relatively dark east of the town.

Potential impacts and mitigation

9.2.38 The project would further change the historical character of the landscape in the Roxton to east of St Neots route section. Survey work will be undertaken to understand the layers

of history visible in the landscape, informing the mitigation of potential impacts through landscape design and integration of the route into the historic landscape where possible. There may be opportunities to reinstate or reinforce historic landscape character, for example replanting lost hedgerows and filtering or framing views through tree planting.

9.2.39 Tempsford Bridge, which is part of the A1, is a scheduled monument and also a listed structure. There are clusters of listed buildings mainly related to Roxton, Tempsford and Little Barford which would be indirectly affected by the project. Temporary impacts would be related to construction activity and compound locations. Permanent impacts would be related to the loss of wider rural landscape setting. Where required, mitigation would rely on an understanding of setting and its contribution to a building's significance within the landscape. Sensitive integration of the route into this landscape setting would be key; for example, through screening, reinstating or reinforcing historic and existing landscape character, or opening up views which allow the buildings to be better understood in their wider landscape.

9.2.40 The landscape character of the area would be affected by the introduction of new embankments, bridges, viaducts and cuttings. While these would be substantial new structures, they would not fundamentally change the character of the landscape south of St Neots since transport infrastructure is already a strong presence here. East of Little Barford and St Neots, the elevated station at Tempsford and potential crossing over the new A421 dual carriageway would have an urbanising effect on the countryside. However, the approach to the design of the new station, public realm and lighting would limit this. New and replacement planting would gradually reintegrate the new railway into the landscape, but where elevated on high embankment and viaduct, it would remain prominent. Careful design of the new bridges and viaducts could allow the existing openness of the landscape to be partially maintained. Noise and movement generated by the passing trains would reduce the tranquillity of the landscape east of St Neots. Mitigation would include planting including woodland, scrub and hedgerows to integrate the project with the new A421 dual carriageway as well as landscape mitigation earthworks and planting either side of the railway. This would include woodland, hedgerows and scrub planting together with grassland and wetland habitat creation.

9.2.41 Planting will be designed to reinstate landscape pattern and enhance visual and ecological linkages, notably to existing woodland blocks. This would create visual screening in the longer term.

9.3 Option comparison

9.3.1 The main environmental differences between the options being considered in this route section are presented in Tables 9-1 and 9-2, which summarise the environmental information that was used in the Assessment Factor process. Chapter 10 of the ***Technical Report*** provides more detailed information on the assessment process and the other factors considered when comparing these options.

Table 9.1: Comparison of the key environmental considerations between Alignments 1b and 1c

Topic	Alignment 1b	Alignment 1c
People and communities	Loss of two residential properties.	Loss of two residential properties and temporary use of land of three residential properties off Spinney Road.
People and communities	Loss of four businesses off Bedford Road.	No direct impacts to business properties.
People and communities	The high crossing of the new A421 dual carriageway on viaduct for this option would be prominent in the view. The railway tracks would be elevated on a new viaduct in the location of the proposed Tempsford Station, which would be approximately 22m above ground level. Potential for visual impacts for residents in Roxton, Chawston and Tempsford, and scattered farmsteads. Also from PRoW, especially to the south of the alignment, and the River Great Ouse.	There would be no need for the high crossing over the new A421 dual carriageway which is required for Alignment 1b. The railway tracks would be elevated on a new viaduct in the location of the proposed Tempsford Station, which would be approximately 9m above ground level. Potential for visual impacts for residents in Chawston, although views from Roxton would be screened by the new Black Cat roundabout and from Tempsford by the new A421 dual carriageway.
People and communities	Some loss of BMV agricultural land.	Some loss of BMV agricultural land, but exacerbated by the longer embankment between viaducts.
People and communities	The option may cause severance to the north of the neighbouring communities of Roxton and Tempsford, although severance will have already been created by the new A421 dual carriageway.	Lower risk of severance given Alignment 1c is closer to the new A421 dual carriageway.
Natural environment	Viaduct crosses the River Great Ouse CWS and may result in the loss of HPI.	Viaduct crosses the River Great Ouse CWS and may result in the loss of HPI.
Natural environment	May result in the loss of floodplain storage from the positioning of the viaduct piers, as well as the proposed station access road and Barford Road proposals.	Less of Alignment 1c is located within flood zone and the alignment is further away from flood extents associated with the Great Ouse and Rectory/Tempsford watercourses.
Landscape and historic environment	Would be seen as a separate element in the landscape from the new A421 dual carriageway along much of the route.	Remains close to new A421 dual carriageway and would run parallel and therefore would be seen and experienced in the landscape as forming a single wide transport corridor.

Table 9.2: Comparison of the key environmental considerations between Option B and Option F for the temporary logistics hub

Topic	Option B	Option F
People and communities	Visible in filtered views from a small number of residential properties on the eastern edge of Little Barford and on Potton Road. Prominent in views across the open landscape from Barford Road, beyond the ECML. The option would be screened by the new A421 dual carriageway on embankment from the landscape to the east, although the elevated platform would be apparent in views above the new road.	Clearly visible from Barford Road and in filtered views from the River Great Ouse and a small number of properties in Little Barford. The new A421 dual carriageway on embankment would screen much of the view from Tempsford in the south but elevated platform would be a noticeable addition to the open, rural landscape and would be visible from parts of Little Barford, Barford Road and the River Great Ouse and may be visible from Tempsford.
People and communities	Potential for disturbance to local residents to the south-west of Eynesbury, although proposed infrastructure is distant from existing settlements.	Potential disturbance to local residents on the outskirts of Little Barford, located immediately adjacent to the option, and also receptors in Chawston.
People and communities	Demolition of buildings at Rectory Farm.	Temporary use of land from one property off Barford Road.
People and communities	Loss of BMV agricultural land.	Loss of BMV agricultural land.
Natural environment	Intersects part of the new A421 dual carriageway's landscape proposals and would result in loss of woodland planting and a new hedgerow and trees proposed as part of the new A421 dual carriageway, which provides potential habitat for barbastelle bats. It would also create disturbance from noise, lighting and vibrations which may degrade habitat suitability and impact the functionality of ecological features supporting bats.	Intersects less of the new A421 dual carriageway's landscape proposals including woodland identified as habitat for barbastelle bats.

Topic	Option B	Option F
Natural environment	Crosses two watercourses which would require culverting or diversion. Earthworks pad is in cutting on multiple sides which may penetrate superficial glacial till, potentially forming a significant barrier to groundwater flows. This could lead to groundwater flooding if substantial groundwater is present in this body unless mitigation is applied.	Geological setting is similar to Option B but less of Option F is underlain by the superficial glacial till aquifer. Parts of the earthworks platform are in cutting; however this is much shallower than Option B. Surface water mapping shows overland flow pathways and ponding in the centre of the option but would only impact one minor watercourse (drain).
Landscape and historic environment	Lighting on the operation of the logistics hub would introduce lighting into the unlit landscape and views. It would also be partially visible from the listed buildings in Little Barford, temporarily removing part of their important rural setting.	Lighting on the logistics hub would introduce lighting into the unlit landscape and views. It also has the potential to impact the important rural setting of listed buildings in both Little Barford to the North and Tempsford to the south.

10. Croxton to Toft

10.1 Project description

Summary

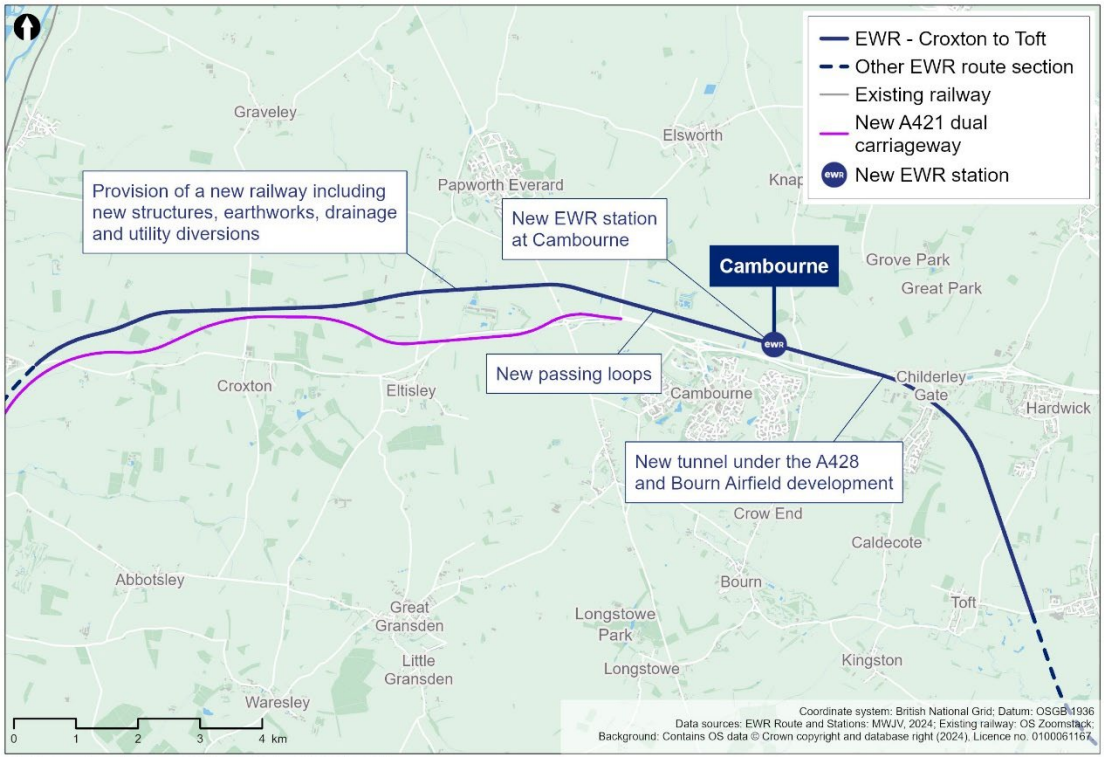
10.1.1 This 19km (12 mile) route section includes a new railway beginning at the roundabout east of St Neots, running north of Cambourne and the new A421 dual carriageway and A428, before crossing the A428 and ending at the B1046 between Toft and Comberton.

10.1.2 The proposed works include:

- New twin-track track railway and associated infrastructure.
- Passing loops between Brockley Road and Cambourne.
- New station at Cambourne.
- Cut and cover tunnel beneath the A428, the proposed Bourn Airfield development and Highfields Caldecote, with associated temporary diversions of the A428 and other local roads.
- Overbridges and underbridges for road, track and path crossings, bridges and culverts for watercourses, and associated diversions where necessary.
- Various drainage and water storage ponds (referred to as balancing ponds) along the route section.
- Utility diversions along the route including overhead electricity transmission lines.

10.1.3 The passenger train service pattern between Bedford and Cambridge stations would be four trains per hour in each direction, with provision for up to two freight trains per day in each direction.

Figure 10-1: Proposed route of the project between Croxton and Toft



Project proposals

Croxton

10.1.4 The railway would enter the Croxton to Toft route section in cutting heading north-east. It would then pass to the north of the junction between the new A421 dual carriageway, passing beneath the realigned A428 immediately to the north of this new junction, which would need to be realigned on a new overbridge. Abbotsley Bridleway 18 would be diverted onto a new 7m high overbridge to cross over the railway. The route would then cross over the Gallow Brook and return to cutting around 4m deep to cross beneath Toseland Road, which will have been realigned by the A428 scheme, and a new bridge would be constructed to take the road over the railway. It would continue at-grade north of and parallel with the new A421 dual carriageway.

Eltisley and Cambourne

10.1.5 The route would rise onto a low embankment to pass over West Brook and a diverted footpath, and then resume at-grade beneath St Ives Road (B1040), which would be realigned onto a new bridge. It would remain at-grade, passing beneath Ermine Street. St Neots Road and Brockley Road which would each be realigned on new bridges over the railway.

10.1.6 The route would continue along a straight section north of Cambourne and the existing A428. Passing loops would be constructed between Brockley Road and the new Cambourne station, with the station sited north of the town and the A428. The station would include a station building to the south of the proposed railway, two platforms, a bridge with stairs and lifts over the railway, along with an active travel hub including cycling facilities, bus facilities and a car park. Vehicular access would be via St Neots Road and a new footbridge would be provided crossing over the A428 and St Neots Road, connecting into Cambourne.

10.1.7 Various farm tracks and public rights of way (PRoW) would be diverted onto bridges over the railway along this section north of Cambourne, including Knapwell Footpath 5 and Elsworth Bridleway 4. Knapwell Footpath 8 would cross the railway via a new footbridge and a new footpath to the south of the railway would then link Knapwell Footpath 8 to Cambourne station. The route would then enter cutting, passing beneath Knapwell Wood Road, which would be realigned over a new bridge.

Bourn Airfield and Hardwick

10.1.8 East of Cambourne and Knapwell Wood Road, the railway would drop into a cutting to enter a tunnel under St Neots Road, the A428, Wellington Way, the proposed Cambourne to Cambridge busway, the north-east corner of the proposed Bourn Airfield development, and Highfields Road. The tunnel, which would be constructed using a cut-and-cover method would be approximately 1.5km (0.9 miles) long. This would require the temporary diversion of roads, including the A428, and a number of utilities. A tunnel services building, housing operational and maintenance equipment, would be required at each end of the tunnel. The tunnel would also require an emergency escape route via shafts towards the middle of the tunnel within the northern side of the Bourn Airfield development site.

10.1.9 The route would emerge from the tunnel in cutting – requiring diversion of the Harcamlow Way/Wimpole Way long distance path onto a new footbridge which would be designed as a green bridge – and then briefly run at-grade before entering cutting once again. Hardwick Road would be realigned onto a new bridge over the railway just west of Asplins Farm.

10.1.10 The railway would continue across this undulating landscape, dropping into cutting to pass beneath the B1046 Comberton Road which would be realigned to the north of the current road on a new overbridge. The new overbridge would be designed as a green bridge.

10.2 Initial environmental information

People and communities

Context

10.2.1 The Croxton to Toft route section comprises a generally rural and sparsely settled area where fewer people would potentially be impacted by the project compared with more urban and developed route sections. Nevertheless, the project would introduce a new permanent feature in this environment, resulting in changes in rural views and sounds.

10.2.2 Moving eastwards from the outskirts of St Neots, the route would run close to the new A421 dual carriageway (due to open in 2027) and existing A428, which would influence the changing character of the area. Isolated farmhouses and cottages occur sporadically near the proposed project route, with larger settlements such as Eltisley and Papworth Everard over 1km (0.6 miles) away. The larger concentration of people in Cambourne and, once completed, the Bourn Airfield development, would benefit from the new Cambourne station and East West Rail services. The environmental character becomes notably more rural south of the A428 towards Comberton and Toft.

10.2.3 A review of the potential long-term impacts to people's wellbeing and amenity – both positive and negative – that would result from the introduction and operation of the new railway and its facilities is set out below, along with initial proposals for mitigating potential adverse effects. Potential disruption during construction is addressed separately, with an explanation of how it could be mitigated where practicable.

Potential impacts and mitigation

10.2.4 On the more rural section of the route between Croxton and Papworth Everard, the introduction of the new railway (largely at ground level or in cutting) and new overbridges would affect views from footpaths, local roads and isolated residential properties in the countryside. Around Cambourne the project would largely be screened from the town by the tree-lined A428, but would be visible from the landscape to the north.

10.2.5 The cut and cover tunnel under the A428 and Bourn Airfield development site would avoid impacts on most views from Highfields Caldecote and Hardwick, but where the route rises to ground level south of the tunnel, the railway corridor and passing trains would be apparent. New highways and PRoW overbridges would be visually prominent between Highfields Caldecote and Toft. In time, replacement planting along the line would screen or partially screen the new structures.

10.2.6 The need for any acoustic mitigation along the railway, using noise barriers and/or bunds, will be determined as the noise assessment progresses.

10.2.7 Cambourne is a new community comprising three villages. The new station would create important journey opportunities for local residents and for future new residents at Bourn

Airfield, enabling improved access to jobs, schools and health facilities. The new railway and the station at Cambourne could bring increased noise levels to the area, although this would need to be considered in the context of the A428, which creates a baseline of relatively high background noise.

10.2.8 The risk of community severance would need careful management through maintenance of good access across the alignment, particularly around Comberton and Toft. Comberton is the larger settlement of the two, providing services such as schools and healthcare facilities. Connectivity between the villages would be maintained with Comberton Road to be realigned onto a bridge over the railway.

10.2.9 Desk-based research has identified agricultural land within the draft Order Limits in this route section. A sizable proportion of this is expected to classify as best and most versatile (BMV), which will be determined through future survey work. In terms of land management, arable cropping predominates with large, highly mechanised farms prevailing. Farm business interviews with potentially affected land managers are ongoing and will continue during the design of the project. Initial studies indicate that 19 arable holdings of various sizes would be affected. Ongoing design development will take land quality into consideration, as well as potential impacts on farm holdings.

10.2.10 The project would require the permanent acquisition and temporary use of certain land and property. It would require the demolition of two residential properties including outbuildings at Two Pots Farm, an adjacent residential property off St Neots Road, and farm buildings and a warehouse in farmland near Comberton Road. There would also be acquisition of a residential property off B1040 St Ives Road.

10.2.11 Acquisition of land would be required from 13 residential properties at various locations, including nine off St Neots Road, two off Cambridge Road, and one each off St Ives Road and Highfields Road. The project would require demolition of a commercial facility off St Neots Road, and land acquisition from Bourn Airfield and a property off Highfields Road.

10.2.12 EWR Co recognises the effects these impacts would have and will be working with affected parties as the designs are further developed, seeking to agree measures to reduce the impacts of the proposals where possible and enter into agreements with property owners where property would need to be acquired or used. Further information is provided in the *Guide to Compulsory Acquisition and Compensation*.

Temporary construction impacts

10.2.13 In this route section, the construction programme would be driven by the cut and cover tunnel below the existing A428 and Bourn Airfield development. Construction compounds would be sited to support specific activities such as construction of Cambourne station, the passing loops and the cut and cover tunnel, as well as at road crossings or for utility works.

10.2.14 Two main compounds are proposed around Croxton, one located immediately east of Cambridge Road junction, and the other both sides of Toseland Road. Various compounds would support the works further east, including the new Cambourne station, with main compounds adjacent to St Ives Road and Ermine Street South. The construction of the cut and cover tunnel below the existing A428 and Bourn Airfield development site would be supported by a main compound sited at the north portal of the cut and cover tunnel. Land along the whole extent of the cut and cover tunnel would be required temporarily during construction.

10.2.15 Where use of local roads is required, heavy goods vehicles (HGVs) would take the shortest suitable route between compounds and the strategic road network. Construction traffic would generally use either the new A421 dual carriageway or the existing A428 respectively west and east of Caxton Gibbet. For compounds around Camborne, construction access between compounds and the A428 would be predominantly via St Neots Road. For compounds around Hardwick and Toft, construction access to and from the A428 would be predominantly via Cambridge Road/Main Road.

10.2.16 All existing roads crossed by the project and requiring new connections over or under it would be maintained through provision of alternative access for the duration of construction with the aim of maintaining current levels of access. This would be true equally for footpath and bridleway crossings, where diversions may be required temporarily. The cut and cover tunnel would require several temporary road diversions, including the A428 and the Cambourne to Cambridge busway.

10.2.17 The construction of the cut and cover tunnel would be one of the more disruptive elements of the work, affecting residents in Childerley Gate and Highfields Caldecote in particular. A temporary realignment of the A428, St Neots Road and (potentially) Cambourne to Cambridge busway would be provided along with a temporary localised diversion of Wellington Way and Highfields Road prior to constructing the tunnel beneath. The tunnelling works would require a particular focus on the phasing of work in order to minimise the duration of potential disruption. In addition, there would be potential for wider effects on business operations or for reduced amenity for businesses. Ongoing assessment work will help to better understand and elaborate how impacts could affect the local communities during construction.

10.2.18 Potential impacts from construction, such as noise and dust, would be controlled through good practice measures set out in the draft CoCP. The implementation of these measures would be secured through the DCO and closely monitored throughout construction. Elevated construction noise levels may still be experienced for limited periods, associated with certain activities. The draft CoCP will also set out measures to minimise impacts from temporary occupation of agricultural land, protect soil resources and otherwise limit disruption of farming operations. Vegetation loss would be minimised through identifying woodlands, trees and hedgerows which could screen construction works if retained and/or are key features of the landscape.

10.2.19 A review of local authority air quality data has revealed limited monitoring data within this route section. However, specific monitoring undertaken to inform the project indicates good air quality along this route section. Any impacts from construction of the project would be unlikely to cause exceedances of the relevant air quality objectives and would in any case be tightly controlled through the application of the draft CoCP.

The natural environment

Context

10.2.20 The Crofton to Toft route section predominantly comprises the large field systems of an open arable farmland landscape straddling the watersheds between the Great Ouse and River Cam catchments. Still situated on the low-lying Bedfordshire and Cambridgeshire Clayland, the landscape is intensively farmed. The landscape is interspersed with small broadleaved deciduous woodland – some qualifying as habitat of principal importance (HPI) and wide hedgerows – which qualify as HPI if containing native species. The project intersects aquatic habitats such as streams and wet ditches including Gallow Brook and Fox Brook.

10.2.21 In the west of the route section, small, scattered pockets of deciduous woodland HPI, including some veteran trees, are present within the wider landscape. Semi-natural habitats, including woodlands and grasslands, are situated either side of the current A428 and around villages, particularly Wintringham, Weald, and Eltisley, and around larger farmsteads. Sizable blocks of deciduous woodland HPI in the west of the route section include The Gorse, New Gorse and Ash Plantation. A section of traditional orchard HPI, adjacent to St Ives Road, overlaps with the draft Order Limits.

10.2.22 No ancient woodland lies within the draft Order Limits in this route section. However, three ancient woodlands are near to the proposed route around Cambourne. Elsworth Wood and Knapwell Wood ancient woodlands are designated as Sites of Special Scientific Interest (SSSIs) and are respectively located approximately 600m and 100m north of the draft Order Limits. Hardwick Wood is also a SSSI, located approximately 560m south and west of the project. Further east, where the route would emerge from the tunnel south of the A428, an unnamed deciduous woodland with potential ancient woodland is situated to the north of Highfield Caldecote.

10.2.23 These ancient woodlands and several nearby woods (such as North Lodge plantation and woods at Wood Farm Cottages) have been identified for supporting barbastelle bats. It is likely that these provide supporting habitat for the Eversden and Wimpole Special Area of Conservation (SAC) as part of a wider network of ancient woodlands located in a swathe from Waresley to Great Eversden.

10.2.24 Between St Ives Road and Toft this route section lies within the SAC barbastelle bat core sustenance zone (Greater Cambridge Biodiversity Supplementary Planning Doc). To date, confirmed barbastelle roosts have been associated with woodland, although none have

been identified within the draft Order Limits. The project would, however, intersect with home ranges for barbastelle bats including those associated with Hardwick Wood SSSI and Kingston Wood.

10.2.25 Other protected species are known to be present within habitats outside of the draft Order Limits. Ecology survey works conducted for the new A421 dual carriageway identified the presence of other bat species, Schedule 1 breeding birds, badger, common reptile species and otter. Schedule 1 breeding birds included barn owl, hobby and kingfisher. Suitable habitats for these species are present within the draft Order Limits.

10.2.26 The project would intersect landscape and mitigation proposals for the new A421 dual carriageway, including mitigation for bats.

Potential impacts and mitigation

10.2.27 Direct impacts on ancient woodland through habitat loss would be avoided. Protection from indirect impacts on the network of ancient woodlands, and other retained habitats (including HPI), will be a key consideration for design and mitigation proposals, including management through the draft CoCP to address risks of air pollution, as well as mitigating against habitat fragmentation and disruption of habitat connectivity. The need for habitat replacement areas will be determined as part of the EIA.

10.2.28 To ensure legal compliance with relevant wildlife legislation, appropriate mitigation strategies for legally protected species found to be present will be developed in consultation with Natural England as the ecology baseline for the project evolves. The potential for impacts on barbastelle bats associated with the SAC will also be considered through the Habitats Regulation Assessment. In considering mitigation options, opportunities for these to also benefit other species will be explored.

10.2.29 The project would intersect ditches and aquifers that are integral to the broader network of water bodies safeguarded and assessed under the Water Framework Directive (WFD). There are at least five WFD surface water catchments potentially impacted in this route section, namely Bourn Brook, Fen Drayton drain, West Brook, the Ouse (Roxton to Earith), and Abbotsley and Hen Brooks. Assessments will be undertaken to demonstrate that the project would not deteriorate the status of any WFD element or prevent the attainment of surface water and groundwater body objectives. Necessary mitigations could include riparian planting and reinstatement of natural bed and bank materials.

10.2.30 The flood risk and potential drainage impacts could occur particularly along the route between Weald (approximately 500m south of the project) and Hunters Chase (adjacent to the project, south of Papworth Everard). Protection of the waterbodies during construction would be needed to mitigate potential impacts to ecology, water quality and other hydrological characteristics. Measures that seek to protect the quality of surface water, including impacts to the hydrological regime will be set out in the draft CoCP. With appropriate design and mitigation in place, an assessment of each crossing will demonstrate how fluvial flood risk would not be increased by the project.

10.2.31 Bourn Brook and its tributaries are chalk streams possessing unique habitats. The design of the project will seek to conserve groundwater flow and reduce in-channel works.

10.2.32 With appropriate design and mitigation in place, an assessment of the watercourse crossing will demonstrate how fluvial flood risk would not be increased by the project. Equally, assessment will also seek to address risks of and mitigation for both surface water and groundwater flood risk.

Landscape and the historic environment

Context

10.2.33 The landscape between Croxton and Toft is gently undulating, predominantly open and with arable fields bound by deep, ditches and managed hedgerows. It is more wooded around Croxton, where the A428 has become quite well integrated into the landscape by roadside vegetation. However, the new A421 dual carriageway will urbanise the character around Croxton, in the same way the dualled A428 has done east of Caxton Gibbet.

10.2.34 As part of the EIA for the new A421 dual carriageway a large-scale programme of archaeological geophysical survey, trial trenching and open excavation has provided an important understanding to the area's history. In addition, the ongoing programme of investigation for the project's EIA is deepening the understanding of the cultural and historic environment, which will inform design and mitigation proposals.

10.2.35 Neolithic and Bronze Age settlement evidence within the landscape of this route section is rare. However, there are several Iron Age/Roman or other archaeological enclosures between Wintringham and Cambourne.

10.2.36 From the medieval period until now, the landscape has remained broadly agricultural, peppered with small villages. However, the more detailed character of this rural landscape has changed over time from a characteristic medieval open field system with ridge and furrow, still visible in parts of Toft, to an enclosed field system following Parliamentary Inclosure Acts during the 18th and 19th centuries, with smaller fields surrounded by hedgerows. Significant rationalisation of field boundaries occurred during the 20th century as a result of mechanisation of farming, with many of the Inclosure hedgerows removed and fields amalgamated. Croxton Park is a Grade II* formal landscaped park which started life as a medieval deer park in the 16th century before developing into gardens, pleasure grounds and a park in the 18th and 19th centuries.

10.2.37 Over the late 19th century and through the 20th century significant transport infrastructure was introduced into this landscape, firstly with the Varsity Line (now dismantled in this route section), which ran to the south of the route with a station in Longstowe, then with the A428 and now with the new A421 dual carriageway.

10.2.38 Although the dominant agricultural character of the area has remained since the 20th century, the prosperity of Cambridge has fostered development west of the city.

Cambourne is a new town (1998) that continues to grow, and the proposed Bourn Airfield development would extend this ribbon of housing along the A428.

10.2.39 Listed buildings near the route are few. Most of these buildings are associated with the villages they lie within, and there is a cluster of buildings in Croxton Park. Other listed buildings have a more direct relationship with the agricultural character such as New Inn Farmhouse and barns north of Cambourne and Old Victoria Farmhouse at Hardwick.

Potential impacts and mitigation

10.2.40 The project would cross several Iron Age, Roman and other archaeological enclosures between Wintringham and Cambourne. Ongoing survey work will help determine the extent of possible impacts, and will direct the necessary mitigation measures, which would be discussed with the local authority archaeological officer.

10.2.41 Otherwise, the new railway would introduce further new transport infrastructure into the landscape, increasing the more recent urbanising impacts of the A428 and the new A421 dual carriageway. Between Hardwick and Toft, the project would affect the small-scale, gently undulating farmland with cuttings and new overbridges. These would disrupt field patterns and diminish the setting of the villages in the area. Mitigation may include landscape mitigation earthworks combined with grassland and hedgerow planting to maintain the existing field pattern and screen project elements. Woodland and hedgerow planting associated with the proposed green bridges at the B1046 Comberton Road and Hardwick Bridleway 5 would strengthen the green infrastructure links in this area.

10.2.42 In time, replacement planting and landscape mitigation planting would help to integrate the new structures into the landscape. There may be opportunities to reinstate or reinforce historic landscape character, for example replanting lost hedgerows and filtering or framing views through tree planting.

10.2.43 Impacts to listed buildings would be related to changes to their rural and agricultural settings. Where required, mitigation would rely on an understanding of setting and its contribution to a building's significance within the landscape. Sensitive integration of the route into this landscape setting would be key; for example through screening, reinstating or reinforcing historic and existing landscape character, or opening up views which allow the buildings to be better understood in their wider landscape.

10.2.44 Throughout this route section planting would seek to enhance visual and ecological links to areas of fragmented woodland either side of the railway, including hedgerow, woodland, grassland, and wetland and scrubland where appropriate. Mitigation may also include landscape mitigation earthworks either side of the proposed West Brook underbridge, and after the proposed B1040 St Ives Road overbridge. Planting will be designed to integrate with the new A421 dual carriageway and recreate the wooded characteristics of the existing transport corridors.

11. Comberton to Shelford

11.1 Project description

Summary

11.1.1 This 14.3km (8.9 mile) section of the route extends between the B1046 Comberton Road to Addenbrooke's Road, Shelford. The project would require new rail infrastructure along much of the route but would use an existing section of railway from a proposed grade-separated junction (called Hauxton Junction), where it joins the existing Shepreth Branch Royston Line (SBR), which serves trains between Cambridge and London King's Cross.

11.1.2 North of Great Shelford, the project would reconfigure the existing Shepreth Junction that connects to the West Anglia Main Line (WAML), which serves trains between Cambridge and London Liverpool Street. Two new tracks would be introduced alongside the existing two-track WAML corridor through the new Cambridge South station (which is under construction at time of writing) and into Cambridge station, although some of this will have been introduced as part of the Cambridge South works.

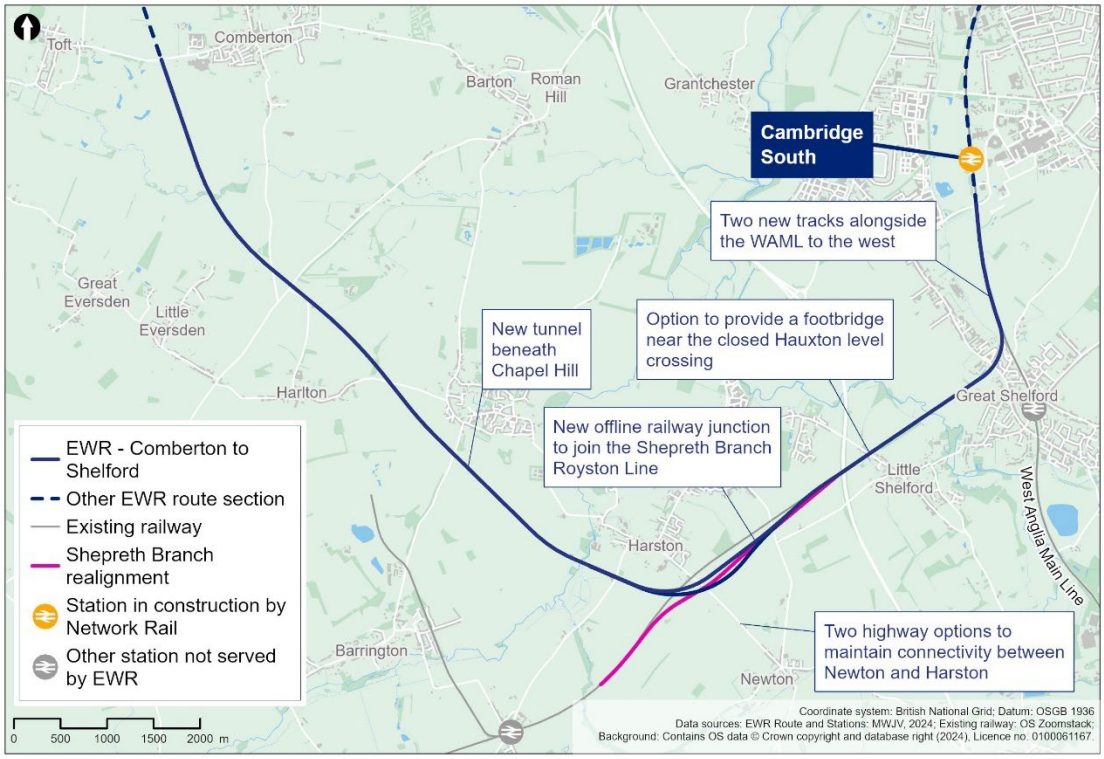
11.1.3 The proposed works include:

- New two-track railway with associated infrastructure between Comberton and Hauxton Junction east of the A10 Royston Road.
- Various watercourse culverts, as well as two viaducts over Bourn Brook to the south of Comberton, and the Rhee/Cam to the west of Harston.
- Tunnel beneath Chapel Hill, south of Haslingfield.
- Realignment of the SBR south of Harston and creation of the new Hauxton Junction west of the M11, where East West Rail joins the existing SBR.
- Realignment of the A10 onto a bridge over the new East West Rail line.
- Closure of two level crossings at Harston and Hauxton with road diversions introduced via new bridge crossings; closure of a footpath level crossing at Harston; and closure of a farm track level crossing at Great Shelford. There are two options for maintaining road access across the railway at Harston, which are described below with a comparison of their environmental impacts in Table 11-1.
- Provision of passing loops at Hauxton Junction to allow fast trains to overtake slower trains.
- Provision of various drainage and water storage ponds (referred to as balancing ponds) along the route section.

- New overbridges and underbridges for road, track and path crossings, as well as diversions and realignments.
- Modifications to existing roads and introduction of new maintenance access roads.

11.1.4 The proposed East West Rail passenger train service pattern between Bedford and Cambridge stations would be four trains per hour in each direction. This is in addition to the non-East West Rail services that run on the SBR and the WAML, including both passenger and freight services.

Figure 11-1: Proposed route of the project between Comberton and Shelford



Project proposals

Comberton

11.1.5 The railway would go under the B1046, which would be realigned to the north of the current road on a new overbridge to the east of Cambridge Meridian golf club. The railway would remain in cutting past Comberton with a new footbridge constructed to allow Toft Footpath 16 to cross over the railway. Emerging from cutting south of the B1046 Comberton Road, the route would rise onto embankment and continue on a short viaduct to cross Bourn Brook. The route would remain on embankment up to about 11m high as it passes to the south-west of the Mullard Radio Astronomy Observatory. Great and Little Eversden Footpath 26 would cross under the railway through an underbridge structure at existing ground level. Still on embankment, the route would pass over the

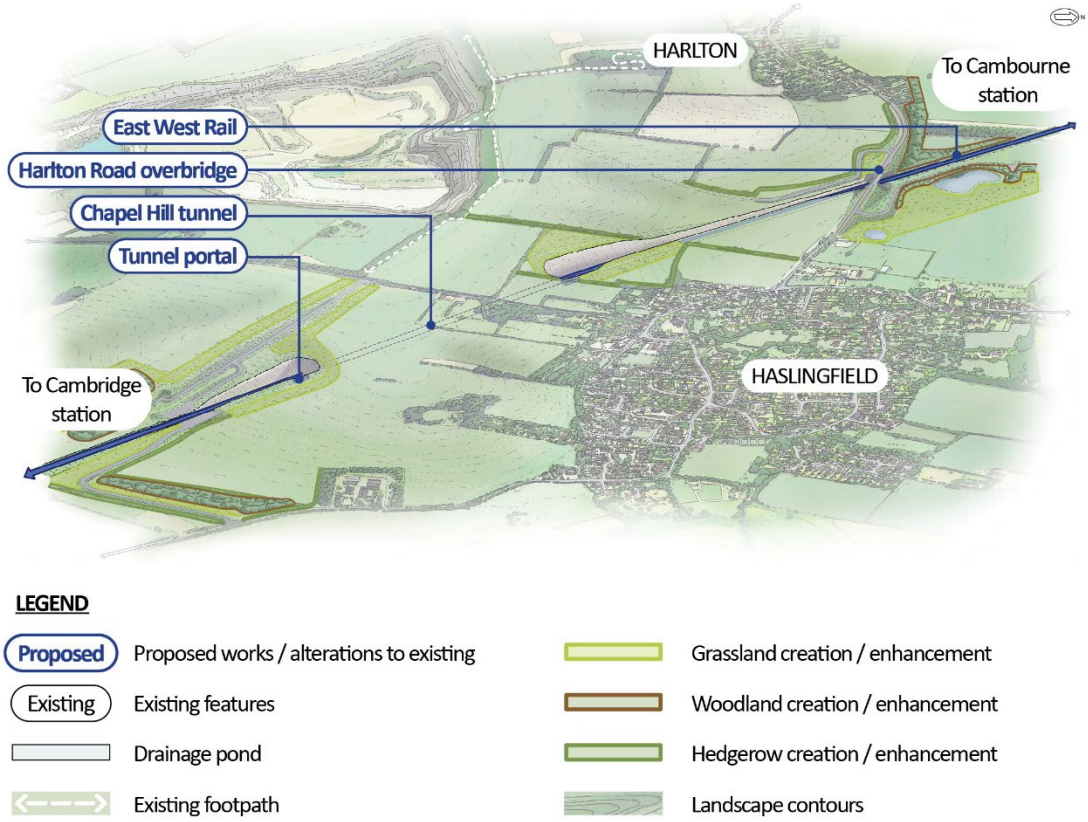
A603 Cambridge Road on a new bridge, requiring minor diversions of Comberton Road and Washpit Lane, and new junctions with the A603 created for each. The railway would then pass over Long Brook on a bridge.

Harlton and Haslingfield

11.1.6 The route would drop gradually, crossing under Harlton Road, which would be slightly realigned to the south on a new bridge. As the land rises relatively steeply southwards up to Chapel Hill and Money Hill, the route would enter a 700m long tunnel. Cuttings would be built at the approaches to the tunnel, and a tunnel services building housing operational and maintenance equipment would be required at each end of the tunnel.

11.1.7 After the tunnel, the railway would rise onto embankment up to 7m high as it passes south of Penn Farm and Charity Farm. A farm access track would be diverted under the railway at Thriplow Farm.

Figure 11-2: Indicative illustration of Chapel Hill tunnel



Harston

11.1.8 The route would then cross the River Rhee on a viaduct, passing immediately south of Harston Mill. The route would continue at grade beneath the A10 Cambridge Road, which would be diverted on a new bridge over the railway. The route would continue around the southern edge of Harston and would converge with the SBR as part of the proposed

changes (referred to as Hauxton Junction) which would see the SBR being diverted over the East West Rail westbound lines. The new railway would continue north and join the existing SBR just west of the M11, returning to a two-track railway.

11.1.9 East West Rail services would use the two existing SBR tracks continuing all the way through to Shepreth Junction, where the SBR merges with the existing WAML.

11.1.10 Two passing loop tracks would be constructed as part of the Hauxton junction. The westbound passing loop would be located from south of Chapel Hill to Hauxton and would join the SBR to the west of the existing M11 crossing. The eastbound passing loop would start approximately halfway between the existing Newton Road and London Road, joining the SBR again to the west of the existing M11 crossing.

11.1.11 The Newton Road/Station Road level crossing in Harston would need to be closed and the road diverted via a new connection to maintain links between Harston and Newton. Two options are under consideration with the preference being to link Newton to Harston via London Road. North of the realigned highways overbridge, a new road connection would use the route of the former Shepreth Branch Line track to connect to Station Road, south of Harston. This would provide an active travel route for pedestrians and cyclists (Option 4). The alternative (Option 1) would divert Newton Road to the south-west of the existing road, passing over the SBR via a new bridge in its new location before heading west to join the realigned A10. A new footbridge for pedestrians and cyclists could be provided in both scenarios, maintaining connectivity between Newton and Harston.

11.1.12 Due to changes to the existing railway associated with Hauxton Junction two further level crossings would need to be closed: Hayes level crossing situated to the west of the proposed Hauxton Junction and level crossing No.37 located between Newton Road and London Road on the SBR. Users of level crossing No.37 would be diverted east to London Road. Non-motorised users would also be able to connect to the new overbridge if constructed.

Figure 11-3: Indicative illustration of potential connectivity solution between Newton and Harston (Option 1)

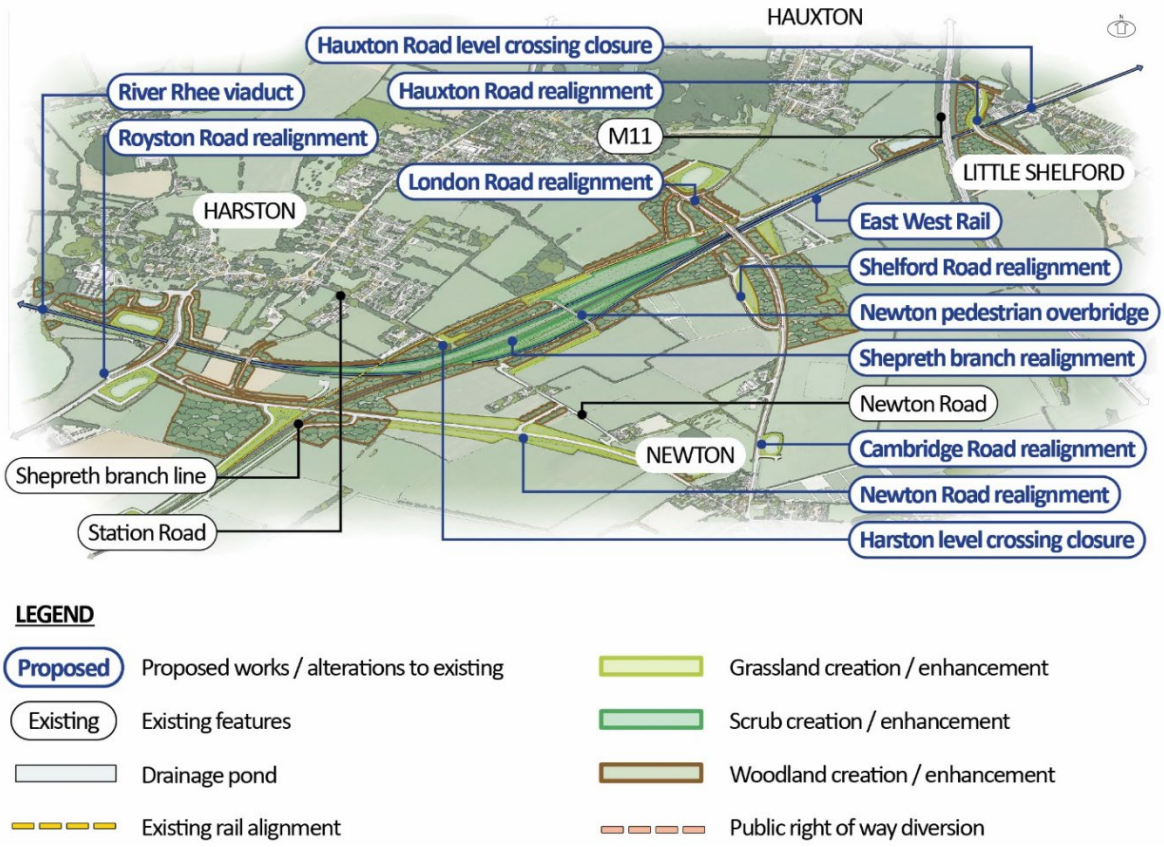
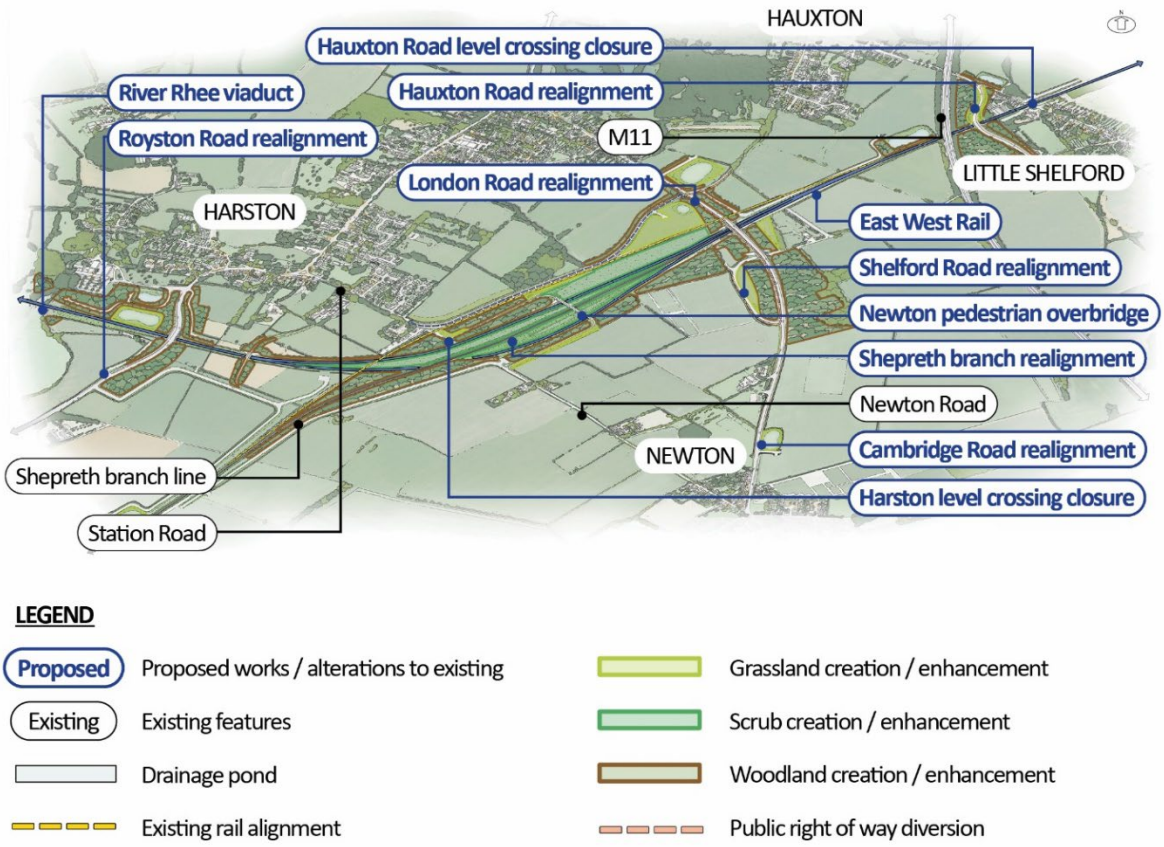


Figure 11-4: Indicative illustration of the preferred connectivity solution between Newton and Harston (Option 4)



11.1.13 London Road provides a second link across the existing railway between Newton and the A10 to the north-east of Harston. London Road would be realigned onto a new overbridge over the East West Rail/SBR lines.

The Shelfords

11.1.14 The SBR passes beneath the M11 and continues along the northern edge of Little Shelford on its existing alignment. Hauxton Road level crossing would be closed with a new road bridge provided over the railway west of Little Shelford, linking High Street with Newton Road. Pedestrians, cyclists and other users of the existing crossing would also be able to use this road bridge. The current proposals also include the option of providing a separate ramped access footbridge to the east of the level crossing which could be used by pedestrians, cyclists (dismounted) and others in addition to the road bridge.

11.1.15 East of Little Shelford, the railway would continue along its existing route. A private level crossing for Rectory Farm would be closed, although the existing footpath would be retained using an underpass beneath the railway.

Aligning with the WAML (Shepreth Junction)

11.1.16 North of Great Shelford, the existing Shepreth Line joins the WAML at Shepreth Junction. The capacity of the existing two-track WAML is insufficient to accommodate the additional East West Rail services, so the section from Shepreth Junction northwards would be increased to four tracks, with the additional tracks running alongside the west side of the existing alignment. The existing Shepreth Junction would be remodelled. The Cambridge South project (located in the Cambridge route section), due for completion in 2025, is providing some additional track on the WAML in the Nine Wells area, partly accommodating the East West Rail proposals.

11.1.17 Providing two new tracks to the west of the WAML would require other interventions. The existing footbridge carrying Great Shelford Footpath 1 across the railway would be replaced and the underbridge at Nine Wells would be widened to accommodate two additional tracks. A new balancing pond would be required south-east of Shepreth Junction and a new rail systems compound would be provided to house equipment supporting the widened railway.

Options

11.1.18 Table 11-1 shows the options for proposals in the Comberton to Shelford route section, which concern the solution for maintaining access across the railway following closure of the Station Road level crossing in Harston. Further work is required to determine which option is most suitable.

Table 11.1: Comberton to Shelford route section proposed interventions and options

Proposed intervention	Option 1	Option 4
Retained vehicle access between Harston and Newton	Diversion of Newton Road to the south-west of the existing road, passing over the SBR via a new bridge and continued connection with the realigned A10. See Figure 11.3.	New road from Station Road along a now redundant section of SBR corridor and connecting with London Road. See Figure 11.4.

11.1.19 The main environmental differences between these options are presented later in Table 11-2, which summarises the environmental information that was used in the Assessment Factor process (see Chapter 12 of the ***Technical Report*** for further information).

11.2 Initial environmental information

Introduction

11.2.1 The main environmental differences between the options to maintain connectivity between Newton and Harston are presented in Table 11-2, which summarises the environmental information that was used in the Assessment Factor process (see Chapter

12 of the ***Technical Report*** for further information). Otherwise, unless stated, the descriptions of the environmental impacts in this route section are relevant to the project, regardless of options.

People and communities

Context

11.2.2 South of the B1046 Comberton Road, the route passes through a predominantly rural, sparsely populated landscape. Existing views from rural roads, scattered farmhouses and the villages are limited by the layering effect of woodland blocks and vegetation bordering fields and settlements. Between the A603 and the approach to Cambridge, the population increases within villages including Harlton, Haslingfield, Harston and Shelford that are connected by roads and public rights of way (PRoW). There are open views from Chapel Hill towards Cambridge and the telescopes of the Mullard Radio Astronomy Observatory are a landmark feature. Around Great Shelford, the character of the area becomes more suburban and the tall buildings of the biomedical campus, Addenbrooke's hospital and Papworth hospital are prominent structures that define the approach to Cambridge, creating a more developed setting for the project, which increases as the project approaches and enters Cambridge station.

11.2.3 The proposed works within this route section would create a new railway corridor up to the connection with the SBR, and would require some major structures including the Chapel Hill tunnel, three river crossings, several road crossings (each requiring new bridges over or under the railway), bridge replacements for level crossing closures, and upgraded junctions respectively where the project joins the SBR at Harston and the WAML at Great Shelford.

11.2.4 A review of the potential impacts to people's wellbeing and amenity – both positive and negative – that would result from the introduction and operation of the new railway and its facilities is set out below, along with initial proposals for mitigating potential adverse effects. Potential disruption during construction is addressed separately, with an explanation of how it could be mitigated where practicable.

Potential impacts and mitigation

11.2.5 The gradual transition from the sparsely settled countryside south of the B1046 Comberton Road to the more populated areas after the A10 crossing determines the extent of potential impacts on people and communities. Up to the A10 crossing, the existing noise environment is strongly influenced by its rural location, with traffic on minor roads, farming and general sounds of the countryside the prevailing sources of noise. The railway would introduce a new source of noise, but residents are few until south of the A603 Cambridge Road, so potential impacts from noise are likely to be limited.

11.2.6 With respect to the visual environment, the project would introduce prominent infrastructure with a series of high embankments, viaducts and bridges between Comberton and Little Shelford. The project would dominate existing views from residential properties, local roads and paths across shallow, tree-lined river valleys. Elevated sections of the railway would form a new skyline in many locations, screening existing, more distant views. New road, farm access and footpath overbridges would be prominent additions to existing views.

11.2.7 The Mullard Radio Astronomy Observatory includes an array of radio telescopes situated near the Bourn Brook crossing, as well as south of the A603. The potential for electro-magnetic interference between East West Rail's traction power system and this facility is being assessed, with a view to integrating protective measures within the railway design. Potential vibration impacts may also need to be mitigated.

11.2.8 The proposed tunnel beneath Chapel Hill has been introduced in response to the potential environmental impacts of the previously proposed surface route through this area, and the extensive cutting that this entailed. In response to public feedback, and informed by the environmental assessment team, various tunnel options were proposed, with the 700m long mined tunnel identified by EWR Co as the preferred option. Information on the design evolution of this element of the project is contained in Chapter 12 of the ***Technical Report***. The tunnel through Chapel Hill would significantly limit potential visual impacts, and the hill would largely retain its profile. Landscape earthworks around the tunnel portals would screen views of the tunnel entrance from the surrounding area.

11.2.9 Past Harlton and Haslingfield the project would have no direct impacts on local community facilities, such as schools, shops or recreational space, although potential noise impacts may affect people using Haslingfield parish church. Noise screening measures would be introduced where necessary to lessen these potential effects. The project would have no direct impacts on residential properties in this location.

11.2.10 Although the two level crossings in Harston would be closed, access between Harston and Newton (via Station Road or London Road) would be maintained. The preferred option for providing this access from Station Road over Hauxton Junction is subject to ongoing assessment. This assessment will be important to determine how the revised road network in this area could affect local journey times, although the removal of the level crossings would alleviate current delays for people waiting for trains to pass. It would be a priority to allow people to continue to move freely between local villages and avoid any sense of severance.

11.2.11 There would be potential noise impacts for residents on the southern and eastern edges of Harston and along Newton Road partly due to increased train noise, but also as a result of road realignments which would affect the proximity of road traffic to different groups of people and properties. These would depend on which rail crossing and road diversion option is selected. Visual impacts could also occur for residents here and in the

countryside north of Newton overlooking the grade-separated Hauxton Junction. In addition, there would be visual impacts resulting from the realigned Newton Road, linking Harston and Newton, again depending on which option is selected. The environmental assessment will consider these risks in detail and identify potential mitigation solutions to lessen or avoid the potential effects where possible. The proposed Hauxton Road overbridge at Little Shelford would be a new feature in the view from the village.

11.2.12 Desk-based research has identified agricultural land within the draft Order Limits in this route section. A sizable proportion of this is known or expected to classify as best and most versatile (BMV) land, depending on future survey work. Ongoing design will take land quality and potential impacts on farm holdings into consideration. Arable holdings predominate, albeit interspersed with smaller livestock holdings. Initial studies indicate that an estimated 20-30 holdings of various sizes would be affected.

11.2.13 The project would require the permanent acquisition and temporary use of certain land and property. It would require the demolition of a warehouse in farmland off Washpit Lane and a barn off Royston Road, with cottages at New Farm likely to be acquired given their proximity to the proposed works. Permanent acquisition of land would be required from four residential properties along Church Road, Chapel Hill Road, and Station Road. Temporary land would be required from four residential properties on Willow Way.

11.2.14 The project would require acquisition of land from Comberton Village College, Cambridge Meridian Golf Club, and Mullard Radio Astronomy Observatory, as well as from one commercial property.

11.2.15 EWR Co recognises the effects these impacts would have and will be working with affected parties as the designs are further developed, seeking to agree measures to reduce the impacts of the proposals where possible and enter into agreements with property owners where property would need to be acquired or used. Further information is provided in the *Guide to Compulsory Acquisition and Compensation*.

Temporary construction impacts

11.2.16 There would be extensive construction along this route section, especially in relation to the tunnel and new rail junction. The tunnel under Chapel Hill would drive the construction programme of this route section, as well as the key interfaces with the SBR.

11.2.17 There would be two main construction compounds south of Comberton: one immediately south of Comberton, and a second adjacent to the road realignments of Comberton Road (B1046) and Cambridge Road (A603). The tunnel beneath Chapel Hill is expected to be constructed from both sides using mined tunnel techniques, with construction compounds required both west and east of Chapel Hill.

11.2.18 For works associated with the Hauxton Junction and road diversions around Harston and Hauxton, there would be several construction compounds located alongside the route between the A10 and the M11. Works at Shepreth Junction and rail works into Cambridge

would be supported from two main compounds at Granham's Road and off the Addenbrooke's Road, which would also serve rail works extending into the Cambridge route section.

11.2.19 Potential impacts from construction, such as visual intrusion, noise, air quality and dust would be controlled as far as practicable through various good practice measures set out in the draft CoCP, which would be mandated through contract arrangements, and closely monitored throughout construction. Noise impacts may still arise for limited periods, associated with certain activities. Details on the sequencing of construction and the types of activities associated with it would be determined to inform the assessment. The significance of consequential effects would depend on the overall duration and frequency of noisy activities in relation to nearby receptors.

11.2.20 Construction compounds would be predominantly rural compounds which would be partly interconnected by on-site construction routes that allow some construction traffic, particularly mass haul movements, to operate without using the public highway network and thus reduce impacts on the area's roads.

11.2.21 Where required to use highways, construction heavy goods vehicles (HGVs) would take the shortest suitable route between compounds and the strategic road network. HGVs would use the A603 Cambridge Road and A10 High Street/Royston Road to access the M11 at junctions 12 and 11 respectively. The B1368 London Road may also carry some construction traffic.

11.2.22 Roads and paths crossed by the project and requiring new connections over or under it would be maintained through provision of alternative access for the duration of construction with the aim of maintaining current levels of access in advance of a permanent solution. This is important for all of the village communities affected in this area, and particularly for users of local facilities such as the Comberton Village College and the Harston and Newton community primary school in Harston.

11.2.23 The introduction of large-scale construction and construction traffic would be uncharacteristic within existing views across the rural landscape, and the removal of existing vegetation would open up views of construction activity. Vegetation loss would be minimised through identifying woodlands, trees and hedgerows which could screen construction works if retained and/or are key features of the landscape. Tranquillity could be reduced along the proposed route due to the noise and activity generated by construction. Implementation of measures set out in the draft CoCP would be key to minimising adverse environmental effects.

The natural environment

Context

11.2.24 The Comberton to Shelford route section traverses a predominantly open farmed landscape with large arable fields. Still situated on the low-lying Bedfordshire and

Cambridgeshire Claylands, the landscape is intensively farmed but interspersed with broadleaved woodland – some ancient – and field ditches and hedgerows. This section of the route crosses the River Rhee, River Granta and the Bourn Brook and its floodplain.

11.2.25 The project would run closest to the Eversden and Wimpole Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) in this route section, at approximately 3km (1.8 miles) distance. Barbastelle bats are the qualifying feature of this internationally designated site and will be the principal subject of the Habitats Regulation Assessment for the project. There is a network of ancient woodland SSSIs located in this part of Cambridgeshire that form a swathe from Waresley to Great Eversden, though none is physically impinged by the project. This network is likely to provide supporting habitats for barbastelle and other bat species.

11.2.26 Information from field surveys and remote sensing has characterised agricultural fields within this route section as large with remaining hedges generally of a poor structure, defunct in places and poorly maintained, although priority hedgerow habitat is crossed in places. The Rhee valley south of Haslingfield supports fields of grazing marsh and lowland fen habitat of principal importance (HPI), as does the Granta between Little and Great Shelford. These main river and floodplain crossings would demand a sensitive approach to design and construction.

11.2.27 The route section includes areas of HPI including deciduous woodland, grazing marsh, chalk river and hedgerows. Areas of HPI intersected by the project are predominantly associated with River Rhee, River Granta and the Bourn Brook.

11.2.28 The landscape south of Comberton is intensively farmed but there are numerous small pockets of deciduous woodland HPI, such as around the Mullard Observatory. The route's passage through the suburban outskirts of Cambridge corresponds with a general paucity of HPI, despite numerous areas of open space. A small area of deciduous woodland priority habitat sits alongside the route in Harston. The crossing of the Granta at Shelford would also pass a belt of woodland and an area of grazing marsh. Hedgerows which qualify as HPI occur around the junctions with the SBR and the WAML.

11.2.29 There are at least three Water Framework Directive (WFD) surface water catchments potentially impacted in this route section, namely the Cam (Stapleford to Hauxton junction), Bourn Brook and Rhee (Downstream Wendy). In addition, the River Granta, Bourn Brook and River Rhee and their tributaries – including Hobson's and Coldham's brooks – are chalk streams, possessing nationally and internationally recognised unique habitats. These chalk streams support a variety of species including water voles and otters. In particular, the Bourn Brook is considered to be a stronghold for water voles and is a key commuting route and foraging area for barbastelle bats. There are known badger setts in the area.

11.2.30 The Bourn Brook floodplain provides an important corridor connecting several large grassland habitat areas to the west and east, the Bourn golf course (undesignated but supporting areas of floodplain grassland HPI) and the Mullard Observatory areas, which

also comprises the Lord's Bridge Observatory county wildlife site. Both sites lie immediately adjacent to the project. Bedford Disused Railway (Harlton) county wildlife site is located adjacent to the draft Order Limits.

11.2.31 Near Great Shelford the project, following the existing railway, would cross Hobson's Conduit just prior to crossing into the Cambridge route section. Hobson's Conduit flows from Nine Wells Local Nature Reserve (LNR), under the railway to the south of Addenbrooke's Road and joins Hobson's Brook. This chalk stream is lined with trees and scattered scrub and qualifies as an HPI. Nine Wells LNR is located to the east of the project, south of Addenbrooke's Road. A section of the Hobson's Conduit is designated as a county wildlife site and is known to support water vole and reptiles.

11.2.32 Barrington Pits chalk pit south of Haslingfield is designated a geological SSSI, although the route would tunnel beneath and north of this site. The Nine Wells local geological site is present adjacent to the route as it approaches Cambridge.

Potential impacts and mitigation

11.2.33 Based on survey work to date (and with further surveys planned) bats, including barbastelle, are known to commute and forage widely across this area. Maintaining connectivity and enhancing their foraging areas would be a key consideration for the project design and mitigation, particularly as barbastelle bats are a qualifying feature of the Eversden and Wimpole SAC/SSSI. This would be achieved by considering this species in the ongoing design development, including appropriate mitigation measures within the draft Order Limits, and through engagement and working in partnership with others involved in strategic mitigation initiatives in the wider countryside, such as local nature partnerships.

11.2.34 Retention and conservation of HPIs and the safeguarding of the protected species they support would be a key consideration. Protective measures would be required during construction to avoid direct and indirect impacts to protected habitats and species. These will be set out in the draft CoCP.

11.2.35 The project may result in direct and/or indirect impacts to the Lord's Bridge Observatory county wildlife site without mitigation measures being designed into the proposals. The Chapel Hill tunnel allows a greater proportion of the agricultural field pattern on the hill to be retained, including hedgerows that could provide bat flight paths.

11.2.36 Planting on either side of the route, including hedgerow, grassland, woodland, and wetland creation would create wider visual and ecological linkages to existing woodland blocks. Woodland and hedgerow planting is proposed, associated with proposed bat crossings under the Bourn Brook viaduct, the bridge for Great and Little Eversden Footpath 26, the tributary of the Bourn Brook underbridge and the Long Brook underbridge, strengthening the green infrastructure links in this area. The realigned B1046 Comberton Road bridge would be designed to maintain bat flight paths in this area.

11.2.37 The proposed route would cross rivers, ditches and aquifers that are integral to the broader network of water bodies safeguarded and assessed under the WFD. Assessments will be undertaken to demonstrate that the project would not deteriorate the status of any WFD element or prevent the attainment of surface water and groundwater body objectives. The design of the project will seek to conserve groundwater flow and reduce in-channel works where possible.

11.2.38 Risks to these water bodies would arise during construction. Protective measures would be employed to mitigate potential impacts to ecology, water quality, groundwater and other hydrological characteristics; these will be set out in the draft CoCP and prescribe measures that protect the quality of surface water and groundwater, including significant changes to the hydrological and hydrogeological regime. The design of the project will seek to conserve groundwater flow and reduce in-channel works.

11.2.39 For each of the watercourse crossings, detailed hydraulic models will be developed to assess fluvial flood risk. The hydraulic modelling will be used to ensure that flood risk is controlled by the project, with appropriate flood mitigation measures including viaducts, cuttings and localised bunding. An assessment will also be undertaken to address risks of and mitigation for both surface water and groundwater flood risk.

The historic and cultural environment

Context

11.2.40 The route follows the low-lying undulating landscape within the shallow valleys of the Gallow Brook and the River Rhee, where a pattern of settlement for rural villages has long been established. Within the higher ground of the Rhee valley to the west of Cambridge, Neolithic and Bronze Age settlement and funerary activity is prevalent in the form of a barrow cemetery at Money Hill to the south of Haslingfield. Evidence of enclosures, round houses and linear features confirms Iron Age settlement on the Cambridgeshire Claylands.

11.2.41 There is an extensive Iron Age/Roman settlement visible in cropmarks at Harston, demonstrating a system of settlement extending into the Roman period. Three major Roman roads are crossed by the project: the Sandy to Godmanchester Roman Road; the Cambridge to Hauxton Mill-Mare Way; and the Cambridge to Barton Roman Road. Following the Roman period there was major abandonment of settlements in this area, although towards the end of the early medieval period farming communities started to develop within Harston, Haslingfield, Hauxton, Little Shelford and Great Shelford.

11.2.42 The villages, which began as farming settlements, developed throughout the medieval period into the post-medieval period as scattered villages supporting farming communities. The landscape around still reflects this historic agricultural character, initially as open fields and later – following Parliamentary Inclosure Acts during the 18th and 19th centuries – as a planned field system, with smaller fields surrounded by

hedgerows. Many of the historic village cores are designated conservation areas, for example at Harlton, Haslingfield, Hauxton and the Shelfords, recognising the rural farming community historic character and how that is reflected in their buildings, spaces and views.

11.2.43 Significant rationalisation of field boundaries occurred during the 20th century, with many of the enclosure hedgerows removed and fields amalgamated. This character emphasises the separate and scattered nature of the villages' historic development. During the 20th century Great Shelford became an attractor for academics from the University, and the character became more suburban and residential as it became a commuter village.

11.2.44 South of Haslingfield, the prominent high point of Chapel Hill is fundamental to the historical landscape character of the area, having been used since the prehistoric period. The Mare Way or Mary Way pilgrimage route passes over the hill, probably continuing through the Money Hill barrows to Harston. The Chapel of Our Lady White Hill once sat on the top of the Chapel Hill, and was en route to the shrine of St Etheldreda at Ely. The chapel was a popular pilgrimage place at Easter and there is still a tradition to walk up Chapel Hill from All Saints Church in Haslingfield and watch the sunrise on Easter morning.

11.2.45 The landscape between Comberton and Shelford includes the shallow, open valley of Bourn Brook, Chapel Hill (the end of a narrow chalk ridge linked to the Chilterns) and the more enclosed, tree-lined valleys of the Rivers Granta and Rhee. The villages of Harlton, Haslingfield, Hauxton and Little Shelford are well integrated into the landscape and separated from each other by woodland and tree belts on the village boundaries. The larger village of Great Shelford, the M11, the convergence of two railways just north of Great Shelford and the tall buildings of the Cambridge Biomedical Campus and Papworth Hospital have an urbanising influence of the surrounding landscape and detract from its tranquillity.

Potential impacts and mitigation

11.2.46 The project through this route section would follow a line of significant historical landscape and archaeological character. It would pass through known or potential areas of archaeological interest, such as enclosures and settlements, the Money Hill barrow, and other multiphase settlement sites, and would pass close to scheduled monuments at Manor Farm near Harston and a settlement site north-west of Little Shelford.

11.2.47 Recognising the historical and wider importance of Chapel Hill in the landscape, the tunnel design was developed to help to preserve the landscape character (along with other benefits) including the dominance of the hill and its continued cultural relevance. Elsewhere, the prominent crossing of the landscape could detract from the historical scattered village character that directly relates to its agricultural setting. This would be particularly realised in areas where the line is on embankment, forming a prominent

feature in an otherwise relatively flat landscape. Survey work will therefore seek to better understand the layers of history visible in the landscape in order to help lessen these potential effects through landscape design, integrating the route into the historical landscape where possible. Mitigation could include opportunities to reinstate or reinforce historic landscape character, for example replanting lost hedgerows and filtering or framing views through tree planting.

11.2.48 Listed buildings are generally clustered within the villages, and their respective conservation areas. The impact on the landscape noted above would similarly impact the setting of the listed buildings. Around the realignment of the A10 and the Hauxton Junction, road and rail embankments would impact the setting of a number of listed buildings around Harston and the edge of Newton, diminishing their rural setting and introducing an engineered character which conflicts with the historic agricultural character.

11.2.49 Although the project would follow and tie in with the existing railway as it approaches Cambridge, changes such as the footbridges and the additional tracks may mean changes to settings of designated and non-designated heritage assets.

11.2.50 The additional tracks leading into Cambridge are likely to require works within the scheduled monument to the west of White Hill Farm. Surveys carried out for the Cambridge South station development show a complex network of trackways, enclosures and pits, including an area in the centre of the scheduled monument which appears to be a former Roman villa.

11.2.51 The design currently assumes that proposed works would be within the boundary of the scheduled monument site. The design will continue to be developed in collaboration with heritage and archaeological specialists and stakeholders to seek to minimise the amount of land that would need to be acquired from the scheduled monument whilst ensuring a safe operational railway. Opportunities to better understand, protect and reveal the importance of the scheduled monument as part of our proposals will also be investigated.

11.2.52 The new railway would introduce new structures into the area of a larger scale than is currently present in the existing predominantly rural landscape. The pattern of the landscape would be changed by the presence of long sections of railway on embankment and viaduct between Comberton and Haslingfield, over the River Rhee and south-east of Harston. These would sever the landscape and result in the loss of some woodland, trees and hedgerow. While new overbridges would retain road and PRoW connectivity and be designed sensitively, they would be prominent and uncharacteristic new features. Noise and movement generated by the passing trains on embankment or viaduct would reduce the tranquillity of the landscape.

11.2.53 Woodland, hedgerows and scrub planting together with grassland habitat creation would integrate project elements into the wider landscape and create ecological links to existing habitats. This would include a mixture of habitat creation associated with balancing ponds and planting either side of the route, including grassland, woodland, wetland and

hedgerow creation. Proposals include wetland and woodland creation associated with the Bourn Brook, and wetland creation associated with the River Rhee and other watercourses and balancing ponds. Landscape mitigation earthworks either side of the route combined with grassland and hedgerow planting would maintain the existing field pattern and open character associated with the chalk hills. Planting would reinstate and enhance habitat connectivity and in the longer term will provide visual screening.

11.3 Option comparison

11.3.1 The main environmental differences between the options to maintain connectivity between Newton and Harston are presented in Table 11-2, which summarises the environmental information that was used in the Assessment Factor process. Chapter 12 of the ***Technical Report*** provides more detailed information on the assessment process and the other factors considered when comparing these options.

Table 11.2: Comparison of the key environmental considerations between Option 1 and Option 4 for connectivity between Newton and Harston

Topic	**Option 1**	**Option 4**
People and communities	Introduction of new structures between Harston and surrounding villages (e.g. Barrington, Foxton and Newton) would create a perception of severance between the villages. The realigned road and overbridge would impact upon local topography as they would be elevated in the landscape, increasing the likelihood of local visual effects. The additional balancing pond adjacent to Royston Road would also contribute to local visual effects.	No effects on community facilities. Less visually intrusive with views limited due to the road being at grade. Impacts would be easy to mitigate with a line of trees or hedges. Option would be at grade (utilising a stretch of the existing SBR line) and therefore have less visual impact for residents in Harston and Newton Road and from the PRoW to the east of Harston. No view of the link road for residents and road users on the A10.
People and communities	As fewer vehicles are likely to use the old section of Station Road/Newton Road, traffic would likely be taken away from residents and community facilities located on Station Road/Newton Road.	The works associated with this option are located at a greater distance from the dwellings on Station Road and would likely be less intrusive on the settlement of Harston. However, proposed link road deviates more from the existing rail corridor, passing closer to residents on the B1368 London Road and Meadow Way.

Topic	Option 1	Option 4
People and communities	During construction, potentially more HGV traffic would be generated based on the larger extent of required earthworks for the realigned Newton Road over the railways.	During operation, there would potentially be increased traffic through Harston from realigned Newton Road. However, option is located some distance from Harston and would affect fewer residential properties. This option is significantly longer for motor users, cyclists, and equestrians.
People and communities	Greater severance of agricultural land.	Option utilises the former SBR railway corridor and would require fewer structures, reducing agricultural land acquisition and severance.
Natural environment	Similar impacts for both options. Impacts to hedgerows with potential adverse effects for bats (roosting, foraging and commuting) badgers and birds.	Similar impacts for both options. Impacts to hedgerows with potential adverse effects for bats (roosting, foraging and commuting) badgers and birds.
Landscape and historic environment	Substantial new road infrastructure in combination with the construction of the railway in a rural setting would potentially sever relationship between listed buildings (located in Harston Village and Newton Village) and conservation area, and the rural aspects of their setting. Option introduces elevated structures and changes in traffic movement at an elevated level, which would change the historic landscape character in this area. Impacts related to changes in the setting of the scheduled monuments. The Grade II listed Baggot Hall in Harston would be impacted by Baggot Farm accommodation overbridge.	Fewer potential Impacts on the setting of the scheduled monuments, on the listed buildings and the historic landscape as the route would reuse the redundant rail line. Less land required with consequent lower potential impact on archaeology. The Grade II listed Baggot Hall in Harston would be impacted by the construction of the Baggot Farm accommodation overbridge.

Topic	Option 1	Option 4
Landscape and historic environment	Option 1 would cut across the prominent chalk outlier of Rowleys Hill which is the site of a triangulation pillar. The realignment would impact local topography as it would be more visually prominent. The three new overbridges to Harston would adversely affect the landscape setting of the village.	The realigned road would run parallel with the East West Rail corridor at grade and would consolidate transport infrastructure in this area with less landscape severance. The three new overbridges to Harston would adversely affect the landscape setting of the village.

12. Cambridge

12.1 Project description

Summary

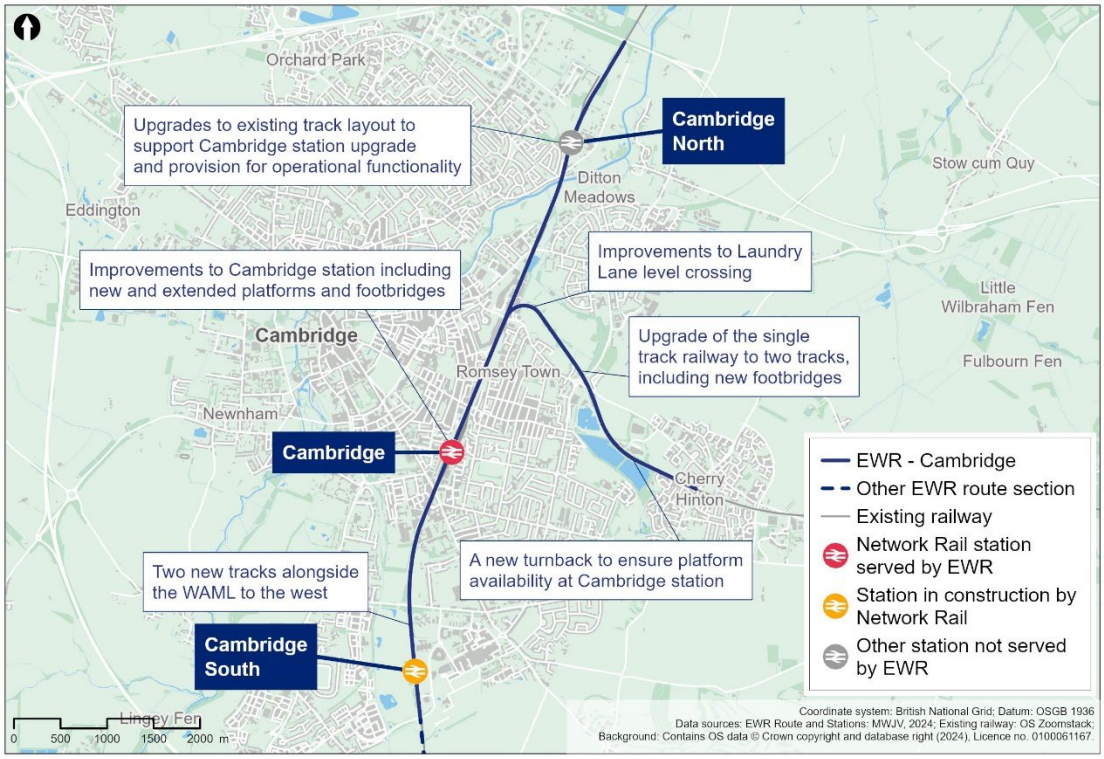
12.1.1 This 8km (5 mile) section of the route would run from Addenbrooke's Road bridge over the existing West Anglia Main Line (WAML) north of Great Shelford, to the A14 bridge north of Cambridge North station and to Yarrow Road in Cherry Hinton to the east of Cambridge.

12.1.2 The proposed works include:

- Two new tracks that run adjacent to the existing twin-track WAML from Addenbrooke's Road, joining the existing four tracks at Cambridge South station (under construction at time of writing) and continuing into Cambridge station.
- Demolition of the road overbridge at Long Road and reconstruction of a new bridge to accommodate the widened rail corridor.
- A new platform, extensions of two existing platforms, new foot bridges, building upgrades and railway systems modifications at Cambridge station.
- New train turnback facility at Cherry Hinton east of Cambridge and an additional track to a section of the existing Newmarket Line.
- Safety improvements to the existing level crossing at Laundry Lane in Cambridge.
- Reconstruction of two footbridges at Coldham's Common and The Tins footpath to allow for the electrification of the railway and the addition of a second track.
- Reprovision of two existing sidings that would be lost due to works at Cambridge station to Chesterton Sidings at Cambridge North station.
- Modifications to track layout works at Cambridge North station to allow some existing train services from the north to terminate there during our construction works.
- Several drainage and attenuation ponds along the route section.

12.1.3 The passenger train service pattern between Bedford and Cambridge stations would be four trains per hour in each direction. This is in addition to the non-East West Rail services that run on the route into Cambridge, as well as the other services that run north and east from Cambridge.

Figure 12-1: Proposed route of the project in Cambridge



Project proposals

Entering Cambridge

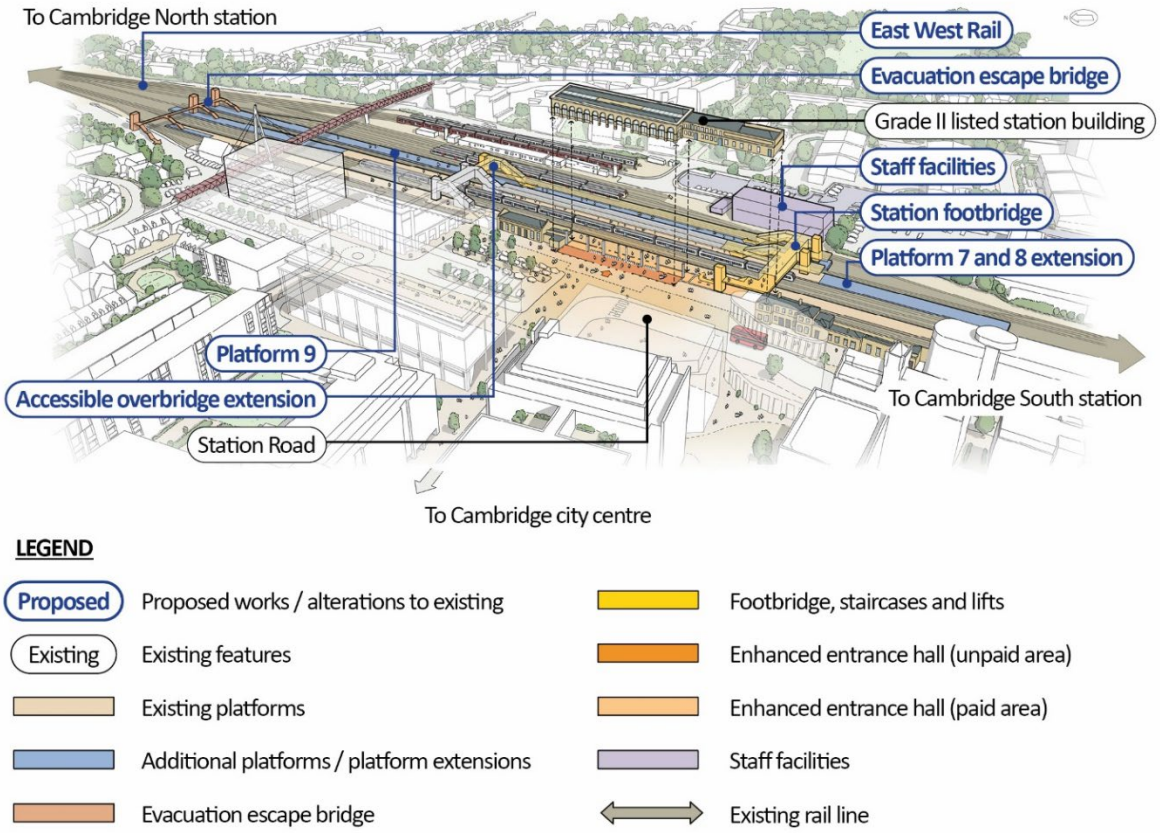
12.1.4 Two new tracks would pass north from Addenbrooke's Road and tie-in with the planned station layout for Cambridge South station, which is currently under construction by Network Rail. New tracks would continue north along the edge of sports fields between the existing railway and the guided busway, mostly within the current Network Rail boundary. The route would pass beneath Long Road, a major arterial route. To accommodate the two new tracks, the existing road bridge would be demolished and replaced with a new longer bridge, during which time alternative access would need to be provided. The new tracks would continue within the existing railway corridor to the east of the Cambridgeshire Guided Busway and Darien Meadow.

12.1.5 Approaching Cambridge station, the new tracks would pass beneath Hills Road using the existing railway corridor without altering the existing bridge and connect into the existing four-track arrangement south of Cambridge station.

12.1.6 At Cambridge station, a new platform 9 would be provided on the eastern side of the station, with platforms 7 and 8 being extended at both ends. Additional rail infrastructure, such as track, signalling and other rail systems would also be provided. There would be modifications within the existing station building off Station Road to improve user access and the station concourse would be upgraded. Other changes

include extending the existing footbridge to serve the new platform 9, relocating staff areas for train crew and other operators, and building two new footbridges for passenger use and emergency evacuation.

Figure 12-2: Indicative illustration of proposed changes at Cambridge station



North of Cambridge station

12.1.7 Construction work is proposed at Cambridge North station to modify the track layout. This is to support delivering the modifications to Cambridge station and provide a potential location for some replacement sidings where they are removed at Cambridge station. The new layout would also provide the flexibility to allow services to terminate at Cambridge North station should this be decided in the future.

12.1.8 One emerging possible location has been identified for the replacement sidings at Chesterton Sidings at Cambridge North station which could be upgraded and brought back into service to provide replacement sidings.

Cambridge East

12.1.9 A new train turnback facility is proposed at Cherry Hinton to the east of Cambridge, so that East West Rail passengers could alight at Cambridge and trains could continue to Cherry Hinton to turn around. This would reduce the amount of space required to provide

turnbacks within the station and reduce the amount of time trains are occupying platforms.

12.1.10 To provide a new train turnback facility east of Cambridge station, an additional track would be provided to the existing section of the Newmarket Line between Coldham's Lane Junction and Cherry Hinton High Street level crossing. It is currently assumed that the new track could be built within the existing rail boundary using the alignment of the currently disused former twin-track corridor.

12.1.11 Two footbridges along this section of the line, one on Coldham's Common and one on The Tins footpath, would be reconstructed to allow for electrification of the railway and the addition of a second track. Improvements to Laundry Lane level crossing would also be required.

12.2 Initial environmental information

People and communities

Context

12.2.1 Along the Cambridge route section the project would use an existing rail corridor. Amongst other things, it would entail the construction of two additional tracks to just south of Cambridge station, with an additional track constructed on a redundant track bed on the Newmarket line. Although some longer-term impacts would result where new infrastructure is introduced or where vegetation is removed – such as to accommodate the Long Road bridge rebuild and additional track along the existing Newmarket Line within Coldham's Common – the location of the new infrastructure is almost entirely within the current Network Rail boundary. This would help to limit the extent of permanent environmental effects, despite the generally dense population throughout this route section.

12.2.2 A review of the potential impacts to people's wellbeing and amenity – both positive and negative – that would result from the introduction and operation of the new railway and its facilities is set out below, along with initial proposals for mitigating potential adverse effects. Potential disruption during construction is addressed separately, with an explanation of how it could be mitigated where practicable.

Potential impacts and mitigation

12.2.3 North of Great Shelford, the existing railway carries both King's Cross and Liverpool Street services, and this would strongly determine baseline noise levels. Road traffic would add to the noise environment, potentially increasing closer to Cambridge. There are noise important areas associated with road traffic on parts of Hills Roads and with rail traffic on the rail corridor south of Hills Road bridge. The introduction of a new railway and additional services is not expected to greatly affect the acoustic character of this area.

12.2.4 Residential communities are generally few along sections of the route north up to Cambridge station. North from Addenbrooke's Road the project would pass the medical facilities of Addenbrooke's and Royal Papworth hospitals, as well as school, college and commercial facilities. The biomedical campus accommodates vibration-sensitive facilities, including the Microbiological Research Centre laboratory and the Ann McLaren Building. The noise and vibration impacts of trains passing these facilities is an important focus of ongoing assessment. The potential for noise mitigation for Scholars Court and Cambridge Junction Performing Arts Centre, east of Cambridge North station, Coldham's Common and at the new turnback at Cherry Hinton will also be assessed.

12.2.5 Darien Meadow is an important informal recreational area within the city. A footpath along its western edge has been integrated into the E2 European Long-Distance Route, and other informal paths cross it. The grassland habitat associated with the proposed construction compound in this area would be reinstated.

12.2.6 At Cambridge station, the project would introduce an important new rail service providing new journey opportunities for residents and businesses in Cambridge, with benefits for the economy of the city and the amenity of the population. The various modifications and improvements at Cambridge station that would be introduced by the project would bring about wider benefits for rail passengers.

12.2.7 Coldham's Common and Stourbridge Common (both in the Green Belt and Common Land) and Ditton Meadows (in the Green Belt) provide recreational open space and a green setting to the city, and they support well used cycling and pedestrian routes. The loss of lineside vegetation to accommodate the additional turnback track alongside the Newmarket line through Coldham's Common would diminish the character of the area and open up views of the railway from the common and adjacent residential areas in Cherry Hinton. The new pedestrian/cycle bridge, required to replace the bridge over the widened railway on the common, would be a more substantial structure than the existing bridge and more prominent in the view.

12.2.8 Desk-based research has identified agricultural land within the draft Order Limits in this route section. A sizable proportion of this is expected to classify as best and most versatile (BMV), which will be determined through future survey work. Information on land holdings is limited at this stage but initial studies suggest that approximately 10 holdings of various sizes may be affected. Ongoing design development will take land quality into consideration, as well as potential impacts on farm holdings.

12.2.9 The project would require the permanent acquisition and temporary use of certain land and property. Permanent acquisition would be required immediately adjacent to the existing railway corridor from Long Road Sixth Form College, St Mary's School and Homerton College sports ground, University of Cambridge, Luard Road sports pitch, Homerton College, and Hills Road Sixth Form College. Permanent acquisition of land would also be required from the biomedical campus.

12.2.10 The project would require demolition of four business units on Clifton Road. There would be a risk of demolition for further business units on Coldhams Road, as well as potential acquisition from a commercial property on Fen Road and a hotel on Norman Way.

12.2.11 EWR Co recognises the effects these impacts would have and will be working with affected parties as the designs are further developed, seeking to agree measures to reduce the impacts of the proposals where possible and enter into agreements with property owners where property would need to be acquired or used. Further information is contained in the *Guide to Compulsory Acquisition and Compensation*.

Temporary construction impacts

12.2.12 The construction works required for Cambridge and the approach would be driven by the constraints of working on and around the existing railway and gaining access whilst reducing disruption to existing train services.

12.2.13 The proposed construction compounds to the south of Cambridge would be supported by three main construction compounds: at Granham's Road (in the Comberton to Shelford route section, but supporting all work along the WAML); Addenbrooke's Road, working in combination with the Granham's Road compound; and Long Road supporting works at Long Road bridge.

12.2.14 The main compound supporting works at Cambridge station would be located south-east of the station. The main compound supporting the works around Cambridge North station would be to the north-east of the station off Cowley Road. The main compound for the works east of Cambridge would be just off Coldham's Lane, between the lane and the existing railway. This would be located on Coldham's Lane historic landfill site.

12.2.15 Construction heavy goods vehicles (HGVs) would take the shortest suitable route between compounds and the strategic road network. HGVs would generally join and leave the strategic road network at M11 junction 11 or 12, the A11 at Little Abingdon or the A14 at junctions 33 or 35. The route between compounds and the M11 at junction 11 are expected to use Hauxton Road, with junction 12 accessed via Barton Road and the city centre. Construction HGV access to and from the A11 is planned to be via A1307 Cambridge Road/Babraham Road, while construction HGV access to and from the A14 is planned via Newmarket Road or Mitch Road.

12.2.16 Potential impacts from construction, such as visual intrusion, noise, air quality and dust would be controlled as far as practicable through various good practice measures set out in the draft CoCP, which would be mandated through contract arrangements, and closely monitored throughout construction. Impacts may still arise for limited periods, associated with certain activities. Details on the sequencing of construction and the types of activities associated with it would be determined to inform the assessment. With respect to noise, the significance of consequential effects would depend on the overall duration and frequency of noisy activities in relation to nearby receptors.

12.2.17 Long Road is likely to be closed for several months, requiring alternative routes to be put in place during this time. Given the strategic importance of this arterial route, the temporary closure and associated diversions could result in local delays and congestion. This will be assessed as proposals for the bridge rebuild and construction programme are developed, with alternative routing and traffic controls the subject of discussion with the local authority. The removal of vegetation either side of the Long Road bridge would open up views of the reconstruction of the bridge from the road, sports pitches and Long Road Sixth Form College.

12.2.18 The worksite north of Long Road on Darien Meadow would temporarily occupy part of this open space and would affect uses of the paths through it – which would need to be diverted – and along its edges, including the guided bus way footpath and cycle path. Residential properties along Rutherford Road and Barrow Road are well screened visually from the meadow, but protective measures to limit risks of construction noise and other impacts may be required.

12.2.19 Removal of screening vegetation to accommodate the additional track on the Newmarket Line through Coldham's Common will open up views of construction from the common and Cherry Hinton. Similarly, loss of vegetation from land adjacent to Ditton Meadows would open up views of construction from the meadows. The noise and movement generated during construction would result in a loss in tranquillity.

12.2.20 A temporary worksite and new sidings on land adjacent to Ditton Meadows would result in a loss of woodland, opening up views of the railway.

The natural environment

Context

12.2.21 The project would cross Hobson's Conduit immediately to the south of Addenbrookes Road in the Comberton to Shelford route section, and this stream joins Hobson's Brook which continues to flow northwards to the west of and roughly parallel with the route corridor in this route section. North of Addenbrooke's Road and west of the project, Hobson's Park is a relatively recently established open space which is rapidly assuming local importance for wildlife, including birds. Hobson's Brook is a chalk stream and includes section of designated county wildlife site status that is known to support water vole and reptiles as well as certain invasive species.

12.2.22 Belts of deciduous woodland are located south of and alongside Long Road (potentially including fragments of ancient woodland) and in pockets just to its north. Vegetation between the railway and Darien Meadow is designated as a county wildlife site (Triangle North of Long Road County Wildlife Site) based on the occurrence of a species of hedge parsley (Torilis arvensis), although works would largely avoid this area.

12.2.23 Darien Meadow, an area of undesignated grassland and open space, would accommodate a worksite. Hobson's Brook runs along its western edge, dividing north of the meadow into Hobson's Brook and Vicar's Brook, chalk streams which continue through Cambridge.

12.2.24 Thereafter, little habitat of interest is encountered until Coldham's Common, which is crossed by the existing Newmarket railway where a turnback line for the project would be introduced. Coldham's Common is designated as a local nature reserve. Deciduous woodland has established along the railway embankment through the common. The route continues along an existing bridge, which crosses over Cherry Hinton Brook. The railway then passes close to three flooded chalk pits (Burnside Lakes) which are subject to non-statutory designation (Norman Cement Pits city wildlife site and CU Officer Training Corps county wildlife site). Open water habitats, grassland (neutral and calcareous), scrub and habitat mosaic, lowland fen and deciduous woodland habitat of principal importance (HPI) are present here.

12.2.25 The watercourses potentially affected by the project – the Cam (Stapleford to Hauxton junction), Hobson's Brook and Cherry Hinton Brook – are associated with Water Framework Directive (WFD) surface water catchments. As noted above, these streams and their tributaries are chalk streams with nationally and internationally recognised unique habitats. Most of the project within the Cambridge route section is underlain by a principal bedrock aquifer.

Potential impacts and mitigation

12.2.26 Direct impacts on HPIs would be avoided as far as possible and appropriate mitigation and compensation would be implemented where this is unavoidable. Direct impacts from habitat loss are anticipated to be minimal. The project would impinge discrete areas of deciduous woodland along the alignment which predominately comprises wooded corridors bounding existing rail infrastructure.

12.2.27 Protection from indirect impacts on the network of other retained habitats (including HPI) and those immediately adjacent to the draft Order Limits will be a key consideration for design and mitigation proposals. This includes management through the draft CoCP to address risks of air pollution, as well as mitigating against habitat fragmentation and disruption of habitat connectivity. The need for habitat replacement areas will be determined as part of the EIA.

12.2.28 To ensure legal compliance with relevant wildlife legislation, appropriate mitigation strategies for legally protected species found to be present will be developed in consultation with Natural England as the ecology baseline for the project evolves.

12.2.29 Assessments will be undertaken to demonstrate that the project would not deteriorate the status of any WFD element or prevent the attainment of surface water and groundwater body objectives. Necessary mitigations could include riparian planting and reinstatement of natural bed and bank materials.

12.2.30 During construction, protective measures to the Hobson Brook (Conduit), a recognised chalk stream, would be implemented to mitigate potential impacts to ecology, water quality, groundwater and other hydrological and hydrogeological characteristics; these will be set out in the draft CoCP and prescribe measures that protect the quality of surface water and groundwater, including significant changes to the hydrological and hydrogeological regime. A particular priority for the chalk stream could be on conserving groundwater flow and reducing in-channel works.

12.2.31 Although the project crosses Cherry Hinton Brook chalk stream, this would be on an existing rail bridge and impacts to the watercourse and its wildlife, including water voles, are not predicted.

12.2.32 Detailed hydraulic models will also be undertaken to assess flood risk and determine the need for and best approach to mitigation. An assessment will also be undertaken to address risks of and mitigation for both surface water and groundwater flood risk.

Landscape and the historic environment

Context

12.2.33 The existing railway line in Cambridge is mainly at ground level and has limited influence on the character of the city as it is mainly screened from the wider area by vegetation or development bordering the rail corridor. It is more apparent south of the city, where the landscape is more open. Here the large-scale buildings of the Cambridge Biomedical Campus and Hobson's Park frame the approaches to the city. A key feature of Cambridge's townscape character is its green setting which is provided by the many commons and meadows that extend into the city, providing a direct link between the city centre and the surrounding countryside. The meadows and residential areas are relatively tranquil but on main roads, in the city centre and around the hospitals and business parks tranquillity is low.

12.2.34 Cambridge has a rich history that stems from the early prehistoric period, with the city founded around an Iron Age hillfort on Castle Hill close to the river, which has long provided a trading route for the city. Settlement and expansion continued with the arrival of the Romans, and by the 3rd century it had become a town with walled defences. Numerous farmsteads and villages have been discovered around Cambridgeshire within the agricultural hinterland surrounding the city.

12.2.35 The areas to the south of Cambridge have been dominated by agricultural fields within the Cam valley. These areas were exploited from the early prehistoric period. By the medieval period the land around Cambridge was primarily agricultural and this use continued into the post-medieval period. The Inclosure Acts of the early 19th century enabled the town to expand into surrounding open fields, and in 1912 and again in 1935 its boundaries were extended to include the villages of Cherry Hinton and Trumpington.

12.2.36 The 20th century saw fields amalgamated and hedgerows removed. The railway came to Cambridge in 1845 with the opening of the Great Eastern Railway's London to Norwich line. The rail link to London stimulated heavier industries, such as the production of brick, cement and malt.

12.2.37 The increase in population in the 20th century saw an expansion of Cambridge, with major development including the introduction of large council estates, including Milton to the north, Cherry Hilton to the east and Trumpington to the south. Cambridge attained city status in 1951.

12.2.38 Aside from the station itself, known heritage features are scarce alongside the rail corridor through Cambridge, with the exception of a cluster of listed buildings along the Newmarket Road, including the Grade I listed Chapel of St Mary Magdalene, Stourbridge Chapel (the Leper Chapel), although the setting of this building is compromised by surrounding roads and industrial buildings. More generally, Victorian estates around the station and immediately north along Mill Road have warranted designation of large conservation areas.

Potential impacts and mitigation

12.2.39 Impacts on the open spaces of Hobson's Park, Darien Meadow, Coldham's Common, Stourbridge Common and Ditton Meadows would be most apparent during construction, but there would be long-term impacts on Coldham's Common and Ditton Meadows through loss of vegetation. A new bridge over the existing railway on Coldham's Common would occupy a larger area of land on the common than the current small-scale, stepped bridge.

12.2.40 Elsewhere, the townscape in the majority of Cambridge would be affected in a small number of discrete areas such as on Long Road, where the road bridge would be replaced. The mitigation strategy would be to retain as much existing vegetation as possible, and to conserve and enhance inner city green spaces and recreational connectivity. Landscape mitigation earthworks and planting either side of the rebuilt A1134 Long Road overbridge would include woodland reinstatement to reinstate and enhance habitat connectivity. The design of the widened Long Road bridge and the new pedestrian/cycle bridges on Coldham's Common and Cherry Hinton would respond to their setting. Replacement planting at Coldham's Common and Ditton Meadows would, in time, restore the green edge to the railway corridor. Scrub habitat reinstatement either side of the railway at Luard Road sports pitch would reinstate visual screening along the railway.

12.2.41 Various proposed works to the Grade II listed Cambridge station, although entirely in line with the station's function, have the potential to require changes to listed structures, which may affect the station's importance as a heritage feature. This would require a full understanding of the station's architectural importance and history, with sympathetic designs being developed that reflect and respect this importance.

12.2.42 The Victorian conservation area around the station and along Mill Road will be investigated to better understand how the proposed works could affect their character and historic value. However, based on current understanding of the proposals, the conservation area is not expected to be adversely affected by the completed project. Where historic value may be lost, mitigation measures will be developed which reflect the assets' heritage values.

13. Route wide and combined impacts

13.1 Introduction

13.1.1 There are several environmental effects that would be realised at a project-wide or route-wide level, rather than affecting specific areas or locations within the context of a route section. These include the following:

- **Carbon** – Considering how East West Rail would affect levels of carbon dioxide emissions and of other greenhouse gases, and therefore impact on national objectives towards achieving net zero.
- **Materials and waste** – Considering the overall needs for raw materials on the project, as well as the generation of waste products, and how these might be accommodated respectively within the supply chain and national waste management facilities.
- **Socio-economic change** – As well as specific impacts on community facilities and local jobs, East West Rail is expected to have a far-reaching impact within the UK as a whole, in terms of economic benefits and growth. This will be the focus of the project's business case but would be summarised in the Environmental Statement (ES).
- **Wider transport impacts** – As well as the effects of the project on local people's travelling experience on the road and rail network, the project (and East West Rail as a whole) would be expected to have wider effects on the transport network.

13.1.2 In addition, multiple environmental impacts at different locations may act in combination to result in wider effects; for example impacts on protected species as a whole, depletion or restoration/enhancement of habitats, and depletion of soil resources. These are referred to as combined effects.

13.1.3 These will be reported in the ES, following the completion of the specific assessment workstreams.

13.2 Carbon

13.2.1 The assessment to be presented in the ES will address the project's impact on climate change. This will consider potential carbon savings arising through people changing their travel patterns and using low-carbon electrically powered rail in preference to cars. It will balance these against the additional emissions that would be due to the operation of East West Rail and from the construction of the project, including the use of building materials within it. The assessment will be undertaken in accordance with relevant guidance

including *PAS 2080: 2023 Carbon Management in Buildings and Infrastructure* (PAS 2080: 2023).

13.2.2 The sources of potential carbon and greenhouse gas emissions during construction include:

- Embodied carbon emissions from the construction materials used, including raw material supply, transport and manufacture. Steel and concrete for bridges and viaducts are construction materials with the potential for high embodied carbon.
- Carbon emissions associated with construction processes, including transport of materials, workers and machinery to/from the works site and construction/installation processes.
- Carbon emissions associated with the transport of waste from the site and the treatment of waste.
- Carbon emissions associated with land use change, for example those mobilised from vegetation or soil loss during construction.

13.2.3 The sources of potential carbon emissions during operation include:

- Carbon emissions from the use of fuel and/or electricity to operate the trains, and any ancillary infrastructure including lighting, signalling and the energy required to operate stations.
- Carbon emissions from changes in traffic flow (road users).
- Replacement and maintenance activities including emissions from embodied carbon (i.e. materials), construction plant, transport of materials, and the treatment/disposal of waste.
- Carbon emissions associated with ongoing land use change/sequestration.

13.2.4 EWR Co aims to be a net zero carbon passenger railway. Various aspects of its design, construction and operation would seek to achieve relative carbon reduction. For example, exploring the potential for re-using and/or refurbishing existing assets and so reducing the extent of new structures, as well as considering the use of low carbon solutions (including technologies materials and products) to minimise resource consumption at each stage.

13.2.5 The evaluation of both the project's carbon footprint (taking into account the operation of the East West Rail scheme and service as a whole) will consider the project's performance as a contribution towards achieving a science-based 1.5^{o}C aligned transition to net zero by 2050. As such, the significance of carbon emissions will be put into context through comparison with the respective UK carbon budgets.

13.3 Materials and waste

13.3.1 The assessment to be presented in the ES will consider impacts from the use of resource materials such as steel, aggregates and minerals, concrete, wood, plastic, and manufactured construction products. It will also consider impacts and management of waste generation from the project.

13.3.2 The project would require large quantities of raw materials for the construction of tracks, railway station buildings, new level crossings, bridges, roads, viaducts, signalling system, signage, lighting, drainage, communications infrastructure, lineside equipment, overhead power cable and landscaping works. Raw materials include aggregates and minerals from primary, secondary and recycled sources.

13.3.3 Potential impacts associated with the project include:

- The availability of materials and the subsequent effect on the demand for materials due to the consumption of raw resources.
- Depletion of non-renewable resources.
- Potential sterilisation or depletion of mineral safeguarding areas.
- Emissions associated with the transportation of materials to site.

13.3.4 The project would also require certain materials for ongoing operation and maintenance.

13.3.5 Taking account of both the construction of the project and its operation, the assessment will also focus on the generation and management of waste products, considering the capacity of landfills and other waste management and re-cycling infrastructure.

13.3.6 The project would prioritise sustainable materials use and waste management. For example, it would look to balance the amount of earthwork material it produces in excess (from tunnels and cuttings) with the material demands for embankments and earthwork mitigation (the cut and fill balance). Other sustainable practices would relate to the selection and management of materials, protection of land and soil, and active monitoring of materials requirements.

13.3.7 During construction, waste would largely derive from site preparation works, including green waste from vegetation clearance, inert waste from demolition and site preparation, surplus excavated materials (including contaminated ground or ground which needs to be treated before it can be reused), and non-hazardous materials such as timber, tarmac and signage.

13.3.8 Potential impacts associated with the project during construction include:

- The ability of waste infrastructure within the region to continue to accommodate waste from other sources and the reduction in regional landfill capacity.

- Potential temporary adverse effect on the ability of waste infrastructure within the region to continue to accommodate waste from other sources.
- Emissions associated with the transport and management of wastes that will require disposal off-site.

13.3.9 During the operation of the project, waste would be generated from general maintenance works as well as municipal solid waste from increased passenger use. Landfills and other waste management infrastructure would need to have sufficient capacity to accommodate waste from the project. The potential impacts from the generation and management of waste would include reduction in the UK's landfill capacity.

13.4 Strategic socio-economic and transport impacts

13.4.1 One of EWR Co's strategic objectives is to enable the sustainable growth and development of Oxford and Cambridge, and the principal towns of Milton Keynes and Bedford in between, by addressing the poor public transport connectivity through this region and congestion around the corridor's cities and towns. East West Rail is central to the UK's economic growth by enabling long term sustainable growth in life sciences and technology, creating jobs in these sectors (as well as wider supporting sectors) and attracting investment for the whole country.

13.4.2 The socio-economic benefits have been described within the 2023 Route Update Report and will be set out in detail within the project's business case. In brief, the improved east-west connectivity resulting from the operation of East West Rail services will support economic growth within the region between Oxford and Cambridge. East West Rail would open up new areas for businesses to grow as well as bring more jobs within reach of local people. In addition, it is anticipated that East West Rail would help attract and retain talent in the region and bring businesses closer to their supply chains, research sectors, competitors and other sectors, creating wealth and jobs. As itemised socio-economic aspects, the benefits of East West Rail include:

- Reduced travel time, so bringing more jobs within reach of local people.
- Opening new areas for businesses to grow.
- Offering more comfortable, productive ways to travel and improved travel experiences.
- Opening up new journeys.
- Reducing congestion resulting in cleaner air, reduced carbon emissions and safer roads.
- Unlocking inward investment locally and for the benefit of the whole UK.

- Providing employment.

13.4.3 The benefits and impacts will be summarised within the ES as part of the wider socio-economic narrative which will set the context for the more specific local impacts that will be described for each route section.

13.5 Combined impacts and effects

13.5.1 Combined effects refer to multiple local environmental impacts that act in combination over a wider area, such as the depletion of a habitat. They also refer to multiple different local impacts that act in combination to exacerbate an experience, such as general disturbance from construction activity. The following environmental topics will be where combined effects are most likely to prevail.

Ecology and biodiversity

13.5.2 For ecology, combined impacts will take account of impacts on habitats and species within a regional, national or international context. For example, the findings of the Habitats Regulation Assessment or HRA (required under the Conservation of Habitats and Species Regulations 2017), will address the protection of certain species and habitats that form part of a network of internationally protected sites across the UK (referred to as Habitats Sites).

13.5.3 Combined effects will also take account of the accumulation of other species or habitat impacts (not addressed by HRA) across different route sections in order to frame these impacts within a wider geographical context.

13.5.4 Although not part of the EIA, the biodiversity net gain (BNG) assessment will take a route-wide approach, presenting the loss of habitat units across the project as a whole, as the basis for identifying areas of new or enhanced habitats to achieve 10% BNG. The government is due to publish a statutory BNG metric for Nationally Significant Infrastructure Projects (NSIP) shortly and the BNG assessment will align with this.

Community

13.5.5 Combined community impacts will consider the combination of different impacts in one location; for example, where impacts from construction noise, public rights of way (PRoW) diversions and closures, traffic and visual impact act together to result in an overall diminution of health or wellbeing for people living within a particular area.

Historic environment

13.5.6 Combined impacts on historic assets can result both from the accumulation of multiple local impacts over a wider area, and from the occurrence of several different impacts at one place. An example of the latter includes potential impacts on the setting of an historic

asset (such as a listed building or historic landscape) resulting from a combination of noise impact and visual intrusion, as well as from wider landscape impacts. Another example would be where physical impacts from vibration and changes in groundwater levels result in structural changes to an asset that undermines its heritage value.

13.5.7 An example of a combined impact resulting from local impacts over a wider area would be where the collective understanding of the heritage value of a related group of assets is undermined by respective changes in their integrity and/or setting.

Land and soil resources

13.5.8 As well as a focus on the impacts of the project on viability and ease of farming within specific land holdings or for specific businesses, the EIA will consider the impact on the agricultural land resource in the round. In particular, it will consider the impact on the most productive land, referred to as the BMV land (best and most versatile). BMV land comprises land that is classified under the Agricultural Land Classification system as being Grade 1, 2 or 3a by policy guidance (see Annex 2 of the *National Planning Policy Framework* (NPPF)). This is the land which is most flexible, productive and efficient in response to inputs and which can best deliver future crops for food and non-food uses such as biomass, fibres and pharmaceuticals.

Appendix A Alternatives

A.1 Consideration of alternatives

A.1.1 Coverage of alternatives in this *Environment Update Report* (EUR) takes a historic perspective of East West Rail as it has been conceived and refined over the course of almost 30 years. It summarises the decisions that have been made and the rationale behind them. During this time, different routes and alignments have been considered, as well as options for stations and other infrastructure. The decision on how East West Rail services would be powered has also been the subject of discussion and review.

A.1.2 At the route update announcement in May 2023 (Route Update) a preferred route alignment between Bedford and Cambridge was identified. This, together with associated work between Oxford and Bedford, forms the basis of the current project. Since the route update announcement East West Railway Company (EWR Co) has continued to develop the proposals, with further options considered at 20 or so locations. The process used to sift and distinguish preferences from these specific project options has used an Assessment Factors process, which is described in Chapter 4 of the ***Technical Report***.

A.1.3 There remain a few locations where options remain, including proposals for: the crossing of the River Great Ouse south of St Neots and the location of the new Tempsford station; proposals for new rail crossing solutions in Harston; and several remaining options for station closure and level crossing closures on the Marston Vale Line.

A.1.4 This chapter describes the consideration of alternatives up to the route update announcement. The alternatives are presented below as a chronological evolution. Information on the assessment factors process and its recommendations can be found in the ***Technical Report***.

A.2 1995-2016

A.2.1 A group of local authorities and businesses called the East West Rail Consortium started to develop proposals for a direct rail link between Bedford and Cambridge. The Consortium was established by Ipswich Borough Council who provided the chairman until 2005 when the role was taken on by Buckinghamshire County Council. The Consortium

included local councils, Network Rail, port authorities and the now defunct regional government bodies.

A.2.2 In 2006, the Office of Deputy Prime Minister supported the principle of reopening the link between Oxford and Bedford.

A.2.3 In 2007, the Consortium commissioned a study confirming the clear business case for a service between Oxford and Milton Keynes, as well as an Aylesbury spur.

A.2.4 In the 2011 Autumn Statement, the Chancellor confirmed that the western section of the proposed East West Rail route (between Oxford and Bedford) would go ahead if the Consortium could demonstrate a strong business case that was accepted as robust by Department for Transport (DfT) and Network Rail.

A.2.5 In 2013, Network Rail announced the western section (Oxford to Bedford) as part of its five-year business plan. The Oxford to Bicester segment was opened to Chiltern Railway services in 2015. A Transport and Works Act order (TWAO) was granted for the Bicester to Bletchley segment in 2018; at the time writing this is under construction.

A.2.6 The improved infrastructure on the western section of East West Rail would, however, need to be upgraded further to meet East West Rail's four trains per hour service, such as lengthening platforms and providing turnbacks. Proposals for this, along with the completion of the link through Bedford and onwards to Cambridge, initiated in 2016 and further developed with the setting up of the EWR Co in 2018.

A.3 2016-2017

A.3.1 Network Rail and Chiltern Railways considered several route corridor alternatives, building on the government's plan to promote an Oxford to Cambridge growth corridor, known as the Ox-Cam Arc. By providing better transport links across this area, improved commuting would help unlock new housing and nurture significant contributions to GDP, particularly in innovative and research-based industries in the biomedical and hi-tech sectors.

A.3.2 The work up to this point established that the route between Oxford and Bedford would follow the existing railway corridor, with no obvious benefit of using other route corridors, which would have entailed great expense and disruption. On the existing line between Oxford and Bedford, the railway would need upgrades and changes to support East West Rail services.

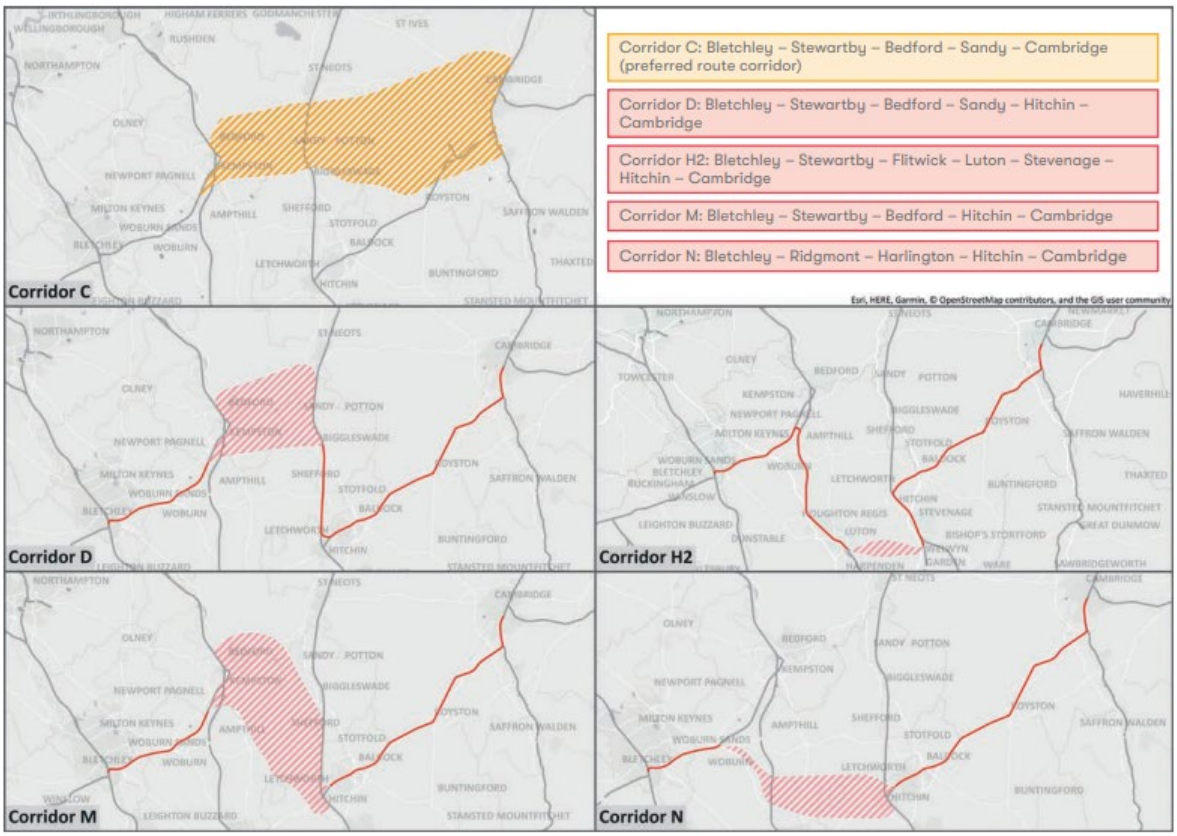
A.3.3 Several route corridor options were developed between Bedford and Cambridge where there is no existing railway track, due to the majority of the old Varsity Line having closed

in 1968. These corridors were proposed as options between Bletchley and Cambridge, spanning the broad area between St Albans and Harlow and northwards to Peterborough.

A.3.4 Network Rail initially identified twenty potential broad route corridors between Bletchley and Cambridge. These were appraised against the initial strategic objectives relating to improving rail links, increasing economic growth and employment, improving journey times, enhancing capacity for freight and contributing to tackling climate change. These strategic objectives focussed on unlocking economic and housing growth and better short-distance rail journeys between towns and cities. As a result, five corridors were taken forward for further work based on engineering modelling:

- Corridor C: Bletchley – Stewartby – Bedford – Sandy – Cambridge.
- Corridor D: Bletchley – Stewartby – Bedford – Sandy – Hitchin – Cambridge.
- Corridor H2: Bletchley – Stewartby – Flitwick – Luton – Stevenage – Hitchin – Cambridge.
- Corridor M: Bletchley – Stewartby – Bedford – Hitchin – Cambridge.
- Corridor N: Bletchley – Ridgmont – Harlington – Hitchin – Cambridge.

Figure 13-1: Route Corridor Options



A.3.5 A quantitative assessment of the potential costs and benefits of these five corridors, and informed by engineering studies, was undertaken, which retained Corridors C and M as preferred.

A.3.6 Further analysis of corridors C and M considered infrastructure requirements, construction cost, demand for travel, geography and environmental impacts (including designated ecological sites, and issues such as flood risk, heritage considerations, landfill and recreation areas and paths). This analysis indicated that Corridor C would generate greater benefits than Corridor M, while incurring similar capital costs and lower operating costs. Journey times were estimated to be between 75 and 82 minutes for Corridor C and between 85 and 106 minutes for Corridor M. On this basis, Corridor C was selected as the preferred corridor in 2016, driven largely by economic opportunities and engineering feasibility. This was effectively the first major decision point in getting to a preferred corridor, within which more detailed design refinement could then occur.

A.4 2018-2019

A.4.1 EWR Co was established in early 2018, taking over the development of the railway link between Oxford and Cambridge from Network Rail. Its remit was to drive the delivery of the western section between Oxford and Bedford and separately the section between Bedford and Cambridge.

A.4.2 During this period an application for a TWAO for works between Bicester and Bletchley was submitted. This was approved in 2020 (EWR Bicester to Bedford TWAO).

A.4.3 The long history of this project, as well as the support from decision-making powers for elements of the overall length from Oxford to East Anglia, has meant that works to the western section between Bicester and Bedford have already begun and services on this section will add to those already in operation between Oxford and Bicester. To accommodate the overall objective of a full service, upgrades would be needed between Oxford and Bedford, and new railway track would be needed between Bedford and Cambridge. The following sections discuss the route corridor and alignment decisions between Bedford and Cambridge in more detail.

A.4.4 Route options within Corridor C were developed as general areas that could accommodate the tracks, stations and associated elements needed between Bletchley and Cambridge. Eleven potential route options were identified based on East West Rail's strategic objectives (EWR Bedford to Cambridge Route Option Consultation Technical Report) as previously developed by the East West Rail Consortium and agreed with DfT. Having agreed the 15 Assessment Factors (as described earlier) with the DfT, these were used to assess and sift down the 11 longlist route options within Corridor C to a shortlist. The Assessment Factors (listed in A.4.6) consider benefits to the transport user,

contribution to wider housing and economic growth, costs, onward travel connections, future demand aspirations, and environmental and social sensitivities.

A.4.5 Both northern and southern approaches into Cambridge, as well as a tunnelled approach, were considered at this stage in the development of proposals (EWR Bedford to Cambridge Route Option Consultation Technical Report). The northern approach was discounted at this stage due to the additional route length required which meant journey time penalties and the need to reverse in Cambridge in order for trains to continue towards Ipswich/Norwich. Additionally, an approach from the north would not provide direct east-west connectivity to the proposed new Cambridge South station, a key tenet of unlocking the growth and housing opportunities from the bio-medical employment there.

A.4.6 The Assessment Factor used at this stage in development of the proposals addressed:

- Transport user benefits.
- Contribution to enabling housing and economic growth including best serving areas benefitting from developable land.
- Capital and operating costs an overall affordability.
- Environmental impacts and opportunities.
- Short distance connectivity to support commuting travel into key employment hubs (current and future).
- Rail passenger connectivity to existing mainline.
- Long distance passenger services.
- Satisfying existing and future freight demand (as anticipated by the freight industry) where affordable.
- Railway performance and alignment with wider railway strategy and infrastructure.
- Safety risk (construction and operation).
- Consistency with proposals for the location of settlements.

A.4.7 EWR Co focused on the potential for route options to support growth and new homes, alongside the indicative cost estimates, benefits for transport users and environmental impacts. The overall affordability, including the potential to capture some of the increase

in land values resulting from the railway and opportunities for private financing, was also an important consideration.

A.4.8 Six of the 11 route options were not taken further based on their overall inferior performance against the Assessment Factors. They offered no significant additional economic or journey benefit to the shortlisted options and largely covered the same alignments as those shortlisted.

A.4.9 The five shortlisted route corridor options were named Routes A to E (EWR Bedford to Cambridge Route Option Consultation Technical Report). These were consulted on in a non-statutory consultation between January and March 2019, wherein a commitment was made to consider the views of a variety of stakeholders alongside the considerations of the Assessment Factors. Consultation feedback was itself categorised on the following basis:

- Supporting economic growth.
- Supporting delivery of new homes.
- Costs and overall affordability.
- Benefits for transport users.
- Environmental impacts and opportunities.

A.4.10 Environmental considerations at this stage focused on distance to and potential impacts on/from various statutory ecological and heritage designations, landfill sites, flood risk and recreational spaces. The potential impacts of the five shortlisted options identified at this stage would be addressed over subsequent project refinements.

A.5 2020-2021

A.5.1 Based on the 2019 non-statutory consultation feedback as well as the Assessment Factors, the DfT selected Route E in 2020 as the preferred route option in the *Preferred Route Update Announcement Report (EWR Bedford to Cambridge Preferred Route Option Report)*. The key reasons for selecting Route E as the preferred route were as follows:

- Best performing option on four out of five key criteria: benefits for transport users, environmental considerations, supporting economic growth and supporting new homes.
- Offered the greatest opportunity to avoid the most environmentally challenging areas and potential direct impacts on irreplaceable or sensitive environmental features.

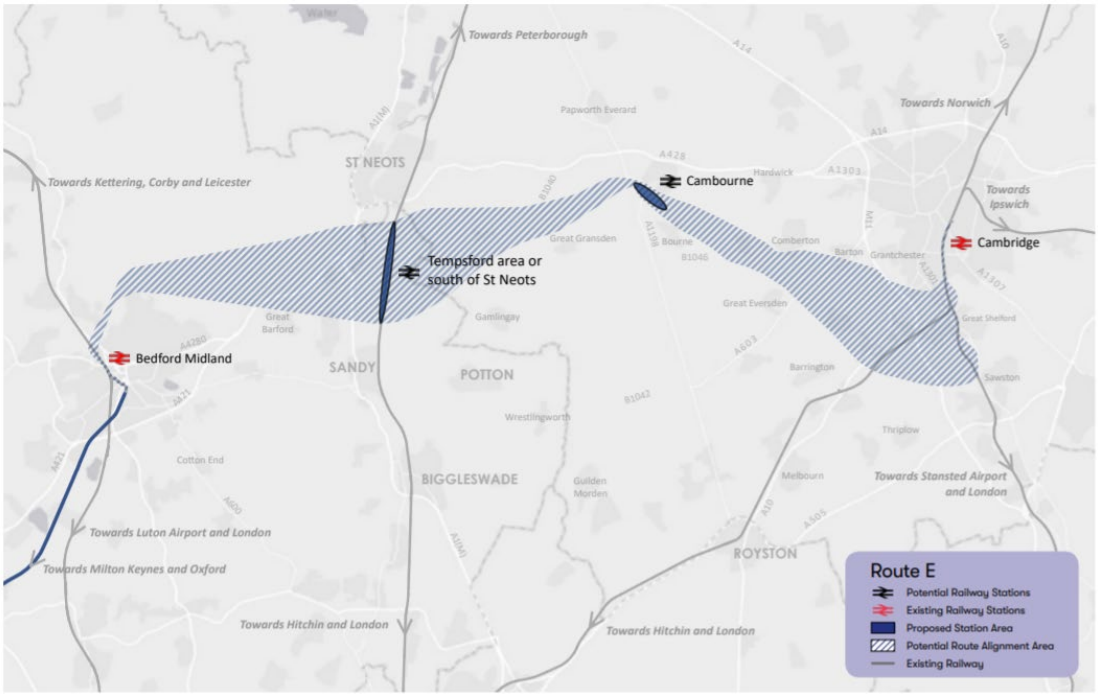
- Included new links to Thameslink and the Midland Main Line at Bedford, the East Coast Main Line in the vicinity of Sandy/St Neots and the West Anglia Main Line in Cambridge, and so was considered to provide additional inter-regional connectivity.
- Provided easy connectivity into Bedford town centre from Bedford Station and also provided an opportunity for other bodies such as Bedford Borough Council to bring forward regeneration proposals in this area of Bedford.
- Connected the growing population of Cambourne with sustainable transport and could integrate with proposed improvements to the local transport network in south Cambridgeshire. This could include the Cambourne to Cambridge busway (soon to be the subject of a TWAO application) or the (since abandoned) Cambridgeshire Autonomous Metro.
- Could support much needed development of more affordable housing in areas such as Bedford, Sandy/St Neots and Cambourne.
- Was supported by most local authorities in the Bedford to Cambridge area.

A.5.2 The 2020 *Preferred Route Option Announcement* also reconfirmed EWR Co's preference for approaching Cambridge from the south rather than north. Key issues associated with the northern approach included in that report were that the northern approach:

- Impacted the local transport connectivity were East West Rail to use the guided busway route.
- Required additional tracks for the West Anglia Main Line.
- Involved a longer route length than the southern approach.
- Was less able to support the planned biomedical campus and wider economic growth opportunities around Cambridge South than the southern approach.

A.5.3 Further detail, including a review of the alternative route proposed by CamBedRailRoad, is contained within the *Route Update Announcement Report.*

Figure 13-2: Route E indicative alignment



A.5.4 Further design work in 2020 culminated in a second non-statutory consultation in 2021 addressing the whole route between Oxford to Cambridge. As far as Bedford this included:

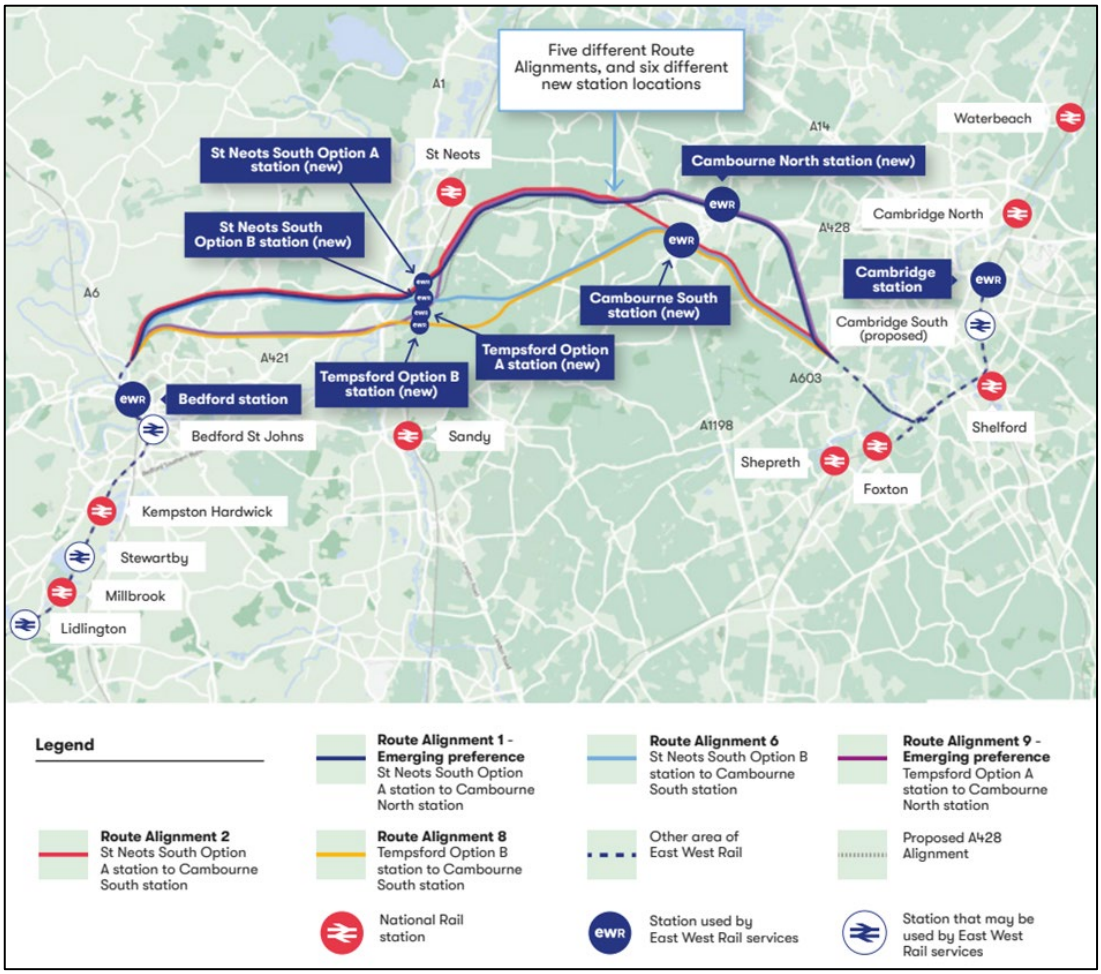
- **Oxford to Bicester** – Improvements to existing railway and stations, considering improving capacity at Oxford station.
- **Bletchley and the Marston Vale Line** – Improving existing infrastructure, stations and level crossings.
- **Bedford** – A redeveloped Bedford station and relocated Bedford St Johns station, improving existing railway and introduction of new tracks.

A.5.5 Between Bedford and Cambridge, the preferred corridor Route E was refined and developed into distinct route alignments. An initial design proposal provided a reference 'Route Option E Indicative Alignment' informed by desktop data, including key environmental features. Variations of this alignment were generated to test operational performance (such as station locations to best serve communities) and to address certain

areas of critical engineering need (such as passing loops and depots), engineering challenges or environmental sensitivities.

A.5.6 Nine route alignment options (1 to 9) emerged from this design phase with different benefits, such as links with other transport infrastructure, support for potential new homes and communities, and overall value for money.

Figure 13-3: Route alignments and station location options



A.5.7 The 15 Assessment Factors were used again to assess the nine alignments and produce a shortlist of five alignment options, with Route Alignment 8 chosen as the Reference Alignment, given its similarity to the Route Option E indicative alignment.

A.5.8 Findings of further Assessment Factor comparison of the five options were reviewed by a multidisciplinary project team including expert assessors and subject matter leads alongside EWR Co core team members. This identified two emerging preferences:

- **Alignment 1** – St Neots South Option B to Cambourne North (via the new A421 dual carriageway corridor). This option includes Cambourne North which was identified as the emerging preferred Cambourne option.

- **Alignment 9** – Tempsford to Cambourne North (via the new A421 dual carriageway corridor). This option also includes Cambourne North as the emerging preferred Cambourne option.

A.5.9 EWR Co's preference for these two was presented in the 2021 public consultation. Locations for new stations at Cambourne and Tempsford were presented at this time. The southern approach to Cambridge was confirmed as the most suitable in order to unlock employment opportunities in the south and for a connection with West Anglia Main Line.

A.5.10 A full explanation of the process is provided within the *Consultation Technical Report* for the 2021 non-statutory consultation (Consultation Technical Report).

A.6 2022-2023

A.6.1 Consultation responses in 2021 raised issues about the strategic case, estimated costs/affordability and previous optioneering decisions, as well as concerns about a route that entered Cambridge from the south.

A.6.2 EWR Co agreed with DfT to set up an Affordable Connections project (ACP) in late 2021 to try and drive lower costs and ensure local leadership buy-in to East West Rail. The ACP considered alternative transport solutions to those previously developed, including a reassessment of transport mode, service level options and route alignments based on an understanding of demand requirements and affordability (EWR Economic and Technical Report). The ACP therefore considered whether there were solutions which could deliver most of the benefits of East West Rail at a lower capital cost. This exercise also sought to address concerns raised during the 2021 consultation.

A.6.3 The *Route Update Report* (Route Update Report) provided an updated rationale and more detail for these decisions, particularly for the London Road level crossing in Bicester, a review of the 31 level crossings on the Marston Vale Line, and how to best serve Bedford with East West Rail.

A.6.4 The 2023 route update announcement also discussed the onward connection between Bedford and Cambridge, concluding that Alignment 1 provided the best option for the majority of East West Rail's length, serving a new station at Cambourne North and unlocking economic benefits for the town whilst mitigating for potential environmental effects.

A.6.5 For Tempsford, the best location for a new station is shown as part of Alignment 9 compared to a station at St Neots South. A station at Tempsford was considered to enable greater growth opportunities, opportunities to improve biodiversity and increase people's access to green space. A new station here would be part of a wider transformation of accessible active travel routes for the area, including for cycling and

mobility aids as well as walking. This emerging preferred route was referred to as Alignment 1 (Tempsford variant).

A.6.6 The route update announcement also confirmed that the southern approach into Cambridge remained EWR Co's preference. The southern approach into Cambridge would provide direct access to Cambridge South and the biomedical facilities on the Addenbrooke's hospital campus, with onward connection to Cambridge station.

Appendix B. Indicative construction management methods

B.1.1 As set out in Chapter 2 of this *Environmental Update Report* (EUR), a draft CoCP will be developed and submitted as part of the application for the Development Consent Order (DCO). This will support the responsible delivery of the new railway, manage expectations, and set a consistent approach to avoiding or minimising construction impacts. The draft CoCP will continue to be developed, in consultation with local authorities and relevant stakeholders, and further information will be presented at statutory consultation. At this stage, the typical elements and measures likely to be included in the draft CoCP are set out below.

Table 13.1: Potential element and measures likely to be included in the draft Code of Construction Practice

Category	Topic	Examples of mitigation
General requirements	General measures	*Contractors will be required to manage their works to comply with relevant regulations and industry best practice, including the following general matters:* • Surveys to record conditions before works start to inform reinstatement requirements. • Measures to avoid spills of chemicals or fuel and procedures to deal with any incidents. • Plans to avoid impacts arising from extreme weather events. • Community helpline for residents to obtain information and report issues. • Community engagement to advise locals of upcoming works and potential disruption. • Provide suitable lighting/general nuisance avoidance measures. • Demonstrate best practice through adoption of Considerate Constructors Scheme or equivalent.

Category	Topic	Examples of mitigation
Effects on people	Sound, noise and vibration	*Contractors will be required to control and limit noise and vibration during the construction works as far as reasonably practicable and in accordance with best practicable means (BPM) as defined under Section 72 of the Control of Pollution Act 1974. This will include a range of measures, such as:* • Controls on working hours, although some works (such as those requiring possessions of the railway) may need to occur during the evenings or overnight. • Acoustic enclosures and screening. • Seeking Section 61 consents under the Control of Pollution Act 1974, if necessary. This is an agreement between the local authority and the contractor to agree, for example, noise levels and hours of work. • Selection of plant and construction methods wherever possible to minimise noise emissions. • Designing site layouts to minimise potential disturbance, such as siting plant or haul roads away from areas where they could cause disturbance. • Noise and vibration monitoring at key locations to ensure potential impacts are kept to reasonable levels.
Effects on people	Air quality	*Contractors will be required to control and limit dust, air pollution, odour and exhaust emission during the construction works as far as reasonably practicable and in accordance with best practicable means (BPM). This will include a range of measures, such as:* • Appropriate measures will be in place to limit emissions and avoid nuisance from construction plant and e.g. the use of diesel or petrol powered generators should be avoided in favour of mains electricity or battery powered equipment. • Setting requirements for emissions standards for construction vehicles and Non-Road Mobile Machinery (NRMM). • Follow good practice dust management measures in accordance with IAQM guidance/industry best practice, to reduce dust during transportation and storage of materials; use of haul routes; demolition, excavation and earthworks activities; and conveying, processing, crushing, cutting and grinding activities. • Setting appropriate monitoring arrangements, which could include undertaking on and off-site visual inspections to monitor dust, or having temporary dust monitoring equipment in place at work-sites. • Covering or treating of materials and stockpiles to reduce risk of dust.

Category	Topic	Examples of mitigation
Effects on people	Traffic and transport	*Contractors will be required to limit undue inconvenience to the public arising from increased traffic flows and disruptive impacts of construction traffic, as far as reasonably practicable, and ensure that legal requirements for works affecting highways are implemented and undertake the works in such a way as to maintain, as far as reasonably practicable, existing public access routes and rights of way during construction. This will include a range of measures such as:* • Construction traffic management and routes. • Management of deliveries including timings, and lorry movements. • Site access arrangements including workforce travel plans.
Effects on natural and historic environment	Biodiversity/ecology	*The contractor will be required to control and minimise damage and disturbance to areas of nature conservation interest and protected species in accordance with relevant legislative requirements and accepted industry practice. This will include a range of measures such as:* • Following licencing requirements for protected species. • Having an environmental clerk of works available to advise, supervise and report on biodiversity (ecology) matters. • Implementing tree protection where possible, such as fencing encompassing the full extent of the root protection zone.

Category	Topic	Examples of mitigation
Effects on natural and historic environment	Historic environment	*The contractor will be required to control and minimise damage and disturbance to designated heritage assets and non-designated heritage assets, archaeological sites, remains and deposits, buildings of historical and architectural interest. This will include a range of measures such as:* • A programme of historic environment site investigation and mitigation. • Temporary support, hoardings, barriers, screening and buffer zones around heritage assets and archaeological mitigation areas within and adjacent to the work sites. • Advance assessment to inform the types of plant and working methods for use where heritage assets are close to work sites or attached to structures that form part of work sites. • Care in operating machinery in areas known to be particularly archaeologically sensitive. In exceptional cases (e.g. nationally significant remains) exclusion zones may apply and in the remaining cases safeguards may include appropriate methods for installing and operating machinery. • Security procedures to prevent unauthorised access to heritage assets and archaeological investigations and damage to or theft from them, including by the use of metal detectors.
Effects on natural and historic environment	Water resources and flood risk	*The contractor will be required to implement working methods to protect surface and groundwater from pollution and other adverse impacts including changes to flow volume, water levels and quality in accordance with relevant legislative requirements and appropriate industry best practice. This will include a range of measures such as:* • Measures to control and prevent pollution to water, such as using bunded storage and drip trays. • Controls to be implemented during construction to protect the quality of surface water and ground water resources through controls to manage the rate and volume of run-off. • Controls to meet requirements to avoid any significant increase of flood risk.

Category	Topic	Examples of mitigation
Effects on natural and historic environment	Landscape and visual	*Contractors will be required to protect visual amenity in rural and urban areas including designated landscape areas, parks and open spaces and smaller green spaces in urban areas. This will include a range of measures such as:* • Compliance with the relevant statutory provisions in respect of the protection of areas of nature conservation interest and of protected species. • Construction activities screened to protect nature conservation sites notable landscape elements, where appropriate, to ensure adverse visual impacts from views of construction activity are controlled. • Control of light spillage by shielding lights or reducing lux levels and dimmed or switched off when not in use. • Reinstatement of open spaces, sport and recreation facilities to their former use in consultation with the local authority or other responsible statutory agency, where possible.
Effects on natural and historic environment	Ground conditions and land quality	*Contractors will be required to assess potentially contaminated land and where necessary undertake remediation, in accordance with the EAs Land Contamination Risk Management (LCRM) guidance. To develop appropriate mitigation measures to protect geological resources and to mitigate the sterilisation or severance of mineral areas. This will include a range of measures such as:* • Measures to control and limit the effects of settlement, for example during excavation for any below ground structures and tunnels. • Specialist piling techniques to prevent mobilisation of contamination into underlying aquifers.

Category	Topic	Examples of mitigation
Effects on natural and historic environment	Materials and waste	*Contractors will ensure the requirements of the waste hierarchy are enforced and the duty of care requirements are met. They will take responsibility for protecting the interests and safety of others from the potential impacts of handling, storing, transporting and depositing of excavated materials and wastes. This will include a range of techniques such as:* • Seek to reduce the amount of excavated material and waste that will be produced through the design process. • Use excavated material that is either uncontaminated or can be remediated for site engineering and restoration purposes in accordance with the controls specified by the *CL:AIRE Definition of Waste: Development Industry Code of Practice,v2* (2011) (DoWCoP) in accordance with an appropriate environmental permit or exemption from permitting. • Apply waste minimisation techniques and on-site segregation of surplus material so that it can be re-used, recycled or appropriately disposed of.
Effects on natural and historic environment	Agriculture and soils	*Contractors will be required to ensure that procedures are implemented to control and minimise damage and disturbance to areas of agricultural land and soils in accordance with relevant legislative requirements and accepted industry practice. This will include a range of measures, such as:* • Implementation of measures set out within the *Code of practice for the sustainable use of soils on construction sites* (Department for Environment, Food and Rural Affairs (Defra) 2009), (or its replacement) in relation to undertaking works on or adjacent to agricultural land. • Protection of agricultural land adjacent to construction sites with appropriate fencing. • Measures to minimise the risk of soil compaction such as preventing traffic movements over areas of soft ground/unprotected soils. • Measures to protect soils where they will be reinstated following construction. • Maintaining details of farm accesses which may be affected by construction.