

THE NETWORK RAIL EAST WEST RAIL PHASE 2 ORDER

SCHEME SCOPING REPORT

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The Network Rail (East West Rail Phase 2) Order
Scheme Scoping Report

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LIST OF ABBREVIATIONS

Abbreviation	Definition
AA	Appropriate Assessment
AADT	Annual Average Daily Traffic
AHLV	Area of High Landscape Value
ALC	Agricultural Land Classification
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
AAL	Area of Attractive Landscape
AVDC	Aylesbury Vale District Council
AW	Ancient Woodland
BBC	Bedford Borough Council
BCC	Buckinghamshire County Council
BGS	British Geological Society
BMV	Best and Most Versatile
BNS	Biological Notification Site
BPM	Best Practicable Means
BS	British Standard
BTO	British Trust for Ornithology
CBC	Central Bedfordshire Council
CBCe	Common Bird Census
CDC	Cherwell District Council
CEMP	Construction Environmental Management Plan
CIEEM	The Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
CLR	Contaminated Land Report
CRE	Contract Requirements – Environment
CRN	Calculation of Railway Noise
CRoW Act	Countryside and Rights of Way Act 2000
DBA	Desk-based Assessment
DCLG	Department for Communities and Local Government
Defra	Department for Environment, Food and Rural Affairs
DETR	Department of the Environment, Transport and Regions
DfT	Department for Transport

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Abbreviation	Definition
DMRB	Design Manual for Roads and Bridges
DMV	Deserted Medieval Village
EA	Environment Agency
EC	European Commission
EcIA	Ecological Impact Assessment
EH	English Heritage
EIA	Environmental Impact Assessment
EPS	European Protected Species
EPUK	Environmental Protection UK
ES	Environmental Statement
EWR	East West Rail
FRA	Flood Risk Assessment
GB	Green Belt
GCN	Great Crested Newt
HA	Highways Agency
HER	Historic Environment Record
HPI	Habitat of Principal Importance
HRSA	Habitats Regulations Screening Assessment
HS2	High Speed Two (Phase One)
HSI	Habitat Suitability Index
IAQM	Institute of Air Quality Management
IEMA	Institute of Environmental Management and Assessment
LAQM	Local Air Quality Management
LB	Listed Building
LBAP	Local Biodiversity Action Plan
LHA	Local Highway Authority
LI	Landscape Institute
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LPA	Local Planning Authority
LTV	Landscape, Townscape and Visual
LTVIA	Landscape, Townscape and Visual Impact Assessment
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
MAFF	Ministry of Agriculture, Fisheries and Food

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Abbreviation	Definition
MAGIC	Multi-agency Geographic Information for the Countryside
MKC	Milton Keynes Council
MNR	Marine Nature Reserve
NBN	National Biodiversity Network
NCA	National Character Areas
NE	Natural England
NERC Act	Natural Environment and Rural Communities Act 2006
NIR	The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996
NNR	National Nature Reserve
NO _x	Nitrogen Oxides
NO ₂	Nitrogen Dioxide
NPPF	National Planning Policy Framework
NSR	Noise Sensitive Receptor
NT	National Trust
NVC	National Vegetation Classification
OCC	Oxfordshire County Council
OLE	Overhead Line Electrification
ONS	Office of National Statistics
PAVA	Public Address and Voice Alarm
PM _{2.5}	Particulate matter less than 2.5 microns in diameter
PM ₁₀	Particulate matter less than ten microns in diameter
PPV	Peak Particle Velocity
PRoW	Public Right of Way
RLB	Red Line Boundary
RPG	Registered Park and Garden
SAC	Special Area of Conservation
SEGI	Site of Ecological or Geographical Interest
SINC	Site of Importance for Nature Conservation
SM	Scheduled Monument
SOAT	Sustainability Options Appraisal Tool
SPA	Special Protection Area
SPI	Species of Principal Importance
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest

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Abbreviation	Definition
TA	Transport Assessment
TPO	Tree Preservation Order
TWA	Transport and Works Act
TWAO	Transport and Works Act Order
UA	Unitary Authority
UXO	Unexploded Ordnance
UKBAP	UK Biodiversity Action Plan
VER	Valued Ecological Receptor
VTa	Visual Tree Assessment
WCA Act	Wildlife and Countryside Act (1981) (as amended)
WCML	West Coast Main Line
WDC	Wycombe District Council
WeBs	Wetland Bird Survey
WFD	Water Framework Directive
WPZ	Water Protection Zone
WSI	Written Scheme of Investigation

GLOSSARY

Term	Definition
Accommodation/access road or track	A road/track that serves a piece of land or residential property and is not considered a public highway.
Agricultural Land Classification	The system devised and introduced by the Ministry of Agriculture, Fisheries and Food to classify agricultural land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. Land is graded from 1 (excellent quality) to 5 (very poor quality), with grade 3 subdivided into agricultural subgrades 3a and 3b.
Agri-environment scheme	A mechanism by which landowners and other individuals and bodies responsible for land management can be incentivised to manage their land in a manner sympathetic to the environment.
Amenity	The pleasantness or attractiveness of a place. Amenity may be affected by a combination of factors such as: sound, noise and vibration; dust/air quality; traffic/congestion; and visual impacts.
Ballast	Graded stone used for drainage and to form the track bed on which railway sleepers are laid.
Best and most versatile land	Land defined as grade 1, 2 or 3a of the Agricultural Land Classification. This land is considered the most flexible, productive and efficient and is most capable of delivering crops for food and non-food uses.
Community assets	Building or place of amenity or social value to the local community such as places of worship, playing fields, community centres or public open space.
Droughtiness	The soil's susceptibility to drought, determined by the amount of water the soil profile can hold, compared with the potential soil moisture deficit of the area and the availability of irrigation.
Dust	All airborne particulate matter.
Effect	Used throughout this environmental statement to refer to the consequence of an impact to the receiving environment (see also: 'impact').
Electric Spine	A north-south rail electrification and capability enhancement by creating a high-capability 25 kV electrified passenger and freight route from the South Coast via Oxford and the Midland to South Yorkshire.
Electromagnetic fields	Areas of energy that surround electronic devices or equipment.
EWR	East West Rail – major railway project connecting East Anglia with Central, Southern and Western England
Free-field	Acoustic measurement taken at least 3.5 m from the nearest reflecting surface or façade.
Flyover	The high level crossing of the EWR line over the West Coast Main Line at Bletchley
High level platforms	Raised platforms proposed on the Flyover
Impact	Used throughout this environmental statement to refer to

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Term	Definition
	changes to the environment that have the potential to occur as a result of the construction and/or operation of the Proposed Scheme (see also: 'effect').
In-combination effects	Those that take place within the Scheme but between different environmental topics.
Lineside plant equipment	Equipment installed alongside the railway essential to its operation such as substations, telecommunications, housing etc.
Passing loop	A section of track alongside the main track, connected at both ends, to allow trains travelling in opposite directions to pass each other.
Setting (cultural heritage)	The surroundings in which a heritage asset is experienced.
Sidings/turnbacks	A section of track alongside the main track, connected at one end only, allowing trains to enter so other rail traffic can pass by, before the train returns to the main track by reversing or 'turning back' out of the siding.
Significant in EIA terms	An adverse effect of Moderate or greater significance.
Signals	A mechanical or electrical device erected beside a railway line to pass information relating to the state of the line ahead to train/engine drivers
Switches and crossings	Mechanical installation enabling trains to be guided from one track to another
The Applications Rules	The Transport and Works (Applications and Objections Procedure)(England and Wales) Rules 2006
The EIA Regulations	The Town and Country Planning (Environmental Impact Assessment) Regulations 2011
The Scheme	The East West Rail Phase 2
The Scheme Area	The footprint of the Scheme
The Scheme Area Boundary	The boundary marking the edge of the footprint of the Scheme
The Scoping Report	Request for a Scoping Opinion

1. INTRODUCTION

1.1 Overview

1.1.1 East West Rail (EWR) is a major project to establish a railway connecting East Anglia with Central, Southern and Western England¹. EWR falls into three distinct sections:

- Western Section (Oxford to Bedford and Aylesbury to Milton Keynes);
- Central Section (Bedford to Cambridge); and
- Eastern Section (Cambridge to Norwich and Ipswich).

1.1.2 The East West Rail Western Section project proposes the introduction of direct rail passenger services between Oxford, Milton Keynes and Bedford, and also between London (Marylebone) and Milton Keynes (via Aylesbury). To achieve these services it is proposed that the partially disused Oxford – Bicester – Bletchley – Bedford and Princes Risborough – Aylesbury – Claydon Junction lines are reconstructed and upgraded. The project provides exciting opportunities for new inter-regional services that could provide wider benefits for passenger travel and freight markets.

1.1.3 The Western Section of the route consists of two distinct phases of work; EWR Phase 1 and EWR Phase 2:

- EWR Phase 1 (Oxford to Bicester) involves the construction of a chord at Bicester to connect to the Chiltern Mainline, upgraded track and signalling, and station improvements at Islip and Bicester Town. EWR Phase 1 was added to the scope of the Chiltern Railways 'Evergreen 3 Phase 2' project to introduce new direct services between London Marylebone and Oxford via Bicester. This section has secured consent and is currently under construction. It will be complete in Spring 2016; and
- EWR Phase 2 involves re-constructing and upgrading disused and underused rail track between Bedford and Bicester via Bletchley, and Milton Keynes and Princes Risborough via Winslow.

1.1.4 This request for a Scoping Opinion applies to the Phase 2 project only, hereafter referred to as 'the Scheme'.

1.1.5 Powers to undertake the Scheme and planning permission will be sought via a Transport and Works Act Order (TWAo) submitted to the Secretary of State for Transport and an application for planning permission under Section 90 (2A) of the Town and Country Planning Act 1990 and, where appropriate,

¹ East West Rail® Consortium (2015) *Welcome to East West Rail*. [Online]. [Accessed 24 February 2015]. Available from: <http://www.eastwestrail.org.uk/?url=homepage/welcome-east-west-rail>

applications under Part 18, Class A of the Town and Country Planning (General Permitted Development) (England) Order 2015.

1.2 The Need for an Environmental Impact Assessment (EIA)

- 1.2.1 Applications for Transport and Works Act (TWA) Orders are made in accordance with the Transport and Works (Applications and Objections Procedure)(England and Wales) Rules 2006 (the Applications Rules). Under Rule 7, when making an application, the Applications Rules require the submission of environmental information, typically considered an Environmental Statement (ES), for works that constitute a project which is of a type mentioned in Annex I or Annex II to the Environmental Impact Assessment (EIA) Directive (European Council Directive 2011/92/EU) (as amended).
- 1.2.2 The works proposed as part of the Scheme fall within the description of projects which require an EIA listed in Annex II to the aforementioned Directive under Infrastructure Projects, specifically para. 10 (d) - "Construction of railways (unless included in Schedule 1)", where the area of works exceeds 1 ha.
- 1.2.3 The submission of this Request for a Scoping Opinion under Rule 8 of the Applications Rules (hereafter referred to as the Scoping Report) to the Department for Transport (the DfT) represents the first step in the EIA process.

1.3 Purpose of the Document

- 1.3.1 Under Regulation 13(1) of The Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (the EIA Regulations), an applicant/developer can formally request an opinion from the consenting body as to the scope of the EIA. A Scoping Report is therefore prepared and submitted to the DfT. The purpose of this report is to assist the DfT in its development of a formal opinion regarding the scope and methodologies for carrying out the EIA for the Scheme.
- 1.3.2 This Scoping Report sets out the framework within which the ES will be produced, including topic areas and information that will be contained within the ES. As part of the scoping process and through the DfT, statutory consultees will be invited to express their views on the proposed scope of the EIA. Through the submission of this Scoping Report, the DfT is formally requested to adopt a 'Scoping Opinion', pursuant to Regulation 13(1) of The EIA Regulations.
- 1.3.3 As part of the EIA exercise, the scoping decisions will be continuously reassessed in light of the information gained as the EIA progresses. For the purposes of this Scoping Report, the worst case options from an environmental impact perspective have informed the assessment.
- 1.3.4 In terms of the context of this report:
 - Chapter 2 describes in broad terms, the location of the Scheme and the nature of the proposals;

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- Chapter 3 sets out the proposed EIA methodology;
- Chapter 4 describes the proposed structure and content of the ES; and
- Chapters 5 – 15 detail topic specific approaches to the assessment of likely significant effects, including the cumulative assessment.

2. THE SCHEME

2.1 Scheme Context

2.1.1 As described in section 1.1 (Overview), the Scheme forms part of a larger programme of works and aspirations known as EWR. The Scheme has six main objectives:

- To provide a strategic east-west railway route linking key centres of economic activity, and provide a strategic link from Milton Keynes to Princes Risborough and beyond;
- To support local authorities' ambition for substantial economic growth based on the creation of new private sector jobs and the development of major areas of new housing;
- To provide an orbital link between existing radial routes out of London in order to facilitate journeys without the need to interchange through London. On completion, it will connect the Great Western, Chiltern, West Coast, Midland and East Coast Main Lines north of London and become a vital strategic rail link in Britain's rail network;
- To positively contribute to tackling climate change by providing a more sustainable means of meeting the demand to travel;
- To enhance Network Rail's network capacity and flexibility by creating opportunities for alternative routing of passenger and freight services, and exploit new medium and long distance markets; and
- To form a key link in the Electric Spine proposals between Oxford and Bedford linking the south coast and the deep sea port at Southampton with the Midlands and South Yorkshire.

2.2 Needs and Benefits

2.2.1 Population numbers and urban centres along the EWR corridor have experienced significant growth in the last decade. Milton Keynes is a key growth area and, along with Bedford and Aylesbury, will see further major development over the next 25 years. The EWR project will connect these growth areas and provide a conduit for new local and regional rail services.

2.2.2 The implementation of the Western section of the EWR project (Phases 1 and 2) will open up a number of passenger and freight opportunities. It will:

- Provide a public transport alternative to the use of the trunk road network in an area where there is no high capacity road network;
- Connect three of the growth areas in the region (Milton Keynes, Aylesbury and Bedford), as identified in the Government's Sustainable Communities Plan;

- Connect Milton Keynes, Aylesbury and Bedford with Oxford and Bristol by means of a single interchange, giving access to most of South West England and South Wales;
- Provide access to Stansted Airport (and also Ipswich from Bedford, Milton Keynes and Oxford);
- Strengthen the role of Bedford as a transport hub, in conjunction with the proposed extension of Thameslink to Northampton;
- Improve access to Luton Airport by means of an interchange at Bedford; and
- Improve services available for local commuters.

2.3 Scheme Description

- 2.3.1 At the time of the preparation of the Scoping Report, the Scheme is in the feasibility stage where the scope of the design is being agreed with the DfT. There are currently a number of options that are being assessed which deliver different operational capabilities. During the EIA process, the Scheme scope will be defined, a preferred option selected and design progressed with the assessment of likely significant effects informing the final Scheme design. The following summary describing the Scheme reflects the current stage of development.

Track and Signalling

- 2.3.2 The Scheme will provide new track and signalling throughout the route (including the Bicester station area, Bletchley to Milton Keynes and the Bedford area) adequate to deliver the DfT service specification summarised in Appendix 2.1. Works will include the replacement of existing ballast, sleepers and track to modern standards.
- 2.3.3 The extent of new track (i.e. the number and location of passing loops, or where track is to be single or double tracked) is currently under consideration as part of the scope selection process with the DfT.
- 2.3.4 The overall width of construction on a typical section of track corridor along the route will be approximately 12.7 m though the precise width will depend on topography. This also does not take account of the need for earthworks, such as for embankments and cuttings, which are location specific and would increase the width of construction where needed. For sections where no provision will be made for overhead lines, the overall width will be less. In areas where there is a requirement for drainage works the width of the construction may also need to be larger.
- 2.3.5 Due to the requirement for overhead line clearances and the increase in the width of the track corridor in places to accommodate the Scheme, existing road overbridges along the route may need to be replaced, altered or upgraded in order to accommodate railway works.

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Electrification

- 2.3.6 The EIA will assume that the route between Bicester and Bletchley will be electrified. This includes the installation of overhead lines with support structures and associated electrical supply infrastructure.
- 2.3.7 For new or re-constructed bridges on the routes between Bletchley to Bedford and Claydon Junction to Princes Risborough, provision will be made for future installation of electrification infrastructure e.g. the bridge deck height will allow space for overhead lines. However, these sections of the route will not be electrified as part of this Scheme.

Line Speed

- 2.3.8 Rail services using the line once operational will include local passenger trains, interregional passenger services and freight services. The feasibility design being examined aims to provide the following train operating speeds along the route:
- Between Bicester – Bletchley - Bedford 100 mph wherever practicable;
 - Between Claydon Junction and Aylesbury 90 mph wherever practicable; and
 - Between Aylesbury and Princes Risborough 80 mph.

Stations

- 2.3.9 Station capacity will be increased by the provision of:
- A new station at Winslow (for which Outline Planning Consent has been granted – 13/02112/AOP); and
 - New high level platforms at Bletchley (serving both Milton Keynes and Bedford routes) to integrate with the existing main line station.
- 2.3.10 The following additional stations along the Scheme route may also require upgrade alterations to accommodate the proposed services, including Little Kimble, Monks Risborough, Milton Keynes Central, Bletchley, Woburn Sands, Ridgmont, Bedford Midland, Aylesbury Vale Parkway, Aylesbury and Princes Risborough stations. This may include extensions to platforms and access improvements.

Level Crossings

- 2.3.11 A risk assessment of all level crossings will be undertaken to take into consideration the change in service pattern that the Scheme will deliver. The risk assessment will help to establish a safe crossing solution, which may require some works to make the crossing safe. This could include crossing upgrades with the latest level crossing technology, closures through the use of diversionary routes or the installation of new structures to grade separate users from the railway.

Earthworks and Drainage

- 2.3.12 Earthworks are to include some embankment widening, cutting widening and stabilisation. Where drainage is to be replaced, altered or repaired, it will be built to meet sustainable drainage standards.

Associated Railway infrastructure

- 2.3.13 In addition to the above, the following associated railway infrastructure will be required:

- Signalling and telecommunication infrastructure;
- Pedestrian and vehicular access for maintenance; and
- Freight sidings (known as loops or turn backs/reversing tracks).

- 2.3.14 As mentioned in the section under Track and Signalling, the location of freight sidings is currently under consideration as part of the scope selection process with the DfT.

2.4 Indicative Programme

- 2.4.1 The indicative outline programme relating to the Scheme is as follows:

- The TWAO application submission to the Secretary of State - mid 2016;
- The TWAO determination - early 2017;
- Construction of the Scheme during 2017 and 2018; and
- The Scheme commissioned and operational in 2019.

2.5 Construction

- 2.5.1 Based on early feasibility designs, Network Rail has identified an outline construction strategy for the Scheme. The construction duration is estimated at approximately 36 months and will be broadly phased along the route as follows:

- Construction Phase 1 – Boundary with EWR Phase 1 at Bicester Town to Claydon Junction
- Construction Phase 2 – Claydon Junction to Flyover at Bletchley
- Construction Phase 3 – Flyover at Bletchley to Milton Keynes
- Construction Phase 4 – Flyover at Bletchley to Bedford Midland
- Construction Phase 5 – Claydon Junction to Aylesbury
- Construction Phase 6 – Aylesbury to Princes Risborough

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- 2.5.2 The linear nature of the Scheme means a number of construction compounds will be required along the route, each accessed from the public highway. All compounds will also have access to the rail corridor with the main compound at Bletchley having access to the wider rail network.
- 2.5.3 Where road and pedestrian overbridges or underpasses are proposed as part of the Scheme, each will require a small construction compound with vehicle access. Some of these overbridges/underpasses may be located in areas which are not currently accessible by the public highway and therefore temporary tracks will need to be constructed for access.

2.6 Scheme Area

- 2.6.1 The footprint of the Scheme, arising from permanent and temporary requirements, will define the Scheme Area. As the Scheme design evolves with the EIA process, the Scheme Area will also evolve until the design is 'frozen' and a 'red line boundary' can be finalised. This finalised Scheme Area will inform the EIA and will be referenced in the TWAO application and the ES. At this stage, a worst-case assumption has been made to enable baseline studies to begin.
- 2.6.2 The proposed route for the Scheme will follow the existing railway corridor from Bicester to Bedford Midland Station, via Bletchley, and from Milton Keynes Central Station to Princes Risborough Station via Aylesbury Station. Figure 2.1 (Appendix 2.2) shows a plan of land affected by the Scheme.
- 2.6.3 The Scheme crosses several Local Authority boundaries:
- Cherwell District Council (CDC), within Oxfordshire County Council (OCC);
 - Aylesbury Vale District Council (AVDC), within Buckinghamshire County Council (BCC);
 - Wycombe District Council (WDC), within BCC;
 - Milton Keynes Council (MKC), a Unitary Authority (UA);
 - Central Bedfordshire Council (CBC), a UA; and
 - Bedford Borough Council (BBC), a UA.
- 2.6.4 The majority of the Scheme is located in rural surroundings, predominantly in use for arable agricultural production. Where the route passes through towns (Bicester, Winslow, Bletchley, Milton Keynes, Bedford, Aylesbury, and Princes Risborough), surroundings change, comprising residential, commercial, industrial and other urban land uses.

3. EIA METHODOLOGY

3.1 Introduction

- 3.1.1 By virtue of Schedule 1 to the Transport and Works (Applications and Objections Procedure) (England and Wales) Rules 2006 (the Applications Rules), an Environmental Statement should, *inter alia*, include the following information:

Table 3.1. Information required in an ES by the Applications Rules

Part	Summary of Requirements
Part 1	Description of the proposed project
Part 2	Outline of main alternatives
Part 3	Description of aspects of the environment likely to be significantly affected
Part 4	Description of likely significant effects and forecasting methods
Part 5	Measures envisaged in relation to significant adverse effects
Part 6	Non-technical summary
Part 7	Indication of difficulties (technical or knowledge based)

- 3.1.2 This Scoping Report provides information on the approach to be taken during the EIA for the following topic areas:

- Chapter 5 – Land use and agriculture;
- Chapter 6 – Cultural heritage;
- Chapter 7 – Air quality;
- Chapter 8 – Noise and vibration;
- Chapter 9 – Ecology;
- Chapter 10 – Landscape and visual impacts;
- Chapter 11 – Water quality and flood risk;
- Chapter 12 – Geology, soil and land contamination;
- Chapter 13 – Traffic and transport;
- Chapter 14 – Electromagnetic interference, and
- Chapter 15 - Cumulative effects.

- 3.1.3 Baseline information collected to date and a summary of relevant legislation, policy and good practice guidance for topic areas is included in Appendix 3.1.

- 3.1.4 In preparing the ES, the following general guidance will be considered:

- DfT, 2006 – A Guide to Transport Works Act Procedures;

- TWA Orders Unit, DfT, 2008 – TWA Good Practice Tips for Applicants;
- Department of the Environment, Transport and Regions (DETR) 1999 – Circular 02/99 – Environmental Impact Assessment;
- DETR 2000 – Environmental Impact Assessment – A Guide to Procedures;
- Highways Agency (HA) 2008 – Design Manual for Roads and Bridges (DMRB), Volume 11 (Environmental Assessment), Section 2 (Environmental Impact Assessment), Part 5 (Assessment and Management of Environment Effects; and
- Institute of Environmental Management and Assessment (IEMA), 2004 – Guidelines for Environmental Impact Assessment.

3.1.5 The assessment of each topic area included in the scope of the EIA will be carried out by specialists with relevant professional expertise and experience. The specialists will be responsible for ensuring the methods they use are appropriate and reflect best practice. The approach to be taken is detailed within the topic specific chapter of this Scoping Report. Where specific guidance is absent the generic approach set out in this chapter will be adopted.

3.2 Topics Scoped Out

Socio-economics

3.2.1 Socioeconomics has been scoped out as a separate topic chapter. As summarised in sections 2.1 (Scheme Context) and 2.2 (Needs and Benefits), the Scheme will bring many social and economic benefits, both locally and at an inter-regional level. The social and economic business case for the Scheme will be set out in documents that will accompany the TWAO application, such as the Explanatory Memorandum, the Statement of Aims or the Proposals for Funding. These will draw upon a Business Case commissioned by the EWR Consortium in 2010² and a further study updated in 2014³. Both concluded that the Scheme represents excellent value for money and would deliver significant benefits for the region and sub region.

3.2.2 The assessment of likely significant effects on local communities and their assets, travellers and businesses (including agriculture) will be set out in Chapters 5 (Land Use and Agriculture) and 13 (Traffic and Transport) of this Scoping Report.

² Oxford Economics (2010) East West Rail: The Economic Case for Investment [Online] [Accessed 17 June 2015] Available from: http://www.eastwestrail.org.uk/wp-content/uploads/2015/03/oxford_economics_ewr_report.pdf

³ ARUP (2014) East West Rail Economic Case Refresh [Online] {accessed 17 June 2015} Available from: http://www.eastwestrail.org.uk/wp-content/uploads/2015/03/arup_refresh_of_east_west_rail_economic_case_issue_28-05.pdf

Decommissioning

- 3.2.3 The Scheme will be developed in line with current Network Rail design standards and with adherence to Network Rail's Environmental Management Systems and Sustainable Development Strategy (2013-2024)⁴. If the Scheme ceased to be in operational use in the future, it is not the intention of Network Rail to remove the rail corridor and associated infrastructure. For those reasons, decommissioning will not have likely significant effects as part of the Scheme and subsequently will not be assessed within the individual topic chapters.

Climate Change Resilience

- 3.2.4 Climatic factors will not be addressed as a separate topic chapter in the ES. Climate change adaption will be considered as part of the design through the application of sustainability tools to the design process. Climate change resilience will be considered in the following aspects of design as a minimum:
- Overhead line, track and line-side equipment resilience in extreme temperatures, higher wind speeds and increased risk of lightning strike;
 - Drainage capacity and bridges for watercourses crossings will be designed to take account of climate change assumptions (greater rainfall and higher risk of flooding/flood levels); and
 - Earthworks will be designed to be resilient to higher rainfall and drought.

- 3.2.5 Climatic factors will be considered as part of Chapters 7 (Air Quality) and 11 (Water Quality and Flood Risk) of this Scoping Report.

Natural Resources, Waste and Materials

- 3.2.6 Use of natural resources will not be addressed as a separate topic chapter in the ES. The design will seek to avoid and reduce the use of virgin materials and maximise the use of materials with recycled content through the application of sustainability tools to the design process. A Site Waste Management plan will be used to avoid and minimise wastes through design and during construction.

Human Health

- 3.2.7 Human Health will not be assessed as a separate topic chapter in the ES. Chapters 7 (Air Quality), 8 (Noise and Vibration), 12 (Geology, Soil and Land Contamination) and 14 (Electromagnetic Interference) will consider potential risk to human health.

⁴ Network Rail (2013) Sustainable Development Strategy [Online] [Accessed 8 June 2015] Available from: <http://www.networkrail.co.uk/browse%20documents/strategicbusinessplan/cp5/supporting%20documents/transforming%20network%20rail/sustainable%20development%20strategy.pdf>

3.3 Temporal Scope

3.3.1 The EIA will address the likely significant effects anticipated to arise from the construction of the proposed works, temporary and permanent land take, and operation of the Scheme as follows:

- Any effects from construction that may arise as a direct result of construction activities (e.g. demolition activities, vegetation clearance, piling, building new structures) and from temporary use of land (e.g. construction sites, compound areas, access routes), or from associated changes in traffic movements (e.g. traffic diversions, road closures, footpath diversions); and
- Any anticipated effects from the operation of the Scheme, the provision of new infrastructure (e.g. stations) or consequent altered traffic flows (permanent highway closures, new rail service patterns).

3.3.2 In accord with best practice, and consistent with the Calculation of Railway Noise (CRN) Technical Memorandum⁵ and current guidance, the operational effects will be assessed from the year of opening to year 15 of operation (calendar years 2019 to 2034).

3.4 Spatial Scope

3.4.1 The provisional area of study is based upon the existing EWR alignment within the Phase 2 area and the outer limit of the scope currently under consideration.

3.4.2 Study areas vary depending on the nature of impacts and the locations of resources and receptors which may experience the impacts. Assessments will also interrogate the design of the Scheme as it evolves to ensure that an appropriate study area is considered. In broad terms where there is uncertainty in relation to design parameters, maximum/minimum limits for studies consider a 'worst case' approach will be identified and considered for the purpose of assessment.

3.4.3 The study area for the EIA is defined by land that has the potential to be affected by the Scheme. The land over which consent will be sought is defined by the Red Line Boundary (RLB), known as the Scheme Area. Each topic chapter will identify a spatial scope taking into account:

- The Scheme Area;
- The nature of the existing baseline environment;
- The pathways for any effects which may extend beyond the boundary of the Scheme Area; and
- The area affected by transport movements including highway and rail traffic.

⁵ Department of Transport, (1995), 'Calculation of Railway Noise', HMSO.

- 3.4.4 To enable the EIA documents to be more easily understood, the ES will be split by Local Authority areas, known as sub-sections. Due to the extent of the Scheme within the Aylesbury Vale District, this area is further divided into three sub-sections. The eight sub-sections are described in the following table and are shown in Figure 2.1 (Appendix 2.2).

Table 3.2. Eight Reporting Sub-sections

Sub-Section	Description
CDC	Relating to the Scheme Area located within the CDC boundary
AVDC: Claydon/Quainton	Relating to the Scheme Area located within the AVDC boundary, between the CDC boundary to the west, the boundary of the Addington and Winslow Parish Councils in the east, and the boundary of the Quainton and Waddesdon Parish Councils in the south
AVDC: Winslow/Swanbourne	Relating to the Scheme Area located within the AVDC boundary, between the boundary of the Addington and Winslow Parish Councils in the west and the MKC Boundary in the east
AVDC: Aylesbury	Relating to the Scheme Area located within the AVDC boundary, between the boundary of the Quainton and Waddesdon Parish Councils in the north and the WDC boundary in the south
MKC	Relating to the Scheme Area located within the MKC boundary
CBC	Relating to the Scheme Area located within the CBC boundary
BBC	Relating to the Scheme Area located within the BBC boundary
WDC	Relating to the Scheme Area located within the WDC boundary.

- 3.4.5 Where study areas for sub-sections overlap, likely significant effects will be reported in the sub-section in which the receptor experiencing the effect is located. Where effects are experienced by receptors across more than one sub-section, in addition to the 'individual' effects being reported in each sub-section, the effect experienced by the receptors together will be assessed and reported as a cumulative effect.

3.5 Baseline

- 3.5.1 The baseline will be the environmental characteristics and conditions of the area likely to be affected by the Scheme, which are present at the time of the assessment, or which are predicted to be present at certain times during the construction or operation of the Scheme such as the year of opening and year 15 of operation.
- 3.5.2 Baseline environmental conditions will be identified principally by making use of existing available data and/or through undertaking additional desk based studies, field surveys or modelling. The methodology for establishing the baseline for each environmental topic is described in each topic chapter.
- 3.5.3 The ES will detail the approach to establish the baseline and will cover:
- Sources of information;
 - Methodology (including that for modelling or surveys);

- Consultation;
- Any limitations (such as data availability, restricted access or seasonal variation); and
- The temporal and spatial study area.

3.5.4 Changes to this baseline arising from the Scheme, known as impacts, are also to be identified. The methodology for identifying impacts, the sensitivity of receptors experiencing these impacts and assessing the likely significant effects arising from these impacts is set out in the following section. Where this requires use of a topic specific methodology, one different to that described in this chapter, this will be described in the chapter for that topic.

3.6 Assessing Likely Significant Effects

3.6.1 The ES will detail the likely significant effects that are predicted to result from the construction and operation of the Scheme. The significance of an effect will be assessed by comparing the magnitude of impact (the degree of change experienced by a receptor), against the sensitivity of the affected receptor.

3.6.2 The following section describes how the criteria of magnitude, sensitivity and significance are interpreted and will be applied throughout the EIA, unless otherwise stated.

Magnitude of Impact

3.6.3 As described in section 3.5 (Baseline), an impact is a change in baseline conditions caused by the Scheme. The following criteria and definitions for magnitude of impact will be used to describe changes arising from the construction or operation of the Scheme, unless otherwise stated.

Table 3.3. Description of the Magnitude of an Impact

Magnitude of impact	Type	Typical Criteria Descriptors
High	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality.
Medium	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Low	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Very Low	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.
No Change	N/A	No loss or alteration of characteristics, features or elements; no observable effects in either direction.

3.6.4 Identification of the impacts of the Scheme will consider whether the impacts are:

- Direct or indirect;
- Secondary or cumulative;
- Short, medium or long-term;
- Permanent or temporary;
- Reversible or irreversible; and
- Positive or negative.

Direct or Indirect

3.6.5 Direct impacts arise as a direct consequence of the Scheme, such as the footprint of a Scheme leading to building demolition or increased congestion on roads due to construction traffic.

3.6.6 Indirect impacts are those which are not a direct result of the Scheme, but occur away from the original impact or as a result of a complex pathway. Indirect impacts consist of a sequence of at least two impact steps. For

example, changes to road traffic movements may affect air quality and in turn may affect receptors; human or ecological. There are many such interactions within an EIA.

- 3.6.7 A secondary impact is a change to the environmental setting of a receptor, which in turn affects the receptor.

Beneficial or Adverse

- 3.6.8 A beneficial impact is defined as one that is favourable or positive to the condition of a receptor. An adverse impact is one that is unfavourable or negative to the condition of a receptor.

Duration of Impacts

- 3.6.9 For the purposes of the ES, the following durations of impact will be taken into consideration:

- Short term – intermittent or construction phase impacts lasting up to two years;
- Medium term – operational phase or opening year impacts lasting between two and five years; and
- Long term impacts – operational phase impacts lasting up to 15 years.

- 3.6.10 In this context, impacts will also be described as either temporary or permanent. If the duration of an impact is predicted to be less than two years, then it will be considered temporary. If an impact is expected to last an indefinite period of time it will be considered permanent.

- 3.6.11 Any impacts described as reversible or irreversible will refer to whether the impact could be removed if deliberate action were taken to do so. If the timescale for the return to baseline conditions at a receptor is greater than 15 years, then it will be considered irreversible. If this timescale is less than 15 years, it can be considered reversible.

- 3.6.12 With regards to the frequency of impacts, the EIA will consider whether the impact will be continual or intermittent over the period of time identified.

Sensitivity of Receptors

- 3.6.13 A receptor is an entity that may be affected by an impact. Relevant receptors will be identified for each environmental topic and an appropriate baseline developed. The method to achieve this is usually topic specific and will therefore be described in each of the topic chapters of this Scoping Report.

- 3.6.14 Once a receptor is identified, the following criteria and definitions for sensitivity will be used to describe the sensitivity of receptors to change arising from the construction or operation of the Scheme, unless otherwise stated.

Table 3.4. Description of the Sensitivity of an Environmental Receptor/Resource

Sensitivity	Typical descriptors
Very High	Very high importance and rarity, international scale and very limited (i.e. no potential for substitution/replacement).
High	High importance and rarity, national scale, and limited potential for substitution/ replacement.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution/ replacement.
Low	Low or medium importance and rarity, local scale. Considerable potential for substitution/replacement.
Negligible	Very low importance and rarity, local scale. Ample potential for substitution/ replacement.

Significance of Effect

- 3.6.15 Once the sensitivity of receptors and magnitude of impacts have been established, the overall significance of effects will be assessed using the following matrix, unless otherwise stated.

Table 3.5. Significance of Effects

		RECEPTOR / RESOURCE SENSITIVITY		
		High	Medium	Low
IMPACT MAGNITUDE	High	Major	Major	Moderate
	Medium	Major	Moderate	Minor
	Low	Moderate	Minor	Minor
	Very low	Minor	Negligible	Negligible
	No change	None	None	None

- 3.6.16 All effects assessed as being of moderate significance or above are considered to be significant in EIA terms for the purpose of this assessment. Effects of minor or negligible significance are not considered to be significant and will therefore not be reported as significant residual effects.

3.7 Proposed Cumulative Assessment

- 3.7.1 An assessment of the in-combination effects between topic areas within the Scheme will be undertaken. An assessment of likely significant cumulative effects of the Scheme with other developments/schemes will also be undertaken with a list of schemes relevant to the individual topic area to be agreed in advance with the Local Authorities and other relevant statutory consultees. The proposed methodology for the assessment of both in-combination and cumulative effects is described in Chapter 15 (Cumulative Effects).

3.8 Mitigation

- 3.8.1 The mitigation hierarchy sets out how an EIA can alter the negative effects of a development. It sets out a hierarchy of actions that can be undertaken to address negative effects.
- 3.8.2 In the first instance, opportunities should be taken to avoid negative effects altogether. Where avoidance is not possible (for example due to financial, operational or societal constraints) the EIA should then seek to reduce the significance of negative effects. Where environmental effects remain significant, compensatory measures may then be required.
- 3.8.3 The Scheme will incorporate the principles of the mitigation hierarchy in the form of the following:
- Design measures - the design of the Scheme will take into account environmental issues and opportunities identified during the design process. These issues and opportunities will inform choices made during the identification and development of design options. Environmental specialists and design engineers will work together to identify design measures that reduce issues or capitalise on opportunities; and
 - Mitigation measures – the EIA will assess likely significant effects arising from the Scheme. Where significant effects occur, measures specific to the Scheme will be identified to mitigate or reduce these effects.

Construction Environmental Management Plan (CEMP)

- 3.8.4 Scheme construction will be carried out in accordance with Contract Requirements – Environment (CRE) and a CEMP. Best practice and identified mitigation measures will be captured in this document to prevent, reduce and offset significant adverse environmental effects where possible. This document and the roles/responsibilities and assurance processes that are laid out within will be the principal mechanism by which mitigation measures from the EIA will be secured.

Mitigation of Significant Adverse Effects

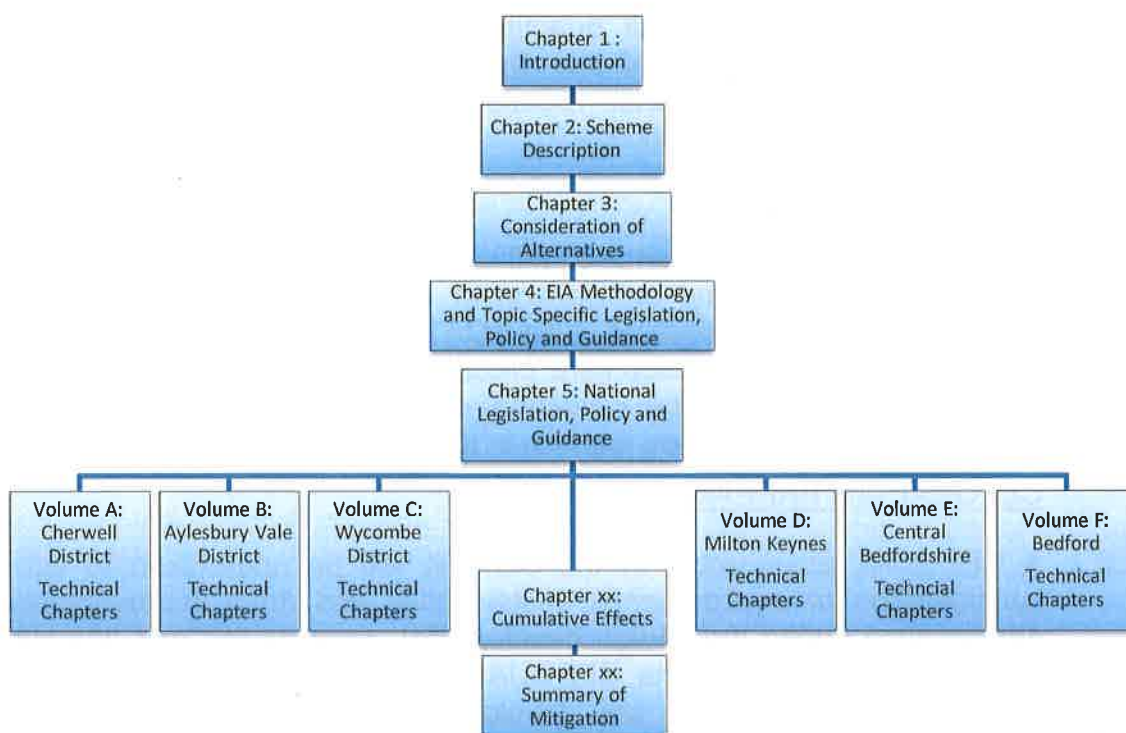
- 3.8.5 Design development is at a preliminary stage at the time of the submission of this Scoping Report. As a consequence, any mitigation suggested in this report is provisional and may change following completion of the assessment.
- 3.8.6 If any residual significant effects remain after mitigation of significant adverse effects, these residual effects will be reported within the ES.

4. DRAFT STRUCTURE OF THE ES

4.1 Structure

- 4.1.1 The proposed structure of the ES is illustrated in Insert 4.1. This structure is provisional and may be subject to change.
- 4.1.2 As indicated, it is proposed to report the technical chapters by Local Authority to make it easier to identify likely significant effects relevant to the reader. The non-technical chapters, cumulative effects and summary of mitigation will be reported as Scheme wide chapters.

Insert 4.1. Proposed structure of the ES



4.2 Other Reports and Environmental Assessments of the Scheme

- 4.2.1 Taking into account the requirements of the EIA directive, the topics to be included in the ES will be those where likely significant effects are considered to occur. The Scheme will be subject to a range of other environmental assessments which may inform or be informed by the ES.
- 4.2.2 Sustainability will also be embedded throughout the design, construction and operation of the Scheme, in line with the aims of Network Rail's

Sustainable Development Strategy⁶. A number of tools and standards will be used to ensure this.

Sustainability Options Appraisal Tool (SOAT)

- 4.2.3 The SOAT has been developed using resources/materials from recent Network Rail projects and is based on current best practice thinking on sustainable development performance assessment in the rail industry. The SOAT approach consists of a high level review of social, economic and environmental themes to identify the key issues and opportunities associated with the Scheme. Inputs to the SOAT process are moderated and agreed by consensus at workshops attended by stakeholders from across Network Rail, their design consultant and other relevant project stakeholders.
- 4.2.4 The SOAT assessment will quantitatively assess and compare design options to be taken forward into Option Development and will highlight design measures that either reduce adverse sustainability impacts or enhance lifecycle performance.

Carbon Footprinting

- 4.2.5 A carbon footprinting exercise will also be undertaken to provide a quantitative analysis and comparison of each design option to be taken forward to option development. Like SOAT, the outputs of this exercise will feed into the option development process for the Scheme, and will also inform a 'carbon challenge workshop' designed to target and implement measures to mitigate carbon impacts in the project lifecycle.

CEEQUAL and BREEAM

- 4.2.6 A CEEQUAL assessment of the Scheme will be undertaken to aid the consideration of environmental sustainability and drive improvements in performance during the design development, construction and operational phases on the project. The CEEQUAL process will be applied to ensure preferred design options are developed in accordance with industry-recognised assessment standards for environmental sustainability.
- 4.2.7 The proposed new station at Winslow will be subject to a BREEAM assessment. The BREEAM assessment will help guide the design toward a low impact station - a particular focus will be on minimising energy demands through efficient materials use, lean systems, and low to zero carbon technologies.

⁶Network Rail (2013) Sustainable Development Strategy [Online] [8 June 2015] Accessed from: <http://www.networkrail.co.uk/browse%20documents/strategicbusinessplan/cp5/supporting%20documents/transforming%20network%20rail/sustainable%20development%20strategy.pdf>

5. LAND USE AND AGRICULTURE

5.1 Introduction

5.1.1 This chapter will consider the likely significant effects of the Scheme in terms of agriculture and land use. Land use effects also address likely significant effects on local communities and both community and private assets.

5.1.2 The chapter will consider:

- The physical character of the land resource;
- Its soils and agricultural land capability;
- The use being made of that resource by agricultural interests;
- The structure and nature of the agricultural enterprises insofar as they are affected; and
- Local community and private assets and their amenity⁷.

5.1.3 Likely significant effects to be considered for this topic later in the EIA process will include:

- The quality and quantity of agricultural land to be temporarily affected and permanently lost;
- The effect of that loss (or other effects such as severance) on agricultural holdings;
- The loss of agricultural buildings or other fixed farm capital;
- Loss of access to agricultural farmsteads/ fields;
- Loss of private and community assets;
- Amenity experienced by visitors to local places of interest or users of local community facilities; and
- Construction effects (e.g. nuisance from dust, traffic, noise or temporary effects on drainage).

5.2 Study Area

5.2.1 For agriculture and land use, effects are mainly expected to occur within areas where there will be permanent land take (e.g. for a station or length of track) or adjacent, or in close proximity to these areas. During the construction process, additional land is likely to be temporarily affected by the requirement for construction compounds, storage areas and construction vehicle access. As a consequence, the study area, including all

⁷ The pleasantness or attractiveness of a place.

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- areas that may potentially be affected by the Scheme (both temporary and permanent) extends 500 m each side of the Scheme Area boundary (described in section 2.6 (Scheme Area)).
- 5.2.2 The likely extent of the study area for the agriculture and land use topic is summarised in the table below.

Table 5.1. Extent of Study Area for Agriculture and Land Use

Sub-section	Estimated Land Area (ha) ⁸
CDC	960
AVDC: Claydon/Quainton	2,510
AVDC: Winslow/Swanbourne	1,110
AVDC: Aylesbury	1,570
WDC	1,500
MKC	2,190
CBC	1,180
BBC	1,330

5.3 Potential for Likely Significant Effects

- 5.3.1 There is potential for the following effects on agriculture from the Scheme:
- Temporary and permanent loss of land currently used for agricultural production resulting in loss of productivity;
 - Introduction of weed/invasive species;
 - Soil structure/quality (compaction and permeability) affected by temporary use/alteration;
 - Disruption to drainage and irrigation resulting in increased soil wetness or susceptibility to drought;
 - Construction effects such as nuisance from dust, traffic and noise; and
 - Severance of land and closing of crossings.
- 5.3.2 In relation to local communities, effects could be summarised as direct (demolition, construction, direct land take) or indirect (disturbance to the amenity of communities and/or their assets from other environmental effects).

⁸ These figures were compiled using GIS analysis of the land within 500m of the Scheme Area.

5.4 Proposed Assessment Methodology

Overview

- 5.4.1 There is no nationally agreed methodology for assessing the impacts of development on agriculture or soils. As such, the assessment of significance will be undertaken in accordance with standard EIA methodology. This approach will be adapted using methodology commonly applied in comparable agricultural, soil and land use assessments. These derive from national policy and good practice guidance set out in Appendix 3.1.
- 5.4.2 There is no standard methodology for the assessment of community effects. The approach that it is proposed will focus on two key issues:
- Direct loss of land or property as a result of land-take for the Scheme; and
 - Indirect effects such as curtailment of gardens, loss of amenity, severance or encroachment.
- 5.4.3 Residential, community, recreational and commercial/employment land use categories will be considered. Land use, as well as individual properties, will be identified using GIS to produce an annotated map of land use in the study area. This will allow the identification of receptors that may experience direct or indirect effects as a result of the Scheme. Site visits will be made to verify the findings of the GIS analysis and investigate possible impacts and receptor sensitivity in more detail. Likely significant effects will then be described qualitatively, in line with the categories and criteria for impact magnitude, receptor sensitivity and significance set out in section 3.6 (Assessing Likely Significant Effects).

Desk Based Studies

- 5.4.4 Areas of temporary and permanent land take from the Scheme will be examined using GIS analysis. This will determine the land use type and, where this is agricultural, the quality of the land. Landowner and agri-environment scheme datasets will also be cross referenced to identify landowners and schemes likely to be affected by the Scheme. This analysis will be verified as part of the field surveys.
- 5.4.5 Natural England (NE) will be consulted on the availability of existing detailed ALC information and existing agri-environment schemes within 500 m of the Scheme Area boundary. The owners and occupiers of land to be affected by the construction and operation of the Scheme will be consulted as part of the assessment.

Field Surveys

- 5.4.6 Field surveys on adjacent agricultural land will be completed in the following steps:
- A walkover survey taking photographs and notes;

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- Verify the accuracy of the mapped ALC classification and identified land use/or community asset;
- Complete a checklist for each of the landholdings and assets visited in order to screen out those unlikely to be significantly affected, i.e. because the land take is sufficiently small, the agricultural resource is poor or there are no pathways for indirect effects from noise or dust, for example; and
- The remaining landholdings or assets will then be carried forward to the next stage of analysis in order to determine the ALC and the effect of the Scheme on farm viability or amenity.

5.4.7 Where access restrictions do not permit a site visit, detailed aerial photography will be analysed to ensure relevant assets are identified for the assessment.

Farm Viability

- 5.4.8 Sites short-listed from the walkover survey will undergo more detailed site visits (subject to being granted permission for access), including interviews with the owners or occupiers of the land. Details collected during the interviews/site visits will include:
- Size and boundaries of farming interests;
 - Nature of land tenure;
 - Nature and scale of agricultural enterprise;
 - Items of fixed farm capital;
 - Means of agricultural access; and
 - Extent of any agri-environment scheme involvement.

5.4.9 This will form the basis of assessing the effect that the Scheme will have on each farm business.

ALC – Soil Sampling

- 5.4.10 Subject to the granting of permission for access, soil samples will be taken during the visits to the short-listed sites described above. This is to verify the accuracy of the ALC for the agricultural land. The extent of such surveys will depend on a number of factors including location, nature of proposed works, area of land take and provisional assessment of ALC (from desk study). The soil sampling will allow for a more definitive categorisation of agricultural land quality than the 1:250,000 scale GIS mapping (at defined locations along the route). This is because it will take into account the wetness, droughtiness, texture, structure, depth, stoniness and chemical fertility of the soil. These factors affect the cropping potential and the management requirements of the land.

- 5.4.11 A hand held 50 mm diameter "Dutch" auger and/ or spade to a depth of 1000 mm are to be used to take the soil samples. The auger investigation points will be initially spaced on a standard 100 m x 100 m grid but additional auger borings may be carried out for further checking of any soil variability. In addition, soil pits may be excavated, to determine subsoil characteristics which cannot be identified from the auger sample. The soil samples will be subject to laboratory analysis.
- 5.4.12 A risk assessment will be prepared to ensure that health and safety hazards relating to the ALC and soil surveys are taken into account. Defra guidance on biosecurity for visits to premises with farm animals will also be followed⁹.

Assessing Significance of Effect

- 5.4.13 The assessment will set out the predicted physical impacts on individual farm holdings. This will include assessing the land lost by each holding during the construction phase, the area of land severed (if any), the area to be restored to agriculture and the resulting residual permanent land loss to each holding. The assessment will also consider the impact on the BMV agricultural land. The effects identified will be assessed in accordance with the established significance criteria, as set out below.

Magnitude of Impact

- 5.4.14 For the purpose of this assessment, the magnitude of impact on individual farm holdings and the loss of agricultural land and soil resources, is described as either 'high', 'medium', 'low' or 'negligible'. An assessment will be made of effects to agricultural land quality and soil resources, and also of effects on individual farm businesses.
- 5.4.15 The magnitude of impact on agricultural land will depend on the amount to be lost due to the Scheme. The NE consultation threshold for the loss of the BMV agricultural land is 20 ha. Any loss below this level will be considered negligible. Above this threshold, the boundaries will reflect the farm size groupings used by Defra in their annual "Agriculture in the United Kingdom" report¹⁰. Losses of 100 ha and over would be equivalent to the size of a large farm and so would be considered of high magnitude. Medium and low thresholds are set at 50-100 ha and 20-50 ha respectively reflecting the Defra groupings. To account for the magnitude of a loss of soil resource, land graded as 3b, 4 and 5 is also considered. These are shown in Table 5.2.

⁹ Defra (2008), 'Biosecurity Guidance to Prevent the Spread of Animal Diseases', Defra.

¹⁰ Defra (2014), 'Agriculture In the United Kingdom 2013', Defra.

Table 5.2. Magnitude of impact on agricultural land quality and soil resources

Magnitude	Area of Impact (BMV Land)	Area of Impact (Lower Quality Agricultural Land)
High	≥ 100 ha	n/a
Medium	50 – < 100 ha	≥ 250 ha
Low	20 – < 50 ha	50 – < 250 ha
Negligible	< 20 ha	< 50 ha

- 5.4.16 The criteria that will be applied to assess the magnitude of impacts on an agricultural landholding is summarised in Table 5.3.

Table 5.3. Magnitude of Impact on Individual Farm Business

Magnitude	Effect on Individual Farm Business
High	Direct loss of land that renders an existing full-time farm business (including any diversification enterprises) unworkable and unviable in its current form. The farmer will have to change the farm enterprises carried out on the remainder of the holding and seek alternative means of income.
Medium	Large impact on the operation of a full-time farm business (including any diversification enterprises) whereby net farm income will be reduced and day-to-day management will need modifying due to e.g. restrictions in accessibility. However, farming can continue in the same way as before.
Low	Small impact on the operation and economic performance of a full-time farm business (including any diversification enterprises) or a large effect on (or loss of) a part-time farm business where income is derived mainly from non-agricultural means.
Negligible	Any adverse impact on the farm business (including any diversification enterprises) is imperceptible and no adjustments to the management of the farm holding required.

Sensitivity of Receptor

- 5.4.17 The BMV agricultural land (grades 1, 2, and 3a on the ALC system) is considered to be a finite national resource and is given special consideration in national policy and guidance. The actual sensitivity category assigned will vary regionally depending on how common it is to find the BMV land there. For the purposes of this assessment, Grade 1 and 2 land will be considered to have high sensitivity, Sub-Grade 3a land medium sensitivity, and Grades 3b, 4 and 5 low sensitivity. This is shown in Table 5.4 below.

Table 5.4. Sensitivity Criteria

Sensitivity	Grade of Land Affected
High	1, 2
Medium	3a
Low	3b, 4, 5
Negligible	Non-agricultural and urban land

- 5.4.18 Under the current planning policy framework, both local farm businesses and soil resources are considered to be of 'medium' sensitivity in terms of the national interest.

Duration of Impact

- 5.4.19 The impact duration categories used will be those described in section 3.6 (Assessing Likely Significant Effects).

- 5.4.20 For impacts on agricultural land and soil, short-term impacts will include those that involve the temporary loss of land during the construction process, assuming that land can be restored to its former quality. If not, and for areas where land take is required, impacts will be considered to be permanent.

Significance of Effect

- 5.4.21 The significance criteria set out below is based on interpretation of good practice, as set out in other agricultural assessments¹¹. The significance level attributed to each effect will be based on the magnitude of impact due to the Scheme, and the sensitivity of the affected receptor. It is considered that all effects which are assessed as being of moderate significance and above are significant in EIA terms.

Table 5.5. Significance of Effect

Magnitude of Impact	Sensitivity of Receptor			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

¹¹ Land Research Associates (2012), 'DIRFT III: Environmental Statement. Chapter N: Agriculture' Land Research Associates; RMA Environmental (2012), 'Environmental Statement Chapter: Agricultural Land Quality and Soil. Hatford Quarry, Oxon – Western Extension' RMA Environmental;

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- 6.2.4 Sub-sections of the Scheme likely to include heritage assets lying outside the study area outlined above include:

AVDC: Aylesbury sub-section

- 6.2.5 Although the standard study areas will be used when assessing the Aylesbury sub-section, several heritage assets on the periphery of the 1 km outer study area will also be scoped in to the assessment, due to the degree of sensitivity (or importance) of these assets. These include a Scheduled Monument (Medieval settlement) and Grade II RPG at Eythrope, and a Grade I RPG at Waddesdon.

AVDC: Claydon/Quainton sub-section

- 6.2.6 Although lying outside of the 1 km Study Area, Marsh Gibbon Conservation Area will be scoped in to the assessment.

WDC sub-section

- 6.2.7 It is possible for several statutory designated assets lying beyond the 1 km study area to be affected by the Scheme due to their location within the Chiltern Hills to the south. Their elevated position suggests that the assets may be sensitive to changes within the wider valley landscape. Therefore, these assets will be scoped into the assessment.

6.3 Potential for Likely Significant Effects

- 6.3.1 The following have been identified as possible effects of the Scheme:

- Expansion outside of the present railway on buried archaeological and earthwork remains (both for permanent and temporary land take);
- New infrastructure constructed to height or incongruous with its surroundings (for example, bridges or overhead electrical equipment) on the setting of designated heritage assets;
- The change in frequency of operational rail traffic along the line and the associated change in noise and vibration on the setting of heritage assets adjacent to the rail corridor; and
- Temporary effects from construction activity on the setting of heritage assets.

- 6.3.2 The following section sets out how significant effects are assessed.

6.4 Proposed Assessment Methodology

Overview

- 6.4.1 The proposed methodology for the assessment of likely significant effects on Cultural Heritage will comprise a desk based assessment (DBA). The DBA will present an overview of the archaeological and historical

background to the study area, an assessment of the sensitivity (importance) and cultural heritage significance¹³ of any archaeological remains that might be present, and an assessment of the significance of the setting of those designated assets that will be impacted upon.

- 6.4.2 The nature of the potential effects of the Scheme on cultural heritage will be considered, and the assessment will identify the requirement for any intrusive investigation that may be required to support the DBA, and/or schemes of mitigation.

Desk Based Studies

- 6.4.3 The DBA will comprise the collection and analysis of data in order to identify the likely heritage assets, their significance, the character of the study area and consideration of the setting of the heritage assets, and the nature, extent and quality of the known or potential archaeological, historic, architectural and their aesthetic interest.
- 6.4.4 The specific objectives of the proposed DBA will be to:
- Identify all heritage assets within the study areas;
 - Assess the sensitivity and cultural heritage significance of the identified or potential heritage assets;
 - Identify the potential impact of proposed or predicted changes on or harm to the significance of the assets and their settings;
 - Provide strategies for further investigation where the nature, extent or significance of the resource is not sufficiently well defined;
 - Suggest strategies to conserve the significance of the assets and their settings; and
 - Present proposals for archaeological mitigation where appropriate.
- 6.4.5 Further to the data supplied by the relevant Historic Environment Record (HER), the following sources will also be consulted as part of the data-gathering process:
- Literature review of publicly available data including reports on any cultural heritage or archaeological work conducted in or near the study areas; and
 - Historical maps including Ordnance Survey.

¹³ Cultural heritage significance is defined in Annex 2 of the NPPF as 'The value of a heritage asset to this and future generations because of its heritage interest'. The NPPF is clear that 'heritage interest' may be archaeological architectural, artistic or historic and that significance derives not only from an assets physical presence, but also from its setting.

Field Surveys

- 6.4.6 The inner study area (defined in section 6.2 (Study Area)) will be visited in order to assess its character, identify any visible historic features and assess factors which may affect the survival or condition of known or potential assets. The outer study area (defined in section 6.2 (Study Area)) will be visited in order to allow an assessment of the potential for direct impacts on the significance of the setting of the heritage assets.

Identification of Sensitive Receptors

- 6.4.7 Within the inner study area sensitive receptors are identified from the data provided by the relevant HER. This will include Scheduled Monuments, Listed Buildings, RPGs, Conservation Areas, locally listed buildings, earthworks and buried archaeological remains.
- 6.4.8 Within the outer study area, sensitive receptors include all designated assets and non-designated assets of demonstrable significance¹⁴ as compiled from the data supplied by the HERs and that available from Historic England.

Assessing Significance of Effect

- 6.4.9 In line with NPPF (Paragraph 128) the DBA will describe the significance of any heritage assets identified within the study area as appropriate. For the purposes of the DBA, significance will be defined as the value of a heritage asset to current and future generations because of its heritage interest, which may be aesthetic, historic, archaeological and architectural.
- 6.4.10 The ClfA 'Standard and Guidance for Historic Environment Desk-based Assessment'¹⁵ considers that an assessment of the significance of heritage assets should identify the effect of proposed or predicted changes on the significance of the asset and the opportunities for reducing that impact. NPPF (Paragraph 129) states that this evidence should be taken into account when considering the impact of a proposal. Harm to the cultural heritage significance of an asset is the basis of assessing the significance of effect.
- 6.4.11 In order to assess the level of harm or impact of the Scheme on heritage assets, consideration will be afforded to:
- Assessing in detail any impact and the significance of the effects arising from the construction and operation of the Scheme;

¹⁴ NPPF states that non-designated assets of demonstrable significance are of three types:

- Those that have yet to be formally assessed for designation;
- Those that have been assessed as being nationally important and therefore, capable of designation, but which the Secretary of State has exercised his discretion not to designate usually because they are given the appropriate level of protection under national planning policy; and
- Those incapable of being designated by virtue of being outside the scope of the Ancient Monuments and Archaeological Areas Act 1979 because of their physical nature.

¹⁵ ClfA, 2014 Standards and Guidance for historic environment desk-based assessment, Reading.

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- Reviewing the evidence for past impacts that may have affected the heritage assets of interest identified during the DBA; and
- Outlining suitable mitigation measures, where possible at this stage, to avoid, reduce, or remedy adverse impacts.

6.4.12 Key effects will be identified as those that would harm the cultural heritage significance of the heritage asset and therefore its sensitivity. Each effect will be determined as the predicted deviation from the baseline conditions, as a result of construction and operation of the Scheme.

6.4.13 Although the significance of effect will be assessed in terms of the sensitivity (importance) of the asset to the magnitude of change or scale of harm during the Scheme, consideration is afforded to the cultural heritage significance (based on NPPF heritage values) of the assets.

Magnitude of Impact

6.4.14 The magnitude of effect, or scale of harm, is often difficult to define, but will be termed as Very High, High, Moderate, Low or Negligible, as defined in Table 6.1 below.

Table 6.1. Defining Magnitude of Effect (Scale of Harm)

Level of Magnitude	Definition of Magnitude
Very High	Complete destruction of the site or feature.
High	Substantial harm: Significant change in environmental factors; Complete destruction of the site or feature; Change to the site or feature resulting in a fundamental change in ability to understand and appreciate the resource and its cultural heritage or archaeological value/historical context and setting.
Moderate	Moderate harm: Significant change in environmental factors; Change to the site or feature resulting in an appreciable change in ability to understand and appreciate the resource and its cultural heritage or archaeological value/historical context and setting.
Low	Slight harm: Change to the site or feature resulting in a small change in our ability to understand and appreciate the resource and its cultural heritage or archaeological value/historical context and setting.
Negligible	Negligible change or no material change to the site or feature. No real change in our ability to understand and appreciate the resource and its cultural heritage or archaeological value/historical context and setting.

Source: After ICOMOS, 2010 *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties*, Paris

6.4.15 The significance of a heritage asset derives not only from its physical presence and historic fabric but also from its setting – the surroundings within which it can be experienced. With regard to the magnitude of effect upon the setting of a heritage asset, the Historic England criteria set out

below will be applied (Table 6.2). This presents definitions of varying scales of harm or benefit to the contribution of the setting.

Table 6.2. Criteria for Assessment of Magnitude of an Impact on the Setting of a Heritage Asset (Historic England)

Magnitude	Guideline Criteria
High Beneficial	The contribution of setting to the cultural heritage asset's significance is considerably enhanced as a result of the development; a lost relationship between the asset and its setting is restored, or the legibility of the relationship is greatly enhanced. Elements of the surroundings that detract from the asset's cultural heritage significance or the appreciation of that significance are removed.
Moderate Beneficial	The contribution of setting to the cultural heritage asset's significance is enhanced to a clearly appreciable extent as a result of the development; as a result the relationship between the asset and its setting is rendered more readily apparent. The negative effect of elements of the surroundings that detract from the asset's cultural heritage significance or the appreciation of that significance is appreciably reduced.
Low Beneficial	The setting of the cultural heritage asset is slightly improved as a result of the development, slightly improving the degree to which the setting's relationship with the asset can be appreciated.
Negligible	The setting of the cultural heritage asset is changed by the development in ways that do not alter the contribution of setting to the asset's significance.
Low Adverse	The contribution of the setting of the cultural heritage asset to its significance is slightly degraded as a result of the development, but without adversely affecting the interpretability of the asset and its setting; characteristics of historic value can still be appreciated, the changes do not strongly conflict with the character of the site, and could be easily reversed to approximate the pre-development conditions.
Moderate Adverse	The contribution of the setting of the cultural heritage asset to its significance is reduced appreciably as a result of the development. Relevant setting characteristics can still be appreciated but less readily.
High Adverse	The contribution of the setting of the cultural heritage asset to its significance is effectively lost or substantially reduced as a result of the development, the relationship between the asset and its setting is no longer readily appreciable.

Sensitivity of Receptor

- 6.4.16 The sensitivity or importance of a heritage asset will be assessed in a neighbourhood, local, regional, national and international context, which results in the cultural sensitivity of the asset being determined along with the appropriate form of mitigation (Table 6.3).

Table 6.3. Defining Sensitivity of a Receptor

Cultural value/ Sensitivity	Criteria
Very high (International)	World Heritage Sites; Sites of International Importance.
High (National)	Scheduled Monuments; All Listed Buildings ; RPGs; Areas of Archaeological Importance; Non-designated heritage assets of archaeological interest that are demonstrably of equivalent significance to scheduled monuments.
Medium (Regional/County)	Conservation Areas containing buildings that contributes significantly to its historic character; Locally listed buildings.
Low (Local/Borough)	Archaeological sites and remains with a local or borough interest for education, cultural appreciation, locally listed buildings; Assets which contribute to local or cultural understanding of the area.
Negligible (Neighbourhood/ Negligible)	Relatively numerous types of remains, of some local importance; Isolated findspots with no context; Areas in which investigative techniques have revealed no, or minimal, evidence of archaeological remains, or where previous large-scale disturbance or removal of deposits can be demonstrated.
Uncertain/Potential	Potential archaeological sites for which there is little information. It may not be possible to determine the importance of the site based on current knowledge. Such sites are likely isolated findspots, place names or cropmarks identified on aerial photographs.

Sourced from EH, 2011 Seeing History in View: A Method for Assessing Heritage Significance within Views, London

6.4.17 The definitions outlined in Table 6.4 below provide definitions for each degree of sensitivity to which the setting of an asset can contribute to the significance of a heritage asset.

Table 6.4. Evaluation of the Contribution of the Setting to the Significance of the Heritage Assets

Contribution to significance of asset	Examples for settings	Sensitivity
Very Substantial	A defined setting that is contemporary with and historically and functionally linked with the heritage asset - may contain other heritage assets of international or national importance - has a very high degree of inter-visibility with the asset and makes a very substantial contribution to both the significance of the heritage asset and to the understanding and appreciation of the significance of the asset.	Very high
Substantial	Contemporary with and historically and functionally linked with the heritage asset, with minor alterations (in extent and/or character) - has a high degree of inter-visibility with the asset and which makes a substantial contribution to both the significance of the heritage asset and to the understanding and appreciation of the significance of the asset.	High
Moderate	Contemporary with and/or historically and/or functionally linked with the heritage asset but with alterations which may detract from the understanding of the heritage asset, and/or with a moderate degree of inter-visibility with the asset and/or which makes a moderate contribution to the significance of the heritage asset and/or a moderate contribution to the understanding and appreciation of the significance of the asset.	Medium
Minor	Largely altered so that there is very little evidence of contemporaneous and/or historic and/or functional links with the heritage asset, and/or with a low degree of intervisibility with the asset and/or which makes a minor contribution to both the significance of the heritage asset and to the understanding and appreciation of the significance of the asset.	Low

Sourced from EH, 2011; *Seeing History in View: A Method for Assessing Heritage Significance within Views*, London

Duration of Impact

- 6.4.18 The duration of impact is as described in section 3.6 (Assessing Likely Significant Effects).

Significance of Effect

- 6.4.19 The interaction of the scale of harm (Table 6.1) and the sensitivity of the heritage asset (Table 6.3) produce the significance of effect. This may be calculated by using the matrix shown in Table 6.5, which is included to allow an objective assessment to be presented.
- 6.4.20 Interaction between the sensitivity of the setting (Table 6.2), and the impact upon the setting (Table 6.4), produce the impact significance. This will also be calculated by using the matrix shown in Table 6.5, which is included to allow an objective assessment to be presented.

Table 6.5. Matrix for Assessing Significance of Effect

SCALE OF HARM / HARM TO THE SETTING						
		No Change	Negligible	Low(Slight harm)	Moderate (Moderate harm)	High/Very High (Substantial harm)
SENSITIVITY	Very High	Neutral	Slight	Moderate/Large	Large/very large	Very large
	High	Neutral	Slight	Slight/Moderate	Moderate/large	Large/very large
	Medium	Neutral	Neutral/slight	Slight	Moderate	Moderate/large
	Low	Neutral	Neutral/slight	Neutral/slight	Slight	Slight/moderate
	Negligible	Neutral	Neutral/slight	Neutral/slight	Neutral/slight	Slight

Source: DMRB 2007

6.4.21 All effects which are assessed as being moderate significance and above are considered to be significant in EIA terms.

6.5 Proposed Cumulative Assessment: In-combination Effects

6.5.1 An assessment of the in-combination effects with other topic areas will be undertaken. Those likely to be of relevance to Cultural Heritage are:

- Noise and Vibration - in terms of their impact upon the setting of assets;
- Geology, Soils and Land Contamination and Geology - to help in assessing the potential for unknown buried archaeology and
- Landscape and Visual Amenity - in relation to key views to and from heritage assets.

6.6 Proposed Mitigation and Residual Effects

6.6.1 Options to reduce or remove identified significant effects will be assessed. Mitigation of significant adverse effects upon heritage assets which are unavoidable will be addressed through a range of measures. These may include preservation in situ, preservation by record, the recording of up-standing remains, the excavation of archaeological sites and the dissemination of the results of this work via publication.

6.6.2 Mitigation for significant effects on setting will be devised in accordance with Historic England guidelines which state:

"...for some developments affecting setting, the design of a development may not be capable of sufficient adjustment to avoid or significantly reduce the harm, for example where impacts are caused by fundamental issues such as the proximity, location, scale, prominence or noisiness of a development. In other cases, good design may reduce or remove the harm, or provide enhancement, and design quality may be the main consideration

in determining the balance of harm and benefit. Where attributes of a single development may cause some harm to significance and cannot be adjusted, screening may have a part to play in reducing harm. As screening can only mitigate negative impacts, rather than removing impacts or providing enhancement, it ought never to be regarded as a substitute for well-designed developments within the setting of heritage assets. Screening may have as intrusive an effect on the setting as the development it seeks to mitigate, so where it is necessary, it too merits careful design. This should take account of local landscape character and seasonal and diurnal effects such as changes to foliage and lighting. The permanence or longevity of screening in relation to the effect on the setting also requires consideration. Ephemeral features, such as hoardings, may be removed or changed during the duration of the development, as may woodland or hedgerows, unless they enjoy statutory protection. Management measures secured by legal agreements may be helpful in securing long-term effect of screening”¹⁶.

- 6.6.3 Construction management practices and plans will form part of the CEMP. This will include methods to manage construction activities and their effects on cultural heritage assets. This may include such documents as a Written Scheme of Investigation (WSI).
- 6.6.4 The residual effects of the development post-implementation of identified mitigation will be confirmed in the ES.

¹⁶ Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets, 2015, 13

7. AIR QUALITY

7.1 Introduction

7.1.1 This chapter describes the scope and proposed methodology for the assessment of the likely significant air quality effects resulting from the construction and operation of the Scheme.

7.1.2 At present, and subject to assessment, it is assumed that any likely significant effects will only occur during construction. During operation, the Scheme will include positive area wide effects from modal shift (rail transport only accounts for approximately 9% of domestic transport emissions for nitrogen oxides (NO_x) and 5% of emissions of particulate matter less than 10 microns in diameter (PM₁₀). The assessment will therefore consider:

- Construction impacts, including direct impacts from construction activities such as dust emitting from earthworks, haul roads and compounds and vehicular exhaust emissions from construction site plant and haulage traffic, and indirect impacts from changes in emissions on the local road network due to traffic management measures; and
- Operational impacts, including changes to emissions to air from rail and road transport on a regional scale taking into consideration modal shift and the increased use of electric locomotive, and, on a local scale, for the permanent re-assignment of vehicles as a result of any route closures or changes.

7.1.3 The UK government has published an Air Quality Strategy (AQS)¹⁷ which sets out air quality objectives and policy options to improve air quality in the long term. The air quality objectives are expressed as maximum ambient (outdoor) concentrations that are not to be exceeded. The aim of the AQS is to achieve a steady improvement in air quality.

7.1.4 Similarly, European Union air quality directives set limit values for the concentration of pollutants in air. For the pollutants of interest to this assessment, the limit values are numerically identical to the AQS objectives.

7.2 Study Area

7.2.1 The study area for the assessment will vary depending on the aspect of the Scheme being assessed.

7.2.2 For impacts caused by construction dust, the study area is the buffer zone within:

¹⁷ UK Government (2011) The air quality strategy for England, Scotland, Wales and Northern Ireland: Volume 1 [Online] [Accessed 10 June 2015] Accessed from: <https://www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-1>

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- 350 m of any construction activities (50 m for ecological receptors), including the Scheme itself and any associated worksites for airborne dust; and
- 100 m of potential haulage routes (50 m for ecological receptors) out to a distance of 500 m from construction activities for 'tracked-out' dust (soils/materials offsite on the wheels and bodies of construction traffic).

7.2.3 These distances are based on guidance from the Institute for Air Quality Management (IAQM) on construction dust¹⁸.

7.2.4 For the assessment of impacts from construction traffic vehicle exhaust emissions on the local road network and local operational impacts, the study area will be based upon the agreed haulage routes. These are the locations most at risk of significant traffic changes and therefore risk of exceedance of air quality objectives. Dispersion modelling will be used to assess effects arising from changes in traffic arising on roads experiencing a change of more than 10% in annual average daily traffic (AADT) or in the number of heavy duty vehicles or a change in average speed of more than 20 km/hr. This approach is in accord with guidance from Highways England¹⁹. The study area for such assessment will include a buffer zone extending 200 m either side of affected roads and junctions.

7.2.5 Operational effects of the Scheme are also to be assessed. This element of the assessment will use data on the forecast modal shift arising from the Scheme, the changes in road traffic from its implementation and the expected pattern of passenger and freight train services.

7.2.6 The methods used to define the study areas are impact specific rather than receptor specific and, therefore, are applicable to all sub-sections of the Scheme. To avoid un-necessary repetition, the following sub-section study area descriptions highlight any specific information relating to quantified construction traffic impacts. These assumptions will be revised/confirmed once traffic data for the Scheme is available.

¹⁸ IAQM (2014) *Guidance on the assessment of dust from demolition and construction*. IAQM, London.

¹⁹ Highways England (2007) DMRB Volume 11, Section 3, Part 1 HA207/07 Air Quality [Online] [Accessed 10 June 2015]
Available from: <http://www.standardsforhighways.co.uk/dmr/vol11/section3/ha20707.pdf>

Table 7.1. Proposed Approach by Sub-section

Sub-section	Possible Approaches Required *
CDC	Dispersion modelling of construction phase traffic
AVDC: Claydon/ Quainton	Qualitative assessment of construction dust
AVDC: Winslow/ Swanbourne	Dispersion modelling of construction phase traffic
AVDC: Aylesbury	Dispersion modelling of construction phase traffic
MKC	Qualitative assessment of construction dust
BBC	Qualitative assessment of construction dust
CBC	Dispersion modelling of construction phase traffic
WDC	Qualitative assessment of construction dust

*subject to analysis of traffic data

7.3 Potential for Likely Significant Effects

7.3.1 Possible effects from the Scheme may arise from:

- Loss of amenity due to dust and particulate emissions associated with construction works;
- Health effects due to emissions of particulate emissions during construction works;
- Health effects due to changes in local air quality from construction and site traffic exhaust emissions;
- Health effects due to changes in local air quality from exhaust emissions of traffic re-routed on the local road network by temporary traffic management measures during construction;
- Health effects due to changes in local air quality from exhaust emissions of traffic re-routed on the local road network by permanent road closures or other measures during operation;
- Improvements in local and regional air quality due to uptake of electric trains following provision of OLE;
- Improvements in regional air quality and carbon emissions due to modal shift from private transport to rail; and
- Improvements in health as a result in improvements in local and regional air quality arising from Scheme operation.

7.3.2 These possible effects apply across the entire Scheme and, with the information currently available, do not warrant detailed analysis at the sub-section level during the scoping exercise.

7.3.3 However, in relation to impacts arising from emissions of dust and particulate matter during construction activities, the risk of impacts occurring

is greatest along Scheme sections which pass through urban areas such as Aylesbury, Bedford, Bicester, Bletchley, Milton Keynes and Winslow.

- 7.3.4 In relation to impacts arising from changes in traffic on the local road network, during either construction or operation, the risk of impacts occurring is greatest in areas of poor air quality i.e. AQMAs and areas at risk of exceeding the air quality objective. These areas include Aylesbury, Bedford, Bicester and Winslow.

7.4 Proposed Assessment Methodology

Overview

- 7.4.1 The methodology for the air quality assessment will follow a risk based approach.
- 7.4.2 Construction dust impacts will be assessed using a qualitative approach, designed to identify the appropriate level of mitigation required, as set out in section 7.2 (Study Area). The requirement for the use of dispersion modelling for assessing changes in construction and operational traffic was also set out in section 7.2 (Study Area).
- 7.4.3 The baseline year for the purpose of the Scoping Report is 2015. However, since air quality objectives and standards are based on either annual mean data or statistics of monitoring data over a calendar year, they cannot be released until the following year. Therefore, baseline data is currently drawn from reports published in 2014 (and based on 2013 data), though it is expected that 2014 data will become available during the assessment.
- 7.4.4 Any dispersion modelling undertaken will be verified against monitoring data and will use meteorological data from an appropriate local station.
- 7.4.5 Emissions from traffic will be quantified using Defra's emissions factor database (v6.01)²⁰. As a minimum, traffic data will be input into the model as AADT values. However, if information on peak hour flows is available, this will also be utilised. The scenarios modelled will be dependent on traffic data availability but will include, as a minimum, a baseline scenario and future scenario (usually year of opening) for the Scheme.

Desk Based Studies

- 7.4.6 A review of the baseline will take place to incorporate 2014 baseline data once it becomes available.

Field Surveys

- 7.4.7 Initial reviews of monitoring undertaken by Local Authorities and UK Government has identified that significant sections of the study area have little ambient air monitoring data, either at the roadside or at background sites.

²⁰ Defra (2015) Emissions Factor Toolkit. Defra, London <http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html> [Accessed 28th April 2015].

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- 7.4.8 Monitoring of ambient air quality is therefore proposed using diffusion tubes for NO₂ and, at a subset of sites, nitrogen oxides (NO_x). Monitoring will be receptor focused and, as such, will be undertaken in publicly accessible areas of roads potentially affected by construction traffic or traffic changes during construction. The survey will be designed to augment Local Authority monitoring. Background concentrations will also be monitored at publicly accessible locations such as alongside public footpaths or minor roads where the contribution from traffic on local roads is minimal. The monitoring locations will be finalised when further information, albeit at high level, on construction traffic and traffic management measures becomes available.
- 7.4.9 In addition, there is no background monitoring available in relation to particulate matter. Monitoring will be undertaken using indicative, optical instruments at a single location for the entire survey period, with a second instrument used to monitor up to 4 additional sites for up to 3 months at each site.
- 7.4.10 The monitoring data will be required to inform the assessment of baseline conditions. In particular, particulate matter monitoring will be required to inform the process of area sensitivity assessment and appropriate mitigation specification during the construction phase. Monitoring locations will be selected to be representative of both urban and rural locations. This will allow any effects from dust generation from existing activities, including transport, industrial and farming processes, to be taken into account in the baseline. Monitoring of NO₂ will be required for the dual purpose of further baseline assessment and air quality model verification.
- 7.4.11 The field surveys will be undertaken for a period of up to 12 months although, the initial assessment will be based on the outcome of 6 months monitoring with only minor updates envisaged as the surveys progress throughout the reporting period.

Identification of Sensitive Receptors

- 7.4.12 Sensitive receptors for air quality will be assessed in desk based studies of mapping to identify and count human receptors, classifying properties as either residential, retail or commercial. Mapping will also be used to identify particularly sensitive receptors for human health effects such as hospitals, residential homes, schools.
- 7.4.13 Ecological receptors will be identified in line with the assessment of effects on ecology.

Assessing Significance of Effect

- 7.4.14 Overall, the significance of effects will be assessed in line with the guidance of IAQM (for construction dust impacts) and EPUK (for quantified traffic impacts).
- 7.4.15 For construction dust, the standard methodology employed to assess the significance of effects within an EIA is based on an assessment of the magnitude of an impact, with design measures or generic mitigation in place

- and then again following the application of bespoke/project specific mitigation measures.
- 7.4.16 It should be noted that the IAQM guidance on construction dust explicitly recommends that significance is only assigned to the effect after considering the construction activity with design or mitigation measures in place, whether generic or bespoke.
- 7.4.17 IAQM guidance states which mitigation measures should be considered as a function of the risk of effects. Therefore, in the assessment of construction dust impacts, the assessment will present the risk of effects in the absence of mitigation and then present the significance of residual effects with all specified mitigation measures in place (in this case design measures and generic mitigation only).
- 7.4.18 The IAQM guidance states that experience has shown that the implementation of effective design measures and generic mitigation will be sufficient to ensure that effects from construction dust and particulate matter are not significant under normal circumstances. Nonetheless, it is important to present the initial assessment of the risk of effects prior to mitigation to demonstrate the process by which the design measures and generic mitigation were derived. Moreover, it is also important to consider any specific characteristics of the development site and the surrounding area to ensure a robust assessment of dust impacts.
- 7.4.19 For the assessment of effects caused by changes in traffic, the assessment methodology and criteria set out in EPUK guidance will be followed.

Magnitude of Impact

- 7.4.20 For construction dust impacts, no magnitude of impact is assigned to activities. Rather the risk of impacts is assessed as a function of the potential magnitude of dust emissions and the sensitivity of the receptor. The risk of impact is identified as high, moderate, low or negligible.
- 7.4.21 For road traffic impacts, the magnitude of impact is defined as the change in pollutant concentration with the Scheme, as a proportion of the air quality objective. This approach follows EPUK guidance. The magnitude is described as imperceptible (<1% of the objective), small (1 – 5% of the objective), medium (5 – 10% of the objective) or large (>10% of the objective).

Sensitivity of Receptor

- 7.4.22 Table 7.2 sets out the sensitivity criteria for human receptors. In relation to dust and particulate matter effects, the sensitivity of receptors will be assessed in accordance with IAQM guidance. In relation to health effects, sensitivity will be assessed with reference to existing air quality i.e. higher sensitivity is attached to receptors in areas of existing poor air quality than receptors in areas of good air quality. The latter approach transposes the guidance of EPUK on the assessment of significance, with an emphasis on total pollutant concentration rather than sensitivity of receptors.

- 7.4.23 Negligible sensitivity would apply where there was no potential for exposure i.e. any human receptors.

Table 7.2. Criteria for the Assessment of Sensitivity of Human Receptors

Receptor Sensitivity	Dust Soiling Effects	Human Health Effects
High	<p>Users can reasonably expect a enjoyment of a high level of amenity; or</p> <p>The appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.</p> <p>Indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.</p>	<p>Locations where members of the public are exposed over a time period relevant to the air quality objectives for NO₂ and/or PM₁₀ (in the case of the 24-hour objectives. A relevant location would be one where individuals may be exposed for eight hours or more in a day).</p> <p>Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.</p> <p>For NO₂, areas where future air quality is at risk of exceeding an objective (>90% of objective)</p> <p>For PM₁₀, areas where future annual mean concentrations exceed 28µg/m³.</p>
Moderate	<p>Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or</p> <p>The appearance, aesthetics or value of their property could be diminished by soiling; or the people or property would not reasonably be expected to be present continuously or regularly for extended periods as part of the normal pattern of use of the land.</p> <p>Indicative examples include parks and places of work.</p>	<p>Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objectives.</p> <p>Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM₁₀, as protection is covered by Health and Safety at Work legislation.</p> <p>In addition, for NO₂, residential areas where future air quality is at moderate risk of exceeding an objective (>75% of objective) and, for PM₁₀, residential areas where future annual mean concentrations exceed 24µg/m³ but are less than 28µg/m³.</p>
Low	<p>The enjoyment of amenity would not reasonably be expected; or</p> <p>Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or</p> <p>There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.</p> <p>Indicative examples include playing fields, farmland (unless commercially-sensitive</p>	<p>Locations where human exposure is transient.</p> <p>Indicative examples include public footpaths, playing fields, parks and shopping streets.</p> <p>In addition, for NO₂, areas where future air quality is at low risk of exceeding an objective (<75% of objective).</p> <p>In addition, for PM₁₀, areas where future annual mean concentrations do not exceed 24µg/m³.</p>

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Receptor Sensitivity	Dust Soiling Effects	Human Health Effects
	horticultural), footpaths, short term car parks and roads.	

- 7.4.24 Ecological receptors will be assessed through desk based studies of conservation site designations, taking account of Chapter 9 (Ecology). In relation to air quality, ecological receptors are sensitive to dust emissions. IAQM guidance on sensitivity to construction dust will therefore be followed when assessing their sensitivity (Table 7.3).

Table 7.3. Criteria for the Assessment of Sensitivity of Ecological Receptors

Receptor Sensitivity	Dust Deposition Effects
High	Locations with an international or national designation and where the designated features may be affected by dust soiling; or Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain. Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Moderate	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or Locations with a national designation where the features may be affected by dust deposition. Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	Locations with a local designation where the features may be affected by dust deposition. Indicative example is a LNR with dust sensitive features.

Duration of Impact

- 7.4.25 Both temporary and permanent impacts will be considered in the air quality assessment. The former relate to construction dust and construction traffic/traffic management; the latter relate to operational effects. Since both acute and chronic effects from changes in air quality are possible, the duration of impact is not taken into account in the assessment of significance in either IAQM or EPUK guidance.

Significance of Effect

- 7.4.26 As noted above, the significance of construction dust effects is likely to be 'not significant' in EIA terms. Professional judgement will be used to assess whether there are any particular aspects of the Scheme that imply that this conclusion will not hold.

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7.4.27 For road traffic effects, the matrix shown in Table 7.4 will be used to assess the significance of effects. EPUK assesses effects on a scale of significance. In EIA terms, effects classed by EPUK as negligible are considered not significant. In addition, effects classed as slight adverse where there is very low risk of exceedance of an objective (i.e. low sensitivity receptors) are also classed as not significant – this is because no health effects would be anticipated with the Scheme.

Table 7.4. Criteria for the Assessment of Significance of Significance (Quantified Impacts)

Sensitivity of Receptor	Absolute Concentration in relation to Objective	Change in Concentration			
		Imperceptible (≤1% of the objective)	Small (>1% - ≤5% of the objective)	Medium (>5% - ≤10% of the objective)	Large (>10% of the objective)
		Increase with Scheme			
High	Above objective with scheme	Negligible	Slight adverse	Moderate adverse	Substantial adverse
	Just Below objective with scheme (90% - 100% of objective)	Negligible	Slight adverse	Moderate adverse	Moderate adverse
Medium	Below objective with scheme (75% - 90% of objective)	Negligible	Negligible	Slight adverse	Slight adverse
Low	Well below objective with scheme (<75% of objective)	Negligible	Negligible	Negligible	Slight adverse

7.5 Proposed Cumulative Assessment: In-combination Effects

7.5.1 The air quality assessment will take into account:

- Traffic and Transport in relation to the assessment of traffic impacts (both permanent and temporary); and
- Ecology.

7.6 Proposed Mitigation and Residual Effects

7.6.1 Mitigation measures will be identified for the construction phase to prevent significant construction dust and particulate matter effects. The measures proposed will be based on IAQM guidance and appropriate to the assessed level of risk of dust effects, and will be secured through the CEMP.

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- 7.6.2 Traffic management measures, whether resulting in temporary or permanent air quality effects, will be proposed to mitigate impacts on roadside air quality.
- 7.6.3 Residual effects and their significance will be assessed after mitigation.

8. NOISE AND VIBRATION

8.1 Introduction

- 8.1.1 A study of the likely significant effects from noise and vibration will be undertaken as part of the EIA. This will consider the likely significant effects on noise and vibration receptors during the construction and operational phases. This chapter includes a discussion of baseline conditions, identification of likely significant noise and vibration effects and possible mitigation measures. The proposed methodology for the assessment of the construction and operational stages of the Scheme are set out in this chapter.

8.2 Study Area

- 8.2.1 A large proportion of the Scheme runs through open countryside, as a consequence the likely significant effects from construction noise will be assessed up to 1 km from the Scheme Area boundary in areas of open countryside, where existing noise sources may be fewer and more distant. For urban areas the assessment of construction noise will be up to 500 m from the Scheme Area boundary. The selection of these study areas was made using professional judgement.
- 8.2.2 Likely significant effects from operational noise will be assessed up to 300 m from either side of the outer most railway tracks, following guidance given in The Calculation of Railway Noise (CRN) Technical Memorandum²¹.
- 8.2.3 Likely significant effects from vibration will be assessed up to 30 m from the Scheme Area boundary during construction and 15 m from the closest running rail during operation.

8.3 Potential for Likely Significant Effects

- 8.3.1 It is possible for both noise and vibration effects to come from construction activities, including earth moving, vehicles and traffic, and operational activities such as rail traffic, fixed plant and station PA systems in new or upgraded stations.
- 8.3.2 The key sources of railway related noise are:
- Rolling noise, including rail transition points;
 - Curve squeal;
 - Aerodynamic noise; and
 - Traction noise, especially diesel engines.
- 8.3.3 The key sources of railway related vibration are:
- Piling;

²¹ Calculation of Railway Noise:1995

- Tamping of ballast;
- Construction vehicles; and
- Rolling stock movements.

8.3.4 It is possible for adverse noise impacts to arise during operation as a result of the change to the existing or the addition of a new service pattern as a result of the Scheme and installation of new railway line in specific areas.

8.4 Proposed Assessment Methodology

Overview

8.4.1 The approach to the assessment for noise and vibration during the construction and operational phases of the Scheme will follow the industry standard practice and guidance.

Desk Based Studies

8.4.2 Noise modelling software²² will be used to produce a model of the existing environment in order to evaluate the changes in noise arising from both construction and operational activities.

8.4.3 GIS analysis will be used to identify whether there are vibration sensitive receptors that are likely to be affected by the Scheme i.e. within 30 m of the Scheme Area boundary during construction and within 15 m of the closest running rail during operation.

Field Surveys

8.4.4 Baseline noise monitoring will be carried out in order to assess the current noise environment at certain pre-determined points along the route. The location for survey locations will be identified through desk based research and site visits where necessary taking into account professional judgement and a series of factors, including distance from the Scheme Area, the presence of other noise sources in the area and the level of existing noise levels.

8.4.5 All noise monitoring will be undertaken in accordance with guidance set out in BS 7445-2: 1991 'Description and measurement of environmental noise Part 2: Guide to the acquisition of data pertinent to land use'. This standard details information that should be recorded in addition to the actual measured noise levels such as meteorological data and a description of the noise source itself.

8.4.6 Baseline vibration monitoring will not be undertaken as there are no receptors known to currently experience high levels of vibration.

²² DataKustik - CadnaA Version 4.5 Noise Prediction Software

Identification of Sensitive Receptors

- 8.4.7 Noise and vibration sensitive receptors will be identified through desk based research. Noise sensitive receptors will include all properties within the study area for modelling purposes. Vibration sensitive receptors will include properties within 20 m of the Scheme Area boundary during construction and within 15 m of the closest running rail during operation. Additional information on certain receptors may be assessed during field surveys where required.

Assessing Significance of Effect

Construction Phase

- 8.4.8 Based on guidance given in BS 5228, an overview of the relevant criteria for the assessment of the likely significant effects of construction noise is presented in Table 8.1. The noise levels presented below are free-field²³ - a factor of 3 dB should be added to obtain façade levels.

Table 8.1 Noise Criteria – Construction

Period	Building/Location	Criteria for Assessment L_{Aeq}	Purpose
Daytime (0700-1900)	Dwellings/Offices	To maintain speech intelligibility	
		67 dB $L_{Aeq,12hr}$	For quieter areas away from major noise sources
		72 dB $L_{Aeq,12hr}$	For higher noise areas
	Hospitals/Schools	To maintain speech intelligibility in classrooms and quiet conditions in hospitals	
		57 dB $L_{Aeq,1hr}$	For quieter rural areas away from major noise sources
		62 dB $L_{Aeq,1hr}$	For higher noise areas
Evening (1900-2300)	Dwellings	57 dB $L_{Aeq,4hr}$	To avoid disturbance
Night Time (2300-0700)	Dwellings	42 dB $L_{Aeq,8hr}$	To avoid sleep disturbance

- 8.4.9 The pre-existing ambient noise level will be established at representative receptors, and noise limits developed as a combination of existing levels and the limits detailed in Table 8.1. The significance criteria for construction noise effects will be developed, taking into account the magnitude and duration of the levels exceeded.
- 8.4.10 Guidance on the significance of vibration levels related to construction activity can be found in BS5228-2:2009. The standard suggests significance criteria in terms of Peak Particle Velocity (PPV) as this parameter is

²³ Acoustic measurement taken at least 3.5 m from the nearest reflecting surface or façade

routinely measured where potential building damage is of concern. An overview of these criteria is presented in Table 8.2. Thresholds for humans will also depend on duration, whereas the criteria for building damage are absolute.

Table 8.2 Vibration Criteria

Period	Building/Location	Criteria for Assessment, PPV	Purpose
Anytime	Inside Dwelling	0.3 mms-1	Threshold of perception (Negligible Effect below 0.3mms-1) (from 0.3 to 1.0 mms-1 slight effect which is insignificant)
Anytime	Inside Dwelling	1.0 mms-1	Complaints likely in residential area, but can be tolerated if prior warning and explanation has been given to residents (above 1.0 mms-1 = Moderate Effect)
Anytime	Inside Dwelling	10.0mms-1	Vibration is likely to be intolerable for any more than a very brief exposure to this level (Major Effect)
Anytime	Reinforced or framed structures and heavy commercial buildings	50 mms-1	Protection of building structure. Levels above are Major Effects, and levels below these are Negligible.
Anytime	Un-reinforced or light framed structures. Residential or light commercial buildings.	15 mms-1	Protection of building structure. Levels above are Major Effects, and levels below these are Negligible.

Operational Phase

- 8.4.11 The assessment of likely significant effects for the operational phase of the Scheme will be primarily based on the expected change in existing ambient noise levels during the day and night time periods as a direct result of the Scheme. The significance can be adverse or beneficial depending on whether the change represents an increase or decrease in railway noise level. As an example, the significance criteria for a long term change in noise levels are set out in Table 8.3. Additional development of the significance criteria will be undertaken during the assessment.

Table 8.3 Indicative Significance Assessment Criteria

Significance	Criteria
Negligible Impact – not significant	Less than 1 dB change in LAeq,T
Slight Impact – not significant	1-3 dB in LAeq,T
Minor Significance	Change of 3-5 dB in LAeq,T
Moderate Significance	Change of 5-9 dB in LAeq,T
Major Significance	Change of 10 dB or more in LAeq,T

- 8.4.12 Residential properties will also be assessed during the operational phase against the eligibility criteria for sound insulation as detailed in the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 (NIR). Properties that are found to be eligible for noise insulation under the scheme will be identified within the EIA. The NIR make provisions for secondary glazing and ventilation for qualifying facades on eligible properties.
- 8.4.13 An assessment of fixed plant and station PA systems in new or upgraded stations will be undertaken following guidance given in BS4142:2014, in order to assess the magnitude of effect.
- 8.4.14 Modern overground railway systems (such as the Scheme) are not expected to generate significant levels of ground borne vibration, but an assessment will be made for properties within 15 m of the closest running rail, and mitigation considered where likely significant effects could occur.
- 8.4.15 As described in section 8.3, the movement of rolling stock (trains) is a source of operational ground borne vibration, which can also produce noise. However, noise levels from the ground borne vibration are generally lower, and therefore masked by, the airborne noise also produced by trains. For this reason, it is very unlikely that significant negative effects will arise as a result of ground borne noise only. It has therefore been scoped out of the assessment.

8.5 Proposed Cumulative Assessment: In-combination Effects

- 8.5.1 An assessment of the in-combination effects between topic areas within the Scheme will be undertaken. This will include the following topic areas:
- Ecology;
 - Cultural Heritage; and
 - Traffic and Transport.

8.6 Proposed Mitigation and Residual Effects

- 8.6.1 The Scheme will follow the principle of the mitigation hierarchy which will first optimise the railway alignment away from sensitive receptors where

possible. It will then mitigate noise at source where practicable and finally apply secondary mitigation in the form of barriers where necessary. These measures will be considered throughout the design process.

- 8.6.2 Noise and vibration can be mitigated at source, along the transmission path and at the receiver or receptor. In general, the most effective mitigation is that carried out 'at source' as this benefits multiple receptors. Network Rail is committed to the principle of reducing noise at source wherever possible and this has been applied during the design process. The design will endeavour to locate signals, switches and crossings, and lineside plant equipment away from noise and vibration sensitive receptors, where possible. Plant equipment and public address and voice alarm (PAVA) systems on stations will also be assessed and mitigated to minimise likely significant effects.
- 8.6.3 Where it is not practical to mitigate the sound at its source, noise may be mitigated through the use of noise barriers or enclosures. Construction noise may be attenuated through the careful selection of equipment and by employing Best Practical Means (BPM) to all activities.

9. ECOLOGY

9.1 Introduction

- 9.1.1 This chapter provides the scope of the Ecological Impact Assessment (EclA) to be undertaken in respect of the Scheme.

9.2 Study Area

- 9.2.1 The study area for the EclA will encompass a range of buffer zones. Desk study and species/habitat specific zones are described in Tables 9.1 and 9.2.

9.3 Potential for Likely Significant Effects

- 9.3.1 Construction and operation of the Scheme has potential for significant effects on ecological resources within all sub-sections, including:
- Direct effects such as habitat and associated species loss;
 - Habitat severance and fragmentation;
 - Direct mortality (for example, during site clearance activities);
 - Indirect effects such as habitat and species disturbance from construction activities in the proximity (noise, dust and light); and
 - Mortality/damage from a pollution event (emission to land or water during construction, most commonly fuel/oil from vehicles or earthworks run off causing siltation of a watercourse).
- 9.3.2 The EclA will only consider the 'Valued Ecological Receptors (VERs)', these are defined as all ecological receptors that are of the threshold value of 'Site Level' or higher. Further survey and assessment will be required in order to determine the Valued Ecological Receptors (VERs) present.
- 9.3.3 At this stage, prior to the determination of the VERs present within each of the sub-sections, it is not possible to scope out any of the ecological receptors noted in the previous section as potentially present. The scope of the EclA will be further refined upon completion and analysis of field surveys.
- Likely significant effects on designated sites could result from the construction and operation of the Scheme. The habitats present are likely to support a range of protected and notable species (including Species of Principal Importance (SPIs)).

Table 9.1. Sub-section Specific Information

Sub-section	Information
CDC	Bats, otter, dormouse, GCN and a range of nationally protected and/or notable fauna
Claydon/ Quainton	Designated sites adjacent to or crossed by railway Bats, otter, GCN, Nationally Scarce plant species, notable bird species, reptiles, badgers and notable invertebrate species
Winslow/ Swanbourne	Eight designated sites adjacent to or crossed by railway Bats, reptiles, badgers, protected and/or notable fauna
Aylesbury	Four designated sites adjacent to or crossed by railway Bats, GCN, protected and/or notable fauna
WDC	Chilterns Beechwoods SAC 400m from railway (a Habitats Regulations Screening Assessment (HRSA) may be required) Bats, otter, dormouse, GCN and nationally protected and/or notable fauna
MKC	Six designated sites adjacent to and/or crossed by railway Bats, otter, dormouse, GCN and nationally protected and/or notable fauna
CBC BBC	Bats, otter, dormouse, GCN and nationally protected and/or notable fauna

9.4 Proposed Assessment Methodology

Overview

- 9.4.1 The EclA will be undertaken in accordance with the guidelines published by the Chartered Institute of Ecology and Environmental Management (CIEEM)²⁴. The methodology does differ substantially from that set out in Chapter 3 (EIA Methodology) and is therefore described below.

Desk Based Studies

- 9.4.2 Desk based research has commenced and to date the following documents and/or sources have been reviewed:
- The HS2 ES²⁵:
 - Volume 2 – Community Forum Area (CFA) report 11 - Stoke Mandeville and Aylesbury;
 - Volume 2 - CFA report 12 - Waddesdon and Quainton;
 - Volume 2 - CFA report 13 - Calvert, Steeple Claydon, Twyford and Chetwode;

²⁴ CIEEM (2006), Guidelines on Ecological Impact Assessment in the United Kingdom. CIEEM

²⁵ High Speed Two Limited (2013) London – West Midlands Environmental Statement. Volume 2 Community Forum Area Reports

detailed information on survey methods are provided in the EWR Phase 2: Field Survey Standards document²⁹.

- 9.4.12 Table 9.3 sets the approach for the various types of survey proposed. It provides summary information this includes: the survey buffer zone, a brief description of methods and equipment, together with any seasonal constraints and the timescale for the study.

²⁹ Parsons Brinckerhoff (unpublished – live document). East West Rail Phase 2: Field Survey Standards. Prepared for Network Rail.

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Table 9.3. Proposed Ecological Surveys

Survey Type	Brief Description	Survey Methodology/Guidance	Timescales	Buffer Zone
Phase 1 Habitat Survey	Walkover survey – daylight hours. Ecologists will survey the habitats and vegetation present, recording information on maps, making notes and taking photographs of habitats and features of note.	Institute of Environmental Assessment (1995). Guidelines for Baseline Ecological Assessment. E & FN Spon, London. Joint Nature Conservation Committee (2010). Handbook for Phase I Habitat Survey: A technique for environmental audit. Joint Nature Conservation Committee, Peterborough.	Optimal: Spring and early summer. Generally can be undertaken at any time to meet programme constraints	100 m – survey 250 m – desk based
Hedgerow Survey	Walkover survey – daylight hours. Ecologists will survey the hedgerows present, recording information on maps, making notes and taking photographs of the hedgerows.	Defra (2007). Hedgerow Survey Handbook. A standard procedure for local surveys in the UK. Defra, London. The Hedgerows Regulations 1997. Statutory Instrument 1997 No. 1160 Crown Copyright (comply with the requirements of the “Wildlife and Landscape Criteria”).	Optimal: June and July Generally can be undertaken between April - October	100 m – survey 250 m – desk based
NVC	Walkover survey/quadrat survey – daylight hours. Ecologists will survey the vegetation present within selected habitat areas using quadrats marked out on the ground to carry out sampling.	Joint Nature Conservation Committee (2006). National Vegetation Classification: Users’ Handbook. JNCC, Peterborough. Rodwell, J.S. (1991 et seq). British Plant Communities. Published in Five Volumes. Cambridge University Press, Cambridge.	May - July	100 m site specific and may extend beyond the 100 m buffer
Pond (PSYM)	Walkover survey/aquatic sampling – daylight hours. Ecologists will take samples of aquatic vegetation and aquatic invertebrates from ponds, in addition to sampling the physical characteristics of each pond (e.g. pH)	Pond Action (2002). A Guide to Monitoring the Ecological Quality of Ponds and Canals Using PSYM. Pond Action, Oxford.	April - October	Ponds identified during Phase 1 Habitat Survey within 100 m

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Survey Type	Brief Description	Survey Methodology/Guidance	Timescales	Buffer Zone
River Corridor Survey	Walkover survey/aquatic sampling – daylight hours. Ecologists will survey the relevant sections of the river, recording information on maps, making notes and taking photographs of the habitats and features of interest.	National Rivers Authority (1992). River Corridor Surveys. Conservation Technical Handbook Number 1.	May - September	Watercourses within 100 m buffer zone, extending to cover 500 m survey lengths
Bird – breeding	Walkover survey – daylight hours (some dusk possible). Ecologists will walk through the habitat areas recording birds seen and heard. Information will be mapped and some photographs may be taken where relevant. Five survey visits to be undertaken.	Modified form of the Common Bird Census (CBCe) methodology. Bibby, C.J., Burgess, N.D., Hill, D.A. and Mustoe, S.H. (2000). <i>Bird Census Techniques</i> . 2nd ed. Academic Press, London.	March – June	250 m
Bird – wintering	Walkover survey – daylight hours. Ecologists will walk through the habitat areas recording birds. Information will be mapped and some photographs may be taken where relevant. Survey visits – once per month.	Pollit, M.S., Hall, C., Holloway, S.J., Hearn, R.D., Marshall, P.E., Robinson, J.A., Musgrove, A., Robinson, J. and Cranswick, P.A. (2003). <i>The Wetland Bird Survey 2000-2001: Wildfowl and Wader Counts</i> . Slimbridge.	September - March	250 m
Bird – Schedule 1	Walkover survey - daylight hours (some dusk possible). Ecologists will walk through the habitat areas recording birds seen and heard. Information will be mapped and some photographs may be taken where relevant.	Hardey, J. C., Humphrey, R. H., Etheridge, B. and Thompson, D. (2013). <i>Raptors: A Field Guide for Surveys and Monitoring</i> . TSO. Gilbert, G., Gibbons, D.W. and Evans, J. (1998). <i>Bird Monitoring Methods</i> . RSPB, Sandy. Shawyer, C. R. (2011). <i>Barn Owl Tyto alba</i> :	Species-specific but generally between February – August	Site specific up to 250 m

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Survey Type	Brief Description	Survey Methodology/Guidance	Timescales	Buffer Zone
		<i>Survey Methodology and Techniques for use in Ecological Assessment. Developing Best Practice in Survey and Reporting.</i> IEEM, Winchester.		
GCN – HSI	Walkover survey. Ecologists will visually assess water bodies recording a number of features. Photographs will also be taken.	Amphibian and Reptile Groups of the United Kingdom (2010). <i>ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index.</i> Amphibian and Reptile Groups of the United Kingdom.	Optimal: mid-April – mid-May Generally can be undertaken at any time	250 m
GCN – Presence / Absence and Population Size Class Surveys	Walkover survey/aquatic sampling – daylight and night time hours. Ecologists will use a combination of methods to sample water bodies including: long-handled pond nets, 500,000 – 1,000,000 candle power torches, and bottle traps. Ponds will be visited in daylight hours and netting of the margins undertaken. Bottle traps will then be set around the shoreline (approx. one trap per 2 m of [accessible] shoreline) prior to dusk. These will be retrieved the following morning. Additionally a high-powered torch will be shone around the (accessible) pond margins after dark to look for newts within the pond. Surveys will be undertaken on four to six visits between mid-March and mid-June.	Biggs, J., Ewald, N., Valentini, A., Gaboriaud, C., Griffiths, R.A., Foster, J., Wilkinson, J., Arnett, A., Williams, P. and Dunn, F. (2014). <i>Analytical and methodological development for improved surveillance of the Great Crested Newt.</i> Defra Project WC1067. Freshwater Habitats Trust: Oxford. English Nature (2001). <i>Great Crested Newt Mitigation Guidelines.</i> English Nature, Peterborough. Gent, T. and Gibson, S. eds (2003). <i>Herpetofauna Workers Manual.</i> JNCC, Peterborough.	Mid-March – mid-June	250 m
GCN – eDNA	Walkover survey/aquatic sampling – daylight hours.	Williams, P. (2013). <i>GCN eDNA protocol.</i> Freshwater Habitats Trust. August 2013.	April – June	Between 100 m and 250 m

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Survey Type	Brief Description	Survey Methodology/Guidance	Timescales	Buffer Zone
Reptile	Ecologists will take water samples from relevant ponds.			
	Walkover survey/use of artificial refugia - daylight hours. Ecologists will place artificial refugia within suitable habitat areas; these will then be checked on seven separate occasions between April and September. Artificial refugia generally comprise 0.5 m x 0.5 m squares of roofing felt or corrugated bitumen. All artificial refugia will be removed upon completion of the surveys.	Froglife (1999). Reptile survey; an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10. Froglife, Halesworth. Gent, T. and Gibson, S. eds (2003). <i>Herpetofauna Workers Manual</i> . JNCC, Peterborough.	Optimal: April, May, June and September Generally subject to weather conditions surveys may also be undertaken during July and August	100 m
Dormouse	Walkover survey/installation of and checking nest tubes within vegetation. Nest tubes will be secured onto appropriate tree / shrub branches using plastic cable ties and will be checked throughout the period April – November. All nest tubes will be removed upon completion of the surveys.	Chanin, P. and Woods, M. (2003). <i>Surveying dormice using nest tubes: Results and experiences from the South West Dormouse Project</i> . English Nature Research Report No. 524. English Nature, Peterborough. Bright, P.W., Morris, P.A. and Mitchell-Jones, A. (2006). <i>Dormouse Conservation Handbook</i> 2nd Edition. English Nature, Peterborough. Natural England (2011). Interim Natural England Advice Note - Dormouse surveys for mitigation licensing – best practice and common misconceptions. Natural England, Peterborough.	April – November	100 m
Badger	Walkover survey – daylight hours. Ecologists will survey the habitats present, recording information on maps, making notes and taking	Harris, S., Cresswell, P. and Jefferies, D. (1989). <i>Surveying Badgers</i> . Mammal Society. Scottish Natural Heritage (2003). Best Practice Guidance - Badger Surveys. Inverness Badger	Optimal: late winter/early spring or autumn/winter Generally can be	100 m possibly extending to 500 m where access is available

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Survey Type	Brief Description	Survey Methodology/Guidance	Timescales	Buffer Zone
	photographs of any evidence of badgers such as foraging, desire lines etc.	Survey 2003. Commissioned Report No. 096. Andrews, R. (2013). The Classification of Badger (Meles meles) Setts in the UK: A Review and Guidance for Surveyors. CIEEM - In Practice 82: 27-31. Delahay, R.J., Brown, J.A., Mallinson, P.J., Spyvee, P.D., Handoll, D., Rogers, L.M. and Cheeseman, C.L. (2000). <i>The use of marked bait in studies of the territorial organisation of the European badger (Meles meles)</i> . Mammal Review 30: 73-87.	undertaken anytime if programme constraints require	
Otter	Walkover survey – daylight hours. Ecologists will survey the habitats and vegetation present, recording information on maps, making notes and taking photographs of any evidence of otters.	Chanin, P. (2003). <i>Monitoring the Otter (Lutra lutra)</i> . Conserving Natura 2000 Rivers Monitoring Series No. 10, English Nature, Peterborough. Chanin, P. (2005). <i>Otter surveillance in SACs: testing the protocol</i> . English Nature Research Reports - Number 664, English Nature, Peterborough. HA (1999). <i>DMRB – Volume 10 – Section 4 Part 4 – Nature Conservation Advice in Relation to Otters</i> . HA, London.	Optimal: winter and spring Generally can be undertaken anytime	250 m
Water Vole	Walkover survey – daylight hours. Ecologists will survey the habitats and vegetation present, recording information on maps, making notes and taking photographs of any evidence of water voles.	Strachan, R., Moorhouse, T. and Gelling, M. (2011). <i>Water Vole Conservation Handbook – Third Edition</i> . Wildlife Conservation Research Unit, Oxford. Natural England (2008). <i>Water voles – the law in practice</i> . Guidance for planners and developers (NE 86). Natural England, Peterborough. Natural England (2011). Natural England	Mid-April – mid-September	100 m

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Survey Type	Brief Description	Survey Methodology/Guidance	Timescales	Buffer Zone
Bat - Preliminary Roost Assessment	<p>Walkover survey – daylight hours.</p> <p>Ecologists will carry out visual assessments of structures and trees, noting evidence of bats and / or features of interest. Photographs will be taken.</p> <p>In some cases trees may be tagged for future reference.</p>	<p>Technical Information Note TIN042: Water voles and development: licensing policy. Natural England, Peterborough.</p> <p>Glover, A. M. and Altringham, J. D. (2008). <i>Cave selection and use by swarming bat species</i>. Biological Conservation. Vol 141, pages 1493 – 1504.</p> <p>Hundt, L. (2012). <i>Bat Surveys – Good Practice Guidelines</i> 2nd Edition. Bat Conservation Trust, London.</p> <p>Mitchell-Jones, A. J. (2004). <i>Bat Mitigation Guidelines (IN136)</i>. English Nature, Peterborough.</p> <p>Mitchell-Jones, A. J. and McLeish, A. P. (2011). <i>Bat Workers' Manual</i>. Peterborough: Joint Nature Conservation Committee.</p>	<p>Any time of the year.</p> <p>Ground-based assessments of trees should aim to be undertaken when leaf-cover is minimal</p>	<p>Within 100 m buffer and potential roost sites as identified during the desk-based screening and scoping exercise for areas between 100 m and 500 m.</p>
Bat - Detailed Internal and Aerial Inspections	<p>Walkover survey - internal access and possible climbing required – daylight hours.</p> <p>Ecologists will carry out detailed inspections of structures and trees. Internal inspections of structures will likely include use of torches, ladders and endoscopes. Aerial inspections of trees will likely include use of ladders, tree climbing equipment, torches and endoscopes.</p> <p>In some cases trees may be tagged for future reference.</p>		<p>Any time of the year</p>	<p>To be considered for all potential roost sites identified during the Preliminary Roost Assessment within 500 m of the proposed route corridor.</p>
Bat - Back / forward tracking surveys	<p>Dusk and dawn walkover survey.</p> <p>Ecologists will use hand-held bat detectors to survey for bat activity at dusk and dawn.</p>		<p>May – September</p>	<p>Within 100 m and site-specific up to 250 m</p>

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Survey Type	Brief Description	Survey Methodology/Guidance	Timescales	Buffer Zone
Bat - Emergence and Re-Entry Surveys	Dusk and dawn point survey		May – September inclusive	Within 100 m and site-specific up to 500 m
Bat - Activity Surveys	Ecologists will survey transects of habitats at dusk once per month between April and September. The surveyors will walk the transects and use hand-held broad-band bat detectors to detect and record bat activity.		April – September inclusive	Within 100 m and site-specific up to 500 m
Bat - Static Surveys	Deployment and retrieval of recording equipment during the day. Two static detectors will be deployed along each transect route.		May – September inclusive	Within 100 m and site-specific up to 500 m
Bat - Crossing / Commuting Point Surveys	Dusk and point survey – once per season. Ecologists will use hand-held broad-band bat detectors, two-way radios, and image intensifying equipment (where appropriate) for each crossing point survey		Spring / Summer / Autumn	Within 100 m and site-specific up to 500 m
Bat - Autumn Swarming Surveys	Evening point surveys. Use of static detectors.		2 nd week of August, 3 rd week of September (inclusive)	Within 100 m and site-specific up to 500 m
Bat - Hibernation Surveys	Daytime internal inspection survey. Internal inspections of structures will likely include use of torches, ladders and endoscopes.		December – February	Within 100 m and site-specific up to 500 m

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Survey Type	Brief Description	Survey Methodology/Guidance	Timescales	Buffer Zone
Fish	<p>Electro-fishing</p> <p>Hydro-acoustic methods</p> <p>Seine-netting</p>	<p>Beaumont, W. R. C., Taylor, A. A. L., Lee, M. J. and Welton, J. S. (2002). <i>Guidelines for Electric Fishing Best Practice</i>. R&D Technical Report W2 -054/TR Environment Agency (EA).</p> <p>British Standards (BS) Institute (2003). BS EN 14011:2003, BS 6068-5.32:2003 'Water Quality: Sampling of fish with electricity'. BSI Milton Keynes.</p>		250 m
Terrestrial Invertebrate	<p>Walkover survey/sampling from habitats and vegetation – daylight hours and possibly some night time hours for light trapping.</p> <p>Methods may include:</p> <ul style="list-style-type: none"> • sweep netting • hand searches of specific host plants • egg searches • conspicuous aggregations • pitfall trapping; • white tray trapping; • suction sampling; and • light trapping. 	<p>Joint Committee for Conservation of British Insects (2002). <i>A Code of Conduct for Collecting Insects and Other Invertebrates</i>. British Journal of Entomology and Natural History 15(1), 1-6.</p> <p>Natural England (2007). Surveying terrestrial and freshwater invertebrates for conservation evaluation. Natural England Research Report NERR005.</p>	May – September	100 m
Aquatic Invertebrate	<p>Walkover survey/aquatic sampling – daylight hours.</p> <p>Ecologists will take aquatic invertebrate samples using a range</p>	<p><i>Collecting Insects and Other Invertebrates</i>. British Journal of Entomology and Natural History 15(1), 1-6.</p> <p>Natural England (2007). Surveying terrestrial</p>	Spring and Autumn	100 m

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Survey Type	Brief Description	Survey Methodology/Guidance	Timescales	Buffer Zone
	of methods including 'kick sampling' with a standard pond net, and surber sampling.	<p>and freshwater invertebrates for conservation evaluation. Natural England Research Report NERR005.</p> <p>Buglife – The Invertebrate Conservation Trust (2010). A Manual for the Survey and Evaluation of the Aquatic Plant and invertebrate Assemblages of Ditches. Version 4 December 2010.</p> <p>Pond Action (1994). <i>National Pond Survey Methods</i>. Oxford Brookes University.</p> <p>Murray-Bligh, J.A.D. and Furse, M.T. (1997). Procedure for collecting and analysing macro-invertebrate samples for RVPACS. EA, Bristol.</p> <p>Chadd, R. and Extence, C. (2004). The conservation of freshwater macroinvertebrate populations: a community-based classification scheme. <i>Aquatic Conservation</i> 14, 597-624.</p>		
White-clawed Crayfish	<p>Walkover survey/aquatic sampling.</p> <p>Ecologists will use a combination of manual searches of suitable aquatic habitats, trapping and night-time searches using torches, where appropriate.</p>	<p>Peay, S. (2003). <i>Monitoring the White-clawed Crayfish Austropotamobius pallipes</i>. Conserving Nature (2000). Rivers Monitoring Series No. 1. English Nature, Peterborough.</p> <p>Peay, S. (2004). A cost-led evaluation of survey methods and monitoring for white-clawed crayfish – lessons from the UK. <i>Bulletin Français de la Pêche et de la Pisciculture</i> 372-373, 335-352.</p>	July – September	

Identification of Sensitive Receptors

- 9.4.13 The Ecological Zone of Influence is an area defined by the EclA. Within the Ecological Zone of Influence, there may be ecological receptors subject to impacts as a result of the development of the Scheme. Such ecological receptors are likely to include Statutory Designated Sites, Non-Statutory Designated Sites (including notable habitats), and protected and notable species. These ecological receptors could be impacted either directly or indirectly. Aquatic habitats are included in the assessment.
- 9.4.14 Accordingly, the Ecological Zone of Influence may vary. It will be ascertained through consideration of the construction and operation of the Scheme, taking into account the consultation, desk study, records of protected species and the results of the survey work.
- 9.4.15 The sensitive receptors and thus the relevant baseline to be assessed in relation to likely significant effects are set out in Table 9.4.

Assessing Significance of Effect

- 9.4.16 The ecology assessment will use a different approach to determining significance to that set out in the standard methodology in Chapter 3 (EIA Methodology). For the purposes of the Scheme EclA and in accordance with guidance issued by CIEEM³⁰, an ecologically significant impact is defined as:
- "an impact (negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area".*
- 9.4.17 Based on the EC Habitats Directive, conservation status is determined by:
- "For habitats, ... the sum of the influences acting on the habitat and its typical species, that may affect its long-term distribution, structure and functions as well as the long-term survival of its typical species within a given geographical area; and for species, ... the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within a given geographical area".*
- 9.4.18 This approach determines whether or not an impact is significant simply on the basis of its characteristics as they affect the integrity of the receptor, and takes no account of the value of the receptor. However, as previously noted, within this Scheme EclA impacts will only be considered on VERs. Therefore, if an impact is found to be Not Significant at the threshold level at which the resource or feature has been valued it will be scoped out of the EclA, unless there are legal implications associated with the impact.
- 9.4.19 In line with the guidance issued by CIEEM, an effect which has been considered as Significant in ecological terms is the same as an effect which is considered Significant in EIA terms.

³⁰ CIEEM (2006), Guidelines for Ecological Impact Assessment in the United Kingdom. CIEEM

Magnitude of Impact

9.4.20 VERs are usually nature conservation sites, habitats, species assemblages or communities, or populations or groups of a species. Impacts can be permanent or temporary, direct or indirect, and can be cumulative. These factors are brought together to assess the magnitude of the impact on particular VERs and, wherever possible, the magnitude of the impact is quantified. Professional judgement is then used to assign the effects on the receptors to one of four classes of magnitude, defined in Table 9.4.

9.4.21 It should be noted that this step in the impact assessment procedure builds on the procedure described within the CIEEM guidelines (CIEEM, 2006) and has been included to provide transparency in how decisions over whether a resultant effect is significant have been reached.

Table 9.4. Definition of the Magnitude of Ecological Impacts

Magnitude	Definition
Very Large	A permanent or long-term impact on the extent, size or integrity of a VER (site, habitat, species assemblage or community, population or group). If adverse, this is likely to threaten its sustainability; if beneficial, this is likely to enhance its conservation status.
Large	A permanent or long-term impact on the extent or size or integrity of a site, habitat, species assemblage or community, population or group. If adverse, this is unlikely to threaten its sustainability; if beneficial, this is likely to be sustainable but is unlikely to enhance its conservation status.
Moderate	A permanent or long-term reversible impact on a site, habitat, species assemblage or community, population or group whose magnitude is detectable but would not threaten its integrity.
Slight	A short-term, reversible impact on the extent or size or integrity of a site, habitat, species assemblage or community, population or group that is within the normal range.
No Change	No impact or an impact which is beneath the level of perception, within normal bounds of variation or within the margin of error of the ecological assessments.

9.4.22 The five key parameters which underpin the assessment of magnitude include:

- Extent - the area over which an impact occurs;
- Duration - the time for which an impact is expected to last;
- Reversibility - a permanent impact is one that is irreversible within a reasonable timescale of for which there is no reasonable chance of action being taken to reverse it. A temporary impact is one from which recovery is possible;
- Timing - whether impacts occur during critical life-stages or seasons; and
- Frequency - how often will impacts occur (i.e. once or on multiple occasions).

9.4.23 Should any of these parameters be unknown, this will be clearly stated.

9.4.24 In addition, direct and indirect impacts are considered:

- Direct Impacts - these are directly attributable to a defined action (i.e. the physical loss of a habitat or the immediate mortality of an individual of a particular species); and
- Indirect Impacts - these are attributable to an action which affects ecological receptors through effects on an intermediary ecosystem, process or receptor (i.e. an impact on an aquatic species located downstream of a site due to polluted surface water run-off from construction entering the river catchment).

Sensitivity of Receptor

9.4.25 The value of sites, habitats, species assemblages and populations of species will be evaluated with reference to both their importance in terms of 'biodiversity conservation' value, which relates to the need to conserve representative areas of different habitats and the genetic diversity of species populations, and their legal status.

9.4.26 A review of the legislation, policy and sensitivity of the ecological receptor will be undertaken and the value of the receptor will be determined within a geographical context on the following basis:

- International;
- UK / National;
- Regional;
- Authority Area (e.g. County or District);
- Local or Parish; and
- Site, within the Ecological Survey Area only.

9.4.27 Accordingly, Table 9.5 (adapted from Ratcliffe³¹) outlines the criteria to be taken into consideration for evaluating the value of both habitats and species in this EcIA.

9.4.28 It should be noted that the description and valuation of VERs takes account of any likely changes in baseline outside of those caused by Scheme activities, such as trends in the population size or distribution of species, likely changes to the extent of habitats and the effects of other proposed developments or land-use changes.

³¹ Ratcliffe, D.A (Ed.) (1977), A Nature Conservation Review. Cambridge University Press.

Table 9.5. Criteria to be considered when identifying VERs

Value/ Importance	Criteria
International (European)	<p>Habitats</p> <p>An internationally designated site or candidate site (SPA, provisional SPA, SAC, candidate SAC, Ramsar Site, Biogenetic/Biosphere Reserve, World Heritage Site) or an area that would meet the published selection criteria for designation. A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat, which are essential to maintain the viability of a larger whole.</p> <p>Species</p> <p>Any regularly occurring population of internationally important species, threatened or rare in the UK (i.e. a UK Red Data Book species categories 1 and 2 of the UK BAP) or of uncertain conservation status or of global conservation concern in the UK BAP. A regularly occurring, nationally significant population/number of an internationally important species.</p>
UK (National)	<p>Habitats</p> <p>A nationally designated site, SSSI, NNR, Marine Nature Reserve (MNR) or a discrete area, which would meet the published selection criteria for national designation (e.g. SSSI selection guidelines). A viable area of a priority habitat identified in the UK BAP, or smaller areas of such habitat essential to maintain wider viability.</p> <p>Species</p> <p>A regularly occurring, regionally or county significant population / number of an internationally/nationally important species. Any regularly occurring population of a nationally important species, threatened or rare in the region or county (see LBAP). A feature identified as of critical importance in the UK BAP.</p>
Regional	<p>Habitats</p> <p>Sites that exceed the county-level designations, but fall short of SSSI selection criteria. Viable areas of key habitat identified in the regional BAP or smaller areas of habitat essential to maintain wider viability.</p> <p>Species</p> <p>Any regularly occurring, locally significant population of a species listed as being nationally scarce, which occurs in 16 of 100 10 km² in the UK or in a regional BAP. A regularly occurring, locally significant population/number of a regionally important species. Sites maintaining populations of internationally/nationally important species that are not threatened or rare in the region or county.</p>
Authority Area (e.g. County or District)	<p>Habitats</p> <p>Sites recognised by Local Authorities, e.g. SINC and SEGIs. County/district sites that the designating authority has determined meet the published ecological selection criteria for designation, including LNR. A viable area of habitat identified in county/district BAP. A diverse and/or ecologically valuable hedgerow network. Semi-natural AW greater than 0.25 ha.</p> <p>Species</p> <p>Any regularly occurring, locally significant population of a species listed in a county/district BAP due to regional rarity or localisation. A regularly occurring, locally significant population of a county/district important species. Sites</p>

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Value/ Importance	Criteria
	supporting populations of internationally/nationally/regionally important species that are not threatened or rare in the region or county, and not integral to maintaining those populations. Sites/features scarce in the county/district or that appreciably enrich the county/district habitat resource.
Local	<p>Habitats</p> <p>Areas of habitat that appreciably enrich the local habitat resource (e.g. species-rich hedgerows, ponds). Sites that retain other elements of semi-natural vegetation that, due to their size, quality or the wider distribution within the local area, are not considered for the above classifications.</p> <p>Species</p> <p>Populations/assemblages of species that appreciably enrich the biodiversity resource within the local context. Sites supporting populations of county/district important species that are not threatened or rare in the region or county, and are not integral to maintaining those populations.</p>
Site (Immediate Local Area or Village importance)	<p>Habitats</p> <p>Areas of heavily modified or managed vegetation of low species diversity or low value as habitat to species of nature conservation interest.</p> <p>Species</p> <p>A good example of a common or widespread species.</p>
Negligible	No intrinsic ecological value.

Duration of Impact

- 9.4.29 The duration of impact can be described as the time for which the impact is expected to last prior to recovery or replacement of the resource or feature. This will be defined in relation to ecological characteristics (for example species lifecycles) rather than human timeframes. For example, five years, which might seem short-term in the human context or that of any other long-lived species, would span at least five generations of dragonflies.
- 9.4.30 The duration of an activity may differ from the duration of the resulting impact caused by the activity. For example, if short-term construction activities cause disturbance to birds during their breeding period, there may be longer-term implications due to a failure to reproduce in the disturbed area during that season.

Significance of Effect

- 9.4.31 The ecology assessment will use a different approach to determining significance to that set out in the standard methodology in Chapter 3 (EIA Methodology). This approach will be used as it is considered to be better suited to assessing the value of ecological receptors and the potential for significant effects on those receptors, particularly when considering the complexity of habitats, and the effects on their integrity.

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- 9.4.32 Significance is assessed as Adverse, Beneficial or Not Significant on the integrity of a VER and/or the conservation status of VERs within a given geographical area.
- 9.4.33 If an effect is found not to be significant at the level at which the resource or feature has been valued, it may however still be significant at a smaller geographical scale. For example, a VER may be of National Value, but an effect could be considered to be significant only at a smaller geographical scale, such as County, Local or Site level
- 9.4.34 Where any effect is of significance at a level below the assigned threshold level (site) the receptor will be scoped out of the assessment, unless there are legal implications associated with the effect, in which case these will be clearly stated.
- 9.4.35 In considering the integrity and conservation status of the receptor the key considerations are:
- Will any site/ecosystem processes be removed or changed or subject to disturbance?
 - What will be the effect on the nature, extent, structure and function of component habitats?
 - What will be the effect on the average population size and viability of component species?
- 9.4.36 In determining the significance of an effect, the above factors and the value of the receptor, magnitude of the potential impact, and the duration of the impact will be considered.

Estimation of Confidence in Prediction of Potential Impact

- 9.4.37 The following four point scale will be adopted to describe the degree of confidence in the prediction of the potential impact. The degree of confidence relates to the likelihood that an event or activity will lead to the described ecological impact on a sensitive receptor:
- Certain / Near-Certain - probability estimated at 95 per cent chance or higher;
 - Probable - probability estimated above 50 per cent but below 95 per cent;
 - Unlikely - probability estimated above 5 per cent but below 50 per cent, or
 - Extremely Unlikely - probability estimated at less than 5 per cent.

9.5 Proposed Cumulative Assessment: In-combination Effects

9.5.1 An assessment of the in-combination effects resulting from the Scheme with other EIA topic areas will be undertaken. Specifically, those topic areas where interactions with ecology may occur are:

- Traffic and Transport;
- Air Quality;
- Noise and Vibration;
- Water Quality and Flood Risk, and
- Landscape and Visual Impact.

9.5.2 Though not part of the EIA, an Arboriculture Impact Assessment will also be undertaken to assess trees and tree features (such as groups of trees and woodland) likely to be affected by the Scheme. It will provide an accurate assessment of the tree population, its condition, the constraints trees may pose to design and the likely significant effects of the Scheme on trees and tree features. Interactions with landscape and visual impacts will be recorded.

9.6 Proposed Mitigation and Residual Effects

9.6.1 A component of the EcIA process will be to determine the requirements for mitigation measures in respect of any significant effects identified. Mitigation recommendations will be developed based on the mitigation hierarchy in accordance with the NPPF:

- Avoidance of impacts;
- Reduction of impacts that cannot be avoided;
- Mitigation of impacts that cannot be reduced below the threshold of significance; and
- Compensation for impacts that cannot be mitigated.

9.6.2 A biodiversity unit calculation to measure losses and gains in biodiversity will be applied to the Scheme. The trialled DEFRA calculation tool³² will be used to measure units lost as a basis for planning and demonstrating sufficient mitigation. In line with Network Rail objectives, the Scheme is aiming for a measurable net biodiversity gain. Ecology management practices will also be written into the Construction Environment Management Plan.

³² UK Government (2013) Biodiversity offsetting. [Online] [Accessed 11 June 2015] Available from: <https://www.gov.uk/biodiversity-offsetting>

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- 9.6.3 Following determination of mitigation measures and based on the implementation of such measures, the residual effects of the Scheme will be assessed and reported within the ES.

10. LANDSCAPE AND VISUAL IMPACTS

10.1 Introduction

- 10.1.1 This chapter sets out the methodology which will be adopted for the Landscape and Visual Impact Assessment (LVIA) for the proposed Scheme. It sets out how landscape, townscape and visual (LTV) baseline conditions and likely significant effects which will be assessed in the Landscape, Townscape and Visual Impact Assessment (LTVIA). The LTVIA will be incorporated into the ES as part of one of its technical chapters.
- 10.1.2 Many of the works proposed by the Scheme involve redevelopment of existing operational railway. Changes in visual impacts during operation will therefore be limited, except for where there are more intensive interventions such as the installation of OLE structures between Bicester and Bletchley, the construction of Winslow Station, the addition of platforms at Bletchley Station, and pedestrian and highway over bridges.

10.2 Study Area

- 10.2.1 An LTV study area is guided by potential visibility of the Scheme in the surrounding landscape and townscape. It therefore depends on the nature of the Scheme and its potential for LTV impacts on the surrounding receptors. The study area should be proportionate to the scale of the development.
- 10.2.2 Due to the visually contained nature of the Scheme - which is limited by combinations of landform, vegetation, built forms and urban features - it is considered unlikely that the Scheme will cause LTV impacts on receptors located further than 5 km from the Scheme.
- 10.2.3 The LTVIA will assess LTV baseline conditions and impacts within the study areas.
- 10.2.4 Figures showing the extents of the 5 km study areas for each of the eight sub-sections can be found in Appendix 10.1.

10.3 Potential for Likely Significant Effects

- 10.3.1 The Scheme may give rise to likely significant effects on LTV amenity receptors in discrete locations within the respective LTVIA study areas. It is possible for the LTV effects to occur in relation to specific elements of the Scheme during construction and operation on the following receptors:
- Direct and indirect effects on baseline landscape features such as vegetation, landforms, drainage and settlements;
 - Direct and indirect effects on landscape designations;
 - Direct and indirect effects on national and local Landscape Character Areas; and
 - Changes in views experienced by visual amenity receptors within the LTVIA study areas.

10.4 Proposed Assessment Methodology

Overview

- 10.4.1 The LTVIA will be undertaken in accordance with the principals set by the LI and the IEMA (2013) in the 'Guidelines for Landscape and Visual Impact Assessment, Third Edition' and guidance on Landscape Character Assessment produced by the Countryside Agency (now NE) and Scottish Natural Heritage (2002). Viewpoint photographs will be prepared in accordance with the LI (2011) Advice Note 01/11'.

Desk Based Studies

- 10.4.2 Desk based research will be undertaken to identify and locate various landscape and townscape designations. Consultation will take place with appointed landscape advisors within each LPA to agree the proposed key viewpoints for assessment.

Field Surveys

- 10.4.3 An LTV field survey was undertaken on 9 – 11 March 2015 to establish the extent of the study areas and potential viewpoint locations. The work was carried out in accordance with the principals set out by the Landscape Institute (LI) and IEMA (2013) in the '*Guidelines for Landscape and Visual Impact Third Edition*'.
- 10.4.4 Further field survey work will be undertaken to photograph and assess the agreed key viewpoints.

Identification of Sensitive Receptors

- 10.4.5 The LTVIA will consider impacts upon:
- The value, quality and sensitivity to change of the existing landscape and townscape features and character and the capacity to accommodate change of the nature proposed; and
 - Identified visual amenity and residential receptors and assessment of impacts upon viewers to accommodate change of the nature proposed.
- 10.4.6 Within the study area, the key stages to the assessment will be as follows:
- Identification of existing baseline landscape and townscape features that may be affected by the Scheme;
 - Identification of existing landscape and townscape character areas, published or locally specific to the areas immediate to the Scheme;
 - Identification of key viewpoints representing views likely to be affected by the Scheme;
 - Assessment of likely significant effects on LTV amenity receptors; and
 - Identification of appropriate measures to mitigate these effects.

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10.4.7 For the purposes of the assessment the following distinctions will be given to LTV assessments in Table 10.1.

Table 10.1. LTV Assessment Definitions

Assessment	Description
Landscape Assessment	Relates to the assessment of likely significant effects of the Scheme on baseline landscape features including topography, drainage, vegetation, settlement patterns and landscape character.
Townscape Character Assessment	<p>Townscape differs from landscape and heritage in that it encapsulates all aspects of the urban form and not just those of an historic or landscape nature. The Townscape Character Assessment includes the description of urban and movement patterns, forms, land use, streetscapes and general heritage contexts.</p> <p>Impacts on individual properties of historic value e.g. listed buildings and Scheduled Monuments are assessed as part of the EIA and will be detailed in the Cultural Heritage chapter of the ES.</p>
Visual amenity assessment	<p>The visual amenity assessment evaluates the sensitivity of key receptors and considers the likely significant effects on groups of similar receptors such as views from public open space, PRoW, transport corridors, residential properties, places of work and recreational users.</p> <p>The visual effects arising from the Scheme are assessed by considering the visibility of the Scheme from within the study area. In the detailed analysis, the likely significant effects on key receptors are judged from a number of agreed viewpoints.</p>

Assessing Significance of Effect

Magnitude of Impact

- 10.4.8 The assessment considers the magnitude of change the Scheme would exert on LTV receptors.
- 10.4.9 Definitions of magnitude of landscape/townscape and or visual effects are outlined in Table 10.2.

Table 10.2. Description of the Magnitude of Landscape/Townscape or Visual Impact

Magnitude of Impact	Impact Type	Typical Criteria Descriptors	
		Landscape/Townscape Receptors	Visual Receptors
High	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.	Major permanent/long term change in the existing view, change very apparent involving high level of change in character and composition of pre Scheme view.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality or major improvement to the visual receptor.	Major improvement to the visual receptors pre Scheme view.
Medium	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.	Medium to high permanent/long term change in the existing view, change very apparent involving medium to high level of change in character and composition of pre Scheme view.
	Beneficial	Benefit to, or addition of, key characteristics, features or elements. Improvement of attribute quality.	Medium to high level of improvement to the visual receptor.
Low	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.	Medium permanent/long term change in the existing view, change apparent involving change in character and composition of pre Scheme view.
	Beneficial	Minor benefit to or addition of, one (maybe more) key characteristics, features or element and some beneficial impact on attribute	Reduced risk of negative impact occurring or medium improvement to the visual receptor.
Very Low	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements.	Minor permanent/long term change in the existing view, change will be distinguishable from surroundings whilst composition and character of view, although altered will be broadly similar to pre-change circumstances.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.	Slight improvement to the visual receptor.
No Change	n/a	No loss or alteration of characteristics, features or	Change barely visible at v long distances or visible for a very short

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Magnitude of Impact	Impact Type	Typical Criteria Descriptors	
		Landscape/Townscape Receptors	Visual Receptors
		elements.	duration. Character and composition of view substantially unaltered.

Sensitivity of Receptor

- 10.4.10 The following criteria and definitions for sensitivity will be used to describe the sensitivity of receptors to change arising from the construction or operation of the Scheme.

Table 10.3. Description of the Sensitivity of Visual Receptors

Sensitivity	Landscape/ Townscape Receptors	Visual Receptors
High	Important/highly valued landscape or townscape recognised by national or regional designation, scenic quality or particularly distinctive character and visited by large numbers of visitors/tourists. Low capacity to accept type of change envisaged.	Important and highly utilised views from within nationally or internationally designated landscapes or townscapes or adjoining townscape with focal point or orientation in the direction of the proposed developments. Large numbers of viewers with proprietary interest and prolonged viewing opportunities such as residents and users of widely known and well used recreational facilities.
Medium	Landscape or townscape of moderate value recognised by local designation. Where character, landuse, pattern and scale may have the capacity to accommodate a degree of the type of change envisaged.	Moderate quality and numbers of views with less viewing opportunities, including residents experiencing views from dwellings or visitors with some interest in their environment such as users of recreational facilities.
Low	Landscape and townscape of moderate to low valued characteristics and reasonably tolerant of change. Not recognised by any form of designation and relatively tolerant of change.	Viewers with moderate to low interest in their environment, and discontinuous and/or irregular viewing periods. Such receptors would include: Visitors to the urban areas passing through the area; People at their place of work with a view across the area; and Passengers on trains, buses or in other vehicles.
Very Low	Relatively degraded or low value landscape or townscape, in poor condition. Capacity to accommodate significant change.	Viewers with a passing interest in their surroundings not focussed on landscape and with momentary viewing periods. Small numbers or low sensitivity viewers assumed. Such receptors include: Drivers of moving vehicles including trains; and People at their place of work with only partial glimpses of the surrounding area or commuters.
Negligible	Very poor quality landscape or townscape with urban blight. Derelict area with low ecological or amenity benefits. Significant potential to accommodate new development of any kind that would unify and bring coherence to the area.	Transient and unimportant views in the direction of the proposed Scheme, rarely utilised by individuals in that location. Unspecified and/or sporadic views from and within the setting of industrial or derelict areas. May include views from fast moving vehicles or busy transport corridors.

Duration of Impact

10.4.11 The LTVIA assessment will assess the impacts during construction and at operation during winter Year 1 opening (2019) and summer Year 15 (2034).

Significance of Effect

10.4.12 The significance of an effect is a product of the sensitivity of the receptor and the magnitude of the impact upon it. The significance of landscape/townscape and visual receptors is set out in the following matrix.

Table 10.4. Significance of LTV Effects

		RECEPTOR/RESOURCE SENSITIVITY		
		High	Medium	Low
IMPACT MAGNITUDE	High	Major	Major or Moderate	Moderate
	Medium	Major or Moderate	Moderate or Minor	Minor
	Low	Moderate	Minor	Minor or Negligible
	Very low	Minor	Negligible	Negligible
	No change	None	None	None

10.4.13 All effects assessed as being of moderate significance or above are considered to be significant in EIA terms for the purpose of this assessment. Effects of minor or negligible significance are not considered to be significant.

10.5 Proposed Cumulative Assessment: In-combination Effects

10.5.1 An assessment of the in-combination effects between topic areas within the Scheme will be undertaken. The topic areas where interactions with landscape and visual impacts may occur include:

- Cultural Heritage; and
- Ecology.

10.5.2 As described in section 9.5 (Proposed Cumulative Assessment: In-combination Effects) of Chapter 9 (Ecology) an Arboricultural Impact Assessment will be undertaken to assess trees and tree features (such as groups of trees and woodland) likely to be affected by the Scheme. Interactions with landscape and visual impacts will be recorded.

10.6 Proposed Mitigation and Residual Effects

10.6.1 Where it is appropriate and possible to do so, trees and vegetation will be retained as part of the Scheme and consideration given to replacing vegetation where compatible with the safe operation of the railway.

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- 10.6.2 Mitigation will be designed to reduce likely significant LTV effects in so far as is practicable through the use of hard and soft landscape proposals.
- 10.6.3 Landscape mitigation measures will be incorporated into construction management practices, such as the inclusion of a landscape management plan.
- 10.6.4 Residual effects of the Scheme following implementation of identified mitigation will be assessed and reported.

11. WATER QUALITY AND FLOOD RISK

11.1 Introduction

- 11.1.1 This chapter sets out the assessment methodology to be used to identify and assess any significant effects that the Scheme may have on the water environment and flood risk and the need for any mitigation to manage such effects.
- 11.1.2 The scope of the ES chapter will comprise impacts to surface water features, groundwater features and flood risk predominantly associated with the creation of surface-borne pollutants, works within surface water features, surface water runoff and works within areas identified to be at risk of flooding.
- 11.1.3 The ES chapter will not cover hydrogeological impacts associated with the disturbance of contaminated land or movement of groundwater flow. Impacts to groundwater resources and groundwater quality associated with these aspects will be addressed in Chapter 12 (Geology, soils and land contamination). Similarly, this chapter will not cover ecological impacts associated with disturbance or loss of terrestrial or aquatic habitats and species. Potential impacts to ecology associated within these aspects will be addressed in Chapter 9 (Ecology).
- 11.1.4 A Flood Risk Assessment will also be undertaken in accordance with the NPPF and local planning policy and will inform the ES chapter.
- 11.1.5 In relation to flood risk from the Scheme, the Environment Agency has operational jurisdiction over main rivers and Lead Local Flood Authorities (LLFA) have jurisdiction over surface water, ground water and ordinary watercourses. LLFAs are either Unitary Authorities, such as MKC, CBC and BBC, or County Councils such as OCC or BCC.

11.2 Study Area

- 11.2.1 The study area will encompass surface water features within close proximity of the proposed Scheme and within 1 km in all directions from the Scheme Area boundary. This study area has been selected based on professional judgment and is considered appropriate for the assessment of likely significant effects on water. It is also proposed that the ES and supporting FRA will consider the impacts of flood risk to the Scheme and to people and property elsewhere as a result of the Scheme.

11.3 Potential for Likely Significant Effects

- 11.3.1 It is possible for the Scheme to affect the water environment and flood risk during construction and operation. Likely significant effects to surface water features, groundwater features and flood risk during construction could arise from:
 - Works directly within river channels of main rivers, ordinary watercourses, surface water features and minor ditches and drains;

- Polluted surface water runoff consisting of high sediment load, chemicals, and hydrocarbons from construction vehicles, plant and high risk activities that may migrate or be discharged to surface water features;
- Polluted surface water runoff and direct migration of mobile pollutants to groundwater resources from construction vehicles, plant and high risk activities that may contaminate groundwater resources; and
- Increased rates and volumes of surface water runoff resulting from intense rainfall combined with compacted soils and reduced vegetation, which could lead to an increase in flood risk.

11.3.2 In addition to those above, likely significant effects to surface water features, groundwater features and flood risk during operation could arise from:

- Polluted surface water runoff consisting of silts and hydrocarbons from the Scheme that may migrate or be discharged to surface water features or groundwater resources;
- Increased rates and volumes of surface water runoff from an increase in impermeable area and/or changes to or rebuilding of the existing drainage regime leading to an increase in flood risk;
- Flood risk to the Scheme as a result of construction within areas identified to be at flood risk and flood risk to people and property elsewhere as a result of the proposals; and
- Impact to the hydro-morphological and ecological quality of main rivers, ordinary watercourses, surface water features and minor ditches and drains associated with works within or in close proximity to the water features.

11.3.3 Likely significant effects in relation to climate change will be assessed in accordance with the guidance set out in the NPPF.

11.4 Proposed Assessment Methodology

Overview

11.4.1 The method of assessment and reporting of significant effects will be a predominantly qualitative assessment based on the methodology set out within the DMRB Volume 11, Section 3, Part 10 (HD 45/09 Road Drainage and the Water Environment). The DMRB promotes the following approach:

- Estimation of the importance of the attribute;
- Estimation of the magnitude of the impact; and
- Assessment of the significance of the effect based on the importance of the attribute and magnitude of the impact.

- 11.4.2 The assessment will consider the likely significant effects of the Scheme on the chemical and hydro-morphological quality of water environment features within the study area. Ecological impacts will also be discussed within this chapter, principally the loss of aquatic habitat, although a full assessment of ecological impacts will be provided elsewhere.
- 11.4.3 As part of the assessment, the need for on-site monitoring of water quality will be identified through ongoing consultation with the relevant authorities. If deemed necessary, such monitoring would be undertaken during detailed drainage design work during later stages of the design process. At this stage all data will be obtained via desk based sources and consultation with the relevant authorities. However, information collected as part of ecological surveys, as discussed in Chapter 9 (Ecology) will be used to inform the assessment of likely significant effects on the water environment.
- 11.4.4 This assessment will consider likely significant effects to the quality and availability of water resources associated with the generation of surface-borne pollutants, such as polluted surface water runoff. However, as per above, no on site monitoring of water quality or quantity is proposed at this stage, with all data obtained via desk based sources and review of data collected to inform Chapter 12 (Geology, soil and land contamination).
- 11.4.5 The assessment will consider the likely significant effects of flood risk from all sources to the Scheme, as well as the likely significant of the Scheme on flood risk to people and property elsewhere. Hydraulic modelling is not proposed.
- 11.4.6 It is proposed that the ES chapter also meets the objectives of the WFD by providing an assessment of likely significant effects of the Scheme in accordance with the WFD and discussing opportunities for betterment to help meet the objectives of the WFD where appropriate.

Desk Based Studies

- 11.4.7 To date, information regarding the water environment and flood risk has been sourced from EA interactive mapping (<http://maps.environment-agency.gov.uk/wiyby>) and Defra interactive mapping (<http://magic.defra.gov.uk/>).
- 11.4.8 The following Insert shows the location of the main rivers in relation to the Scheme (shown in orange) between Bicester, Milton Keynes, Bedford, Aylesbury and Princes Risborough.

Insert 11.1. Watercourses in Relation to the Scheme



- 11.4.9 Further desk based research will be undertaken to establish baseline conditions on and around the site through literature review, consultation with relevant authorities, Envirocheck Report and site walkover.

Field Surveys

- 11.4.10 The need for further field surveys, beyond a site walkover, will be determined as part of the assessment and via consultation with the relevant authorities. It is considered likely that sufficient information can be gained via desk based sources and consultation with relevant authorities to inform the ES.

Identification of Sensitive Receptors

- 11.4.11 Sensitive receptors that may be affected by the Scheme will be identified through the desk based studies. Many of these receptors have been discussed within the review of baseline conditions provided in Appendix 3.1. Further analysis will be undertaken to clarify the sensitivity of these receptors in line with the methodology below.
- 11.4.12 It is also important to note that likely significant effects associated with the release of contaminating substances or increase in the rate or volume of

surface water runoff may affect receptors that are outside of the proposed 1 km study area. Downstream effects of this nature will also be considered within the assessment.

Assessing Significance of Effect

Magnitude of Impact

- 11.4.13 The criteria for assessing the magnitude of impacts are summarised in Table 11.1 which is developed from HD 45/09. Not all impacts are adverse and there is the potential for beneficial impacts, for example an improvement to the ecological quality of a water feature.

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Table 11.1. Criteria for assessing the potential magnitude of an impact

Magnitude	Criteria	Example
High Adverse	Results in loss of attribute and / or quality and integrity of the attribute	<p>Loss or extensive change to a fishery / designated nature conservation site.</p> <p>Loss of, or extensive change to, an aquifer / groundwater supported designated wetlands.</p> <p>Change to the environmental status/classification of a water feature, including water quality classification.</p> <p>Changes to site resulting in an increase in discharge/runoff of > 75% with flood/sewerage exceedance potential.</p> <p>Increase in peak flood level (1% annual probability event) > 100mm.</p> <p>Loss of flood storage areas.</p>
Moderate Adverse	Affects integrity of attribute, or loss of part of attribute	<p>Partial loss or change to a fishery / designated nature conservation site. Loss in the productivity of a fishery.</p> <p>Partial loss or change to an aquifer/ groundwater supported designated wetlands.</p> <p>Pollution of a receiving water body, but insufficient to change the environmental status/classification, including water quality classification.</p> <p>Changes to site resulting in an increase in discharge/runoff of > 50% with flood/sewerage exceedance potential.</p> <p>Increase in peak flood level (1% annual probability event) > 50mm.</p>
Low Adverse	Results in some measurable change in attribute's quality or vulnerability	<p>Potential low risk of some pollution to a surface water or groundwater body, but insufficient to cause loss in quality, fishery productivity or biodiversity.</p> <p>Changes to site resulting in an increase in discharge/runoff of > 25% with flood/sewerage exceedance potential.</p> <p>Increase in peak flood level (1% annual probability event) > 10mm.</p>
Negligible Adverse	Affects attribute, but of insufficient magnitude to affect the use of integrity	<p>The proposed scheme may adversely affect the integrity of the water environment, but this is not considered measurable.</p> <p>No measurable impact upon an aquifer.</p> <p>Negligible change in peak flood level (1% annual probability event) < 10mm</p>
No Change	Results in no change to the receptor	No predicted adverse or beneficial impact to the receptor.
Negligible	Beneficial to attribute, but of insufficient magnitude to affect the use of integrity	<p>The proposed scheme may beneficially affect the integrity of the water environment, but this is not considered measurable.</p> <p>No measurable impact upon an aquifer.</p>

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Magnitude	Criteria	Example
		Negligible change in peak flood level (1% annual probability event) < 10mm.
Low Beneficial	Beneficial to attribute or a reduced risk of negative impact occurring	<p>Potential for slight reduction in pollution to a surface water or groundwater body, but insufficient to cause noticeable benefit in quality, fishery productivity or biodiversity.</p> <p>Changes to site resulting in a decrease in discharge/runoff > 25%.</p> <p>Reduction in peak flood level (1% annual probability event) > 10mm.</p>
Moderate Beneficial	Results in moderate improvement of attribute quality	<p>Moderate improvement to a fishery / designated nature conservation site. Potential increase in the productivity of a fishery.</p> <p>Reduced pollution of a receiving water body, but insufficient to change the environmental status/classification, including water quality classification.</p> <p>Changes to site resulting in a decrease in discharge/runoff > 50%.</p> <p>Reduction in peak flood level (1% annual probability event) > 50mm.</p>
High Beneficial	Results in major improvement of attribute quality	<p>Significant improvement to a fishery / designated nature conservation site.</p> <p>Removal of existing polluting discharge, or removing the likelihood of polluting discharges occurring.</p> <p>Change to the environmental status/classification of a water feature, including water quality classification.</p> <p>Changes to site resulting in a decrease in discharge/runoff of > 75%.</p> <p>Reduction in peak flood level (1% annual probability event) > 100mm.</p>

11.4.14 Identified impacts will also be assessed as either direct or indirect impacts.

Sensitivity of Receptor

11.4.15 The sensitivity of the receptors is considered in terms of indicators, such as quality, scale, rarity and substitutability. The following criteria have been developed following the general guidance of HD 45/09 as set out in Table 11.2.

Table 11.2. Criteria for estimating the sensitivity of water environment attributes

Importance	Criteria	Example
Very High	Attribute has a high quality and rarity on regional or national scale	<p>Water body of very good chemical or biological quality, i.e. WFD Class 'High'.</p> <p>Site protected/designed under EU or UK habitat legislation (SAC, SPA, SSSI, Water Protection Zone (WPZ), Ramsar site, species protected by EU legislation.</p> <p>EC designated Salmonid fishery.</p> <p>Principal aquifer providing a regionally important resource or supporting site protected under EC and UK habitat legislation.</p> <p>SPZ 1. A source used for public or local potable water supply.</p> <p>Water body of high amenity value, including areas of bathing and where water emersion sports are regularly practised.</p> <p>Floodplain or defence protecting more than 100 residential properties from flooding.</p> <p>Areas which are highly vulnerable. These can include essential infrastructure, emergency services and basement dwellings.</p>
High	Attribute has a high quality and rarity on local scale	<p>Water body of good chemical and biological quality, i.e. WFD Class 'Good'</p> <p>Species protected under UK legislation</p> <p>EC designated Cyprinid fishery.</p> <p>Principal aquifer providing locally important resource or supporting river ecosystem. SPZ 2. A source used for domestic non-potable water supply.</p> <p>Water body of a moderate amenity value including public parks, boating, non-contact water sports, popular footpaths adjacent to watercourses, or watercourses running through housing developments/town centres.</p> <p>Floodplain or defence protecting between 1 and 100 residential properties or industrial premises from flooding.</p> <p>Areas which are more vulnerable. These can include hospitals, residential units, educational facilities and waste management sites.</p>
Medium	Attribute has a medium quality and rarity on local scale	<p>Water body of fair chemical or biological quality, i.e. WFD Class 'Moderate'.</p> <p>Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ 3.</p> <p>Water body of particular local social/cultural/educational interest. Water body of low amenity value with only casual access, e.g. along a road or bridge in a rural area.</p> <p>Floodplain or defence protecting 10 or fewer industrial properties from flooding.</p> <p>Areas which are less vulnerable. These can include retail,</p>

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Importance	Criteria	Example
		commercial and general industrial units, agricultural/forestry sites and water/sewage treatment plants.
Low	Attribute has a low quality and rarity on local scale	<p>Water of poor or bad chemical or biological quality, i.e. WFD Class 'Poor'</p> <p>Low sensitivity aquatic ecosystem.</p> <p>Non-Aquifer.</p> <p>Water body of no amenity value, seldom used for amenity purposes, in a remote or inaccessible area.</p> <p>Floodplain with limited constraints and a low probability of flooding of residential and industrial properties.</p> <p>Areas which are considered to be water-compatible. These can include flood control infrastructure, docks/marinas, pumping stations and recreational/landscape areas.</p>

Duration of Impact

- 11.4.16 Impacts will be considered with regards to duration by classifying the impact as permanent or temporary and providing an indication of likely 'recovery' times for the natural environment to return to baseline condition or better.

Significance of Effect

- 11.4.17 The overall significance of effects considers both the magnitude of the impact against the sensitivity of the receptor, as demonstrated in Table 11.3.

Table 11.3. Criteria for Assessing Significance of Effect

Magnitude of Impact	Value of Receptor			
	Very High	High	Medium	Low
Major	Very Large	Large	Moderate	Slight
Moderate	Large	Moderate	Slight	Slight
Minor	Moderate	Slight	Slight	Neutral
Negligible	Slight	Slight	Neutral	Neutral
No Change	Neutral	Neutral	Neutral	Neutral

11.5 Proposed Cumulative Assessment: In-combination Effects

- 11.5.1 An assessment of the in-combination effects with other topic areas will be undertaken within this Chapter, principally Chapter 9 (Ecology) and Chapter 12 (Geology, soil and land contamination).

11.6 Proposed Mitigation and Residual Effects

- 11.6.1 Appropriate mitigation measures to reduce and, wherever possible, avoid identified adverse effects will be explored and discussed within the ES chapter.

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- 11.6.2 During construction, many of these measures are likely to be associated with good site practice and preparation of robust method statements. Such measures will be incorporated into emissions management plans as part of a Scheme wide CEMP.
- 11.6.3 During operation, these measures are likely to be part of the design of the Scheme and will look to avoid likely significant effects and provide betterment where possible. They are likely to comprise measures such as maintaining channel capacity and enhancing watercourse habitats.
- 11.6.4 Any residual effects of the Scheme on the water environment and flood risk following the inclusion of mitigation measures will be identified.

12. GEOLOGY, SOILS AND LAND CONTAMINATION

12.1 Introduction

- 12.1.1 This chapter details the scope for the EIA of the Scheme in relation to geology, soils and land contamination. How the assessment will be undertaken is explained together with the source of information and the methodology for the collection of site data (if required). The detailed assessment will, if appropriate, recommend mitigation/remedial measures to reduce any Scheme specific adverse effects with the aim of ensuring that suitable and safe conditions are achieved for the end-use.
- 12.1.2 The assessment of soils in the context of use for agricultural purposes is not covered within this chapter; instead, it is discussed within the Land Use and Agricultural chapter. Potential geotechnical constraints, where identified in the EIA process, will also be discussed, although geotechnical design is outside the scope of the assessment.
- 12.1.3 The ES chapter will also cover hydrogeology, namely the distribution and movement of groundwater.

12.2 Study Area

- 12.2.1 The study area will comprise a maximum 500 m lateral 'buffer' zone, in all directions, from the proposed Scheme Area boundary. This zone is based on professional judgement bearing in mind the scope of the design during the feasibility stage, described in section 2.3 (Scheme Description). It is also considered adequate coverage of the surrounding area based on the proposed future land use.

12.3 Potential for Likely Significant Effects

- 12.3.1 It is possible for the Scheme to have the following effects:
- Land contamination due to emissions from construction phase pollution events, such as fuel and oil spills;
 - Direct effects upon geological resources such as sand and gravel as a result of land take and groundwork;
 - Mobilisation of pollutants in contaminated land; and
 - Alterations to groundwater resources and hydrogeology through changes to water courses or the recharge of aquifers.

12.4 Proposed Assessment Methodology

Overview

- 12.4.1 The baseline condition will be established through a desk study for each of the subsections. This will define the geo-environmental setting using readily

available information and walkover surveys. The desk study will be included as a technical appendix to the ES chapter.

- 12.4.2 For the purpose of the EIA, there are no specific changes or amendments to the proscribed EIA assessment methodology in Chapter 3 (EIA Methodology).

Desk Based Research

- 12.4.3 Information for desk based studies will be obtained from the following sources:

- British Geological Society (BGS) - Geology of Britain Viewer 1:50,000 Geological Maps
<http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html?src=topNav>;
- EA – What's in your backyard pages: <http://apps.environment-agency.gov.uk/wiyby/default.aspx>;
- Historical Mapping - from www.old-maps.co.uk;
- Department of the Environment Industry Profiles – from www.gov.uk;
- Department for Environment Food and Rural Affairs – Information on the natural environment – from <http://magic.defra.gov.uk/home.htm>;
- A review of relevant information from an Environmental Data Search (such as a Landmark Search or similar);
- Detailed Historical mapping at scales of 1:10,000 and 1:2,500 to identify former industrial or similar land uses with the potential to cause residual land contamination or indicate an area of geological significance (such as a geological resource);
- Local Authorities to obtain any existing site investigation and/or remediation reports from within the scoped area;
- Existing risk assessment reports regarding the potential risk from unexploded ordnance (UXO); and
- The EA, Local Authorities and other regulatory agencies will be contacted, as required, to obtain preliminary consultation advice in respect of potential impacts to ground conditions.

- 12.4.4 A desk study investigation into ground water will also be undertaken.

- 12.4.5 These studies will result in a description of current geological, hydrogeological and the historical conditions of each subsection. This data will be used to prepare a risk assessment of the Scheme, in line with Part 2a of the Environmental Protection Act 1990. This includes the definition of "contaminated land" and under what circumstances any remediation may be required.

Field Surveys

12.4.6 A site walkover of the Scheme will be undertaken to verify desk study data.

12.4.7 A geotechnical site investigation of localised areas of the Scheme is being undertaken at the time of Scoping Report preparation. Laboratory analysis of made ground and shallow soil samples will form part of this investigation. This information will be incorporated, where available, into the relevant desk study and EIA for the Scheme. This field information will help to accurately define the baseline ground conditions.

Identification of Sensitive Receptors

12.4.8 Sensitive receptors will be identified through the desk study, site walkover and review of the relevant published information. At this high level overview, potential receptors to the Scheme are considered to be similar across all subsections and are briefly described as follows:

- Residents in properties located in close proximity to the proposed route; possibly exposed to potentially contaminated dust created during construction;
- Groundwater – some of the subsections, such as that underlying Bedford, are situated on Principal Aquifers;
- Surface water features within ~500m of the development, also streams and rivers which intersect the Scheme;
- Any sensitive ecological sites in close proximity to the site;
- Construction workers exposed to potentially contaminated soils, dust and groundwater; and
- Future users of new buildings during the operational phase e.g. new stations.

Assessing Significance of Effect

12.4.9 Magnitude of impact and sensitivity of the receptor will be assessed as per the EIA methodology described in Chapter 3 (EIA Methodology) in assessing the significance of effect with respect to geology, soils and land contamination.

12.5 Proposed Cumulative Assessment: In-combination Effects

12.5.1 An assessment of in-combination effects with other environmental topics will be undertaken as part of the EIA.

12.5.2 At this early stage, not all environmental disciplines with which in-combination effects will occur can be identified. It is anticipated that the following environmental topics may be affected by the results of the assessment of geology, soils and land contamination:

- Land Use and Agriculture;

- Air Quality;
- Ecology, and
- Water Quality and Flood Risk.

12.6 Proposed Mitigation and Residual Effects

- 12.6.1 The majority of significant adverse effects which can arise from contamination are mitigated through detailed assessment of potential contamination sources via the application of industry best practices included within the planning process. These practices are often described as embedded mitigation, or design measures, and whilst discipline specific, is a requirement for any proposed development.
- 12.6.2 Where necessary, best practice encompasses a detailed desk study and, where data gaps are identified, possible intrusive investigation. This will determine whether the site is suitable for use and if remedial works are required to make the land fit for purpose.
- 12.6.3 This will then facilitate the development of appropriate methods of working for the construction and operation of the Scheme. These should also consider technical specifications and should follow practice guidance such as Network Rail's environmental guidance for construction projects, as well as relevant guidance by the EA.
- 12.6.4 In addition, as part of good construction management practices, a materials management plan and a site waste management plan will be prepared, both of which can be incorporated into a CEMP.
- 12.6.5 The changes to and management of the physical soil resource with regards to construction of the Scheme will also be described and managed as part of these plans.

13. TRAFFIC AND TRANSPORT

13.1 Introduction

13.1.1 A study of the likely significant transport effects of the Scheme on traffic and transport will be undertaken as part of the assessment. The assessment will cover:

- The highway network;
- Sustainable transport modes including public transport, walking and cycling;
- Accessibility to homes, services, employment and business; and
- Rail users

13.1.2 The methodology will consider the likely significant effects on the transport network and its users during the construction and operation of the Scheme. It will assess:

- Any effects from construction that may arise as a direct result of construction activities (e.g. demolition activities, building new structures) and from temporary use of land (e.g. construction sites, compound areas, access routes), or from associated changes in traffic movements (e.g. traffic diversions, road closures, footpath diversions); and
- Any anticipated effects from the operation of the Scheme, such as new infrastructure (e.g. new station); altered traffic flows (e.g. permanent highway closures, new and more frequent rail service patterns) and altered accessibility (e.g. closures of level crossing, changes to journey times for pedestrians, cyclists and vehicles).

13.2 Study Area

13.2.1 The study area will be defined by the change in traffic flows, changes in access arrangements and changes in journey times on the transport network caused by the Scheme during both the construction and operational phases.

13.2.2 The study area will be agreed in consultation with the local highway authorities (LHA).

13.3 Potential for Likely Significant Effects

13.3.1 The following overview is of the likely significant effects, during construction and operation, in all of the associated sub-sections.

13.3.2 A list of all likely significant effects identified for each particular sub-section can be found in Appendix 13.1.

Construction Effects

13.3.3 Changes during construction that may have likely significant effects will include, but not be limited to:

- Road/lane closures on A-roads, local distributor and local roads during the construction period;
- Changes in road traffic levels as a result of diversions and road/lane closures on A-roads, local distributor and local roads during the construction period;
- Changes in road traffic levels as a result of construction traffic, including vehicles, staff arriving/departing site compound and construction sites, and the removal of waste;
- Changes to local bus routes as a result of diversions;
- Potential construction work on the M1 J13 overbridge;
- Diversion to National Cycle Route 6 as a result of section closure during the construction period;
- Severance, caused by closure of level crossings, local roads (either by full closure or lane closure), waterways and PRowWs; and
- Closure of rail lines/stations resulting in increased journey times, displaced parking and/or use of replacement buses.

Operational Effects

13.3.4 Operation of the Scheme will comprise new increased train service patterns, new stations and enhancements of existing stations. Changes during operation that may have likely significant effects will include:

- Changes in journey times and route options for train users as a result of the service patterns delivered by the Scheme;
- Changes in road traffic levels as a result of the closure of highway level crossings and provision of alternative crossing points (either replacement bridge crossing or permanent diversion);
- Changes in journey times for cyclists and pedestrians from the closure of highway and footpath level crossings and provision of alternative crossing points (replacement highway/foot bridges or permanent diversion);
- Changes to local bus routes as a result of closure of highway level crossings and provision of alternative crossing points (replacement bridges or permanent diversions);
- Changes in journey time as a result of increased barrier down time at level crossings due to increases in train speeds and frequency;
- Changes in journey times as a result of removal of level crossing (and associated delays and congestion) and provision of bridge crossing alternative; and
- Changes in road traffic levels and local parking in relation to existing stations enhancements and new stations.

13.4 Proposed Assessment Methodology

Overview

- 13.4.1 A TA will be produced as a standalone document to accompany applications for consent for the Scheme. The TA will inform the assessment of likely significant effects on transport and traffic in the EIA.

Desk Based Studies

- 13.4.2 Limited desk based studies have been undertaken to date in relation to traffic and transport. A desk based study identifying existing interfaces between the Scheme and adjacent transport network has been undertaken. All crossing points have been identified by tracking the Scheme using Google Earth.
- 13.4.3 MKC has undertaken an initial transport model run using their existing transport model within their Local Authority area. This has identified the broad area that may experience changes in traffic flows as a result of increases in barrier downtimes caused by the Scheme proposals, between Bletchley and Bedford, assuming no mitigation is in place.
- 13.4.4 Desk based research as part of the TA will consist of the following:
- Use of modelling software to determine changes in traffic levels and journey times as a result of temporary and permanent changes to the highway network within each of the eight sub-section study areas;
 - Assessment of changes in journey times to local public transport routes, including buses and trains;
 - Assessment of changes in demand for parking at new and enhanced rail stations;
 - Assessment to determine whether there are any requirements for diversion of waterway traffic due to construction work over canals and rivers;
 - Assessment of changes to existing routes and safe crossing points for cyclists and pedestrians; and
 - Assessment of construction vehicles and staff traveling to compound and construction sites.
- 13.4.5 Consultation will be undertaken during the development of the TA with the following key stakeholders:
- Highways England;
 - Local Highways Authorities (LHA) (incl. Highways, Public Transport and Cycling officers) for the specified study areas;
 - Local cyclist groups affiliated with the LHA for the specified study areas;
 - Sustrans; and

- Canal & River Trust.

Field Surveys

- 13.4.6 Where additional data is required for the completion of the TA, traffic count surveys will be undertaken of vehicles, cyclists and pedestrians.

Identification of Sensitive Receptors

- 13.4.7 Table 13.1 identifies receptors which could be affected by the Scheme, either positively or negatively.

Table 13.1. Potentially sensitive receptors of traffic and transport effects

Receptors	Description
Private and commercial vehicles	Cars, Commercial Vehicles, Taxis
Users of public transport	Buses and rail
Emergency vehicles	Police vehicles, Ambulances, Fire Engines
Pedestrians	Pedestrians
Cyclists	Cyclists and Cycle Route 6
Vulnerable transport users	Persons with limited mobility
Other key receptors defined by air quality and noise specialists	See Chapters 7 (Air Quality) and 8 (Noise and Vibration)
Businesses and residents	Diversions, road/lane closures, access changes and displaced parking

Assessing Significance of Effect

- 13.4.8 The methodology for assessing significance of effect will be broadly the same as that described in Chapter 3 (EIA Methodology).
- 13.4.9 In addition, the likely significant effects of operational changes in traffic levels will be assessed based on the Guidelines for the Environmental Assessment of Road Traffic (Institute of Environmental Assessment of Road Traffic (Institute of Environmental Assessment, 1993³³), and DfT's Guidance on TAs³⁴.
- 13.4.10 When assessing the significance of effects, the assessment will use professional judgement in order to allow for the subjectivity in evaluation of significance as described by IEMA³⁵.
- 13.4.11 As such, the assessment of significance of effects will take into account the type of development occurring, the surrounding area, the composition of vehicles on the network, the nature of the local road network, and any

³³ Institute of Environmental Assessment (1993), 'Guidelines on the Environmental Assessment of Road Traffic'.

³⁴ DfT (2007), 'Guidance on Transport Assessments', The Stationary Office.

³⁵ Institute of Environmental Assessment (1993), 'Guidelines on the Environmental Assessment of Road Traffic'.

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betterment or delay to journey times for vehicles, bus services, train users, emergency vehicles, walkers or cyclists.

Magnitude of Impact

13.4.12 Table 13.2 describes how the different magnitudes of impact that may arise during the construction and operation of the Scheme will be evaluated.

Table 13.2. Description of the Magnitude of an Impact

Magnitude of Impact	Typical Criteria Descriptors
Very Large	Changes to a road feature/PRoW that adversely affects the integrity of the transport network, or a severe change in traffic flows, journey times and/or journey quality.
Large	Changes to a road feature/PRoW that does not adversely affect the integrity of the transport network, or a moderate change in traffic flows, journey times and/or journey quality.
Moderate	Changes to a key road feature/PRoW or a minor change in traffic flows, journey times and/or journey quality.
Slight	Very minor changes to road feature/PRoW or transport characteristics
No Change	No changes to road features/PRoW or transport characteristics

Sensitivity of Receptor

13.4.13 The following criteria and definitions for sensitivity will be used to describe the sensitivity of receptors to change arising from the construction or operation of the Scheme.

Table 13.3. Description of the Sensitivity of Environmental Receptors

Sensitivity	Typical Descriptors
Very High	Very high importance and rarity, international scale and very limited (i.e. no potential for substitution/replacement).
High	Any transport effects lead to degradation of performance of the national transport network (including the rail network) which leads to permanent or substantial issues.
Medium	Any transport effects lead to degradation of performance of the regional transport network which leads to permanent or substantial issues.
Low	Any transport effects which lead to degradation of performance of the local transport network which leads to temporary issues.
Negligible	Any transport effects are insignificant and the transport network will continue to operate as normal.

13.4.14 On the basis of the studies undertaken to date, it is believed that there will be no international level or impacts that could not be mitigated by replacements. Therefore sensitivity of receptors would not be considered as very high significance.

Duration of Impact

- 13.4.15 The durations of impact that will be taken into consideration will be the same as those described in Chapter 3 (EIA Methodology).

Significance of Effect

- 13.4.16 The following matrix will be used to determine the significance of likely effects by comparing the magnitude of the impact with the sensitivity of the receptor.

Table 13.4. Arriving at the Significance of Effects

		Magnitude of Impact (Degree of Change)				
		No Change	Slight	Moderate	Large	Very Large
Receptor Sensitivity	High	Not Significant	Minor	Minor/Moderate	Moderate/High	High/Very High
	Medium	Not Significant	Not Significant/Minor	Minor	Moderate	Moderate/High
	Low	Not Significant	Not Significant/Minor	Not Significant/Minor	Minor	Minor / Moderate
	Negligible	Not Significant	Not Significant	Not Significant/Minor	Not Significant/Minor	Minor

- 13.4.17 All effects assessed as being of moderate significance or above are considered to be significant in EIA terms for the purpose of this assessment.

13.5 Proposed Cumulative Assessment: In-combination Effects

- 13.5.1 An assessment of the in-combination transport related effects with other topic areas (*within* the Scheme) will be undertaken.
- 13.5.2 Transport effects will have repercussions for related topic areas, among them:
- Air Quality;
 - Noise and Vibration, in relation to construction traffic; and
 - Land Use and Agriculture.
- 13.5.3 Information on change in traffic levels in conjunction with the Design Manual for Road and Bridges will inform Chapter 7 (Air Quality) and Chapter 8 (Noise and Vibration) of the EIA.

13.6 Proposed Mitigation and Residual Effects

13.6.1 The TA will consider and identify mitigation measures to minimise any likely significant effects. These may include:

- Construction
 - Travel plans for staff working on site during construction;
 - Defined routes and departure/arrival times for vehicles travelling to/from site; and
- Operation
 - Design measures at Winslow Station integrating the Scheme with local public transport options and facilities for cyclists;
 - Reduction in congestion caused by level crossings and barrier down times;
 - Mitigation measures for all road users (including public transport users, cyclists and pedestrians) impacted by temporary and permanent changes.

13.6.2 Any residual effects of the Scheme following implementation of identified mitigation will be assessed and reported.

14. ELECTROMAGNETIC INTERFERENCE

14.1 Introduction

14.1.1 This chapter sets out the proposed approach to the assessment of possible Electromagnetic Interference (EMI), including Electromagnetic Compatibility (EMC) arising from the operation of the Scheme. It proposes a method to establish how baseline conditions and likely significant effects will be assessed for reporting as one of the technical chapters in the ES.

14.1.2 EMI is disturbance that affects an electrical system due to magnetic and electric fields, electromagnetic induction or electromagnetic radiation emitted from an external source. EMC is concerned with ensuring that electrical and electronic equipment will work as intended and EMI that may arise does not interrupt other equipment that might reasonably be expected to operate in the same setting. Electrification of the railway introduces complexity into the electromagnetic environment during operation with the potential to disturb sensitive and safety critical equipment across a wide range of frequencies.

14.1.3 Strong electromagnetic fields can have an impact on human health. The effects of EMF are highly localised and have the most potential to affect people in buildings that are immediately adjacent, or above OLE structures. Electricity sub-stations and transformers are also sources of EMF.

14.2 Study Area

14.2.1 The assessment will identify potentially sensitive receptor sites within a 20 m corridor either side of the centreline of the nearest track within the Scheme, or from proposed power equipment (e.g. overhead lines and traction substations). The section of the Scheme to be subject to electrification is the route from Bicester to Bletchley, though the design also makes provision for future electrification between Bletchley to Bedford.

14.3 Potential for Likely Significant Effects

14.3.1 Sensitive sites along the route where EMI could give rise to likely significant effects potentially include residential and business premises, hospitals and light industrial areas, telephone and communication systems.

14.3.2 Where the Scheme is adjacent to an existing railway corridor, the interface may also result in potential for likely significant effects to occur.

14.4 Proposed Assessment Methodology

Desk Studies

14.4.1 A desk study will be undertaken to identify potential sources of EMI that exist or may be produced during the operational phase of the Scheme. The study will identify the potential risk and the potential impact and effect, and will form part of a hazard log. The study will also identify establishments

where people are potentially at risk from EMF produced by the Scheme's electrification traction power and its rolling stock.

Sources

- 14.4.2 Potential sources of EMI may result from the operation of the railway and its supporting systems. These sources include OLE equipment and traction distribution, stations/interchanges and other line side equipment, traction depots and rolling stock, both existing and proposed).
- 14.4.3 Typically, the main source of EMI will be the traction power system, as electromagnetic emissions are caused by the current flowing in an electrical system. The higher currents found in high voltage distribution have the potential to create larger EMF, the strength of which diminish rapidly with the distance from the source.

Identification of Sensitive Receptors

- 14.4.4 The desk study will identify sensitive sites along the route where EMI could be an issue and a risk assessment undertaken. Each receptor will be categorised with the perceived level of risk and to identify the potential mitigation for the receptor. The risk assessment will assess the impact of EMF and EMC effects on nearby equipment, installations and people.
- 14.4.5 Where the Scheme is adjacent, or joins with an existing railway there will be a significant interface with those existing railway networks. Although the present existing infrastructure may have systems and procedures to mitigate the effects of EMI, the introduction of the Scheme's infrastructure may have an adverse effect on the existing railway infrastructure. Similarly, the existing railway infrastructure may have an effect on the Scheme (both infrastructure and rolling stock). Relevant records for the existing railway network will be obtained to identify and assess and record any risk within an EMC hazard log.
- 14.4.6 It is necessary that the specification for the rolling stock to be deployed is compatible with the operational limits of the infrastructure and the Technical Specification for Interoperability (TSI). The main impact of EMI resulting from the rolling stock is on the railway infrastructure itself.

Legislation and Guidance

- 14.4.7 The approach to the assessment during the construction and operational phases of the Scheme will take into account the industry standard practice and guidance. The EMI, EMC and EMF assessment will have regard to a range of British Standards that address the electromagnetic compatibility of railway infrastructure, apparatus and rolling stock. Other BSs relevant to the assessment include those that relate to residential, commercial industrial and light industrial environments along with ICNIRP Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz) (1998).

Assessing Significance of Effect

- 14.4.8 The significance of predicted EMI effects has been evaluated as outlined below.

Importance of Receptor

- Low importance – a receptor which has no significance with regard to safety or to operational integrity of a system or service, whose failure when subjected to EMI is non-critical;
- Moderate importance – any receptor whose failure to perform as intended, may disrupt the normal operation of a system. The effect of which is to produce a delay to the production of a service or an annoyance; and
- High importance – a receptor that has safety-critical applications.

Magnitude of Impact

- Low magnitude – any EMI effects are insignificant with regard to the operation of the equipment or system. Equipment or system continues to operate as normal;
- Moderate magnitude – any EMI effects lead to degradation of equipment or system performance, leading to temporary malfunction, annoyance or delay which is fully recoverable following the removal of the disturbance; and
- High magnitude – any EMI effects lead to degradation of performance of equipment or systems in such a way that injury or worse may be incurred by the operator, third party or member of the public or which leads to unrecoverable operation of equipment or system itself.

Level of significance

- 14.4.9 Each type of effect will be allocated a level of significance as shown below.

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- Identifying impacts – setting out which impacts are cumulative, their magnitude and whether these are in-combination or cumulative, positive or negative, or temporary or permanent;
- Assessment of significance – establishing whether the impacts identified constitute significant effects; and
- Mitigation – where significant effects are identified, mitigation will be proposed.

Other Schemes in the Scope of the Assessment

15.2.3 There are a number of other rail schemes with which the Scheme will interact. The proposed rail schemes for inclusion in this assessment are:

- HS2 – not yet consented;
- The 'Electric Spine' (within 5km of the Scheme Area boundary) – proposed and expected to proceed.

15.2.4 There will also be a number of other schemes with which the Scheme may have cumulative effects. Local Authorities will be asked to identify schemes meeting the following criteria for inclusion in the assessment of cumulative effects, those that are:

- Under construction;
- Consented (in whole or in part) but not yet under construction;
- Submitted for consent but not yet determined; or
- Identified or safeguarded in a development plan or other Local Authority plan or programme.

15.2.5 Existing schemes that are already built and operational will be included in the environmental baseline and are therefore considered to have already been assessed as part of the EIA.

Sensitive Receptors

15.2.6 Sensitive receptors will be identified using the following questions:

- Are residual effects⁴¹ of the Scheme predicted for any receptors?
- Is it likely that the receptor will be affected by more than one residual effect from the Scheme?
- Is it likely that the receptor will be affected by residual effects from other schemes?

⁴¹ This refers to any level of significance for residual effects, not just those considered significant in EIA terms e.g. moderate or above.

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- 15.2.7 Where any receptors or environmental topics are scoped out of the assessment of cumulative effects, rationale will be provided.

Identifying impacts

- 15.2.8 The activities causing impacts on receptors will be identified using the source-pathway-receptor model. The step will look to pull together the pathways and then activities by which receptors, having already been identified in the previous step, will be affected.
- 15.2.9 For in-combination effects, a matrix based approach will then be used to compare the resulting list of Scheme activities, during both construction and operation, to allow receptors experiencing multiple effects to be identified.

Table 15.1. Example of In-combination Impacts Matrix

	Receptor 1	Receptor 2
Construction		
Removal of ballast and other materials from existing infrastructure		
Movement of site construction staff to and from place of work		
Operation		
Increase in passenger train services		
Operation of Winslow Station		

- 15.2.10 A similar matrix based approach will be used to identify cumulative impacts with activities and/or impacts associated with other schemes by environmental topic.

Table 15.2. Example of cumulative impacts matrix

Schemes	Agriculture and Land Use	Air Quality	Ecology
Scheme 1			
Scheme 2			

- 15.2.11 For both, the magnitude and positive or negative nature of the impacts are proposed to be identified as follows:

Table 15.3. Impact descriptions

Impact Description	Symbol
High positive	'+++'
Medium positive	'++'
Low positive	'+'
Neutral	'0'
Low negative	'-'
Medium negative	'--'
High negative	'---'
Mixed effects	'+/-'

15.2.12 If impacts are identified that may be more quantifiably determined, perhaps through modelling and required data is available, a revised assessment will be undertaken and the detailed methodology described in the ES.

Assessment of significance

15.2.13 Having identified sensitive receptors, and impacts and their magnitude, the assessment will go onto assess whether these will lead to likely significant effects. The assessment of significance will take account of the receptors affected, the nature of change at the receptor, the probabilities of such effects occurring and the ability of the receptor to absorb further effects before becoming irreversibly altered.

15.2.14 The following table from Volume 11, Section 2, Part 5, HA 205/08 (Assessment and Management of Environmental Effects) of the DMRB suggests a framework for determining significance of significant effects.

Table 15.4. An Example of Significance Criteria for the Assessment of Cumulative Effects

Significance	Effect
Severe	Effects that the decision-maker must take into account as the receptor/resource is irretrievably compromised
Major	Effects that may become key decision-making issue
Moderate	Effects that are unlikely to become issues on whether the project design should be selected, but where future work may be needed to improve in current performance
Minor	Effects that are locally significant
Not significant	Effects that are beyond the current forecasting ability or are within the ability of the resource to absorb such change

Mitigation

- 15.2.15 Where significant cumulative effects are predicted, mitigation measures will be proposed to remove or reduce an effect in the first instance, or if not possible, provide replacement, compensation or restoration to the receptor affected.

Assumptions and Uncertainties

- 15.2.16 The assessment of cumulative effects is widely recognised to be limited by available baseline information on the other schemes likely to interact with the scheme being assessed, as well as the difficulties in determining the interactions between effects from different schemes that may have been assessed differently.
- 15.2.17 Any assumptions made and the uncertainties inherent in the assessment of cumulative effects will be clearly set out in the ES.

APPENDIX 2.1 – CAPACITY SPECIFICATION

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Route/Line	Service Type	Trains per hour (each way)	Calling At
Oxford to London (Marylebone)	passenger	2	Oxford Parkway and Bicester Town
Oxford to Milton Keynes	passenger	1	Oxford Parkway, Bicester Town, Winslow and Bletchley Some trains also calling at Islip. Subject to capacity on Great Western Main Line (GWML) trains to start at Didcot or Reading;
Oxford to Bedford	passenger	1	Oxford Parkway, Bicester Town, Winslow, Bletchley, Woburn Sands and Ridgmont. Some trains also calling at Islip (Subject to capacity on GWML, trains to start at Didcot or Reading);
London Marylebone to Milton Keynes	passenger	1	Aylesbury, Aylesbury Vale Parkway, Winslow and Bletchley. Calling pattern London – Princes Risborough not specified;
Bletchley to Bedford	passenger (Current stopping service)	1	calling all stations
Oxford to Milton Keynes	freight	1	
Bletchley to Bedford	freight	existing freight rights to be retained	
Princes Risborough Claydon Junction,	freight	1	
Oxford to Milton Keynes	inter-regional passenger	1	

These capacity specifications are sourced from the Core Scheme Output Specification set out in the Contract Specific Requirements to which the Scheme Designer is working.

APPENDIX 2.2 – FIGURE 2.1

APPENDIX 3.1 – BASELINE CONDITIONS AND LEGISLATION, POLICY AND GOOD PRACTICE

1 INTRODUCTION

- 1.1.1 This appendix contains the baseline information collected to date and a summary of the relevant legislation, policy and good practice for the environmental topics discussed in the Scoping Report. Background to the Project

1.2 Land Use and Agriculture

Baseline Conditions

- 1.2.2 The desk based research completed to date has revealed that the majority of land within the provisional study area is Grade 3 agricultural land. As few post-1988 surveys have been carried out in the study area, it is not known what proportion of this falls within sub-grades 3a or 3b, and therefore whether this resource represents the BMV agricultural land.

- 1.2.3 The following tables show the detail on grading within the provisional study area and each of the eight subsections (areas are approximations and have been rounded to the nearest 10 ha).

Table 1. ALC grading within the provisional study area

Grade	Provisional Estimated Area (ha)	Percentage of Total
1	-	-
2	780	6%
3	5,350	43%
4	3,120	25%
5	-	-
Non-Agricultural	1,220	10%
Urban	1,670	14%
Other/Not surveyed	210	2%
Total	12,350	100%

- 1.2.4 The breakdown of the ALC grading for each of the eight subsections is provided below.

Table 2. ALC Grading within the Provisional CDC Study Area

Grade	Provisional Estimated Area (ha)	Percentage of Total
1	-	-
2	-	-
3	120	13%
4	830	86%
5	-	-
Non-Agricultural	-	-
Urban	<10	<1%
Other/Not surveyed	<10	<1%
Total	960	100%

Table 3. ALC Grading within the Provisional Claydon/Quainton Study Area

Grade	Provisional Estimated Area (ha)	Percentage of Total
1	-	-
2	-	-
3	1,000	40%
4	1,290	51%
5	-	-
Non-Agricultural	220	9%
Urban	-	-
Other/Not surveyed	<10	<1%
Total	2510	100%

Table 4. ALC Grading within the Provisional Winslow/Swanbourne Study Area

Grade	Provisional Estimated Area (ha)	Percentage of Total
1	-	-
2	60	6%
3	890	80%
4	140	12%
5	-	-
Non-Agricultural	-	-
Urban	<10	<1%
Other/Not surveyed	20	2%
Total	1,110	100%

Table 5. ALC Grading within the Provisional Aylesbury Study Area

Grade	Provisional Estimated Area (ha)	Percentage of Total
1	-	-
2	-	-
3	720	46%
4	290	18%
5	-	-
Non-Agricultural	-	-
Urban	560	36%
Other/Not surveyed	<10	<1%
Total	1,570	100%

Table 6. ALC grading within the provisional WDC study area

Grade	Provisional Estimated Area (ha)	Percentage of Total
1	-	-
2	590	40%
3	440	29%
4	260	18%
5	-	-
Non-Agricultural	<10	<1%
Urban	130	8%
Other/Not surveyed	70	5%
Total	1,500	100%

Table 7. ALC Grading within the Provisional MKC Study Area

Grade	Provisional Estimated Area (ha)	Percentage of Total
1	-	-
2	100	5%
3	1,310	60%
4	180	8%
5	-	-
Non-Agricultural	-	-
Urban	580	26%
Other/Not surveyed	20	1%
Total	2,190	100%

Table 8. ALC Grading within the Provisional CBC Study Area

Grade	Provisional Estimated Area (ha)	Percentage of Total
1	-	-
2	10	1%
3	530	45%
4	140	12%
5	-	-
Non-Agricultural	410	35%
Urban	10	1%
Other/Not surveyed	70	6%
Total	1,180	100%

Table 9. ALC Grading within the Provisional BBC Study Area

Grade	Provisional Estimated Area (ha)	Percentage of Total
1	-	-
2	10	1%
3	320	24%
4	-	-
5	-	-
Non-Agricultural	580	44%
Urban	400	30%
Other/Not surveyed	10	1%
Total	1,330	100%

Legislation, Policy and Good Practice

- 1.2.5 The European Commission (EC) adopted a Soil Thematic Strategy in 2006 with the objective of protecting soils across the EU. While the EC withdrew the proposal for a Soil Framework Directive in May 2014, the Seventh Environment Action Programme, which entered into force on 17 January 2014, recognises that soil degradation is a serious challenge. It requires that by 2020 land is managed sustainably and soil is adequately protected in the Union, and commits the EU and its Member States to increasing efforts to reduce soil erosion and increase soil organic matter.
- 1.2.6 Although there is no specific legislation for the protection of soil and agricultural land, in September 2009, the Government published 'Safeguarding our Soils: A Strategy for England'. This Strategy calls for effective protection for soil during construction and development. It seeks to ensure that planning decisions take sufficient account of soil quality and states that:
- "The presence of best and most versatile agricultural land is a material consideration in planning decisions, but has to be taken into account alongside other sustainability considerations including: biodiversity, the quality and character of the landscape,

accessibility to infrastructure, workforce and markets and maintaining viable communities.”

- 1.2.7 The Government's planning policies for England are set out in the NPPF. Paragraph 112 states that:

“Local planning authorities should take into account the economic and other benefits of the best and most versatile agricultural land. Where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality.”

- 1.2.8 Little weight of protection is given to land of lower quality unless the land has other special environmental characteristics.

- 1.2.9 For planning applications, specific consultations are required with Natural England (NE) (on behalf of Department for Environment, Food and Rural Affairs (Defra)) in relation to the loss of the BMV agricultural land (Grades 1, 2, and 3a). This requirement arises from the Town and Country Planning (Development Management Procedure) Order 2010. NE Technical Information Note TIN049 provides that consultations:

“...are required for non-agricultural development proposals that are not consistent with an adopted local plan and involve the loss of twenty ha or more of the best and most versatile land.”

- 1.2.10 In terms of local planning policy, soil and agricultural land are referred to as follows by the six Local Authorities covered by the study area.

- 1.2.11 CDC submitted the Cherwell Local Plan 2011-2031 to the Secretary of State in January 2014 and expect it to be adopted during 2015. Policy SLE 5 refers to the need for HS2 to “avoid the severance of agricultural holdings” whilst locational policies for Bicester and Banbury require “a detailed survey of the agricultural land quality identifying the best and most versatile agricultural land and a soil management plan”. Policy ESD 10 which seeks to protect the natural environment requires the reuse of soils.

- 1.2.12 AVDC does not have an up-to-date local plan, having withdrawn both its core strategy (in 2010) and its draft local plan (in 2013). Saved policies from 2007 do not include a policy on ‘development of the BMV agricultural land’, so at present the District relies on the NPPF for direction on this topic.

- 1.2.13 WDCs Core Strategy was adopted in July 2008. Policy CS 17 states that the Council will prevent the inappropriate sub-division of agricultural land to avoid degradation of land of amenity value, and will require developments to avoid unacceptable soil pollution.

- 1.2.14 MKC adopted its Core Strategy in July 2013. However its previous policy on ‘Protection of the Best and Most Versatile Agricultural Land’ was deleted in 2008 and not replaced.

- 1.2.15 CBC submitted their Development Strategy to the Secretary of State in October 2014 and expects it to be adopted during 2015. Policy 50 states that: “All appropriate development will be expected to address positively its impact on the area’s... best and most versatile agricultural land”. Supporting text explains that the Council “will achieve this by steering proposals to less valuable land accept where outweighed by

other sustainability considerations, for example locational factors or where lower quality land supports valuable biodiversity assets.”

- 1.2.16 BBC adopted their Core Strategy and Rural Issues Plan in April 2008; however this does not refer to agricultural land or soils. The Council is currently preparing its Local Plan 2032, The Issues and Options paper lists ‘Safeguarding the potential of best and most versatile agricultural land’ amongst those to be addressed through the local plan development management policies.

1.3 Cultural Heritage

Baseline Conditions

- 1.3.2 Based on the desk-based research undertaken to date, as described above, the following baseline conditions are presented for the eight subsections:

CDC subsection

- 1.3.3 There is a single Scheduled Monument, RAF Bicester (SM 1021455), located within the outer study area of this subsection. Additionally, there are 138 Listed Buildings, which include the Grade I listed Church of St Edburg (LB 1199769) and the Church of St Mary (LB 1369735). The remainder are Grade II* and Grade II listed, and many of which fall within the Bicester Conservation Area.

- 1.3.4 The inner study area contains 37 non-designated heritage assets that will be considered as part of the assessment, including locally significant buildings, archaeological assets and historic hedgerows.

AVDC: Claydon/Quainton subsection

- 1.3.5 There are 38 Listed Buildings of Grade II* and Grade II designation, and these are mainly clustered in Middle Claydon, Steeple Claydon and Poundon. Middle Claydon is also a Conservation Area. A Grade II Registered Park and Garden is located just to the south of Middle Claydon at Claydon House. The listed buildings at Quainton station (now the site of the Buckinghamshire Railway Centre) are likely to be particularly sensitive receptors, as are the remains of the non-designated Brill Tramway located at the station.

- 1.3.6 Although there are no Scheduled Monuments within this subsection, a non-designated deserted medieval village (DMV) to the east of Doddershall House is likely to be of national significance.

- 1.3.7 A further 53 non-designated monuments are located within the inner study area these include archaeological earthworks and locally significant buildings, many of which are related to the railway, such as the former Claydon Station.

AVDC: Winslow/Swanbourne subsection

- 1.3.8 There are no Scheduled Monuments within the Winslow/Swanbourne subsection. There are 101 Grade II* and Grade II Listed Buildings, the majority of which are located within the Conservation Areas of Winslow and Newton Longville.

- 1.3.9 A further 63 non-designated monuments are located within the inner study area that include the locations of former brickworks and gravel pits, archaeological assets and locally significant buildings.

AVDC: Aylesbury subsection

- 1.3.10 A single Scheduled Monument comprising DMVs and Civil War earthworks (SM 1013416) is located within the outer study area. A further Scheduled Monument on the periphery of the outer study area, a DMV at Eythrope, will also be considered. There are 195 Listed Buildings within the section, including the Grade I listed Church of St. Mary (LB 1160522) in the outer study area; the remainder are Grade II* and Grade II listed. Many of the listed buildings are located within the Aylesbury, Walton and Wendover Road Conservation Area.
- 1.3.11 The Grade II* Registered Park and Garden of Hartwell House is located within the outer study area.
- 1.3.12 The HER data from Buckinghamshire County Council identifies over 500 non-designated monuments within the inner study area. These include the route of Roman roads, earthworks, archaeological assets and locally significant buildings, including railway infrastructure.

WDC subsection

- 1.3.13 There are 17 Scheduled Monuments within the inner and outer study areas of the Wycombe District Council subsection and these include: a village settlement site at Lodge Hill (SM 1006942), The Mount (SM 1006951), cross dyke on Ragpit Hill (SM 1013933), cross dyke east of Great Kimble church (SM 1013934), Cymbeline's castle (SM 1013941), several barrows which are part of Saunderton Lee barrow cemetery (SM 1013952 – 1013954), Roundabout Wood moated site (SM 1015211), Roman villa east of St Mary and St Nicholas church (SM 1016788), Dial Hill Roman barrow (SM 1017512), moated site and medieval settlement southwest of Manor Farm (SM 1017513), Roman villa east of All Saint's Church (SM 1018007), moated site at Apsley Manor Farm (SM 1018729), moated site at Church Farm (SM 1018736) and Anglo-Saxon cemetery on Hemley Hill (SM 1020290).
- 1.3.14 There are 130 Listed Buildings of which three are Grade I listed; the Church of St. Dunstan, the Church of St. Nicholas and the Church of All Saints. The remainder are Grade II* and Grade II listed. In the outer study area, to the east of Great Kimble, is the Grade II Registered Park and Garden at Chequers.
- 1.3.15 A further 128 non-designated monuments are located within the inner study area including earthworks, ancient boundaries, locally significant buildings and non-designated gardens and landscapes.

MKC subsection

- 1.3.16 There are eight Scheduled Monuments within the inner and outer study areas in the Milton Keynes Council subsection, and these include the Roman town of Magiovinium and Roman fort (SM 1006943), Bradwell castle mound (SM 1007935), Caldecotte shrunken medieval village (SM 1007941), Bradwell Abbey (SM 1009540), moated site west of Loughton Manor (SM 1011297), Bradwell Bury moated site (SM 1011298), motte castle south-east of Wavendon Manor (SM 1011301), and motte and bailey castle, deserted village and monastic grange at Old Wolverton (SM 1013660).
- 1.3.17 There are 151 Listed Buildings of which two are Grade I listed; the Church of St. Mary (LB 1125430) and a chapel to the north of Bradwell Abbey House (LB 1125271). Of the remainder 11 are Grade II* and the rest are Grade II listed. Although several of the buildings within Bletchley Park are listed, the wider park is also potentially of

national, if not international, significance as outlined by English Heritage (EH)¹. There are Conservation Areas located at Bletchley, Loughton, Woburn Sands and Wolverton.

- 1.3.18 A further 137 non-designated monuments are listed by the HER within the inner study area including the route of Watling Street (A5) Roman road and several turnpike roads as well as the location of former brickworks and gravel pits.

CBC subsection

- 1.3.19 There are two Scheduled Monuments within the Central Bedfordshire Council subsection; a DMV and moated sites at Thrupp End (SM 1010364) and a ringwork castle at Brogborough Park Farm (SM 1013016). Forty-nine Listed Buildings of Grade II* and Grade II designation are present in the subsection, the majority of which are located within the Aspley Guise and Husbourn Crawley Conservation Areas. A further conservation area, at Aspley Heath, extends into the outer study area and will also be considered.

- 1.3.20 Thirty Nine non-designated monuments are also noted in the HER data within the inner study area. These include earthworks, non-designated historic landscapes and parks, the routes of Roman roads and the locations of former clay pits.

BBC subsection

- 1.3.21 There are seven Scheduled Monuments within this subsection including The Moot Hall (SM 1004507), remains of the George Inn (SM 1004674), a medieval lime kiln (SM 1005394), Bedford Bridge (SM 1005399), Elstow Manor House (SM 1005405), Bedford Castle (SM 1010366) and Kempston Hardwick moated site (SM 1012312). These assets are all located in the outer study area.

- 1.3.22 There are 125 Listed Buildings within this subsection, of which eight are Grade I listed including Hillersdon Mansion (LB 1321607), Parish church of St Mary and St Helena (LB 1114168), Parish Church tower (LB 1312577), 172 High Street (LB1114170), Church of St Mary (LB 1114516), Church of St Paul (LB 1321436), Statue of John Howard (LB 1321437) and Church of St Peter (LB 1146340). The remaining buildings are Grade II* and Grade II listed. There are three Conservation Areas: Bedford Town Centre, Elstow and Stewartby.

- 1.3.23 The inner study area includes approximately 160 non-designated monuments as defined by the Bedford Borough Council HER, including the locations of former brickworks, cropmarks, archaeological assets and locally significant buildings including railway infrastructure.

Legislation, Policy and Good Practice

- 1.3.24 The relevant national and local policy and good practice guidance that will be taken into consideration as part of the EIA exercise include:
- National Planning Policy Framework (NPPF), Department for Communities and Local Government (DCLG) (2012);
 - Planning Practice Guidance, DCLG (2014);

¹ EH 2005 *The National and International Significance of Bletchley Park: A platform for discussion and its future*

- National Policy Statement for National Road and Rail Networks (2014);
- EH, 2006 Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide, Swindon;
- EH, 2011 The Setting of Heritage Assets, London;
- Chartered Institute for Archaeologists (CIfA), 2014 Standards and Guidance for historic environment DBA, Reading;
- CIfA, 2014 Code of Conduct, Reading; and
- Local planning policy (summarised in the following section).

Local Planning Policy

Cherwell District Council

1.3.25

The non-statutory Local Plan 2011 was approved for development control purposes in December 2004 as an interim document; it sets out the following policies for the protection of the historic environment:

- **Policy EN39**
Development should preserve listed buildings, their features and settings, and preserve or enhance the character or appearance of designated Conservation Areas, as defined on the proposals map. Development that conflicts with these objectives will not be permitted.
- **Policy EN40**
In a Conservation Area or an area that makes an important contribution to its setting Planning Control will be exercised to ensure, inter alia, that the character or appearance of the area so designated is preserved or enhanced. There will be a presumption in favour of retaining buildings, walls, trees or other features which make a positive contribution to the character or appearance of a Conservation Area. A new development should understand and respect the sense of place and architectural language of the existing but should seek to avoid pastiche development except where this is shown to be clearly the most appropriate.
- **Policy EN43**
Proposals that would result in the total or substantial demolition of a Listed Building, or any significant part of it, will not be permitted in the absence of clear and convincing evidence that the market testing set out in ppg15 paragraphs 3.16 to 3.19 has been thoroughly followed with no success.
- **Policy EN44**
Special care will be taken to ensure that development that is situated within the setting of a Listed Building respects the architectural and historic character of the building and its setting.
- **Policy EN45**
Before determination of an application for planning permission requiring the alteration, extension or partial demolition of a Listed Building, applicants will be required to provide sufficient information to enable an assessment of the likely impact of the proposals on the special architectural or historic interest of the structure, its setting or special features.
- **Policy EN45a**

The inclusion of a building in a Local List of buildings of architectural or historic interest adopted by the council for planning purposes will be a material consideration in the determination of planning applications that would affect it.

- Policy EN46

In exceptional circumstances other policies in this plan may be set aside in order to secure the retention and re-use of a heritage asset. Enabling development may be acceptable where it can be demonstrated that it is the only viable means to secure the renovation, refurbishment, and long-term re-use (where appropriate) and maintenance of a heritage asset.

- Policy EN47

The council will promote sustainability of the Historic Environment through conservation, protection and enhancement of the archaeological heritage and its interpretation and presentation to the public. in particular it will:

(i) seek to ensure that Scheduled Ancient Monuments and other unscheduled sites of national and regional importance and their settings are permanently preserved;

(ii) ensure that development which could adversely affect sites, structures, landscapes or buildings of archaeological interest and their settings will require an assessment of the archaeological resource through a desk-top study, and where appropriate a field evaluation;

(iii) not permit development that would adversely affect archaeological remains and their settings unless the applicant can demonstrate that the archaeological resource will be physically preserved in-situ, or a suitable strategy has been put forward to mitigate the impact of development proposals;

(iv) ensure that where physical preservation in- situ is neither practical nor desirable and sites are not scheduled or of national importance, the developer will be responsible for making appropriate provision for a programme of archaeological investigation, recording, analysis and publication that will ensure the site is preserved by record prior to destruction. Such measures will be secured either by a planning agreement or by a suitable planning condition.

- Policy EN48

Development that would damage the character, appearance, setting or features of designed historic landscapes (parks and gardens) and battlefields will be refused.

- Policy EN49a

In seeking the preservation and enhancement of the RAF Bicester Conservation Area permission will be granted for:

(i) proposals for the re-use of the buildings within the technical area shown on the proposals map, including proposals for adaptation or conversion, provided that they are set in the context of an agreed comprehensive plan and are sympathetic to the appearance and character of those buildings, their settings, the trident layout and the wider conservation area;

(ii) proposals for the use of the open airfield for recreational purposes provided that such use would not conflict with or change its open, flat, and treeless landscape character and its visual relationship with the technical area and adjoining countryside;

- (iii) proposals that would be compatible with the ecological value present on the site.

Aylesbury Vale

1.3.26 Aylesbury Vale District Local Plan was adopted on January 2004, and revised in September 2007. Saved policies relating to the Historic Environment include:

- Policy GP.53

In Conservation Areas the Council will seek to preserve or enhance the special characteristics that led to the designation of the area.

Proposals for development will not be permitted if they cause harm to the character or appearance of Conservation Areas, their settings or any associated views of or from the Conservation Area.

Proposals for development or redevelopment must respect the historic layout, scale and form of buildings, street patterns, open spaces and natural features in the Conservation Area that contribute to its character and appearance.

Proposals for alterations, extensions and changes of use must respect and complement the character, materials and design details of the structure and site concerned and its neighbours.

- Policy GP.59

In dealing with development proposals affecting a site of archaeological importance the Council will protect, enhance and preserve the historic interest and its setting.

Where research suggests that historic remains may be present on a development site planning applications should be supported by details of an archaeological field evaluation. In such cases the Council will expect proposals to preserve the historic interest without substantial change.

Where permission is granted for development involving sites containing archaeological remains the Council will impose conditions or seek planning obligations to secure the excavation and recording of the remains and publication of the results.

- Policy GP.60

Development proposals within or affecting a Park or Garden of Special Historic Interest should take full account of the area's historic and landscape significance. The Council will resist proposals that do not protect the distinctive characteristics of such Parks and Gardens.

Wycombe District Council

1.3.27 The Core Strategy, setting out the vision and spatial strategy for the district, was adopted in July 2008 and outlines policy in regard to Environmental Assets as:

- Policy CS2 Main Principles for the Location of Development

At Marlow, Princes Risborough and the other smaller settlements identified in Policy CS7 'Rural Settlements and the Rural Areas', development will be on a smaller scale and of a character commensurate with the size and relative sustainability of the settlements.

- Policy CS6 Princes Risborough

6a. Safeguard the historic core of the town and its Chiltern escarpment setting, reinforcing the town's distinctive sense of place.

- Policy CS 17 Environmental Assets

The Council will conserve and improve the environmental assets of the District by requiring:

1. The conservation and enhancement of the Chilterns Area of Outstanding Natural Beauty and its setting.

5. The conservation and enhancement of landscape character, with reference to national and county-level landscape character assessments and, where appropriate, landscape character defined in more detail at local level.

6. The preservation or enhancement of historic environments (and, where appropriate, their settings) through the identification, protection and/or appropriate management of archaeological remains, historic buildings and registered landscapes of national and local importance (see also Policy CS 19 'Raising the Quality of Place-Shaping and Design').

1.3.28

Additionally the Local Plan, adopted January 2004 and amended July 2013, states:

- Policy HE1

1. Development requiring the demolition of a Listed Building or any building listed by virtue of being within its curtilage, will only be permitted if, where relevant, the following criteria are met:

a. it is not possible to continue to use the Listed Building for its existing, previous or original purpose or function, and;

b. every effort has been made to continue the present use or to find another use, with or without physical alteration, or;

c. the historic character or appearance of the main building would be restored or improved by the demolition of curtilage building (s), or;

d. substantial benefits to the community would derive from the nature, form and function of the proposed development, and (in all cases);

e. demolition would not result in the creation of a permanently cleared site to the detriment of adjacent listed buildings.

2. if permission is granted in conformity with any of the above criteria, it will be made subject to a condition, agreement or undertaking that any necessary demolition is not to be carried out until all the relevant details of the successor development have been approved and a contract has been entered into for its subsequent execution.

- Policy HE2

1. Development requiring the incidental alteration or extension of any listed building (or buildings) will not be permitted unless, where relevant, means of access to and the siting, design and external appearance of the proposed development would:

a. respect the Listed Building's character and appearance and would also,

b. serve to preserve, restore or complement its features of special architectural or historic interest and, where applicable,

c. contribute to the character or appearance of any group of Listed Buildings or conservation area of which it forms part or within which it is located.

- Policy HE3

Planning permission will not be granted for development, which would adversely affect the setting of any Listed Building.

- Policy HE5

The district council will prepare and maintain a list of buildings of local architectural or historic interest through the preparation of supplementary planning guidance. The contribution made to the local scene or local historical associations will be a material consideration in the determination of planning applications.

- Policy HE6

1. The district council will require proposals for new development in conservation areas to preserve or enhance its special character or appearance.

2. Proposals will be assessed against the conservation area character survey for that area where produced.

- Policy HE8

1. Development within conservation areas, requiring or involving demolition, may be permitted if the buildings in question make a negative or insignificant contribution to the character or appearance of the area, or if the design quality of the proposed redevelopment is considered to be an enhancement.

2. There should be firm and appropriately detailed proposals for the redevelopment of the site that have been approved and their implementation assured by conditions or agreements.

3. Buildings identified as of local interest will enjoy a general presumption against such demolition.

- Policy HE10

In the historic towns of High Wycombe, Marlow and Princes Risborough, the burgage and other historic plots to the rear of principal streets will generally be protected from amalgamation and development that would diminish their historic interest and value.

- Policy HE11

Development will not be permitted which, although not wholly or partly located within a conservation area, might nevertheless have a visibly adverse effect upon the area's special character or appearance, including intrusiveness with respect to any recognised or recorded familiar views affecting the designated area.

- Policy HE18

Planning permission will not be granted for development which has an adverse effect upon the site or setting of a Scheduled Ancient Monument.

- Policy HE19

1. Planning permission will not be granted for any proposed development which would harm unscheduled archaeological remains or their setting which are considered to be of county, regional or national importance and worthy of preservation.

2. On some sites it may be possible to accommodate the proposed development and keep important remains in situ. planning permission may be granted where the applicant can demonstrate, to the satisfaction of the council, that the

important remains will be physically preserved in-situ without harm to them. Details to ensure this should be submitted to the council as part of the planning application.

3. In cases where the preservation of archaeological remains in-situ is not merited, planning permission may be granted subject to provision being made for archaeological excavation and recording to the satisfaction of the council.

- **Policy HE20**

Development likely to have an adverse effect upon the special historic interest or setting of existing parks and gardens will not be permitted.

Milton Keynes Council

1.3.29 The Milton Keynes Core Strategy was adopted by the Council in July 2013, strategic policies relevant to the Historic Environment include:

- **Policy CS19 The Historic and Natural Environment**

Developments will protect and enhance the significance of the Borough's Heritage Assets, including important elements of the 20th Century New Town architecture. Development proposals must consider the character, appearance and setting of sites, buildings, structures, areas, parks and gardens and landscapes that are of historic, architectural, cultural, biodiversity or archaeological significance.

Green infrastructure will be protected and enhanced. Open space will be provided in line with the Council's standards. The existing linear parks system along the Broughton, Caldecotte and Loughton Brooks will be extended into the urban extensions and along the Ouse and Ouzel Valleys to the north to provide multi-purpose green infrastructure that:

1. is attractive;
2. is safe and well used for recreation;
3. meets the needs of existing and future residents;
4. achieves a net gain in biodiversity;
5. is designed to manage flood risk.

Development will protect and enhance the condition and strength of character of the different landscapes of the Borough and respect their local and Borough-wide significance as identified in a Landscape Character Assessment.

1.3.30 Policies adopted from the previous 2005 Local Plan include:

- **PROTECTION OF ARCHAEOLOGICAL SITES POLICY HE1**

Planning permission will be refused for development proposals that would have an adverse impact upon a Scheduled Ancient Monument or its setting, or unscheduled site of local, regional or national importance or their settings.

Where development is proposed affecting an unscheduled site of known archaeological interest then archaeological investigations will need to be carried out to establish a mitigation and/or excavation strategy prior to development being permitted.

Where development is permitted, consent will be subject to a legal agreement and/or conditions, to ensure that:

(i) Archaeological remains are preserved in situ; or

(ii) In appropriate circumstances, provision is made for the evaluation, excavation and recording of below and above ground archaeological remains prior to and during development, followed by post excavation research and publication of the results of the investigation.

- **BUILDINGS OF SPECIAL ARCHITECTURAL OR HISTORIC INTEREST (LISTED BUILDINGS) POLICY HE2**

The Council will exercise its Planning and Listed Building Control powers to safeguard the preservation of Listed Buildings by permitting a change of use where it would contribute to the retention of the building without adversely affecting its character, special interest or structural integrity.

The Council will exercise its concurrent development control powers to ensure or secure the preservation of statutorily listed buildings. Development involving the change of use of listed buildings may be permitted where it would demonstrably contribute towards the restoration, retention or future maintenance of such buildings, without adversely affecting their special architectural or historic interest. Where an application for a change of use will require alterations to a listed building, an application for Listed Building Consent should be submitted at the same time.

- **DEMOLITION OF A LISTED BUILDING POLICY HE3**

Development requiring the demolition of a listed building will not be permitted unless all the following criteria are met:

i) It is not possible to continue to use the building for its existing or a previous use;

ii) There is no other viable use for the building;

iii) Demolition would not cause harm to the setting of any other listed building, the character of the street scene or the character of a Conservation Area;

iv) Clear and convincing evidence is provided with the application to show that all reasonable efforts have been made to continue the existing use or find an appropriate new use and that those efforts have failed. If, exceptionally, permission is granted, it may be made subject to a condition that development (involving demolition) is not to be carried out until all the relevant details have been submitted to and approved by the Council and a binding contract has been let for the subsequent execution of such development.

- **EXTENSION OR ALTERATION OF A LISTED BUILDING POLICY HE4**

Development requiring the internal alteration or external extension of a listed building (or buildings) will not be permitted unless:

In relation to external extension - where relevant, the siting, design, external appearance, access to and landscaping of the proposed development would respect the listed building's setting, integrity, character and appearance and would also serve to preserve, restore or complement its features of special architectural or historic interest.

In relation to internal alteration – the development will not adversely affect the building's character or features of special architectural or historic interest.

- **DEVELOPMENT AFFECTING THE SETTING OF A LISTED BUILDING POLICY HE5**

Planning permission will be refused for any form of development that would adversely affect the setting of a listed building or group of listed buildings. This setting may extend well beyond their immediate building curtilage(s) and may include an extensive street scene or a wider urban design context, especially when the application site is located within a designated conservation area. Applications may need to be advertised under sections 67 or 73 of the Planning (Listed Buildings and Conservation Areas) Act 1990 and may, in appropriate cases, require the concurrent submission of details relating to the siting, access, design, external appearance and landscaping of the proposed development.

- **CONSERVATION AREAS POLICY HE6**

Development proposals within or affecting the setting of a Conservation Area should preserve or enhance the character and appearance of the area.

The criteria used to assess such proposals are set out in English Heritage Guidance on the Management of Conservation Areas (1995); and interpreted in Character Statements for specific Conservation Areas.

Full planning applications will be required for all proposals in Conservation Areas, including detailed plans and elevations showing the new development in its setting.

Conservation consent for demolition will be refused for buildings or features that make a positive contribution to the character and appearance of a Conservation Area, unless the proposed redevelopment would enhance the character of the area.

- **PROTECTION OF HISTORIC PARKS AND GARDENS POLICY HE8**

Planning permission will be refused for development that would adversely affect the special interest of Historic Parks and Gardens identified on the Proposals Map. The Council will encourage the conservation and / or restoration of their landscape and architectural features where this is based on thorough historic research.

Central Bedfordshire

1.3.31 The Core Strategy was adopted by Central Bedfordshire Council in November 2009. It sets out the objectives, spatial strategy and policies to guide development, in relation to the Historic Environment, this includes:

- **Policy CS15: Heritage**

The Council will:

Protect, conserve and enhance the district's heritage including its Listed Buildings, Scheduled Ancient Monuments, Conservation Areas, Registered Parks and Gardens and archaeology and their setting.

Conserve and where appropriate enhance the quality and integrity of the local built and natural environment, including historic structures or open green spaces considered to be of special local interest.

Designate and keep under review Conservation Areas in order to protect or enhance their special architectural or historic interest. This will include the implementation of an on-going programme of Conservation Area Character Appraisals to include a review of their special interest and boundaries. Monitor and survey the condition of Listed Buildings and periodically review and update a

Register of Buildings at Risk, providing appropriate grant assistance to encourage their essential sympathetic repair.

1.3.32

The associated Development Management Policies include:

- Policy DM13: Heritage in Development

The Council will ensure that:

proposals for development relating to Listed Buildings and registered Parks and Gardens will pay particular attention to the conservation of locally distinctive features and uses;

planning applications for development within Conservation Areas will be assessed against the Conservation Area appraisals and inappropriate development will be refused.

Bedford Borough Council

1.3.33

The Core Strategy and Rural Issues Plan Development Plan was adopted by the Council in April 2008 and sets out the long term spatial vision for Bedford Borough, including:

- POLICY CP23 – HERITAGE

Development will be required to protect and where appropriate enhance:

- i. the character of conservation areas, scheduled ancient monuments, historic parks and gardens, listed buildings and other important historic or archaeological features; and,
- ii. the borough's cultural assets, including its landscape, in order to underpin sense of place, cultural identity and promote quality of life.

A new Local Plan is in preparation but until it is adopted, policies from the 2002 Local Plan are used in the decision making process for planning applications. Those relating to the Historic Environment are:

- POLICY BE11

The Borough Council will ensure that all new development within, adjoining, or likely to affect the setting of conservation areas, preserves or enhances its character or appearance. Applications will be assessed against the following criteria:

- ii) the scale, form and density of development in relation to its surroundings;
- iii) the quality and type of materials and architectural detailing;
- iv) levels of traffic generation, the visual impact of car parking/servicing arrangements or other environmental problems which could have an adverse effect on the character of the area;
- v) the effect on the streetscape, roofscape and skyline including important views both into and out of the area;
- vi) whether or not any open space will be affected by the proposals;
- vii) the extent to which the proposed works would bring about substantial benefits in terms of economic regeneration and environmental enhancement.

- POLICY BE13

Demolition consent will be refused where the building or other structure make a positive contribution to the character of the conservation area. An applicant applying for demolition consent will need to demonstrate that the economic viability of alternative uses has been fully investigated and that a satisfactory scheme for redevelopment can be achieved. In considering applications for demolition, the Borough Council will need to have full information about what is proposed for the site.

- **POLICY BE15**

The Borough Council will protect important views in conservation areas and development will not be permitted on any open space which contributes to the inherent character of a conservation area.

- **POLICY BE18**

Listed Building Consent for the demolition of any building of special architectural or historic interest will not be granted other than in the following exceptional circumstances:

i) the condition of the building makes it impracticable to repair, renovate or adapt to any reasonable economic use for which planning permission may be given, or to enable it to be incorporated into any redevelopment scheme; or

iii) the proposed works would produce substantial benefits for the community which would decisively outweigh any loss arising from demolition.

In all cases, before any listed building consent is granted, it should be demonstrated that every possible effort has been made to retain the building in its current use or to find a suitable alternative.

- **POLICY BE19**

In considering applications for Listed Building Consent which involve development, either for alteration, extension or demolition, the Borough Council will take the following into account:

i) the importance of the building in terms of architectural and historic interest at both the local and national level;

ii) the impact on particular features of the building eg. the interior, plan and structure;

iii) the effect of the proposals on the character and setting of the listed building;

iv) the extent to which the proposed works would bring about substantial benefits in terms of economic regeneration and environmental enhancement.

- **POLICY BE20**

The change of use of a listed building will only be permitted if it would not have a detrimental effect on the character or appearance of the building.

- **POLICY BE21**

The Borough Council will seek to preserve and enhance the setting of listed buildings by appropriate control over the design of new development in their vicinity, over the use of adjacent land, and where appropriate, by the preservation of trees and landscape features.

- **POLICY BE22**

When granting Listed Building Consent for development, the Borough Council may impose a requirement for adequate access for the purpose of investigation and recording, during building or other operations.

- **POLICY BE23**

Proposals which would have an adverse effect on scheduled ancient monuments and other important archaeological sites and monuments, and their settings, will not be permitted except in circumstances where the adverse impact of a proposal can be overcome and the site or monument physically preserved in-situ.

- **POLICY BE24**

In considering planning proposals, the Borough Council will have regard to the need to protect, enhance and preserve sites of archaeological interest and their settings. It will where appropriate require the archaeological aspects of development proposals to be examined and evaluated before a planning application is determined. In the absence of an adequate assessment of the archaeological implications, planning permission will be refused.

- **POLICY BE25**

Where the Borough Council decides that the physical preservation in situ of archaeological remains is not justified, and that development affecting such remains should proceed, it will require applicants to submit proposals that:

- i) minimise as far as possible the effect of a proposal on the archaeological remains; and
- ii) ensure satisfactory provision for the excavation and recording of the remains, prior to the commencement of development.

- **POLICY BE26**

Development which would have an adverse effect on the site, setting or enjoyment of any part of the grounds of historic parks and gardens will not be permitted.

- **POLICY BE30**

When determining applications for new development, the Borough Council will have full regard to all material considerations and in particular:

- i) the visual impact of the development and its relationship with the context within which it is placed, and the contribution the building will make to the townscape and landscape qualities of the area, and where appropriate, the extent to which local distinctiveness is reinforced or created;
- ii) the quality of the buildings in terms of scale, density, massing, height, materials and layout;
- iii) the quality of the public spaces created by new buildings in terms of public safety, hard and soft landscaping, and where appropriate how buildings interact with public space;
- iv) any additional traffic expected to arise from the development, either in relation to highway capacity or general disturbance, and provision made for car parking;
- v) the extent to which the development is served by, and makes provision for access by public transport, cycles and pedestrians;
- vi) the suitability of access arrangements to and within new development for all members of the community, including, pedestrians, cyclists and disabled people;

- vii) any noise, smell or other health and safety problems which are likely to be generated by the development;
- viii) the suitability of the existing noise environment;
- ix) any factors which might give rise to disturbance to neighbours and the surrounding community;
- x) any adverse effects on the natural environment and the built heritage likely to arise from the development;
- xi) the proposals for dealing with any significant amounts of waste which may arise;
- xii) the adequacy of the existing infrastructure. Consultation will be undertaken with the appropriate agencies in this respect. If provision is inadequate the Borough Council will seek to phase or postpone the development until adequate infrastructure provision is likely to be available.

1.4 Air Quality

Baseline Conditions

- 1.4.2 Air quality across the Scheme study areas is generally good, particularly in rural areas. However, alongside major roads and in some towns and cities, pollutant concentrations are elevated and in places exceed UK and EU air quality objectives.
- 1.4.3 Road transport is the major source of pollution in the region and, as a result, the pollutant of greatest concern is nitrogen dioxide (NO₂).
- 1.4.4 Particulate matter (less than 10 microns in diameter, PM₁₀ and less than 2.5 microns in diameter, PM_{2.5}) is also of concern in the UK due to the significant health effects associated with this pollutant and the fact that there is no known threshold concentrations below which effects do not occur. Whilst it is unlikely that breaches of the air quality objectives for particulate matter are occurring (as evidenced by monitoring in Central Bedfordshire and Milford Keynes), there is little PM₁₀ baseline data available across the entire study area.
- 1.4.5 In all areas, the principal sensitive receptors for air quality impacts are residential properties, although the density and numbers of receptors vary considerably between urban and rural sections of the Scheme.
- 1.4.6 In addition, there are a number of sites designated at local and national level for nature conservation within the study area, including ancient woodlands (AW), Local Nature Reserves (LNR) and Sheephouse Wood SSSI. The sensitivity of features within these sites to air quality effects will be ascertained in consultation with the Scheme ecologists, during the assessment process.
- 1.4.7 The following subsection descriptions focus on areas of poor air quality and AQMAs.
CDC subsection
- 1.4.8 CDC is in the process of reviewing air quality within Bicester. Previous years' monitoring identified exceedances of the annual mean NO₂ objective, but CDC has deferred the declaration of an AQMA on Queens Avenue/Kings End (~800 m west of the railway station) until the effects of recent road changes on air quality can be quantified.

- 1.4.9 The latest available data (for 2013) suggest that annual mean NO₂ concentrations in Bicester are up to 48.5 µg/m³ at the façade of residential properties (on Kings End South).

AVDC: Claydon/Quainton subsection

- 1.4.10 No monitoring data is available in the Claydon/Quainton subsection, but with the study area being predominantly rural with no major roads, air quality is likely to be good. Monitoring at a background site (Long Meadow, a site distant from main roads) in Aylesbury in 2013 recorded an annual mean NO₂ concentration of 19 µg/m³, which is well below the objective. Concentrations in the study area are likely to be of a similar order of magnitude.

AVDC: Winslow/Swanbourne subsection

- 1.4.11 AVDC monitors air quality in Winslow and previous years' monitoring identified a risk of exceedence of the annual mean NO₂ objective on High Street, a few hundred metres from the Scheme. Data from 2012 and 2013 indicated that there were no monitored exceedences but that concentrations were just below the objective at the most affected receptors (37 µg/m³ at 109 High Street).

AVDC: Aylesbury subsection

- 1.4.12 AVDC has declared three AQMAs in Aylesbury as a result of monitored exceedences of the annual mean NO₂ objective. Of these, the Friarage Road and Stoke Road AQMAs are closest to the Scheme. Diffusion tube monitoring in the Friarage Road AQMA, around 100 m from the Scheme, showed NO₂ concentrations up to 47 µg/m³ in 2013 - well above the objective, although continuous monitoring in the AQMA showed concentrations within the objective. Consideration is being given to whether this AQMA can be revoked. In contrast, monitoring in and around the Stoke Road AQMA, around 200 m from the Scheme, indicated that the extent of this AQMA may need to be extended. Both continuous and diffusion tube monitoring in the AQMA show ongoing exceedences of the air quality objective for annual mean NO₂, with concentrations in 2013 up to 56 µg/m³.

WDC subsection

- 1.4.13 No monitoring data is available in the WDC subsection, but with the study area being predominantly rural with no major roads, air quality is likely to be good.

- 1.4.14 WDC has declared an AQMA alongside the M40 to the south of High Wycombe and proposes to declare an AQMA on the approach roads to High Wycombe Town Centre. NO₂ concentrations also exceed the objective in Marlow. However, none of these areas are within the study area for the Scheme or are likely to be affected by the Scheme.

MKC subsection

- 1.4.15 MKC do not monitor pollution levels in Bletchley at present, although monitoring was previously undertaken at an urban background location on Selbourne Avenue. NO₂ concentrations were consistently well below the objective and monitoring was discontinued in 2005.

- 1.4.16 NO₂ concentrations are monitored in Milton Keynes itself, at both roadside and urban background locations. Air quality in the town is currently good. At the Civic Offices,

2013 annual mean concentrations were 20.9 µg/m³ and well within the objective. Concentrations at this location show no significant temporal trend from 2000 onwards. Pollutant concentrations at roadside locations in the centre of the town were similarly low.

1.4.17 Monitored concentrations of PM₁₀ at the Civic Offices were well below the daily and annual mean objectives in 2013 (and in previous years).

1.4.18 MKC has declared an AQMA in Olney. However, this location is too distant from the Scheme (>10 km) to be affected by construction or operational local air quality impacts.

CBC subsection

1.4.19 CBC declared an AQMA in Dunstable and is in the process of declaring an AQMA in Ampthill and Sandy. In all cases these areas are several kilometres or more from the Scheme and are unlikely to be affected by the works or construction traffic.

1.4.20 The closest monitoring in CBC to the Scheme is undertaken in Brogborough at a kerbside site. This site is approximately 1 km to the north-east of Junction 13 on the M1 where traffic impacts are likely. In 2013, the concentration of annual mean NO₂ was 26.9 µg/m³. This is within the air quality objective. Concentrations closer to the M1 are likely to be higher although there are few receptors in this area.

BBC subsection

1.4.21 BBC has declared an AQMA in Bedford Town Centre. In 2013, concentrations of NO₂ up to 57 µg/m³ were monitored within the AQMA, although concentrations had decreased from previous years. The AQMA is within the study area. Outside of the AQMA, concentrations are below the objective although a mixed use development on Ampthill Road has the potential to increase concentrations in an area where concentrations in 2013 were only just below the objective.

Legislation, Policy and Good Practice

1.4.22 The air quality assessment will consider plans, policies and guidance mandated by the relevant authorities, as well as those recommended by the various relevant regulatory bodies and Local Authorities. These include, but are not limited to:

- Defra, Part IV of the Environment Act 1995, LAQM, Technical Guidance LAQM TG(09) 2009;
- The DMRB, Volume 3, Section 11, Air Quality, May 2007;
- AQS for England, Wales, Scotland and Northern Ireland, 2007, Defra;
- Development Control - Planning for Air Quality, 2010 Update, Environmental Protection UK (EPUK);
- Institute of Air Quality Management (IAQM), Assessment of Dust from Construction and Demolition, 2014; and
- NPPF, 2012.

1.4.23 The air quality objectives set out in the UK's AQS have been transcribed into legislation via The Air Quality (England) Regulations 2000 and The Air Quality (England) (Amendment) Regulations 2002. The requirements of the European Union

Directive on Ambient Air have been implemented by the Air Quality Standards Regulations 2010.

1.5 Noise and Vibration

Baseline Conditions

- 1.5.2 The railway will pass through a mixture of industrial, commercial and residential areas as well as open countryside. Some of the potential receptors are already exposed to noise arising from existing operations.

Legislation, Policy and Good Practice

- 1.5.3 Relevant standards and guidance for noise and vibration assessment of the construction phase of the Scheme include:
- BS 5228:2014 "Noise and Vibration Control on Construction Sites – Part 1 Noise";
 - BS 5228:2014 "Noise Control on Construction and Open Sites – Part 2 Vibration";
 - BS 6472-1:2008, "Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting";
 - BS 7385 Part 2: 1993 "Evaluation and Measurement for Vibration in Buildings. Part 2 Guide to Damage Levels from Groundbourne Vibration"; and
 - Department for Education and Skills: Building Bulletin 93 "Acoustic Design of Schools – A Design Guide".
- 1.5.4 Relevant standards and guidance for noise and vibration assessment of the operational phase of the Scheme include:
- Department for Transport, "Calculation of Railway Noise 1995";
 - Statutory Instrument 1996 No 428, The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996;
 - BS 4142:2014 Methods for Rating and Assessing Industrial and Commercial Sound"; and
 - IEMA 'Guidelines for Environmental Noise Impact Assessment' October 2014.

1.6 Ecology

Baseline Conditions

CDC subsection

- 1.6.2 The western end of the CDC subsection is located in Bicester and therefore predominantly urban. The remainder of this subsection is bordered primarily by farmland. The village of Launton is located within this subsection.
- 1.6.3 This subsection is located within Natural Area 63 – The Thames and Avon Vales. Natural Area 63 is characterised by NE as:

“forming an important element of the essentially English lowland scene with its gently rolling vistas with a mixture of arable and grass fields surrounded by thick hedgerows and interspersed with small woods”².

- 1.6.4 Phase 1 Habitat survey data collected in 2013 and 2014 shows that trackside habitats are dominated by dense scrub and poor semi-improved grassland with small areas of semi-improved neutral grassland, hedgerows, ditches and tall ruderal vegetation.
- 1.6.5 The presence of ecologically valuable habitats/species is likely throughout this subsection, with two designated sites located within 2 km:
- Bure Park LNR; and
 - Stratton Audley Quarries SSSI.
- 1.6.6 Based on the desk based research undertaken to date, and Phase 1 Habitat survey data, the habitats present within this subsection are likely to be suitable for use by a range of protected and/or notable species.
- 1.6.7 Evidence of badger (*Meles meles*) was recorded during Phase 1 Habitat surveys undertaken in 2013.
- AVDC: Claydon/Quainton subsection*
- 1.6.8 The AVDC: Claydon/Quainton subsection includes the villages of Quainton and Calvert, with Winslow bordering the eastern end. The remainder of this subsection is bordered primarily by intensive farmland, woodland, a large landfill site, scattered housing and gardens and incorporates part of the railway not currently open to traffic.
- 1.6.9 This subsection is located across two Natural Areas; the majority of this subsection is located within Natural Area 63 – The Thames and Avon Vales, with the southern end located within Natural Area 64 – The Midvale Ridge. Natural Area 64 is characterised by NE as:
- “a low band of hills stretching east-west across the otherwise low-lying plain of the Thames and Avon clay vales. It contrasts strongly with the clay vales as the soils are generally sandy and free-draining.....This gives rise to a distinctive landscape of dry woodlands, sandy pastures and arable fields....”³.
- 1.6.10 Phase 1 Habitat survey data shows that trackside habitats are dominated by dense and scattered scrub with small areas of semi-improved neutral grassland, bracken, marshy grassland, ephemeral/short perennial vegetation and amenity grassland. Certain parts of the trackside are dominated by broad-leaved semi-natural woodland.
- 1.6.11 The presence of ecologically valuable habitats/species is likely throughout this subsection, with 36 designated sites located within 2 km of the Scheme Area boundary:
- Area north west of Calvert Brickworks Biological Notification Site (BNS);
 - Balmore Wood AW and LWS;
 - Calvert Brick Pits, Great Moor Sailing Club LWS (immediately adjacent to the railway);

² English Nature. *The Thames and Avon Vales*. Natural England.

³ English Nature. *The Midvale Ridge*. Natural England.

- Calvert Jubilee Nature Reserve LWS (immediately adjacent to the railway);
- Calvert Railway Station LWS (immediately adjacent to the railway);
- Decoypond Wood AW and LWS (immediately adjacent to the railway);
- Doddershall Wood AW;
- Finemere Wood SSSI and LWS;
- Fields near Padbury Farm (Area 2) BNS;
- Grassland near Addington BNS (immediately adjacent to the railway);
- Greatsea Wood LWS;
- Grendon and Doddershall Meadows LWS (crossed by the railway);
- Grendon and Doddershall Woods SSSI;
- Grendon Underwood Meadows LWS;
- Hewins Wood AW;
- Home Wood AW;
- Home Wood, Middle Claydon LWS;
- Lawn Farm, Tinkers Hole LWS (immediately adjacent to the railway);
- Lower Farm Fields LWS;
- Marshfield Farm Local Wildlife Site (LWS);
- Padbury Brook, Three Bridge Mill BNS;
- Pond north of Rosehill Farm BNS;
- Quainton Church Pond BNS;
- Railway Cutting north of Twyford BNS;
- Redland Bridge, Steeple Claydon BNS;
- Romer Wood AW and LWS;
- Runts Wood AW and LWS;
- Sheephouse Wood SSSI and AW (crossed by the railway);
- Shrubs Wood AW and LWS;
- South Lake, Addington BNS (immediately adjacent to the railway);
- St Mary the Virgin Churchyard, Addington BNS;
- St Mary the Virgin Churchyard, Marsh Gibbon BNS;
- Track leading to railway BNS (immediately adjacent to the railway);
- Verney Junction Station LWS (immediately adjacent to the railway);
- Wet meadows by disused railway BNS; and
- Wood between Lawn Hill and Dunsty Hill LWS.

1.6.12

The results of the desk based research and field surveys undertaken to date confirm the presence of a number of protected and notable species:

- Nationally Scarce plant species have been recorded within the Calvert Jubilee Nature Reserve LWS (HS2 data);
- Notable bird species known to be present within habitats along this subsection include barn owl (*Tyto alba*), red kite (*Milvus milvus*), Cetti's warbler (*Cettia cetti*), common tern (*Sterna hirundo*), gadwall (*Anas strepera*), turtle dove (*Streptopelia turtur*) and nightingale (*Luscinia megarhynchos*), with the latter five species associated with the Calvert Jubilee Nature Reserve LWS and the Calvert Brick Pits LWS – all records from HS2 surveys and desk study;
- HS2 field surveys have confirmed GCN within this subsection, in particular at the Calvert Jubilee Nature Reserve LWS and at various locations in the Calvert Landfill site;
- Reptiles have been recorded within habitats along this subsection with the presence of grass snake (*Natrix natrix*), adder (*Vipera berus*) and common lizard (*Lacerta vivipara*) confirmed during reptile surveys carried out along the section of railway not currently open to traffic during 2013 and recorded by HS2 in 2012 and 2013;
- Evidence of badgers was previously recorded within habitat areas along this subsection during the Phase 1 Habitat surveys of trackside habitats in 2013;
- The presence of otters (*Lutra lutra*) was confirmed within the Calvert Jubilee Nature Reserve LWS and the Calvert Brick Pits LWS during surveys for HS2;
- The presence of a range of bat species was confirmed by HS2 field surveys. In particular, the presence of a population of Bechstein's bat, associated with Grendon and Dodderhsall Woods, Sheephouse Wood and Finemere Wood was confirmed. This population was assessed by HS2 as being of National Ecological Value. In addition, the presence of a range of bat species was confirmed during bat surveys undertaken during 2014 and by HS2 surveys in 2012 and 2013. The surveys confirmed a number of bat roosts and a maximum of ten species were recorded during activity surveys. The bat populations varied from Regional ecological value to Local/Parish ecological value; and
- Data provided within the HS2 ES indicate the presence/potential presence of a number of notable invertebrates within this subsection. Of particular note is the presence of a number of colonies of black hairstreak (*Satyrrium pruni*) including those associated with Calvert Jubilee Nature Reserve LWS, those associated with Finemere Wood, Sheephouse Wood and Grendon and Doddershall Woods, and in trackside habitat to the south of Steeple Claydon.

1.6.13 In addition to the species discussed above, the habitats within this subsection (and the numerous designated sites present) are considered likely to be of ecological value and have the potential to support a range of other protected and notable species such as water vole (*Arvicola amphibius*), hazel dormouse (*Muscardinus avellanarius*), white-clawed crayfish (*Austropotamobius pallipes*) and protected and/or notable fish species.

AVDC: Winslow/Swanbourne subsection

1.6.14 The AVDC: Winslow/Swanbourne subsection includes two main urban areas; Winslow at the western end and Newton Longville at the eastern end. In addition, the eastern end of this subsection is bordered by the settlements of Milton Keynes and Bletchley. The remainder of this subsection is bordered primarily by intensive farmland and comprises the eastern half of the section of railway not currently open to traffic.

- 1.6.15 This subsection is located within Natural Area 63 – The Thames and Avon Vales.
- 1.6.16 Phase 1 Habitat survey data shows that trackside habitats are dominated by dense and scattered scrub with small areas of semi-improved neutral grassland, bracken, marshy grassland, ephemeral/short perennial vegetation and amenity grassland. Certain parts of the trackside are dominated by broad-leaved semi-natural woodland.
- 1.6.17 The presence of ecologically valuable habitats/species is likely throughout this subsection, with 29 designated sites located within 2 km:
- Broadway and Thrift Wood AW and LWS;
 - Church Hill Farm Fisheries BNS;
 - Claypit near Horwood House BNS (immediately adjacent to the railway);
 - Ex-Brickfield Scrub BNS;
 - Hogpond Wood LWS and AW;
 - Horwood House BNS (immediately adjacent to the railway);
 - Jubilee Pit BNS;
 - Little Horwood Airfield LWS;
 - Middle Salden Wood AW;
 - Newton Longville Brickworks BNS (immediately adjacent to the railway);
 - Norbury Coppice AW and LWS;
 - North Salden Farm BNS;
 - Old Quarry, Winslow BNS (immediately adjacent to the railway);
 - Ponds east of Lower Grove Farm BNS (immediately adjacent to the railway);
 - Railway bank by Salden Wood LWS (immediately adjacent to the railway);
 - Railway Siding east of Salden Wood LWS (immediately adjacent to the railway);
 - Salden Wood AW and LWS (immediately adjacent to the railway);
 - Stearhill Wood AW;
 - Swanbourne Park BNS;
 - Three-fields, Great Horwood BNS;
 - Unnamed BNS near Salden;
 - Wet meadow near Hill Farm BNS; and
 - Wood copse, off Magpie Way LWS.
- 1.6.18 Field surveys and desk based research undertaken to date confirm the presence of a number of protected and notable species:
- Reptiles have been recorded within habitats along this subsection with the presence of grass snake, adder and common lizard all confirmed during 2013;
 - Evidence of badgers was previously recorded during the Phase 1 Habitat surveys in 2013; and

- The presence of a range of bat species was confirmed during bat surveys undertaken in 2014. The surveys confirmed a number of bat roosts and a maximum of ten species were recorded during activity surveys.

1.6.19 In addition to the species discussed above, the habitats associated with the section of railway not currently open to traffic are considered likely to be of ecological value and have the potential to support a range of other protected and notable species such as water vole, otter, GCN, hazel dormouse, white-clawed crayfish and protected and/or notable birds, fish, plants and invertebrates.

AVDC: Aylesbury subsection

1.6.20 The AVDC: Aylesbury subsection includes one main area where urban habitats predominate; Aylesbury at the southern end. The remainder of this subsection is bordered by intensive farmland, woodland, a land-fill site and scattered housing and gardens. The village of Waddesdon is located within 2 km of the Scheme.

1.6.21 This subsection is located across two Natural Areas; the northern section is located within Natural Area 64 – The Midvale Ridge and the southern section is located within Natural Area 63 – The Thames and Avon Vales.

1.6.22 Phase 1 Habitat survey data shows that trackside habitats are dominated by dense and scattered scrub with small areas of poor semi-improved neutral grassland. Within the urban area of Aylesbury the most dominant habitat types are shrub and tall ruderal vegetation.

1.6.23 The presence of ecologically valuable habitats/species is likely throughout this subsection. There are 16 designated sites located within 2 km:

- Aylesbury Arm of the Grand Union Canal BNS;
- Aylesbury Sewage Works LWS;
- Bear Brook BNS;
- Blackgrove Meadows BNS;
- Eythrope Park BNS;
- Lower Farm Fields LWS;
- Medieval Village north of Quarrendon BNS;
- Quainton Church Pond BNS;
- Quarrendon Fields BNS;
- River Thames north of Aylesbury BNS (crossed by the railway);
- River Thames, south east Putlowes BNS;
- Sunny Hill Farm Pastures LWS (immediately adjacent to the railway);
- Three Ponds Meadow LWS;
- Waddesdon Common LWS (immediately adjacent to the railway);
- Waddesdon Park BNS; and
- Waddesdon Station Complex LWS (immediately adjacent to the railway).

- 1.6.24 The results of the desk based research undertaken to date confirm the presence of a number of protected and notable species:
- HS2 field surveys recorded GCN and reptiles within this subsection; and
 - The presence of a number of bat species was confirmed by HS2 bat surveys.
- 1.6.25 In addition to the species discussed above, the habitats within this subsection have the potential to support a range of other protected and notable species such as water vole, otter, hazel dormouse, badger, white-clawed crayfish and protected and/or notable birds, fish, plants and invertebrates.
- WDC subsection*
- 1.6.26 The WDC subsection includes two main areas where urban habitats predominate; Aylesbury just to the north, Monks Risborough and Princes Risborough at the southern end. The villages of Stoke Mandeville, Little Kimble and Great Kimble are located within 2 km of the Scheme.
- 1.6.27 This subsection is located within Natural Area 63 – The Thames and Avon Vales.
- 1.6.28 Phase 1 Habitat survey data shows that trackside habitats are dominated by dense and scattered scrub with small areas of poor semi-improved neutral grassland and hedgerows.
- 1.6.29 The presence of ecologically valuable habitats/species is likely throughout this subsection, with 34 designated sites located within 2 km:
- Askett Meadow and Orchard LWS;
 - Aylesbury Arm BNS;
 - Bledlow Lyde BNS;
 - Brush Hill Complex LWS;
 - Brush Hill LNR;
 - Chilterns Beechwoods SAC;
 - Ellesborough and Kimble Warrens SSSI;
 - Fields around Roundabout Wood BNS;
 - Garden and Orchard, Saunderton BNS;
 - Grangelands and Pulpit Hill SSSI;
 - Grass between Rectory and Chequers LWS;
 - Grassland at North Lee BNS;
 - Great Kimble Pond BNS (immediately adjacent to the railway);
 - Kingsmead Meadow and Pond BNS;
 - Longdown Hill Wood BNS;
 - Longwick Bog LWS;
 - Meadow north of Armour Farm LWS;
 - Monks Risborough Fields BNS;

- North of the Grange BNS (immediately adjacent to the railway);
- Northwest of Beacon Hill LWS;
- Pond Wood and Weyburns Wood BNS;
- Pulpit Wood LWS;
- Pyrtle Spring BNS;
- Saunderton Marsh LWS;
- Saunderton Railway LWS;
- South of Whiteleaf BNS;
- St Nicholas' Churchyard, Great Kimble BNS;
- St. Peter and Paul's Churchyard, Ellesborough BNS;
- Summerleys Cottage Wood BNS;
- Tumulus Field, Great Kimble BNS;
- Whiteleaf and Giles Woods and The Hanging BNS;
- Whiteleaf Golf Course BNS;
- Whiteleaf Hill LNR; and
- Windsor Hill SSSI.

1.6.30 No data is available regarding the presence of protected species within this subsection. However, based on the desk based research undertaken to date, the habitats present within this subsection are likely to be suitable for use by a range of protected and/or notable species.

MKC subsection

1.6.31 The MKC subsection is predominantly located within the urbanised setting of Milton Keynes. Towards the Buckinghamshire county boundary to the east, surrounding habitats beyond the railway become more rural in character. This subsection is located within the Milton Keynes City Local BOA, which is characterised by a gently sloping hill with the Ouse Valley to the north and the Ouzel Valley to the east. Key biodiversity features noted within the BOA include woodlands, the Grand Union Canal, ponds and GCN, traditional orchards, urban green corridors, the Shenley Brook and the Loughton Brook.

1.6.32 This subsection is located within Natural Area 52 – West Anglian Plain. Natural Area 52 is characterised by NE as:

"comprising flat or gently rolling land with managed hawthorn hedges and occasional ancient woods, separated by extensive tracts of intensively managed arable land"⁴.

1.6.33 Phase 1 Habitat survey coverage does not extend into this subsection. There are 15 designated sites located within 2 km of this subsection:

- Black Wood AW;
- Bleak Hall Elfield Park Pond BNS;

⁴ English Nature (1997). West Anglian Plain: Second Draft. Natural England.

- Bleak Hall Railway Cutting LWS (crossed by the railway);
- Blue Lagoon BNS (immediately adjacent to the railway);
- Blue Lagoon LNR (immediately adjacent to the railway);
- Caldecote Lake BNS (immediately adjacent to the railway);
- Grand Union Canal Fenny Stratford to Water Eaton BNS;
- Jubilee Works (excluding Jubilee Pit) BNS;
- Jubilee Works BNS;
- Linford Stanton AW;
- Mount Farm Lake BNS;
- Newton Longville Brickworks BNS (crossed by the railway);
- River Ouzel, Sparks Meadow to west of Eaton Mill BNS; and
- Waterhall Park LWS.

1.6.34 No data is available regarding the presence of protected species within this subsection. However, based on the desk based research undertaken to date, the habitats present within this subsection are likely to be suitable for use by a range of protected and/or notable species.

CBC subsection

1.6.35 The CBC subsection is predominantly bordered by intensive farmland or sub-urban housing and gardens, where it is near small towns and villages, including Woburn Sands, Aspley Guise, Lidlington, Brogborough, and Stewartby. The following four broad locations, which are adjacent to this subsection, may contain aggregations of ecologically valuable habitats / species; Caldecotte Lake which is due north of this subsection to the east of Milton Keynes, Apsley Heath and Woburn Sands Golf course which is south of this subsection and contains aggregations of woodland and scrub, large areas of woodland are south of this subsection, near to the village of Lidlington, and a series of quarries, a country park and several large lakes in the Marston Vale area near Stewartby.

1.6.36 This subsection is located in the Natural Area 52 – West Anglian Plain.

1.6.37 Among other features, former gravel workings with wetland habitats are cited by NE as a key nature conservation resource within this Natural Area. This subsection is located in the 'Settled and Farmed Clay Vales' Biodiversity Character Area as demarked on the Bedfordshire biodiversity characterisation study⁵. In relation to ecological features which are close to this subsection, this study also highlights the importance of wetland habitats in the Marston Vale area for birds and wetland plants.

1.6.38 Phase 1 Habitat survey data shows that trackside habitats are dominated by coarse grassland, tall ruderal vegetation and scattered scrub with small areas of broad-leaved semi-natural woodland, bracken and semi-improved neutral grassland.

1.6.39 The presence of ecologically valuable habitats/species is likely throughout this subsection, with five designated sites located within 2 km:

⁵ Bedfordshire and Luton Recording and Monitoring Centre et al. (January, 2007). Rebuilding Biodiversity In Bedfordshire & Luton Volume II: Biodiversity Characterisation. BedsLife.

- Four areas of unnamed AW; and
 - Heydon Hill AW.
- 1.6.40 The water bodies of the Marston Vale, at the eastern end of this subsection, are known to support one of the largest populations of GCN in Bedfordshire.
- 1.6.41 No other data is available regarding the presence of protected species within this subsection. However, based on the desk based research undertaken to date, the habitats present within this subsection are likely to be suitable for use by a range of protected and/or notable species.
- BBC subsection*
- 1.6.42 The BBC subsection includes one area where urban habitats predominate; Bedford at the eastern end. The remainder of the subsection is bordered by intensive farmland or sub-urban housing and gardens.
- 1.6.43 This subsection is located in the Natural Area 52 – West Anglian Plain.
- 1.6.44 Among other features, former gravel workings with wetland habitats are cited by NE as a key nature conservation resource within this Natural Area. This subsection is located in the 'Settled and Farmed Clay Vales' Biodiversity Character Area as demarked on the Bedfordshire biodiversity characterisation study⁶. In relation to ecological features which are close to this subsection, this study also highlights the importance of wetland habitats in the Marston Vale area for birds and wetland plants.
- 1.6.45 Phase 1 Habitat survey data shows that trackside habitats are dominated by scattered and tall ruderal vegetation with small areas of bracken, amenity grassland and semi-improved neutral grassland.
- 1.6.46 The presence of ecologically valuable habitats/species is likely throughout this subsection, with four designated sites located within 2 km:
- Biddenham Pit SSSI;
 - Bromham Lake LNR;
 - Fenlake meadows LNR; and
 - Hill Rise LNR.
- 1.6.47 The water bodies of the Marston Vale, near the western end of this subsection, are known to support one of the largest populations of GCN in Bedfordshire.
- 1.6.48 No other data is available regarding the presence of protected species within this subsection. However, based on the desk based research undertaken to date, the habitats present within this subsection are likely to be suitable for use by a range of protected and/or notable species.

⁶ Bedfordshire and Luton Recording and Monitoring Centre et al. (January, 2007). Rebuilding Biodiversity In Bedfordshire & Luton Volume II: Biodiversity Characterisation. BedsLife.

Legislation, Policy and Good Practice

1.6.49 The EclA will be compiled with reference to the following relevant nature conservation legislation, planning policy and the UK Biodiversity Framework from which the protection of sites, habitats and species is derived in England:

- The Conservation of Habitats and Species Regulations 2010, as amended (Habitats Regulations);
- The Wildlife and Countryside Act 1981, as amended (WCA);
- The Countryside and Rights of Way (CROW) Act 2000;
- The Natural Environment and Rural Communities (NERC) Act 2006;
- The Protection of Badgers Act 1992;
- The Hedgerow Regulations 1997;
- The Wild Mammals (Protection) Act 1996;
- The UK Post-2010 Biodiversity Framework (2011-2020)⁷;
- Biodiversity 2020: A strategy for England's wildlife and ecosystem services⁸;
- UK Biodiversity Action Plan (UKBAP)⁹;
- The NPPF 2012¹⁰; and
- Circular 06/05 Biodiversity and Geological Conservation - Statutory Obligations and Their Impact within the Planning System¹¹.

Non-Statutory Policies

1.6.50 The 'UK Post-2010 Biodiversity Framework', published in July 2012, has succeeded the UK BAP. BAPs define actions and measures to meet the objectives defined in a Strategy, and specify measurable targets. Accordingly, BAPs determine the broad habitats and species that are of value to the natural environment of the UK, and identify actions and projects that could be undertaken to help protect or enhance the national biodiversity. The UK BAP lists of priority species and habitats remain applicable as reference sources. Notably, they have been used to draw up statutory lists of priority species and habitats (SPIs and HPIs) as required by Section 41 of NERC Act, 2006.

1.6.51 Local Biodiversity Action Plans (LBAPs) are implemented through planning policy, identifying habitats and species of particular value or endangerment at the local or

⁷ JNCC and Defra (July 2012). UK Post-2010 Biodiversity Framework. [on-line] <http://jncc.defra.gov.uk/page-6189> (accessed July 2014).

⁸ Defra (2011). Biodiversity 2020: A strategy for England's wildlife and ecosystem services. DEFRA. London

⁹ The UK BAP has now been replaced by the UK Post-2010 Biodiversity Framework, however, it contains useful information on how to characterise important species assemblages and habitats which is still relevant.

¹⁰ Department for Communities and Local Government (2012). The National Planning Policy Framework. DCLG. London.

¹¹ Office of the Deputy Prime Minister (ODPM) and Defra, 2005, ODPM Circular 06/2005 and Defra Circular 01/05, Government Circular: Biodiversity and geological conservation – statutory obligations and their impact within the planning system, ODPM

regional level. As such, LBAPs have no statutory status, but provide a framework for implementing conservation requirements.

- 1.6.52 Locally designated nature conservation sites (including Sites of Importance for Nature Conservation (SINCs), LWSs, BNSs and Sites of Ecological or Geographical Interest (SEGIs)) are sites of local conservation interest designated by Local Planning Authorities in conjunction with the relevant Wildlife Trust and other nature conservation organisations. Such sites are afforded a measure of protection in Local Development Plans.

1.7 Landscape and Visual Impact

Baseline Conditions

Cherwell District Council (CDC)

- 1.7.2 The general setting of the reporting area is summarised as:

- Urban context in vicinity of Bicester; and
- East of Bicester, of rural character with arable land use, medium sized field patterns and good, well maintained hedgerows to fields and road sides.

- 1.7.3 The LTVIA 5 km study area falls within the following Landscape Character Areas. At a national level, landscape is divided into National Character Areas (NCAs) as defined by NE. There are two NCAs within the LTVIA study area as follows:

- 107. Cotswolds; and
- 108. Upper Thames Clay Vales.

- 1.7.4 At a local level, the Scheme falls within the following local Landscape Character Areas as defined in the *Cherwell District Landscape Assessment for Cherwell District Council (1995)*:

- Otmoor Lowlands;
- Oxfordshire Estate Farmlands;
- Clay Vale; and
- Wooded Estatelands.

- 1.7.5 There are a number of sensitive landscape and townscape designations of importance identified within the study area to date, including but not limited to:

- Conservation Areas;
- Bure Park Local Nature Reserve (LNR);
- Scheduled Monument (SM);
- Listed Buildings (LB);
- Registered Parks and Gardens (RPG);
- Ancient Woodland (AW) - Gravenhill Wood ;
- SSSI Stratton Audley Quarries;
- Green Belt (GB);

- Tree Preservation Orders (TPO) within 1km of Scheme;
- Public Rights of Way (PRoW)
- National Trail/Recreational Route - Cross Bucks Way;
- Category 'A' village – Launton.

AVDC Aylesbury Sub-section

1.7.6 The general setting of the subsection is summarised as:

- Low lying vale landscape with limited topographic variation and containing transport corridors and large villages that due to the open nature and the urban edge of Aylesbury break down the rural character. The Chilterns to the south are the backdrop to many views;
- Strongly defined thickets of mature dense hedgerow vegetation bound the pasture and arable fields in this flat landscape. The network of hedgerows creates a strong sense of enclosure and unity throughout;
- Few woodlands;
- Aylesbury - south of Aylesbury Station – predominantly low rise residential development and area of allotments (Old Stoke Road Allotments);
- Mature trees adjacent to rail corridor in urban setting; and
- Good network of PRoW and bridleways.

1.7.7 The LTVIA 5 km study area for this subsection falls within the following Landscape Character Areas. There are four NCAs:

- 88. Bedfordshire and Cambridgeshire Claylands;
- 108. Upper Thames Clay Vale;
- 109. Midvale Ridges; and
- 110. Chilterns.

1.7.8 At a local level, there are a number of local Landscape Character Types and Areas as defined in the 'Aylesbury Vale Landscape Character Assessment' (2008). The Landscape Character Types are:

- LCT 04 Undulating Clay Plateau;
- LCT 05 Shallow Valleys;
- LCT 08 Vale;
- LCT 09 Low Hills and Ridges;
- LCT 10 Chalk Foothills;
- LCT 11 Chalk Escarpment;
- LCT 12 Chalk Dip Slope; and
- LCT 13 Chalk Valleys.

1.7.9 The Landscape Character Areas are:

- 4.14 Wingrave – Mentmore Ridge;

- 4.15 Weedon Ridge;
- 5.9 Westcott Claylands;
- 5.10 Crawley Narrow Valley;
- 5.11 Thame Valley;
- 8.5 Northern Vale;
- 8.6 Hulcott Vale;
- 8.9 Haddenham Vale;
- 8.10 Southern Vale;
- 9.4 Weddesdon – Eythrope Parkland;
- 9.7 Chearsley Ridge;
- 9.9 A418 Ridge;
- 9.10 Hartwell House and Golf Course;
- 9.11 Berton Ridge;
- 10.4A Wendover Foothills (East);
- 10.4B Wendover Foothills (West);
- 11.1C Chiltern Scarp (Wendover East);
- 11.1D Chiltern Scarp (Wendover West);
- 12.1B Chiltern Dip Slope (Chivery Top); and
- 13.1 Wendover Gap.

1.7.10

There are a number of sensitive landscape and townscape designations of importance identified within the study area to date, including but not limited to:

- AONB - The Chilterns;
- Conservation Areas (CA);
- Area of Very Attractive Landscape (AVAL);
- Scheduled Monuments (SM);
- Registered Parks and Gardens (RPG);
- Ancient Woodlands (AM);
- SSSI;
- Green Belt (GB);
- TPOs (within 1 km of Scheme);
- Recreational Routes (Aylesbury Ring, Bernwood Jubilee Way, Grand Union Canal Walk, Midshires Way, North Buckinghamshire Way, Round Aylesbury Walk, Swan's Way, Thame Valley Walk); and
- Access Land.

AVDC Claydon/Quainton Subsections

- 1.7.11 The general setting of the subsection is summarised as:
- Landfill site near Calvert;
 - National Grid pylons and HV lines traverse about mid-way along this section;
 - Good network of PRow and bridleway;
 - Principal historic landscape elements include the RPG National Trust (NT) properties at Waddesdon Manor and Claydon House;
 - Conservation Areas at Botolph Claydon, Claydon Park and Quainton;
 - Rail corridor generally well vegetated;
 - A network of B roads connects the scattered settlements and farmsteads throughout the Waddesdon and Quainton area;
 - Well-signposted PRow throughout area include the Aylesbury Ring, Bernwood Jubilee Way, Midshires Way, North Buckinghamshire Way, and Swan's Way;
 - Approach to Aylesbury from north west - urban edge industrial and commercial estates characterise views at edge of town; and
 - Visitor attraction at Buckingham Railway Centre at Quainton.
- 1.7.12 The LTVIA 5 km study area for this subsection falls within the following Landscape Character Areas. There are three NCAs:
- 88. Bedfordshire and Cambridgeshire Claylands;
 - 108. Upper Thames Clay Vale; and
 - 109. Midvale Ridges.
- 1.7.13 At a local level, there are a number of local Landscape Character Types and Areas as defined in the *Aylesbury Vale Landscape Character Assessment (2008)*. The Landscape Character Types are:
- LCT 04 Undulating Clay Plateau;
 - LCT 05 Shallow Valleys;
 - LCT 07 Wooded Rolling Lowlands;
 - LCT 08 Vale; and
 - LCT 09 Low Hills and Ridges.
- 1.7.14 The Landscape Character Areas are:
- 4.2 Preston Bissett Plateau Edge;
 - 4.3A Gawcott Ridge (West);
 - 4.3B Gawcott Ridge (East);
 - 4.4 Thornborough – Beachampton Great Ouse Tributaries;
 - 4.6 A421 Ridge;
 - 4.10 Greenway Open Farmland;

- 4.12A Winslow Ridge (West);
- 4.12B Winslow Ridge (East);
- 5.1 Padbury Valley;
- 5.4 Twyford Vale;
- 5.5 Claydon Tributary;
- 5.6 Claydon Valley;
- 5.7 Hogshaw Claylands;
- 5.8 North Marston Undulating Claylands;
- 5.9 Westcott Claylands;
- 7.1 Poundon – Charndon Settled Hills;
- 7.2 Calvert Clay Pits;
- 7.3 Claydon Bowl;
- 7.4 Kingswood Wooded Farmland;
- 7.5 Bernwood Forest;
- 8.1 Marsh Gibbon Vale;
- 8.2 Kingsbridge Valley;
- 8.5 Northern Vale;
- 9.1 Finemere Hill;
- 9.2 Quainton Hill;
- 9.3 Pitchcott – Whitchurch Ridge;
- 9.4 Waddesdon – Eythrope Parkland; and
- 9.6 Ashendon Ridge.

1.7.15

There are a number of sensitive landscape and townscape designations of importance identified within the study area to date, including but not limited to:

- AONB-The Chilterns;
- Conservation Areas (CA);
- Area of Very Attractive Landscape (AVAL);
- Scheduled Monuments (SM);
- Registered Parks and Gardens (RPG);
- Ancient Woodlands (Shrubs Wood, Decoypond Wood, Home Wood, Sheephouse Wood, Romer Wood, Balmore Wood, Runts Wood, Finemere Wood, Hewins Wood, Diddershall Wood);
- SSSI (Sheephouse Wood, Finemere Wood, Grendon and Diddershall Woods);
- Green Belt (GB);
- TPOs (1 km);

- Recreational Routes (Aylesbury Ring, Bernwood Jubilee Way, Cross Bucks Way, Matthew's Way, Midshires Way, Swan's Way, North Buckinghamshire Way); and
- Access Land.

AVDC: Winslow/Swanbourne Subsection

1.7.16 The general setting of the subsection is summarised as:

- Well vegetated rail corridor lies on northern edge of small market town of Winslow;
- Urban context on approach to Bletchley Station – residential to north of corridor and restoration landscape characteristic of clay extraction and brick industry;
- Landfill site to south of rail corridor at Bletchley;
- East of Bletchley, the majority of this area is of rural character with arable land use, medium sized field patterns and good, well maintained hedgerows to fields and road sides; and
- Small scattered woodlands.

1.7.17 The LTVIA 5 km study area falls within the following Landscape Character Areas. There are four NCAs:

- 88. Bedfordshire and Cambridgeshire Claylands;
- 90. Bedfordshire Greensand Ridge;
- 108. Upper Thames Clay Vale; and
- 109. Midvale Ridges.

1.7.18 At a local level, there are a number of local Landscape Types and Character Areas as defined in the *'Aylesbury Vale Landscape Character Assessment' (2008)*. The Landscape Character Types are:

- LCT 04 Undulating Clay Plateau;
- LCT 05 Shallow Valleys; and
- LCT 06 Greensand Ridge.

1.7.19 The Landscape Character Areas are:

- 4.4 Thornborough – Beachampton Great Ouse Tributaries;
- 4.5 Grove Farm Shallow Valley;
- 4.6 A421 Ridge;
- 4.7 Whaddon Chase;
- 4.8 Horwood Claylands;
- 4.9 Newton Longville – Stoke Hammond Claylands;
- 4.10 Greenway Open Farmlands;
- 4.11 Mursley – Soulbury Claylands;
- 4.12A Winslow Ridge (West);

- 4.12B Winslow Ridge (East);
- 4.13 Cublington – Wing Plateau;
- 5.1 Padbury Valley;
- 5.2 Ouzel Valley;
- 5.3 Ouzel Valley Lower Slopes;
- 5.5 Claydon Tributary;
- 5.6 Claydon Valley;
- 5.8 North Marston Undulating Claylands;
- 6.1 Brickhills Scarp; and
- 6.2 Stockgrove Wooded Slopes

1.7.20 There are a number of sensitive landscape and townscape designations of importance identified within the study area to date, including but not limited to:

- Conservation Areas (CA);
- Area of Very Attractive Landscape (AVAL);
- Scheduled Monuments (SM);
- Registered Parks and Gardens (RPG);
- Ancient Woodlands (Salden Wood, Middle Salden Wood, Norbury Coppice, Stearhill Wood, Hogpound Wood, Broadway and Thrift Wood);
- SSSI;
- Green Belt (GB);
- TPOs (Within 1 km of the Scheme);
- Recreational Routes (Cross Bucks Way, Grand Canal Walk, Matthew's Way, Midshire Way, Milton Keynes Boundary Walk, North Buckinghamshire Way, Swan's Way); and
- Access Land.

WDC subsection

1.7.21 The general setting of the subsection is summarised as:

- Lies partly within the Chilterns AONB;
- Lying within the Vale of Aylesbury and dominated to the south east by the Western Escarpment of the Chiltern Hills; a wooded ridge contrasting against the lower agricultural vale;
- Visually rich and cohesive agricultural landscape with attractive scattered historic settlements set in a gently undulating rural landscape with scattered AWs;
- A pattern of large-scale pasture and arable fields bounded by trimmed hedgerows overlays the relatively flat to gently rolling landform;
- Panoramic views across the lower-lying landscape from Coombe Hill, recognised as a special quality of the Chilterns AONB. The lower-lying landscape includes

electricity pylons and the urban edge of Aylesbury, visual detractors which affect the landscape setting;

- Little Kimble – Significant mature trees line west side of rail corridor through village;
- Monks Risborough – rail corridor well vegetated through village; and
- Princes Risborough - lies in the Conservation Area.

1.7.22

The LTVIA 5 km study area of this subsection falls within the following Landscape Character Areas. There are two NCAs:

- 108. Upper Thames Clay Vales; and
- 110. Chilterns.

1.7.23

At a local level, there are a number of local Landscape Character Areas:

- 'Buckinghamshire Landscape Character Assessment'
 - 8: Vale;
 - 10: Chalk Foothills;
 - 11: Chalk Escarpment;
 - 13: Chalk River Valleys;
 - 14: Wooded Plateau;
 - 16: Settled Plateau; and
 - 17: Dipslope with Dry Valleys.
- 'Wycombe District Landscape Character Assessment' (2011)
 - 8.13 Longwick;
 - 10.6 Risborough;
 - 11.2 Wain Hill;
 - 11.3 Combe Hill and Whiteleaf;
 - 13.3 Hughenden;
 - 13.4 Wye;
 - 14.1 Great Hampden;
 - 16.2 Walters Ash and Naphill; and
 - 17.1 Bledlow Ridge.

1.7.24

There are a number of sensitive landscape and townscape designations of importance identified within the study area to date, including but not limited to:

- AONB -The Chilterns;
- National Trust properties (NT);
- Scheduled Monuments (SM);
- Conservation Areas (CA);
- Access Land

- Registered Parks and Gardens (RPG);
- Ancient Woodlands (AW);
- SSSI
- Green Belt (GB);
- TPO (within 1 km of the Scheme);
- National Trail - The Ridgeway; and
- Recreational Routes (Aylesbury Ring, Bledlow Circular Ride, Chiltern Way, Icknield Way Trail, Midshire Way, South Bucks Way, Swan's Way).

MKC subsection

1.7.25 The general setting of the subsection is summarised as:

- Urban context including rail infrastructure; overhead lines and gantries, NR fencing;
- Industrial, commercial and residential development immediately adjacent to rail corridor;
- Open countryside character south of railway towards Bow Brickhill;
- Grid pattern development in Milton Keynes;
- Open space/parks in vicinity of rail corridor;
- Dense tree and shrub belt between B3034, Saxon Street, and rail corridor;
- Scrub on embankments between housing and rail corridor; and
- Bletchley Park Conservation area to west of Bletchley Station and rail corridor and Loughton Conservation area to west of A5, rail corridor and Milton Keynes Station.

1.7.26 The LTVIA 5 km study area of this subsection falls within the following Landscape Character Areas. There are two NCAs:

- 88. Bedfordshire and Cambridgeshire Claylands; and
- 90. Bedfordshire Greensand Ridge.

1.7.27 At a local level, there are a number of local Landscape Character Areas as defined in the 'Milton Keynes Landscape Character Assessment, Draft Report (2007).

- Yardley Ridge;
- Ouse Valley;
- Tove Valley;
- Shenley Lowlands;
- Chichley/Crawley Claylands;
- Clayland Fringes; and
- Brickhills Greensand Ridge.

1.7.28 There are a number of sensitive landscape and townscape designations of importance identified within the study area to date, including but not limited to:

- Blue Lagoon Local Nature Reserve (LNR);
- Conservation Areas (CA) (Bletchley Park and Loughton);
- Scheduled Monuments (SM);
- Registered Parks and Gardens (RPG);
- Ancient Woodlands (AW) (Linford/Stanton Woods, Black Wood);
- SSSI;
- Green Belt (GB)
- TPOs (within 1 km of the Scheme)
- Recreational Routes (Milton Keynes Boundary Walk, Grand Union Canal Walk); and
- Parks (Bletchley Park, The National Bowl, Elfield Nature Park, South Loughton Valley Park).

CBC

1.7.29 The general setting of the subsection is summarised as:

- Large scale open vale landscape;
- Landscape character dominated and shaped by past brick industry leaving large open derelict tracts of land, large water bodies and industrial estates;
- Area contains major transport corridors such as the M1 and A421;
- Well vegetated railway corridor through area and closely follows valley slopes at Brogborough;
- Open and intensive arable landscape. Fields bounded by open ditches or sparse hedges; and
- Escarpment with distinct scarp slope to north-west.

1.7.30 The LTVIA 5 km study area of this subsection falls within the following Landscape Character Areas. There are two NCAs:

- 88. Bedfordshire and Cambridgeshire Claylands; and
- 90. Bedfordshire Greensand Ridge.

1.7.31 At a local level, there are a number of local Landscape Character Types as defined in the '*Mid-Bedfordshire District Landscape Character Assessment*' (2007).

- 1. Arable Clay plateau with Tributaries;
- 5. Settled and Farmed Clay Vales;
- 6. Wooded Greensand Ridge;
- 7. Greensand River Valleys;
- 8. Settled and Farmed Clay Hills;
- Mid Bedfordshire Landscape Classifications;
- 1A: Cranfield to Stagsden Clay Farmland;

- 5C: Salford-Apsley Clay Vale;
- 5D: North Marston Clay Vale;
- 6A: Woburn Greensand Ridge; and
- 7A: Flit Greensand Valley.

1.7.32 There is a number of sensitive landscape, townscape designations of importance identified within the study area to date, including but not limited to:

- Conservation Areas (CA) (Jackdaw Hill, Coney Hill, Apsley Heath);
- Scheduled Monuments (SM);
- Registered Parks and Gardens (RPG);
- Ancient Woodlands (AW) (Heydon Hill);
- SSSI;
- Green Belt (GB);
- TPOs;
- Recreational Routes (Marston Vale Trail, John Bunyan Trail, Milton Keynes Boundary Walk); and
- Marston Vale Community Forest.

BBC

1.7.33 The general setting of the subsection is summarised as:

- Approach to Bedford from south west - urban edge industrial and commercial estates characterise views at edge of town;
- Mature trees near rail corridor and housing in Bedford, particularly east of corridor; and
- Belt of mature trees between rail corridor and River Great Ouse in Bedford.

1.7.34 The LTVIA 5 km study area for this subsection falls within the following Landscape Character Areas. There are two NCAs:

- 88. Bedfordshire and Cambridgeshire Claylands; and
- 90. Bedfordshire Greensand Ridge.

1.7.35 At a local level, there are a number of local Landscape Character Types as defined in the 'Bedfordshire Borough Landscape Character Assessment' (2007).

- 1. Arable Clay plateau with Tributaries;
- 2. Wooded Wolds;
- 3. Limestone River Valley with Open Water;
- 4. Clay River Valleys;
- 5. Settled and Farmed Clay Vales; and
- 6. Wooded Greensand Ridge.

1.7.36 There are a number of sensitive landscape and townscape designations of importance identified within the study area to date, including but not limited to:

- Conservation Areas (CA);
- Local Nature Reserves (LNR) (Fenlake Meadows, Bromham Lake, Hill Rise);
- Scheduled Monuments (SM);
- Registered Parks and Gardens (RPG);
- Ancient Woodlands (AW);
- SSSI (Biddenham Pit);
- Green Belt (GB);
- TPOs;
- Recreational Routes (John Bunyan Trail, Ouse Valley Way, Marston Vale Trail); and
- Marston Vale Community Forest.

Legislation, Policy and Good Practice

1.7.37 The LTVIA will take into account the legislation relevant to LTV policy, including the European Landscape Convention and Hedgerow Regulations 1997.

NPPF

1.7.38 The LTVIA will refer to the NPPF which forms the wide, national policy context for the Scheme. The relevant planning principles and objectives will be identified and referenced in the report.

Local and Regional Planning

1.7.39 The LTVIA will cover study areas in the administrative boundaries of six LPAs. The local policy documents in each of the following LPAs will be considered in the LTVIA:

Table 10 Local and Regional Policy Documents

Local Authority Area	Local and Regional Policy
CDC	Cherwell Local Plan 2011-2031 (submitted for approval); Non-Statutory Cherwell Plan 2011 (December 2004); Adopted Local Plan 1996 (November 1996); Local Plan Part 2 (to be prepared); and Supplementary Planning Documents – in preparation
AVDC	Adopted Aylesbury Vale District Local Plan; and Vale of Aylesbury Local Plan – in preparation.
WDC	Wycombe District Local Plan; and Adopted Core Strategy.
MKC	Milton Keynes Local Plan (2005); and Core Strategy (adopted 2013).
CBC	North Local Development Framework – North Area; Core Strategy and Development Policies Development Plan (North) to 2026; South Local Development Framework – South Area; and Endorsed Luton and South Beds Joint Core Strategy 2011.
BBC	Local Plan 2032; and Core Strategy and Rural Issues Plan 2008.

1.8 Water Quality and Hydrology

Baseline Conditions

CDC subsection

- 1.8.2 To the east of Bicester, the railway crosses Langford Brook, a designated main river under the jurisdiction of the EA, and it's associated Flood Zone 3. The quality of Langford Brook is monitored against the objectives of the Water Framework Directive (WFD) and is assessed to currently have 'moderate' ecological quality.
- 1.8.3 Further east at approximate grid reference 461854, 223553 the railway crosses Launton Brook, designated as an ordinary watercourse to the north of the railway and therefore under the jurisdiction of OCC and designated as a main river to the south of the railway and therefore under the jurisdiction of the EA. Water quality within this watercourse is monitored against the objectives of the WFD and is assessed to currently have 'bad' ecological quality.
- 1.8.4 A small pond is located immediately to the north of the railway at approximate grid reference 461544, 223485; the quality or ecological value of this pond is currently unknown.

AVDC: Claydon/Quainton subsection

- 1.8.5 The railway passes immediately north and east of a number of discussed disused clay pits to the north of the village of Calvert. The lakes, which include Grebe Lake and Itter's Pit, are a LNR for wildfowl and are also used for sailing, angling (by the Calvert Angling Club) and kayaking.
- 1.8.6 The railway passes immediately to the west of Sheephouse Wood SSSI and Finemere Wood SSSI to the south of the village of Calvert. The importance of these sites to aquatic ecology is currently unknown, although a number of watercourses flow through the sites and continue beneath the railway. A small pond is also located adjacent to the railway in the vicinity of Finemere Wood.
- 1.8.7 The railway crosses the River Ray to the south of Finemere Wood, a designated main river under the jurisdiction of the EA. Between Claydon Junction and the village of Quainton, the railway crosses a number of other ordinary watercourses under the jurisdiction of BCC and main rivers under the jurisdiction of the EA that flow west to confluence with the River Ray further downstream. Water quality within the River Ray is monitored against the objectives of the WFD and is assessed to currently have 'moderate' ecological quality and 'good' chemical quality.
- 1.8.8 Between Claydon Junction and Winslow, the railway crosses a number of ordinary watercourses under the jurisdiction of BCC that generally flow north towards Padbury Brook. One of the most important of these watercourses is Claydon Brook, located between the villages of Steeple Claydon and Addington, and its associated Flood Zone 3. Water quality within Claydon Brook is monitored against the objectives of the WFD and is assessed to currently have 'moderate' ecological quality. A lake known as South Lake is located immediately to the north of the railway at the location of the crossing of Claydon Brook. The ecological value of this lake is currently unknown.
- 1.8.9 A NT property at Middle Claydon is located approximately 1 km to the south of the railway. The grounds include two lakes that are controlled by the Leighton Buzzard Angling Club predominantly stock catfish, tench, bream, carp, roach and rudd.
- 1.8.10 The railway is not indicated to be located within a designated groundwater SPZ and groundwater resources within the study area are not monitored against the objectives of the WFD.

AVDC: Winslow/Swanbourne subsection

- 1.8.11 Between Winslow and Bletchley, the railway crosses a number of ordinary watercourses under the jurisdiction of BCC. One of the most important of these is the watercourse immediately to the north-east of Winslow that flows beneath the railway from the north before turning and flowing beneath the railway again from the south. From here the watercourse flows west to discharge to Claydon Brook.

AVDC: Aylesbury subsection

- 1.8.12 Approximately 500 m to the south of the Buckinghamshire Railway Centre, the railway crosses a main river (name currently unknown) under the jurisdiction of the EA. The watercourse and its associated floodplain flows adjacent to the railway in an easterly direction for approximately 1 km south of the Railway Centre and again for approximately 1 km to the north of Aylesbury Vale Parkway. Immediately to the north of Aylesbury Vale Parkway, the watercourse crosses beneath the railway for a second time and continues south to confluence with the River Thames. Water quality

within this watercourse is monitored against the objectives of the WFD and is assessed to currently have 'poor' ecological quality.

- 1.8.13 The River Thame, a main river under the jurisdiction of the EA, flows beneath the railway to the south of Aylesbury Vale Parkway and continues in a south-westerly direction. Water quality within the River Thame is monitored against the objectives of the WFD and is assessed to currently have 'poor' ecological quality, with upstream tributaries assessed as having 'moderate' and 'bad' ecological quality.
- 1.8.14 Land within the centre of Aylesbury and in the vicinity of Aylesbury Station is indicated to be at fluvial flood risk associated with Bear Brook and California Brook (both main rivers under the jurisdiction of the EA) that flow adjacent to the north and south of the railway respectively. Water quality within Bear Brook is monitored against the objectives of the WFD and is assessed to currently have 'moderate' ecological quality.
- 1.8.15 California Brook confluences with Bear Brook to the north-west of Aylesbury Station, prior to Bear Brook continuing to flow in a north-westerly direction to confluence with the River Thame on the outskirts of the town.
- 1.8.16 A number of other minor watercourses, ditches and main rivers (principally within the urban areas of Aylesbury and west of Stoke Mandeville) flow beneath and within close proximity to the railway between Quainton and Stoke Mandeville and discharge to the catchment of the River Thame.
- 1.8.17 The Grand Union Canal is located approximately 360m east of Aylesbury Station.

WDC subsection

- 1.8.18 The railway crosses two main rivers (names currently unknown) to the north of Little Kimble that flow in a westerly direction to confluence with the River Thame.
- 1.8.19 A number of other minor watercourses flow beneath and within close proximity to the railway between Stoke Mandeville and Princes Risborough Station and discharge to the catchment of the River Thame.

MKC subsection

- 1.8.20 Blue Lagoon LNR is located approximately 200 m south of the railway on the approach to Bletchley Station. The Blue Lagoon is formed of former clay pits and is known to offer a diverse range of aquatic habitat. It is also popular for recreation and, in particular, scuba diving.
- 1.8.21 A smaller but still significant pond is indicated immediately between the crossing of the Scheme and the West Coast Main Line (WCML), although the ecological value of this feature is currently unknown.
- 1.8.22 The railway passes immediately to the east of Loughton Valley Park to the south of Milton Keynes Station and approximately 300 m to the east of Lodge Lake to the north of Milton Keynes Station. An ordinary watercourse, Loughton Brook, flows through the Loughton Valley Park and Lodge Lake and continues north to discharge to the River Great Ouse to the north of Wolverton Station. The Brook passes beneath the railway to the south of the A422 and a tributary of Loughton Brook passes beneath the railway north of the A422.

- 1.8.23 The lakes and ponds within Loughton Valley Park and Lodge Lake comprise manmade balancing ponds required to store flood waters prior to controlled release to Loughton Brook. Lodge Lake is also used for coarse fishing by the Milton Keynes Angling Association.
- 1.8.24 The Grand Union Canal passes beneath the railway approximately 200 m south of Wolverton Station and again approximately 200 m to the east of Fenny Stratford Station.
- 1.8.25 Water quality within Loughton Brook, the River Great Ouse and Grand Union Canal is monitored against the objectives of the WFD and all are assessed to currently have 'moderate' ecological quality. The River Great Ouse is also assessed to currently have 'good' chemical quality (noting that chemical quality is not monitored within the other named watercourses).
- 1.8.26 The River Ouzel, a main river under the jurisdiction of the EA, flows in a northerly direction beneath the railway approximately 400 m to the east of Fenny Stratford Station. The river continues north to confluence with the River Great Ouse in Newport Pagnell to the north-east of Milton Keynes. Water quality within the River Ouzel is monitored against the objectives of the WFD and is assessed to currently have 'moderate' ecological quality and 'good' chemical quality.
- 1.8.27 The River Ouzel feeds Caldecotte Lake, a manmade lake that is located immediately to the north of the railway. The lake is popular for watersports, particularly sailing and rowing, as well as bird watching. Immediately north of Caldecotte Lake is Walton Lake, originally built as a balancing pond but now dense with reeds and popular for bird watching.
- 1.8.28 A number of smaller ponds are located in the vicinity of Woburn Sands, although their purpose and ecological value are currently unknown.

CBC subsection

- 1.8.29 Between Woburn Sands and the M1 motorway, the railway crosses a number of ordinary watercourses that generally flow in a northerly direction and into the catchment of the River Ouzel and eventually the River Great Ouse. One of the most significant of these is Broughton Brook that flows immediately to the west of Junction 13 of M1 motorway and that passes beneath the railway, motorway and associated slip roads before continuing north to the River Ouzel. Water quality within this watercourse (and a tributary approximately 500 m west) is monitored against the objectives of the WFD and is assessed to currently have 'good' ecological quality.
- 1.8.30 The railway passes approximately 500 m south of Lidlington Lake (also known as Brogborough Lake) located to the north of the village of Lidlington. The lake, which is formed of a disused pit, is reported to be popular for bird watching, fishing, sailing and other watersports. The lake is monitored against the objectives of the WFD and is reported to currently have 'good' ecological quality.
- 1.8.31 A large number of lakes form the Marston Vale Millennium Country Park, located immediately adjacent to the western alignment of the railway between Lidlington and Stewartby. The Park is reported to cover over 225 ha and provides a mix of woodland, grassland, meadow, lakes and wetland habitats. Further disused pits that have filled with water are located within the study area to the east of the railway.

- 1.8.32 Stewartby Lake, within the north of the Marston Vale Millennium Country Park, is monitored against the objectives of the WFD and is reported to currently have 'poor' ecological quality.

BBC subsection

- 1.8.33 Further disused pits that have filled with water are located within the study area to the east of the railway on the approach to Bedford. Elstow Brook, an ordinary watercourse under the jurisdiction of BBC, flows parallel to the railway from Stewartby towards Bedford, passing beneath the railway north of Kempston Hardwick Station. Water quality of this watercourse is monitored against the objectives of the WFD and is reported to currently have 'moderate' ecological quality and 'good' chemical quality.

- 1.8.34 The railway crosses the River Great Ouse, a designated main river under the jurisdiction of the EA, between Bedford St Johns Station and Bedford Station. Water quality of the River Great Ouse is monitored against the objectives of the WFD and is reported to currently have 'moderate' ecological quality and 'good' chemical quality.

Legislation, Policy and Good Practice

- 1.8.35 The assessment will be informed by review of international, national and local legislation, policies and guidelines in relation to water resources, water quality and flood risk, including:

- Water Framework Directive (2000/60/EC);
- Floods Directive (2007/118/EC);
- The NPPF;
- The Water Act 2014;
- The Flood Risk Regulations 2009;
- The Flood and Water Management Act 2010;
- Environment Agency Groundwater Protection: Policy and Practice (GP3);
- The Water Resources Act 1991
- The Environmental Permitting (England and Wales) Regulations 2010;
- Pollution Prevention Guidelines (PPGs); and
- Local Planning Policy and Guidance.

1.9 Geology, Soils and Land Contamination

Baseline Conditions

- 1.9.2 A high level overview of the baseline conditions are provided below per subsection.

CDC subsection

- 1.9.3 Geological conditions along this subsection of the Scheme comprise bedrock of the Kellaways formation (sand or clay) to the west and mudstone of the Peterborough and Stewartby Members of the Oxford Clay Formation to the east. Overlying superficial deposits are generally absent, and are typically only present as alluvium associated with surface water channels.

- 1.9.4 There is limited evidence of significant quarrying associated with this subsection of the Scheme, although there is the potential for areas of mineral extraction (and backfilling) which are not detailed in mapping reviewed to date.
- 1.9.5 Existing rail track, which is understood to be active still operational railway land (albeit with limited use), has been present since earliest available mapping (c.1880s) within the proposed Scheme Area and therefore, land contamination associated with current and historical railway land use is possible.
- 1.9.6 Surrounding Bicester Town train station, there was formerly a coal depot, brick works and gas works, which are no longer present. Former brick fields and industrial sites may have been backfilled with demolished materials possibly left on site. Whilst not necessarily located within the Scheme Area, the backfill material could have the potential for generating ground gas, which could potentially migrate onto the site and accumulate within future proposed buildings/subsurface voids, if constructed on or within the ground.
- 1.9.7 This subsection is considered to be at low risk from UXO, based on an initial assessment.
- 1.9.8 A relatively small historical landfill is registered within 200 m of the Scheme, east of the train station in Bicester. Waste received at this landfill includes inert, industrial, commercial and household waste, although it has been reportedly closed since 1969.
- 1.9.9 A single significant pollution incident to groundwater is reported in the vicinity of subsection, some 400m south of the existing rail track. The pollutant type is listed as unidentified and as the incident occurred seven years ago, it is considered unlikely to have an on-going impact on the Scheme.
- 1.9.10 The railway is not indicated to be located within a designated groundwater Source Protection Zone (SPZ) and groundwater resources within the study area are not monitored against the objectives of the WFD.

AVDC: Claydon/Quainton subsection

- 1.9.11 BGS 1:50,000 mapping of the Claydon subsection indicates that underlying bedrock predominantly comprises various members of the Oxford Clay Formation (mudstone), specifically the Peterborough, Stewartby and Weymouth members and members of the Ancholme Group (specifically the West Walton and Ampthill Clay Formation) which generally comprise mudstones. Superficial deposits comprise meandering strips of Glacial Till, Diamicton and Alluvium intersecting the section, with localised areas, particularly south of Claydon Junction, of no superficial deposits. Mapping from 1879-1880 presents a large-scale brick works near Calvert, to the south of the Scheme, which is no longer present. There is the possibility of other areas of extraction of backfilling.
- 1.9.12 Historical mapping suggests that the railway has been present since before 1880 and therefore, there is potential for historical contamination associated with this land use.
- 1.9.13 This subsection is considered to be low risk from UXO, based on an initial assessment.
- 1.9.14 The former Calvert Brick works was present immediately west of the existing railway. Another brick works and several small extraction pits are mapped adjacent to the Scheme Area boundary south west of Quainton (1877). There is the potential for

other areas of mineral extraction and backfilling which have not been detailed on available mapping.

- 1.9.15 At Calvert, there are four landfills south of the existing railway. These coincide with the location of the former brick works. Three landfills are historic and one landfill is authorised (potentially active), although the latter is more than 1.5 km from the Scheme Area boundary. The available data suggests these landfills received commercial and / or industrial waste.
- 1.9.16 All the landfills post-date the railway and therefore, waste material is unlikely to directly underlie the Scheme. However, there is the potential for the landfills to be generating ground gas, which could have implications for construction and any proposed buildings or railway stations. If the Scheme corridor is widened significantly from the existing corridor, there is the potential for landfill material to be encountered during the construction phase.
- 1.9.17 There are no registered pollution incidents to groundwater or land within the study area of this subsection.
- 1.9.18 The railway is not indicated to be located within a designated groundwater SPZ and groundwater resources within the study area are not monitored against the objectives of the WFD.

AVDC: Winslow/Swanbourne subsection

- 1.9.19 Underlying bedrock geological conditions of the Winslow/Swanbourne subsection comprise various mudstone members of the Ancholme Group within the central and western portion of the Scheme. The extreme eastern part of the subsection, near Newton Longville, is also underlain by mudstone members of the Oxford Clay Formation. Superficial deposits comprise meandering strips of Glacial Till, Diamicton and Alluvium intersecting the section, with localised areas of no superficial deposits. There is limited evidence of significant mineral extraction in close proximity to the scheme in this subsection.
- 1.9.20 The existing railway present within this subsection is not currently open to traffic. Historical mapping suggests that the railway pre-dates the 1880s. There is the possibility, therefore, of historical contamination associated with railway land use.
- 1.9.21 A Phase 1 Survey completed for the entirety of the Scheme has identified the majority of this subsection (specifically the corridor starting immediately west of Winslow and continuing approximately 5 km east) as Rating 6 (i.e. above Moderate Risk) for UXO. Although it is foremost an explosion risk, there is also the possibility of land contamination associated with high explosives. A more detailed assessment of the UXO is required to further understand the possible contamination associated with UXO along this section of the Scheme.
- 1.9.22 A relatively small-scale historic landfill is situated adjacent south of the existing railway approximately 1.7 km east of Winslow. Reported waste includes inert and industrial waste; the landfill reportedly closed in 1996. At the extreme eastern-end of the subsection, there are both authorised and historic landfills immediately south of the existing railway. These are discussed in more detail in the MKC subsection.
- 1.9.23 Again, all landfills post-date the railway but the proximity to the Scheme means there are potential issues associated with landfill gas.

- 1.9.24 A single significant pollution incident to groundwater is identified, within 100 m to the south of the existing rail track at the extreme east of the subsection. The pollutant type is unidentified; the incident was reported to have occurred eight years ago.
- 1.9.25 The railway is not indicated to be located within a designated groundwater SPZ and groundwater resources within the study area are not monitored against the objectives of the WFD.

AVDC: Aylesbury subsection

- 1.9.26 The Aylesbury subsection is predominantly underlain by members of the Kimmeridge Clay Formation (mudstones) to the north. Moving south from central Aylesbury the mapped geology indicates that the railway crosses a relatively narrow band of limestones of the Portland and Purbeck Groups before crossing onto mudstones of the Gault Formation towards the south of Aylesbury. North of Aylesbury, localised areas of alluvium, head deposits and river terrace deposits are present and become more prevalent with proximity to Aylesbury. South of Aylesbury, mapping indicates that superficial deposits underlying the Scheme are generally absent.
- 1.9.27 The existing railway present within this subsection has been present since before 1880. Therefore, there is potential historical contamination associated with this land use. Urbanisation of Aylesbury saw the construction of industrial properties within the Scheme study area, the most significant of which appears to be the industrial park in northwest Aylesbury, which included light engineering works. The industrial area remains present today. Such land uses have the potential to cause ground contamination.
- 1.9.28 This subsection is considered to be at low risk from UXO, based on an initial assessment.
- 1.9.29 There are no landfills identified within the study area of this subsection. A minimum of three significant pollution events to water are recorded by the EA in the Aylesbury area, which occurred between 2003 and 2011. The listed contaminants include oils and fuels or biodegradable wastes or materials. Given that some of the events occurred four years ago, there is the potential for residual impact to affect land underlying the Scheme, although further detail will be required to ascertain the likely extent of impact.
- 1.9.30 The railway is not indicated to be located within a designated groundwater SPZ, although groundwater resources within the study area are monitored against the objectives of the WFD and are reported to currently have 'good' quantitative status and 'good' chemical quality.

WDC subsection

- 1.9.31 The northern part of the subsection comprises mudstones of the Gault Formation, which are shown to extend to around Little Kimble. The subsection then passes over a relatively narrow band of siltstones and sandstones of the Upper Greensand Formation onto sandstones and chalk of the Grey Chalk subgroup (Glaucouitic Marl Member and West Melbury Marly Chalk Formation). Superficial deposits underlying are generally absent, with some localised areas of alluvium, head deposits and river terrace deposits.

- 1.9.32 The existing railway has been present since the earliest available mapping (c.1880s) within the proposed Scheme Area and therefore, land contamination associated with current railway land use is possible.
- 1.9.33 This subsection is considered to be at low risk from UXO, based on an initial assessment.
- 1.9.34 A single historic landfill is located adjacent north of the existing railway, south west of where the A4129 intersects the railway line. The landfill received inert, commercial and household waste and no date of closure is provided. There are no registered pollution incidents within the study area for this subsection.
- 1.9.35 The study area is not indicated to be located within a designated groundwater SPZ, although groundwater resources within the study area are monitored against the objectives of the WFD and are reported to currently have 'poor' quantitative status and 'good but deteriorating' chemical quality.

MKC subsection

- 1.9.36 Underlying the subsection within MKC, bedrock geology largely comprises Oxford Clay Formation (mudstones). North of Milton Keynes Central Station, bedrock changes to sandstone, siltstone and mudstone (Kellaways formation), with localised areas of limestone (Cornbrash and Blisworth Formations) and clay (Blisworth Clay formation). The subsection terminates on the Whitby Mudstone formation.
- 1.9.37 Superficial deposits overlying bedrock in this subsection are more variable. Immediately west of Bletchley, alluvium, typically surrounded with glacial river terrace deposits, is orientated sub-parallel with the railway. In the part of the subsection extending from Bletchley to the north, bedrock is overlain by Diamicton Tills, with alluvium present along surface water channels. North of Milton Keynes Central, there are also localised areas of Quaternary sand and gravel. East of Bletchley, a belt of head deposits is present; in other areas superficial deposits are largely absent.
- 1.9.38 Available historical mapping details several gravel or clay pits adjacent to the Scheme, notably east of Bletchley (such as Woburn Sands). The majority of the pits are no longer present and may have been backfilled with waste materials. Given the number of gravel/clay pits observed in the wider area, it is possible that there are further unmapped pits in proximity to the Scheme.
- 1.9.39 The existing railway has been present since earliest available mapping (c.1880s) within the proposed Scheme corridor and therefore, land contamination associated with current and historical railway land use is possible.
- 1.9.40 This subsection is considered to be low risk from UXO, based on an initial assessment.
- 1.9.41 South west of Bletchley, a series of six landfills are present immediately south of the Scheme; both historic (five) and authorised (one) landfills are present. All the landfills post-date the existing railway and therefore waste material is unlikely to directly underlie the Scheme. However, there is the potential for the landfills to be generating ground gas, which could have implications for railway construction and any proposed buildings or railway stations.

1.9.42 Within the study area, a minimum of five significant pollution incidents have occurred to groundwater, all of which coincide with the landfills south west of Bletchley. Pollutants range from biodegradable wastes to oils and fuel.

1.9.43 The study area is not indicated to be located within a designated groundwater SPZ, although groundwater resources are monitored north of Milton Keynes Station against the objectives of the WFD. Quantitative quality is currently reported to have 'good' status. Chemical quality is currently reported to have 'good' status in the vicinity of Wolverton Station, but 'poor and deteriorating' status south of Wolverton Station.

CBC subsection

1.9.44 BGS 1:50,000 mapping of the site indicates that the bedrock underlying the majority of the Scheme comprises various members of the Oxford Clay Formation (mudstones). Superficial deposits comprise sand and gravel, with alluvium present along main river channels. In other areas, superficial deposits are generally absent.

1.9.45 Available historical mapping shows several gravel or clay pits adjacent to or within the study area (notably near Lidlington and Stewartby). The majority of the pits are labelled as disused or are no longer identified on current mapping and may have been backfilled with waste materials. Given the number of gravel/clay pits observed in the wider area, it is possible that there are further unmapped pits in proximity to the Scheme.

1.9.46 The existing railway has been present since earliest available mapping (c.1880s) within the proposed Scheme Area and therefore, land contamination associated with current and historical railway land use is possible.

1.9.47 This subsection is considered to be low risk from UXO, based on an initial assessment.

1.9.48 There are a minimum of five landfills (a combination of both authorised and historic landfills) within the study area, which are situated adjacent to the existing railway. Some of these correspond with former quarries, for example, those in Stewartby. All the landfills post-date the existing railway and therefore, waste material is unlikely to directly underlie the proposed Scheme. However, there is the potential for the landfills to be generating ground gas, which could have implications for railway construction and any proposed buildings or railway stations.

1.9.49 The study area is not indicated to be located within a designated groundwater SPZ, although groundwater resources are monitored to the south of Woburn Sands and to the south of Lidlington against the objectives of the WFD and are reported to currently have 'poor' quantitative status and 'poor' chemical quality.

BBC subsection

1.9.50 BGS 1:50,000 mapping of the site indicates that below the south west of Bedford the bedrock comprises the Kellaways Sand and Clay Members together with older limestone and mudstone of the Great Oolite Group. Superficial deposits comprise of quaternary sand and gravel, with localised areas where superficial deposits are absent.

1.9.51 The existing railway has been present since earliest available mapping (c.1880s) within the proposed Scheme and therefore, land contamination associated with current and historical railway land use is possible.

- 1.9.52 This subsection is considered to be low risk from UXO, based on an initial assessment.
- 1.9.53 South west of Bedford, landfills straddle the existing railway from Millbrook station heading north east, and also straddle the A421, which runs approximately south-west – north east of the city.
- 1.9.54 Historic landfills close to Elstow are reported to have evidence of control measures (both gas and leachate). There is also the possibility of gassing or migration of leachate from the remaining landfills migrating to the Scheme Area. Landfill gassing may also be a potential longer-term risk for new stations.
- 1.9.55 The groundwater aquifer approximately 500 m to the north-west of Bedford Station is a designated groundwater SPZ. Groundwater resources within the study area are also monitored against the objectives of the WFD and are reported to currently have 'good' quantitative status but 'poor and deteriorating' chemical quality.

Legislation, Policy and Good Practice

- 1.9.56 In addition to the standard EIA legislation, policy and good practice, the following will also be used to inform the EIA in relation to geology, soils and land contamination:
- EA 'Model Procedures for the Management of Land Contamination Guidance (Contaminated Land Report (CLR) 11) 2004; and
 - Environmental Protection Act 1990, Part 2A, Section 78.

1.10 Traffic and transport

Baseline Conditions

- 1.10.1 The list of all crossings and highway interactions can be found in the table in Appendix 13.1.

CDC subsection

- 1.10.2 The CDC subsection contains seven crossings that interact with the Scheme at various locations, consisting of:

- Two highway level crossings;
- Two farm level crossing;
- One over-bridge crossing; and
- Two under-pass crossings.

- 1.10.3 The A4421 Charbridge Lane and two local distributor roads intersect with the Scheme. There are no existing railway stations located in this subsection of the Scheme.

AVDC: Claydon/Quainton subsection

- 1.10.4 The AVDC Claydon/Quainton subsection contains 27 crossings that interact with the Scheme at various locations, consisting of:

- Six farm level crossings;

- 17 over-bridge crossings; and
 - Four crossings by underpass
- 1.10.5 The A413 Buckingham Road and several local distributor roads intersect with the Scheme. There are no existing railway stations located in this subsection of the Scheme.
- AVDC: Winslow/Swanbourne subsection*
- 1.10.6 The AVDC Winslow/Swanbourne subsection contains nine crossings that interact with the Scheme at various locations, consisting of:
- Three over-bridge crossings; and
 - Six crossing by underpass.
- 1.10.7 Several local distributor roads intersect with the Scheme. There are no existing railway stations located in this subsection of the Scheme.
- AVDC: Aylesbury subsection*
- 1.10.8 The AVDC Aylesbury subsection contains 18 crossings that interact with the Scheme route at various locations, consisting of:
- Two footway level crossings;
 - Two farm level crossings;
 - 12 over-bridge crossing; and
 - Two crossings by under-pass.
- 1.10.9 The A41, A418 and several local distributor roads intersect with the Scheme. There are two existing railway stations located in this subsection of the Scheme:
- Aylesbury Vale Parkway; and
 - Aylesbury Station.
- WDC subsection*
- 1.10.10 The WDC subsection contains nine crossings that interact with the Scheme at various locations, consisting of:
- Three highway level crossings;
 - Three over-bridge crossing; and
 - Three crossings by under-pass.
- 1.10.11 Several local distributor and local roads intersect with the Scheme. There are three existing railway stations located in this subsection of the Scheme:
- Little Kimble Station;
 - Monks Risborough Station; and
 - Princes Risborough Station.
- 1.10.12

MKC subsection

- 1.10.13 The MKC subsection contains 29 crossings that interact with the Scheme at various locations, consisting of:
- Four highway level crossings;
 - Two footway level crossings;
 - One farm level crossing;
 - Seven over-bridge crossing; and
 - 15 crossings by under-pass.
- 1.10.14 Of the under-pass crossings one is on the Grand Union Canal - Bridge 95A and the National Cycle Route 6. Of the under-pass crossings one is on the River Ouzel. The A5, A421 and several local distributor and local roads intersect with the Scheme. There are six existing railway stations located in this subsection of the Scheme:
- Wolverton Station
 - Milton Keynes Station;
 - Bletchley Station;
 - Fenny Stratford Station;
 - Bow Brickhill Station; and
 - Woburn Sands Station.

CBC subsection

- 1.10.15 The CBC subsection contains 13 crossings that interact with the Scheme route at various locations, consisting of:
- Eight highway level crossings;
 - One footway level crossings;
 - Five over-bridge crossing; and
 - 15 crossings by under-pass.
- 1.10.16 Of the over-bridge crossings one is across the M1 (east of J13). The A507 and several local distributor and local roads intersect the Scheme route. There are four existing railway stations located in this subsection of the Scheme:
- Aspley Guise Station;
 - Ridgmont Station;
 - Lidlington Station; and
 - Millbrook (Beds) Station.

BBC subsection

- 1.10.17 The BBC subsection contains 18 crossings that interact with the Scheme at various locations, consisting of:

- Three highway level crossings;
- Two footway level crossings;
- 12 over-bridge crossing; and
- A single crossing by under-pass (Old Bedford River).

1.10.18 The A5141, A6, A421 and several local distributor roads intersect with the Scheme route. There are four existing railway stations located in this subsection of the Scheme:

- Stewartby Station;
- Kempston Hardwick Station;
- Bedford Station; and
- A6 Ampthill Road / Bedford St John's Station.

Legislation, Policy and Good Practice

1.10.19 The TA will include the assessment of changes in traffic flows based on the Guidelines for the Environmental Assessment of Road Traffic (Institute of Environmental Assessment of Road Traffic (Institute of Environmental Assessment, 1993¹²). The TA will also follow the DfT Guidance on TAs¹³.

1.11 Electromagnetic Interference

Legislation, Policy and Good Practice

1.11.2 The assessment will be informed by review of international, national and local legislation, policies and guidelines in relation to Electromagnetic Interference (EMI) and Electro Magnetic Compatibility (EMC). These include the following:

- British Standard (BS) EN 50121-1:2006 Railway applications - Electromagnetic compatibility - General;
- BS EN 50121-2:2006 Railway applications - Electromagnetic compatibility - Emissions of the whole railway system to the outside world;
- BS EN 50121- 3-1:2006 Railway applications – Electromagnetic compatibility - Rolling stock - Train & Complete Vehicle;
- BS EN 50121- 3-2:2006 Railway applications – Electromagnetic compatibility - Rolling stock - Apparatus;
- BS EN 50121-4:2006 Railway applications - Electromagnetic compatibility - Emission and immunity of the signalling and telecommunication apparatus;
- BS EN 50121-5:2006 Railway applications - Electromagnetic compatibility - Fixed Power Supply Installations;
- BS EN 61000-6-1:2007 Electromagnetic compatibility (EMC). Generic standards. Immunity for residential, commercial and light-industrial environments;

¹² Institute of Environmental Assessment (1993), 'Guidelines on the Environmental Assessment of Road Traffic'.

¹³ DfT (2007), 'Guidance on Transport Assessments', The Stationary Office.

- BS EN 61000-6-2:2005 Electromagnetic compatibility (EMC). Generic standards. Immunity for industrial environments;
- BS EN 61000-6-3:2007 Electromagnetic compatibility (EMC). Generic standards. Emission standard for residential, commercial and light-industrial environments;
- BS EN 61000-6-4:2007 Electromagnetic compatibility (EMC). Generic standards. Emission standard for industrial environments;
- BS EN 50122-1:1998 Railway applications. Fixed installations. Protective provisions relating to electrical safety and earthing;
- BS EN 50122-2:1999 Railway applications. Fixed installations. Protective provisions against the effects of stray currents caused by d.c. traction systems;
- BS EN 50122-3:2008 Railway applications. Fixed installations. Electrical safety, earthing and bonding. Mutual interaction of a.c. and d.c. traction systems;
- BS EN 61000-4-16:2009 Electromagnetic compatibility (EMC). Testing and measurement techniques. Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz;
- BS IEC 60000-2-7:1998 Electromagnetic compatibility (EMC). Low frequency magnetic fields in various environments; and
- ICNIRP Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz) (1998).

APPENDIX 10.1 – ZONES OF THEORETICAL VISIBILITY

APPENDIX 10.2 – VIEWPOINTS

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Table 1. Proposed Viewpoint Locations

Viewpoint (Area Abbrev) No.	Receptors*	Location
CH1	P, M,R	North west edge of Launton
CH2	P, M	North east edge of Launton.
CH3	P, R,H	Southern edge of Stratton Audley, from the Cross Bucks Way.
CH4	M, R	B4011 east of Arncott Hill and Upper Arncott at PRoW into Piddington NR.
CH5	M, R	Near summit of Muswell Hill, north west of Brill.
A1	M	Aylesbury Parkway Park and Ride.
A2	P	Aylesbury north from residential properties on north of railway.
A3	P	Aylesbury Near centre from residential properties south of railway line.
A4	W	Aylesbury Railway Station.
A5	P	Southcourt, Aylesbury from residential properties west of railway line.
A6	P	South Aylesbury, west of Stoke Mandeville Hospital from residential properties east of railway line.
A7	P,R	Waddesdon north side near Aylesbury Ring trail.
A8	P,R	Waddesdon Hill near Waddesdon Hill Farm and Swan's Way, Midshires Way.
A9	P,R,M	Bishopstone, south west of Aylesbury.
A10	P,R	Farm properties near Blackberry Farm Animal Centre, north east of Waddesdon.
A11	P,M	Western edge of Weedon from the New Road towards the A413.
A12	P	Residential properties in Berryfield, north of the Aylesbury Park and Ride.
A13	P,M	Southern edges of Stoke Mandeville.
A14	R,M	Brill Common from the Bernwood Jubilee Way/
CQ1	P, M,R,	West of Poundon near Poundon Hill from NCR 51.
CQ2	P, R,M	Northern edge of Marsh Gibbon at Cross Bucks Way.
CQ3	P, R	Southern edge of Twyford from PRoW.
CQ4	P, M	East Charndon, north of landfill site.
CQ5	P, M	Southern edge of Steeple Claydon.
CQ6	P, M	Near Calvert Cottages, south of Steeple Claydon looking north.
CQ7	P, M	Near Calvert Cottages, south of Steeple Claydon looking west.
CQ8	P, M	Near Blackmoorhill Farm, west of NT Claydon Court.
CQ9	R, H	From NT Claydon Court looking north.
CQ10	R, H	From NT Claydon Court looking south west.
CQ11	P, M,R	Northern edge of Middle Claydon.
CQ12	P, M,R	Near Claydon Hill Farms from the Cross Bucks Way.
CQ13	P, M, R, W, C	From near Verney Junction from the North Buckinghamshire Way.
CQ14	P, M, R	Northern edges of East Claydon from near the North

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		Buckinghamshire Way.
CQ15	P, M, R	Northern edge of Botolph Claydon.
CQ16	P, R	Hillesden from the Cross Bucks Way.
CQ17	M, R	A413 south east of Padbury.
CQ18	R	Between north west Winslow and South east Addington from the Cross Bucks Way near to rail crossing.
CQ19	P, R	Near Finemeerhill House, Finemeer Hill near junctions of Bernwood Jubilee Way and other PRow.
CQ20	P, M	Near North Farm rail underbridge east of Grendon Underwood.
CQ21	P, M, R	Shipton Lee near Bernwood Jubilee Way.
CQ22	P, R, M, C	Western edge of Quainton.
CQ23	P, R, M, C	Southern edge of Quainton.
CQ24	P, R, M, C	Railway crossing near Buckinghamshire Railway Centre.
CQ25	R, H	Buckinghamshire Railway Centre.
CQ26	P, R	North eastern edges of Grendon Underwood.
WS1	P	Northern edge of Winslow adjacent to railway
WS2	P, R, M	Northern edge of Swanbourne
WS3	P, R, M	Northern edge of Mursley
WS4	P, R, M	Whaddon Road near Crabtree Farm, north of Mursley
WS5	R	South western corner of MK at picnic site near Botale Dump roundabout
WS6	P, R, M	Northern edge of Newton Longville
WS7	P, M, R	Southern edge of Great Horwood from Winslow Road at junction from the North Buckinghamshire Way and Midshire Way
WS8	P, M	North of Little Horwood near The Manor Farm
WS9	P, M, R, H	North of Granborough from Milkknob Hill
WS10	P, M, R	North western edge of North Marston
WS11	P, R	North edge of Oving
W1	P,M	From Marsh, south of Aylesbury.
W2	P	High Holborn Farm, south of Marsh.
W3	P,M	Little Kimble.
W4	P,M	Properties on Grove Lane, Little Kimble.
W5	P,R,W	Little Kimble Rail Station.
W6	P,M,R,H	Ellesborough Road at Aylesbury Ring trail.
W7	P,M	Smoke Row near Great Kimble rail crossing.
W8	P,M	Great Kimble.
W9	P,R	South eastern edge of Meadle.
W10	P,M	Askett near to rail crossing.
W11	P	South western edges of Askett near railway line.
W12	P,M,R,W	Risborough Railway Station (North).
W13	P	North edge of Princess Risborough near railway line.

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W14	P,M	Alscot from the A4129 north west of railway and Princess Risborough.
W15	P,M	Princess Risborough from the A4129 near to railway crossing.
W16	H,P,R	South western edges of Princess Risborough, from Monks Staithe site near to railway line.
W17	P,M,W	Southern edge of Princess Risborough from the B4444 near Horsden junction and Princess Risborough Railway Station.
W18	P	Kimble Wick, north west of Little Kimble.
W19	P,M	Southern edge of Longwick.
W20	P,M	North Lee, south of Stoke Mandeville.
W21	P,M,R	Western edge of Butler's Cross, Ellesborough.
W22	R,H	Public viewing point, Combe Hill from the Chilterns AONB.
W23	R	Picnic site at Cop Hill, east of Princess Risborough.
MK1	P	Residential Properties on southern edge of Bletchley adjacent to railway line.
MK2	P	Residential properties north of Bletchley Park west side of railway line.
MK3	R,H	Bletchley Park.
MK4	R,W,M	Bletchley Railway Station.
MK5	P,W,M	Residential properties and small industrial units south of Bletchley Station east of railway line and viaduct.
MK6	R	Blue Lagoon Park, south Bletchley.
MK7	P	Fenny Stratford north, residential properties south of railway line.
MK8	W,R	Offices adjacent railway line in Caldecotte, MK south.
MK9	P,M	Western edge of Bow Brickhill, south MK.
MK10	P,M,R	Eastern edge of Bow Brickhill, near Bow Brickhill Park, south MK
MK11	P,R	Southern edges of Wavendon Gate, adjacent to the railway line.
MK12	P	Eastern edges of Woburn Sands.
MK13	P,M,R,W	Woburn Sands Station and crossing.
CB1	P,R	Woburn Sands east from the Milton Keynes Boundary Walk.
CB2	P,R,W,M	Aspley Guise Railway Station.
CB3	M,P	Northern edge of Husborne Crawley.
CB4	R	North Brogborough from the John Bunyan Trail.
CB5	P,M,W	Lidlington Railway Station.
CB6	P,M,R	Millbrook Railway Station, south of Marston Vale Millennium Country Park.
CB7	R	Marston Vale Millennium Country Park, footpath and cycle path adjacent railway line.
CB8	P,R,W	Marston Vale Trail from Stewartby railway crossing near to Stewartby Lake.
CB9	M	London Lane south east of Houghton Conquest.
B1	P,R,W	Bedford central, residential properties south of station, adjacent railway line and River Great Ouse.
B2	P	Bedford John's Station.
B3	P	South End, Bedford, Residential properties adjacent railway line.

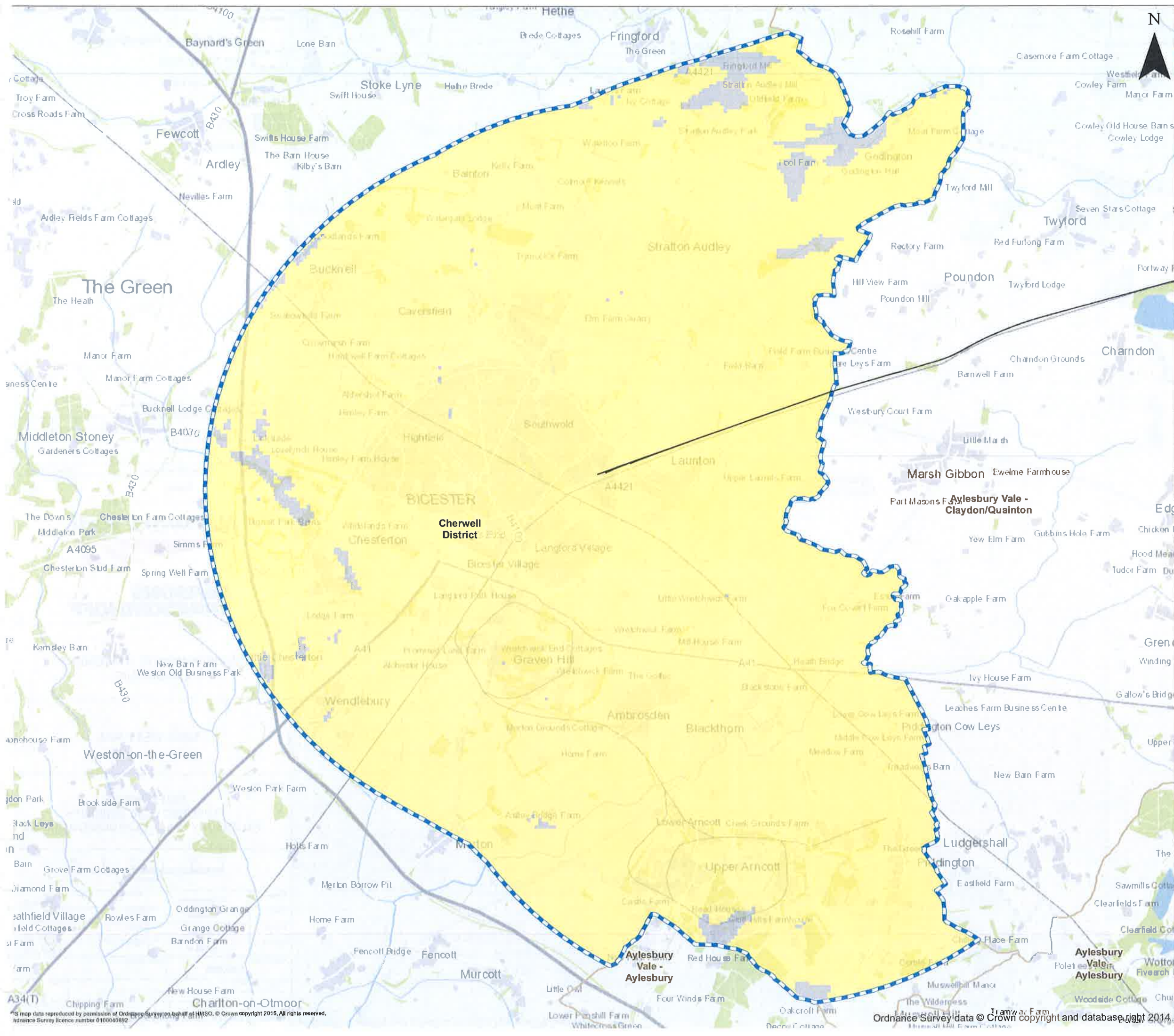
The Network Rail (East West Rail Phase 2) Order

Scheme Scoping Report

B4	P,R,C,W,M	Kempston, south eastern edge.
B5	P,M	South eastern edge of Wootton, south of Kempston.
B6	P,R,W,C,M	Stewartby central.

*Residential (P), Recreational (R), Community (C), Work (W), Road user (M) Cultural Heritage (H)

APPENDIX 13.1 – FEASIBILITY TABLE



Legend/Notes

- Local Authority Reporting Area
- 5km Study Area
- Route Corridor

Visibility:

- Not Visible
- Visible

Note:
ZTV has been generated using OS Terrain 50 data.
Route height = 8m, Observer height = 1.8m

Rev	Date	Description of Revisions	Drawn	Chkd	Appr
		FINAL			

Client: **Network Rail**

Contractor: **PARSONS BRINCKERHOFF**

ENVIRONMENTAL STATEMENT LANDSCAPE

Project: **EAST WEST RAIL**

Drawing Title: **5KM ZONE OF THEORETICAL VISIBILITY CHERWELL DISTRICT COUNCIL**

Scale(s) at A3: **1:50,000** ELR & Mileage

Designed	P.Johnstone	Signed	Date
Drawn	J.Leeke	Signed	20/03/2015
Checked	L.Wholey	Signed	20/03/2015
Approved	S.Walker	Signed	20/03/2015

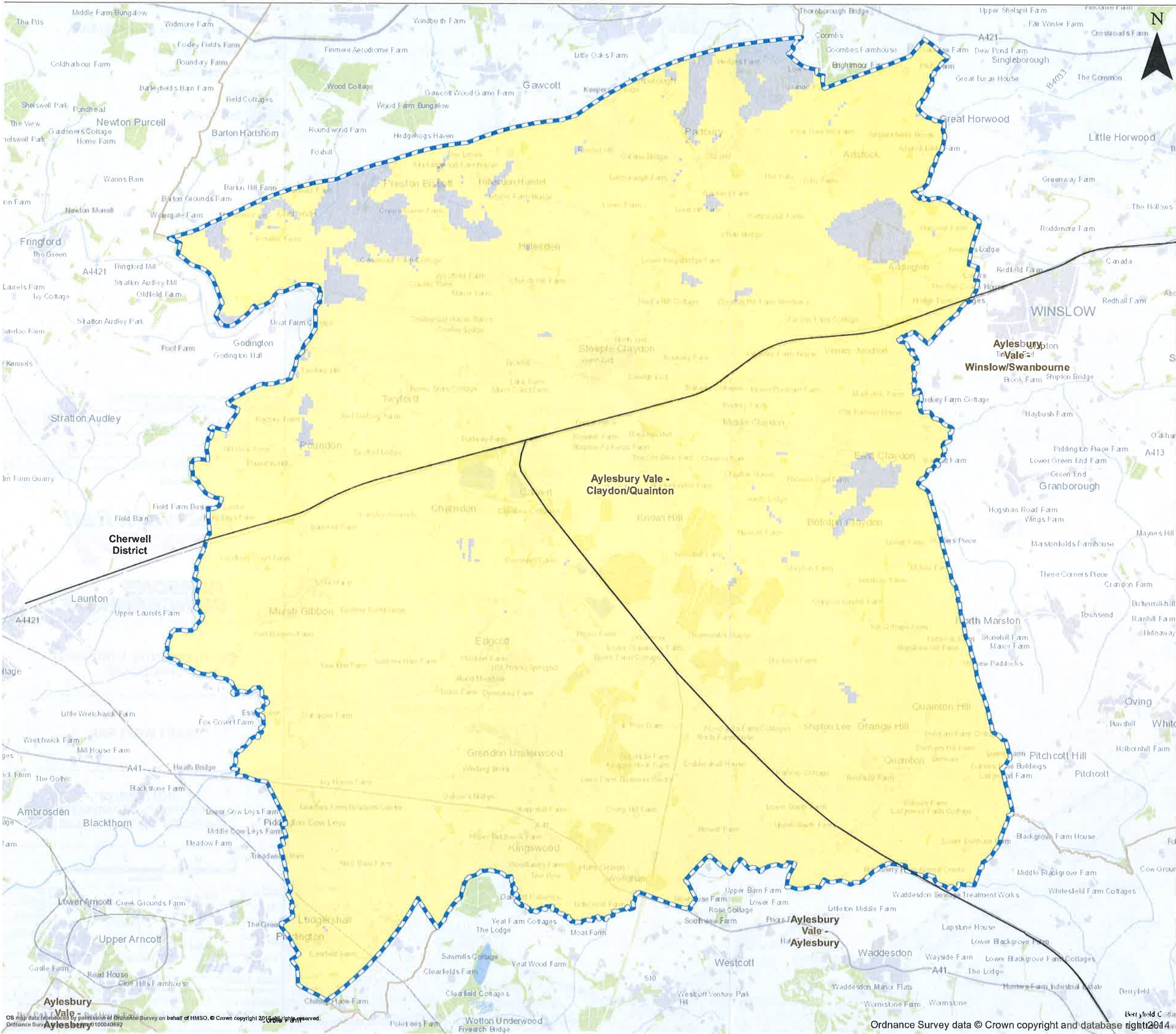
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Drawing Number: **20150320_3513769A_LDSC_ZTV_5km_CD**

Sheet: **1 of 1**

Revision: **-**

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Legend/Notes

Local Authority Reporting Area

5km Study Area

Route Corridor

Visibility:

Not Visible

Visible

Note:
ZIV has been generated using OS Terrain 50 data.
Route height = 8m, Observer height = 1.8m

Rev	Date	Description of Revisions	Drawn	Chkd	App
FINAL			S3		

Client:

Contractor:

ENVIRONMENTAL STATEMENT
LANDSCAPE

Project

EAST WEST RAIL

Drawing Title

5KM ZONE OF
THEORETICAL VISIBILITY
AYLESBURY VALE - CLAYDON/QUAINTON

0100040692

0 0.5 1 1.5 2 2.5

Kilometres

Designed	P.Johnstone	Signed	Date
Drawn	J.Leeke	Signed	Date
Checked	L.Wholey	Signed	Date
Approved	S.Walker	Signed	Date

Scale(s) at A3

1:60,000

ELR & Mileage

Alternative Reference

20150320_3513769A - East West Rail Landscape 20150320_3513769A_LDSC_ZTV_5km_CQU

Sheet

1 of 1

Drawing Number

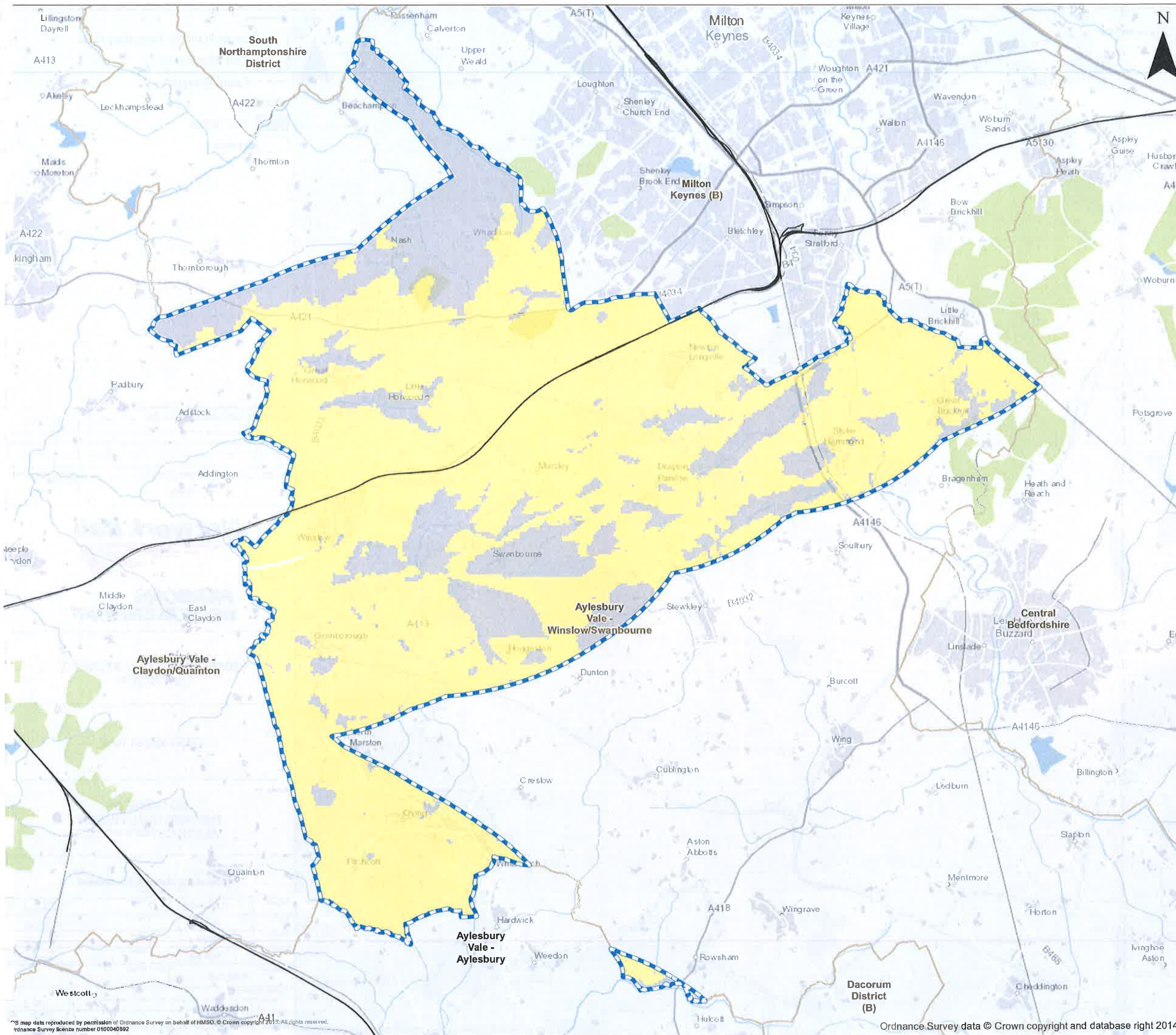
Name: 20150320_3513769A_LDSC_ZTV_5km_CQU

Revision



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Barryfield C



Legend/Notes

-  Local Authority Reporting Area
 5km Study Area
 Route Corridor

Visibility:

- ☐ Not Visible
☒ Visible

Note:
ZTV has been generated using OS Terrain 50 data.
Route height = 8m, Observer height = 1.8m

Route height = 0m, Observer height = 1.0m					
Rev	Date	Description of Revisions	Drawn	Chkd	App
Status			Suitability		
FINAL					S3

Client:	
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Contractor:

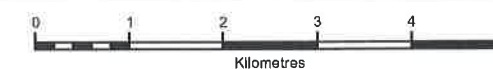


ENVIRONMENTAL STATEMENT LANDSCAPE

Project	EAST WEST RAIL
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Drawing Title

5KM ZONE OF
THEORETICAL VISIBILITY
AYLESBURY VALE - WINSLOW/SWANBOURNE

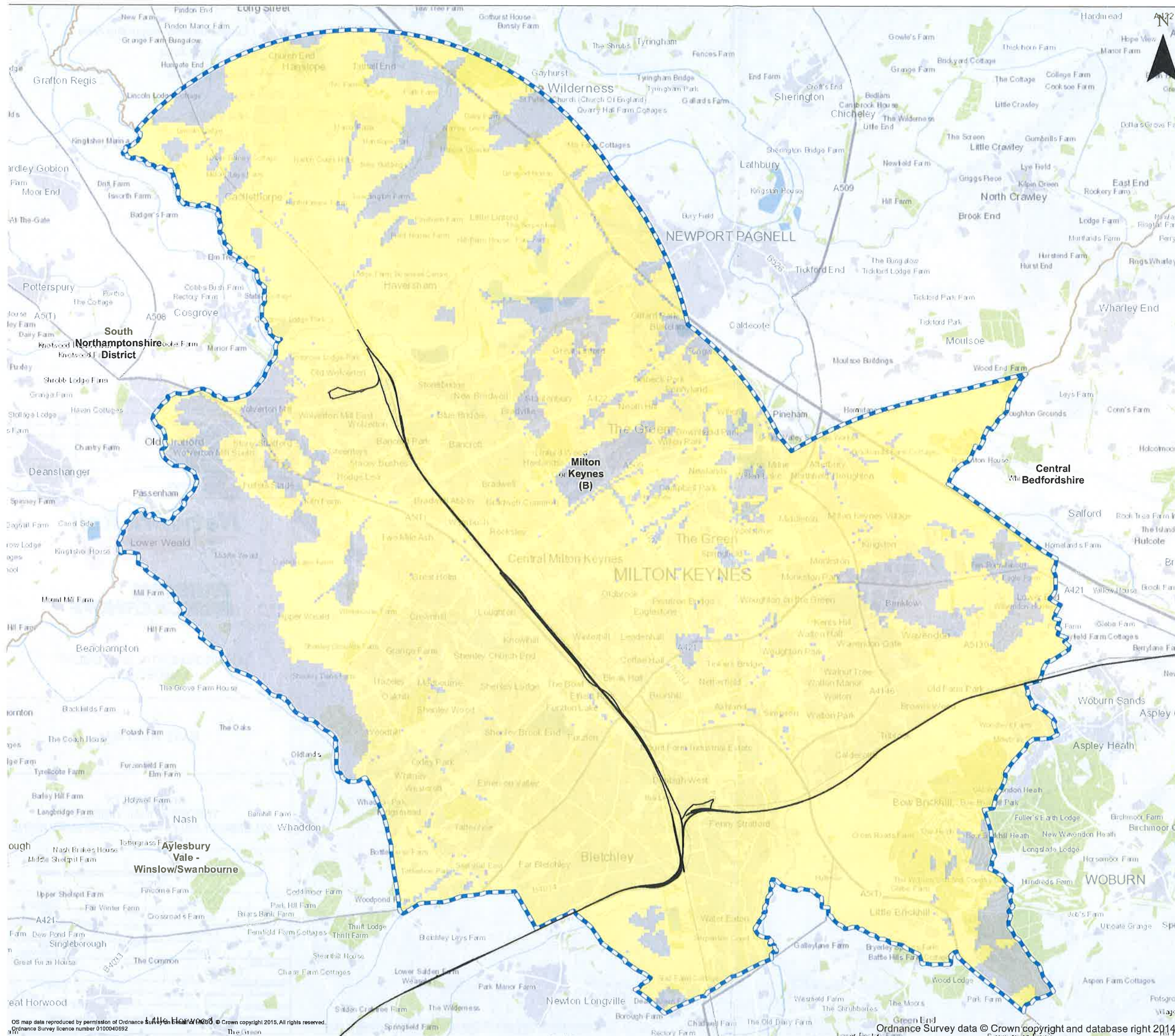


Designed	P.Johnstone	Signed	Date 20/03/2015
Drawn	J.Leeke	Signed	Date 20/03/2015
Checked	L.Wholey	Signed	Date 20/03/2015
Approved	S.Walker	Signed	Date 20/03/2015

Scale(s) at A3	ELR & Mileage
1:80,000	

Alternative Reference	Sheet
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Drawing Number		Revision
Name: 20150320_3513769A_LDSC_ZTV_5km_WIS		



Legend/Notes




☐ Local Authority Reporting Area

 5km Study Area

- Route Corridor

Visibility:

 Not Visible

☐ Visible

Note:
ZTV has been generated using OS Terrain 50 data.
Route height = 8m, Observer height = 1.8m

Rev		Date	Description of Revisions	Drawn	Chkd	App
Status				Sustainability		S3
FINAL						

Client	
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Contractor:



ENVIRONMENTAL STATEMENT LANDSCAPE

G	Project
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EAST WEST RAIL

Drawing Title

5KM ZONE OF
THEORETICAL VISIBILITY
MILTON KEYNES COUNCIL



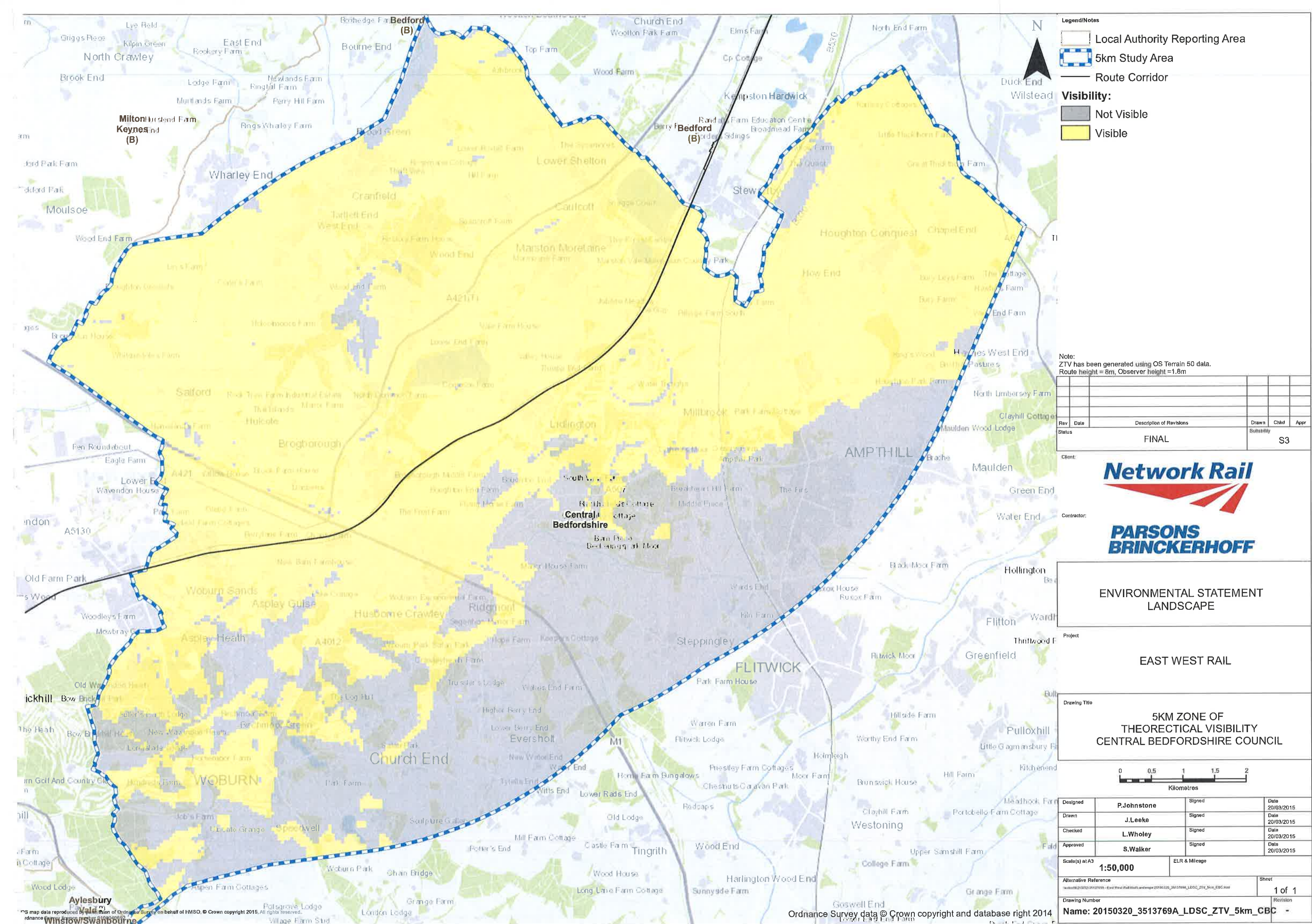
Designed	P.Johnstone	Signed	Date 20/03/2015
Drawn	J.Leeke	Signed	Date 20/03/2015
Checked	L.Wholey	Signed	Date 20/03/2015
Approved	S.Walker	Signed	Date 20/03/2015

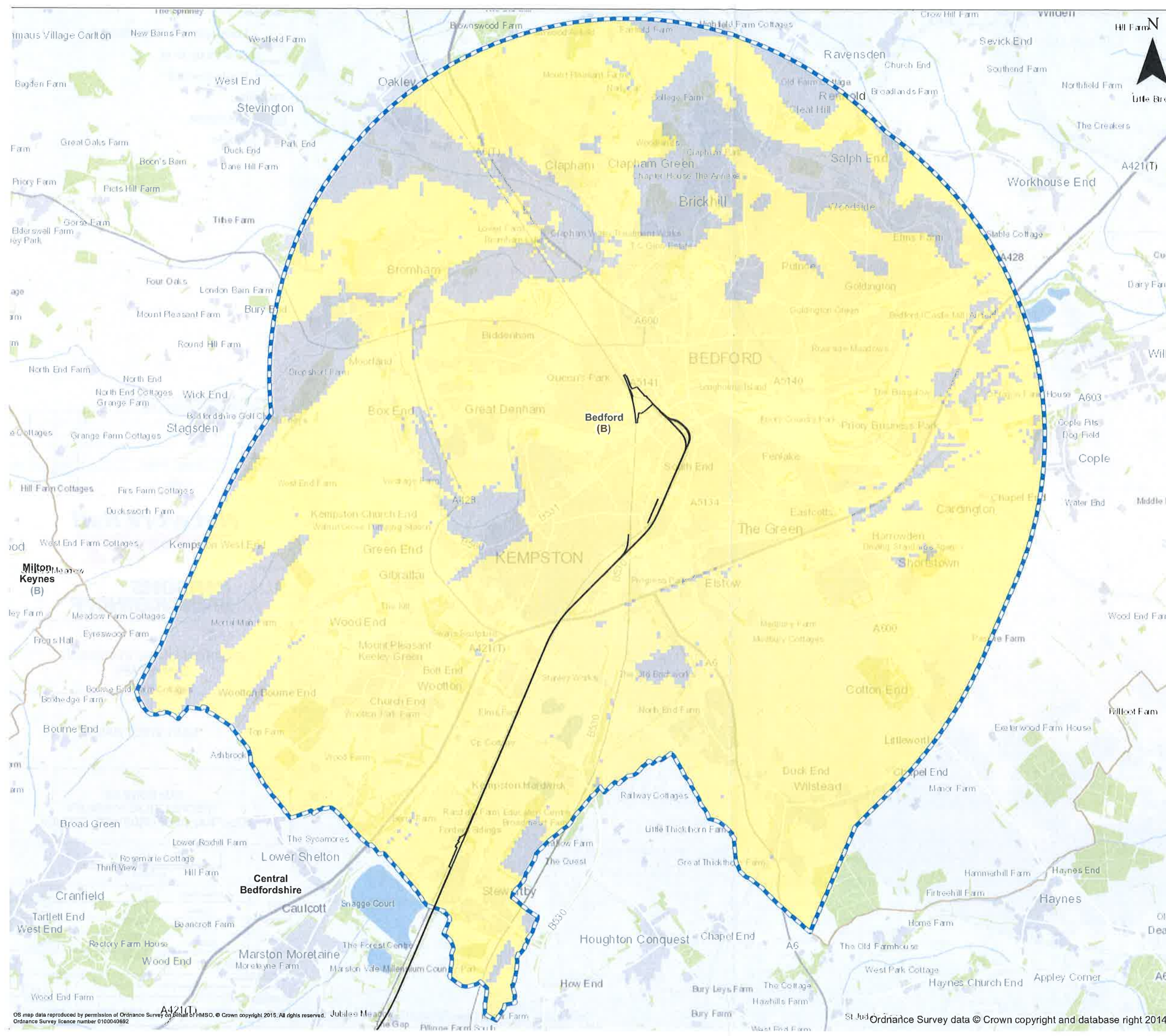
Scale(s) at A3
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Alternative Reference	
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TaskID: 202104821313769A - EA

Drawing Number	Revision
Name: 20150320_3513769A_LDSC_ZTV_5km_MKC	-





Legend/Notes

- Local Authority Reporting Area
- 5km Study Area
- Route Corridor
- Visibility:**
 - Not Visible
 - Visible

Note:
ZIV has been generated using OS terrain 50 data.
Route height = 8m, Observer height = 1.8m

Rev	Date	Description of Revisions	Drawn	Chkd	App
Status		FINAL	Suitability		S3

Client:

Network Rail

Contractor:

PARSONS BRINCKERHOFF

**ENVIRONMENTAL STATEMENT
LANDSCAPE**

Project:

EAST WEST RAIL

Drawing Title:

**5KM ZONE OF
THEORETICAL VISIBILITY
BEDFORD BOROUGH COUNCIL**

Scale(s) at A3: **1:50,000** ELR & Mileage

Designed	P. Johnstone	Signed	Date
Drawn	J. Leeke	Signed	20/03/2015
Checked	L. Wholey	Signed	20/03/2015
Approved	S. Walker	Signed	20/03/2015

Alternative Reference:
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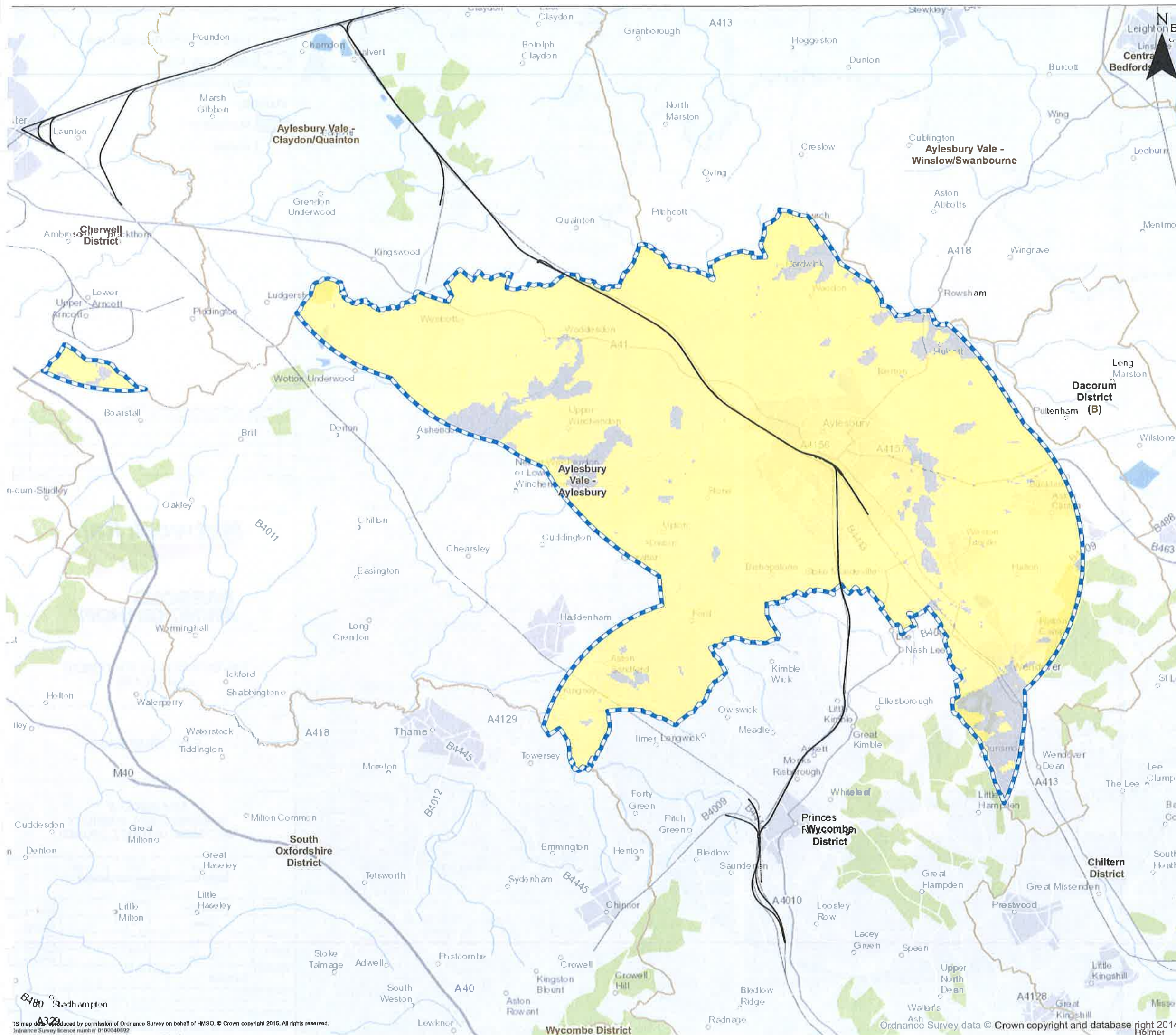
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Sheet: **1 of 1**

Revision: **-**

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Legend/Notes

- Local Authority Reporting Area
- 5km Study Area
- Route Corridor
- Visibility:**
 - Not Visible
 - Visible

Note:
ZTV has been generated using OS Terrain 50 data.
Route height = 8m, Observer height = 1.8m

Rev	Date	Description of Revisions	Drawn	Chkd	Appr
Status		FINAL	Suitability		S3

Client:
Network Rail

Contractor:
PARSONS BRINCKERHOFF

Project:
EAST WEST RAIL

Drawing Title:
**5KM ZONE OF THEORETICAL VISIBILITY
AYLESBURY VALE - AYLESBURY**

Scale(s) at A3:
1:100,000

Alternative Reference:
Name: 20150320_3513769A_LDSC_ZTV_5km_AYL

Drawing Number:
Name: 20150320_3513769A_LDSC_ZTV_5km_AYL

Sheet:
1 of 1

Revision:

0 1 2 3 4 5
Kilometres

Designed	P. Johnstone	Signed	Date
Drawn	J. Leeke	Signed	20/03/2015
Checked	L. Wholey	Signed	20/03/2015
Approved	S. Walker	Signed	20/03/2015

Scale(s) at A3:
1:100,000

Alternative Reference:
Name: 20150320_3513769A_LDSC_ZTV_5km_AYL

Drawing Number:
Name: 20150320_3513769A_LDSC_ZTV_5km_AYL

Sheet:
1 of 1

Revision:

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Track	Location	District Council	Local Highways Authority	Location Description	Type	Sub-Category
2A	2A1	Cherwell District Council	Oxfordshire Council	Jarvis' Lane	Construction Access / Construction Route	Track access
2A	2A2	Cherwell District Council	Oxfordshire Council	Charbridge Lane	Level Crossing	A-Road
2A	2A3	Cherwell District Council	Oxfordshire Council	Bicester Road	Crossing Over-Bridge	Local Distributor
2A	2A4	Cherwell District Council	Oxfordshire Council	East of Bicester	Level Crossing	Farm Access
2A	2A5	Cherwell District Council	Oxfordshire Council	East of Bicester	Level Crossing	Farm Access
2A	2A6	Cherwell District Council	Oxfordshire Council	West of Station Road	Crossing Under-Pass	Farm Access
2A	2A7	Cherwell District Council	Oxfordshire Council	Station Road	Level Crossing	Local Distributor
2A	2A8	Cherwell District Council	Oxfordshire Council	Bicester Road	Crossing Under-Pass	Local Distributor
2A	2A9	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	East of Bicester Road	Level Crossing	Farm Access
2A	2A10	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	East of Bicester Road	Crossing Over-Bridge	Farm Access
2A	2A11	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	East of Bicester Road	Level Crossing	Farm Access
2A	2A12	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	South East of Poundon	Crossing Under-Pass	Local Distributor
2A	2A13	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	South East of Poundon	Adjacent Land Use Issues / New Developments	Possible compound
2A	2A14	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	East of Poundon	Crossing Over-Bridge	Farm Access
2A	2A15	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	East of Poundon	Crossing Over-Bridge	Farm Access
2A	2A16	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	Main St	Crossing Over-Bridge	Local Distributor
2A	2A17	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	North of Grebe Lake	Crossing Over-Bridge	Local Distributor
2B	2B1	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	Addison Road	Crossing Over-Bridge	Local Distributor
2B	2B2	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	Rosehill Farm	Level Crossing	Farm Access
2B	2B3	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	Rosehill Farm	Level Crossing	Farm Access
2B	2B4	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	Rosehill Farm	Level Crossing	Farm Access
2B	2B5	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	Queen Catherine Road	Crossing Over-Bridge	Local Distributor
2B	2B6	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	North of Middle Claydon	Crossing Over-Bridge	Farm Access
2B	2B7	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	Sandhill Road	Crossing Over-Bridge	Local Distributor
2B	2B8	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	Verney Junction	Crossing Over-Bridge	Local Distributor
2B	2B9	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	East of Verney Junction	Crossing Under-Pass	Local Distributor
2B	2B10	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	South of Addington	Crossing Under-Pass	Farm Access
2B	2B11	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	South of Addington	Crossing Under-Pass	Local Distributor
2B	2B12	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	Furze Lane	Crossing Over-Bridge	Local Distributor
2B	2B13	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	Northwest Winslow	Crossing Over-Bridge	Farm Access
2B	2B14	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	A413 Buckingham Road	Crossing Over-Bridge	A-Road
2B	2B15	Aylesbury Vale District Council (AVDC): Wilnslow/Swanbourne	Buckinghamshire Council	Northeast Winslow	Crossing Under-Pass	Farm Access

Track	Location	District Council	Local Highways Authority	Location Description	Type	Sub-Category
2B	2B16	Aylesbury Vale District Council (AVDC): Wilnslow/Swanbourne	Buckinghamshire Council	Northeast Winslow	Crossing Under-Pass	Local Distributor
2B	2B17	Aylesbury Vale District Council (AVDC): Wilnslow/Swanbourne	Buckinghamshire Council	South of Little Horwood	Crossing Over-Bridge	Farm Access
2B	2B18	Aylesbury Vale District Council (AVDC): Wilnslow/Swanbourne	Buckinghamshire Council	Station Road, near Little Horwood	Crossing Over-Bridge	Local Distributor
2B	2B19	Aylesbury Vale District Council (AVDC): Wilnslow/Swanbourne	Buckinghamshire Council	West of Whaddon Road	Crossing Over-Bridge	Farm Access
2B	2B20	Aylesbury Vale District Council (AVDC): Wilnslow/Swanbourne	Buckinghamshire Council	Whaddon Road	Crossing Over-Bridge	Local Distributor
2B	2B21	Aylesbury Vale District Council (AVDC): Wilnslow/Swanbourne	Buckinghamshire Council	East of Whaddon Road	Crossing Over-Bridge	Local Distributor
2B	2B22	Aylesbury Vale District Council (AVDC): Wilnslow/Swanbourne	Buckinghamshire Council	Northwest of Newton Longville	Crossing Over-Bridge	Local Distributor
2B	2B23	Aylesbury Vale District Council (AVDC): Wilnslow/Swanbourne	Buckinghamshire Council	Bletchley Road	Crossing Under-Pass	Local Distributor
2B	2B24	Milton Keynes Council	Milton Keynes Council	South Bletchley	Adjacent Land Use Issues / New Developments	Possible compound
2B	2B25	Milton Keynes Council	Milton Keynes Council	Selbourne Avenue	Crossing Under-Pass	Local Distributor
2B	2B26	Milton Keynes Council	Milton Keynes Council	Water Eaton Road	Crossing Under-Pass	Local Distributor
2B	2B27	Milton Keynes Council	Milton Keynes Council	B4034	Crossing Under-Pass	Local Distributor
2C	2C1A	Milton Keynes Council	Milton Keynes Council	Milton Keynes Station	Railway Station (existing)	Station Access
2C	2C1A	Milton Keynes Council	Milton Keynes Council	Milton Keynes Station	Railway Station (existing)	Station Access
2C	2C1A	Milton Keynes Council	Milton Keynes Council	Milton Keynes Station	Railway Station (existing)	Station Operation
2C	2C1A	Milton Keynes Council	Milton Keynes Council	Milton Keynes Station	Railway Station (existing)	Station Operation
2C	2C1	Milton Keynes Council	Milton Keynes Council	Childs Way	Crossing Over-Bridge	Local Distributor
2C	2C1	Milton Keynes Council	Milton Keynes Council	Childs Way / A5	Crossing Over-Bridge	A-Road
2C	2C2	Milton Keynes Council	Milton Keynes Council	A5 between Childs Way and Chaffron Way	Construction Access / Construction Route	Track access
2C	2C3	Milton Keynes Council	Milton Keynes Council	Chaffron Way	Crossing Over-Bridge	Local Road
2C	2C3	Milton Keynes Council	Milton Keynes Council	Chaffron Way	Crossing Over-Bridge	Local Road
2C	2C4	Milton Keynes Council	Milton Keynes Council	Bleak Hall, west of Chesney Wold	Crossing Over-Bridge	Access Track
2C	2C4	Milton Keynes Council	Milton Keynes Council	Bleak Hall, west of Chesney Wold	Crossing Over-Bridge	Track access
2C	2C5	Milton Keynes Council	Milton Keynes Council	East of A5, between Bleak Hall and A421	Construction Compound	Possible compound
2C	2C6	Milton Keynes Council	Milton Keynes Council	A421, between A5 and Grafton Street RB	Crossing Over-Bridge	A-Road
2C	2C7	Milton Keynes Council	Milton Keynes Council	A5, south of A421	Crossing Under-Pass	A-Road
2C	2C8	Milton Keynes Council	Milton Keynes Council	Groveway, off V4 Watling Street	Crossing Under-Pass	Access Track
2C	2C8	Milton Keynes Council	Milton Keynes Council	Groveway, off V4 Watling Street	Construction Access / Construction Route	Track access

Track	Location	District Council	Local Highways Authority	Location Description	Type	Sub-Category
2C	2C9	Milton Keynes Council	Milton Keynes Council	V4 Watling Street, South of Groveway	Crossing Under-Pass	Local Distributor
2C	2C10	Milton Keynes Council	Milton Keynes Council	Rail Line to Fenny Stratford	Crossing Under-Pass	Rail Line
2C	2C11	Milton Keynes Council	Milton Keynes Council	Bletchley Station	Railway Station (existing)	Station Access
2C	2C11	Milton Keynes Council	Milton Keynes Council	Bletchley Station	Railway Station (existing)	Station Access
2C	2C11	Milton Keynes Council	Milton Keynes Council	Bletchley Station	Railway Station (existing)	Station Operation
2C	2C11	Milton Keynes Council	Milton Keynes Council	Bletchley Station	Railway Station (existing)	Station Operation
2D	2D1	Milton Keynes Council	Milton Keynes Council	Saxon Street / B4034 and adjacent shared footway	Crossing Under-Pass	Local Distributor
2D	2D2	Milton Keynes Council	Milton Keynes Council	Watling Street	Crossing Over-Bridge	Local Road
2D	2D3	Milton Keynes Council	Milton Keynes Council	Fenny Stretford Station	Railway Station (existing)	Station Access
2D	2D3	Milton Keynes Council	Milton Keynes Council	Fenny Stretford Station	Railway Station (existing)	Station Access
2D	2D3	Milton Keynes Council	Milton Keynes Council	Fenny Stretford Station	Railway Station (existing)	Station Operation
2D	2D3	Milton Keynes Council	Milton Keynes Council	Fenny Stretford Station	Railway Station (existing)	Station Operation
2D	2D4	Milton Keynes Council	Milton Keynes Council	Simpson Road	Level Crossing	Local Road
2D	2D4	Milton Keynes Council	Milton Keynes Council	Simpson Road	Level Crossing	Local Road
2D	2D4	Milton Keynes Council	Milton Keynes Council	Simpson Road	Construction Access / Construction Route	Local Road
2D	2D5	Milton Keynes Council	Milton Keynes Council	Grand Union Canal - Bridge 95A	Crossing Under-Pass	Waterway
2D	2D5	Milton Keynes Council	Milton Keynes Council	Grand Union Canal - Bridge 95A	Crossing Under-Pass	Footway
2D	2D5	Milton Keynes Council	Milton Keynes Council	Grand Union Canal - Bridge 95A	Crossing Under-Pass	Cycleway
2D	2D6	Milton Keynes Council	Milton Keynes Council	River Ouzel	Crossing Under-Pass	Waterway
2D	2D6	Milton Keynes Council	Milton Keynes Council	River Ouzel	Crossing Under-Pass	Footway
2D	2D7	Milton Keynes Council	Milton Keynes Council	A5, East of Fenny Stretford	Crossing Under-Pass	A-Road
2D	2D8	Milton Keynes Council	Milton Keynes Council	Bow Brickhill Station	Railway Station (existing)	Station Access
2D	2D8	Milton Keynes Council	Milton Keynes Council	Bow Brickhill Station	Railway Station (existing)	Station Access
2D	2D8	Milton Keynes Council	Milton Keynes Council	Bow Brickhill Station	Railway Station (existing)	Station Operation
2D	2D8	Milton Keynes Council	Milton Keynes Council	Bow Brickhill Station	Railway Station (existing)	Station Operation
2D	2D8	Milton Keynes Council	Milton Keynes Council	Brickhill Street	Level Crossing	Local Road
2D	2D9	Milton Keynes Council	Milton Keynes Council	Footpath, south east of Old Farm Park, north of Woburn Sands Road	Level Crossing	Footway
2D	2D10	Milton Keynes Council	Milton Keynes Council	Private Road, north of Bow Brickhill Road	Level Crossing	Farm Access

Track	Location	District Council	Local Highways Authority	Location Description	Type	Sub-Category
2D	2D11	Milton Keynes Council	Milton Keynes Council	Woburn Sands Station	Railway Station (existing)	Station Access
2D	2D11	Milton Keynes Council	Milton Keynes Council	Woburn Sands Station	Railway Station (existing)	Station Access
2D	2D11	Milton Keynes Council	Milton Keynes Council	Woburn Sands Station	Railway Station (existing)	Station Operation
2D	2D11	Milton Keynes Council	Milton Keynes Council	Woburn Sands Station	Railway Station (existing)	Station Operation
2D	2D12	Milton Keynes Council	Milton Keynes Council	Newport Road / Station Road	Level Crossing	Local Road
2D	2D13	Milton Keynes Council	Milton Keynes Council	off Station Road, south of 2D12	Construction Compound	Possible compound
2D	2D13	Milton Keynes Council	Milton Keynes Council	off Station Road, south of 2D12	Construction Access / Construction Route	Track access
2D	2D14	Milton Keynes Council	Milton Keynes Council	Footpath, south of Cranfield Road, north of Station Road / A5130	Level Crossing	Footway
2D	2D15	Milton Keynes Council	Milton Keynes Council	Waterway, north east of Weathercock Close	Crossing Under-Pass	Waterway
2D	2D16	Central Bedfordshire Council	Central Bedfordshire Council	Aspley Guise	Railway Station (existing)	Station Access
2D	2D16	Central Bedfordshire Council	Central Bedfordshire Council	Aspley Guise	Railway Station (existing)	Station Access
2D	2D16	Central Bedfordshire Council	Central Bedfordshire Council	Aspley Guise	Railway Station (existing)	Station Operation
2D	2D16	Central Bedfordshire Council	Central Bedfordshire Council	Aspley Guise	Railway Station (existing)	Station Operation
2D	2D16	Central Bedfordshire Council	Central Bedfordshire Council	Salford Road	Level Crossing	Local Road
2D	2D17	Central Bedfordshire Council	Central Bedfordshire Council	Berry Lane	Level Crossing	Local Road
2D	2D18	Central Bedfordshire Council	Central Bedfordshire Council	Bedford Road, south of M1 J13	Crossing Over-Bridge	Local Road
2D	2D19	Central Bedfordshire Council	Central Bedfordshire Council	M1, east of J13	Crossing Over-Bridge	Motorway
2D	2D19	Central Bedfordshire Council	Central Bedfordshire Council	Underneath M1, east of J13	Level Crossing	Footway
2D	2D20	Central Bedfordshire Council	Central Bedfordshire Council	A507	Crossing Over-Bridge	A-Road
2D	2D21	Central Bedfordshire Council	Central Bedfordshire Council	Ridgmont Station	Railway Station (existing)	Station Access

Track	Location	District Council	Local Highways Authority	Location Description	Type	Sub-Category
2D	2D21	Central Bedfordshire Council	Central Bedfordshire Council	Ridgmont Station	Railway Station (existing)	Station Access
2D	2D21	Central Bedfordshire Council	Central Bedfordshire Council	Ridgmont Station	Railway Station (existing)	Station Operation
2D	2D21	Central Bedfordshire Council	Central Bedfordshire Council	Ridgmont Station	Railway Station (existing)	Station Operation
2D	2D22	Central Bedfordshire Council	Central Bedfordshire Council	Station Road, east of 2D21	Level Crossing	Local Road
2D	2D22	Central Bedfordshire Council	Central Bedfordshire Council	Station Road, east of 2D21	Construction Access / Construction Route	Track access
2D	2D23	Central Bedfordshire Council	Central Bedfordshire Council	Local Access to Middle Farm	Crossing Over-Bridge	Local Road
2D	2D24	Central Bedfordshire Council	Central Bedfordshire Council	Middle Farm Access Tracks	Construction Access / Construction Route	Track access
2D	2D25	Central Bedfordshire Council	Central Bedfordshire Council	Station Road, Lidlington	Level Crossing	Local Distributor
2D	2D26	Central Bedfordshire Council	Central Bedfordshire Council	Lidlington Station	Railway Station (existing)	Station Access
2D	2D26	Central Bedfordshire Council	Central Bedfordshire Council	Lidlington Station	Railway Station (existing)	Station Access
2D	2D26	Central Bedfordshire Council	Central Bedfordshire Council	Lidlington Station	Railway Station (existing)	Station Operation
2D	2D26	Central Bedfordshire Council	Central Bedfordshire Council	Lidlington Station	Railway Station (existing)	Station Operation
2D	2D27	Central Bedfordshire Council	Central Bedfordshire Council	Marston Road, east of Lidlington	Level Crossing	Local Distributor
2D	2D28	Central Bedfordshire Council	Central Bedfordshire Council	Land East of Marston Road	Construction Compound	Possible compound
2D	2D29	Central Bedfordshire Council	Central Bedfordshire Council	Millbrook	Level Crossing	Local Distributor
2D	2D30	Central Bedfordshire Council	Central Bedfordshire Council	Millbrook (Beds) Station	Railway Station (existing)	Station Access
2D	2D30	Central Bedfordshire Council	Central Bedfordshire Council	Millbrook (Beds) Station	Railway Station (existing)	Station Access

Track	Location	District Council	Local Highways Authority	Location Description	Type	Sub-Category
2D	2D30	Central Bedfordshire Council	Central Bedfordshire Council	Millbrook (Beds) Station	Railway Station (existing)	Station Operation
2D	2D30	Central Bedfordshire Council	Central Bedfordshire Council	Millbrook (Beds) Station	Railway Station (existing)	Station Operation
2D	2D31	Central Bedfordshire Council	Central Bedfordshire Council	West of Green Lane. Stewartby	Crossing Over-Bridge	Footway
2D	2D32	Central Bedfordshire Council	Central Bedfordshire Council	Green Lane, Stewartby	Level Crossing	Local Distributor
2D	2D33	Bedford Borough Council	Bedford Council	Stewartby Station	Railway Station (existing)	Station Access
2D	2D33	Bedford Borough Council	Bedford Council	Stewartby Station	Railway Station (existing)	Station Access
2D	2D33	Bedford Borough Council	Bedford Council	Stewartby Station	Railway Station (existing)	Station Operation
2D	2D33	Bedford Borough Council	Bedford Council	Stewartby Station	Railway Station (existing)	Station Operation
2D	2D34	Bedford Borough Council	Bedford Council	Land East of Green Lane	Construction Compound	Possible compound
2D	2D35	Bedford Borough Council	Bedford Council	Hanson Bricks Compound	Level Crossing	Local Road
2D	2D35	Bedford Borough Council	Bedford Council	Hanson Bricks Compound	Adjacent Land Use Issues / New Developments	Local Road
2D	2D36	Bedford Borough Council	Bedford Council	Hanson Bricks Compound Rail Terminus	Adjacent Land Use Issues / New Developments	Rail Line
2D	2D36	Bedford Borough Council	Bedford Council	Hanson Bricks Compound Rail Terminus	Construction Access / Construction Route	Rail Line
2D	2D37	Bedford Borough Council	Bedford Council	Broadmead Road	Level Crossing	Local Distributor
2D	2D38	Bedford Borough Council	Bedford Council	Land adjacent to Broadmead Road	Construction Compound	Possible compound
2D	2D39	Bedford Borough Council	Bedford Council	Kempston Hardwick Station	Railway Station (existing)	Station Access
2D	2D39	Bedford Borough Council	Bedford Council	Kempston Hardwick Station	Railway Station (existing)	Station Access
2D	2D39	Bedford Borough Council	Bedford Council	Kempston Hardwick Station	Railway Station (existing)	Station Operation
2D	2D39	Bedford Borough Council	Bedford Council	Kempston Hardwick Station	Railway Station (existing)	Station Operation
2D	2D40	Bedford Borough Council	Bedford Council	Manor Road, Kempston Hardwick	Level Crossing	Local Road
2D	2D41	Bedford Borough Council	Bedford Council	Land North of Kempston Hardwick	Construction Compound	Possible compound
2D	2D42	Bedford Borough Council	Bedford Council	Land South of A421 and Woburn Industrial Estate	Construction Compound	Possible compound
2D	2D43	Bedford Borough Council	Bedford Council	A421, south of Woburn Industrial Estate	Crossing Over-Bridge	A-Road
2D	2D44	Bedford Borough Council	Bedford Council	Chantry Road	Level Crossing	Footway
2D	2D44	Bedford Borough Council	Bedford Council	Chantry Road	Construction Access / Construction Route	Local Road
2D	2D45	Bedford Borough Council	Bedford Council	North of B530	Crossing Over-Bridge	Rail Line
2D	2D46	Bedford Borough Council	Bedford Council	A6 Ampthill Road, south of Elstow Rd	Crossing Over-Bridge	A-Road
2D	2D47	Bedford Borough Council	Bedford Council	Apthill Road - Elstow Road Link	Crossing Over-Bridge	Cycleway
2D	2D48	Bedford Borough Council	Bedford Council	Land east of Ossory Way, Bedford	Construction Access / Construction Route	Track access
2D	2D49	Bedford Borough Council	Bedford Council	Land northeast of Althorpe St	Construction Access / Construction Route	Track access

Track	Location	District Council	Local Highways Authority	Location Description	Type	Sub-Category
2D	2D50	Bedford Borough Council	Bedford Council	A6 Ampthill Road/Beford St John's station	Crossing Over-Bridge	A-Road
2D	2D50	Bedford Borough Council	Bedford Council	A6 Ampthill Road/Beford St John's station	Railway Station (existing)	Station Access
2D	2D50	Bedford Borough Council	Bedford Council	A6 Ampthill Road/Beford St John's station	Railway Station (existing)	Station Access
2D	2D50	Bedford Borough Council	Bedford Council	A6 Ampthill Road/Beford St John's station	Railway Station (existing)	Station Operation
2D	2D50	Bedford Borough Council	Bedford Council	A6 Ampthill Road/Beford St John's station	Railway Station (existing)	Station Operation
2D	2D51	Bedford Borough Council	Bedford Council	Land adjacent to Melbourne Street	Construction Compound	Possible compound
2D	2D52	Bedford Borough Council	Bedford Council	A5141	Crossing Over-Bridge	A-Road
2D	2D53	Bedford Borough Council	Bedford Council	Land Adjacent to A5141	Construction Compound	Possible compound
2D	2D54	Bedford Borough Council	Bedford Council	Old Bedford River	Crossing Under-Pass	Waterway
2D	2D55	Bedford Borough Council	Bedford Council	North of Old Beford River	Crossing Over-Bridge	Footway
2D	2D56	Bedford Borough Council	Bedford Council	Ford End Road	Crossing Over-Bridge	Local Distributor
2D	2D57	Bedford Borough Council	Bedford Council	Adjacent to Ford End Road	Crossing Over-Bridge	Footway
2D	2D58	Bedford Borough Council	Bedford Council	Bedford Station Footbridge (South)	Crossing Over-Bridge	Footway
2D	2D59	Bedford Borough Council	Bedford Council	Bedford Station Footbridge (North)	Crossing Over-Bridge	Footway
2D	2D60	Bedford Borough Council	Bedford Council	Bedford Station	Railway Station (existing)	Station Access
2D	2D60	Bedford Borough Council	Bedford Council	Bedford Station	Railway Station (existing)	Station Access
2D	2D60	Bedford Borough Council	Bedford Council	Bedford Station	Railway Station (existing)	Station Operation
2D	2D60	Bedford Borough Council	Bedford Council	Bedford Station	Railway Station (existing)	Station Operation
2D	2D61	Bedford Borough Council	Bedford Council	Northwest of Hillesdon Avenue	Crossing Over-Bridge	Footway
2D	2D62	Bedford Borough Council	Bedford Council	East of Hurst Grove	Level Crossing	Footway
2E	2E1	Aylesbury Vale District Council (AVDC): Claydon	Buckinghamshire Council	West of Rosehill Farm	Level Crossing	Farm Access
2E	2E2	Aylesbury Vale District Council (AVDC): Calvert	Buckinghamshire Council	North Calvert	Crossing Over-Bridge	Local Distributor
2E	2E3	Aylesbury Vale District Council (AVDC): Calvert	Buckinghamshire Council	North Calvert	Overhead cables	
2E	2E4	Aylesbury Vale District Council (AVDC): Calvert	Buckinghamshire Council	East Calvert	Adjacent Land Use Issues / New Developments	Possible compound
2E	2E4	Aylesbury Vale District Council (AVDC): Calvert	Buckinghamshire Council	East Calvert	Adjacent Land Use Issues / New Developments	Rail Line
2E	2E5	Aylesbury Vale District Council (AVDC): Calvert	Buckinghamshire Council	East of Lawn Hill, Edgcott	Crossing Over-Bridge	Farm Access
2E	2E6	Aylesbury Vale District Council (AVDC): Calvert	Buckinghamshire Council	Lawn Hill, NE of Quainton	Crossing Over-Bridge	Local Distributor
2E	2E7	Aylesbury Vale District Council (AVDC): Calvert	Buckinghamshire Council	SW of Quainton	Crossing Over-Bridge	Local Distributor
2E	2E8	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Station Road, Quainton	Crossing Over-Bridge	Local Distributor
2E	2E9	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Buckinghamshire Railway Centre	Adjacent Land Use Issues / New Developments	Station Operation
2E	2E9	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Buckinghamshire Railway Centre	Crossing Over-Bridge	Footway
2E	2E9	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Buckinghamshire Railway Centre	Crossing Over-Bridge	Footway
2E	2E9	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Buckinghamshire Railway Centre	Construction Access / Construction Route	Rail Line

Track	Location	District Council	Local Highways Authority	Location Description	Type	Sub-Category
2E	2E10	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	West of Blackgrove Road	Construction Access / Construction Route	Track access
2E	2E11	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Blackgrove Road	Crossing Over-Bridge	Local Distributor
2E	2E12	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	East of Blackgrove Road	Level Crossing	Farm Access
2E	2E13	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Fleet Marston Farm	Crossing Over-Bridge	Farm Access
2E	2E14	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	A41 adjacent to Sir Henry Lee Crescent	Crossing Under-Pass	A-Road
2E	2E15	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Aylesbury Vale Parkway	Railway Station (existing)	Station Access
2E	2E15	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Aylesbury Vale Parkway	Railway Station (existing)	Station Access
2E	2E15	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Aylesbury Vale Parkway	Railway Station (existing)	Station Operation
2E	2E15	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Aylesbury Vale Parkway	Railway Station (existing)	Station Operation
2E	2E16	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	East of Aylesbury Vale Parkway	Crossing Over-Bridge	Farm Access
2E	2E17	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	West of Aylesbury	Crossing Under-Pass	Farm Access
2E	2E18	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Rabans Lane	Crossing Over-Bridge	Local Distributor
2E	2E19	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Griffin Lane	Crossing Over-Bridge	Local Distributor
2E	2E20	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	East of Griffin Lane	Crossing Over-Bridge	Footway
2E	2E21	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	A418	Crossing Over-Bridge	A-Road
2E	2E22	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	West of Aylesbury Station	Adjacent Land Use Issues / New Developments	Rail Line
2E	2E23	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Aylesbury Station	Railway Station (existing)	Station Access
2E	2E23	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Aylesbury Station	Railway Station (existing)	Station Access
2E	2E23	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Aylesbury Station	Railway Station (existing)	Station Operation
2E	2E23	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Aylesbury Station	Railway Station (existing)	Station Operation
2F	2F1	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Penn Road	Level Crossing	Footway
2F	2F2	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Old Stoke Road	Crossing Over-Bridge	Local Distributor
2F	2F3	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	West of B4443	Level Crossing	Footway
2F	2F4	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	Churchill Avenue	Crossing Over-Bridge	Local Distributor
2F	2F5	Aylesbury Vale District Council (AVDC): Aylesbury	Buckinghamshire Council	West of Stoke Mandeville	Level Crossing	Farm Access
2F	2F6	Wycombe District Council	Buckinghamshire Council	Bishopstone	Level Crossing	Local Distributor
2F	2F7	Wycombe District Council	Buckinghamshire Council	South of North Lee Lane	Level Crossing	Local Road
2F	2F8	Wycombe District Council	Buckinghamshire Council	South of North Lee Lane	Level Crossing	Local Road

Track	Location	District Council	Local Highways Authority	Location Description	Type	Sub-Category
2F	2F9	Wycombe District Council	Buckinghamshire Council	Grove Lane	Crossing Over-Bridge	Local Distributor
2F	2F10	Wycombe District Council	Buckinghamshire Council	Little Kimble Station	Railway Station (existing)	Station Access
2F	2F10	Wycombe District Council	Buckinghamshire Council	Little Kimble Station	Railway Station (existing)	Station Access
2F	2F10	Wycombe District Council	Buckinghamshire Council	Little Kimble Station	Railway Station (existing)	Station Operation
2F	2F10	Wycombe District Council	Buckinghamshire Council	Little Kimble Station	Railway Station (existing)	Station Operation
2F	2F11	Wycombe District Council	Buckinghamshire Council	Bridge Street, Great Kimble	Crossing Over-Bridge	Local Distributor
2F	2F12	Wycombe District Council	Buckinghamshire Council	West of Monks Risborough	Crossing Over-Bridge	Local Distributor
2F	2F13	Wycombe District Council	Buckinghamshire Council	Monks Risborough Station	Railway Station (existing)	Station Access
2F	2F13	Wycombe District Council	Buckinghamshire Council	Monks Risborough Station	Railway Station (existing)	Station Access
2F	2F13	Wycombe District Council	Buckinghamshire Council	Monks Risborough Station	Railway Station (existing)	Station Operation
2F	2F13	Wycombe District Council	Buckinghamshire Council	Monks Risborough Station	Railway Station (existing)	Station Operation
2F	2F14	Wycombe District Council	Buckinghamshire Council	Mill Lane	Crossing Under-Pass	Local Distributor
2F	2F15	Wycombe District Council	Buckinghamshire Council	Longwick Rd	Crossing Under-Pass	Local Distributor
2F	2F16	Wycombe District Council	Buckinghamshire Council	Summerleys Road	Crossing Under-Pass	Local Distributor
2F	2F17	Wycombe District Council	Buckinghamshire Council	Princes Risborough Station	Railway Station (existing)	Station Access
2F	2F17	Wycombe District Council	Buckinghamshire Council	Princes Risborough Station	Railway Station (existing)	Station Access
2F	2F17	Wycombe District Council	Buckinghamshire Council	Princes Risborough Station	Railway Station (existing)	Station Operation
2F	2F17	Wycombe District Council	Buckinghamshire Council	Princes Risborough Station	Railway Station (existing)	Station Operation

