Wokingham Borough Council

SOUTH WOKINGHAM DISTRIBUTOR ROAD - CENTRAL AND WESTERN SECTION

Vol. 1 Environmental Statement - Main Text

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Wokingham Borough Council

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Vol. 1 Environmental Statement - Main Text

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Vol. 1 Environmental Statement - Main Text

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CONTENTS

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ABBREVIATIONS

Acronym	Definition
AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekday Traffic
ADMS	Advanced Dispersion Modelling System
AEP	Annual Exceedance Probability
ALC	Agricultural Land Classification
Annex II	Annex II of the Habitats Directive (92/43/EEC)
AOD	Above Ordnance Datum
AQAL	Air quality assessment levels
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
ARN	Appraised Road Network
ASR	Annual Status Report
AWI	Ancient Woodland Inventory
BGL	Below Ground Level
BGS	British Geological Survey
BMV	Best and Most Versatile
BNG	Biodiversity net gain
BNL	Basic Noise Level
BRE	Building Research Establishment
BS	British Standard
CA	Conservation Area
CAD	Computer Aided Design
CCG	Clinical commissioning group
CCTV	Closed Circuit Television
CDE	Construction, Demolition and Excavation

CDM	Construction Design and Management
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CIEH	Chartered Institute of Environmental Health
CIfA	Chartered Institute for Archaeologists
CIRIA	Construction Industry Research and Information Association
CL:AIRE	Contaminated Land: Applications in Real Environments
CLR 11	Contaminated Land Report 11
CMP	Construction Management Plan
CO2e	Carbon Dioxide Equivalent
COPD	Chronic obstructive pulmonary disease
COSHH	Control of Substances Hazardous to Health
CRTN	Calculation of Road Traffic Noise
CSM	Conceptual Site Model
DCLG	Department for Communities and Local Government
DEFRA	Department for Environment, Food and Rural Affairs
DM	Do minimum
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
DNA	Deoxyribonucleic acid
DS	Do something
DSM	Digital Surface Model
DTM	Digital Terrain Model
DWS	Drinking Water Standards
EBAS	East Berkshire Archaeological Survey
EC	European Commission
ECOSA	Ecological Survey & Assessment Ltd.
EEC	European Economic Community

EFT	Emissions Factors Toolkit
EHD	Environmental Health Department
EIA	Environmental Impact Assessment
ELC	European Landscape Convention
EMP	Environmental/Ecological Management Plan
EMS	Environmental Management System
EPA	Environmental Protection Act 1990
EPUK	Environmental Protection UK
ES	Environmental Statement
ESB	European Soil Bureau
ESRI	Environmental Systems Research Institute
EU	European Union
FP	Footpath
FTE	Full time equivalent
FUL	Full (planning permission)
GA	General Arrangement
GAC	Generic assessment criteria
GCSE	General Certificate of Secondary Education
GHG	Greenhouse Gas
GI	Ground Investigation
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GP	General Practitioner
HA	Hectare
HCA	Homes and Communities Agency
HDV	Heavy Duty Vehicle
HEDBA	Historic Environment Desk Based Assessment
HER	Historic Environment Record
HM	Her Majesty's

HPI	Habitats of Principal Importance
HRA	Habitats Regulation Assessment
HV	Heavy vehicles
IAN	Interim Advice Note
IAQM	Institute of Air Quality Management
ID	Identifier
IEF	Important ecological features
IEMA	Institute of Environmental Management and Assessment
IMD	Indices of Multiple Deprivation
JNCC	Joint Nature Conservation Committee
LAQM	Local Air Quality Management
LCA	Local Character Area
LED	Light Emitting Diode
LEP	Local Enterprise Partnership
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LOAEL	Lowest Observed Adverse Effect Level
LPA	Local Planning Authority
LSOA	Lower-layer Super Output Area
LULUCF	Land use, land-use change and forestry
LVIA	Landscape and Visual Impact Assessment
LWS	Local wildlife site
m AOD	metres above ordnance datum
m bgl	metres below ground level
MAFF	Ministry of Agriculture, Fisheries and Food
MAGIC	Multi Agency Geographic Information for the Countryside
MCIWEM	Member of CIWEM
MDD	Managing Development Delivery Local Plan

MIOA	Member of the Institute of Acoustics
MMP	Material Management Plan
NCA	National Character Area
NCN	National Cycle Network
NERC	Natural Environment and Rural Communities
NHBC	National House-Building Council
NHLE	National Heritage List for England
NHS	National Health Service
NIA	Noise Important Area
NIR	Noise Insulation Regulations 1975
NMU	Non-Motorised User
NNR	National Nature Reserve
NOMIS	National Online Manpower Information System
NOX	Oxides of Nitrogen
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPSE	Noise Policy Statement for England (published March 2010)
NRMM	Non-Road Mobile Machinery
NS	Not Significant
NSR	Noise sensitive receptor
NTS	Non-technical summary
NVC	National Vegetation Classification
NVQ	National Vocational Qualification
OD	Ordnance Datum
ONS	Office for National Statistics
OS	Ordnance Survey
OUT	Outline (planning permission)
PA	Planning Act 2008

Part 2A	Part 2A of the Environmental Protection Act 1990
PBRA	Preliminary Bat Roost Assessment
PCF	Project Control Framework
PHE	Public Health England
POS	Public open space
PPG	Planning Practice Guidance
PPV	Parts per volume
PRF	Potential Roosting Features
PRoW	Public Right of Way
PSSR	Preliminary Sources Study Report
RAC	Reading Agricultural Consultants
RCP	Representative Concentration Pathway
RDB	Red Data Book
REAC	Register of environmental actions and commitments
REM	Reserved matters (planning permission)
RICS	Royal Institution of Chartered Surveyors
RIGS	Regionally Important Geological Site
RLB	Red line boundary
RPG	Registered parks and gardens
SAC	Special Area of Conservation
SANG	Suitable Alternative Natural Green Space
SDL	Strategic Development Location
SEN	Special educational needs
SLM	Sound level meter
SOAEL	Significant Observed Adverse Effect Level
SPA	Special Protection Area
SPI	Species of Principal Importance
SQE	Suitably Qualified Ecologist

SRN	Strategic Road Network
SSSI	Site of Special Scientific Interest
SUDS	Sustainable drainage systems
SWDR	South Wokingham Distributor Road
SWMP	Site Waste Management Plan
TAG	Transport and Analysis Guidance
TBC	To be confirmed
TG	Technical guidance
TGP	Tony Gee and Partners
TRRL	Transport and Road Research Laboratory
UK	United Kingdom
UKAS	United Kingdom Accreditation Service
UKBAP	UK Biodiversity Action Plan
UKCP18	UK Climate Projections 2018
UV	Ultraviolet
UXO	Unexploded Ordnance
VP	Viewpoint
WBC	Wokingham Borough Council
WCA	Wildlife and Countryside Act 1981
WFD	Water Framework Directive (Directive 2000/60/EC)
WHO	World Health Organisation
WPZ	Water Protection Zone
WRZ	Water Resource Zone
WSI	Written Scheme of Investigation
WSTM4	Wokingham Strategic Transport Model v4
ZVI	Zone of Visual Influence

1. INTRODUCTION

1.1. OVERVIEW

1.1.1. WSP was commissioned by Wokingham Borough Council (WBC) (referred to as the 'applicant') to undertake an Environmental Impact Assessment (EIA) and prepare an Environmental Statement (ES) to support the planning application for the proposed South Wokingham Distributor Road (SWDR) – Central and Western Section ('the Scheme'). The SWDR is a major new road being delivered in phases south of the town of Wokingham (Berkshire). An EIA scoping report for the Scheme was submitted to the Local Planning Authority (LPA) in October 2017 (Volume 3 Appendix 2-1).

1.1.2. The Core Strategy[1] adopted by WBC in January 2010 identified a number of key strategic transport improvements for the Borough of Wokingham including the SWDR, which is referenced as the 'south Wokingham relief road' in Item 7 of Core Strategy policy CP21:

> *'Improvements to transport capacity along the A321 and A329 including the provision of south Wokingham relief road from the vicinity of the Coppid Beech roundabout to the Finchampstead Road'*.

1.1.3. The SWDR is being delivered in phases:

- Montague Park (construction completed in Summer 2015);
- Eastern Gateway (construction due to begin in late 2019);
- Central and Western Section (i.e. the Scheme); and
- Western Gateway.

1.1.4. The major purpose of the SWDR is to create access for 2,500 new residential dwellings which WBC has committed to developing within the South Wokingham Strategic Development Location (SDL) identified in the Core Strategy[1] (policy CP21). Up to 655 of these are located in Montague Park, outline planning permission for which was granted in December 2012 (planning ref. 101367).

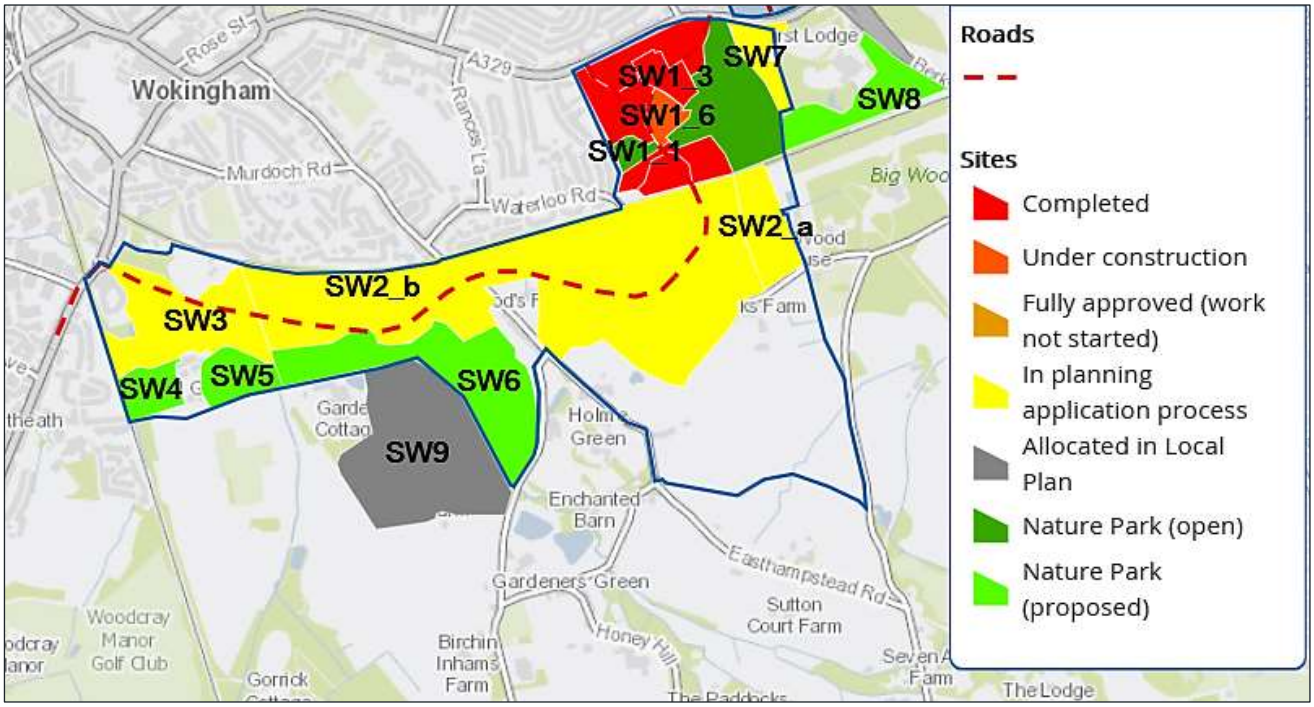
1.1.5. Another 1,840 residential dwellings, to be located in the predominantly agricultural area south of Wokingham (in the area just south of the Waterloo-Reading railway between Waterloo Road and Finchampstead Road), will be delivered by 2026. Separate planning applications for the residential development have been submitted by a development consortium comprising Keir Ventures Ltd and Miller Homes Ltd (submitted in April 2019 and validated in June 2019) (planning ref. 191068) and by Persimmon Homes (planning ref. 192325).

1.1.6. The progress of major developments within the South Wokingham is shown on the South Wokingham Major Developments Map[2] below in Figure 1-1.

[1] Wokingham Borough Local Development Framework Adopted Core Strategy Development Plan Document. January 2010. Available at [Link].

[2] South Wokingham Major Developments Map (2019). Available at [Link].

Figure 1-1 - South Wokingham Major Developments Map



1.1.7. Other aims of the SWDR are the following:

- To allow dispersal of traffic within the street network, relieving pressure on the town centre;
- To act as a corridor for pedestrians, cyclists and public transport; and
- To become a key public street within Wokingham.

1.1.8. The Scheme comprises the Central and Western Section of the SWDR, which connects with the Eastern Gateway (via a new roundabout on Waterloo Road), Western Gateway (at the existing Tesco roundabout on Finchampstead Road) and Easthampstead Road. Other elements of the Scheme include a new Tesco roundabout, a new road bridge over Emm Brook, and a combined footway and cycleway. The new infrastructure will be located on landscaped embankments. Full details of the Scheme are presented in Volume 1 Chapter 3 The Scheme and shown on the general arrangement drawings submitted with the planning application.

1.1.9. The route for the Scheme was selected in November 2014 following a public consultation carried out in August 2014. In the public consultation 81% of respondents agreed with the 'central route' presented as Option B. This option was selected and refined, to take into account environmental constraints and traffic and planning requirements, in 2018 and 2019[3].

1.1.10. Subject to planning approval and land acquisition, construction of the Scheme is due to commence in Autumn 2020 and complete in Autumn 2021.

1.2. DESCRIPTION OF SITE AND SURROUNDING AREA

1.2.1. The area of land with the potential to be directly affected by the Scheme (31.3 ha) is referred to as the 'Site' and is defined by the 'red line boundary' shown in Volume 2 Figure 1-2.

[3] WSP (2014). South Wokingham Highway Study. Options Appraisal Report. May 2014. Available at [Link].

1.2.2. The red line boundary includes the footprint of the new highway and associated structures, as well as the areas required for enabling works during the construction phase. Enabling works will include the construction of a temporary access road and the siting of two construction compounds (one southeast of the existing Tesco carpark and one adjacent to the proposed link to Easthampstead Road).

THE SITE

1.2.3. The Site is located approximately 1 km south of the centre of Wokingham within an area of rural and agricultural land. The agricultural land is bounded by Finchampstead Road and the North Downs Line (railway) to the west and, to the north, the Waterloo-Reading railway. The agricultural land is associated with three agricultural holdings: Wokingham Equestrian Centre, Holme Park Game Hatcheries and Wood's Farm. Only the latter of these is used for conventional farming and the others are rural businesses (i.e. an equestrian centre and hatchery).

1.2.4. The Site contains part of the channel and floodplain of Emm Brook (a 'main river' for which flood risk is managed by the Environment Agency). Emm Brook flows northwest through the Site and intersects Finchampstead Road approximately 50 m north of the existing Tesco roundabout.

1.2.5. There are trees and hedgerows within the Site. These are primarily located along the field boundaries and adjacent to the banks of Emm Brook. There are a number of residential dwellings adjacent to the Site boundary on Finchampstead Road and Easthampstead Road. The Site also contains a barn associated with Wokingham Equestrian Centre.

1.2.6. The Site is intersected by the following public rights of way:

- 'Wokingham footpath 25' (FP 25), located adjacent to the existing access road for the Tesco superstore and intersected by the east-west orientated part of the Scheme east of the new Tesco roundabout;
- 'Wokingham footpath 24' (FP 24) and 'Wokingham without footpath 9' (FP 9), a single route intersected by the east-west orientated part of the Scheme at its intersection with Emm Brook; and
- 'Wokingham without footpath 10' (FP 10), intersected by the east-west orientated part of the Scheme at the boundary between the land occupied by Wokingham Equestrian Centre and Holme Park Hatchery.

1.2.7. In the central-east, the Site is intersected by Easthampstead Road. This a northwest-southeast orientated single carriageway with a speed limit of 40 mph.

THE SURROUNDING AREA

1.2.8. The agricultural land extends north as far as the east-west oriented Waterloo-Reading railway. Beyond the railway the land is residentially developed (typically with detached and semi-detached properties), forming the southern outskirts of Wokingham; and approximately 1 km further north is the historical town centre of Wokingham.

1.2.9. To the west the agricultural land extends as far as Finchampstead Road and the northwest-southeast oriented North Downs Line. There are a number of developments off Finchampstead Road including the Tesco superstore, a BP petrol station and the Warr Physio & Well-Being Clinic. There are also a small number of residential dwellings (including Eyre Court), located to the northwest, accessed via a private road off Finchampstead Road; and there is an area of privately-owned marshy woodland adjacent to Emm Brook, east of the existing Tesco roundabout. Beyond the North Downs Line, the

land contains residential and commercial development including an industrial estate centred around Molly Millars Lane.

1.2.10. There is an east-west oriented minor road to the south (this is Luckley Road) which connects with Finchampstead Road to the west, passes beneath the North Downs Line and, to the east, connects with Easthampstead Road. Luckley Road provides access to a number of features located south of the Site, including Wokingham Equestrian Centre and Ludgrove School, and connects with Easthampstead Road opposite Wood's Farm. There is a 0.94 ha parcel of ancient and semi-natural woodland north of Luckley Road opposite Ludgrove School.

1.2.11. There are several residential dwellings adjacent to Easthampstead Road and Heathlands Road (which connects with Easthampstead Road and provides access to Holme Park Game Hatcheries and Holme Grange School). Further east towards Waterloo Road is Britton's Farm. The land to the south of Luckley Road and to the south and east of Easthampstead Road and Heathlands Road is rural and agricultural. The agricultural land in the area delineated by the North Downs Line, Waterloo-Reading railway, Luckley Road, Heathlands Road and Waterloo Road is purchasable under option agreement by developers including Persimmon Homes, Centex Strategic Land Ltd. (Miller Homes), Croudace Strategic Ltd., Thames Valley Housing Association and Kier Homes. The agricultural land forms part of the SDL and will be subject to a new mixed use development, including the delivery of 2,500 new residential dwellings (up to 655 of which are located in Montague Park).

1.3. LEGAL FRAMEWORK

1.3.1. This ES presents the findings of the statutory EIA carried out to meet the requirements of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017[4] (the 'EIA Regulations 2017'). These regulations apply the EIA Directive (2014/52/EU) to the planning system in England. Volume 1 Technical Chapters and Volume 3 Appendices of the ES provide an overview of relevant policy and demonstrate the Scheme has been assessed with reference to relevant national and local planning policy including the National Planning Policy Framework (NPPF)[5].

1.3.2. The EIA Regulations 2017 prohibit the granting of planning permission or subsequent consent for EIA development unless an EIA has been carried out. "EIA development" means development which is either—

(a) Schedule 1 development; or

(b) Schedule 2 development likely to have significant effects on the environment by virtue of factors such as its nature, size or location.

1.3.3. The Scheme falls within Schedule 2 of the EIA Regulations under '10(f) Construction of roads'. The applicable thresholds and criteria for such projects is 'the area of works exceeds 1 hectare'. As the area of works for the Scheme exceeds 1 hectare (ha) and it is otherwise likely to have significant effects on the environment it is mandatory to undertake an EIA for the project.

[4] HM Government (2017). Town and Country Planning (Environmental Impact Assessment) Regulations 2017 – Statutory Instrument 2017 No. 571. Available at Link].

[5] Ministry of Housing, Communities and Local Government (2019). National Planning Policy Framework. February 2019. Available at [Link].

1.3.4. The assessment of likely significant environmental effects is based on the description of the Scheme presented in Volume 1 Chapter 3 The Scheme using available information and knowledge of the Site and surrounding area gathered from baseline surveys and studies. The Scheme is described in Volume 1 Chapter 3 The Scheme. The environmental assessments and recommendations for mitigation (as well as residual effects) are presented within the technical chapters in Volume 1 of this ES and the non-technical summary (NTS).

1.3.5. The scope of the ES has been agreed with WBC as the LPA for the Scheme through a submission of an EIA scoping report (Volume 3 Appendix 2-1) and receipt of consultee responses to the scoping report (Volume 3 Appendix 2-2). Further consultation has been undertaken with relevant statutory bodies as part of the EIA process. This is summarised in Volume 1 Chapter 2 Approach to the Assessment, with further details included in the respective technical chapters in Volume 1 of this ES.

1.3.6. The ES has been prepared in accordance with the principles of the following guidance:

- NPPF[5];
- Planning practice guidance[6];
- Environmental Impact Assessment: A guide to good practice and procedures[7];
- Environmental Impact Assessment Guide to: Delivering Quality Development[8]; and
- Design Manual for Roads and Bridges (DMRB)[9].

1.3.7. An overview of the guidance referenced in each technical assessment is provided in the respective technical chapters of the ES.

1.4. CONTENT OF THE ENVIRONMENTAL STATEMENT

1.4.1. To meet the requirements of the EIA Regulations 2017 the ES contains the information specified in Regulation 18(3)(a)-(f) of the EIA Regulations 2017, namely:

(a) a description of the proposed development comprising information on the site, design, size and other relevant features of the development;

(b) a description of the likely significant effects of the proposed development on the environment;

(c) a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;

(d) a description of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment;

(e) a non-technical summary of the information referred to in sub-paragraphs (a) to (d); and

[6] Ministry of Housing, Communities and Local Government (2019), Planning Practice Guidance. Available at [Link].

[7] Department for Communities and Local Government (2006) Environmental Impact Assessment: A guide to good practice and procedures. Available at [Link].

[8] IEMA (2016), Environmental Impact Assessment Guide to: Delivering Quality Development Available at [Link].

[9] Highways England. Volume 11 Environmental Assessment. Design Manual for Roads and Bridges (DMRB) Available at [Link].

(f) any additional information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.

1.5. STRUCTURE OF THE ENVIRONMENTAL STATEMENT

1.5.1. The ES comprises the following:

- Non-Technical Summary;
- Volume 1 Environmental Statement – Main Text;
- Volume 2 Figures; and
- Volume 3 Appendices.

NON-TECHNICAL SUMMARY

1.5.2. The NTS is a concise standalone document which summarises the ES. It is intended to make the findings of the EIA accessible to the public and to serve as a 'quick guide' for other stakeholders including decision-makers. It provides a description of the project; a summary of the likely significant environmental effects and proposed mitigation; a summary of the data underlying the assessments; and an outline of the main alternatives considered and the reasons for choosing to progress the project, taking into account its potential to impact the environment.

VOLUME 1 ENVIRONMENTAL STATEMENT - MAIN TEXT

1.5.3. The main text of the ES is divided into the following chapters:

- Chapter 1 Introduction;
- Chapter 2 Approach to the Assessment;
- Chapter 3 The Scheme;
- Chapter 4 Air Quality;
- Chapter 5 Cultural Heritage;
- Chapter 6 Landscape and Visual;
- Chapter 7 Biodiversity;
- Chapter 8 Geology and Soils;
- Chapter 9 Groundwater;
- Chapter 10 Road Drainage and the Water Environment;
- Chapter 11 Noise and Vibration;
- Chapter 12 Materials and Waste;
- Chapter 13 People, Communities and Health;
- Chapter 14 Climate; and
- Chapter 15 Cumulative Effects.

1.5.4. The requirements of Schedule 4 'information for inclusion in environmental statements' (referenced in Regulation 18(3)(f) of the EIA Regulations 2017) are set out, along with the location of the information fulfilling the requirement, in Table 1-1.

Table 1-1 - Location within the ES of information required by Schedule 4

Schedule 4 Information for inclusion in environmental statements	Location within the ES
1. Description of the development, including in particular: (a) a description of the location of the development; (b) a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases; (c) a description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used; (a) (d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases.	Volume 1 Chapter 1 Introduction; and Chapter 3 The Scheme
2. A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.	Volume 1 Chapter 3 The Scheme
3. A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.	'Baseline conditions' sections of technical chapters (Volume 1)
4. A description of the factors specified in regulation 4(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.	'Assessment and methodology and significance criteria' and 'baseline conditions' sections of technical chapters (Volume 1); Volume 1 Chapter 15 Cumulative Effects
5. A description of the likely significant effects of the development on the environment resulting from, inter alia:	'Assessment of effects, mitigation and residual effects' sections of the technical chapters (Volume 1); Volume 1 Chapter 15 Cumulative Effects

Schedule 4 Information for inclusion in environmental statements	Location within the ES
(a) the construction and existence of the development, including, where relevant, demolition works; (b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources; (c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste; (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters); (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources; (f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change; (g) the technologies and the substances used. The description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project, including in particular those established under Council Directive 92/43/EEC(a) and Directive 2009/147/EC(b).	
6. A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	Volume 1 Chapter 2 Approach to the Assessment; 'Assessment and methodology and significance criteria' sections of the technical chapters (Volume 1)
7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.	'Assessment and methodology and significance criteria' sections of the technical chapters (Volume 1)

Schedule 4 Information for inclusion in environmental statements	Location within the ES
8. A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU(c) of the European Parliament and of the Council or Council Directive 2009/71/Euratom(d) or UK environmental assessments may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.	Major accidents and disasters are events with a low probability of occurrence and (if they occur) a high magnitude of harm. Examples include flooding, road traffic accidents and issues in relation to ground stability. These considerations are captured in the relevant parts of the ES or elsewhere in the planning application (including the transport assessment and CEMP). Contamination events are considered in Chapter 8 Geology and Soils. Flood risk is considered in the Flood Risk Assessment.
9. A non-technical summary of the information provided under paragraphs 1 to 8.	Non-technical summary
10. A reference list detailing the sources used for the descriptions and assessments included in the environmental statement.	Reference lists are included at the end of each chapter

VOLUME 2 FIGURES

1.5.5. Volume 2 contains the figures referenced throughout the main text of the ES.

VOLUME 3 APPENDICES

1.5.6. Volume 3 contains the full text of a number of surveys and technical assessments undertaken as part of the EIA, as well as relevant survey and modelling data, such as the EIA scoping report, preliminary ground appraisal reports, results of modelling for air quality and noise, and ecological survey reports.

1.6. PROJECT TEAM

1.6.1. Table 1-2 presents the project team for the ES, providing evidence of their competence and expertise including their qualifications and suitability.

Table 1-2 - Project team

Topic	Competent Experts
EIA Coordination, overarching technical authority for the ES Chapter 1 Introduction Chapter 2 Approach to the Assessment Chapter 3 The Scheme	Alan Heatley (BA (Hons), PGDipTP, MSc) Adam White (BSc, MSc, CEnv, MIEMA) Steven McMullen (BSc, MSc, PIEMA) Sophie Harris (BSc, MSc, GradIEMA)
Chapter 4 Air Quality	Jo Rochfort (BA, MSc) Alex Jones (MSci, AMIEnvSc)

Chapter 5 Cultural Heritage	Janette Platt (BA, MA) Reider Payne (BA, MA, PhD)
Chapter 6 Landscape and Visual	Landscape and Visual Impact Assessment: Andy Cocks (BA (Hons) MLA CMLI) Landscape Design: Sue Lowenthal (BSc (Jt Hons) CMLI MAPM FRGS)
Chapter 7 Biodiversity	Rosie Pope (MA Oxon, MSc, ACIEEM)
Chapter 8 Geology and Soils	Reena Gohel (BSc(Hons), CGeol, FGS)
Chapter 9 Groundwater	Will King (BSc, MSc, mCIWEM)
Chapter 10 Road Drainage and the Water Environment	Matthew Quinnell (BEng (Hons)).
Chapter 11 Noise and Vibration	Steve Fisher (BA(Hons), MIOA) Tom Farmer (MEnvSci, PGDip, AMIOA)
Chapter 12 Materials and Waste	Tim Danson (BSc (Hons) MSc (Dist) AIEMA MCIWEM CSci)
Chapter 13 People, Communities and Health	Adam White (BSc, MSc, CEnv, MIEMA) Sophie Harris (BSc, MSc, GradIEMA)
Chapter 14 Climate	Liz Watts (BSc, PIEMA)
Chapter 15 Cumulative Effects	Adam White (BSc, MSc, CEnv, MIEMA) Sophie Harris (BSc, MSc, GradIEMA)

1.7. EIA QUALITY MARK

1.7.1. WSP has developed and applies an in-house set of processes, procedures and guidance based on sound project management principles. WSP is responsible for the coordination, compilation and procedural review of the ES. The Institute of Environmental Management & Assessment (IEMA) has awarded WSP the EIA Quality Mark for its holistic activity around EIA. WSP was one of the original eight pilot organisations in the UK that trialled the process in 2011 and developed the scheme from the former Corporate Registered Assessor process, and it has continued to maintain the EIA Quality Mark, following ongoing examination by IEMA in relation to ongoing products, staff, innovation and promotion of EIA within the industry.

2. APPROACH TO THE ASSESSMENT

2.1. INTRODUCTION

2.1.1. This Chapter sets out the approach taken to the Environmental Impact Assessment (EIA). It outlines the process and methodology for the EIA, in the relevant legislative context, including the following:

- Identifying the approach to the assessment of environmental effects;
- The significance criteria which will be used within the EIA;
- Level of information required and structure of the Environmental Statement (ES); and
- Consultation undertaken.

2.1.2. The Chapter identifies the environmental topics within the scope of (i.e. 'scoped in' to) the EIA and the 'sensitive receptors' assessed within each technical chapter.

2.2. WHAT IS ENVIRONMENTAL IMPACT ASSESSMENT?

2.2.1. The term 'EIA' describes a systematic process which must be undertaken to identify the likely significant environmental effects of certain types of development project ('EIA development'), set out in the Town and Country Planning (Environmental Impact Assessment) Regulations 2017[4] (the 'EIA Regulations'). This is so that adverse effects can be prevented, mitigated or otherwise compensated for (in accordance with the mitigation hierarchy) and beneficial effects can be enhanced, in line with the government's ambition to embed the principle of 'environmental net gain' in development.

2.2.2. The aim of EIA is to ensure the local planning authority (LPA), when deciding whether to grant planning permission for a project, does so in full knowledge of the likely significant environmental effects of the project, and takes these into account in the decision-making process. The aim of EIA is also to ensure members of the public are aware of the likely significant environmental effects of local development projects and given effective opportunities to participate in the decision-making process.

2.2.3. The major output of the EIA process is the ES. This is a publicly available document which, along with other documents including the Planning Statement, forms part of the submission to the LPA.

2.3. STAGES OF ASSESSMENT METHODOLOGY

2.3.1. The ES contains a series of technical assessments undertaken in accordance with the following generalised methodology:

- Review of the legislative framework, policy and guidance relevant to the assessment;
- Review of the scope of the assessment, taking into account the findings of the EIA scoping report (Volume 3 Appendix 2-1) and consultee responses (Volume 3 Appendix 2-2);
- Review of any further consultation undertaken with relevant statutory environmental bodies (i.e. the Environment Agency, Natural England and Heritage England);
- Review of the criteria used to assess the significance of any identified environmental effects (which take into account the degree of change and the sensitivity of the receptor);
- Definition of the relevant study area and review of its baseline condition (including a review of the results of any baseline surveys carried out to inform the assessment);
- Identification of the aspects of the environment ('sensitive receptors' such as population, flora, fauna, soil, water and air) with the potential to be affected by the Scheme;

- Assessment of the likely significant environmental effects of the Scheme during the construction and operational phases and their interrelationships ('cumulative effects');
- Development of appropriate mitigation, enhancement and monitoring strategies where likely significant environmental effects are present; and
- Assessment of the significance of any residual effects for which no embedded or further mitigation can be identified.

2.4. ASSESSMENT APPROACH

DESIGN MANUAL FOR ROADS AND BRIDGES, VOLUME 11

2.4.1. Volume 11 of the DMRB (titled 'Environmental Assessment') sets out the Highways England requirements and procedures for assessing the environmental effects of highways projects affecting the Strategic Road Network (SRN). Following the DMRB is considered industry 'best practice' and, for this reason, Volume 11 has been used, along with relevant Interim Advice Notes (IANs), as the primary guidance document for this ES.

2.4.2. Volume 11 Section 2 of the DMRB (titled 'General Principles of Environmental Assessment') includes guidance for 'scoping projects for environmental assessment'[10] (LA 103). Scoping is the process of determining the extent of issues to be considered in the EIA and reported in the ES. As described in the 'introduction to environmental assessment'[11] (LA 101), scoping provides justification and evidence for:

- Further assessment (or not) of environmental factors;
- The level of assessment to be undertaken;
- The approach to consultation; and
- The environmental assessment methodologies / study areas).

2.4.3. The guidance for 'environmental assessment and monitoring'[12] (LA 104) provides general principles and guidance for EIAs and describes the following levels of assessment:

- **Simple Assessment**: an assessment carried out to gain an understanding of the likely significant environmental effects of a project (including consultation with statutory environmental bodies and reconnaissance surveys as necessary) for the purpose of informing the final design or to identify the need for a Detailed Assessment; and
- **Detailed Assessment**: carried out to fully understand the likely significant environmental effects expected to be key issues in the decision-making process (typically involving consultation with statutory environmental bodies, detailed data-collection and quantitative modelling).

2.4.4. Volume 11 Section 3 of the DMRB provides topic-specific guidance on environmental assessment techniques (e.g. for air quality and cultural heritage). The relevant Parts of Volume 11 Section 3 of the DMRB are referred to (where applicable) in the technical chapters of the ES.

[10] Highways England. Volume 11 Section 2 Part 4 Scoping projects for environmental assessment (LA 103). Available at [Link].

[11] Highways England. Volume 11 Section 1 Part 1 Introduction to environmental assessment (LA 101). Available at [Link].

[12] Highways England. Volume 11 Section 2 Part 5 Environmental assessment and monitoring (LA 104). Available at [Link].

ASSESSMENT AREA

2.4.5. In the ES the following terms of reference are used to describe the area of land subject to assessment:

- **Scheme**: The entirety of the proposed new road and all land adjacent to the road which may be temporarily occupied during the construction phase (e.g. by the storage of construction materials or the siting of construction compounds) or subject to permanent land take when the proposed new road is operational.
- **Site**: The area of land with the potential to be directly affected by the Scheme is referred to as the 'Site' and is defined by the red line boundary. The term 'site' is also used throughout to refer to specific features which may be represented as point locations within the given context (e.g. monitoring points) or which comprise subordinate parts of a geographical area (e.g. environmentally designated sites).
- **Study Area**: The technical assessments each define a 'study area' which comprises the maximum physical extent of the land directly affected by the Scheme plus a 'buffer zone' or 'search radius' in which there may be features with the potential to be affected by, or to constrain the design of, the Scheme. The size of the study area varies by topic and may be interpreted with a degree of professional judgement.

DEFINING ASSESSMENT YEARS AND ASSESSMENT SCENARIOS

2.4.6. This ES assesses the effects of the Scheme (as described in Volume 1 Chapter 3 The Scheme) as a standalone project, independently of other known planned developments, such as those within the South Wokingham SDL. However, it is acknowledged that the major purpose of the SWDR is to facilitate access to development within the SDL. Therefore, the potential for cumulative effects between the Scheme and other known planned developments is also considered under 'cumulative effects' in each technical chapter.

2.4.7. The assessments set out in the technical chapters establish the baseline condition of their respective study areas as a starting point against which future change can be measured. Those assessments which make use of traffic data (principally Volume 1 Chapter 4 Air Quality and Chapter 11 Noise and Vibration) take into account anticipated future change (e.g. background growth in traffic) so as to differentiate this from effects associated with the Scheme itself. To do this they compare a 'do minimum' scenario (without the Scheme) against a 'do something' scenario (with the Scheme) in an 'opening year' and a 'future year'. The anticipated opening year for the Scheme is 2021. In accordance with air quality and noise guidance set out in Part 1 and Part 7 of Volume 11 Section 3 of the DMRB the 'future year' is 2036 (i.e. 15 years after project opening).

2.4.8. As it is considered unlikely that the residential development associated with the South Wokingham SDL will not be present in 2036, the noise and air quality chapters include a third 'future year' scenario in which both the Scheme and the SDL are present. This allows the assessments to differentiate the effects of the Scheme from the effects SDL and thereby ensure any responsibility for mitigation is assigned appropriately. In each scenario the assessments consider effects in the construction and operational phases.

TRAFFIC MODEL

2.4.9. The Transport Assessment has identified that the Scheme will have an impact on the Waterloo Road/Peacock Lane/Old Wokingham Road priority junction in terms of reduced capacity, longer

queues and delays. Junction mitigation options are being considered, and once these are agreed, they will be tested in the Wokingham Strategic Transport Model v4 (WSTM4), resulting in a new set of forecast scenarios. This will affect the air quality, noise and greenhouse gas assessments. It is therefore anticipated that further assessment work may be required to supplement the ES, in particular for air quality and noise. The air quality assessment has not been fully completed for operational traffic effects at this time as this assessment is particularly sensitive to changes in the traffic data analysis.

2.5. THE STAGES OF ASSESSMENT

2.5.1. The stages described below have been completed in preparation of this ES.

SCOPING

2.5.2. 'Scoping' is the process of determining the extent of the issues to be considered in the EIA and reported in the ES. Scoping occurs early in the EIA process and provides an opportunity for the applicant to consult with the LPA, in accordance with Regulation 15 of the EIA Regulations 2017, by making a formal request for a 'scoping opinion'. Such a request allows the LPA to state which aspects of the environment it considers most likely to be affected by a development project. Scoping opinions must be complied with and identify aspects which should be focussed upon in the ES.

2.5.3. An EIA scoping report (Volume 3 Appendix 2-1) was submitted to the LPA for the Scheme with a request for a scoping opinion in October 2017. Following the introduction of the EIA Regulations 2017, which extended the scope of EIA to include the topics 'human health' and 'climate', a scoping memo was submitted on 10 October 2017 to agree an approach to the assessment of these topics with the LPA. The EIA scoping report identified a potential for likely significant effects to arise in relation to a number of topics and recommended that these were 'scoped in' to the EIA. Once extended by the scoping memo the list of technical assessments appearing as chapters in the ES is the following:

- Air quality;
- Cultural heritage;
- Landscape and visual;
- Biodiversity;
- Geology and soils;
- Groundwater;
- Road drainage and the water environment;
- Noise and vibration;
- Materials and waste;
- People, communities and health; and
- Climate.

2.5.4. Scoping opinions were received between November 2017 and April 2018. These provide comments on the proposed content of the ES (incorporating consultee input where relevant) and are included in Volume 3 Appendix 2-2. The comments provided have been addressed throughout the technical chapters of the ES. Scoping opinions were received from the following:

- The WBC Flood Risk Officer (14 November 2017);
- Natural England (16 November 2017);
- Highways England (17 November 2017);
- Historic England (20 November 2017);
- Bracknell Forest Council (27 November 2017);

- WBC Highways (27 November 2017);
- The WBC Environmental Health Officer (30 November 2017);
- The WBC Landscape Officer (5 December 2017);
- British Horse Society Access and Bridleways Officer Wokingham (6 December 2017).
- The Environment Agency (7 December 2017);
- The WBC Urban Design and Conservation Officer (3 January 2018);
- The SDL Public Rights of Way Officer (8 March 2018);
- The WBC Commissioning Officer (Public Rights of Way) (12 March 2018); and
- WBC Public Health (19 April 2018).

2.5.5. No scoping opinion was received from the planning department at WBC.

2.5.6. Although the preliminary design for the Scheme has evolved since the submission of the EIA scoping report, the scope and methodology agreed for the EIA is considered to remain applicable to the current preliminary design for Scheme as described in Volume 1 Chapter 3 The Scheme.

BASELINE CONDITIONS

2.5.7. To assess the likely significant effects of a future development project it is necessary to understand the environmental conditions that currently exist in the absence of the development. The technical assessments establish the 'baseline condition' of their respective study areas as a starting point against which future change can be measured. The baseline scenarios for the Scheme have been developed through activities including the following:

- Site visits and surveys;
- Desk-based studies;
- Reviews of existing information;
- Modelling;
- Reviews of relevant national, regional (where relevant) and local planning policy; and
- Consultation with relevant statutory consultees.

2.5.8. The sources of information used to establish the baseline scenarios for the technical assessments (including information obtained during site visits and surveys undertaken in 2018 and 2019), as well as details of any limitations encountered, are summarised in Volume 1 Chapters 4-14.

Future Baseline

2.5.9. The 'future baseline' describes the anticipated environmental conditions that would exist at some point in the future in the absence of the development project. For example, the assessments which make use of traffic data (including Volume 1 Chapter 4 Air Quality and Chapter 11 Noise and Vibration) take into account background growth in traffic and changes in emissions rates anticipated to occur regardless of the Scheme. The future baseline includes anticipated changes to the built environment including the residential development associated with the South Wokingham SDL.

SENSITIVE RECEPTORS

2.5.10. A 'sensitive receptor' is a feature of the environment (such as population, flora, fauna, soil, water and air) with the potential to be affected by a development project. Sensitive receptors identified in the baseline studies completed for this Scheme (excluding those which are 'scoped out') are summarised in Table 2-1.

Table 2-1 - Sensitive Receptors considered in the EIA

Environmental Topic	Sensitive Receptors	Chapter Reference
Air quality	Residential dwellings and public footpaths.	Volume 1 Chapter 4
Cultural heritage	Paleoenvironmental remains; prehistoric remains; post-medieval remains; and heritage assets including listed buildings and conservation areas.	Volume 1 Chapter 5
Landscape and visual	Landscape: natural topography, landscape fabric; and local landscape character. Visual: local residents; users of public rights of way; and local business proprietors, workers and customers. Arboricultural: trees subject to tree protection orders; veteran trees; notable trees; and ancient woodland.	Volume 1 Chapter 6
Biodiversity	Designated sites: ancient woodland; and habitat of ecological importance (hedgerow, standing water, wet woodland, lowland meadow grassland, and Emm Brook). Protected species: bats; otters; breeding birds; reptiles; and fish.	Volume 1 Chapter 7
Geology and soils	Current adjacent Site users; below-ground services and structures; and Secondary A aquifers.	Volume 1 Chapter 8
Groundwater	Secondary A aquifers (including the Bagshot Formation); other secondary (undifferentiated) aquifers; unproductive strata (including the London Clay Formation, which may contain perched groundwater) users of abstracted groundwater; and Emm Brook.	Volume 1 Chapter 9
Road drainage and the water environment	Surface water, groundwater and flood risk.	Volume 1 Chapter 10
Noise and vibration	Dwellings, community facilities, a library, a sports/leisure centre, medical facilities, care/nursing homes places of worship and Noise Important Areas (NIAs).	Volume 1 Chapter 11
Materials and waste	Construction materials and their availability in South East England and the UK. Landfill capacity in South East England.	Volume 1 Chapter 12
People, communities and health	Employment opportunities, best and most versatile agricultural land, agricultural holdings, non-motorised users and human health.	Volume 1 Chapter 13
Climate	Greenhouse gas assessment: the global climate.	Volume 1 Chapter 14

ASSESSMENT OF LIKELY SIGNIFICANT ENVIRONMENTAL EFFECTS

2.5.11. The assessments take into account the baseline condition of the relevant study area, the sensitivity of the identified receptors and the anticipated degree of change resulting from the development of the Scheme (whether adverse or beneficial). The likely significant environmental effects have, wherever possible, been assessed quantitatively.

2.5.12. The assessments of significance have included consideration of the following:

- Beneficial and adverse effects;
- Short, medium and long-term effects;
- Direct, indirect and secondary effects;
- Permanent and temporary effects; and
- Cumulative effects.

2.5.13. The environmental value (or sensitivity) of the identified receptors and the anticipated magnitude of impact (or degree of change) have been categorised in accordance with the principles of LA 104 Environmental assessment and monitoring[12] (part of the DMRB). The categories have then been compared to determine a category for 'significance of effect', using the matrix shown in Table 2-2.

Table 2-2 - Matrix for Determining the Significance of Effects

Environmental Value (Sensitivity of Receptor)	Magnitude of Impact (Degree of Change)					
		No Change	**Negligible**	**Minor**	**Moderate**	**Major**
	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Very Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

DMRB Volume 11 Section 2 Part 4 Environmental assessment and monitoring (LA 104)

2.5.14. Descriptors of the significance of effect categories are provided in Table 2-3.

Table 2-3 - Descriptors of the significance of effect categories

Significance category	Typical descriptors of effect
Very Large	Effects at this level are material in the decision-making process.
Large	Effects at this level are likely to be material in the decision-making process.
Moderate	Effects at this level can be considered to be material decision-making factors.
Slight	Effects at this level are not material in the decision-making process.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

2.5.15. The assessments also make use of topic-specific methodologies to aid the assessment of likely significant effects and, where these apply, they are set out in the relevant technical chapter. In cases where there is scope for interpretation in the attribution of significance, e.g. where there is uncertainty about the nature of the design or an effect, a reasonable 'worst case' scenario has been assumed. For risk-based effects the probability of occurrence has been taken into account. In cases where no regulatory standards, published guidance or other assessment criteria exist, the attribution of significance relies on a degree of professional judgement.

IDENTIFICATION OF MITIGATION, ENHANCEMENT AND MONITORING MEASURES

2.5.16. Mitigation, enhancement and monitoring measures are identified throughout the technical chapters of the ES. Mitigation measures are identified wherever adverse effects are present. The adverse effect levels presented take into account 'embedded mitigation', e.g. implementation of a Construction Environmental Management Plan (CEMP), and assume compliance with all legislation, guidance and 'best practice' relevant to the construction industry. Where it is not possible to 'design out' adverse effects, 'further mitigation' is identified to prevent, minimise or compensate for the adverse effect, in accordance with the mitigation hierarchy.

2.5.17. In the case of compensating for adverse effects, or where beneficial effects are present, opportunities have been sought to deliver an enhancement to the environment in line with the government's ambition to embed the principle of 'environmental net gain' in development.

2.5.18. The technical chapters also consider the effectiveness of the identified mitigation and enhancement measures and, where necessary, outline any monitoring strategies which may be required to ensure the effectiveness and fulfil any requirements for validation and verification reporting.

RESIDUAL EFFECTS ASSESSMENT

2.5.19. Adverse effects which cannot be fully mitigated are 'residual effects'. The assessments each consider the significance of any residual effects and, where these are deemed 'significant', it is for decision-makers to determine whether these are acceptable, taking into account the overall costs and benefits of the project and the priorities of the local government and community.

2.6. CUMULATIVE EFFECTS

2.6.1. Schedule 4 of the EIA Regulations 2017 requires that the cumulative impacts of a development are considered within an EIA. In 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions' published in 1999[13] the European Commission defines 'cumulative impacts' as 'impacts that result from incremental changes caused by other past, present or *reasonably foreseeable* [emphasis added] actions together with the project' and provides the following guidance on the scope of the cumulative effects assessment:

> *'In practical terms, the extent of the assessment in terms of how far into the past and into the future will be dependent upon the availability and quality of information…"* ; and

[13] European Commission (1999) Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions, EC. Available at [Link].

'…it is only reasonable to consider current events and those that will take place in the foreseeable future. Furthermore, the assessment can only be based on the data that is readily available.'

2.6.2. LA 104 Environmental assessment and monitoring[12] notes the following:

'There are no defined limits or criteria for selecting the list of projects for cumulative assessment. Professional judgement using Annex III of the EIA Directive [Ref 4.N] can be applied and justification provided for developments selected (and excluded).'

2.6.3. This is supplemented by the (now superseded) guidance in Volume 11 Section 2 Part 5 of the DMRB which provides the following definition of 'reasonably foreseeable':

'For the purposes of this guidance, 'reasonably foreseeable' is interpreted to include other projects that are 'committed'. These should include (but not necessarily be limited to):

Trunk road and motorway projects which have been confirmed (i.e. gone through the statutory processes).
Development projects with valid planning permissions as granted by the Local Planning Authority, and for which formal EIA is a requirement or for which non-statutory environmental impact assessment has been undertaken.

In each case, other projects to be considered in the assessment of cumulative effects should be determined in consultation with the Local Planning Authority and other statutory bodies…'

2.6.4. In the consultation draft of 'Environmental Impact Assessment: A Guide to Good Practice and Procedures' published in 2006[7] the former Department for Communities and Local Government (DCLG) identified two types of cumulative effects requiring consideration within an EIA. These are the following:

'The combined effects of different development activities within the vicinity of the development'; and

'*Different aspects of a single development on a particular receptor*'.

2.6.5. In accordance with the above the ES includes consideration of (a) cumulative (or 'combined') impacts arising from the Scheme in combination with other nearby developments (including 'reasonably foreseeable' developments, such as those within the SDL) and (b) cumulative effects arising in relation to multiple topics (e.g. the cumulative effect of changes in both noise and air quality on human health as a result of the Scheme). The former is set out in the technical chapters within Volume 1 and the latter is set out in Volume 1 Chapter 15 Cumulative Effects.

2.6.6. The significance criteria used for the assessment of cumulative effects are those presented in LA 104 Environmental assessment and monitoring[12] (refer to Table 2-3).

2.7. CONSULTATION

2.7.1. Consultation is critical to the development of a comprehensive ES. The views of key statutory and non-statutory consultees serve to focus the environmental studies and help identify specific matters which require further investigation. Consultation is an on-going process, which enables mitigation measures to be agreed and incorporated into the project design, thereby limiting adverse effects and enhancing benefits.

2.7.2. Consultation by email, telephone call and face-to-face meetings has taken place with statutory and non-statutory consultees as part of the technical studies for the EIA. The purpose of these consultations was to agree the assessment methodologies for technical studies and identify any sensitivities or concerns associated with the Scheme which may need consideration in the design process and assessed as part of the EIA.

2.7.3. The consultations undertaken are described in the relevant sections of Volume 1 Chapters 4-14.

2.8. STRUCTURE OF THE TECHNICAL CHAPTERS

2.8.1. The general structure of Volume 1 Chapters 4-14 is the following:

- Introduction;
- Legislative Framework, Policy and Guidance;
- Assessment Methodology and Significance Criteria;
- Baseline Conditions;
- Sensitive Receptors;
- Assessment of Effects, Mitigation and Residual Effects;
- Limitations and Assumptions; and
- Summary.

2.9. OTHER DOCUMENTS TO BE SUBMITTED

2.9.1. The ES should be read in conjunction with the following documents submitted as part of the planning application. The Planning Statement and Design & Access Statement define the Scheme for which planning permission is being sought.

- Planning statement;
- Design and access statement;
- Statement of Community Engagement;
- Transport assessment;
- Design drawings, including:
  - Location plan;
  - Red line boundary drawing;
  - General arrangement drawings;
  - Cross sections;
  - Long section;
  - Drainage catchment plan;
  - Existing services;
  - Landscape design; and
  - Street lighting design; and
- Outline CEMP.

2.10. ASSUMPTIONS AND LIMITATIONS

2.10.1. The following list sets out the major assumptions and limitations associated with the preparation of the ES:

- Information received by third parties is complete and up to date;

- The design, construction and operational phases of the Scheme will comply with all relevant legislation, guidance and 'best practice' relevant to the construction industry;
- The construction phase will commence (subject to planning approval and land acquisition) in Autumn 2020 and be completed in Autumn 2021;
- The construction phase will require siting of two construction compounds (southeast of the Tesco carpark and adjacent to the link to Easthampstead Road) connected by a temporary access road located south of the east-west orientated part of the Scheme and west of the link to Easthampstead Road;
- The assessment of likely significant effects associated with the construction phase is based on professional judgement and assumptions representing a reasonable 'worst case' scenario;
- Planning conditions will be imposed that would secure appropriate measures to control the construction methods for the site preparation, earthworks and construction phase; and
- Likely significant environmental effects have been assessed on the basis of the defined description of the Scheme set out in Volume 1 Chapter 3 The Scheme

2.10.2. Other topic-specific assumptions and limitations are set out in the technical chapters of the ES.

3. THE SCHEME

3.1. INTRODUCTION

3.1.1. This chapter provides the background to, and a detailed description of, the Scheme, and includes an indication of the proposed phasing and construction programme for the project. The description aligns with the proposal for which planning consent is sought and, together with the supporting plans, forms the basis of the technical chapters of the Environmental Statement (ES) (Volume 1 Chapters 4-14).

3.2. PLANNING CONTEXT

LOCAL PLAN CORE STRATEGY – POLICY CP21 AND APPENDIX 7

3.2.1. In the Core Strategy[1] adopted in January 2010, WBC committed to delivering a 'sustainable, well designed mixed-use development' within the South Wokingham SDL (policy CP21). The SDL will include the phased delivery of 2,500 new residential dwellings, appropriate retail facilities and social and other physical infrastructure (including two new primary schools). The South Wokingham Distributor Road (SWDR), referenced as 'south Wokingham relief road', will address items 7 and 9 of policy CP21:

> *'7) Improvements to transport capacity along the A321 and A329 including the provision of south Wokingham relief road from the vicinity of the Coppid Beech roundabout to the Finchampstead Road'*; and
>
> *'9) Measures to improve access by non-car modes to Wokingham town centre (including the station interchange).'*

3.2.2. Further detail setting out the aspirations of WBC for the SDL are described in the 'concept statement' in Appendix 7 of the Core Strategy (pages 116-120).

WOKINGHAM BOROUGH COUNCIL LOCAL TRANSPORT PLAN 2011-2026

3.2.3. The Local Transport Plan 2011-2023 (LTP3)[14] sets out the long-term transport strategy for Wokingham until 2026 (a timeframe consistent with the Core Strategy). The implementation of the SWDR is consistent with the 'overarching vision', goals and policies set out in LTP3.

3.2.4. The overarching vision for LTP3 is the following:

> *'To provide a cost-effective, inclusive transport network that enhances the economic, social and environmental prospects of the Borough whilst promoting the safety, health and well-being of those that use it.'*

3.2.5. The goals of LTP3 are the following:

- Highways Goal: To have a resilient, safe highway network that balances capacity for all users, enhances the economic prospects of the Borough, and promotes sustainable travel;
- Active Travel Goal: To work with partners to promote walking and cycling as a health enhancing physical activity for all of our residents through providing:

[14] Wokingham Borough Council Local Transport Plan 2011 - 2026. Available at [Link].

- Connected, convenient, safe and signed pedestrian networks across the Borough to enhance existing networks;
- New cycleways integrated with the existing cycle network; and
- Improved cycle parking at stations, businesses and schools;

- Public Transport Goal: To promote an integrated and inclusive public transport network that provides a convenient, acceptable, reliable and affordable alternative to car travel;
- Smarter Choices and Demand Management Goal: To enable people who live, visit and work in the Borough to make informed, safe and sustainable travel decisions from a range of transport options; and
- Strategic Projects Goal: To manage the demand for travel in order to ensure that people have a high level of access to different destinations, with sufficient choice, whilst minimising the adverse effects of congestion.

3.2.6. Key policies of LTP3 are the following:

- Policy HW1 'Address Congestion' aims to deliver engineering and highways measures that will help to address areas of congestion in the Borough; and
- Policy HW3 'Improving Access to Key Hubs' aims to improve access to key corridors in order to create a connected network through the Borough and preserve its links into the regional hubs such as Reading, Heathrow and London.

3.3. AIMS OF THE SCHEME

3.3.1. The aims of the Scheme are the following:

- To provide access to development within the SDL;
- To allow dispersal of traffic within the street network, relieving pressure on the town centre;
- To act as a corridor for pedestrians, cyclists and public transport; and
- To become a key public street within Wokingham.

3.3.2. Other anticipated benefits of the SWDR include the alleviation of congestion in Wokingham town centre; improved facilities for pedestrians, cyclists and equestrians (with associated improvements to the accessibility of Wokingham railway station) with the potential to incentivise reductions in numbers of motor vehicle trips; and improvements to the viability of Wokingham town centre.

3.4. BACKGROUND TO THE SCHEME

3.4.1. The SWDR is being delivered in phases:

- Phase 1: Montague Park;
- Phase 2: Eastern Gateway;
- Phase 3: Central and western section; and
- Phase 4: Western Gateway.

3.4.2. The first phase of the SWDR was constructed as part of the Montague Park residential development, with outline planning permission granted in December 2012 (planning ref. 101367) and construction completed in Summer 2015. This comprised a 7.5 km section of new roadway (William Heelas Way) diverging southwards from the east-west orientated London Road and passing through Montague Park towards the Waterloo-Reading railway.

3.4.3. The second phase will extend William Heelas Way southwards over the railway line to connect via a new roundabout with Waterloo Road. Planning permission for this section of the SWDR was granted in February 2018 (planning ref. 172934) and construction is due to start in Autumn 2019.

3.4.4. The third phase is the Central and Western Section, which connects with the Eastern Gateway (in the east) via a roundabout junction on Waterloo Road (the roundabout will be constructed as part of the Eastern Gateway); the Western Gateway (in the west) via the existing Tesco roundabout on Finchampstead Road; and, via a new link road to the south, Easthampstead Road. This will provide a route between London Road in the northeast and Finchampstead road in the southwest.

3.4.5. The fourth phase is the Western Gateway, which is not part of the Scheme, is expected to involve a series of online improvements to the section of roadway between the existing Tesco roundabout and the roundabout junction between Molly Millars Lane and Finchampstead Road.

3.5. DESCRIPTION OF THE SCHEME [S]

3.5.1. This section is superseded by Section 2.1 of the ESA 2020.

3.6. IMPLEMENTATION OF THE SCHEME [S]

3.6.1. This section is superseded by Section 2.2 of the ESA 2020.

3.7. REASONABLE ALTERNATIVES CONSIDERED

3.7.1. In accordance with regulation 18 Section 3(d) of the EIA Regulations 2017[4] the ES is required to provide 'a description of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment.'

3.7.2. The following alternatives have been considered:

- A 'do minimum' scenario; and
- Alternative alignments for the Scheme.

THE 'DO MINIMUM' SCENARIO

3.7.3. No significant changes to baseline conditions are anticipated in a 'do minimum' scenario in which neither the SWDR or the SDL are implemented. The area in which the Scheme is located is expected to remain rural and agricultural. However, the potential benefits of the Scheme will not be realised. The 'do minimum' scenario is unlikely to materialise as the SWDR is an integral part of the SDL which the local authority has committed to developing in the Local Plan.

ALTERNATIVE ALIGNMENTS CONSIDERED FOR THE PROPOSED HIGHWAY

3.7.4. Given the limited space between the Waterloo-Reading railway and the southern boundary of the SDL, three general route options were examined (Options A, B and C) as part of the Options Appraisal Report[3] published in May 2014. The proposed alignments were the following:

- The proposed alignment for Route Option A was the nearest to the Waterloo-Reading railway and connected with the Eastern Gateway at a junction with Waterloo Road and the Western Gateway at the existing Tesco roundabout. Similar to the current alignment, the proposed route intersected Emm Brook and public rights of way FP9 and FP10.
- The proposed alignment for Route Option B connected with the Eastern Gateway at a junction with Waterloo Road and the Western Gateway at the existing Tesco roundabout. The route was

further south of, but otherwise similar to, Route Option A. The proposed route diverted south of the existing surface water detention pond and intersected Emm Brook and public rights of way FP9 and FP10.

- The proposed alignment for Route Option C connected with the Eastern Gateway at a junction with Waterloo Road and the Western Gateway at the existing Tesco roundabout. The route was further south of, but otherwise similar to, Route Options A and B. The proposed route passed directly adjacent to the parcel of ancient woodland near Ludgrove School and intersected Heathlands Road as well as Easthampstead Road and Waterloo Road; and intersected Emm Brook and public rights of way FP9 and FP10.

3.7.5. The route of the SWDR between Waterloo Road and Finchampstead Road was chosen following public consultation in 2014. 81% of respondents agreed with Option B (central route) and the WBC Executive supported the public preference in November 2014. This was further refined in 2018 based on site surveys taking account of environmental constraints, traffic and planning requirements.

4. AIR QUALITY [S]

4.1.1. This chapter is superseded by Chapter 3 of the ESA 2020.

5. CULTURAL HERITAGE [S]

5.1.1. This chapter is superseded by Chapter 4 of the ESA 2020.

6. LANDSCAPE AND VISUAL [S]

6.1.1. This chapter is superseded by Chapter 5 of the ESA 2020.

7. BIODIVERSITY [S]

7.1.1. This chapter is superseded by Chapter 6 of the ESA 2020.

8. GEOLOGY AND SOILS

8.1. INTRODUCTION

8.1.1. This Chapter reports the outcome of the assessment of likely significant effects arising from the Scheme on ground conditions and areas of geological interest in the context of the Site and surrounding area. In particular, the chapter considers the likely significant effects associated with potential contamination risks during the construction and operational stages.

8.1.2. The Chapter describes the assessment methodology, baseline condition of the Site and surrounding area, mitigation adopted for the purposes of the assessment, a summary of the likely significant effects taking into account national legislation, the further mitigation measures required to prevent, reduce or offset significant adverse effects, and the likely residual effects after these measures have been employed.

8.1.3. This Chapter (and its associated appendices) is intended to be read as part of the wider environmental statement (ES), with particular reference to Chapter 5 Biodiversity for further details on ecology, Chapter 10 Road Drainage and the Water Environment for further details on water quality and status and Chapter 11: People and Communities for details on agricultural land use and classification.

8.1.4. This Chapter has been informed by a Preliminary Sources Study Report (PSSR)[15] completed by WSP, dated October 2017 (Volume 3 Appendix 8-1) and the Phase 2 Contaminated Land Assessment[16] completed by WSP, dated June 2019 (Volume 3 Appendix 8-2) (this includes the Factual Ground Investigation Reports produced by Geotechnics Limited[17,18].

8.2. LEGISLATIVE FRAMEWORK, POLICY AND GUIDANCE

8.2.1. The applicable legislative framework, policy and guidance are summarised as follows and further details can be found in Volume 3 Appendix 8-3:

- Environmental Protection Act 1990;
- Contaminated Land (England) (Amendment) Regulations 2012;
- Water Framework Directive 2000/60/EC;
- Construction (Design and Management) Regulations (CDM) 2015;
- NPPF[5];
- Contaminated Land Report 11 (CLR11) Model Procedures for the Management of Land Contamination;
- Environmental Protection Act 1990: Part 2A, Contaminated Land Statutory Guidance 2012;
- Highways England (2008) Design Manual for Roads and Bridges (DMRB), HD22/08, Volume 4, Section 1, Part 2: Managing Geotechnical Risk;

[15] WSP (2018) South Wokingham Distributor Road – Spine Road and Western Gateway. Preliminary Sources Study Report, 70032441-WBC SWDR Spine Road-PSSR-V1, October 2017.

[16] WSP (2019) South Wokingham Distributor Road – Spine Road and Western Gateway. Phase 2 Contaminated Land Assessment, 70032441-CON-1, June 2019.

[17] Geotechnics Limited (2018) South Wokingham Distributor Road – Spine Road and Western Gateway. Ground Investigation, Factual Report, PC187024, September 2018 (Phase 1 Ground Investigation).

[18] Geotechnics Limited (2018) South Wokingham Distributor Road – Spine Road and Western Gateway. Ground Investigation, Factual Report, PC187196, October 2018 (Phase 2 Ground Investigation).

- Highways England (2008) DMRB, HA 205/08, Volume 11, Section 2, Part 5: Environmental Assessment, Environmental Impact Assessment; and
- Highways England (1993) DMRB, Volume 11, Section 3, Part 11: Geology and Soils.

8.3. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

CONSULTATION

8.3.1. No formal consultation has been undertaken as part of this assessment. However relevant regulatory information has been obtained via Envirocheck and included in the PSSR in Volume 3 Appendix 8-1.

SCOPE OF THE ASSESSMENT

8.3.2. An EIA scoping report was submitted to Wokingham Borough Council in October 2017 (Volume 3 Appendix 2-1). Consultee responses were received between November 2017 and April 2018 (Volume 3 Appendix 2-2). This section provides an update on the scope of the assessment and summarises the evidence base for insignificant effects.

INSIGNIFICANT EFFECTS

8.3.3. No insignificant effects relating to ground conditions were identified in the Scoping Report.

POTENTIALLY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

- Disturbance of contaminated ground and associated effects as a result of the construction design. The assessment will include the identification of receptors (i.e. adjacent Site users, below ground services and structures and the Secondary A aquifer) that are may be affected as a result of the construction phase.

OPERATIONAL PHASE

- Identification of sources of contamination that could be introduced by the operational phase of the Scheme; and
- Evaluation of the potentially harmful exposure of the post-construction phase receptors in the context of exposure to existing contaminants (or those that enter the ground due to the operation of the Scheme).

EXTENT OF THE STUDY AREA

8.3.4. The Study Area comprises the anticipated maximum physical extent of the Scheme as per drawings GA_010 to GA_014 and the associated temporary works plus a buffer zone of 250 m. This distance is referenced in guidance documents, including R&D Publication 66 (2008)[19], and is typical at the hazard identification stage of an assessment.

METHOD OF BASELINE DATA COLLATION

DESK STUDY

8.3.5. In order to satisfy the scope and derive a preliminary conceptual site model (CSM), existing soil, geological, hydrogeological and hydrological conditions have been reviewed, together with information

[19] Guidance for the Safe Development of Housing on Land Affected by Contamination: R&D Publication 66, 2008.

on current and historical activities both on-site and in the vicinity, which could impose constraints on the proposed new road. This was completed within the PSSR and the sources of information used included:

- British Geological Society (BGS) 1:50,000 Series Geological Map Sheet 268 'Reading' (Solid and Drift Edition);
- BGS 1:50,000 Series Geological Map Sheet 269 'Windsor' (Solid and Drift Edition);
- BGS, 1:10,000 scale Geological Sheet SU 86 NW, 1997;
- BGS exploratory hole records, BGS map viewer, last accessed 22 February 2019;
- British Geological Survey GeoIndex, http://www.bgs.ac.uk/geoindex/ , last accessed 22 February 2019;
- MAGIC Maps https://magic.defra.gov.uk/, last accessed 22 February 2019; and
- Landmark, Envirocheck Report, Datasheet, Order number 137281759_1_1, 25 August 2017.

SITE VISIT

8.3.6. A walkover survey of Site was completed to support preparation of the PSSR on 18 October 2017.

SURVEYS

8.3.7. A ground investigation was undertaken between 27 February and 9 March 2018 and 30 July and 1 August 2018 by Geotechnics Limited. The purpose of the ground investigations was to inform geotechnical design of the Proposed South Wokingham Distributor Road (SWDR) Scheme. Ground contamination testing was also undertaken in order to support this ES. The following factual reports were produced by Geotechnics Limited:

- Geotechnics Limited 'South Wokingham Distributor Road – Spine Road and Western Gateway, Ground Investigation, Factual Report', Report N° PC187024, dated September 2018. (Phase 1 Ground Investigation); and
- Geotechnics Limited 'South Wokingham Distributor Road – Spine Road and Western Gateway, Ground Investigation, Factual Report', Report N° PC187196, dated October 2018. (Phase 2 Ground Investigation).
- Following the review of the above reports, WSP produced the following Phase 2 report:
- WSP 'South Wokingham Distributor Road – Spine Road and Western Gateway. Phase 2 Contaminated Land Assessment', Report N° 70032441-CON-1, dated January 2019.

ASSESSMENT METHODOLOGY

8.3.8. Risks arising from land potentially affected by contamination have been assessed with due regard to Part 2A, guidance from land contamination risk management set out in CLR11, DMRB, NPPF[5] and CDM 2015 (see Section 8.2).

8.3.9. Potential sources and receptors have been identified following a desk study review and ground investigation in order to assess the possibility for land to be contaminated, thereby enabling an evaluation of the potential for pathways to exist between them to form complete contaminant linkages under baseline conditions, during construction and during the operational phase of the Scheme.

8.3.10. The likely significance of the risk for each plausible linkage has then be assessed to determine the beneficial and adverse effects of the Scheme against baseline conditions. The ground investigation has been used to establish if the Site is suitable for the Scheme (as required by the NPPF[5]) and that it, as a minimum, would not be determinable as 'contaminated land' under Part 2A.

Significance criteria

8.3.11. The assessment of potential effects as a result of the Scheme has taken into account both the construction and operational phases. The construction phase includes: enabling works, demolition, earthworks and construction activities as set out in Chapter 3 The Scheme. The significance level attributed to each effect has been assessed based on the magnitude of impact from the construction and operation of the Scheme and the sensitivity of the affected receptors as outlined in more detail in Chapter 2 Approach to the Assessment. The sensitivity of the affected receptor is assessed on a scale of very high, high, medium, low and negligible, and the magnitude of change is assessed on a scale of major, moderate, minor, negligible and no change (as shown in Chapter 2 Approach to the Assessment).

8.4. BASELINE CONDITIONS

8.4.1. The baseline conditions are the environmental conditions against which the potential environmental effects of and constraints on the Scheme are assessed. The baseline conditions refer to the present time and with no significant change predicted during the interim period before development works are programmed to commence. The baseline conditions are summarised below with further details provided within the PSSR (Volume 3 Appendix 8-1) and the Phase 2 Contaminated Land Assessment completed by WSP (Volume 3 Appendix 8-2).

SITE DESCRIPTION

8.4.2. The Scheme runs east to west between Finchampstead Road and Waterloo Road a distance of circa 2.4 km. The Scheme also includes a link off Easthampstead Road and is approximately 300 m in length.

8.4.3. The majority of the Scheme was identified to comprise open fields covered with grass, except where it crosses existing roads.

8.4.4. Ordnance Survey topographical maps (Explorer Sheet 160, Windsor, Weybridge & Bracknell, 1:25,000 scale and Landranger Sheet 175, Reading & Windsor, 1:50,000 scale) and the topographical survey undertaken as part of the ground investigation showed that the topography varies in elevation from approximately 65 m AOD to the east to approximately 50 m AOD towards the western end. The land to the north and south is generally higher than the Scheme, as the route tends to follow the valley of Emm Brook as it flows from west to east.

HISTORICAL SETTING

8.4.5. The area of the Scheme was open fields with networks of streams and drainage ditches dating as far back as the earliest available maps (1876-1883). The majority of the area remains greenfield/agricultural.

8.4.6. From the earliest maps (1876-1883) an existing London and South-Western Railway line ran parallel to the north of the main route, with farms located in the surrounding area. By 1900 there was development to Wokingham Town north of the railway line, including a gas works. A gravel pit, brickworks and sewage farm were all located within 500 m of the Scheme. By 1971-1975 residential and commercial development had occurred to the north, southwest and west of the Scheme. In 1999, the Tesco supermarket was developed in the west of the Study Area.

LANDFILLING

8.4.7. Two recorded historical landfill sites are located within 250 m of the Scheme. Mulberry Park was located 70 m west of the Western Gateway which received inert, industrial and commercial waste between 1960 and 1969. Finchampstead Road was located 100 m north east of the existing Tesco roundabout which received household waste and is now closed (no active dates supplied).

UNEXPLODED ORDNANCE

8.4.8. A Detailed Unexploded Ordnance Risk Assessment[20] was undertaken by 1st Line Defence the findings of which confirm that there is a Low Risk on the Site.

8.4.9. During WWII, the Site was located in the Muncipal Borough of Wokingham which recorded to have sustained an overall very low density of bombing, with just 12 items (including seven high explosive bombs) across the entire borough.

8.4.10. No incidents recorded within the available record sets either within or adjacent to the areas encompassing the Site. However, it is has not beenpossible to absolutely negate the possibility of UXO therefore a UXO Risk mitigation plan and site specific UXO awareness training is recommended during intrusive works.

GEOLOGY

8.4.11. The ground conditions encountered along the Scheme during the ground investigation are summarised in Table 8-1. The exploratory hole plans and logs are included in the Factual Ground Investigation Reports (refer to Volume 3 Appendix 8-2).

Table 8-1 - Summary of Ground Conditions

Strata	Description	Depth to top (m bgl*) [m AOD]**	Depth to base (m bgl*) [m AOD]	Location
Topsoil	Very soft brown/dark brown slightly sandy gravelly CLAY with rootlets and roots. Gravel angular to sub angular/sub rounded fine to coarse flint. Light grey slightly gravelly slightly clayey SAND with rootlets and roots. Gravel is sub angular to sub rounded fine to coarse flint.	0 [49.16 to 62.80]	0.2 to 0.65 [48.96 to 62.28]	Topsoil was encountered at most of the exploratory hole locations with the exception of BH113, WS208, WS209, WS211, WS212 and WS213.
Made Ground	Soft to stiff brown/dark brown gravelly sandy CLAY. Gravel is angular to sub angular fine to coarse, occasional cobbles, brick, concrete, flint and sandstone.	0 to 0.4 [49.69 to 62.41]	0.3 to 1.4 [49.09 to 61.37]	Made Ground was encountered from surface or beneath the topsoil at BH113, WS206, WS208 WS209, WS211, WS212 and WS213.

[20] 1st Line Defence (2019). Detailed Unexploded Ordnance (UXO) Risk Assessment. DA9571-00.

	Reddish brown/dark brown slightly gravelly slightly clayey SAND with occasional pockets of very stiff reddish brown slightly sandy CLAY. Gravel is sub angular to sub rounded fine to coarse flint, sandstone and brick. Rootlets present.			
Head Deposits	Very soft to firm, occasionally stiff, orangish/greyish brown sandy gravelly CLAY, pockets of hard greyish brown slightly sandy CLAY. Gravel is sub angular to sub rounded fine to coarse flint.	0.3 to 0.6 [49.48 to 53.17]	0.8 to 3 [48.84 to 52.42]	Head Deposits were cohesive soils encountered at BH105, BH109, BH110, WS208 and WS209.
River Terrace Deposits	Medium dense to very dense orangish/greyish brown SAND and GRAVEL, gravelly clayey SAND, sandy clayey GRAVEL. Gravel sub angular to sub rounded fine to coarse flint. Soft to stiff orangish brown/grey sandy gravelly CLAY. Gravel sub angular to sub rounded fine to coarse flint.	0.2 to 1.4 [48.84 to 61.37]	0.8 to 5.7 [47.64 to 58.11]	The River Terrace Deposits (mix of sand, gravel and clay) were encountered at most of the exploratory hole locations with the exception of BH106, BH109, BH110, BH114, WS208 and WS209.
Bagshot Formation	Very loose to medium dense orangish grey brown clayey SAND. Soft brown grey sandy CLAY.	0.5 to 3.45 [56.71 to 57.01]	6 [51.21] Where proven	The Bagshot Formation was encountered at two exploratory hole locations, BH106 and WS207.
London Clay	Soft to firm orangish brown/grey sandy CLAY, becoming firm to very stiff dark grey sandy CLAY, with shell fragments and mudstone, claystone and rare flint.	0.8 to 6 [47.64 to 58. 11]	Base not proven. Proven to 25.45 [24.69]	The London Clay Formation was encountered in all exploratory holes completed, except WS207, which terminated in the Bagshot Formation.

*metres below ground level, ** metres above ordnance datum

8.4.12. No nationally important geological or geomorphological features were identified within the Study Area (i.e. geological Sites of Special Scientific Interest (SSSI) or Regionally Important Geological and Geomorphological Sites (RIGS)).

HYDROGEOLOGY

8.4.13. The geology identified beneath the Scheme from the ground investigations indicates that it is underlain by a Secondary A Aquifer (River Terrace Deposits (superficial) and Bagshot Formation (bedrock)), a Secondary Undifferentiated Aquifer (Head Deposits (superficial)) and Unproductive Strata (London Clay (bedrock)), as classified by the Environment Agency.

8.4.14. The Secondary A and Secondary Undifferentiated superficial aquifers area located along the Scheme where the River Terrace Deposits and Head Deposits are encountered (typically along the route of Emm Brook and to the south-west). The Secondary A bedrock aquifer is located generally in the west

of the Scheme, while the Unproductive Strata (bedrock) is located across the remainder of the Scheme. The Scheme and Study Area are not located within a groundwater Source Protection Zone for public water supply.

8.4.15. Groundwater has been encountered in the superficial deposits and bedrock, with monitored levels ranging between 47.25 m AOD and 62.17 m AOD. Based on the cohesive nature of the Head Deposits and London Clay Formation, the water in these strata is likely to be perched pockets within granular bands. Perched groundwater was also encountered in the Made Ground. Groundwater in the River Terrace Deposits is likely to be in hydraulic continuity with the Emm Brook and Luckley Brook, however, given the linear nature of the ground investigation a groundwater flow direction cannot be determined. However, groundwater is likely to flow in the direction of these surface water bodies.

HYDROLOGY

8.4.16. The Scheme passes over Emm Brook (flowing southeast to northwest) and a bridge is proposed as part of the works. Additionally, Luckley Brook flows approximately south to north into Emm Brook near the Western Gateway. There are proposals to construct a new culvert for Luckley Brook and either retain or replace an existing culvert.

CONTAMINATIVE SOURCES

8.4.17. The human health contamination risk assessment completed (Volume 3 Appendix 8-2) revealed an isolated elevated concentration of benzo(a)pyrene recorded in one of the thirty-two samples analysed. The elevated concentration was recorded at WS202 (0.2 m bgl, 14 mg/kg) and exceeded the selected Generic Assessment Criteria (GAC) for residential public open space (5.2 mg/kg). The sample was taken within the topsoil at this location. There was no visual or olfactory evidence of contamination at this location that would have accounted for the elevated concentration.

8.4.18. Twenty-three soil samples were screened for asbestos and no asbestos was detected.

8.4.19. Seven rounds of ground gas monitoring were completed after the ground investigation. The monitoring recorded a maximum flow of 8.3 l/hr, a maximum carbon dioxide concentration of 4.3% and a maximum methane concentration of 0.2%. During monitoring volatile organic compounds were measured using a photo ionisation detector and results were generally low, with a maximum concentration of 11 ppm.

8.4.20. The CIRIA C665 guidance[21] is not applicable given the Scheme is a road. However, as a conservative assessment calculation of the gas screening value (concentration x flow/100) indicates a worst value of 0.36l/hr which is indicative of a low risk from ground gas (to off-site occupants and construction/maintenance workers), based on the CIRIA guidance. However, this is considered likely to be too high a classification as the installation with the highest screening value is within the natural Bagshot Formation (BH106) and the risk from ground gas in this stratum is considered to be very low. The remaining boreholes were indicative of a very low risk from ground gases.

8.4.21. There were some exceedances of the Environmental Quality Standards and UK Drinking Water Quality Standards (DWS) for metals, sulphate and ammonia within groundwater samples analysed. However, given the conservative nature of DWS, the perched nature of the water in the London Clay, the marginal exceedances and that some concentrations are representative of background

[21] CIRIA, Assessing risks posed by hazardous ground gases, 2007.

concentrations the risk to controlled waters (i.e. surface waters and underlying aquifer) from these contaminants is considered to be low.

FUTURE BASELINE

8.4.22. The future baseline is not expected to change significantly with respect to ground conditions.

8.5. SENSITIVE RECEPTORS

8.5.1. The Scoping report considered that contaminants in soils and groundwater have the potential to impact the following receptors in the context of the Scheme:

- Current adjacent Site users;
- Below-ground services and structures; and
- Secondary A Aquifers.

8.5.2. The sensitivity of these receptors is detailed below in Table 8-2.

Table 8-2 - Sensitive Receptors

Sensitivity	Receptor
High	Current adjacent Site users (including nearby residents and school children)
Medium	Secondary A aquifer
Low	Below ground services and structures

8.5.3. Surface water has not been assessed as a sensitive receptor within this Chapter as it is assessed in Chapter 10 Road Drainage and Water Environment.

8.6. RELEVANT ELEMENTS OF THE SCHEME AND ESTABLISHING THE PRE-MITIGATION SCENARIO

CONSTRUCTION PHASE

8.6.1. Construction activities such as earthworks and landscaping could mobilise contaminants into the surrounding environment or alter the CSM.

8.6.2. The Phase 2 Contaminated Land Assessment indicates a low likelihood of ground contamination across the majority of the Scheme.

8.6.3. During site clearance and construction earthworks for the Scheme, there is low potential for areas of contamination to be encountered, although there is potential for localised areas (e.g. of asbestos) of unexpected contamination. Ground disturbance could result in:

- Generation of contaminated dusts, vapours and asbestos fibres and the resulting exposure of existing human and environmental receptors; and
- Mobilisation of contaminants into the Secondary A Aquifers.

8.6.4. Without suitable procedures and containment, operational activities such as vehicle and equipment refuelling and maintenance, operation of welfare facilities, earthworks and stockpiling have the potential to contaminate the ground and shallow groundwater via leaching.

Embedded mitigation

8.6.5. A Construction Environmental Management Plan (CEMP) will be produced for the Scheme and as such is considered to be embedded mitigation. The CEMP will set out the principles of contaminated land mitigation and will describe suitable containment measures and procedures for the storage and handling of materials and wastes, both on the construction site and within the construction compound, to ensure that contaminant releases do not occur in line with relevant regulations and good practice guidance. Examples of outline mitigation measures that could be included and expanded upon within the CEMP include:

- General good construction working practices such as dust suppression (damping down), windbreak netting around excavations and/or perimeter fencing, covering stockpiles with tarpaulins and road sweeping to prevent local residents and employees in the vicinity of the earthworks from being exposed to windblown dusts, vapours and asbestos fibres.
- Appropriate stockpile segregation, locations and containment measures to minimise the exposure of local neighbours from windblown dusts, vapours and asbestos fibres.
- A protocol for managing unexpected ground contamination that may be encountered during construction. This may require additional investigations, sampling, risk assessment and remediation to ensure the protection of the possible receptors.

OPERATIONAL PHASE

8.6.6. During operation, the surface of the road will reduce the potential for the disturbance of contaminants that may be present beneath the Scheme, limiting contact with the underlying ground and limiting the risk of leaching of contaminants. If contamination is identified in areas of proposed soft verges, remediation may be required to mitigate the potential risk to receptors.

8.6.7. During operation accidental spillage of fuels and oils from vehicles has the potential to enter drains and affect the groundwater quality.

8.7. ASSESSMENT OF EFFECTS, MITIGATION AND RESIDUAL EFFECTS

CONSTRUCTION PHASE

Impact on human health of current adjacent Site users

8.7.1. Current adjacent Site users may come into contact with contaminants via dermal contact, ingestion or inhalation pathways as a result of dust generated during construction works.

8.7.2. The sensitivity of current adjacent Site users is considered to be high and the magnitude of impact prior to mitigation is considered to be negligible given the limited contaminants identified during the ground investigation. Therefore, there is likely to be a direct, temporary, short-term, adverse effect on adjacent Site users of **Slight** significance prior to implementation of mitigation measures.

Mitigation

8.7.3. The majority of the effects during the construction phase will be addressed through the implementation of the measures within the CEMP.

8.7.4. Contaminated ground materials that cannot be reused will be suitably managed to prevent or minimise the potential for contaminants to enter the environment (and thereby minimise the potential for impacts to sensitive receptors prior to off-site disposal). This may be achieved through implementation of a Materials Management Plan (MMP), produced in accordance with Contaminated Land: Applications

in Real Environments (CL:AIRE) guidance[22], or similar materials management protocols (i.e. an environmental permit or exemption). This will ensure that all imported or reused soil are suitable and do not have the potential to significantly affect human health.

8.7.5. An earthworks specification will include protocols for testing and limiting values to ensure that reused and imported materials are suitable for their intended use in terms of their chemical quality.

Residual Effects

8.7.6. The sensitivity of current adjacent Site users is considered to be high and the magnitude of impact following mitigation is considered to be no change. Therefore, the effect on adjacent Site users is considered to be of **Neutral** significance following implementation of mitigation measures.

Degradation in quality of Secondary A aquifer

8.7.7. Exposure of contaminated soils may increase the leachability of contaminants to groundwater specifically the Secondary A Aquifer. This leachate could affect controlled waters by lateral and vertical migration.

8.7.8. Spills associated with construction works would have the potential to affect the Secondary A Aquifer.

8.7.9. On-site storage of potentially contaminated material prior to removal or remediation could result in entrainment and dissolution of contaminants in surface water and infiltration to the aquifer.

8.7.10. Below-ground drains or services may act as a preferential pathway for contaminants, which may migrate into the aquifer.

8.7.11. Measures detailed in the CEMP (embedded mitigation) will be used to mitigate the effects to the Secondary A aquifer, including but not limited to management of run-off, appropriate containment of fuel (i.e. bunded), procedures to deal with accidental spillage (e.g. spill kits), the protocol for managing unexpected ground contamination and appropriate material management.

8.7.12. The sensitivity of the Secondary A aquifer is considered to be medium and the magnitude of impact prior to mitigation (while considering embedded mitigation) is considered to be negligible. Therefore, there is likely to be a direct, temporary, short-term, adverse effect on the Secondary A aquifer of **Neutral or Slight** significance prior to implementation of mitigation measures.

Mitigation

8.7.13. New service trenches will be designed and constructed to prevent the migration of contaminants that are identified.

Residual Effects

8.7.14. The sensitivity of the Secondary A aquifer is considered to be medium and the magnitude of impact following mitigation is considered to be no change. Therefore, the effect on the Secondary A aquifer is considered to be of Neutral significance following implementation of mitigation measures.

[22] CL:AIRE, The Definition of Waste: Development Industry Code of Practice, Version 2, March 2011.

Degradation of below ground services and structures

8.7.15. The pyritic London Clay Formation could impact on buried concrete given it is described in BRE buried concrete guidance[23] as a principal sulphate and sulphide bearing strata.

8.7.16. Contamination in the underlying ground may impact on water supply pipes or buried concrete. However, low levels of contamination have been identified in the soil and groundwater

8.7.17. The sensitivity of below ground services and structures is considered to be low and the magnitude of impact prior to mitigation is considered to be moderate. Therefore, there is likely to be a direct, permanent, long-term, adverse effect on the below ground services and structures of Slight significance prior to implementation of mitigation measures.

Mitigation

8.7.18. Materials use for buried services, particularly water supply pipes, should be agreed with the relevant statutory authority in accordance with UK Water Industry Research guidance[24] and dedicated service corridors should be backfilled with clean material.

8.7.19. In addition, buried concrete should be designed in accordance with BRE buried concrete guidance.

Residual Effects

8.7.20. The sensitivity of below ground services and structures is considered to be low and the magnitude of impact following mitigation is considered to be minor. Therefore, there is likely to be a direct, permanent, long-term effect on below ground services and structures of Neutral or Slight significance following implementation of mitigation measures.

OPERATIONAL PHASE

Impact on human health of current adjacent Site users

8.7.21. The presence of hardstanding along the road would restrict dust generation. However, if contaminated ground remains present beneath the Scheme in areas of soft landscaping dust could be generated which would affect current adjacent Site users, or imported soils used in areas of soft landscaping would impact on current adjacent Site users of not of suitable quality.

8.7.22. The topsoil at WS202 would not be suitable for reuse in areas of soft landscaping given the presence of the elevated benzo(a)pyrene concentrations.

8.7.23. The sensitivity of current adjacent Site users is considered to be high and the magnitude of impact prior to mitigation is considered to be negligible given the limited contaminant identified during the ground investigation. Therefore, there is likely to be a direct, permanent, long-term, adverse effect on adjacent Site users of Slight significance prior to implementation of mitigation measures.

Mitigation

8.7.24. An earthworks specification will include protocols for testing and limiting values to ensure that imported materials are suitable for their intended use in terms of their chemical quality.

[23] British Research Establishment (BRE) Special Digest, Concrete in aggressive ground, third edition, 2005.

[24] UK Water Industry Research: Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, 2010.

Impacted site-won material should either be excavated and disposed off-site or reused beneath areas of hardstanding or capping.

Residual Effects

8.7.25. The sensitivity of current adjacent Site users is considered to be high and the magnitude of impact following mitigation is considered to be 'no change'. Therefore, the effect on adjacent Site users is considered to be of Neutral significance following implementation of mitigation measures.

Degradation in quality of Secondary A aquifer

8.7.26. The presence of hardstanding along the road would restrict infiltration. However, based on the ground investigation the existing ground conditions are not considered to pose a risk to the Secondary A aquifer.

8.7.27. Although accidental fuel or soil spillage from vehicles may impact the aquifer during operation this will be addressed through appropriate drainage design, which is part of the embedded mitigation of the Scheme.

8.7.28. The sensitivity of the Secondary A aquifer is considered to be medium and the magnitude of impact while considering embedded mitigation is considered to be no change. Therefore, the effect on the Secondary A aquifer is considered to be of **Neutral** significance and the implementation of further mitigation measures is not considered necessary.

Degradation of below ground services and structures

8.7.29. Once appropriately designed and constructed there is not considered to be a significant effect to below-ground services and structures during operation.

8.8. CUMULATIVE EFFECTS

8.8.1. This section assesses the effects of the Scheme, combined with other committed developments in the area, on ground conditions.

8.8.2. The committed developments being considered as part of this assessment on ground conditions include the SDL (of which the Scheme is part of) and the Eastern Gateway scheme (adjacent to the Scheme), which comprises the construction of a 420m long road. The other committed developments included in Chapter 15 have not been considered as part of this assessment as they are located outside of the Study Area.

8.8.3. Receptors which are common to both the Scheme and the committed developments are considered to comprise controlled waters, adjacent site users and below ground services and structures.

8.8.4. The construction of the Scheme together with the construction of the committed developments have the potential to release and mobilise historical contamination, which could have an indirect, temporary minor adverse effect on receptors.

8.8.5. However, these committed schemes would need to meet the same requirements as the Scheme including a CEMP during construction and meeting the 'suitable for use' requirements in relation to ground contamination in accordance with the NPPF[5].

8.8.6. As a result, the significance of cumulative effects is considered to be minor (as defined in Chapter 2 Approach to the Assessment).

8.9. LIMITATIONS AND ASSUMPTIONS

8.9.1. Ground investigations are only able to investigate a very small area of any site (i.e. isolated point locations). As such, a degree of uncertainty as to the presence or absence of ground contamination beneath the Scheme remains (i.e. potential for hotspots of contamination). However, given the known history and current land uses on and surrounding the Scheme, the risk of encountering significant unknown contamination is considered to be low.

8.10. SUMMARY

8.10.1. Based on the agricultural history of the Site and the findings of the 2018 ground investigations, there is no evidence of widespread ground contamination. One elevated concentration of benzo(a)pyrene was encountered in shallow topsoil during the ground investigations. There is a low likelihood that further localised contamination associated with agricultural activities may be present beneath the Scheme.

8.10.2. The Scheme is situated in a moderately sensitive environmental setting since it is underlain by Secondary Undifferentiated and Secondary A superficial aquifers (Head over River Terrace Deposits). The superficial deposits are underlain by the Bagshot Formation (Secondary A aquifer) and low permeability London Clay (Unproductive Stratum). The Emm Brook passes through the Scheme. Data from the 2018 ground investigations indicates a low risk to groundwater and surface water from on-site contaminants within the soils.

8.10.3. Sensitive receptors which may be impacted by the underlying ground conditions are considered to be current adjacent Site users, below-ground services and structures, and the Secondary A aquifers.

8.10.4. During construction there is likely to be effects on adjacent Site users and the Secondary A aquifer of Neutral significance and a direct, permanent, long-term effect on below ground services and structures of Neutral or Slight significance following implementation of mitigation measures.

8.10.5. During operation there is likely to be effects on adjacent Site users of Neutral significance following implementation of mitigation measures. Once the Scheme is appropriately designed and constructed there is not considered to be a significant effect to the Secondary A aquifer and below ground services and structures during operation.

8.10.6. A summary of effects is presented in Table 8-3.

Table 8-3 - Summary of Effects Table for Ground Conditions

Description of Effects	Receptor	Significance and Nature of Effects Prior to Mitigation / Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Construction Phase				
Impact on human health	Adjacent Site users	Slight adverse D / T / ST / - / ●	Measures in CEMP (embedded mitigation). Appropriate material management (e.g. MMP).	Neutral ○
Degradation in quality of aquifer	Secondary A aquifers	Neutral or slight adverse D / T / ST / - / ● or ○	Measures in CEMP (embedded mitigation) Appropriate design of service trenches to limit migration.	Neutral ○
Degradation of below ground services and structures	Below ground services (i.e. water supply pipes) and structures (i.e. concrete structures)	Slight adverse D / P / LT / - / ●	Use of appropriate water supply pipework and designing buried concrete in accordance with BRE guidance.	Slight beneficial D / P / LT / + / ●
Operational Phase				
Impact on human health	Adjacent Site users	Slight adverse D / P / LT / - / ●	Impacted site-won soils removed from site or appropriate capped. Material of suitable chemical quality imported onto Site.	Neutral ○
Degradation in quality of aquifer	Secondary A aquifers	Neutral ○	Appropriate drainage systems designed to mitigate the risk from fuel/oil spills (embedded mitigation).	N/A

Degradation of below ground services and structures	Below ground services (i.e. water supply pipes) and structures (i.e. concrete structures)	N/A	N/A	N/A

● Very Large significance, ● Large significance, ● Moderate significance, ● Slight significance ○ Neutral significance

+ / - = Beneficial or Adverse P / T = Permanent or Temporary, D / I = Direct or Indirect, ST / MT / LT = Short Term, Medium Term or Long Term

N/A = Not Applicable

9. GROUNDWATER

9.1. INTRODUCTION

9.1.1. This Chapter reports the likely significant effects of the Scheme on groundwater. Groundwater is 'all water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil', as defined in the Water Framework Directive (WFD).

9.1.2. The Chapter sets out the assessment methodology, establishes the baseline condition of the study area in the context of groundwater, and identifies sensitive groundwater resources and elements of the Scheme relevant to the assessment. The Chapter then provides an assessment of the potential for these elements of the Scheme to impact groundwater resources, taking into account 'embedded mitigation', during the construction and operational phases of the Scheme; and, where there is an adverse effect, outlines the 'further mitigation' required to prevent, minimise or compensate for the adverse effect.

9.1.3. Consideration is also given to the potential for the Scheme to have cumulative effects in combination with other nearby developments. The Chapter then presents a tabular summary of residual effects.

9.1.4. The Chapter (and its associated figures and appendices) is intended to be read as part of the wider ES, with particular reference to Chapter 8 Geology and Soils and Chapter 10 Road Drainage and Water Environment.

9.2. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

CONSULTATION

9.2.1. A summary of consultation undertaken for this Chapter is provided in Table 9-1.

Table 9-1 - Summary of Consultation

Body / organisation	Individual / stat body / organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
Environment Agency	Julia Hewitt – Customers and Engagement Officer	Groundwater and surface water abstraction data enquiry emails dated 04/12/2017 and 14/12/2017 Responses via email dated 08/12/2017 and14/12/2017	Spreadsheet of licensed groundwater and surface water abstractions in the catchment and detailed groundwater abstraction licence details for potable water supply.

SCOPE OF THE ASSESSMENT

9.2.2. An EIA scoping report was submitted to Wokingham Borough Council in October 2017 (Volume 3 Appendix 2-1) and consultee responses were received between November 2017 and April 2018 (Volume 3 Appendix 2-2). This section summarises the evidence base for insignificant effects, which are 'scoped out' of the assessment, and sets out the potentially significant effects 'scoped in' to the assessment.

Insignificant Effects

9.2.3. The following effects are considered insignificant and have therefore not been assessed (or have been assessed elsewhere) within the ES:

- Effects on groundwater where the Scheme is underlain by the London Clay Formation, as this formation is classified as unproductive strata by the Environment Agency;
- Any potential for degradation in the quality or contamination of groundwater as risks in relation to contamination are assessed in Chapter 8 Geology and Soils.

Potentially Significant Effects

Construction Phase

9.2.4. Potentially significant effects during the construction phase include the following:

- Effects of routine runoff to groundwater and reduced groundwater recharge;
- Potential changes to groundwater hydrodynamics through cuttings and other excavation activities (including groundwater dewatering control measures where applicable), with subsequent effects on receptors;
- Increased groundwater vulnerability;
- Potential impacts from groundwater flooding; and
- Obstruction to groundwater flow pathways due to intrusive ground structures (piling and sheet piles).

Operational Phase

9.2.5. Potentially significant effects during the operational phase include the following:

- Effects of routine runoff to groundwater and reduced groundwater recharge;
- Potential for groundwater flooding;
- Potential changes to groundwater hydrodynamics through cuttings and other excavation activities (including groundwater dewatering control measures where applicable) subsequent effects on receptors; and
- Potential obstruction to groundwater flow from subsurface structures (foundations).

EXTENT OF THE STUDY AREA

9.2.6. The study area for the groundwater assessment comprises the Site plus a ‘buffer zone’ or ‘search radius’ of 1 km, encompassing sensitive water receptors in the area in which the Scheme is considered to have the potential to directly influence the hydrogeological system.

METHOD OF BASELINE DATA COLLATION

Desk study

9.2.7. The baseline condition of the study area has been established using the following:

- British Geological Survey (BGS) 'Onshore GeoIndex';
- The BGS Lexicon of Named Rock Units (referred to as ‘the BGS Lexicon’);
- Department for Environment, Farming and Rural Affairs (Defra) 'Magic' map application;
- Local third-party borehole logs (Arcadis);
- Environment Agency Catchment Data Explorer;

- WSP (2019) South Wokingham Distributor Road – Spine Road and Western Gateway. Phase 2 Contaminated Land Assessment, 70032441-CON-1, June 2019; and
- Wokingham Borough Council Groundwater Level Monitoring Report Western Gateway – Spine Road (WSP, 2019, Report no. 70032441-001).

Ground Investigation

9.2.8. A ground investigation (GI) was carried by Geotechnics (overseen by WSP) in February and March 2018. This included the formation and installation of eight boreholes for groundwater and ground gas monitoring. Soil samples obtained at intervals for geoenvironmental testing. For full details of the GI, refer to Appendix C of the Phase 2 Contaminated Land Assessment (Volume 3 Appendix 8-2).

Groundwater level monitoring

9.2.9. Groundwater level monitoring was carried out by WSP at five borehole locations between March 2018 and April 2019. Groundwater levels were obtained using non-vented (absolute) pressure dataloggers recording 'real time' data at intervals of 30 minutes. The boreholes were spatially well distributed and are considered to provide a good understanding of the hydrodynamics of the study area. Permeability testing was also carried out to measure the potential of the geological units to convey water. For full details of the groundwater level monitoring and permeability testing, refer to the Groundwater Level Monitoring Report[25].

ASSESSMENT METHODOLOGY

9.2.10. The assessment has been undertaken in accordance with Volume 11 Section 3 Part 10 of the DMRB (HD45/09)[26]. The assessment is based on the environmental value (sensitivity) of groundwater features (e.g. aquifers, groundwater abstraction boreholes) and the anticipated magnitude of impact (degree of change). The sensitivity of groundwater features is assigned using the criteria in Table 9-2. The magnitude of impact is assigned using the criteria in Table 9-3. These aspects are compared using the matrix in Table 2-2 (refer to Chapter 2 Approach to the Assessment) to determine the significance of effect.

9.2.11. The significance of effect represents the degree of change from baseline conditions for groundwater receptors; specifically, groundwater hydrodynamics (such as level and flow); degradation of water quality due to physical contamination (i.e. sedimentation); and water quality (to which indirect effects may occur as a result of changes in groundwater level or flow). The potential for degradation of water quality due to chemical contamination is assessed in Chapter 8. Examples of groundwater effects for each of the significance of effect categories are provided in Table 9-4 (illustrative only).

9.2.12. Potentially significant effects have been assessed qualitatively for the construction and operational phases of the Scheme. The construction phase includes all enabling works, earthworks and other construction activities set out in Chapter 3.

[25] WSP. Groundwater Level Monitoring Report. Western Gateway - Spine Road. 70032441-001. June 2019.

[26] It is noted that this guidance was superseded by LA 113 Road drainage and the water environment (published August 2019).

Table 9-2 - DMRB sensitivity (value) of groundwater receptors (water environment)

Sensitivity (Value)	Criteria Description	Example
Very High	High importance and rarity, national scale, and limited potential for substitution.	Principal aquifer providing regionally important resource or supporting site protected under European Commissions and UK habitat legislation. Source Protection Zone 1.
High	High or medium importance and rarity, regional scale, limited potential for substitution.	Principal aquifer providing locally important resource or supporting river ecosystem. Source Protection Zone 2.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.	Aquifer providing water to agricultural or industrial use with limited connection to surface water. Source Protection Zone 3.
Low	Low or medium importance or rarity.	Unproductive strata

Table 9-3 - DMRB magnitude of impact on groundwater receptor (water environment)

Magnitude of Impact	Criteria Description	Example
Major Adverse	Result in loss of attribute and/or quality and integrity of the attribute.	Loss or extensive change to an aquifer. Potential high risk of pollution to groundwater from routine runoff. Risk score >250.
Moderate Adverse	Results in effect on integrity of attribute, or partial loss or degradation of attribute.	Potential loss or change to an aquifer. Potential medium risk of pollution to groundwater from routine runoff. Risk score 150-250.
Minor Adverse	Loss of some resources and/or quality and integrity of resource, minor damage to key characteristics, features or elements.	Potential low risk of pollution to groundwater from routine runoff. Risk score >0.5% annually and <1% annually.
Negligible	Loss of resource but not adversely affecting the integrity of resource; minimal loss of/damage to key characteristics, features of elements.	No measurable impact upon an aquifer and risk of pollution from spillage. Risk score <0.5%

Table 9-4 - Examples of effects for the significance of effect categories

Significance category	Examples
Very Large or Large	Emm Brook baseflow may be impacted potentially affecting the water body's condition and classification, where pollution or reduction in groundwater baseflow could have irreversible adverse effects upon the water body, including its ecological condition/status.

Moderate	Short term disappearance and/or low-level contamination of springs at the base of the Bagshot Formation during the construction work located in the central area of the Site.
Slight	Short term decrease in the stream flow rate (stream velocity) during the construction or operational phases of the Scheme which will not be damaging to the local flora or fauna. Temporary decrease in the recharge and infiltration rate to the active secondary A aquifer, where the superficial river terrace deposits and Bagshot Formation are obstructed by the Scheme.
Neutral	No change in the hydrodynamic hydrogeological system from cutting and roadworks carried out in the London Clay Formation.

9.3. BASELINE CONDITIONS

GEOLOGY

9.3.1. The geology underlying the study area has been reviewed using the BGS 'Onshore GeoIndex' and the borehole logs from the ground investigation carried out between 27 February and 9 March 2018 and 30 July and 1 August 2018 by Geotechnics Limited (Volume 3 Appendix 8.1). The sources indicate the bedrock geology underlying the majority of the Site is the London Clay Formation (clay, silt and sand), with smaller areas underlain by the Bagshot Formation (sand). Superficial deposits are sparsely distributed across the Site but, where present, include river terrace deposits, alluvium and head. The superficial alluvium and head deposits are associated with the Emm Brook. The river terrace deposits are located in areas of higher topography, typically overlying the Bagshot Formation.

HYDROGEOLOGY

9.3.2. The Bagshot Formation, river terrace deposits and alluvium are designated by the Environment Agency as ‘secondary A aquifers’. The Environment Agency defines secondary A aquifers as ‘permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers’. The secondary A aquifers underlying the Site are considered likely to be hydraulically connected, providing the dominant groundwater flow path and base flow to Emm Brook.

9.3.3. The head deposits are a ‘secondary undifferentiated aquifer’. This designation is ‘assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type’. Although groundwater may be present in the head deposits, groundwater flow is likely to be low to negligible.

9.3.4. The London Clay Formation is designated ‘unproductive strata’ due to its very low permeability and very limited potential to store water. ‘Unproductive strata’ describes ‘rock layers or drift deposits with low permeability that have negligible significance for water supply or river baseflow’. The lithological description in the borehole logs from the ground investigation[76,77] and BGS Lexicon suggest this unit is likely to act as an aquitard, preventing vertical groundwater flow between near surface aquifers and deeper aquifers. Perched groundwater was found in sand lenses within the London Clay Formation and monitored by WSP in March and April 2018.

9.3.5. The secondary A aquifers (the Bagshot Formation, river terrace deposits and alluvium), as well as the secondary undifferentiated aquifer (the head) are considered to be in hydraulic connectivity, as there is no impermeable (low hydraulic conductivity) layer separating the deposits.

9.3.6. The Defra 'Magic' map application indicates the Site is not within a groundwater source protection zone. However, the Site is located partially within a Minor Aquifer High groundwater vulnerability zone and a nitrate vulnerability zone. There may be private abstractions in the vicinity of the Scheme.

9.3.7. The groundwater level monitoring undertaken by WSP in March and April 2018 indicated that groundwater is shallow within the study area, at less than 1 m below ground level (BGL) at all borehole locations and at the surface at one borehole location (BH114). The direction of groundwater flow was not measured but, considering the local topography and hydrogeological conceptual model, is likely to be towards Emm Brook. A summary of hydraulic conductivity values, derived from the permeability testing, is provided in Table 9-5.

Table 9-5 - Summary of hydraulic conductivity (permeability testing)

Borehole	Tested Geology	Hydraulic Conductivity (m/day)
BH105	Head Deposits and River Terrace Deposits	0.53
BH106	Bagshot Formation	0.35
BH112	River Terrace Deposits	0.01
BH114	London Clay Formation	0.05

9.3.8. The permeability test data in Table 9-5 indicates the Site has a varying hydraulic conductivity values for all geological units across the Site. The composition of river terrace deposits is variable and therefore likely to be characterised by differing hydraulic conductivity values across the Site.

WATER FRAMEWORK DIRECTIVE STATUS

9.3.9. For the purposes of reporting under the WFD, a groundwater body must 'represent a distinct body of groundwater flow with a coherent flow unit including recharge and discharge areas with little flow across the boundaries'. The nearest recognised WFD groundwater body is the Farnborough Bagshot Beds. The Farnborough Bagshot Beds are located to the south of the Site but comprise the same geological units as the Bagshot Formation and are likely to be in hydraulic connectivity with the Bagshot Formation and other secondary A aquifers underlying the Site. The quantitative and chemical statuses (and therefore overall classification) of the Farnborough Bagshot Beds was 'good' in 2016.

FUTURE BASELINE

9.3.10. No significant changes to groundwater baseline conditions are anticipated in a 'do minimum' scenario in which neither the SWDR or the SDL are implemented.

9.3.11. According to predicted future climate change in the UK up to 2080, referenced in the government guidance titled 'Adapting to Climate Change, UK Climate Predictions, June 2009'[27], winters in the southern UK are predicted to be on average generally wetter by approximately 30%. Conversely, summers will be drier and warmer. The significance of this is that there will likely be more marked seasonal variation with respect to groundwater levels with greater groundwater level variations between average summer and average winter levels. The consequence of this from a water resource perspective is that less groundwater may be available during the drier periods of the year and more

[27] Defra (2009). Adapting to climate change. UK Climate Projection. June 2009 Available at Link].

groundwater may be available during future winters. Notably, this is predicted to increase groundwater level maxima across the site. As the groundwater levels are found at less than 1 m BGL, and at surface at borehole BH114, it can be predicted that groundwater will require control.

9.4. SENSITIVE RECEPTORS

9.4.1. The sensitive receptors (groundwater resources) assessed are identified in Table 9-6.

Table 9-6 - Sensitive receptors (groundwater resources)

Receptor	Value (sensitivity)
Groundwater secondary A aquifer	Medium - The Scheme is underlain by secondary A aquifer of the Bagshot Formation and Superficial River Terrace Deposits and Alluvium.
Emm Brook	Medium - The Scheme is underlain by secondary A aquifer which is likely to be contributing to baseflow
Groundwater secondary undifferentiated aquifer	Low - The Scheme is underlain by secondary undifferentiated aquifer of superficial Head Deposits, primarily along the Emm Brook.
Groundwater Users/Abstractions	Low - The Scheme is not located within a Source Protection Zone. However, local groundwater abstractors and users have not been identified by this study. It should be noted that any potential changes may impact local users.

9.5. RELEVANT ELEMENTS OF THE SCHEME AND ESTABLISHING THE PRE-MITIGATION SCENARIO

CONSTRUCTION PHASE

Road cuttings

9.5.1. Cuttings into the landscape are proposed at chainages 1560-1600, 1620-1680 and 1700. The proposed cuttings have respective lengths of 10 m, 40 m and 70 m, depths of less than 1 m, and will be located in the London Clay Formation. The respective average levels of the bases of the cuttings are 59.03 m AOD (0.08 m BGL), 59.64 m AOD (0.17 m BGL) and 60.04 m AOD (0.06 m BGL). If it is conservatively assumed that groundwater level is concurrent with ground level (as groundwater was recorded at the surface in the London Clay Formation) then these may require dewatering to maintain their structural integrity. The purpose of dewatering is the abstraction of groundwater and this has the potential to adversely impact groundwater resources. The potential for road cuttings to increase the vulnerability of groundwater to contamination is considered in Chapter 8 Geology and Soils.

9.5.2. It is uncertain whether groundwater seepage into road cuttings will occur, as, due to seasonal variation, groundwater level was measured below the average cutting base levels in late spring and summer and above in autumn and winter (in the longer-term monitoring carried out in 2018 and 2019). If groundwater is present in the road cuttings then flows are expected to be minimal and, once the perched aquifer has drained, it is unlikely to recharge significantly. Requirements for dewatering will be determined at a later stage by the design and build contractor.

Piling

9.5.3. Detailed design of the Emm Brook bridge is being undertaken by Tony Gee and Partners (TGP). As full details are not yet available, it is assumed the construction of the Emm Brook bridge may require

piling or sheet piling. The introduction to the ground of piled structures has the potential to obstruct the flow of groundwater (which may alter groundwater flow paths and affect groundwater levels) and adversely impact groundwater quality. The introduction of sheet piling may also obstruct the flow of groundwater resulting in groundwater mounding on the upgradient side of the obstruction (and corresponding groundwater recess on the downgradient side of the obstruction).

9.5.4. The potential for piling to increase the vulnerability of groundwater to contamination by forming migratory pathways for contaminants is considered in Chapter 8 Geology and Soils.

Hardstanding

9.5.5. The introduction of new hardstanding for construction compounds, car parking, and the impermeable road surface, may reduce the level of infiltration to groundwater receptors. This could impact the local groundwater flow regime leading to reduced aquifer recharge.

OPERATIONAL PHASE

Road cuttings and piling

9.5.6. The road cuttings (described in paragraph 9.5.1) may require ongoing dewatering to maintain their structural integrity and prevent 'underflow' (which may otherwise affect the surface of the road). The piling or sheet piling (described in paragraph 9.5.3) may also generate a requirement for ongoing dewatering. It is unknown at this stage whether ongoing dewatering will be required.

Hardstanding

9.5.7. The presence of impermeable road surfacing on greenfield land is expected to increase surface water runoff and change the local hydrogeology. There may be an overall decrease in groundwater recharge and groundwater level.

EMBEDDED MITIGATION

Groundwater dewatering

9.5.8. Groundwater dewatering is the abstraction of groundwater using a range of hydraulic control measures which may include use of the following:

- Individual wells fitted with pumps;
- Series of wells fitted with pumps (wellpoint dewatering system);
- Sump pumps;
- Perimeter drains; and
- Permeable blankets / starter layers.

9.5.9. One or more of these techniques may be applied in the construction or operational phases to mitigate the potential for groundwater ingress into road cuttings and groundwater mounding on the upgradient side of obstructions such as sheet piling. Requirements for dewatering may be quantified by measuring the rate of ingress into a subsurface excavation, such that adequate equipment (e.g. pumps and water storage tanks) can be arranged to remove the used quantity of groundwater.

9.5.10. The need for groundwater dewatering is likely to be greatest during the winter (October to February), when groundwater levels are at their highest; and greatest in the vicinity of the Emm Brook and its tributaries, where groundwater level is most likely to reach ground level (and most particularly during prolonged periods of heavy rainfall).

9.5.11. Consents required to manage this dewatered groundwater will be obtained by the contractor. The method of discharge is yet to be determined. The groundwater collected will either be discharged to surface water, sewer, disposed off-site or some combination thereof. If the water is to be discharged to sewer or a surface waterbody then discharge consents may be required. The permitting process will be completed by the contractor after detailed design once a dewatering and discharge management methodology has been agreed upon. The contractor will be responsible for acquiring, and adhering to the conditions of, the relevant consents. There may also be requirements in relation to the on-site treatment or off-site disposal of water affected by contamination.

9.6. ASSESSMENT OF EFFECTS, MITIGATION AND RESIDUAL EFFECTS

CONSTRUCTION PHASE

Piling

Effect prior to mitigation

9.6.1. As the detailed design for the Emm Brook bridge is ongoing, it is assumed in this assessment that piling has the potential to affect both the unproductive strata (i.e. the London Clay Formation) and the secondary A aquifers (i.e. the Bagshot Formation and superficial deposits [river terrace deposits, alluvium, head]). It is also assumed that the secondary A aquifers are in hydraulic connectivity. On this basis, the sensitivity of perched groundwater within the unproductive strata is 'low' while the sensitivity of groundwater within the secondary A aquifers is 'medium'. The potential magnitude of impact is considered to be 'negligible' for the unproductive strata and 'moderate' adverse for the secondary A aquifers. There is, therefore, prior to mitigation, a potential for a direct, permanent, short-term adverse effect on groundwater resources of **neutral or slight** significance for the unproductive strata and **moderate** significance for the secondary A aquifers.

9.6.2. Embedded mitigation is described in paragraphs 9.5.8-9.5.11.

Further mitigation

9.6.3. The introduction of piled structures to the ground in the vicinity of Emm Brook is likely to require measures for groundwater control, including groundwater dewatering and the installation of perimeter drains if groundwater is encountered. The potential to encounter groundwater, and the extent of dewatering required if groundwater be encountered, may be minimised by scheduling the ground works for the late summer, when groundwater levels are likely to be at their lowest.

9.6.4. The potential for structural risks in relation to groundwater uplift (heave) may be mitigated by ensuring intrusive piled structures are 'toed in' to competent bedrock within the London Clay Formation.

Residual effects

9.6.5. The sensitivity of perched groundwater within the unproductive strata is 'low' while the sensitivity of groundwater within the secondary A aquifers is 'medium'. Following the implementation of further mitigation, the potential magnitude of impact for both the unproductive strata and secondary A aquifers is considered to be 'negligible'. There remains, after mitigation, a potential for a direct, permanent, short-term adverse effect on groundwater resources of **neutral or slight** significance for the unproductive strata and **slight** significance for the secondary A aquifers.

Groundwater Dewatering

9.6.6. Groundwater dewatering has a potential to adversely impact groundwater features (e.g. aquifers, groundwater abstraction boreholes). However, the sensitivity of perched groundwater within the London Clay Formation to dewatering is 'low'; and, as dewatering carried out in the London Clay Formation is unlikely to create significant drawdown and is therefore unlikely to have the potential to impact groundwater abstractions, the magnitude of impact is expected to be 'negligible'. Therefore, there is likely to be a direct, temporary, short-term effect on groundwater resources of **neutral or slight** significance. No further mitigation or enhancement is proposed.

OPERATIONAL PHASE

Groundwater Dewatering

9.6.7. As per paragraph 9.5.6, the presence of road cuttings and piled or sheet-piled structures, particularly those in close proximity to the Emm Brook, may require ongoing dewatering. If ongoing dewatering is required, this has a potential to adversely impact groundwater resources in groundwater abstraction boreholes. As per paragraph 9.6.6, the sensitivity of perched groundwater within the London Clay Formation to dewatering is 'low' and the magnitude of impact is expected to be 'negligible'. Therefore, there is expected to be a direct, permanent, long-term effect on groundwater resources of **neutral or slight** significance. No further mitigation or enhancement is proposed.

9.6.8. A summary of effects is presented in Table 9-7.

Table 9-7 - Summary of Effects Table for Groundwater

Description of Effects (and Embedded mitigation)	Receptor	Significance and Nature of Effects Prior to Mitigation / Enhancement	Further Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Construction Phase				
Piling (including sheet piling) to facilitate the construction of the Emm Brook bridge	Secondary A aquifers (Bagshot Formation and superficial deposits)	Moderate adverse D / P / ST / - / ●	Scheduling the ground works for the late summer, when groundwater levels are likely to be at their lowest. Hydraulic control measures such as wells fitted with pumps, well-points, sheet piling, sump pumps perimeter drains and permeable blankets. Groundwater ingress quantification CEMP	Slight adverse D / P / ST / - / ●
	Perched groundwater within the London Clay Formation	Neutral or slight adverse D / P / ST / - / ● or ○	Scheduling the ground works for the late summer, when groundwater levels are likely to be at their lowest. Hydraulic control measures such as wells fitted with pumps, well-points, sheet piling or sump pumps.	Neutral or slight adverse D / P / ST / - / ● or ○
Groundwater dewatering	Perched groundwater within the London Clay Formation	Neutral or slight adverse D / T / ST / - / ● or ○	No further mitigation or enhancement is proposed.	Neutral or slight adverse D / T / ST / - / ● or ○

Operational Phase				
Groundwater dewatering (if required)	Perched groundwater within the London Clay Formation	Neutral or slight adverse D / P / LT / - / ● or ○	No further mitigation or enhancement is proposed.	Neutral or slight adverse D / P / LT / - / ● or ○

Key to table:

● Very Large significance, ● Large significance, ● Moderate significance, ● Slight significance, ○ Neutral significance

+ / - = Beneficial or Adverse P / T = Permanent or Temporary, D / I = Direct or Indirect, ST / MT / LT = Short Term, Medium Term or Long Term

N/A = Not Applicable

9.7. CUMULATIVE EFFECTS

9.7.1. In combination with other nearby developments, such as the residential development associated with the SDL, the Scheme is not expected to result in cumulative effects to groundwater. This is because the London Clay (classified as “unproductive strata” by the Environment Agency) underlying the majority of the Site contains limited amounts of groundwater. Effects on this perched groundwater, due, for example, to dewatering, are expected to be of neutral or slight significance and extent of any such effects is likely to be localised. Dewatering of other aquifers, such as the Bagshot Formation, or other superficial aquifers is expected to have slight effects on groundwater.

9.8. LIMITATIONS AND ASSUMPTIONS

9.8.1. This assessment has been undertaken with information available at the time of writing, and the assessment has been undertaken within the requirements of the National and Local Polices, and Regulations.

9.8.2. No information on the proposed intrusive structures were available at the time of writing this report, therefore, the above listed assessment is based on theoretical impacts of potential design elements. A conservative assessment of potential impacts of the Scheme upon the groundwater environment has been completed.

9.8.3. it is assumed that the drainage strategy for the Scheme will be implemented in consideration of the groundwater level monitoring exercise results and the testing information that has been recommended.

9.8.4. It is assumed that the mitigation measures presented in Table 9-7 will be undertaken by the appointed construction contractors (e.g. preparation and adherence to the CEMP).

9.9. SUMMARY

9.9.1. The groundwater receptors considered within this assessment include the secondary A aquifer (Bagshot Formation, River Terrace Deposits and Alluvium) and the unproductive London Clay Formation strata. It is anticipated that groundwater is found at shallow depths (<1mBGL) in both aquifers. The groundwater flow direction is expected to be towards the Emm Brook in the western areas of the site and the towards topographic lows in the eastern areas of the scheme. Groundwater may be present in relatively small finite quantities within the London Clay Formation in isolated sand pockets.

9.9.2. The potential effects during the construction and operational phases on groundwater quality relate to the potential contamination of pollutants (sediment, spillages or leakages of fuel and other contaminants) into the surface water network or directly into the groundwater aquifers. During the construction phase this will be managed through the CEMP, and during the operational phase through the Scheme drainage features. These will provide sufficient water quality treatment, in accordance with industry guidance. There is a risk to groundwater quality through direct pathways where potential intrusive structures have been proposed. The effects of routine runoff to groundwater resources and groundwater hydrodynamics (groundwater level change, groundwater mounding/heave and groundwater flow obstruction) have also been assessed.

9.9.3. Potential groundwater dewatering may be required for the proposed cuttings located along the scheme alignment. However, due to their location and the geology they are founded upon, there is

not expected to be a significant impact to regional and local groundwater resources, users or dependent features.

10. ROAD DRAINAGE AND THE WATER ENVIRONMENT [S]

10.1.1. This chapter is superseded by Chapter 10 of this ESA 2020.

11. NOISE AND VIBRATION [S]

11.1.1. This chapter is superseded by Chapter 7 of the ESA 2020.

12. MATERIALS AND WASTE [S]

12.1.1. This chapter is superseded by Chapter 9 of the ESA 2020.

13. PEOPLE, COMMUNITIES AND HEALTH

13.1. INTRODUCTION

13.1.1. This Chapter reports the outcome of the assessment of likely significant effects arising from the Scheme upon 'people and communities'. The assessment considers potential impacts to people including motorists and non-motorised users (pedestrians, cyclists and equestrians), impacts to communities, and impacts on human health outcomes.

13.1.2. The Chapter describes the assessment methodology, the baseline conditions at the Application Site and in the surrounding area, any primary and tertiary mitigation adopted for the purposes of the assessment, a summary of the likely significant effects taking into account national legislation, the further mitigation measures required to prevent, reduce or offset any significant adverse effects, and the likely residual effects after these measures have been employed.

13.1.3. This Chapter (and its associated figures and appendices) is intended to be read as part of the wider ES, with particular reference to Chapter 4 Air Quality and Chapter 11 Noise and vibration. The Chapter summarises the results of the Agricultural Circumstances Assessment (Appendix 13.2).

13.2. LEGISLATIVE FRAMEWORK, POLICY AND GUIDANCE

LEGISLATION

13.2.1. Schedule 4 Section 4 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017[4] requires a description of the factors likely to be significantly affected by the Scheme to be considered within the EIA. The factors that are relevant to this chapter include "*population, human health*", and "*land (for example land take)*". This chapter provides an assessment of the likely impacts to these factors. Following the introduction of the EIA Regulations 2017, the scope of the assessment was extended to include the assessment of impacts to Human Health.

POLICY

13.2.2. The applicable policy is summarised as follows and further details can be found in Appendix 13.1:

- NPPF[5]; and
- Wokingham Borough Core Strategy Development Plan[1].

GUIDANCE

13.2.3. The following guidance documents have been used during the preparation of this Chapter:

National Planning Practice Guidance (NPPG, January 2016)

13.2.4. The following paragraphs set out in the NPPG are relevant to soil and agricultural land quality, respectively, as follows:

13.2.5. 'Paragraph 25: The NPPF states that the planning system should protect and enhance valued soils and prevent the adverse effects of unacceptable levels of pollution. This is because soil is an essential finite resource that provides important 'ecosystem services', for example as a growing medium for food, timber and other crops, as a store for carbon and water, as a reservoir of biodiversity and as a buffer against pollution. As part of the Government's 'Safeguarding our Soils' strategy, Defra has published a code of practice on the sustainable use of soils on construction sites, which may be helpful in development design and setting planning conditions'; and

‘Paragraph 26: The NPPF expects local planning authorities to take into account the economic and other benefits of the best and most versatile agricultural land (see NPPF above).’

People and Communities Clarification Note 186

13.2.6. In August 2012, Highways England (formally the Highways Agency) produced the "People and Communities Clarification Note 186", which recommends combining the Interim Advice Note (IAN) assessments of "Community and Private Assets' and "Effects on all Travellers" into a single topic entitled "People and Communities". There is currently no specific guidance for the ‘People and Communities’ in the Design Manual for Roads and Bridges (DMRB).

13.2.7. Given that no formal publication of the DMRB People and Communities guidance has come forward for publication, this assessment has been undertaken with reference to the relevant principles of the previous DMRB guidance, comprising, Volume 11, Section 3 Part 8: 'Pedestrians, Cyclists, Equestrians and Community Effects[28]. The People and Communities section is intended to cover the same themes as the existing guidance outlined above, whilst also covering wider socio-economic and human health effects. These wider socio-economic effects have been assessed with reference to the Additionality Guide[29] guidance.

Design Manual for Roads and Bridges Volume 11 Section 3 Parts 6, 8 and 9

13.2.8. The assessment has been undertaken in general accordance with the Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 6 Land Use, Part 8 Pedestrians, Cyclists, Equestrians and Community Effects and Part 9 Vehicle Travellers.

Health in Environmental Impact Assessment

13.2.9. In response to the introduction of the topic of “human health” in the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, the Institute of Environmental Management and Assessment (IEMA) published “Health in Environmental Impact Assessment: A primer for a proportionate approach”. Consensus on the approach to human health in EIA is still under development, with IEMA’s document very much being a starting point for further discussion.

13.3. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

CONSULTATION

13.3.1. No consultation has been undertaken for the Chapter.

SCOPE OF THE ASSESSMENT

13.3.2. An EIA scoping report was submitted to WBC in October 2017 (see Volume 3 Appendix 2-1). Scoping opinions were received between November 2017 and May 2018.

Scoping Opinions

13.3.3. Relevant scoping opinions were received from the following:

- The Strategic Development Location (SDL) Public Rights of Way Officer (8 March 2018);
- The WBC Commissioning Officer (Public Rights of Way (PROW)) (13 March 2018); and

[28] Highways England (1993) DMRB Volume 11, Section 3, Part 8: Pedestrians and Others and Community Effects. Available at [Link].

[29] Homes and Communities Agency (HCA) (2014). Additionality Guide. Fourth Edition 2014. Available at [Link].

- WBC Public Health (25 May 2018).

13.3.4. The key matters raised by the SDL Public Rights of Way Officer were the retention of PROWs wherever possible, surface improvements to impacted PROWs and consideration of routes to the south of Wokingham which the British Horse Society would like to see opened up to equestrians. The WBC Commissioning Officer identified a number of inaccuracies in the Scoping Report which have been addressed in this Chapter.

13.3.5. In relation to this assessment WBC Public Health welcomed the inclusion of human health in the scope of the assessment. For the full content of the scoping opinions see Volume 2 Appendix 2-2.

Effects 'scoped in' to the assessment

13.3.6. The following potentially significant effects are scoped in to the assessment:

- Generation of direct, indirect and induced employment opportunities for the local population during the construction phase;
- Loss, by direct land take, of best and most versatile (BMV) agricultural land;
- Land take from private local agricultural holdings (including impacts due to agricultural severance) and other effects relating to the viability of agricultural businesses; and
- Effects on non-motorised users of the local transport network (including changes in amenity value for users of Public Rights of Way [PROWs] and non-designated routes and potential positives arising from the provision of new cycling and crossing facilities).

13.3.7. Following the introduction of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 the following additional potentially significant effect is scoped in to the assessment:

- Impacts (both beneficial and adverse) to human health associated with changes in noise, air quality, employment opportunities during construction, improved access, and opportunities for active travel.

Effects 'scoped out' of the assessment

13.3.8. The following effects have been scoped out of the assessment on the basis that they do not have the potential to be significant:

- Effects relating to crime during the construction and operational phases as no increase in crime is anticipated. During the construction phase the site will be secured in accordance with the requirements of Section 18 of the Construction (Design and Management) Regulations 2015. Site security will include perimeter fencing and potentially use of Close-Circuit Television (CCTV).
- Effects relating to employment opportunities are only included for the construction phase and are scoped out of the operational phase assessment as once the Scheme is operational the impacts on jobs will be neutral.

Effects considered elsewhere within the assessment

13.3.9. The following effects have been scoped out of the assessment on the basis that they are considered elsewhere in the ES:

- Effects on local residents during the construction and operational phases due to changes to air quality (assessed in Chapter 4 Air Quality), visual amenity (assessed in Chapter 6 Landscape and Visual) and noise and vibration (assessed in Chapter 11 Noise and Vibration).

13.3.10. Note that the exclusion of impacts on local residents noted above, does not exclude impacts to human health. The assessment of impacts to human health has been informed by the assessments contained within Chapter Air Quality and Chapter 11 Noise and Vibration as well as sub-topics within this chapter (e.g. Employment Opportunities and Non-Motorised Users).

STUDY AREA

13.3.11. The study area for each of the identified potentially significant effects is as follows:

- For employment-related impacts, the study area comprises the county of Berkshire, which is the area within the Thames Valley Berkshire Local Enterprise Partnership (LEP). This includes West Berkshire, Reading, Wokingham, Bracknell Forest, Windsor and Maidenhead, and Slough. This area represents the "regional level" defined in the Additionality Guide published by the HCA in 2014[133] and is considered suitable given the strong transport and economic connections in Wokingham, which mean the Scheme has the potential to have employment-related impacts beyond the local Borough of Wokingham.
- For loss, by direct land take, of BMV agricultural land, the study area comprises the development footprint plus a buffer of 2 km.
- For land take from private local agricultural holdings and associated effects on the viability of agricultural businesses, the study area is the development footprint. Further details are provided in Appendix 13.2.
- For effects on non-motorised users the study area comprises the development footprint. Changes in amenity value for users of PROWs are assumed to be insignificant beyond 0.5 km.
- For impacts associated with human health, the study area comprises the administrative wards crossed by the development footprint. This includes the following three wards; Evendons, Wescott, and Wokingham Without.

METHODOLOGY

Methodology for Impacts to Employment Opportunities

13.3.12. The assessment of impacts includes assessment of gross direct employment, indirect and induced employment opportunities where the following definitions apply:

- Direct: jobs that are a primary output of a project (e.g. construction workers);
- Indirect: jobs that are an output of additional activities made possible by the project but not as a direct output of the project itself (e.g. employment as a result of increased demand for materials); and
- Induced: additional jobs flowing from the wider positive effects of the project that fall outside the direct and indirect definitions above.

13.3.13. The assessment of effects relating to employment opportunities during the construction phase have been calculated using secondary data obtained from National Online Manpower Information System (NOMIS)[30], which is publicly available from the Office of National Statistics (ONS).

13.3.14. The gross employment generated by the temporary construction phase is estimated by applying an average gross output per construction industry employee to the estimated total construction cost.

[30] ONS (2017). NOMIS: Official Labour Market Statistics. Available at [Link].

Leakage, displacement, and multiplier effects are then taken into account to determine the total net employment.

Leakage

13.3.15. Leakage effects are the *"proportion of outputs that benefit those outside of the intervention's target area or group"*[133]. Analysis carried out on Census 2011 data indicates that 25% of people working in Wokingham live outside the area. This corresponds to a medium leakage rate, as set out by English Partnerships Additionality Guidance[133], and implies that the majority of employment opportunities will go to people living within the target (effect) area.

Displacement

13.3.16. Displacement measures the extent to which the benefits of a project are offset by reduction of output or employment elsewhere. Additional demand for labour as a result of the construction phase of the Scheme cannot simply be treated as a net benefit as it has the potential to remove workers in the study area (WBC) (i.e. 1%). These figures will be evaluated against the total number of employees in the construction industry (Sector F) from other positions, and the net benefit is therefore reduced by the extent that this occurs.

13.3.17. Construction workers typically move between construction projects within Thames Valley area when delays occur or to help the workforce meet particular construction deadlines. Overall it is assumed that, due to the flexibility of the labour market and the fact that construction workers at the Scheme represent such a small proportion of the Thames Valley area construction labour force, displacement of the direct construction employment will be low.

13.3.18. The English Partnerships Additionality Guidance provides guidance on the levels of displacement. Within the context of a Thames Valley area construction project, a low level of displacement of 25% is considered appropriate, where "*there are expected to be some displacement effects, although only to a limited extent*".

Multiplier Effects

13.3.19. In addition to the direct employment generated by the Scheme itself, there will be an increase in local employment arising from "*further economic activity (jobs, expenditure or income) associated with additional local income and local supplier purchases*" i.e. the indirect and induced effects of the construction activity[133]. Employment growth will arise locally through manufacturing services and suppliers to the construction process (indirect or supply linkage multipliers). Additionally, part of the income of the construction workers and suppliers will be spent in the Thames Valley area, generating further employment (induced or income multipliers).

13.3.20. The effects of the multiplier depend on the size of the geographical area that is being considered, the local supply linkages and income leakage from the area. The English Partnerships Additionality Guidance[133] provides a guide to the composite multipliers (the combined effect of indirect and induced multiplier effects) which should be applied. In line with this guidance, within a Thames Valley area context a multiplier of 1.5 is considered appropriate.

Methodology for Impacts to Best and Most Versatile Agricultural Land

13.3.21. For the purposes of this assessment, impacts to agricultural land are measured as loss, by direct land take, of BMV agricultural land. BMV agricultural land, as defined by the NPPF[5], is land of Grades 1, 2 and 3a in the system of Agricultural Land Classification (ALC) developed by the Ministry of Agriculture,

Fisheries and Food (MAFF)[31]. It is an objective of the NPPF to promote safeguarding of the long-term potential of BMV agricultural land. The ALC grade is determined by the extent to which the physical and chemical characteristics of the soil impose long term limitations on agricultural use for food production.

13.3.22. Detailed ALC surveys were carried out by the UK Government between 1988 and 1999 and the data used to produce larger-scale maps showing ALC grade for limited areas of England. The detailed maps are considered definitive and, as they differentiate between ALC Subgrades 3a and 3b, are used in this assessment to calculate the approximate loss of BMV agricultural land. The loss of BMV agricultural land is considered significant if it exceeds 20 ha (the threshold above which consultation is required with Natural England).

13.3.23. A detailed ALC survey of 114 ha of land at Chapel Green, to the immediate south and east of Wokingham, was commissioned by the MAFF and carried out in January 1996. The land surveyed includes the majority of the study area for the Scheme. For full results (ALCR18395)[32].

13.3.24. The assessment considers the quality of the land and the amount of each grade of land to be taken by the Scheme to inform the evaluation of the magnitude of change and significance of effects.

Methodology for Impacts to Agricultural Holdings

13.3.25. A review of land ownership, based on information provided by WBC, has been undertaken to identify landowners and land tenants within the study area. Reading Agricultural Consultants (RAC) was commissioned to carry out a detailed Agricultural Circumstances Assessment, undertaken in May 2019. Landowners and tenants were surveyed to qualitatively determine impacts to agricultural holdings e.g. in relation to severance. The Agricultural Circumstances Assessment is presented in Appendix 13.2. The assessment is taking a worst case scenario approach for impacts to agricultural holdings.

13.3.26. The assessment of effects relating to land take from agricultural holdings has been determined through the evaluation of the nature and role of the agricultural businesses and the proportion of land-take from land holdings alongside changes in severance and infrastructure changes arising from the Scheme using professional judgement.

Methodology for Impacts to Non-Motorised Users

13.3.27. The assessment of impacts on non-motorised users has been undertaken in accordance with the guidance in DMRB Volume 11 Section 3 Part 8: Pedestrians, Cyclists, Equestrians and Community Effects. The DMRB defines amenity as “the relative pleasantness of a journey”, comprising degree and duration of people’s exposure to traffic (fear, safety, noise, dirt, air quality) and the impact of the road itself (primarily any visual intrusion associated with the scheme and its structures). Impacts associated with visual amenity are included where relevant but the full assessment of impacts to landscape character and visual amenity is reported within Chapter 6 Landscape and Visual.

[31] Ministry of Agriculture, Fisheries and Food (MAFF), 1988. Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land. October 1988. Available at [Link].

[32] Natural England, 2016. Agricultural Land Classification detailed Post 1988 ALC survey, Chapel Green (Wokingham DLP) (ALCR18395). Available at [Link].

13.3.28. This Chapter therefore focusses on impacts to fear of accidents and visual intrusion associated with Scheme. Factors taken into account include:

- The width of footpaths and the distance between non-motorised user receptors and traffic;
- The presence or absence of barriers between pedestrians and vehicular traffic; and
- The quality of any street furniture and planting.

Methodology for Impacts to Human Health

13.3.29. A qualitative, desk-based assessment of human health has been carried out using professional judgement in the absence of any formal methodology. The assessment has been informed by other topic assessments including Air Quality (Chapter 4) and Noise and Vibration (Chapter 11), and assessments of sub-topics within this chapter (Employment Opportunities and Non-Motorised Users).

Cumulative Impacts

13.3.30. The methodology for the assessment of cumulative impacts is described within Chapter 15: Cumulative Impacts, this includes the list of committed developments which has been used to assess the effects of the Scheme in-combination with development for which consent has been granted. Effect interactions are reported within Chapter 15: Cumulative Effects.

SENSITIVITY OF RECEPTORS

13.3.31. The sensitivity of receptors has been evaluated with reference to the criteria in Table 13-1.

Table 13-1 - Receptor Sensitivity Criteria

Sensitivity	Receptor	Criteria
High	Employment opportunities	Areas of very high unemployment relative to the national or regional averages and very high relative deprivation (e.g. 10% most deprived).
	BMV agricultural land	Agricultural land of Grades 1, 2 and 3a (i.e. BMV agricultural land).
	Agricultural holdings	Land of fundamental importance to business operations (e.g. farms which are dependent on the proximity of the farmland to nearby infrastructure, frequent journeys between the farmland and infrastructure, or the existence of the infrastructure itself).
	Non-motorised users	PROWs frequently used by non-motorised users for utility journeys (e.g. commuting) or likely to be used for recreational or leisure purposes (e.g. national trails) or PROWs used by vulnerable travellers (older people, school children or people with a disability).
Medium	Employment opportunities	Areas of high unemployment relative to the national or regional averages and high relative deprivation (e.g. 50% most deprived).
	BMV agricultural land	Agricultural land of ALC Grade 3b.
	Agricultural holdings	Land of moderate importance to business operations (e.g. farms in which there is a degree of flexibility in the course of normal operation).
	Non-motorised users	PRoW moderately used by non-motorised users for recreational or leisure purposes (e.g. regional trails).

Sensitivity	Receptor	Criteria
Low	Employment opportunities	Areas with similar levels of unemployment to the national or regional average and average level of relative deprivation (e.g. 50% least deprived).
	BMV agricultural land	Agricultural land of ALC Grades 4 and 5.
	Agricultural holdings	Land of minor importance to business operations (e.g. where there are alternative large agricultural holdings, tenancy or other short-term arrangements i.e. annual grass keep or non-commercial farms or land uses)
	Non-motorised users	PROWs occasionally used by non-motorised users for recreational or leisure purposes (e.g. local routes).
Negligible	Employment opportunities	Areas of low unemployment relative to the national or regional average and low relative deprivation (e.g. 10% least deprived).
	BMV agricultural land	Non-agricultural land.
	Agricultural holdings	Land of negligible importance to business operations.
	Non-motorised users	PROWs not or infrequently used by non-motorised users.

13.3.32. In the absence of formal guidance, human health receptors have been assigned a sensitivity of high, medium, low, or negligible using professional judgement and experience. A health receptors' sensitivity is based on their ability to experience a potential impact without incurring a substantial change to their health status. Information used to determine receptor value includes the following;

- Level of deprivation and/or isolation;
- Accessibility;
- Availability of local services and/or assets, and availability of alternatives; and
- Use of routes by NMU, particularly vulnerable travellers, for journeys (either utility or recreational); and Importance of land for business or employment uses.

MAGNITUDE OF IMPACT

13.3.33. The magnitude of impacts is evaluated with reference to the criteria in Table 13-2, determined for the purposes of this assessment, taking into account:

- The spatial extent of the impact (isolated, localised, widespread);
- Duration of impact: short term (< 1 year), medium term (1-10 years) or long term (10+ years);
- The temporariness or permanency of the impact; and
- The likelihood of realisation of the impact.

Table 13-2 - Criteria for assessing magnitude of impact

Magnitude	Receptor	Criteria
Major	Employment opportunities	> 5% increase or decrease to existing baseline levels of employment.
	BMV agricultural land	≥ 20 ha of BMV agricultural land (i.e. agricultural land classified as Grades 1, 2 and 3a in the MAFF ALC system) affected by the Scheme; or, change is likely to cause a direct adverse or permanent or long term (more than 10 years) impact on the integrity or value of the receptor[33].
	Agricultural holdings	> 20% of all land farmed, no access available to severed land, direct loss of farm dwelling, building or structure, nuisance discontinues land use or enterprise.
	Non-motorised users	Permanent loss or of severance to an existing route used by pedestrians, cyclists or other NMU / considerable change in amenity value.
	Human Health	Effects could lead directly to deaths, acute or chronic diseases, or mental ill health. They can affect either or both physical and mental health either directly or through the wider determinants of health. Effects are likely to be important, locally, regionally and nationally.
Moderate	Employment opportunities	1% - 5% increase or decrease on baseline levels of employment.
	BMV agricultural land	Between 10.0 ha to 19.9 ha of BMV agricultural land (i.e. MAFF ALC grades 1, 2 and 3a) or 50.0 ha or more of lower quality agricultural land (i.e. agricultural land classified as ALC grade 3b, 4 and 5 in the MAFF ALC system) is affected by the Scheme[34], and/or change is likely to impact adversely the integrity/value of the receptor but recovery is predicted in the medium term (>5 to 10 years) and there is predicted to be no permanent impact on its integrity.
	Agricultural holdings	10% - 20% of all land farmed, access available to severed land via the public highway, loss of or damage to infrastructure affecting land use, nuisance necessitates change to scale or nature of land use or enterprise.
	Non-motorised users	Disruption of a route used by pedestrians, cyclists or other NMU with significant increase in journey length / time, or moderate change in amenity value.
	Human Health	Effects are long term nuisance impacts, or may lead to exacerbations of existing illness. Impacts may be nuisance/quality of life impacts which may affect physical and mental health either directly or through the wider

[33] A 20 ha threshold follows the approach of the Town and Country Planning (Development Management Procedure) (England) Order 2010 (as amended). As described in Natural England TIN049 (Second Edition, December 2012), for planning applications, specific consultations are required under Development Management Procedure Order where non-agricultural development proposals that are not consistent with an adopted local plan and involve the loss of 20ha or more of best and most versatile land. The '20ha threshold' represents a measure of significance for the loss of such land which has been tried and tested in land use planning, and at public inquiries, over the last four decades, or more.

[34] The latter specifically relates to the effect of the loss of land in grades 3b, 4 and 5 to national agricultural land resource, and does not take account of landscape character, or ecological qualities that low quality agricultural land may have.

Magnitude	Receptor	Criteria
		determinants of health. These effects can be important locally and regionally.
Minor	Employment opportunities	0.1% - 0.9% increase or decrease on existing baseline levels of employment.
	BMV agricultural land	5.0 ha to 9.9 ha of BMV agricultural land (i.e. MAFF ALC grades 1, 2 and 3a), and/or 10.0 ha to 49.9 ha of lower quality agricultural land (i.e. MAFF ALC grades 3b, 4 and 5) is affected by the Scheme[35], and/or change is likely to adversely impact the integrity/value of the receptor but recovery is expected in the short term (0 to ≤ 5 years = 'aftercare period').
	Agricultural holdings	5% - 10% of all land farmed, access available to severed land via private way, infrastructure loss or damage does not affect land use and nuisance does not affect land use or enterprise.
	Non-motorised users	Alteration of a route used by pedestrians, cyclists or other NMU but with no significant increase in journey length / time, or minor change in amenity value.
	Human Health	Effects are generally lower level quality of life or wellbeing impacts (e.g. increases in noise, odour, or visual amenity). These effects can be important local considerations.
Negligible	Employment opportunities	< 0.1% increase or decrease on existing baseline levels of employment.
	BMV agricultural land	≤ 4.9 ha BMV agricultural land (i.e. MAFF ALC grades 1, 2 and 3a), or less than 10.0 ha of lower quality agricultural land (i.e. MAFF ALC grades 3b, 4 and 5), or non-agricultural/other land, is affected by the Scheme[36].
	Agricultural holdings	< 5% of all land farmed, no new severance, no impact on farm infrastructure and no nuisance on land use or enterprise.
	Non-motorised users	No change to route used by pedestrians, cyclists or other NMU or change in amenity value.
	Human Health	No effect or effects within the bounds of normal/accepted variation.

SIGNIFICANCE OF EFFECT

13.3.34. The significance of effect is evaluated taking into account the sensitivity of the receptor, the magnitude of the impact (assuming the impact is realised), as well as a number of other factors that are outlined in more detail in Chapter 2 Approach to Assessment. The significance of effect is evaluated for the construction and operational phases of the Scheme.

[35] The latter specifically relates to the effect of the loss of land in grades 3b, 4 and 5 to national agricultural land resource, and does not take account of landscape character, or ecological qualities that low quality agricultural land may have.

[36] The effect of the loss of land in grades 3b, 4 and 5 is in terms of the national agricultural land resource, and does not take account of landscape character, or ecological qualities that low quality agricultural land may have.

13.3.35. The evaluation of significance of effect takes into account “embedded mitigation” (mitigation which is considered fundamental to the implementation of the Scheme), in accordance with DMRB Volume 11 Section 2 Part 6: Reporting of Environmental Impact Assessments.

13.3.36. Descriptors of the significance of effect categories are provided in Table 2-3.

13.4. BASELINE CONDITION

SOURCES OF INFORMATION

13.4.1. The baseline condition of the study area has been reviewed with reference to the following:

- Office for National Statistics (ONS) ‘Nomis – Official Labour Market Statistics’. Available at: https://www.nomisweb.co.uk/ (accessed July 2019);
- Sustrans ‘National Cycle Network’ Available at: https://www.sustrans.org.uk/ncn/map (accessed July 2019);
- Google ‘Google Street View’ imagery Available at: https://www.google.co.uk/maps (accessed July 2019);
- Natural England, 2010. Agricultural Land Classification map London and the South East (ALC007) Available at: http://publications.naturalengland.org.uk/ (accessed July 2019);
- Natural England, 2016. Detailed ALC Survey for Chapel Green (Wokingham DLP) (ALCR18395); Available at: http://publications.naturalengland.org.uk/ (accessed July 2019);
- Defra’s ‘Magic Map’ application Available at: http://www.natureonthemap.naturalengland.org.uk/magicmap.aspx (accessed July 2019);
- Public Health England. Wokingham Unitary Authority. Health Profile 2018. Available at: http://fingertipsreports.phe.org.uk/health-profiles/2017/e06000041.pdf (accessed July 2019);

13.4.2. No site visit has been undertaken to inform this Chapter. All relevant information has been obtained from publicly available mapping, including OS mapping and aerial imagery from Google Maps.

DESCRIPTION OF CURRENT BASELINE CONDITION

Employment Opportunities

13.4.3. The Labour Market Profiles available from NOMIS the Office for National Statistics (ONS) bring together data from several sources which is used in this Chapter to establish the baseline condition of the local economy. For each indicator, data is provided for the Borough of Wokingham and for Great Britain. The salient information from the Labour Market Profile for Wokingham[37] is presented in Table 13-3 to Table 13-11.

Qualifications

13.4.4. In 2018 the percentage of the population of Wokingham obtaining a National Vocational Qualification (NVQ) of Level 1 (which included GCSE grades D-G) to Level 4 (which includes a bachelor’s degree)

[37] NOMIS (2017). Population Statistics for Wokingham Available at [Link].

was higher than the percentage for Great Britain. In the same year the percentage of the population of Wokingham obtaining no formal qualifications was lower than the percentage for Great Britain. This difference is likely to be systematic and indicative of the population of the Borough of Wokingham obtaining higher levels of qualification than the average for Great Britain. Refer to Table 13-3.

Table 13-3 - Qualifications

Qualification	Period	% Population (Wokingham)	% Population (Great Britain)
NVQ 4 and above	2018	53.7	39.3
NVQ 3 and above	2018	69.2	57.8
NVQ 2 and above	2018	85	74.9
NVQ 1 and above	2018	92.9	85.4
Other Qualifications	2018	3.3	6.8
No Qualifications	2018	3.8	7.8

Earnings

13.4.5. In 2018, average earnings by residence for male and female full-time workers were higher in the Borough of Wokingham than the average for Great Britain. This data describes the earnings of people living in Wokingham, including those who work outside of Wokingham and excluding the self-employed. Refer to Table 13-4.

13.4.6. The median earnings of full-time male and full-time female workers resident in Wokingham were more than their respective averages for Great Britain by £275.2 and £71.1 respectively.

Table 13-4 - Earnings

Earnings by place of residence	Period	Wokingham	Great Britain
Full-time Workers	2018	£737.4	£571.1
Male Full-time Workers	2018	£887.4	£612.2
Female Full-time Workers	2018	£587.1	£510.0

Employment

13.4.7. The proportion of the total population of Wokingham (165,000) aged 16-64 was 61.5% in 2017—slightly lower than the averages across the Thames Valley Berkshire LEP area (63.4%) and Great Britain (62.9%). One of the contributing factors to this statistic may be the higher than average retired demographic, which forms 19.6% of the economically inactive part of the population aged 16-64 (the average was 13.2% for Great Britain).

13.4.8. The job density value was 0.94 for Wokingham in 2017, higher than the value of 0.86 for Great Britain, indicating a higher than average number of jobs per resident aged 16-64 (note—a job density of 1.0 would mean that there was one job for every resident aged 16-64). The unemployment rate (the

unemployed as a percentage of the economically active population) was 2.5% for Wokingham in 2018, lower than the average of 4.2% for Great Britain. Refer to Table 13-5.

Table 13-5 - Labour supply: Employment and unemployment (Jan 2018-Dec 2018)

Employment and unemployment	Period	Wokingham (%)	Great Britain (%)
Economically Active	2018	82.5	78.5
In Employment	2018	80.7	75.1
Employees	2018	69.6	64.3
Self Employed	2018	10.7	10.6
Unemployed (Model-Based)	2018	2.5	4.2

13.4.9. Table 13-6 provides the employee breakdown for each industry sector within Wokingham and Great Britain.

Table 13-6 - Employee Jobs Profile (2017)

Industry	Wokingham (%)	Great Britain (%)
B: Mining and quarrying	0.0	0.2
C: Manufacturing	4.2	8.2
D: Electricity, gas, steam and air conditioning supply	0.7	0.5
E: Water supply; sewerage, waste management and remediation activities	1.2	0.7
F: Construction	3.6	4.8
G: Wholesale and retail trade; repair of motor vehicles and motorcycles	13.1	15.2
H: Transportation and storage	1.8	4.7
I: Accommodation and food service activities	6.0	7.5
J : Information And Communication	17.9	4.4
K: Financial and insurance activities	1.0	3.5
L: Real estate activities	1.1	1.7
M : Professional, Scientific And Technical Activities	13.1	8.4
N : Administrative And Support Service Activities	8.3	9.1
O: Public administration and defence; compulsory social security	1.2	4.3

Industry	Wokingham (%)	Great Britain (%)
P : Education	13.1	8.9
Q: Human health and social work activities	7.1	13.3
R: Arts, entertainment and recreation	2.7	2.6
S: Other service activities	2.4	2.0

13.4.10. The nearest built-up areas to the Scheme are Wokingham, located within 1 km to the north, northwest, west and southwest, and the larger town of Bracknell which is located approximately 1 km to the east. The local authority is Wokingham Borough Council.

13.4.11. Community facilities identified within 1 km of the Scheme are listed in Table 13-7.

Table 13-7 - Community Facilities

Community Facility	Class	Postcode	Distance	Direction
Tesco Superstore (with pharmacy facility)	Healthcare	RG40 2NS	0.00 km	West
Holme Grange School	Education	RG40 3AL	0.23 km	South
Langborough Recreation Ground	Recreation	RG40 2BS	0.25 km	North
Ludgrove School	Education	RG40 3AB	0.25 km	South
Northern House School (Wokingham)	Education	RG40 2HR	0.25 km	North
Floreat Montague Park Primary	Education	RG40 1GB	0.4 km	Northeast
Luckley House School	Education	RG40 3EU	0.54 km	South
Corpus Christi Catholic Church	Culture	RG40 2HE	0.6 km	North
St Teresa's Catholic Primary School	Education	RG40 2EB	0.6 km	North
Wokingham Dental Clinic	Healthcare	RG40 2EE	0.75 km	North
Quakers Religions Society of Friends	Culture	RG40 2DX	0.8 km	North
Evendons primary School	Education	RG40 3HD	0.8 km	Southwest
Wescott Infant School	Education	RG40 2EN	0.8 km	North
Westende Junior School	Education	RG40 2EJ	0.8 km	North
St. Crispin's School	Education	RG40 1SS	0.8 km	North
Wokingham Medical Centre	Healthcare	RG40 1XS	0.9 km	North
Wokingham Methodist Church	Culture	RG40 1XS	0.9 km	North
B S B Methodist Church	Culture	RG40 2LL	0.9 km	North

Community Facility	Class	Postcode	Distance	Direction
Christ Church Wokingham	Culture	RG40 1SS	0.95 km	North
Wokingham railway station	Travel	RG40 2AP	1 km	Northwest
Wokingham Hospital	Healthcare	RG41 2XR	1 km	Northwest
Dr RS Bahra Rectory Road Surgery	Healthcare	RG40 1DH	1 km	North

Best and Most Versatile Agricultural Land

13.4.12. In the detailed ALC grading undertaken in January 1996, most of the land through which the Scheme passes was classified as Grade 3b (i.e. not BMV agricultural land). Although the Scheme passes through some minor areas of land classified as Grade 3a, and the proposed Easthampstead staggered link road passes through land classified as Grade 2, as shown in Volume 2 Figure 13.1.

13.4.13. The agricultural fields within the study area are used for mixed arable and pastoral farming, based on a review of satellite imagery available from Google Earth. There are tracks crossing the proposed route in the west of the study area including Ludgrove Path.

Agricultural Holdings

13.4.14. The study area is rural and agricultural. The review of land ownership, based on information provided by WBC, showed that the study area contained land owned or leased by commercial development companies including: WBC, David Wilson Homes, Thames Valley Housing Association or Kier Homes, Persimmon Homes, Centex Strategic Land (Millar Homes) and Croudace Strategic. The agricultural land within the study area is not farmed as conventional agricultural businesses, instead hosting two separate rural businesses, Holme Park Game Hatcheries and Wokingham Equestrian Centre.

Non-Motorised Users

13.4.15. PROWs present within the study area (0.5 km) are listed in Table 13-8. The “intersection” column indicates those PROWs which are intersected by the Proposed Development.

Table 13-8 - PROWs

PROW	Type	Length (km)	Intersection
WOKI 17	Footpath	0.076	N
WOKI 20	Footpath	0.219	N
WOKI 21	Footpath	0.201	N
WOKI 23	Footpath	0.568	N
WOKI 24	Footpath	0.196	Y
WOKI 25	Footpath	0.426	Y
WOKI 26	Byway open to all traffic	0.068	N
WOKI 26	Restricted byway	0.425	N

WOKW 5	Footpath	0.637	Y
WOKW 9	Footpath	0.201	Y
WOKW 10	Footpath	0.618	Y
WOKW 28	Footpath	1.255	N
WOKW 30	Byway open to all traffic	0.628	N

13.4.16. These are identified in Volume 2 Figure 13.2. The study area contains no cycle routes forming part of the National Cycle Network (NCN). As well as pedestrians and cyclists, it may be likely that equestrians are using these tracks, potentially associated with Wokingham Equestrian Centre.

13.4.17. The study area contains the east-west orientated London Waterloo-Reading railway in the north and the northwest-southeast orientated Waterloo–Reading railway in the west. These are primary routes connecting Reading with London. Wokingham railway station is located approximately 1 km to the northwest in Wokingham.

13.4.18. The Wokingham Public Transport Map[38] shows the local highways network is used by bus services. The local highways used by bus services are Finchampstead Road, Molly Millars Land, Denmark Street, London Road, and Easthampstead Road. These services provide non-motorised users with access to neighbouring towns and cities.

Human Health

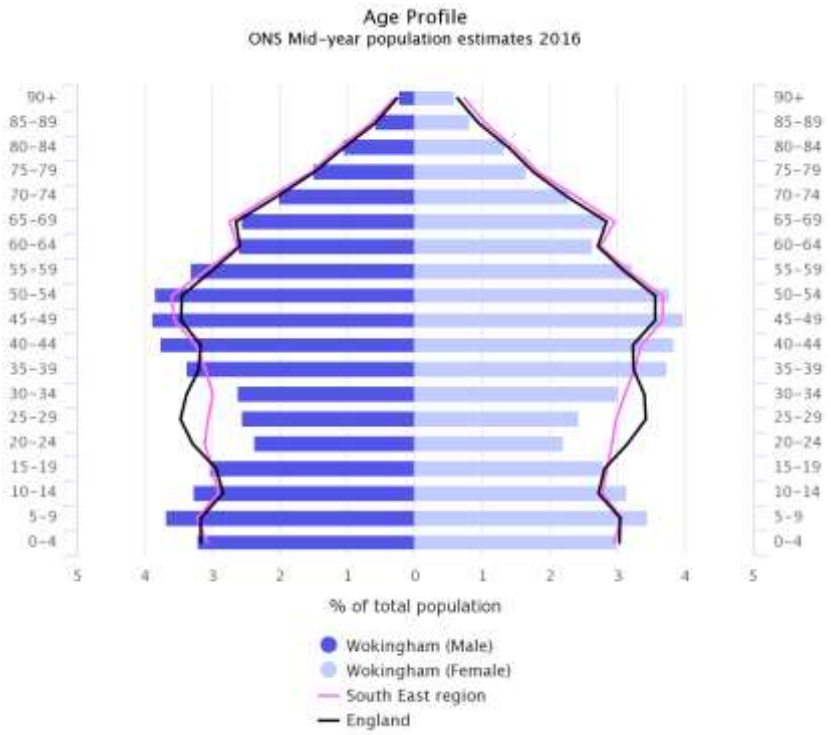
Population

13.4.19. In Wokingham, the proportion of the population aged 20-34 years is lower than both the regional and national averages. However, the proportion of the population aged 5-14 years and 35-55 years is higher. Figure 13.3 below shows the mid-year population estimates for 2016[39].

[38] Wokingham Borough Council. Wokingham Borough Public Transport Map & Guide. September 2019. Available at [Link].

[39] Public Health England. Local Authority Health Profiles. Available at [Link].

Figure 13-3 - Mid-Year Population Estimates 2016



13.4.20. The population of Wokingham Unitary Authority was 165,000 in 2017. The population is projected to increase to 169,000 in 2020. The dependency ratio (number of dependent persons as a percentage of the working population) for Wokingham was 64.0% in 2017. This was higher than the dependency ratio for England (60.7%). An area with a higher dependency ratio may require a greater level of services for older or younger people than an area with a lower dependency ratio.

13.4.21. Ward level population breakdown by age groups are shown in Table 13-9[40].

Table 13-9 - Population breakdown by age (2016) (%)

	Pop under 16 (%)	Pop 16-24 (%)	Pop 25-64 (%)	Pop 65-84 (%)	Pop aged 85 and over (%)
England Average	19	11.3	52	15.4	2.4
Evendons	21.8	7.7	55.8	12.6	2.2
Wescott	19.6	7.8	52.4	17	3.2
Wokingham Without	20.9	8.5	49.9	18.4	2.3

[40] Public Health England, 2016 Local Health Reports for the Evendons, Wescott and Wokingham Without Wards. Available at [Link].

13.4.22. The latest data for Wokingham Borough Council shows that the average life expectancy in the area is 81.6 years for men, and 85.1 years for women, both higher than the England average. However, in the most disadvantaged areas of Wokingham life expectancy is estimated to be lower by 4.5 years for men, and 5.5 years for women[41].

Wokingham Borough Health Profile

13.4.23. The 2018 Public Health England (PHE) Health Profile for Wokingham Borough Council[145] compares indicators for a number of population health statistics for this area with the national average. Overall, the health of people in Wokingham is generally better than the national average.

13.4.24. The following indicators included in the Profile are significantly better than the national average;

- Life expectancy at birth (both Male and Female);
- Under 75 mortality rate (all causes, cardiovascular, and cancer);
- Killed and seriously injured on roads;
- Hip fractures in older people (aged 65+);
- Alcohol-specific stays (under 18s);
- Alcohol-related harm hospital stays;
- Smoking prevalence in adults (aged 19+);
- Excess weight in adults (aged 18+);
- Under 18 conceptions;
- Smoking status at time of delivery (maternity);
- Obese children (aged 10-11);
- Children in low income families (under 16s);
- GCSEs achieved;
- Employment rate (aged 16-64);
- Physically Active Adults;
- Violent crime (violent offences); and
- New sexually transmitted infections.

13.4.25. The following indicators are not significantly different from the national average;

- Suicide rate;
- Hospital stays for self-harm;
- Dementia diagnoses (aged 65+);
- Infant mortality rate;
- Excess winter deaths; and
- New cases of tuberculosis.

13.4.26. The following indicator is significantly worse than the national average;

- Diabetes diagnoses (aged 17+).

13.4.27. Deprivation is measured by the Indices of Multiple Deprivation (IMD) published by the Ministry of Housing, Communities & Local Government in 2015 and 2019 (respectively IMD 2015 and IMD 2019). The IMD reports at the level of the Lower Layer Super Output Areas (LSOA) which are a standard

[41] Public Health England, Local Authority Health Profile 2018: Wokingham Unitary Authority. Available at [Link].

statistical geography designed to be of a similar population size, with an average of approximately 1,500 residents or 650 households.

13.4.28. The average score across all domains for the LSOAs within the Borough of Wokingham is 5,562. This ranks 325 when compared with the 326 local authority districts in England (the local authority district with the rank of 1 is the most deprived). The Borough of Wokingham is therefore one of the least deprived local authority districts in England (upper 1% least deprived). The highest ranking domain is health (325/326) while the lowest ranking domain is barriers to housing and services (215/326).

13.4.29. Over half of Wokingham's adults are overweight or obese (53%), 4.7% have diabetes, 12.3% are living with high blood pressure, and 4.6% suffer from heart disease.

Ward Health Data

13.4.30. At the ward level, life expectancy for men in Evendons is significantly better than the national average, but not significantly different for women. In Wescott and Wokingham Without, life expectancy for both men and women is significantly better than the national average.

13.4.31. The proportion of Census respondents in Evendons, Wescott and Wokingham Without who rated their health as "bad" or "very bad" was significantly better than the national average. Similarly, the proportion of people with a limiting long-term illness or disability was significantly better in all three wards than the national average. These figures are shown in Table 13-10.

Table 13-10 - Health data (ward level)

Ward	Life Expectancy at birth for males (years)	Life expectancy at birth for females (years)	General Health bad or very bad (%)	Limiting long term illness or disability (%)
Year	2011-2015	2011-2015	2011	2011
England	79.4	83.1	5.5	17.6
Evendons	81.7	84.2	1.8	9.7
Wescott	82.6	86	2.8	14.1
Wokingham Without	82.5	87.8	2.8	11.8

13.4.32. Income deprivation, child poverty, and older people living in deprivation are all significantly better in all three wards when compared to the national average (refer to Table 13-11).

Table 13-11 - Deprivation data (ward level) 2015

Ward	Income deprivation (%)	Child Poverty (%)	Older People in Deprivation (%)
England	14.6	19.9	16.2
Evendons	3.5	4.1	4.4

Wescott	4.9	4.8	7.1
Wokingham Without	5.2	5.0	4.5

Clinical Commissioning Group Data

13.4.33. All GP practices within the wards of Evendons, Wescott and Wokingham Without are members of the NHS Berkshire West Clinical Commissioning Group (CCG), and prior to 2018 were covered by the NHS Wokingham CCG. CCGs commission the majority of health services, including emergency care, maternity services and community health services.

13.4.34. Table 13-12 provides the figures for the number of chronic obstructive pulmonary disease (COPD) admissions per 1,000 population. Compared to both the England and Sub-region (South East) values, Wokingham performs significantly better for this indicator.

Table 13-12 - COPD admissions per 1,000 population (CCG level) 2012/13

CCG	Total COPD admissions, per 1,000 population	Recent trend
NHS Wokingham CCG	0.87	No significant change
South East (Hampshire, Isle of Wight and Thames Valley) NHS Region	1.46	Decreasing and getting better
England	2.15	Increasing and getting worse

13.4.35. Table 13-13 provides details of hospital admissions for children with asthma. While the recent trend is “No Significant Change”, when compared to both the South East region and England figures, Wokingham performs better.

Table 13-13 - Hospital admissions for asthma (CCG level) 2016/17

CCG	Hospital Admissions for asthma (under 19 years), per 100,000	Recent trend
NHS Wokingham CCG	107.9	No significant change
South East (Hampshire, Isle of Wight and Thames Valley) NHS Region	162.3	Increasing and getting worse
England	199.7	Decreasing and getting better

Access and Accessibility

13.4.36. In Evendons ward, approximately 5.7% of households do not own a car or van which is lower than the Wokingham Borough average of 9.0%[42]. Approximately 65.1% of people in employment choose

[42] ONS, Census 2011 KS404EW – Car or van availability. Available at [Link].

driving a car or van as their method of travel to work, which is slightly higher than the proportion of 63.9% for Wokingham Borough.[43]

13.4.37. In Wescott ward approximately 13.8% of all households do not own a car or van, which is higher than the Wokingham Borough average. Approximately 59.0% of people in employment choose driving a car or van as their method of travel to work, which is lower than the proportion for Wokingham Borough. Wescott Ward is approximately a 7 minute walk from the centre of Wokingham.[44]

13.4.38. In the Wokingham Without ward, approximately 5.3% of households do not own a car or van, which is lower than the Wokingham Borough average. Approximately 67.5% of people in employment choose driving a car or van as their method of travel to work, which is higher than the proportion for Wokingham Borough.

13.4.39. Local bus services in Wokingham are provided by Reading Buses, Courtney Buses and Horseman Coaches. Evendons Ward is served by frequent services (hourly or better) along Barkham Rd and Woosehill Spine Rd, and less frequent service (less than once an hour) along Molly Millars Lane. Wescott ward is well served by routes into the town centre. The bus routes closest to the Scheme are located in Wescott ward, these are the 121, 125, 128 and 145 which stop at the Tesco Superstore, and the 124 which travel along Easthampstead road from Wokingham town centre, though doesn't cross the railway line. Wokingham Without ward is served by services along the B3430, and south of the B3430 along New Wokingham Road and Old Wokingham Road.

13.4.40. Train services to Reading, London Waterloo and Gatwick Airport run from Wokingham railway station by operators South Western Railway and Great Western Railway. The railway station has a car park, cycle storage and is serviced by several bus routes. The railway station is approximately a 10 minute walk from Wokingham town centre[45].

DESCRIPTION OF FUTURE BASELINE CONDITION

Development Land

13.4.41. Chapter 4: Core Strategy Policies of the Managing Development Delivery Local Plan (MDD) published by WBC in February 2014[29] identifies the "CP21 South Wokingham Strategic Development Location". This land is identified for sustainable, well designed, mixed use development including the following by 2026:

- Phased delivery of around 2,500 dwellings including affordable in accordance with policy CP5;
- Appropriate retail facilities;
- Social and physical infrastructure (including provision for two new primary schools);
- Measures to maintain separation from Binfield/Bracknell, Crowthorne/Pinewood (Crowthorne) and Finchampstead North;
- Measures to protect and enhance pedestrian (including using mobility aids) access to the countryside from Wokingham town centre;

[43] ONS, Census 2011 QS703EW – Method of Travel to Work. Available at [Link].

[44] Wokingham Borough Council: Wescott Ward Profile (January 2018). Available at [Link].

[45] Wokingham Station onward travel information. Available at [Link].

- Necessary measures to avoid and mitigate the impact of development upon the Thames Basin Heaths Special Protection Area in line with Policy CP8 to meet the requirements of the Habitats Regulations and in accordance with Natural England's latest standards. This will include sufficient Suitable Alternative Natural Greenspace (subject to monitoring of the quality and quantity standards);
- Improvements to transport capacity along the A321 and A329 including the provision of south Wokingham relief road from the vicinity of the Coppid Beech roundabout to the Finchampstead Road;
- Measures to improve accessibility by non-car transport modes along the A321 and A329 corridors; and
- Measures to improve access by non-car modes to Wokingham town centre (including the station interchange).

13.4.42. It is understood that the phased delivery of around 2,500 dwellings will result in the loss, by direct land take, of all agricultural land and the cessation of all agriculture within the study area.

Proposed Sites for Mixed Use

13.4.43. Chapter 4: Core Strategy Policies of the MDD identifies "Policy SAL08: Allocated Mixed Use Sites" which includes allocation of a number of sites for mixed commercial and residential development. Those within 2 km of the Scheme are shown in Table 13-14.

Table 13-14 - Proposed Sites for Mixed Use

Proposed Site for Mixed Use	Relation
Land at Peach Place, Wokingham, for the delivery of A1 (retail) floorspace with flexibility for A3 (restaurants & cafes), A4 (drinking establishments) and C3 (residential) development.	0.75 km northeast
Land at Station Gateway, Wokingham, for the delivery of the Reading Road to Wellington Road link (Core Strategy CP10 – Improvements to the Strategic Transport Network), works to relocate and rebuild Wokingham Station as a public transport interchange, office provision and ancillary uses including limited A1 (retail) & A3 (restaurants & cafes) uses.	0.8 km northwest
Land at Elms Field, Wokingham, for the delivery of A1 (retail) floorspace, including an anchor store of circa 3,000 sqm (net) on the existing Wellington House site, with flexibility for A3 uses (restaurants & cafes), A4 (drinking establishments), D1 (community uses), C1 (hotel) and C3 (residential) uses.	0.3 km north
Land at Carnival Pool, Wokingham, for the delivery of D1 (community uses), D2 (leisure uses) with flexibility for A3 (restaurants & cafes), A4 (drinking establishments) and C3 (residential) uses.	0.3 km north

Allocated Sites

13.4.44. Chapter 4: Core Strategy Policies of the MDD identifies "Policy SAL02: Allocated housing development sites" allocated for residential development. Sites within 2 km of the Scheme are shown in Table 13-15.

Table 13-15 - Allocated Sites for Residential Development

Allocated Site	Relation
Land at Elms Field & The Paddocks, Elms Road, Wokingham for the delivery of around 190 dwellings (site WK179).	0.3 km north
Land off Norton Road, Wokingham for the delivery of around 7 dwellings (site WK176).	0.35 km north
Land at Folly Court, Blagrove Lane, Wokingham for the delivery of around a further 34 dwellings (site WK160) (in addition to the 66 permitted on the site under application RM/2011/0036).	1 km west
Land off Smith Walk, Fernlea Drive, Woosehill, Wokingham for the delivery of around 18 dwellings (site WK175).	1.4 km northwest

13.4.45. The Scheme will include construction of a new segregated shared-use cycleway and footpath route utilising existing the eastern part of Luckley Road and PROWs WOKI 25 (footpath adjacent to Wokingham Equestrian Centre), WOKI 24 and WOKI 9 (footpath crossing Emm Brook) and WOKI 17 (footpath crossing the London Waterloo-Reading railway). This will connect the residential area of Eastheath with Gipsy Lane, south of Wokingham Town Centre.

Future Population

13.4.46. It is anticipated that in the absence of the Scheme, a number of demographic factors are likely to change due to natural fluctuation and change, including total population.

13.4.47. Following population forecasts undertaken for the Berkshire Joint Strategic Planning Unit by the Greater London Assembly, it is predicted that the population of the Wokingham borough will increase by 9% and the number of households will increase by 22% by 2026[1].

13.4.48. It is assumed that a future baseline scenario would present similar health conditions and trends as described above.

13.5. IMPACTS, MITIGATION AND MANAGEMENT

Sensitive Receptors

13.5.1. Table 13-16 provides a summary of the potential people and communities impacts, their receptors and the receptor sensitivity.

Table 13-16 - Summary of People and Communities Impacts, Receptors and Sensitivity of Receptors.

Potential Impact	Receptors	Sensitivity of receptors
Generation of direct, indirect and induced employment opportunities for the local population	Economic receptors in Wokingham (local level)	Negligible
Loss, by direct land take, of best and most versatile (BMV) agricultural land	Best and most versatile (BMV) agricultural land	High

Potential Impact	Receptors	Sensitivity of receptors
Land take from private local agricultural holdings (including impacts due to agricultural severance) and other effects relating to the viability of agricultural businesses	Land owners	High
Effects on non-motorised users of the new highway (including changes in amenity value for users of Public Rights of Way [PROWs] and non-designated routes and potential benefits arising from the provision of new cycling and crossing facilities);	Users of the PRoW and non-designated public routes	Medium
Effects (both beneficial and adverse) to human health associated with changes in noise, and air quality, employment opportunities, improved access, and opportunities for active travel	Residential properties, PRoW users and those visiting community and recreational facilities in close proximity to the Scheme	Low

Employment Opportunities – Construction Phase

13.5.2. It is anticipated that the construction activities will commence in Autumn 2020 and will be completed in Autumn 2021, as outlined in Chapter 3 - The Scheme. It is assumed that there will be employment opportunities for individuals employed in Industry Sector F (Construction) during this 1 year period. It also assumed that employment opportunities associated with such works will be made available to the local workforce where possible, although the use of specialist plant or installation of certain types of infrastructure/structures may not be able to be completed by a local contractor.

13.5.3. Construction employment represents a positive economic effect that can be estimated as a function of the scale and type of construction (infrastructure and buildings). The following section estimates gross employment arising from the Scheme during the construction phase and then takes into account leakage, displacement and multiplier effects in order to assess the net effects on construction employment for the Wokingham economy.

Gross Direct Construction Employment

13.5.4. The construction work is not permanent and therefore the effect will be temporary but medium term in nature. The capital and revenue expenditure involved in the construction period will lead to increased output in the Wokingham and the wider regional economy.

13.5.5. Applying an average gross output per construction industry employee to the estimated total construction cost, as outlined in the Methodology, it is estimated that there are likely to be 122.9 gross full time equivalent (FTE) construction employees per annum on the Site during the demolition and construction phase.

13.5.6. It is assumed that for the purposes of this assessment that one FTE is equivalent to one job.

Leakage

13.5.7. Leakage effects are the benefits to those outside the effect area. In line with the leakage rates set out by English Partnerships Additionality Guidance an adjustment of 25% has been applied to the estimated 122.9 gross construction jobs on average per annum. It is therefore estimated that average of 92.2 employees from within Wokingham and an average of 30.7 employees from the wider Thames Valley Area will be employed per annum at the Scheme during the demolition and construction period.

Displacement

13.5.8. Displacement measures the extent to which the benefits of a project are offset by reduction of output or employment elsewhere. Applying English Partnerships Additionality Guidance, a low-level displacement of 25% is considered appropriate in a Wokingham and Thames Valley Area context. Applying this level of displacement to the total gross direct employment figure results in a net direct employment average of 92.2 jobs per annum during the construction period.

Multiplier Effect

13.5.9. Generation of indirect and induced employment opportunities associated with the construction phase have been calculated using an assumed multiplier of 1.5 on the basis that the level of multiplier effects is considered to be 'medium' as there are anticipated are to be 'average linkages' associated with the Scheme. Applying the 1.5 multiplier to the figure for the total net direct employment of 92.2 (average) results in an indirect and induced employment average of 46.1 average employees per annum during the construction period.

Net Additional Construction Employment

13.5.10. Table 13-17 presents the temporary employment generated by the Scheme taking leakage, displacement and multiplier effects into account. The total net additional employment created within Wokingham as a result of the Scheme is estimated to be 103.7 employees on average per annum. Also, an average of 34.6 jobs will be created in the wider Thames Valley Area, resulting in a total net employment generation of 138.2 jobs on average per annum during the construction period.

Table 13-17 - Construction Employment Generation (Average number of workers onsite per year)

FTE Employment Generation	Wokingham	Thames Valley Area	Total
Gross Direct Employment	92.2	30.7	122.9
Displacement	23	7.7	30.7
Net Direct Employment	69.1	23.0	92.2
Net Indirect and Induced Employment	34.6	11.5	46.1
Total Net Employment	**103.7**	**34.6**	**138.2**

Source: WSP calculations

13.5.11. The total number of employee jobs estimated within Wokingham is approximately 84,000 as of 2017. Within the Wokingham, 3.6% were in Sector F (Construction) as of 2017, which equates to approximately 3,000 employees. Based on the assumption that 103.2 jobs will be generated over the 1 year construction period, this represents approximately a 3.4% increase in the number of employee jobs in Sector F (Construction) in Wokingham. Therefore, overall the magnitude of impact is considered to be moderate.

13.5.12. The sensitivity of economic receptors is negligible given that Wokingham is a one of the least deprived local authority districts in England (upper 1% least deprived) and with low levels of unemployment compared with regional and national averages. The magnitude of impact is considered to be moderate. Therefore, there is likely to be a direct, temporary, medium-term effect of **neutral or slight positive** in relation to the generation of direct on-site employment opportunities as a result of the Scheme.

Mitigation / Enhancement

13.5.13. There are no mitigation measures required or proposed for people and communities in relation to construction employment generation.

Residual Effects

13.5.14. A **neutral or slight positive residual effect** is predicted in relation to the generation of direct on-site employment opportunities as a result of the Scheme.

Best and Most Versatile Agricultural Land – Construction and Operational Phases

13.5.15. The study area is rural and agricultural and contains a 32.8 ha of agricultural land within the red line boundary, including 8.8 ha of BMV agricultural land (Grades 2 and 3a). As the Scheme includes 'offline' construction of a new highway, it will result in the permanent loss of BMV agricultural land. The Scheme will result in the loss, by direct land take, of 1.9 ha BMV agricultural land and therefore does not exceed the 20 ha threshold, above which consultation is required with Natural England. The loss, by direct land take, of lower quality agricultural land (i.e. agricultural land classified as ALC grade 3b, 4 and 5 and other (unclassified land) as a result of the Scheme will be 24 ha.

13.5.16. The sensitivity of best and most versatile agricultural land is high and the magnitude of change is minor. There is considered to be a direct, permanent, long-term effect of **slight adverse** significance in relation to loss of BMV agricultural land.

13.5.17. However, as it is understood that the phased delivery of around 2,500 dwellings will result in the loss, by direct land take, of all agricultural land and the cessation of all agriculture within the study area, the impact relative to the future baseline will be **neutral**.

Mitigation/Enhancement

13.5.18. No mitigation measures are proposed for the loss of best and most versatile agricultural land.

Residual Effects

13.5.19. The sensitivity of best and most versatile agricultural land is high and the magnitude of change is minor. Therefore, there is likely to be a direct, permanent, long-term effect of **slight adverse** significance in relation to loss of BMV agricultural land.

Agricultural Holdings – Construction and Operational Phases

13.5.20. The affected rural businesses that operate on the agricultural land within the Study area are Holme Park Game Hatcheries and Wokingham Equestrian Centre. The Agricultural Circumstances Assessment (Appendix 13.2) concluded that business at Holme Park Game Hatcheries is likely to cease as a result of the construction and operation of the Scheme. It is likely that the Wokingham Equestrian centre will potentially need to reduce the number of horses kept, with a resulting reduction in income as a result of the Scheme. Furthermore, the affected land at Woods Farm is permanent pasture in a non-commercial equestrian use, this use will cease as a result of landed needed to accommodate the construction of the Scheme.

13.5.21. The effects to the Holme Park Game Hatcheries and Wokingham Equestrian Centre described in the construction phase will remain once the Scheme is operational. However, the land at Woods Farm is likely to be unaffected by the operation of the Scheme and the land it is assumed the land is likely to be able to return to the pre-construction use of non-commercial equestrian use.

13.5.22. Although these impacts fall within both categories they have been described in the construction section only to avoid double counting.

13.5.23. The sensitivity of the agricultural holdings is high given that the land is of fundamental importance for the business' operations. The magnitude of impact is considered to be major given the Scheme will result in the discontinue of business at the Holme Park Game Hatcheries. Access to severed agricultural land will be available only via public highways. Therefore, there is likely to be a direct, permanent, long term **large or very large** adverse effect to agricultural holdings as a result of the construction of the Scheme.

13.5.24. However, as it is understood that the phased delivery of around 2,500 dwellings will result in the loss, by direct land take, of all agricultural land and the cessation of all agriculture within the study area, the impact relative to the future baseline will be **neutral**.

Mitigation/Enhancement

13.5.25. It may be possible to reduce impacts due to agricultural severance through the inclusion of primary mitigation in the design of the Scheme (e.g. provision of private access to severed agricultural land). However, due to the proportion of land required to accommodate the Scheme and the layout and operation of the affected businesses, it is unlikely that any further mitigation measures could be implemented. Therefore, mitigation of the effects of the Scheme on the individual rural businesses are likely to be in the way of financial compensation and are matters of private negotiation between the parties.

13.5.26. Mitigation measures that could be implemented to avoid or minimise disruption to day to day agricultural operations on the remainder of the agricultural holdings affected during the construction phase of the Scheme, are as follows:

- Access will be maintained to parcels of agricultural land severed by the construction of the Scheme;
- All reasonable precautions will be taken to avoid obstruction or interference with the user of the land and consultation and co-operation will be carried out as fully as possible with the land-owner/farmer to resolve any problems that may occur;
- All reasonable precautions will be taken to prevent damage and injury to land, buildings, fencing stock, crops and the environment generally;

- Where fences, sections of hedgerow, ditches and culverts are removed or disturbed during construction, these will be fully re-instated as soon as possible after construction in consultation with the land-owners/farmers, where necessary;
- All reasonable precautions in line with current best practice will be taken to prevent the spread of animal and plant diseases;
- Measures will be put in place to protect and reinstate existing services and water supplies, as necessary;
- All reasonable actions will be taken to protect sporting interests and prevent poaching, where appropriate; and
- Ensure the minimum damage and disruption to existing land drainage and agree appropriate remedial works as required with the land owners/farmers.

Residual Effects

13.5.27. The sensitivity of the agricultural holdings is high given that the land is of fundamental importance for the business' operations. The magnitude of impact is will remain major. Therefore, there is likely to be a direct, permanent, long term **large adverse** effect to agricultural holdings as a result of the construction of the Scheme.

Non-Motorised Users - Construction Phase

Amenity Value

13.5.28. It is assumed that the implementation of a traffic management plan during the construction phase will ensure access remains open for non-motorised users of the majority of PROWs within the study area. The PROWs that intersect the Scheme are likely to be temporarily closed and diverted during the construction phase. It is acknowledged that there may be changes in the land use within the Scheme Boundary due to the site preparation, earthworks, construction activities and site plant. Together these are likely to increase fear/safety and reduce amenity value of PRoW that intersect the Scheme.as a result of construction activities and site plant use).

13.5.29. The sensitivity of non-motorised users is medium given the absence of survey data and the PROWs in the study area are local routes used for recreational or leisure purposes. The magnitude of impact is considered to be moderate as there will be a temporary reduction in amenity due to the presence of construction plant and ongoing activities during this phase. Therefore, there is likely to be a direct, temporary, medium-term effect of **moderate adverse** significance in relation to the impacts to amenity value for non-motorised users as a result of the Scheme.

Mitigation / Enhancement

13.5.30. To minimise the likely significant adverse effects to users of PROWs and non-designated public routes during the construction phase, the following mitigation measures should be implemented by the contractor via a Construction Environmental Management Plan (CEMP):

- The public should be informed of the nature, timing and duration of construction works by newsletters and liaison with Parish Council where deemed necessary;
- The provision of clear directions for any alternative routes and appropriate alternative diversions to be clearly publicised to maintain public access;
- For health and safety reasons, public access will be redirected away from construction areas wherever possible; and

- Visual effects to be reduced as far as possible through a 'tidy construction' site policy and implementation of long term landscaping as soon as possible.

Residual Effects

13.5.31. The sensitivity of non-motorised users is medium given the absence of survey data and the PROWs in the study area are local routes used for recreational or leisure purposes. The magnitude of impact following mitigation is considered to be moderate. Therefore, there is likely to be a direct, temporary, medium-term effect of **moderate adverse** in relation to the impacts to amenity value for non-motorised users as a result of the Scheme.

Non-Motorised Users - Operational Phase

Amenity Value

13.5.32. The Scheme is likely to improve amenity for pedestrians, cyclists and equestrians. The new segregated shared-use cycleway and footpath will be provided along both sides and along the entire length of the Scheme, which will reduce the exposure of non-motorised users to traffic. New crossing points will also be included as part of the Scheme which will ensure users can cross the traffic more safely within the Scheme.

13.5.33. The new segregated shared-use cycleway and footpath will also provide non-motorised users with access to the countryside landscape in this rural and agricultural area. The Scheme will provide, safe, linked routes to footpaths WOKI 9 and WOKI 24, providing a connected community route enabling safe passage for people of all ages.

13.5.34. The sensitivity of non-motorised users is medium given the absence of survey data and the PROWs in the study area are local routes used for recreational or leisure purposes. The magnitude of impact is considered to be moderate given the improvements in amenity value. Therefore, there is likely to be a direct, permanent, long term **moderate positive** effect in relation to changes in amenity value of PROW as a result of the Scheme.

Mitigation/Enhancement

13.5.35. As part of the Scheme, clear directions for access routes will be provided in order to maintain safe public access.

Residual Effects

13.5.36. The sensitivity of non-motorised users is medium given the absence of survey data and the PROWs in the study area are local routes used for recreational or leisure purposes. The magnitude of impact following mitigation is considered to be moderate. Therefore, there is likely to be a direct, permanent, long term **moderate positive** effect in relation to changes in amenity value of PROW as a result of the Scheme.

Human Health – Construction Phase

13.5.37. Noise and vibration impacts of the construction of the Scheme is anticipated to be negligible, however, due to their proximity, two receptors have the potential for **adverse effects**. Noise and vibration from excavation, earthworks and road surfacing is likely to have a direct, temporary, short-term adverse impact on both Rosedeane, Easthampstead Road and Britton's Farm, Waterloo Road. However, as a whole, the Study Area population is unlikely to experience significant effects, and therefore, it is

anticipated that changes to noise during the construction period are likely to have a **negligible** impact on human health outcomes in the population.

13.5.38. PRoWs provide opportunities for walking and cycling for both recreation and as a means of travel between community facilities and employment areas. As stated above (Non-Motorised Users - Construction Phase), the PROWs that intersect the Scheme are likely to be temporarily closed and diverted during the construction phase. The magnitude of the subsequent impact of these temporary closures on human health is considered to be **minor.** This temporary reduction in amenity is likely to have a **medium** effect on human health.

13.5.39. Using the assumptions above, it is anticipated that 103.2 jobs will be generated over the 1 year construction period, which represents approximately a 3.4% increase in the number of construction employee jobs in Wokingham. These employment gains should result in beneficial health outcomes such as improved mental and physical health and provide opportunities for social contact. Health outcomes as a result of increased employment opportunities and income levels during construction are anticipated to be of temporary, short to medium-term, **neutral or slight positive** of minor magnitude (**not significant**).

13.5.40. As stated within the proposed methodology (**Section 1.3** above), the assessment of human health will be informed by the Air Quality assessment. At present, the air quality assessment is not available and therefore this assessment of health does not fully satisfy the outlined scope, however, the effects of air quality on health will be addressed once the air quality assessment is available.

13.5.41. The sensitivity of human health among the local population is considered to be **low**, and the magnitude of change prior to mitigation, is considered to be **moderate**. Therefore, there is likely to be a direct, temporary, short-term **slight adverse** effect on human health (**not significant**) prior to the implementation of mitigation measures, and the assessment of air quality.

Mitigation/Enhancement

13.5.42. Best practice construction methods would be used to minimise noise levels, impacts on PRoWs as outlined in the CEMP. Monitoring would be established to ensure acceptable working limits are adhered to, using best practice methods to be included in the CEMP.

13.5.43. No further mitigation above what is stated in **Chapter 11: Noise and Vibration** is recommended.

Residual effects

13.5.44. The sensitivity of human health is **low**, and the magnitude of change, following mitigation, is **negligible**. Therefore, there is likely to be a direct, temporary, medium-term **neutral** residual effect on human health (**not significant**) following the implementation of mitigation measures.

Human Health – Operation Phase

13.5.45. A number of residential and non-residential noise sensitive receptors are likely to experience an **adverse significant effect** as a result of noise from the Scheme. Amongst these receptors, Montague Park Community Centre and Montague Primary School, are of particular concern due to their vulnerable users (children and the elderly). Therefore, it is anticipated that there will be a **moderate adverse effect** on human health outcomes related to noise.

13.5.46. The new segregated shared-use cycleway and footpath is likely to improve amenity for pedestrians, cyclists and equestrians, provide greater access to the and reduce the exposure of non-motorised users to traffic. New crossing points will also be included as part of the Scheme which will ensure

users can cross the traffic more safely within the Scheme. It is anticipated that the Scheme will result in an indirect, long-term **moderate positive** effect on human health.

13.5.47. Looking at the combined impacts from both noise and vibration and non-motorised users, the sensitivity of human health is considered to be **low**, and the magnitude of change prior to mitigation, is considered to be **minor**. Therefore, there is likely to be a direct, permanent, long-term **slight adverse** effect on human health (not significant) prior to the implementation of mitigation measures, and the assessment of air quality.

Mitigation/Enhancement

13.5.48. No further mitigation beyond what is outlined above (employment and non-motorised users) and within Chapter 11 Noise and Vibration, is recommended.

Residual effects

13.5.49. The sensitivity of human health is **low**, and the magnitude of change, following mitigation, is **negligible**. Therefore, there is likely to be a direct, permanent, long-term **neutral** residual effect on human health (**not significant**) following the implementation of mitigation measures.

13.6. CUMULATIVE IMPACTS

Employment Opportunities

13.6.1. There is likely to be positive effects associated with direct, temporary construction employment generated by all of the committed developments. However, the scale of the construction employment generated cannot be readily quantified on the basis of the information available for each scheme as this information is commercially sensitive. Nonetheless, there is considered to be a **slight or moderate** beneficial effect associated with direct employment opportunities. In addition, multiplier effects are anticipated during the construction phase, both in terms of the sourcing of local supplies (indirect employment across wider supply chains), and local spend by on-site workers (induced employment). Therefore, there is considered to **slight to moderate** beneficial effect associated with indirect and induced employment opportunities.

Best and Most Versatile Agricultural Land

13.6.2. A total of 1.9 ha BMV agricultural land will be lost as a result of the Scheme and a further 0.8 ha BMV agricultural land will be affected by the construction of the Eastern Gateway Scheme. Therefore, the significance of the cumulative effect of the Eastern Gateway Scheme and the Scheme is assessed as having an effect of **slight or moderate** adverse significance, in terms of best and most versatile agricultural land. There will be further loss of BMV agricultural land associated with the residential development within the SDL.

Agricultural Holdings

13.6.3. The outcome of the assessment was that business will cease at the Holme Park Game Hatchery, therefore the cumulative effect of the adjacent Eastern Gateway will not add to the significance of the effect, which will remain **large or very large** adverse, in terms of agricultural holdings.

Non-Motorised Users

13.6.4. The integrity of PROWs will be maintained or enhanced, through the provision of crossings where PROWs intersect the roadway.

Human Health

13.6.5. The Eastern Gateway and Western Gateway schemes, which are located adjacent to the Scheme have the potential to contribute to an increase in noise pollution. Therefore, the significance of the cumulative effect of these schemes is assessed as having an effect of **slight or moderate** adverse significance, in terms of human health.

13.6.6. As stated above, there are likely to be positive effects associated with direct, temporary construction employment generated by all of the committed developments. These potential employment gains could result in beneficial health outcomes such as improved mental and physical health and provide opportunities for social contact. Health outcomes as a result of these cumulative schemes are anticipated to be of temporary, short to medium-term, **slight or moderate** beneficial of minor magnitude (**not significant**).

MITIGATION AND MANAGEMENT

Construction Phase

13.6.7. The potential for adverse impacts during the construction phase will be managed through the implementation of a Construction Environmental Management Plan (CEMP). This will anticipate environmental risks and recommend measures for risk mitigation for implementation by the Principal Contractor.

Operation

13.6.8. The potential for adverse impacts during the operational phase will be managed primarily through the design of the scheme. Some adverse effects, such as the loss, by direct land take, of BMV agricultural land, are more likely to be compensated for rather than mitigated against.

13.7. LIMITATIONS AND ASSUMPTIONS

13.7.1. The limitations and assumptions relevant to this People and Communities Chapter are as follows:

- It is assumed that any land used for construction compounds would be reinstated to its former condition and use following the completion of the construction phase.
- It is assumed that for health and safety reasons, public access would be redirected away from any areas of construction activities.
- The assessment relies, in part, on data provided by third parties (e.g. OS Mapping, local authorities, Office for National Statistics) which are the most up-to-date, available at the time of the assessment. No significant changes or limitations in these datasets have been identified that would affect the robustness of the assessment for EIA purposes.
- Given the nature of the Scheme, it is anticipated that there will be no direct, indirect, or induced employment opportunities associated with the operational phase.
- In the absence of survey data regarding the frequency of use of the PROW in the study area, it has been assumed the PROW are moderately used.
- In the absence of information regarding the diversion route plans of the PROW during the construction phase, it has been assumed that there will be a moderate reduction in amenity of the PROW intersected by the Scheme.
- The assessment of effects on human health relies on the use of reasonable assumptions and professional judgement to determine the significance of effects.

- At present, the air quality assessment is not available and therefore the assessment of health does not fully satisfy the outlined scope, however, the effects of air quality on health will be addressed once the air quality assessment is available.

13.8. SUMMARY AND RECOMMENDATIONS

13.8.1. Data from NOMIS indicated that the levels of unemployment in 2017 were lower in Wokingham (2.5%) for than the average for Great Britain (4.2%). In addition, the job density value was 0.94 for Wokingham in 2017, higher than the value of 0.86 for Great Britain, indicating a higher than average number of jobs per resident aged 16-64.

13.8.2. Within the 0.5 km study area, there are five PROWs that will be intersected by the Scheme, which include WOKI 5, WOKI 9, WOKI10, WOKI 24 and WOKI 25. These are shown in Volume 2 Figure 13.2.

13.8.3. The majority of the land through which the Scheme passes is classified as Grade 3b (i.e. not BMV agricultural land). Although the Scheme passes through some minor areas of land classified as Grade 3a, and the proposed Easthampstead staggered link road passes through land classified as Grade 2. The agricultural land within the study area is not farmed as conventional agricultural businesses, instead hosting two separate rural businesses, Holme Park Game Hatcheries and Wokingham Equestrian Centre.

13.8.4. During the construction phase, it is anticipated that the Scheme will provide an estimated average of 138.2 jobs per annum. In addition, there is likely to be an increase in local employment arising from indirect and induced effects of the construction activity. Overall, the generation of direct employment opportunities for the local population is considered to result in a **neutral or slight positive** effect on the Wokingham economy. Gains in employment have the potential to also result in beneficial health outcomes and as a result during construction it is anticipated that there will be a **neutral or slight positive** albeit only short-medium term, on human health.

13.8.5. The Scheme will result in the loss, by direct land take, of 1.9 ha BMV agricultural land and therefore does not exceed the 20 ha threshold, above which consultation is required with Natural England. The loss, by direct land take, of lower quality agricultural land (i.e. agricultural land classified as ALC grade 3b, 4 and 5 and other (unclassified land) as a result of the Scheme will be 24 ha. Therefore, as a result of the construction and operation of the Scheme, there is likely to be a direct, permanent, long-term effect of **slight adverse** in relation to loss of best and most versatile agricultural land.

13.8.6. As a result of the construction of the Scheme, the businesses that currently operate in the agricultural holdings within the study area will either cease or will incur a reduction in income as a result of the construction and operation of the Scheme. Furthermore, access to severed agricultural land will be available only via public highways. Following mitigation measures, **large adverse** effect to agricultural holdings as a result of the construction of the Scheme. This effect will be permanent in nature and will remain during the operational phase of the Scheme. However, the use of land at Woods Farm will be will cease in order to accommodate the construction of the Scheme, but the land is likely to be unaffected during the operational phase of the Scheme.

13.8.7. During the construction phase, there is potential for a reduction in amenity value to the users of the PROW intersected by the Scheme as a result of the construction works. Following the implementation of mitigation, such as liaison with the local community and clear signage to alternative routes, the residual effects to non-motorised users are considered to be **moderate adverse**, albeit only

temporary. The subsequent impact on health of temporary closures of PRoWs are considered to have a **medium** effect on health due to the temporary reduction in access and amenity, the magnitude of impact is considered to be **minor**.

13.8.8. During the operational phase, the new segregated shared-use cycleway and footpath has the potential to improve the safety of non-motorised users; and will separate motorised and non-motorised users, reducing overtaking and improving amenity. The new segregated shared-use cycleway and footpath will connect with existing footpaths, providing community routes, improving safety and opportunities for the improvement of the health and wellbeing of the local population. Therefore, the amenity value for non-motorised users of the Scheme during operation is considered to result in a **moderate positive** effect. It is anticipated that the Scheme will also result in an indirect, long-term **moderate positive** effect on human health.

13.8.9. Health has the potential to be adversely impacted by noise and vibration, particularly at two properties located within close proximity to the Scheme. However, as a whole, the Study Area population is unlikely to experience significant effects, and therefore, it is anticipated that changes to noise during the construction period are likely to have a **negligible** impact on human health outcomes in the population.

13.8.10. Overall impacts on health during the construction period (drawing upon impacts on PRoW access, noise and vibration and employment), has potential to have a **slight adverse** impact on human health receptors, prior to the implementation of mitigation measures.

13.8.11. During the operational phase, a number of residential and non-residential noise sensitive receptors are likely to experience an **adverse significant effect** as a result of noise from the Scheme. It is therefore, anticipated that there will be a **moderate adverse effect** on human health outcomes in relation to noise.

13.8.12. Prior to the implementation of mitigation measures, it is anticipated that there will be a long-term **slight adverse** effect on human health (not significant), during the operational phase. Following mitigation, impacts on human health impacts on health during operation are considered to be low, and the magnitude of change is negligible. Therefore, there is likely to be a direct, permanent, long-term **neutral** residual effect on human health (**not significant**).

13.8.13. A summary of effects is provided in Table 13-18.

Table 13-18 - Summary of Effects Table for People and Communities

Description of effect	Receptor	Significance and nature of effect prior to mitigation or enhancement	Summary of mitigation or enhancement	Significance and nature of effect following mitigation or enhancement (residual effect)
Construction				
Construction employment opportunities	Economic receptors in Wokingham (local level)	Neutral or slight beneficial D / T / MT / + / ○ or ●	None	Neutral or slight beneficial D / T / MT / + / ○ or ●
Loss of best and most versatile agricultural land	Best and most versatile agricultural land	Slight or moderate adverse D / P / LT / - / ● or ●	No mitigation measures are proposed for the loss of best and most versatile agricultural land.	Slight adverse D / P / LT / - / ●
Land-take from agricultural holdings	Land owners	Large or very large adverse D / P / LT / - / ● or ●	Financial compensation. Measures to minimise disruption to day to day agricultural operations.	Large adverse D / P / LT / - / ●

Change in amenity value for users of PRoWs and non-designated public routes	Users of the PRoW and non-designated public routes	Moderate adverse D / T / MT / - / 🟡	Implementation of a CEMP covering the following: The public should be informed of the nature, timing and duration of construction works by newsletters and liaison with Parish Council where deemed necessary; For health and safety reasons, public access will be redirected away from construction areas wherever possible; and Visual effects to be reduced as far as possible through a 'tidy construction' site policy and implementation of long term landscaping as soon as possible.	Moderate adverse D / T / MT / - / 🟡
Human Health	Residential properties, PRoW users and those visiting community and recreational facilities in close proximity to the Scheme	Slight or moderate D / T / ST / - / 🟢 or 🟡	Best practice construction methods would be used to minimise noise levels, impacts on PRoWs as outlined in the CEMP. Monitoring would be established to ensure acceptable working limits are adhered to, using best practice methods to be included in the CEMP. No further mitigation above what is stated in Chapter 11 Noise and Vibration is recommended.	Neutral D / T / MT / - / ○

Operation				
Loss of best and most versatile agricultural land	Best and most versatile agricultural land	Slight or moderate adverse D / P / LT / - / 🟢 or 🟡	No mitigation measures are proposed for the loss of best and most versatile agricultural land.	Slight adverse D / P / LT / - / 🟢
Land-take from agricultural holdings	Land owners	Large or very large adverse D / P / LT / - / 🟠 or 🔴	Financial compensation. Measures to minimise disruption to day to day agricultural operations.	Large adverse D / P / LT / - / 🟠
Change in amenity value for users of PRoWs and non-designated public routes	Users of the PRoW and non-designated public routes	Moderate beneficial D / P / LT / + / 🟡	Clear directions for access routes will be provided in order to maintain safe public access.	Moderate beneficial D / P / LT / + / 🟡
Human Health	Residential properties, PRoW users and those visiting community and recreational facilities in close proximity to the Scheme	Slight adverse D / P / LT / - / 🟢	No further mitigation beyond what is outlined above (non-motorised users) and within Chapter 11 Noise and Vibration, is recommended.	Neutral D / P / LT / ○

Key to table:

🔴 Very Large significance, 🟠 Large significance, 🟡 Moderate significance, 🟢 Slight significance, ○ Neutral significance

+ / - = Beneficial or Adverse P / T = Permanent or Temporary, D / I = Direct or Indirect, ST / MT / LT = Short Term, Medium Term or Long Term

N/A = Not Applicable

14. CLIMATE

14.1. INTRODUCTION

14.1.1. This Chapter reports the outcome of the assessment of likely significant effects arising from the Scheme (described in Chapter 3 The Scheme) on the climate, based on data available at the present stage of the assessment process. This assessment consists of two parts:

- The potential effects of the Scheme on the climate, in particular the magnitude and mitigation of greenhouse gases (GHGs) emitted during construction and operation; and
- The resilience of the Scheme to impacts of climate change.

14.1.2. The Chapter describes the assessment methodology, the baseline conditions, any primary and tertiary mitigation adopted for the purposes of the assessment, a summary of the likely significant effects taking into account national legislation, the further mitigation measures required to prevent, reduce or offset any significant adverse effects, and the likely residual effects after these measures have been employed.

14.1.3. This Chapter (and its associated figures and appendices) is intended to be read as part of the wider ES, with particular reference to Chapter 3 The Scheme, Chapter 4 Air Quality, Chapter 12 Materials and Waste, Chapter 15 Cumulative Effects and the Climate Resilience Baseline (Appendix 14.1).

14.2. LEGISLATIVE FRAMEWORK, POLICY AND GUIDANCE

14.2.1. The legislative framework applicable to climate is summarised as follows:

LEGISLATION

Directive 2014/52/EU (the EIA directive)

14.2.2. Directive 2014/52/EU[46] on the assessment of the effects of certain public and private projects on the environment (the EIA Directive) provides the overarching legislative framework for assessing the significance of impacts and effects from development projects on the environment.

14.2.3. The Directive requires EIAs to identify, describe and assess the direct and indirect significant effects of a project on climate (Article 3). It also stipulates that the information to be included within the ES should include “the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change” (Annex IV). The requirement to consider the effects of a project in relation to climate has resulted from the 2014 amendment to the EIA Directive (2014/52). The Directive has been fully transposed into UK law in the Infrastructure Planning (Environmental Impact Assessment) Regulations and came into force in the UK on 16 May 2017.

[46] Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effect of certain public and private projects on the environment (2014). Available at [Link].

UK Climate Change Act

14.2.4. The Climate Change Act 2008[47] established a legal requirement for an 80% reduction in the GHG emissions of the UK economy by 2050 in comparison to the 1990 baseline. The Act also created the Committee on Climate Change, with a responsibility for:

- Setting five-year carbon budgets, covering successive periods of emissions reduction to 2050;
- Advising and scrutinising the UK Government's associated climate change adaptation programmes; and
- Producing a national adaptation plan for the UK Government to implement.

14.2.5. Article 2 of The Climate Change Act 2008 (2050 Target Amendment) Order 2019[48] amends Section 1 of the Climate Change Act so that the target is for 'net zero' GHG emissions in 2050.

POLICY

National planning policy framework (NPPF)

14.2.6. According to Chapter 14 of the NPPF 2019[5], the planning system should "support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change" and "shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure".

National policy statement for national networks

14.2.7. The National Policy Statement for National Networks[49] has also been used as this is considered to be appropriate guidance for the Scheme.

14.2.8. The chapters of the National Policy Statement for National Networks relevant to climate change mitigation and adaptation for the Scheme are shown in Table 14-1.

Table 14-1 - National Policy Statement for National Networks (2014)

CHAPTER 3: WIDER GOVERNMENT POLICY ON NATIONAL NETWORKS	
Emissions	Identifies that the transport sector will play an important part in meeting the Government's carbon targets. It is acknowledged that technologies, fuels, and promoting lower carbon transport choices will make the biggest reductions and that (comparatively) the likely impact from road development is "very small".
Technology	Sets out how the use of innovative technologies has the potential to improve the way we travel while "reducing costs and environmental impacts".

[47] HM Government, Climate Change Act 2008. Available at [Link].

[48] HM Government, Climate Change Act 2008. Available at [Link].

[49] Department for Transport (DfT) (2014). National Policy Statement for National Networks, Department for Transport. December 2014. Available at [Link].

Sustainable transport	Describes how carbon impacts can be reduced by promoting "sustainable modes of transport and high-quality cycling and walking environments" which are "essential to reducing carbon emissions from transport".
CHAPTER 4: ASSESSMENT PRINCIPLES	
Environment impact assessment	This section sets out the fact that all proposals are subject to the EIA Directive (2011/92/EU) which requires "an environmental impact assessment to identify, describe and assess effects on…air, climate…and the interactions between them".
CHAPTER 5: GENERIC IMPACTS	
Carbon emissions	Sets out Government policy on climate change and outlines the importance of reducing carbon emissions, stating that the Government has a legally binding commitment to reduce GHG emissions by "at least 80% by 2050" and to conform to carbon budgets outlined in the "Carbon Plan 2011". The policy states that "Carbon impacts will be considered as part of the appraisal of scheme options (in the business case), prior to the submission of an application" and that "any Environmental Statement will need to describe an assessment of any likely significant climate factors in accordance with the requirements in the EIA Directive". However, it goes on to say that "It is very unlikely that the impact of a road project will, in isolation, affect the ability of Government to meet its carbon reduction plan targets. However, road projects applicants should provide evidence of the carbon impact of the project and an assessment against the Government's carbon budgets". The policy also states that "an increase in carbon emissions is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the proposed Project are so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets".
Biodiversity & Conservation	The Biodiversity 2020 Strategy's aims need to be "viewed in the context of the challenge of climate change: failure to address this challenge will result in significant impacts on biodiversity".

Infrastructure carbon review

14.2.9. In 2013, the UK government published the Infrastructure Carbon Review[50], aiming to "release the value of lower carbon solutions and to make carbon reduction part of the DNA of infrastructure in the UK". Major infrastructure owners, operators and developers were invited to endorse, become signatories and make commitments under the review. The review provided increase emphasis on 'capital carbon' (GHG emissions associated with raw materials, activities and transport for construction, repairs, replacement, refurbishment and deconstruction of infrastructure) while acknowledging that 'operational carbon' (associated with energy consumption for the operation and use of infrastructure) will continue to dominate overall emissions to 2050 and beyond. The

[50] Infrastructure Carbon Review, HM Treasury, November 2013. Available at [Link].

Infrastructure Carbon Review highlighted the importance of assessing GHG emissions early in the lifecycle of an infrastructure scheme when there is the greatest carbon reduction potential. It is for this reason that the 'carbon footprint' of the Scheme is assessed and targeted through the Project Control Framework (PCF) Stages. The Infrastructure Carbon Review also led to the publication of a publicly available specification on infrastructure carbon management (PAS2080:2016)[51].

LOCAL POLICY

West Berkshire Local Transport Plan

14.2.10. The West Berkshire Local Transport Plan[52] includes strategic environmental assessment to ensure the area has a resilient, safe and sustainable transport with limited congestion. The plan aims to improve and enhance infrastructure in the area providing alternatives to the private car.

Wokingham Borough Core Strategy 2010-2026

14.2.11. The WBC Core Strategy (2010)[1] sets out where and how development will take place until 2026. It aims to "promote sustainable use and disposal of resources while mitigating and adapting to climate change." It states that developers and applicants must "take account of the effects of climate change" and prepare a "detailed site-based Flood Risk Assessment or Drainage Impact Assessment depending upon the location and scale of development… consider[ing] the possible change in flood risk over the lifetime of the development due to climate change," and "fund effective SUDS maintenance regimes." New development should be designed to be "resilient to flooding as appropriate".

Sustainable Environment Strategy 2010-2020

14.2.12. The WBC Sustainable Environmental Strategy Strategic Priority 4.3, "Prepare", aims to "plan for the likely impacts of climate change and managing limited resources efficiently." This involves preparing for "wetter winters and hotter, drier summers", "high future water stress" and "extreme weather events, particularly flooding." Water usage should be reduced to 135 litres per person per day by 2020. Managing disease risks and limiting exposure to UV and extreme heat are also mentioned.

GUIDANCE

14.2.13. The following guidance documents have been used during the preparation of this Chapter*:*

- Greenhouse Gases:
  - IEMA EIA Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significant (IEMA), 2017[53];
  - TAG Unit A3 Environmental Impact Appraisal – Chapter 4 Greenhouse Gases;
  - PAS 2080: 2016 Carbon Management in Infrastructure; and

[51] Carbon Management in Infrastructure, British Standards Institution, May 2016.

[52] West Berkshire Local Transport Plan 2011 - 2026. Available at [Link].

[53] IEMA EIA Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance, 2017. Available at [Link].

- RICS Profession Standards and Guidance, UK: Whole life carbon assessment for the built environment, 2017[54].

- Resilience:
  - IEMA (2015) EIA Guide to Climate Change Resilience and Adaptation[55];
  - European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into EIA[56];
  - European Commission (2016) Climate change and major projects[57]; and
  - European Commission Non-Paper Guidelines for Project Managers: Making vulnerable investments climate resilient[58].

14.3. GREENHOUSE GAS ASSESSMENT [S]

14.3.1. This section is superseded by Chapter 8 of the ESA 2020.

[54] RICS professional standards and guidance, UK: Whole life carbon assessment for the built environment, 1st Edition, November 2017. Available at [Link].

[55] IEMA (2015) EIA Guide to Climate Change Resilience and Adaptation. Available at [Link].

[56] European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into EIA. Available at [Link].

[57] European Commission (2013) Climate change and major projects. Available at [Link].

[58] European Commission Non-Paper Guidelines for Project Managers: Making vulnerable investments climate resilience. Available at [Link].

14.4. CLIMATE RESILIENCE ASSESSMENT

METHODOLOGY AND SIGNIFICANCE CRITERIA

Consultation

14.4.1. No statutory consultation has been undertaken to date for the completion of this chapter, as information is publicly available or provided through discussions with the design team and/or client as appropriate.

Scope of assessment

14.4.2. Drainage aspects (such as surface water drainage systems; cross-culverts; road-edge drainage; attenuation; outfalls; and drainage ditches) are not assessed within this chapter, but have been assessed in Chapter 10 Road Drainage and the Water Environment.

14.4.3. Incident management does not form part of the climate vulnerability assessment.

14.4.4. Table 14-10 shows the climate variables which have been scoped into the assessment and are therefore considered in this assessment (indicated with a tick in the table).

Table 14-10 - Climate variables and climate related risks

Sector	Variable																			
	Sea				Precipitation				Temperature			Wind		Relative Humidity		Water quality and soils				
	Sea level rise	Storm surge and tide	Surface temperature	Currents and waves	Changes in seasonal average	Drought	Extreme precipitation events	Snow	Changes in seasonal average	Extreme temperature events	Solar radiation	Gales and extreme wind events	Storms (lightning, hail)	Changes in annual average	Evaporation	Soil moisture	Salinity/pH	Runoff	Soil stability
Road transport					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓
Bridges						✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			✓
Pedestrian and cycle					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓

EXTENT OF THE STUDY AREA

14.4.5. The Study Area for the climate change vulnerability assessment is related to the impact of climate on the Scheme. The Study Area is the Site, as defined in Chapter 2 Approach to the Assessment. The choice of Study Area relates to the choice of climate projections on which to base the resilience assessment, in terms of spatial and temporal resolution, as well as choice of emissions scenario. The choice of climate projections has been informed by IEMA guidance[59].

14.4.6. The projections that are used to define the future baseline (against which vulnerability of the Scheme to climate change is assessed) are UK Climate Projections 2018 (UKCP18) projections[60] for the 2080s for the South East England region for a high emissions scenario (RCP8.5).

14.4.7. The climate projections described above will be used as the basis of the vulnerability assessment and will provide the backdrop against which potential impacts are identified.

METHOD OF BASELINE DATA COLLATION

Desk study

14.4.8. The baseline data collected and presented in this climate vulnerability assessment was sourced through desktop research.

14.4.9. The baseline conditions described for this assessment are derived from the following sources:

- Current climate:
  - State of the UK Climate (2017)[61];
  - Climate of the UK: observed trends[62]; and
  - Met Office Regional Climate Profile for Southern England[63].
- Projected climate:
  - UKCP18 climate projections[169];
  - UKCP09 climate projections[169]; and
  - Relevant peer reviewed papers.

ASSESSMENT METHODOLOGY

14.4.10. The climate resilience assessment assesses the resilience of the Scheme to the change in the climate variables as detailed in Table 14-10.

14.4.11. A precautionary approach has been adopted by selecting the RCP8.5 emissions scenario and a long-term timeslice (2080s).

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[59] IEMA 2015. IEMA Environmental Impact Assessment Guide to Climate Change and Resilience. Available at [Link].

[60] Met Office UK Climate Projections. Available at [Link].

[61] Met Office 2017. State of the UK Climate 2017. Available at [Link].

[62] Jenkins, G.J., Perry, M.C., and Prior, M.J. (2008). The climate of the United Kingdom and recent trends. Met Office Hadley Centre, Exeter, UK.

[63] Met Office. Southern England. Available at [Link].

14.4.12. The four-step approach is outlined below.

Step 1: identify potential impacts

14.4.13. During this stage, potential impacts of climate change on project receptors are identified with consideration given to the impact of extreme weather and changes in climate on the Scheme over its lifetime. These have been outlined in Table 14-14 for construction impacts and Table 14-15 for operational impacts

Step 2: identify embedded mitigation

14.4.14. The risk assessment to be undertaken in Step 3 is informed by embedded mitigation that has been committed to through the design process, construction phase planning or mitigation identified by other environmental disciplines.

14.4.15. In this step, consultation with designers and environmental discipline leads is undertaken to identify embedded mitigation measures.

Step 3: risk assessment

14.4.16. The risk assessment is undertaken by considering the consequence and the likelihood of climate hazards to the Scheme elements. The significance of climate impacts depends on the likelihood of them occurring and the consequence if they do occur, taking into account embedded mitigation measures. Consequence and Likelihood have been qualitatively assessed using the descriptions in Table 14-11 and Table 14-12.

Table 14-11 - Qualitative description of consequence

Consequence of impact	Description
Negligible	No infrastructure damage, minimal adverse effects on health, safety and the environment or financial loss. Little change to service and disruption lasting less than 1 day.
Minor adverse	Localised infrastructure disruption or loss of service. No permanent damage, minor restoration work required: disruption lasting less than 1 day. Small financial losses and/or slight adverse health or environmental effects.
Moderate adverse	Limited infrastructure damage and loss of service with damage recoverable by maintenance or minor repair. Disruption lasting more than 1 day but less than 1 week. Moderate financial losses. Adverse effects on health and/or the environment.
Large adverse	Extensive infrastructure damage and severe loss of service. Disruption lasting more than 1 week. Early renewal of infrastructure 50-90%. Permanent physical injuries and/or fatalities. Major financial loss. Significant effect on the environment, requiring remediation.
Very large adverse	Permanent damage and complete loss of service. Disruption lasting more than 1 week. Early renewal of infrastructure >90%. Severe health effects and/or fatalities. Extreme financial loss (>90%). Very significant loss to the environment requiring remediation and restoration.

Table 14-12 - Qualitative description of likelihood

Measure of likelihood	Description
Very high	The event occurs multiple times during the lifetime of the project e.g. approximately annually.
High	The event occurs several times during the lifetime of the project e.g. approximately once every five years.
Medium	The event occurs limited times during the lifetime of the project e.g. approximately once every 15 years.
Low	The event occurs occasionally during the lifetime of the project e.g. once in 60 years.
Very low	The event may occur once during the lifetime of the project.

14.4.17. The 'consequence' and 'likelihood' are combined using the matrix shown in Table 14-13 to determine whether the risk is considered significant (S) or not significant (NS) in terms of the EIA.

Table 14-13 - Risk rating matrix

Likelihood of hazard occurring	Consequence of hazard occurring				
	Negligible	**Minor adverse**	**Moderate adverse**	**Large adverse**	**Very large adverse**
Very high	NS	S	S	S	S
High	NS	S	S	S	S
Medium	NS	NS	S	S	S
Low	NS	NS	NS	S	S
Very low	NS	NS	NS	NS	S

BASELINE CONDITIONS

14.4.18. The baseline section contains information about current and projected climate variables. The assessment of climate risks includes risks associated with changes in seasonal or annual average temperature and rainfall as well as risks associated with extreme events (e.g. intense rainfall events or heatwaves). This is best practice in climate risk assessment and is consistent with IEMA EIA Guidance on Climate Change Resilience and Adaptation[64].

[64] IEMA 2015. IEMA Environmental Impact Assessment Guide to Climate Change and Resilience. Available at [Link].

14.4.19. The current climate change baseline is described in Appendix 14.1.

FUTURE BASELINE

14.4.20. The future climate change baseline is described in Appendix 14.1.

SENSITIVE RECEPTORS

14.4.21. The receptors considered in the climate resilience assessment are the following:

Construction phase

- Site compounds;
- Machinery and plant;
- Materials, including topsoil which has been stripped and stored; and
- Staff.

Operational phase

- Built structures (including bridges);
- Geotechnics (including earthworks, embankments and foundations);
- Hard surfaces (including pavements and the road surface);
- Roadside infrastructure (including signs and signals);
- Soft estate (including vegetation); and
- Scheme users (motorists, cyclists, pedestrians and equestrians).

RELEVANT ELEMENTS OF THE SCHEME AND ESTABLISHING THE PRE-MITIGATION SCENARIO

Potential climate- and weather-related impacts affecting the Scheme receptors over the construction and operational phases associated with change in the climate variables identified in Table 14-10 are described in Table 14-14 and Table 14-15. Unless stated, the impacts identified in the table below are expected to impact the whole Scheme.

Table 14-14 - Potential climate impacts (construction) on scheme receptors

Climate variable		Projected change	Site compounds	Machinery and plant	Materials	Staff
Precipitation	Annual average rainfall	Increase in winter rainfall	Flooding of construction works and compound Waterlogging of excavations Increased runoff and silt	N/A	Excessive moisture in materials	N/A
		Decrease in summer rainfall	Increase in dust Soil erosion	N/A	Enhanced reactions when cement stabilising and drying of concrete	N/A
	Extreme rainfall	Increase in magnitude and frequency of extreme rainfall events	Flooding of construction works and compounds Waterlogging of excavations Overwhelming of drains Soil erosion and sedimentation	N/A	Destabilisation of material, including topsoil and spoil heaps	Unsafe working conditions
	Drought	Increased risk of drought	Increase in dust Soil erosion Fire	N/A	Enhanced reactions when cement stabilising and drying of concrete	N/A

Climate variable		Projected change	Site compounds	Machinery and plant	Materials	Staff
Temperature	Annual average temperature	Increase in annual and seasonal average temperature	Increased vegetation growth	N/A	N/A	Unsafe working conditions (heatstroke)
	Extreme temperature	Increase in magnitude of extreme temperature	Fire	Overheating of machinery	Deformation of materials	Unsafe working conditions (heatstroke)
	Solar radiation	Increase in solar radiation	N/A	N/A	Deterioration of materials	Unsafe working conditions (high UV levels)
Wind	Gales	Increase in mean wind speed and more frequent gusts	Increase in dust	High winds may affect operation of cranes	Loss of materials	Unsafe working conditions - working at height, increased dust, reduced visibility
	Storms	Increase in frequency of storms	Flooding of construction works and compounds	N/A	Destabilisation of material, including topsoil and spoil heaps	Unsafe working conditions, particularly for working at height
Humidity	Annual average	Decrease in summer humidity, increase in winter humidity	N/A	Fog in winter may affect operation of plant	Deterioration of materials	Unsafe working conditions – low visibility
Soils	Soil moisture	Decrease in soil moisture in summer	Soil erosion and sedimentation Increase in dust Waterlogging of site	N/A	Loss of materials	Unsafe working conditions - increased dust, reduced visibility
	Soil stability	Decrease in soil stability	Subsidence	N/A	Collapse of spoil heaps	Unsafe working conditions

Table 14-15 - Potential climate impacts (operation) on scheme receptors

Climate variable		Projected change	Built structures	Geotechnics	Road infrastructure	Hard surfaces	Soft estate	Scheme users
Precipitation	Annual average rainfall	Increase in winter rainfall	Flooding of structures Increase in scour of structures	Destabilisation of embankments	Flooding of infrastructure and associated control equipment	Flooding of paved surfaces Damage to paved surfaces	Mobilisation of pollutants in the soil	Delays and disruption Increase risk of slips, trips and falls (operators)
		Decrease in summer rainfall	Drying out and cracking of substrate	Drying out and cracking of soils leading to destabilisation	Increase in dust	Drying out and cracking of substrate leading to pavement damage	Drying out of vegetation leading to soil erosion	Unfavourable environment for users - Increase in dust Unsafe driving conditions
	Extreme rainfall	Increase in magnitude and frequency of extreme rainfall events	Surface water flooding Increase of scour	Destabilisation of embankments	Surface water flooding	Surface water flooding Damage to paved surfaces Drainage overwhelmed	Flooding of unpaved shoulders Mobilisation of pollutants in soil / ground	Delays and disruption due to flooding Increase risk of slips, trips and falls (operators) Difficult driving conditions
	Drought	Increased risk of drought	Drying out and cracking of substrate	Drying out and cracking of soils leading to destabilisation	Increase in dust	Drying out and cracking of substrate leading	Drying out of vegetation leading to soil erosion	Unfavourable environment for users -

Climate variable		Projected change	Built structures	Geotechnics	Road infrastructure	Hard surfaces	Soft estate	Scheme users
						to pavement damage	Fire	increase in dust Unsafe driving conditions
Temperature	Annual average temperature	Increase in annual and seasonal average temperature	Increased thermal expansion of bridge joints	Drying out and cracking of soils leading to destabilisation	N/A	Drying out and cracking of substrate leading to pavement damage	Longer growing season – more vigorous vegetation growth	Unfavourable environment for users
	Extreme temperature	Increase in magnitude of extreme temperature	Increased thermal expansion of bridge joints	Drying out and cracking of soils leading to destabilisation	Overheating of electronic and control equipment	Deformation of paved surfaces	Loss of vegetation	Uncomfortable travelling conditions Unsafe working conditions for staff
	Solar radiation	Increase in solar radiation	N/A	N/A	Deterioration in materials e.g. fading, brittleness	N/A	N/A	Unsafe working conditions for staff (high levels of UV)
Wind	Gales	Increase in mean wind speed and more frequent gusts	Increased wind loading on structures	N/A	Wind driven rain infiltration into materials causing more rapid deterioration	N/A	N/A	Difficult driving conditions Unsafe working conditions

Climate variable		Projected change	Built structures	Geotechnics	Road infrastructure	Hard surfaces	Soft estate	Scheme users
					Damage to signage			
	Storms	Increase in frequency of storms	N/A	N/A	Increased risk of lightning strike affecting control equipment Damage to signage Loss of power	N/A	N/A	Difficult driving conditions
Humidity	Annual average	Decrease in summer humidity, increase in winter humidity	N/A	N/A	Increased mould growth during winter leading repainting / greater maintenance requirements	N/A	N/A	Difficult driving conditions
Soils	Soil moisture	Decrease in soil moisture in summer	N/A	Drying out and cracking of soils leading to destabilisation	N/A	Drying out and cracking of substrate leading to pavement damage	N/A	
	Soil stability	Decrease in soil stability	Subsidence and destabilisation of bridge foundations	Subsidence and destabilisation	N/A	Destabilisation of soils leading to pavement damage	N/A	

ASSESSMENT OF EFFECTS, MITIGATION AND RESIDUAL EFFECTS

Embedded mitigation

14.4.22. This section outlines adaption measures integrated into the design in response to a preliminary risk assessment (not presented in this Chapter) to reduce the vulnerability of the Scheme to the climate- and weather-related hazards identified in Table 14-14 and Table 14-15. The adaption measures are presented in Table 14-16.

Table 14-16 - Identified risks and planned adaptation measures for the Scheme

Climate variable	Project change	Adaptation measure(s)
Precipitation	**Changes in annual average – drier summers** (applicable to road)	▪ Drought-resistant vegetation. ▪ Water efficiency measures. ▪ Dust management plan. ▪ Concrete and reinforcement of structures.
	Changes in annual average – wetter winters (applicable to road)	▪ Appropriate drainage design, including SuDS to reduce surface water flooding. ▪ Designed to the 1 in 100 Annual Exceedance Probability plus 40% climate change scenario. ▪ General inspections and Principal inspections of each structure would be carried out at minimum 2 and 6-year intervals respectively. The inspections would determine condition of structures and identify any potential maintenance requirements.
	Drought (applicable to road, cycle and footway)	▪ Steel structures designed to meet the limit stipulated in the standard at a maximum design temperature of 35°C and a minimum temperature of -35°C. ▪ Dust management plan. ▪ Use vegetation to bind soil and prevent desiccation (specify drought-resistant species)
	Extreme rainfall events (applicable to road, bridge, cycle and footway)	▪ Appropriate drainage design, including SuDS to reduce surface water flooding. ▪ Designed to the 1 in 100 Annual Exceedance Probability plus 40% climate change scenario. ▪ Structure drainage systems would have maintenance access built in to ensure blockages are reduced as much as practically possible to eliminate build-up of water. ▪ All structures have been designed with their own system of waterproofing. ▪ Aluminium members would be protected by galvanised coatings.
Temperature	**Extreme temperature events** (applicable to road, bridge, cycle and footway)	▪ Steel structures designed to meet the limit stipulated in the standard at a maximum design temperature of 35°C. ▪ Design bridge expansion joints to take account of higher temperature.

Climate variable	Project change	Adaptation measure(s)
		▪ More regular maintenance and preventative action
Wind	**Gales and high winds** (applicable to road, bridge)	▪ More regular maintenance and preventative action
Soils	**Soil moisture** (applicable to road, cycle and footway)	▪ Use vegetation to bind soil and prevent desiccation (specify drought-resistant species).
	Soil stability (applicable to road, bridge, cycle and footway)	▪ Use vegetation to bind soil and prevent desiccation (specify drought-resistant species).

Residual effects

14.4.23. Following the implementation of the adaption measures outlined in Table 14-16, the significance of residual risks is evaluated and presented in Table 14-17.

Table 14-17 - Significance evaluation

Component	Description of risk		Consequence	Likelihood	Significance
	Hazard	Risk			
Structural stability	**Changes in annual average – drier summers** (applicable to road, cycle and footway)	Failure of earthworks due to desiccation	Large adverse	Very Low	NS
		Shrinking and cracking of soils leading to subsidence	Minor adverse	Medium	NS
	Changes in annual average – wetter winters (applicable to road, cycle and footway)	Flooding and damage due to increased run-off	Minor adverse	Medium	NS
		Soil softening and erosion leading to collapse and settlement of soil structures	Moderate adverse	Low	NS
		Increased slope instability	Moderate adverse	Low	NS
		Soil saturation	Minor adverse	Low	NS
	Drought	Failure of earthworks due to desiccation,	Large adverse	Very Low	NS

Component	Description of risk		Consequence	Likelihood	Significance
	Hazard	Risk			
	(applicable to road, cycle and footway)	particularly impacting the road structure			
		Shrinking and cracking of soils leading to subsidence	Moderate adverse	Low	NS
	Extreme rainfall events (applicable to road, bridges, cycle and footway)	Damage to road, roundabouts bridges, cycle and footway structures due to flooding and increased run-off	Minor adverse	Medium	NS
		Soil saturation and water damage	Minor adverse	Low	NS
		Increased slope instability	Moderate adverse	Low	NS
		Erosion, silting and sedimentation	Minor adverse	Medium	NS
		Softening of subsurface materials	Moderate adverse	Low	NS
	Extreme temperature events (applicable to road, bridges, cycle and footway)	Cracking and expansion, particularly impacting road, bridge, cycle and footway structures	Moderate adverse	Low	NS
		Increased risk of erosion	Minor adverse	Medium	NS
	Gales and high winds (applicable to road and bridges)	Risk of damage to road and bridge structures and foundations	Moderate adverse	Low	NS
		Erosion of banks and exposed surfaces	Minor adverse	Medium	NS

Component	Description of risk		Consequence	Likelihood	Significance
	Hazard	Risk			
	Soil moisture (applicable to road, cycle and footway)	Shrinking and cracking of soils leading to subsidence	Moderate adverse	Low	NS
		Soil softening and erosion leading to collapse and settlement of structures	Moderate adverse	Low	NS
		Increased slope instability	Moderate adverse	Low	NS
		Soil saturation	Minor adverse	Low	NS
	Soil stability (applicable to road, bridges, cycle and footway)	Subsidence impacting road, bridge, cycle and footway structures	Moderate adverse	Low	NS
		Failure of earthworks due to desiccation	Large adverse	Very Low	NS
		Greater rates of soil erosion	Minor adverse	Medium	NS
Structural robustness	**Changes in annual average – drier summers** (applicable to road)	Shrinking and cracking of soils leading to cracking of road surface	Moderate adverse	Low	NS
	Changes in annual average – wetter winters (applicable to road)	Deformation of rigid structures	Moderate adverse	Low	NS
		Damage to unpaved shoulders	Minor adverse	Medium	NS
	Drought (applicable to road, cycle and footway)	Drying out of construction materials and cracking	Minor adverse	Medium	NS
		Deformation of rigid structures,	Moderate adverse	Low	NS

Component	Description of risk		Consequence	Likelihood	Significance
	Hazard	Risk			
		particularly road, cycle and footway			
	Extreme rainfall events (applicable to road, bridge, cycle and footway)	Deformation of rigid structures	Moderate adverse	Low	NS
		Damage to unpaved shoulders	Minor adverse	Medium	NS
	Extreme temperature events (applicable to road, bridge, cycle and footway)	Damage and disruption from fires	Minor adverse	Low	NS
		Deformation of structures and materials	Moderate adverse	Low	NS
	Gales and high winds (applicable to road, bridge)	Damage from high winds and rain-infiltration into surfaces and materials	Minor adverse	Medium	NS
	Soil moisture (applicable to road, cycle and footway)	Cracking of structures	Moderate adverse	Low	NS
Ancillary equipment	**Changes in annual average – drier summers** (applicable to road)	Damage and disruption from fires	Minor adverse	Low	NS
		Die-back of vegetation	Minor adverse	Medium	NS
	Changes in annual average – wetter winters (applicable to road)	Blockage / overwhelming of drains and associated assets	Minor adverse	Low	NS
		Water accumulation in low spots and/or on impermeable surfaces	Minor adverse	Medium	NS

Component	Description of risk		Consequence	Likelihood	Significance
	Hazard	Risk			
		Excessive vegetation growth	Minor adverse	Medium	NS
		Softening of subsurface materials	Minor adverse	Low	NS
	Drought (applicable to road, cycle and footway)	Damage and disruption from fires	Minor adverse	Low	NS
		Die-back of vegetation	Minor adverse	Medium	NS
	Extreme rainfall events (applicable to road, bridges, cycle and footway)	Drains and culverts becoming overwhelmed	Minor adverse	Medium	NS
		Blockages of drainage assets	Minor adverse	Low	NS
	Extreme temperature events (applicable to road, bridges, cycle and footway)	Overheating of equipment, including during construction and operation (e.g. electronic signage)	Minor adverse	Low	NS
	Gales and high winds (applicable to road, bridge) Damage from high winds and rain-infiltration into surfaces and materials	Damage from high winds and rain-infiltration into surfaces and materials	Minor adverse	Medium	NS
		Damage to signage and site structures	Minor adverse	Medium	NS
	Soil moisture (applicable to road, cycle and footway)	Shrinking and cracking of soils leading to subsidence	Moderate adverse	Low	NS
	Soil stability (applicable to road, bridges,	Increased rate of deterioration, potentially leading to need	Minor adverse	Medium	NS

Component	Description of risk		Consequence	Likelihood	Significance
	Hazard	Risk			
	cycle and footway)	for early replacement			
Material durability	**Changes in annual average – drier summers** (applicable to road)	Enhanced reactions when cement stabilising and drying of concrete	Minor beneficial	Medium	Not applicable, beneficial effect
	Changes in annual average – wetter winters (applicable to road)	Greater mobilisation of pollutants in the soil/ground	Minor adverse	Low	NS
		More rapid erosion of materials	Minor adverse	Medium	NS
	Drought (applicable to road, cycle and footway)	Enhanced reactions when cement stabilising and drying of concrete	Minor beneficial	Medium	Not applicable, beneficial effect
		Increased rate of deterioration of materials, potentially leading to need for early replacement	Minor adverse	Medium	NS
		Shrinking and cracking	Minor adverse	Medium	NS
	Extreme rainfall events (applicable to road, bridges, cycle and footway)	Accelerated deterioration of materials	Minor adverse	Medium	NS
		Greater mobilisation of pollutants in soil/ground causing premature deterioration of materials	Minor adverse	Low	NS
		Enhanced reactions when	Minor beneficial	Medium	Not applicable, beneficial effect

Component	Description of risk		Consequence	Likelihood	Significance
	Hazard	Risk			
	Extreme temperature events (applicable to road, bridges, cycle and footway)	cement is stabilising and drying of concrete			
		UV degradation of exposed equipment e.g. cabling	Minor adverse	Low	NS
	Gales and high winds (applicable to road and bridges)	Increased rate of deterioration of materials	Minor adverse	Medium	NS
	Soil moisture (applicable to road, cycle and footway)	Greater mobilisation of pollutants in the soil/ground	Minor adverse	Low	NS
	Soil stability (applicable to road, bridges, cycle and footway)	Increased rate of deterioration of materials	Minor adverse	Low	NS
Site contents and business continuity	**Changes in annual average – drier summers** (applicable to road) **Changes in annual average – drier summers** (applicable to road)	Increased dust and windborne materials affecting site construction, operation and maintenance, including silting and sedimentation	Minor adverse	Medium	NS
		Increased dust and windborne materials affecting site construction, operation and maintenance, including silting and sedimentation	Minor adverse	Medium	NS
	Changes in annual	Increasingly difficult working	Minor adverse	Medium	NS

Component	Description of risk		Consequence	Likelihood	Significance
	Hazard	Risk			
	average – wetter winters (applicable to road)	conditions, including time available to undertake works			
		Reduced opportunities for maintenance	Minor adverse	Medium	NS
	Extreme rainfall events (applicable to road, bridges, cycle and footway)	Water accumulation causing disruption to construction and operation	Minor adverse	Medium	NS
		Stopping of services due to asset failure	Moderate adverse	Low	NS
		Scour of embankments	Moderate adverse	Low	NS
		Traffic disruption and congestion	Minor adverse	Medium	NS
	Extreme temperature events (applicable to road, bridges, cycle and footway)	Reduced working periods and delays	Minor adverse	Medium	NS
		Risks to stored equipment, including waste	Minor adverse	Medium	NS
		Reduced opportunities for maintenance	Minor adverse	Medium	NS
		Operational disruption	Minor adverse	Medium	NS
	Gales and high winds (applicable to road and bridges)	Reduced opportunities for maintenance	Minor adverse	Medium	NS
		Operational disruption	Minor adverse	Medium	NS
	Soil moisture (applicable to road, cycle and footway)	Increased maintenance costs and risks to operation	Minor adverse	Low	NS

Component	Description of risk		Consequence	Likelihood	Significance
	Hazard	Risk			
	Soil stability (applicable to road, bridges, cycle and footway)	Increased maintenance costs and risks to operation	Minor adverse	Low	NS
H&S of users (operators and customers)	**Changes in annual average – drier summers** (applicable to road	Fewer construction days lost to heavy rainfall	Minor beneficial	Medium	Not applicable, beneficial effect
		More dust	Minor adverse	Medium	NS
	Changes in annual average – wetter winters (applicable to road)	Movement of debris causing slip, trip and fall hazards	Minor adverse	Medium	NS
		Increased risk of aquaplaning	Minor adverse	Medium	NS
		Construction days lost to heavy rainfall	Minor adverse	Medium	NS
	Drought (applicable to road, cycle and footway)	More dust	Minor adverse	Medium	NS
		Evaporation of construction water	Minor adverse	Medium	NS
	Extreme rainfall events (applicable to road, bridges, cycle and footway)	Difficult working conditions	Minor adverse	Medium	NS
		Movement of debris causing slip, trip and fall hazards	Minor adverse	Medium	NS
		Health and safety risks to road users	Minor adverse	Medium	NS
	Extreme temperature events	Difficult working conditions	Minor adverse	Medium	NS
		Increased fire risk	Minor adverse	Low	NS

Component	Description of risk		Consequence	Likelihood	Significance
	Hazard	Risk			
	(applicable to road, bridges, cycle and footway)	Hot surfaces which may cause injury	Minor adverse	Low	NS
		Health and safety risks to road users	Minor adverse	Medium	NS
	Gales and high winds (applicable to road and bridges)	Difficult working conditions	Minor adverse	Medium	NS
		Health and safety risks to road users, particularly high sided vehicles	Minor adverse	Medium	NS
	Soil moisture (applicable to road, cycle and footway)	Difficult working conditions	Minor adverse	Low	NS
		Risk from slope instability	Moderate adverse	Low	NS
	Soil stability (applicable to road, bridges, cycle and footway)	Movement of debris causing slip, trip and fall hazards	Minor adverse	Medium	NS

Recommendations for further mitigation

14.4.24. Adaptation and resilience to climate and weather-related risks should be considered periodically through maintenance regimes. For example, regular inspections are advised for structures to mitigate the effects of excessive vegetation growth and deterioration of materials. Inspections should also occur following extreme weather events (e.g. flood, storm surge, drought, heat wave) to monitor any damage and implement appropriate mitigation as necessary.

14.4.25. In addition, it is advised that a list of weather related incidents (for example, road surface deformations, snow and ice etc.) is established and maintained to assist in identifying thresholds which, when exceeded, require maintenance.

14.4.26. Given the uncertainties inherent in climate science and the associated projections used in this assessment, it is recommended that the effects considered in this assessment are monitored throughout the detailed design, construction and operational phases of the Scheme. The monitoring should be undertaken to assess the appropriateness of the mitigation measures and be revisited when new or updated information becomes available.

LIMITATIONS AND ASSUMPTIONS

14.4.27. The assessment undertaken here provides a broad indication of the potential impacts of climate change on the Scheme based on professional judgement.

14.4.28. There is currently no agreed methodology that should be applied for assessing the vulnerability of major schemes, including road infrastructure, under the EIA regulations. Therefore, an approach has been developed and applied in this assessment based on existing best practice and professional judgement.

14.4.29. The UKCP18 projections have been used to infer future changes in a range of climate variables that may impact the vulnerability of the Scheme to climate change. In any case, it is noteworthy that projections are based on a range of hypothetical emissions scenarios. Our future emissions of GHGs, and resulting pathway, is uncertain.

14.4.30. The determination of significance has been undertaken under the assumption that robust design standards will be adhered to where detailed information is unavailable.

SUMMARY

14.4.31. The climate resilience assessment has identified no significant risks to the Scheme. However, given the uncertainties inherent in climate science and projections, the hazards identified should be monitored throughout the construction and operational phases of the Scheme. The monitoring would be undertaken to assess the effectiveness of the mitigation measures.

14.4.32. In addition, a list of extreme weather-related incidents (for example, road surface deformations, snow and ice etc.) should be maintained by WBC to assist in identifying thresholds which, when exceeded, require maintenance. Inspections should be carried out following an intense rainfall event or heatwave to monitor any damage and implement appropriate mitigation as necessary.

15. CUMULATIVE EFFECTS

15.1. INTRODUCTION

15.1.1. This Chapter reports the likely significant cumulative environmental effects associated with the Scheme. Cumulative effects can result from the effects of reasonably foreseeable human induced changes within a specific geographical area and over a certain period of time, and can be both direct and indirect. An assessment of the significance of cumulative effects needs to be undertaken in the context of characteristics of the existing environment. The cumulative effects assessment aims to ensure that all the developments considered are:

- Mutually compatible;
- Consistent with good practice guidance; and
- Remain within the environmental capacity of the area.

15.1.2. Paragraph 5(e) in Schedule 4 of the EIA Regulations[4] requires that the cumulative effects of a development are considered within an EIA, namely:

"*The description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development, resulting from: a) the existence of the development; b) the use of natural resources; c) the emission of pollutants, the creation of nuisances and the elimination of waste; and the description by the applicant or appellant of the forecasting methods used to assess the effects on the environment*."

15.1.3. The Guidance on Environmental Impact Assessment[65] also refers to the requirement for cumulative effects to be assessed. As such, the following types of cumulative effects are assessed within this Chapter:

- Effect Interactions: The interaction of environmental effects of the Scheme affecting the same receptor either within the Site or in the local area (e.g. increased recreational access to and light spill into a woodland area); and
- In-combination Effects: The combination of environmental effects of the Scheme with committed projects affecting the same receptor (e.g. disturbance to breeding birds from new developments in an area). A committed development is defined as development for which consent has been granted.

15.1.4. The in-combination effects of the Scheme in conjunction with the committed developments listed and described below are assessed within the cumulative effects section of each technical topic covered in the ES (Chapters 4-14). The Effect interactions are described within this chapter.

[65] Ministry of Housing, Communities and Local Government (2019). Environmental Impact Assessment. Available at [Link].

15.2. SCOPE AND METHODOLOGY

15.2.1. The approach to identify the likely in-combination and cumulative effects arising from the Scheme and interaction with other schemes will be based upon guidance contained within DMRB Volume 11 Section 2 Part 5[66] and consider the nature of the affected receptor and of the impact concerned.

15.2.2. The criteria for determining significance of cumulative effects is outlined in Table 2-3 (refer to Chapter 2 Approach to the Assessment), and will be used alongside professional judgement to determine the significance of cumulative effects.

15.2.3. The approach adopted for the assessment of cumulative effects is based on professional experience, the types of receptors being assessed, the nature of the development and the identified committed developments. The assessment methodology comprises:

- A desk based assessment of effect interaction based on predicted changes in baseline conditions at specific sensitive receptors, informed by the results of assessment presented within the technical chapters of this ES (Chapters 4-14); and
- A desk based assessment of each technical topic in turn, generally qualitative, using professional expertise to make a judgement as to the likely significance of changes in baseline conditions in the area surrounding the Site arising from the Scheme together with committed developments which have been identified in consultation with Wokingham Borough Council (WBC), the Highway Planning Authority, through the scoping process (see Volume 3 Appendices 2.1 and 2.2).

IN-COMBINATION EFFECTS

15.2.4. The purpose of the 'in-combination effects' assessment is to consider the potential for interactions between the Scheme and other nearby 'committed development'. 'Committed development' includes all land with current planning permission and land which is allocated in adopted local development plans for development (particularly residential development).

15.2.5. The assessment of in-combination effects considers change from baseline conditions at sensitive receptors due to the Scheme in combination with other committed development.

15.2.6. The DMRB guidance suggests cumulative effects should be considered for all 'reasonably foreseeable' projects and to encompass all schemes which are 'committed', including (but not necessarily limited to):

(1) Trunk Road projects which have been confirmed (i.e. gone through the statutory processes) in proximity to the Scheme;
(2) Development projects with valid planning permissions as granted by the Local Planning Authority, and for which formal EIA is a requirement or for which non-statutory environmental impact assessment has been undertaken.

15.2.7. In accordance with the above definition, local planning applications that are deemed not to have the potential to interact with the Scheme and have no requirement for EIA or non-statutory environmental assessment are excluded. Only proposals that can reasonably be expected to proceed (i.e. those identified on WBC's and Bracknell Forest Council's planning application registers) have been taken

[66] Highways England. Volume 11: Section 2 Part 5: Assessment and Management of Environmental Effects. Available at [Link].

into account within the in-combination effects. Developments which have already been implemented (such as Montague Park) are consequently excluded and therefore assessed as part of the baseline.

15.2.8. The EIA Scoping Report (Volume 3 Appendix 2-1) submitted to WBC in 2017 did not identify any specific developments to be considered in the assessment of cumulative effects.

15.2.9. Consequently, a review of the available information on WBC and Bracknell Forest Council's online register of planning applications was undertaken within the following wards which are within 1km of the Scheme:

- Wards reviewed within WBC:
  - Westcott;
  - Evendons;
  - Wokingham Without;
  - Embrook;
  - Finchampstead North;
  - Hurst; and
  - Norreys.
- Wards reviewed within Bracknell Forest Council:
  - Great Hollands North;
  - Great Hollands South; and
  - Binfield with Warfield.

15.2.10. The identified committed developments are shown within Table 15-1. Further details regarding the identified committed developments, including the locations of the committed developments can be found at the WBC[67] and Bracknell Forest Council's[68] Planning Portals.

15.2.11. The outcomes of the in-combination effects assessment are reported in the relevant technical chapters of the ES (Chapters 4-14).

[67] Wokingham Borough Council. Planning Portal. Available at [Link].

[68] Bracknell Forest Council. Planning Portal. Available at [Link].

Table 15-1 – Committed Developments

Application number and Status (as of July 2019)	Scheme	Type of development/ Proposal	Location	Proximity to Site
Wokingham Borough Council				
191068 Awaiting decision	Mixed-use Development within South Wokingham Strategic Development Location (SDL).	Hybrid planning application (part outline/part detailed) comprising an outline application with all matters reserved except principal means of access to the highways, for a mixed use development of up to 1,495 dwellings, a two form entry primary school, local centre (A1, A2, A3, A4, A5 and D1 including community building D1/D2), public open space, play areas and associated infrastructure and landscaping; and a full application for the proposed Suitable Alternative Natural Greenspace (SANG), associated landscaping and temporary car park.	Land at phase 2b of the South Wokingham SDL	Adjacent
190900 Awaiting decision		Full planning application for the proposed change of use of land from nil use to D2 for proposed Suitable Alternative Greenspace (SANG) with associated landscaping.	Land to the South of Anne's Manor	
190914 Awaiting decision		Outline application with all matters reserved except for principal means of access to the highways, for up to 215 dwellings, public open space, play areas,	Land at phase 2a of the South Wokingham SDL	

Application number and Status (as of July 2019)	Scheme	Type of development/ Proposal	Location	Proximity to Site
		associated infrastructure and landscaping.		
192325 Awaiting decision	Mixed-use Development within South Wokingham Strategic Development Location (SDL).	Hybrid planning application comprising Outline application with all matters reserved for up to 190 dwellings, public open space and associated infrastructure and Full application for the Suitable Alternative Natural GreenSpace (SANG) at land South east of Finchampstead Road, South Wokingham SDL.	Land South east of Finchampstead Road	Adjacent
172934 Permission granted (19th February 2018)	Eastern Gateway – land at Waterloo Road	Construction of a 420m carriageway road (with a total width of 15m) and accompanying footways and cycleways. This route will connect the Montague Park residential development (William Heelas Way) to a new junction with Waterloo Road, a 4-arm roundabout, via a new bridge over the Reading-Waterloo Railway Line.	Land at Waterloo Road, Wokingham	Adjacent
143213 Permission granted (23rd July 2019)	Land west of Waterloo road (west of the Eastern Gateway Development)	Full planning application for formation of a new attenuation pond on the western side of the Eastern Gateway Development (Planning permission 172934) and the formation of a drainage ditch.	Land to the Eastern Gateway West of Waterloo Road	Adjacent

Application number and Status (as of July 2019)	Scheme	Type of development/ Proposal	Location	Proximity to Site
A planning application has not been submitted for this development. However, is included as part of the South West Distributor Road SWDR, which is referenced as the 'south Wokingham relief road' in Item 7 of Core Strategy policy CP21[1].	Western Gateway	Western Gateway is expected to involve a Series of online improvements to the section of roadway between the existing Tesco roundabout and the roundabout between Molly Millars Lane and Finchampstead Road.	Finchampstead Road, Wokingham	Adjacent
190673 Permission granted (14th June 2019)	Luckley House School New Sports Pitch	Full application for the proposed construction of a reduced size multi-use synthetic turf sports pitch with a 3m - 4.5m high fence and 6no 12m column floodlights.	Luckley House School, Luckley Road, Wokingham, RG40 3EU	650m
140863 Under construction (northern distributor road only)	Mixed-use development and Eastern section of the full Northern Distributor Road	Hybrid Application for Outline and Full Permission. Outline Application (All Matters Reserved) for a development comprising of up to 300 residential dwellings, up to 800 square metres of restaurant/public house (use class A3 and A4), public open space and landscaping, allotments, acoustic mitigation comprising an earth bund and acoustic fence, surface water drainage, foul water pumping stations, land reserved for park and ride and a Suitable Alternative Natural Greenspaces (SANGs) at Stokes Farm (7.91 ha). Full	Keephatch Beech Land To (Rear/North Of 398) London Road Wokingham	900m

Application number and Status (as of July 2019)	Scheme	Type of development/ Proposal	Location	Proximity to Site
		Permission for the Eastern section of the full Northern Distributor Road including proposed junctions with London Road and Binfield Road.		
143213 and O/2014/2242 (reserved matters applications including 162140) Under construction	Land at Matthewsgreen Farm	Outline application and associated reserved matters applications for a phased development of approximately 760 dwellings, including 60 units of assisted living homes / older person accommodation, a local centre (including retail), a primary school, community facilities and associated areas of open space and drainage/ attenuation, parking etc. Accesses from Twyford Road, Matthewsgreen Road and Toutley Road. Development would also incorporate the demolition of outdoor storage, buildings in employment use and 2 x dwellings.	Land at Matthewsgreen Farm, Matthewsgreen Road, Wokingham, RG411JX	1.7km
161839 Under construction (mixed use development and SANG)	Mixed-use development and a section of the Northern Distributor Road (NDR) and associated infrastructure.	Hybrid Application Outline Application: A section of the Northern Distributor Road (NDR) and associated infrastructure, including a cycle and footway. (All Matters Reserved) Full Application: The erection of 128 dwellings and associated areas of Suitable Alternative Natural Green Space (SANG), open spaces and drainage/attenuation. Two accesses from Bell Foundry Lane and a temporary cycle	Bell Farm, Bell Foundry Lane, Wokingham, RG405QF	2km

Application number and Status (as of July 2019)	Scheme	Type of development/ Proposal	Location	Proximity to Site
		and footway. Demolition of existing farm buildings and one dwelling.		
191010 Awaiting decision	Section of the Northern Distributor Road through Ashridge Farm	Full application for a section of the Northern Distributor Road through Ashridge Farm, linking Bell Foundry Lane to the west with Kentwood Farm to the east, incorporating a new priority junction on Bell Foundry Lane and associated works including a shared footway/cycleway.	Land at and adjacent to Ashridge Farm, Wokingham	2km
162964 Under construction	Land west of Old Wokingham Road	Erection of 116 dwellings with associated access, highway and drainage works.	Land West of Old Wokingham Road, Pinewood, Wokingham	2.6km
190198 Permission granted (13th May 2019)	Western section of the Northern Distributor Road	Full application for the construction of the western section of the Northern Distributor Road linking Toutley Road in the north and the A329 Reading Road in the south west, incorporating a railway bridge, a new junction on Toutley Road / Old Forest Road, and associated works including crossings, drainage, flood risk improvement, shared footway/cycleway, SANG replacement and laying out of new public open space.	Toutley Road / Old Forest Road Winnersh Berkshire	3.1km

Application number and Status (as of July 2019)	Scheme	Type of development/ Proposal	Location	Proximity to Site
180760 Permission granted (17th October 2018)	Winnersh Relief Road (Phase 2) Winnersh	Full planning application for the proposed development of relief road, connecting B3030 King Street Lane / Winnersh Relief Road Phase 1 to the A329 Reading Road including two new roundabout junctions on A329 Reading Road, two new minor residential access roads and associated works including traffic signals, crossings, drainage, footways and cycleways (road forms Phase 2 of Winnersh Relief Road and part of the western section of the Northern Distributor Road).	Winnersh Relief Road, Winnersh	3.4km
Bracknell Forest Council				
15/00872/REM and 14/00315/OUT Under construction	Land at Amen Corner development	Outline planning and subsequent submission of details of layout, scale, appearance and landscaping for the erection of 377 dwellings and the laying out of open space and Suitable Alternative Natural Greenspace (SANG) pursuant to outline planning permission 14/00315/OUT	Land At Amen Corner, North of London Road, Binfield, Bracknell, Berkshire	1.2km
17/01091/FUL Awaiting decision	New Sports Centre and associated works	Full planning application for the erection of new sports centre with associated car parking, cycle storage and landscaping.	Land South of Allotment Gardens and East Of Downshire Driving	2.2km

Application number and Status (as of July 2019)	Scheme	Type of development/ Proposal	Location	Proximity to Site
			Range, South Road, Wokingham, Berkshire	
163086 Under construction	Re-development of the former Transport Research Laboratory	Re-development to include demolition of existing buildings, erection of up to 1,000 dwellings, neighbourhood centre, primary school, care home, community centre and public open space	TRL Ltd Crowthorne, Nine Mile Ride Berkshire	2.75km
16/00020/FUL and 17/01109/FUL Permission granted (26th February 2018)	Blue Mountain Golf Club and conference centre	Planning permission for up to 400 additional dwellings, a community facility of up to 1,077 m^2, sports provision and open space. And: Full planning permission for an all-through school providing nursery, primary, secondary, post 16 and SEN facilities, 13 ha of Suitable Alternative Natural Greenspace land, two vehicular accesses from Temple Way, a spine road through the development and a school drop-off/SANG car park.	Blue Mountain Gold Club and Conference Centre, Wood Lane, Binfield, Bracknell, Berkshire, RG42 4EX	2.8km

15.2.12. A review of these committed developments was undertaken and only those relevant effects of the respective schemes which have the potential to result in likely significant cumulative effects together with the Scheme have been taken forward for consideration in the assessment for each technical topic. This was determined based on consideration of the following:

- The nature and scale of the committed development;
- The distance of the committed development from the Scheme; and
- The potential for significant residual environmental effects to arise from the committed development (assuming that mitigation measures have been implemented in accordance with good practice and legal requirements).

15.2.13. The potential effects of the in-combination effects of the Scheme in conjunction with the committed developments listed and described above are assessed within the cumulative effects section of each technical topic covered in the ES (Chapters 4-14).

EFFECT INTERACTIONS [S]

15.2.14. This section is superseded by Chapter 11 of the ESA 2020.

15.3. EFFECT INTERACTIONS - SUMMARY AND CONCLUSION [S]

15.3.1. This section is superseded by Chapter 11 of this ESA 2020.

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