A46 Coventry Junctions Upgrade

Walsgrave Junction

Staged Overview of Assessment Report

PCF Stage 2

Appendix

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APPENDIX A
PRELIMINARY SOURCES STUDY REPORT

A46 Coventry Junctions Upgrade (Walsgrave Junction)

Preliminary Sources Study Report
PCF Stage 2

Status: P03 S4

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November 2021

A46 Coventry Junctions Upgrade (Walsgrave)

Preliminary Sources Study Report

Report No: HE604820-ACM-SGT-WAL_SW_000_Z-RP-CE-0001

November 2021

Revision	Current Status	Date	Prepared By	Reviewed By	Approved By
P01	S4	11/10/2021	H Shaw	D Chan R Eaton	M de Kretser
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National Highways
2 Colmore Square
38 Colmore Circus
Birmingham
B4 6BN

AECOM
Sunley House
4 Bedford Park
Croydon
CR0 2AP

project brief. Similarly, the site visit excluded detailed consideration of the ecological or archaeological aspects of the site, and if such are believed to be of potential significance then it is recommended that specialist advice is sought.

Any risks identified in this Report are perceived risks, based on the information reviewed during the desk study and therefore partially based on conjecture from available information. The study is limited by the non-intrusive nature of the work and actual risks can only be assessed following a physical investigation of the site.

The opinions expressed in this Report concerning any contamination found and the risks arising there from are based on current good practice simple statistical assessment and comparison with available soil guideline values, AECOM generic assessment criteria and other guidance values.

It should be noted that the effects of ground and water borne contamination on the environment are constantly under review, and authoritative guidance values are potentially subject to change. The conclusions presented herein are based on the guidance values available at the time this Report was prepared, however, no liability by AECOM can be accepted for the retrospective effects of any changes or amendments to these values.

The opinions expressed in this report and the comments and recommendations given are based on a desk assessment of readily available information and an initial site reconnaissance by an AECOM Engineer. At this stage intrusive investigations have yet to be undertaken at site to establish actual ground and groundwater conditions and to provide data for an assessment of the geo-environmental status of the site.

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Glossary of Terms and Abbreviations

Abbreviation	Definition
PSSR	**Preliminary Sources Study Report**
RIS	**Roads Investment Strategy**
PCF	**Project Control Framework**
SOI	**Statement of Intent**
SSSI	**Special Site of Scientific Interest**
BSI	**British Standards Institution**
GISR	**Ground Investigation Scoping Report**
GDMS	**Geotechnical Data Management System**
GAD	**Geotechnical Asset Database**
BGS	**British Geological Society**
NPPF	**National Planning Policy Framework**
CA	**Coal Authority**
UXO	**Unexploded Ordnance**
RoFRAS	**Risk of Flooding from Rivers and Sea**
EA	**Environmental Agency**
DrWPA	**Drinking Water Pollution Area**
SPZ	**Source Protection Zone**
SPT	**Standard Penetration Test**

Figures and Tables

Figures

Tables

1 Introduction

1.1 Scheme Overview and Options Appraisal

AECOM were commissioned by National Highways to produce a Preliminary Sources Study Report (PSSR) for the 'A46 Coventry Junctions Upgrade' scheme. The scheme forms part of the Roads Investment Strategy (RIS), which outlines the roads that are to be developed by National Highways over the RIS period, 2015 to 2021.

The A46 is a strategic link between M1 J21 in the east Midlands to M40 J15 in the West Midlands. It connects Coventry and Warwickshire to the wider motorway system and strategic road network. It is reported that the A46 Coventry Eastern Bypass experiences congestion issues and poor journey reliability.
It is proposed to carry out improvement works of the A46 to contribute to economic growth, improve the operation and efficiency of the existing transport network, support employment and residential development opportunities and improve connectivity and community cohesion.

Prior to this study, four options have been considered pertaining to the scope of works: Options 6, 7, 8 and 11. Following a Solution Review and Validation Event held in May 2021, Options 6, 7 and 8 were determined non-viable. Option 11 was then developed and reviewed at a second Solution Review and Validation Event in September 2021 and was agreed as a viable solution to take forward.

Option 11 is a fully grade separate dumbbell junction approximately 0.8km to the north of the existing roundabout location. The existing A46 mainline is realigned and the creation of four new slip roads and an overbridge is required. A new B4082 connector road (adjacent to the A46) links the western dumbbell of the junction to the existing section of the B4082.The geometry of this option allows for a 50mph speed limit on the mainline dual carriageway.

The Project Control Framework (PCF) Stage 2 design has been frozen to facilitate modelling, assessment and public consultation. Feedback from the non-statutory Public Consultation planned in Spring 2022 will be considered in making the Preferred Route Announcement and subsequent design developments in future PCF stages.

1.2 Limits of Site Area

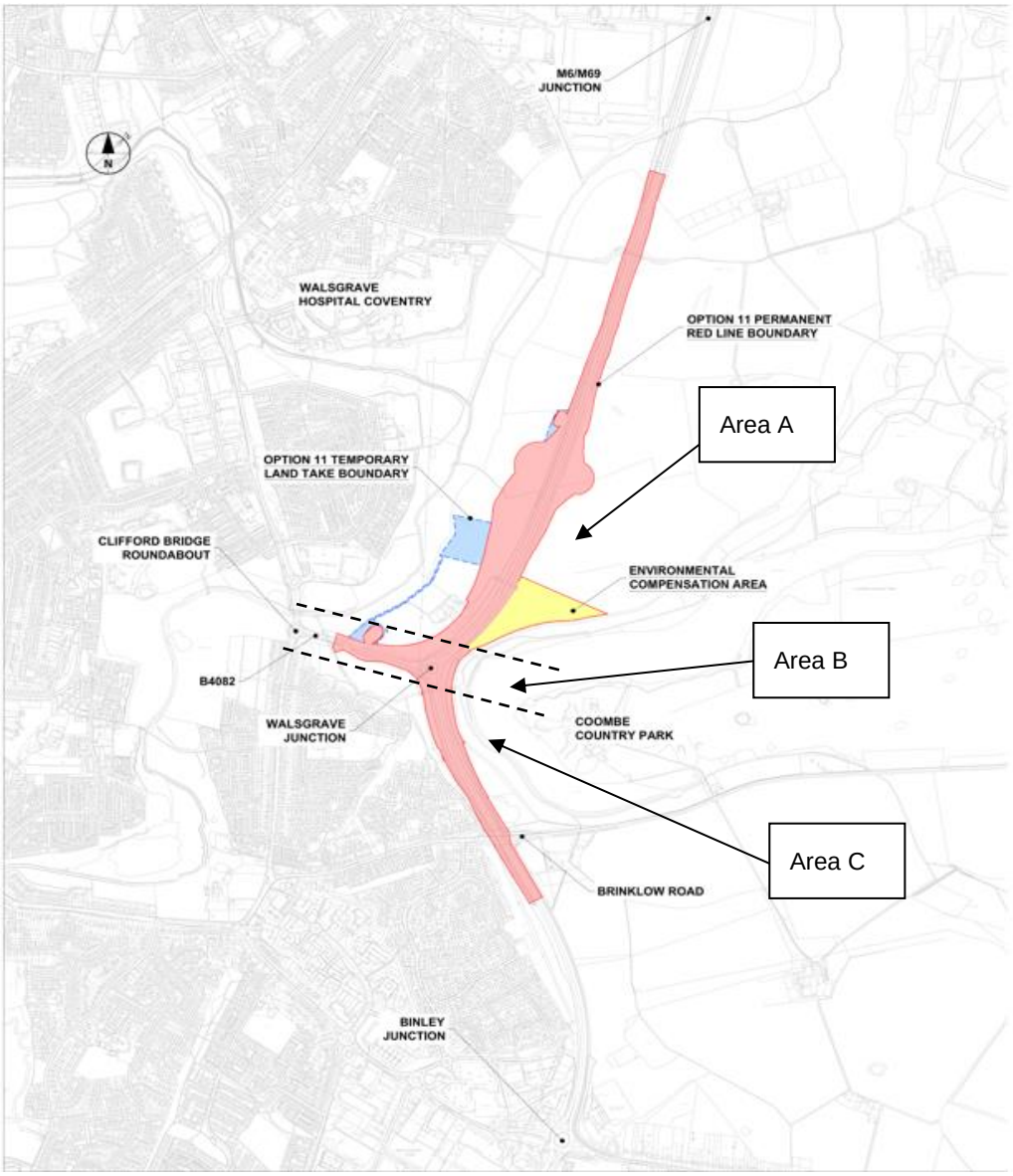
The approximate extents of the site area can be found on Figure 1 below.

Figure 1 shows the site area covers an approximate 2.5 km section of the A46 which passes from E439087, N281000 (north) to E438570, N278723 (south). In the central part of the site is Walsgrave junction, linking the A46 to the B4082 which trends east to west. The site area also encompasses some of the B4082 which extends west to E438040, N279396.

The Scheme Extents drawing (HE604820-ACM-HGN-WAL_SW_OP11_Z-DR-CH-0102) indicating the scheme Chainage is provided in Appendix A. This Chainage system has been adopted as a location reference throughout this report.

In order to better assess the ground conditions at different parts of the site, the site has been divided into three areas A, B and C based on the layout of the highway. These areas are annotated on Figure 1.

Figure 1- Site Location Plan



1.3 Statement of Intent

A geotechnical Statement of Intent (SOI) was produced by AECOM in August 2018 during PCF Stage 1 in accordance with HD22/08. The scheme was classified as Geotechnical Category 2. It was anticipated that any ground investigation undertaken in the vicinity of Walsgrave junction may include locations outside the National Highways highway boundary. Therefore, consultation with landowners in this regard is imperative. Also, Walsgrave roundabout is positioned adjacent to Coombe Pool and the associated Site of Scientific Interest (SSSI). Specialist consultation and permissions must be sought prior to design of any ground investigation and site works.

It should be noted that HD22/08 has been revised to CD 622. This revision has not changed the objectives or validity of the existing SOI however it is worth noting that as the project has progressed, options have been further developed and refined which has altered some previously described in the SOI. This includes the development of Option 11 based on the Option 6 fully grade separated solution in the SOI. Option 11 was developed following the Solutions Review and Validation event mentioned previously. Options 7 and 8 are based on Option 4 in the SOI which is a left in left out solution.

1.4 Scope and Objectives

1.4.1 Scheme

This is a PSSR produced in accordance with CD622 'Managing Geotechnical Risk'. The report presents a ground, groundwater and environmental model for the site and discusses the geotechnical and geo-environmental risks and suitability of the proposed options.

This report has also been prepared in general accordance with the procedures described in the Model Procedures for the Land contamination risk management, (LCRM) (Defra/EA, 2021), BS 5930:1999 (as amended) Code of Practice for Site Investigations (BSI), and BS 10175:2011 (as amended) Investigation of Potentially Contaminated Sites – Code of Practice (BSI).

1.4.2 Geo-environmental

The Geo-environmental assessment objectives of the scheme are to summarise a brief Conceptual Site Model for the prevailing ground conditions, including a limited preliminary qualitative evaluation of potential land contamination risks to support the determination of recommendations for further investigative work to reduce the uncertainty of the Conceptual Site Model.

1.4.3 Geotechnical

This PSSR collates the available information and assesses the sufficiency of that information for the design of the current scheme. It has been identified that additional information will be required, and the appropriate ground investigation proposal will be set out in the Ground Investigation Scope Report (GISR).

The key geotechnical objective of the scheme is to provide grade separation of the A46 and the B4082 and removal of original junction roundabout. This will likely be achieved by utilising a combination of earthworks and retaining structures, the proposed extents of which are detailed in the general arrangement drawings in Appendix A. The preliminary dimensions of earthworks are discussed in Section 6 of this report.

A further objective is to manage geotechnical risk associated with the ground conditions and grade-separation works to a sufficient level.

1.5 Geotechnical Asset Database

The National Highways Geotechnical Data Management System (GDMS) Geotechnical Asset Database (GAD) records the details of historic earthwork inspections within the site. For most assets, the last inspection was a Principal Inspection carried out in March 2017 and all earthworks were classed as 'approved' and 'in date' requiring a follow-up inspection in February 2026. For asset no. 50554 an inspection was carried out in February 2021 so will require further inspection in February 2030. This information is summarised in Table 1 below for each individual earthwork.

Table 1- Earthworks Inspections Record

Area	Geotechnical Asset ID	Type[1]	Date of Last Inspection	Start grid ref (m)	End Grid ref (m)	Observations
A	50553	Cut	22/03/2017	E438990 N280694	E438590 N279593	Drainage
A	50554	Cut	26/02/2021	E438591 N279580	E438346 N279315	Drainage at base heavy silted and covered in vegetation. Animal burrowing.
A	50537	Cut	15/02/2017	E438856 N280199	E439010 N280690	-
A	50535	Cut	10/03/2017	E438625 N279537	E438805 N279898	Drainage
A	50536	Grade	16/02/2017	E438748 N279885	E438878 N280200	Drainage
A/B	50534	Bund	16/02/2017	E438395 N279227	E438607 N279569	-
B	50561	Grade	18/04/2017	E438340 N279309	E438337 N279284	Vegetation
C	50555	Bund	16/02/2017	E438345 N279273	E438569 N278724	Marshy, High Moisture Content, Drainage
C	3298	Bund	10/03/2017	E438423 N279220	E438591 N278748	Subsidence

Notes:
1. Emb=embankment, Cut=cutting, Bund=bund, Grade=At Grade

The earthwork defects observed during inspections are summarised in Table 2 below. A feature class has been assigned to each inspection denoting the state of the defect and a feature grade has been assigned indicating the recommended geotechnical intervention. The full detail of feature grade and feature class can be found in CS 641.

Table 2- GDMS Earthworks Defects

Area	Defect ID	Date of Last Inspection	Feature Class	Feature Grade	Description
A	50554_644103	26/02/2021	2 (likely defect)	2 (preventative intervention can be required)	Large burrows at mid slope (Badger sets). Burrows appear to be recent and show no sign of slope deformation.
C	3298_477886	22/03/2011	3 (area of repair)	1 (intervention not required)	Subsidence within carriageway post remediation with new surfacing, due to underlying Made Ground. No subsidence apparent on reinspection on 03/2011.

In May 2021 the Highways Agency Geotechnical Data Management (HA GDMS) database upgraded to the Geotechnical Data Management Database (GDMS). The defect shown in the table below was included on HA GDMS but not on GDMS.

Table 3- HA GDMS Earthwork Defects

Area	Defect ID	Date of Last Inspection	Feature Class	Feature Grade	Description
C	3298_477885	10/03/2017	1D (minor defect)	3 (remedial or preventative intervention can be required)	Subsidence hole in drainage at base of slope due to erosion.

1.6 Previous Geotechnical Studies

Previous geotechnical studies within the scheme extents have been obtained from GDMS, Table 4 lists the sources of information used.

Table 4- Previous Geotechnical Studies

Scheme Title	GDMS ID	Report Title	Produced by	Date	Description
A46 Coventry Eastern Bypass	17881	Geotechnical Desk Study	Warwickshire County Council	January 1980	Desk study of A46 between M6/M69 interchange and Tollbar End roundabout on A45 in southwest Coventry
A46 Coventry Eastern Bypass	17870	Geotechnical Report	Ove Arup & Partners	May 1984	Volume 1: Introduction & Ground Conditions Volume 2: Design of Earthworks Volume 3: Design of Foundations for Structures
A46 Coventry Eastern Bypass	33	Geotechnical Interpretive Report	Arup	June 1986	Volume 1: Introduction & Ground Conditions Volume 2: Design of Earthworks Volume 2A: Design of Earthworks Volume 3: Design of Foundations for Structures Volume 3A: Design of Foundations for Structures
Area 11 MAC, A46 Brinklow Road	22438	Geotechnical Report	Atkins	January 2004	Contamination Assessment
A46 Coventry Junctions Upgrade	30033	Geotechnical Interpretive Report (GIR)	AECOM	February 2018	GIR Report around Binley Junction (directly south of site)
A46 Coventry Junctions Upgrade – Binley Junction	31351	Geotechnical Design Report	COWI	November 2019	GDR for permanent structures as part of the Binley Junction Works

Scheme Title	GDMS ID	Report Title	Produced by	Date	Description
A46 Coventry Junctions Upgrade – Binley Junction	31350	Ground Investigation Report	COWI	May 2020	As part of A46 Binley Junction Flyover scheme (directly south of site)
A46 Coventry Junctions Upgrade – Binley Junction	32422	Combined Statement of Intent and Geotechnical Design Report	BPS Consulting	April 2021	SOI and GDR for a sewer diversion as part of the Binley Junction works

2 Desk Study Research

2.1 Sources of Information

The general information sources consulted in the preparation of this report are summarised in Table 5 below.

Table 5- Sources of Information

Information type	Source	Comments
Geology	British Geological Survey (BGS) 1:50,000 scale geology map sheet 169 (solid and drift)	Geological Mapping
	BGS Memoir for map sheet 169 (Coventry and Nuneaton)	Regional geology guide
	BGS Geology of Britain Viewer	Includes local sites geology
	BGS Lexicon of Named Rock Units	Typical geology descriptions
	Coal Authority Interactive Map	Coal mining hazards reported in the area
	Groundsure Coal Mining Report	
Geotechnical	National Highways Geotechnical Data Management System (GDMS)	Previous geotechnical reports (see Table 4), earthwork geometry, aerial photography, topographical maps, geology, boreholes, drainage features, environmental data
Groundsure Report	Groundsure Report Package	Geology maps and historic maps, geotechnical and environmental data, coal mining report
Environmental	Environmental Agency website, Historic reports from GDMS.	Landfill mapping and constituents, pollution, flood risk, groundwater designations.
	1st Line Defence Detailed Unexploded Ordnance (UXO) Risk Assessment	Unexploded Ordnance hazards

The desk study research has identified several potential geotechnical hazards with respect to the proposed scheme design. An overlay of this information is presented in the Geohazards Plans (drawing no's HE604820-ACM-HGT-WAL_SW_000Z-DR-CR-001 – 005), provided in Appendix A. This should be considered in conjunction with the relevant sections of this report.

A Coombe Pool Dam Stability Report undertaken by JBA Consulting could not be made available for review at the time of this PSSR.

Review of the Area 9 Geotechnical Asset Management Plan (2021/2022) Section 11 did not include the A46 as an area of high geotechnical risk.

3 Field Studies

3.1 Walkover Survey

3.1.1 Introduction

An inspection of the site and its immediate surroundings was undertaken on 2nd September 2021 by AECOM Engineers. The weather was dry with slight cloud cover and good visibility. The visit included walking the land surrounding the A46 Coventry Eastern Bypass and the B4082, and not along the roads and earthworks due to the need for temporary traffic management if working adjacent to live carriageways and complications with existing traffic management associated with Binley junction works. As a result, the entire site area was not able to be covered. The only area not assessed was the highway itself, although a visual inspection was carried out from a distance from the two bridges crossing the A46. The risk associated with this limitation has been added to the project risk register in Xactium for mitigation within the next stages. It involved a review of the current and recent site activities and focused on the condition of the site and any activities that could cause ground contamination, any pertinent geotechnical features, and any key structures. The key structures identified prior to visiting site included a culvert, indicated to run from Coombe Pool within Coombe Country Park, (which is indicated to include a dam) underneath the A46 and along the southern site boundary in Smite Brook, and a dam. The following sections detail the information gained and observations made during the site visit. The following sections should be read with reference to the Photographic Log included as Appendix B and associated drawings (HE604820-ACM-EGT-WAL_SW_OP11_Z-MP-GS-0001 and HE604820-ACM-EGT-WAL_SW_OP11_Z-MP-GS-0002).

3.1.2 General

The site comprises mainly agricultural land, the A46 Coventry Eastern Bypass and the B4082. At the time of the walkover, the majority of the fields were growing crops; however, some had been recently harvested. The site topography is generally flat ignoring any earthworks. The site location plan is shown on Figure 1 in Section 1.2.

3.1.3 Topography and Ground Surface

The topography of the site excluding earthworks is generally flat. The roads occupying the site include the A46, (see Photo No. 1a, 1b, 15 & 16) the B4082, and two access roads: farmer's access road in the north of the site passing over the A46, and an access road off the northern side of the B4082. Most of the site was covered by vegetation: mainly grass with hedgerows, trees and bushes present around the perimeter. The hardstanding appeared to be in good condition (see Photo No. 2, 22 & 27). At the north of the site, there are embankment earthworks passing through the site for the farm track off Farber Road that passes over the A46 (see Photo No. 2).

Smite Brook is present in the south of the site, indicated to be culverted under the A46 and flowing from Coombe Pool in the east, to Smite Brook in the west. Smite Brook flows adjacent to a field immediately south of the south-western site boundary

and eventually joins the River Sowe, which runs approximately north to south, parallel to the western site boundary.

A very small area of the site (<1%) was covered with fly tipped material, including a sofa, plastic guttering and plasterboard (see Photo No. 28 & 29). This was found on the southern boundary of the B4082 in front of the field access gate. A small pile of material from a bowl like structure was found in a field on the western boundary of the A46 north of Hungerley Hall Farmhouse, comprising concrete and fibreglass or potentially asbestos (see Photo No. 6a & 6b).

3.1.4 Soil and Vegetation

Where exposed, soil appears to be clayey topsoil, predominantly covered in grass or crops (see Photo No. 2 & 21). Grass appears healthy (no dead patches) and there are no areas of standing water. The majority of the fields present at the site are used for growing crops (see Photo No. 8, 9, 10, 14, 17, & 18). Hedgerows line the sides of the A46, with occasional lone semi-mature trees present in eastern fields (see Photo No. 17 & 18). Smaller trees, hedges and bushes are present along field boundaries (see Photo No. 13 & 25).

No invasive species were observed during the walkover.

3.1.5 Surrounding Area

The A46 Coventry Bypass extends to the north, providing access to the M6 (running east to west) or continues north as the M69. Agricultural fields are present to the north-east and an industrial area associated with Walsgrave-on-Sowe located north-west.

East of the site are agricultural fields and Coombe Country Park. Located within Coombe Country Park is Coombe Pool and Coombe Abbey. There are local fishing spots and a heronry within Coombe Country Park. Smite Brook is indicated to join Coombe Pool further east. Woodland surrounds the northern boundary of Coombe Pool.

The residential area of Binley is located south of the site, including a primary school. The River Sowe is located west of the site, flowing approximately north to south; however, is indicated to meander and follow a south-western direction as it progresses south. There is a body of water named Stroke Floods Nature Reserve present south-west of the site, adjacent to the River Sowe. University Hospital Coventry and Warwickshire is located west of the site. An active construction site was also present at the time of the walkover. West of the site is University Hospital Coventry and Warwickshire. An active construction site was present west of the site at the time of the walkover. The city of Coventry is located approximately 3.5 miles west of the site.

4 Site Description

4.1 Topography

In Area A due north of Walsgrave junction, the ground slopes gently falling west from approximately 86 m OD to 75 m OD. Area B is located around the roundabout at Walsgrave junction lying relatively flat and at approximately 75 m OD. Between the southern perimeter of site and Walsgrave junction at Chainage (CH) 800m known as Area C, the A46 lies upon the lower reaches of a gentle slope falling to the south-west. The ground level slopes gently from approximately 80 m OD to 75 m OD.

4.2 Historic Development of the Site Area

The site history has been interpreted from historical maps in the Groundsure report (Appendix C). Findings are summarised in Table 6 below.

Table 6- Historical Map Review

Date	Map Scale	Description
1886	1:10,560	• Generally, the site and surrounding area comprises agricultural land. • The River Sowe runs southwards along the western perimeter of site, from the northern section running under Sowe Bridge and joining Smite Brook in the south west area of site. • Smite brook runs eastwards along the southern perimeter of site through a sluice to Coombe Pool in Area C. • Coombe Pool (current SSSI) is labelled adjacent to the east site perimeter. • Sowe Lane orientated north south through the west of site. • Hungerly Farm is located at the southern section of Area A. • A gravel pit is labelled directly adjacent to the north-eastern site perimeter of Area A. • There is a surface water pond located directly adjacent to the gravel pit (Area A). • A surface water pond is located directly adjacent to Hungerly Hall Farm and a second pond approximately 100m south in Area A. • Two surface water ponds are located in the centre and centre east of site in Area A. • A land drain shown between Coombe Pool and the eastern site perimeter.

Date	Map Scale	Description
1903	1:10,560	• Two unspecified pits located approximately 50m and 75m south west of Hungerley Farm, on the border of Area A and B. • An unspecified pit located at the centre of site on the border between Area A and B.
1912	1:10,560	• A gravel pit labelled at the far southern section of Area C. • A tributary flowing northward to join Smite Brook in Area C.
1926	1:10,560	• Enlargement of gravel pit first shown on 1912 map.
1938	1:10,560	No significant changes.
1955	1:10,560	• Allotment gardens located at the south west area of site, adjacent to Area B and C. • Large unspecified pit located at the far southern section of Area C. • Housing developments along Clifford Bridge Road (former Sowe Lane).
1967	1:10,560	• Enlargement of large unspecified pit along with 2 new adjacent pits.
1973-1974	1:10,000	• Development of housing east of Clifford Bridge Road at the south of site.
1980	1:10,000	• Gravel pits at the south of site in Area C no longer shown.
1991	1:10,000	• Development of A46 and Walsgrave junction including roundabout leading west to a secondary roundabout connecting Clifford Bridge Road. • A bridge crossing the A46 leading from Hungerley Hall Farm at the south section of Area A. • A bridge crossing the A46 at the northern section of Area A. • Weir labelled approximately 100m north of the Sluice.
2001	1:10,000	No significant change.
2010	1:10,000	• Development of housing and roads at the south of site adjacent to Area C.
2020	1:10,000	No significant change.

4.3 As-built Construction Records

Information pertaining to as-built construction has been obtained from GDMS. The A46 was constructed in the mid-1980s (Area 11 MAC Geotechnical Report) and comprises a two lane dual carriageway with central reserve, trending approximately north to south. Walsgrave junction has been constructed in the centre of the site and comprises an at-grade roundabout linking the A46 to the B4082. The B4082 comprises a single lane carriageway trending approximately east to west.

4.3.1 Earthworks

There is an approximate 1.7km long cutting north of Walsgrave junction adjacent to the A46 Northbound from the boundary of Area A and B at Ch900m surpassing Ch2050m at the end of Area A. Geotechnical Asset Database (GAD) measurements indicate that the cutting slopes are approximately 25º dipping to the east, varying in height between approximately 0.8m and 7.2m.

There are two cuttings adjacent to the A46 Southbound in Area A from Ch1200m to Ch1550 and from Ch1550m surpassing Ch2050m north of Area A. GAD indicates the cuttings are between 10º and 25º dipping to the west. The measured height varies between approximately 0.5m and 7.6m.

Generally, the remainder of the A46 site south of Walsgrave junction is a bund front ranging in slope angle from 25º to 40º and heights from approximately 3.5m to 7.6m.

4.3.2 Drainage

Surface water drainage throughout the site has been managed through combined surface and sub-surface filter drains, and pipework drains. Drainage has been constructed along the verges and central reserve of the A46, and within Walsgrave junction. An assessment of the drainage condition was not carried out within the Stage 2 PCF.

4.4 Geology

This section details the anticipated superficial and bedrock geology for the site. This information has been interpreted from the British Geological Survey (BGS) source material and Groundsure Report. The proven thickness of superficial deposits on site are discussed in Section 5. Geology mapping with respect to the proposed design is presented in the Geohazards Plan in Appendix A.

Review of GeoIndex and Geological Map 169 shows no geological faults of interest.

4.4.1 Artificial Ground

The Groundsure report indicates deposits of Made Ground in Area C south of Walsgrave junction immediately north of Brinklow Road and a smaller deposit at the northern perimeter of site Area A east of the A46. Made Ground is defined by BGS as ‘artificial deposits, such as embankments and spoil heaps, on the natural ground surface’.

An area of ‘Infilled Ground’ is also labelled at the northern perimeter of Area A, west of the A46. This is described by the BGS as ‘areas where the ground has been cut away then wholly or partially backfilled’.

It is possible that other artificial ground exists within the site footprint at a thickness that has not been mapped.

4.4.2 Superficial Deposits

Superficial deposits are recorded throughout the majority of the site and comprise the following sequence: -

Alluvium

Alluvium underlies the area around B4082 roundabout following the River Sowe northwards along the western perimeter of site and Smite Brooke eastwards, underlying most of Walsgrave junction roundabout up to Coombe Pool in Areas B and C. The BGS Lexicon describes the deposits as ‘yellow or brown silty clay with sand and gravel’ and can contain layers of peat.

River Terrace Deposits

The River Terrace Deposits Sand are recorded in areas across the site; At the east and west of the A46 north of Walsgrave Roundabout and at the south end of site north of the B4082. The BGS Lexicon described the deposits as ‘sand and gravel, locally with lenses of silt, clay or peat’.

Wolston Formation: Bosworth Clay Member

The Bosworth Clay Member is recorded in Area A and to the north of site along the A46. These deposits are described as ‘glacial lacustrine muds’ and form part of the pre-Devensian glacial succession within the Wolston Formation.

Wolston Formation: Thrussington Member – Diamicton

The Thrussington Member is recorded at the north of site under and on the western flank to the A46. Brown or reddish brown pebbly clay.

Baginton Sand and Gravel Formation

The Baginton Sand and Gravel Formation underlies parts of Areas A and C, north of Walsgrave roundabout and at the south of site, over and north of the B4428. The BGS Lexicon describes the deposits as ‘sands and gravels, with lenses of silt and clay’.

4.4.3 Bedrock Deposits

Bedrock deposits anticipated beneath the site are described below.

Mercia Mudstone

The Mercia Mudstone underlies the entirety of the site. It is described by the BGS Lexicon as 'dominantly red, less commonly green-grey, mudstones and subordinate siltstones with thick halite-bearing units in some basinal areas. Thin beds of gypsum/anhydrite widespread; sandstones are also present.'

4.5 Natural Ground Subsidence

The Groundsure Report gives the following risk levels for natural ground subsidence:

- Shrink swell clay: areas of negligible, low and high risk.
- Running sands: areas of negligible, low and high risk.
- Compressible deposits: areas of negligible, very low and high risk.
- Collapsible deposits: areas of negligible and very low risk.
- Landsides: areas of very low and low risk.
- Ground dissolution of soluble rocks: very low risk.

4.6 Ground Workings

The Groundsure Report indicates several historic ground workings within the site extents. These are summarised in Table 7 below.

Table 7- Ground Workings

ID	Description	Grid Reference	Date(s) shown on historic mapping
A	Coombe Woods Sand and gravel pit	E438480, N279020	1912-1959
B	Walsgrave Hill Sand and gravel pit	E439000, N280190	1886-1955
G	Binley Gravel pit	E438400, N278820	1955-1987
F	Refuse Heap	E438420, N278880	1958-1974
O	Unspecified Heap	E438300, N278900	1959-1987
C	Unspecified Pit	E438600, N279620	1886-1955
E	Unspecified Pit	E439390, N279420	1886-1955
3	Cuttings	E438700, N279600	1991
4	Pond	E438200, N279200	1926
D	Unspecified Pit	E438420, N279790	1886-1955
M	Unspecified Pit	E439220, N280500	1950-1903
T	Unspecified Pit	E438880, N280700	1886-1955

4.7 Records of Mines and Mineral Deposits

4.7.1 Planning Policy for Mineral Use

The National Planning Policy Framework (NPFF) for England requires minerals planning authorities to promote sustainable use of mineral resources in their Local Plans. This includes defining mineral safeguard zones to ensure that specific mineral resources of local or national importance are not sterilised by non-mineral development (but not assuming that the identified minerals will be worked). If it is necessary for non-mineral development to take place then the local planning authority should set out policies to encourage the prior extraction of minerals, where practicable and environmentally feasible.

When determining planning applications local planning authorities must ensure that, amongst other matters, that there are no unacceptable impacts on the natural and historic environment, human health or aviation safety (taking into account cumulative effects from multiple sites); unavoidable noise, dust and particle emissions, and vibrations are controlled, mitigated or removed at source; and to not normally permit other developments in mineral safeguard zones.

4.7.2 Mining

The BGS GeoIndex website [Accessed May 2021] shows areas of coal measures to the west of the site. This includes Deep Coal (between 50m and 1200m) adjacent to the west side of the junction of the B4082 and Clifford Bridge Road on the Red Line Boundary. Younger Coal measures (seams at least 2m thick, between 600m and 1200m depth) are situated approximately 1.1 miles (1.8km) further west of this junction. The productive Coal Measures are concealed and lie at considerable depth beneath the Permo-Triassic sequence of strata along the route. Any working of the coal seams is likely to be synonymous with Binley Colliery (approximately 2km south) and have been achieved using modern mechanised longwall mining and shallow abandoned mine workings are therefore not anticipated to be present; and that any subsidence associated with deep longwall mining will have ceased within a short time period of the working of the seams.

The Coal Authority's Interactive Map Viewer [accessed May 2021] indicates that the Study Area is within the Coal Authorities Mining Reporting Area.

As part of this assessment a CON29M official coal mining search was obtained as part of the Groundsure report shown in Appendix C.

The only notably entry in the CON29M report relates to a Coal mining subsidence claim: "We have evidence of a damage notice or subsidence claim for the property or within 50m of the property since 31st October 1994." (Details in Table 8).Table 8-Coal Mining Subsidence Claim

Table 8- Coal Mining Subsidence Claim

Distance	Type	Reference	Address	Claim Date	Status	Status reason
200m from site	TCA	S35956-CI	161 Clifford Bridge Road, Binley, Coventry, West Midlands, CV32DX	10/10/1995	Rejected	-

The CON29M report further details:

- No past or present underground coal mining works have been undertaken within the Site Area, nor are there future works planned.
- No past or present opencast coal mining works have been undertaken within the Scheme Area, nor are future works planned.
- No 'coal mining geology' identified.
- No shafts or adits are noted.
- No working facilities orders, emergency call outs or payments to copyhold owners are recorded.
- The location is not within a Cheshire Brine designation.
- No Mine Gas emissions identified.

The 'Key Recommended Next Steps' within the report suggest a 'Subsidence Claims History report' is to be obtained from the Coal Authority with a view to clarifying any associated risk with regards to the Coal mining subsidence claim for further details. A report has not been obtained based on the substantial distance from the site due to the information given above suggesting long wall mining causes subsidence within a few years of completion of mining and therefore indicating negligible mining risk within the site area.

4.8 Unexploded Ordnance

A 1st Line Defence Unexploded Ordnance (UXO) Assessment Risk Assessment has been reviewed, indicating a Medium Risk Area for UXO in Area A from approximately CH1500 to CH1950 extending approximately 200m east and west of the A46.

The full risk assessment can be found in Appendix D.

4.9 Landfill

The extents of historic landfill have been interpreted from the GDMS and the Environmental Agency database. Landfill sites encountered on site are summarised in Table 9 and the accompanying text below. Drawings HE604820-ACM-HGT-WAL_SW_000_Z-DR-CE-0001 to 005 (Geohazard Plans) shows the extents of the 5 landfill sites in relation to the proposed scheme. All sites are found in Area C except for Walsgrave Hill Borrow Pit which is found in Area A.

Table 9- Landfill

No	Site Name	Waste Type	Approximate Extents North/South
1	Walsgrave Hill Borrow Pit	Inert, Special	E280400, N439100 / E280600, N439100
2	Sharman's Yard		E438200, N279000 / E438200, N278800
3	Scrap Yard		E438200, N279000 / E438200, N278800
4	Coombe Fields	Industrial	E438400, N28800 / E438400, N28800
5	Coombe Estate	Inert	E438000, N279300 / E438000, N279100

1. Underlies an approximate 200m section of the A46 at the northern perimeter of site, approximately 200m north of the area of design and east of the carriageway.
2. Underlies an approximate 200m x 200m area west of the A46 at the southern section of site around CH500.
3. Underlies an approximate 300m x 100m area westerly adjacent to the A46 on the southern perimeter of site.
4. Underlies a 300m long section of the A46 at the southern end of site.
5. Underlies residential housing of an approximate 300m x 200m area west of the A46 at the southern perimeter of site.

4.10 Hydrology

4.10.1 Surface Water Courses and Drainage

The Environment Agency (EA) website, GDMS and the Groundsure report have been reviewed to assess the hydrology of the site.

Coombe Pool is an artificial lake designated as a Site of Special Scientific Interest, located directly east of site. Overflow from the pool drains into a secondary river, which trends southwest from Coombe Pool away from the site.

Water is also controlled from Coombe Pool to Smite Brook by a sluice. Smite Brook orientated east west through the southern section of site and underneath the A46 via a culvert. Smite Brook is a tributary to the River Sowe, which runs approximately north south through the western perimeter of the site before meandering westwards and exiting site.

There are 3 surface water ponds in and around Area A, one located approximately 100m from the A46 at the northern section of site and two ponds located approximately 250m east of the northern perimeter of the site.

The Water Framework Directive rates the surface water bodies catchments based on a chemical and ecological rating, giving an overall rating shown in the table below. This rating identifies a baseline of the water condition and will not impact any of the works to be undertaken. It should be noted that this is a 'worst case' rating i.e. Moderate could be Good but should not be Poor.

Table 10- Surface Water

Surface Water Feature	Overall Rating	Distance	Direction
Smite Brook	Moderate	On site	West
River Sowe	Moderate	On site	SW
Coombe Pool	Moderate	50m east	N/A

4.10.2 Surface Water Abstractions

Table 11 summarises the records for surface water abstractions within 2km of the site taken from the Groundsure Report.

Table 11- Surface Water Abstractions

National Grid Reference	Distance (m) and direction	Name	Source	Use
440100 280300	983m E	A G Hill & Co	Surface water	Spray irrigation
439650 278570	1079m E	Roland Hill & Son	Surface water	Spray irrigation

4.10.3 Flooding

The Risk of Flooding from Rivers and Sea (RoFRaS) map from the Groundsure Report, sourced by the EA, shows that the site is considered susceptible to fluvial flooding. There is a medium risk of flooding from the River Sowe and Smite Brook (less than 1 in 30 but greater than or equal to 1 in 100 chance) and a high risk from Coombe Pool (greater than or equal to 1 in 30 chance).

The Groundsure Report notes a moderate - high potential for groundwater flooding following the River Sowe intruding onto Area B. There is also a moderate potential for groundwater flooding at the southern part of Area C at the location of landfill. The rest of the site area is deemed as a low or negligible risk of groundwater flooding.

4.10.4 Planning Policy for Flood Risk

The National Planning Policy Framework (NPPF) for England requires local planning authorities to take account of flood risk and the implications for climate change. It requires that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere.

Technical guidance on flood risk accompanies the NPPF and set out how this policy should be implemented. It stipulates that development proposals in flood risk Zone 2 (medium probability), Zone 3a (high probability) and Zone 3b (the functional floodplain) should be accompanied by a flood risk assessment. The site lies within a medium and high flood risk zone, so a site specific flood risk assessment has been undertaken during PCF Stage 2 and is included in full within the Environmental Assessment Report (EAR) (HE604820-ACM-EGN-WAL_SW_000_Z-RP-LE-0002). In summary, the A46 road alignment is located within Flood Zone 1, denoting a low risk of fluvial/tidal flooding. There are areas of Flood Zone 2 and 3 in the west of the site associated with the River Sowe and Smite Brook. The hydraulic model results for Option 11 suggest that the proposed scheme would have no fluvial flood risk impacts both on and off site.

4.11 River Basin Management Plan

The Water Framework Directive requires a Management Plan to be published for each River Basin District. These are plans that set out the environmental objectives for all the water bodies within the district and how they will be achieved.

The regime has introduced the concept of safeguard zones, which identify a catchment or other zone around a point where water is abstracted for potable use and where actions may be taken to protect water quality, prevent deterioration, and so minimise the need for treatment. Where water is abstracted for human consumption the water body is designated as a Drinking Water Protected Area (DrWPA). If there is a reasonable confidence that a DrWPA objective will not be met, a safeguard zone will be identified.

The WFD has also brought about Water Protection Zones. These areas are a regulatory mechanism to address diffuse water pollution by restricting or forbidding activities that are polluting the most vulnerable waters (e.g. DrWPA). They can be used if it appears there is a risk of a water not achieving good ecological and chemical status by 2015.

The site lies within the Severn River Basin District. According to the MAGIC website, the site does not lie within a Drinking Water Safeguard Zone for Surface Water or Groundwater.

4.12 Hydrogeology

4.12.1 Aquifer Classification

The Groundsure Report indicates that the permeability of superficial deposits and bedrock on site varies from ‘very low’ to ‘high’ as listed below:

- Alluvium is classed as a Secondary A strata identified as having permeable layers capable of supporting water supplies at a local rather than strategic scale.
- Thrussington member as a Secondary Undifferentiated strata.
- Bosworth clay member as Unproductive strata identified deposits with low permeability that have negligible significance for water flow.
- Baginton Sand and Gravel as a Secondary A strata identified as having permeable layers capable of supporting water supplies at a local rather than strategic scale.
- River Terrace Deposits as a Secondary A strata identified as having permeable layers capable of supporting water supplies at a local rather than strategic scale.

The Mercia Mudstone Group is classed as Secondary B strata. These are predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures.

4.12.2 Vulnerability of Groundwater Resources

The Groundsure Groundwater Vulnerability Map of the area shows that the groundwater vulnerability of the superficial deposits and bedrock range from high to unproductive.

- Alluvium is classed as high vulnerability.
- Thrussington member as medium vulnerability.
- Bosworth Clay as unproductive.
- Baginton Sand and Gravel as high vulnerability.
- River Terrace Deposits as high vulnerability.
- The Mercia Mudstone Group is classed as a strata with high groundwater vulnerability due to well-connected fractures within the bedrock.

In terms of identifying the risk of contamination from potential polluting activities in a given area to groundwater sources (wells, boreholes, springs) used for supplying public drinking water, the EA identifies Source Protection Zones. These show the extent of a groundwater source catchment and are divided into three zones, as follows:

- SPZ1 (Inner protection zone) is located immediately adjacent to the groundwater source. It is based on a 50-day travel time from any point below the water table and is designed to protect against the effects of human activity and biological/chemical contaminants that may have an immediate effect on the source. The zone has a minimum radius of 50m.

- SPZ2 (Outer protection zone) is larger than SPZ1 and is defined by a 400-day travel time from a point below the water table to the source. The travel time is designed to provide delay and attenuation of slowly degrading pollutants. This zone has a minimum radius of 250m or 500m depending on the size of the abstraction.
- SPZ3 (Source catchment protection zone) covers the complete catchment area of a groundwater source.

Mapping produced by the EA and supplied within the Groundsure report shows that the site does not lie within a Source Protection Zone and consent with a water authority is not required by the scheme.

4.12.3 Site Characteristics

According to the 1:625,000 Hydrogeological Map of England and Wales and review of the Groundsure Hydrogeological Map, groundwater is likely to be present locally within both the superficial deposits and bedrock.

The BGS archive of historical exploratory hole logs identified groundwater to be between 71.35 to 78.38m OD in 1981 and 67.49 to 77.14m OD in 1983.

4.12.4 Licensed Groundwater Abstractions

Table 12 summarises the records for groundwater abstractions within 2km of the site taken from the Groundsure Report.

Table 12- Licensed Groundwater Abstractions

National Grid Reference	Distance (m) and direction	Name	Source	Use
437520,280320	853m NW	Brita Finish Ltd	Groundwater	Process water
437530,280390	914m N	Brita Finish Ltd	Groundwater	Process water

4.13 Radon Data

The Groundsure Report indicates that the site is not within a radon affected area.

4.14 Services

A Statutory Undertakers Report (SUR) (HE604820-ACM-VUT-WAL_SW_000_Z-RP-CU-0001) was prepared during PCF Stage 2 and should be consulted along with the relevant service plans prior to any intrusive ground investigation and construction work.

The SUR indicates Western Power Distribution (WPD) overhead cables and associated pylons traversing the west flank of the site would affect Option 11. Requirements of a Minimum Horizontal offset of 5m from the edge of earthworks/or

carriageway and a Minimum 7.3m vertical clearance from the top of proposed pavement was supplied by WPD.

4.15 Review of Geo-environmental Risk

4.15.1 Introduction

This section is aimed at identifying the possible risks, if any, arising from substances used or deposited on-site, or from other sources of land contamination. Both past and current potentially contaminative land uses have been considered.

4.15.2 Potential Sources of Contamination

Historical Usage

Historical OS maps of the area reveal that the site has been agricultural land since the first available maps in 1886 and 5 landfill sites at the south end of site and infilled ground at the north. Five entries for Unspecified Tanks are noted for dates between 1948 and 1964 around one location, on the south eastern edge of the Clifford Bridge Road and B4082 round about on the western end of the Scheme Area. It is not clear from historic mapping what these may relate to however allotments are located nearby and this was also at the start of the main track entrance to Hungerley Hall Farm at the time.

Potential contaminants associated with the historic usage of the site include:

- Heavy metals;
- Pesticides and herbicides;
- Fertilisers; and
- Inorganic and organic chemicals.

Recent and Current Usage

There is the probability that the above contaminants are present in the ground from early use of the site or from land uses in the vicinity.

The A46 and B4082 live roads running through site indicate potential hydrocarbon contaminants and other organic or inorganic chemicals.

Off Site Sources of Contamination

Historical OS maps and the GroundSure report identify within the area west of the A46, allotment gardens were present west of the A46 from 1955 and residential housing up until the present day. The allotment gardens may have created potential pesticide and herbicide contamination sources and construction activities for the housing developments may have created potential sources of contamination.

Beechwood Trees and Landscapes tree surgeons, formerly a nursery adjacent to the A46 at the south end of the proposed scheme boundary poses the potential for equipment and vehicle oils and fuels.
Further from site are the current Walsgrave and Cross Point Retail Parks to north of the proposed scheme and the current superstore to the north-west of the existing roundabout for which the most notable potential contamination would be associate with potential fuel and oils spills and leakage, with the potential for refrigeration and de-icing chemicals.

However, due to the nature of the development and distance from site it is considered likely that off-site sources of contamination, if present, would have a low impact upon the site.

Previous Ground Investigation

There were two previous ground investigations undertaken in 1981 and 1983 by Norwest Holst Soil Engineering Ltd and Bostock Hill and Rigby Ltd. The Area 11 MAC Contamination Assessment is a review of the area of landfill at the south of site near Brinklow Road. This was assessed using historical ground investigation information and a supplementary investigation in 2003 that has not been made available.

The contamination assessment highlights two hotspot areas of contamination east of the A46 <3m BGL although, it should be noted that it is possible for these areas to have changed over time.

Summary

The potential sources of contamination can be summarised as follows:

- Historical and current agricultural site use;
- Historical landfill;
- Potential contamination from live road;
- Potential contamination from historic unspecified tanks; and
- Potential contamination from construction activities for residential housing off site.

4.15.3 Pathway for Migration

For the purpose of this assessment, the principal pathways for contaminant migration are considered to be as follows:

- Dermal contact/Ingestion/Inhalation with/of soils, dusts or liquids;
- Migration of contamination via permeable strata
- Migration of contamination by groundwater
- Migration of contamination by watercourse
- Migration of soil gases and vapours via permeable natural soils;

- Inhalation of hazardous gases in confined spaces;
- Plant uptake of bio-available contamination in soils; and
- Physical contact with construction materials.

4.15.4 Potential Receptors

For the purpose of this assessment, the principle receptors are considered to be as follows:

- Humans - current site users (mainly the public driving vehicles)
- Humans - construction and maintenance workers;
- Humans - adjacent site users (residentials);
- Humans – future users of the highway;
- Groundwater;
- Surface water;
- Landscaping and open space;
- Infrastructures and services; and
- Air.

4.15.5 Brief Summary of the Qualitative Risk Assessment

For an environmental risk to be present there must be a contaminant linkage between source, pathway and receptor present. Notable identified contaminant linkages and the potential geo-environmental risks associated with the site in the context of this report is provided in the table below. This should be read in conjunction with the geo-environmental classification of consequence matrix provided in Appendix E. The environmental risks are discussed in detail within the EAR (HE604820-ACM-EGN-WAL_SW_000_Z-RP-LE-0002). A conceptual site model for the site will be refined as part of the Ground Investigation Report (GIR) following the ground investigation.

Table 13- Geo-environmental Risk Register

Issues	***Risk Rating***	***Justification / Comments***
Contamination Potential		
Potential for Significant On Site Contamination	*Moderate risk*	*Potential contaminants present onsite notably associated with current and former land uses onsite including landfill areas, unspecified tanks, existing farm workings, and road development on site*
Potential for Contaminants to Migrate On to Site	*Low risk*	*No significant off site sources have been identified*
Potential for Contaminants to Migrate Off Site	*Moderate risk*	*Landfill present on site, migration of contaminants via groundwater or surface water.*

Issues	Risk Rating	Justification / Comments
Environmental Risks		
Risk of Harm to Human Health - Existing Conditions	*Low risk*	*Landfill present on site could come into human contact while undertaking construction work.*
Risk to Construction Workers	*Moderate/ low risk*	*Acute risk to construction workers should be managed onsite through appropriate H&S documentation and procedures. Measures may include: Minimising contact with soils/dust using appropriate PPE. Suitable precautions required for any persons entering confined spaces.*
Risk of Pollution of Controlled Water	*Moderate risk*	*Possible shallow groundwater onsite with potential pathway connections to made ground and landfilled areas.*
Hazards to Flora and Fauna	*Moderate / low risk*	*Site next to SSSI Coombe Pool – habitat of protected bird species. Surface water and possible shallow groundwater onsite with potential pathway connections to made ground and landfilled areas.*
Liabilities		
Likelihood of designation as Contaminated Land under Part IIA EPA 1990	*Low risk*	*Some potential for contamination identified - but likely to be addressed under the planning regime.*
Liability issues for owner	*Moderate risk*	*Potential for migration of contaminants to Coombe Pool (SSSI) and Smite Brook culvert*
Development Implications		
Possible Requirement for Remediation of Soil	*Low risk*	*No significant remediation anticipated.*
Possible Requirement for Remediation of Groundwater	*Moderate risk*	*Possible shallow groundwater onsite with potential pathway connections to made ground and landfilled areas.*
Possible Requirement for Gas Protection Measures	*Moderate risk*	*Possible gas generation from buried made ground within landfilled areas migrating to confined spaces.*
Special Requirements for Water Supply Pipes	*Low risk*	*No special precautions*
Potential Limitations on Foundation Design	*Low risk*	*No special precautions*
Risk of Encountering Materials classified as Hazardous Waste	*Moderate risk*	*Potential for encounter across site notably within areas of Landfill, the vicinity of the existing farm and developed area on site.*

5 Ground Conditions

5.1 Historic Ground Investigation

Details of historic ground investigation (GI) have been obtained from GDMS and the British Geological Survey. There have been several phases of historic ground investigation (GI) within and immediately adjacent to the site footprint. The various phases of GI are listed in Table 14 below.

Table 14- Historic Ground Investigations

Company	Date	Description	Exploratory Holes[1]
Norwest Holst Soil Engineering Ltd	1981	Coventry Eastern Bypass Stage I	16 No. BHs
	1983	Coventry Eastern Bypass Stage II	25 No. BHs
Bostock Hill and Rigby Ltd	1983	Coventry Eastern Bypass & M40 Gaydon	15 No. BHs

Notes:
1. BH = boreholes

5.2 Summary of Ground Conditions

The ground conditions for each area of the site have been interpreted from the ground investigations summarised in Section 5.1 and shown in Table 15, Table 16 and Table 17. A list of the exploratory holes considered for each area is provided in Appendix F.

Table 15- Ground Conditions of Area A

Stratum	Depth top (m)	Depth base (m)	Proven Thickness (m)	No. of exploratory holes	Description
Topsoil	0.00	0.15 – 0.80	0.15 – 0.8	15	Brown sandy topsoil
Alluvium	0.20 – 0.30	0.40 – 0.60	0.15 – 0.4	3	Orange-brown very clayey silty fine sand with occasional fine medium subangular gravel Brown very clayey fine to coarse sand Firm brown sandy gravelly clay
Baginton Sand and Gravel	0.15 – 0.80	1.30 – 4.30	0.9 – 3.7	8	Medium dense brown silty fine to coarse sand with occasional fine to medium subrounded gravel
Thrussington Member of the Wolston Formation	0.25 – 2.30	1.80 – 5.70	1.45 – 5.6	9	Soft to very stiff brown sandy silty clay with some fine subangular to subrounded gravel
Bosworth Member of the Wolston Formation	0.35 – 1.80	4.00	2.20 – 3.65	2	Stiff reddish brown heavily fissured silty clay with very occasional gravel with grey staining along all fissures with occasional roots and gypsum
Mercia Mudstone (Weathered)	0.4 – 5.7	6 – 11 (base not proven)	Not proven	15	Stiff to hard reddish brown silty clay with some occasional large very weak mudstone bands and lithorelicts and occasional grey mottling Slightly weathered thin to medium fine grained red brown and blue moderately strong to strong sandstone with small cavities of between 2-3mm present throughout (Found in BH29R at 1.2m thick)

Table 16- Ground Conditions of Area B

Stratum	Depth top (m)	Depth base (m)	Proven Thickness (m)	No. of exploratory holes	Description
Topsoil	0.00	0.20 – 0.40	0.20 – 0.40	5	Brown sandy topsoil
Made Ground	0.30	1.80	1.50	1	Black sandy stoney clay with ash and brick
Alluvium	0.30 & 1.70	2.30 & 2.7	2.30 & 2.7	3	Firm yellowish brown sandy silty clay with occasional gravel Very loose to loose brown very clayey fine to coarse subangular gravel Medium dense brown clayey fine to coarse sand and fine to coarse subrounded gravel
Baginton Sand and Gravel	0.40	2.30	1.90	1	Brown silty clayey fine medium sand with some fine medium sub-rounded gravel
Thrussington Member of the Wolston Formation	0.20	1.45	1.25	1	Firm brown sandy silty clay with scattered gravel
Mercia Mudstone (Weathered)	1.45 – 3.50	3.00 – 12.35	0.50 – 10.90	5	Firm to hard reddish brown silty clay with some mudstone lithorelicts and occasional bands and grey mottling

Table 17- Ground Conditions of Area C

Stratum	Depth top (m)	Depth base (m)	Proven Thickness (m)	No. of exploratory holes	Description
Topsoil	0.00	0.30 – 0.60	0.30 – 0.60	4	Brown sandy topsoil
Made Ground	0.00	0.50 – 9.10	0.50 – 9.10	22	Brown/black sandy gravelly silty clay / gravelly sand with anthropogenic deposits such as scrap metal, concrete, slag, ash, glass, clinker, asbestos, polythene
Alluvium	0.30	1.40 – 2.20	1.10 - 1.90	3	Soft to firm brown and grey mottled sandy silty clay Loose orange brown clayey silty fine to coarse sand and fine to coarse gravel
River Terrace Deposits	0.60 – 8.20	1.60 – 9.80	0.90 – 5.20	16	Brown gravelly sand with occasional gravel and clay and black oily contamination (sludge) Dense sandy pebbly gravel with some clay Orange red silty clay with sweet disinfectant like odour and organic plant material
Baginton Formation	0.50 – 4.00	3.15 – 6.20	2.20 – 4.00	6	Dark grey sand with traces of gravel Dense dark grey sandy pebbly gravel Sand and Gravel Brown clayey gravel to brown sandy gravelly clay Soft red silty clay
Mercia Mudstone (Weathered)	1.40 – 9.80	7.00 – 14.28	1.20 – 12.55	31	Firm to very stiff reddish brown occasionally blue speckled silty clay with some weak mudstone lithorelicts Reddish brown silty friable slightly weathered very weak mudstone with some clay along fissures

5.3 Summary of Groundwater Conditions

Several groundwater strikes were encountered during the historic ground investigations. Details are summarised in Table 18.

Table 18- Groundwater conditions of Areas A, B & C

Area	Stratum	No. of results	Groundwater Strike (m below ground level)		
			Max	Min	Avg
A	Thrussington Member	3	4.5	2.8	3.6
	Baginton Sand and Gravel	1	-	-	3.6
	Mercia Mudstone (Weathered)	9	6.5	3.1	5.0
B	Alluvium	2	2.5	2	2.25
C	Made Ground	14	7.9	3.85	5.4
	Alluvium	1	-	-	1.7
	River Terrace Deposits	6	6.94	3.65	4.9
	Baginton Sand and Gravel	5	4.1	1.8	2.56

5.4 Engineering Properties

The Arup Geotechnical Interpretive Report (1986) gives design values and methods used in design of the Coventry Eastern Bypass. This information has not been considered in this report but may be useful for future design.

A number of in-situ and laboratory test results are included within the historic ground investigation logs obtained from the BGS. These are summarised in the relevant sections below.

5.4.1 In-Situ Testing

Standard Penetration Test (SPT) results have been obtained from historic borehole logs. ‘N’ values for each site area are summarised in Table 19 below.

‘N’ values above 100 have been removed as refusal for rock is an SPT ‘N’ value of 100.

5.4.2 Laboratory Testing

Table 19- Standard Penetration Test Results

Area	Strata	No. of tests	SPT 'N' Value		
			Max	Min	Avg
A	Thrussington Member	5	24	3	15
	Baginton Sand and Gravel	10	34	11	21
	Mercia Mudstone	52	100	11	49
B	Made Ground	1	-	-	9
	Alluvium	2	12	4	8
	Mercia Mudstone	10	78	6	39
C	Made Ground	87	83	1	13
	River Terrace Deposits	27	69	6	27
	Baginton Sand and Gravel	13	40	6	16
	Mercia Mudstone	52	99	8	54

6 Preliminary Engineering Assessment

6.1 Introduction

The preliminary engineering assessment considers the design implications for the scheme with respect to the information contained within this report. The main potential geotechnical issues anticipated are:

- Swelling of cohesive material in cut slopes and in excavations for foundations;
- Stability issues for embankments that are constructed using cohesive site-won material;
- Stability issues for over-steep embankments and cuttings;
- The need to import fill for construction of proposed embankments;
- Total and differential settlement of earthworks and structures, particularly in the presence of cohesive material and deep made ground in founding depth;
- High flood risk in parts of the site;
- High groundwater level in parts of the site;
- Intrusive investigation and construction within a medium risk UXO area;
- Construction of earthworks near Grade II listed building. Space limitations may require retaining structures; and
- Construction activities near dam structure. Dam Stability Report was not available for review at the time of this PSSR, therefore an assessment could not be made.

6.2 Earthworks

The proposed dimensions and anticipated ground conditions for earthworks at different parts of the scheme are summarise in Table 20. Chainage references have been adopted from the general arrangement drawings in Appendix A. Associated geological cross section drawings are provided in Appendix A.

Table 20- Proposed Earthworks Dimensions

Chainage (m)	Location	Max Cutting Height (m)	Max Embankment Height (m)	Geology
0 - 265	A46 NB off-slip to overbridge west	1.00	7.5	Wolston Formation-Thrussington Member
0 - 500	A46 NB on -slip to overbridge west	4.0	7.0	Baginton Sand and Gravel

Chainage (m)	Location	Max Cutting Height (m)	Max Embankment Height (m)	Geology
0 - 280	A46 NB on – slip from overbridge west	0.8	7.0	Thrussington Member Bosworth Clay Member
0 - 293	A46 SB off -slip to overbridge east	1.4	5.5	Thrussington Member Bosworth Clay Member
0 - 276	A46 SB on – slip from overbridge east	0.5	5.5	Baginton Sand and Gravel Bosworth Clay Member Thrussington Member

6.2.1 Attenuation Ponds

At approximately CH150 of NB on – slip to overbridge west, there is a proposed embankment of 4.5m height next to a proposed attenuation pond approximately 12m to the south. It is recommended that this attenuation pond be moved, or the shape changed to minimise the risk of instability of the earthworks. The current location can be found on geological cross section drawing HE604820-ACM-VGT-WAL_SW_OP11_Z-DR-CE-0009. Other attenuation ponds affecting stability of the earthworks should also be assessed at detailed design.

6.2.2 Hungerley Hall Farmhouse

At approximately CH550 of the NB on – slip (shown in drawing HE604820-ACM-VGT-WAL_SW_OP11_Z-DR-CE-0010) there is a proposed cutting adjacent to Hungerley Hall Farmhouse of approximately 4.5m in height. Due to space limitations, the need of a retaining structure should be considered around the cutting and to mitigate the risk of damaging the property.

6.3 Subgrade

An assessment of the proposed subgrade for the improvement works pertaining to the A46 and Walsgrave junction will be required for pavement design purposes. California Bearing Ratio testing should be carried out for the subgrade founding materials during the ground investigation.

6.4 New A46 Overbridge Structure Foundations and Intrusive Works

A new overbridge complete with raised roundabouts is required to provide access to the B4082.

A Detailed UXO Risk Assessment produced by '1st Line Defence' revealed that a Medium Risk Area is present directly within the proposed overbridge location. The remainder of the site is deemed a Low Risk Area.

The assessment recommends that for all works, a UXO Risk Management Plan and Site Specific UXO Awareness Briefings to be undertaken for all personnel conducting intrusive works. The following measures are recommended in the Medium Risk Area:

- Non-intrusive UXO Magnetometer Survey and Target Investigation (where appropriate)
- Unexploded Ordnance (UXO) Specialist Presence on Site to support shallow intrusive works
- Intrusive Magnetometer survey of all Borehole and pile locations down to a maximum bomb penetration depth.

6.5 Contaminated Land and Soil Chemistry

There is the potential for contaminated land on site, arising from areas of landfill deposits and historic industrial land use. A detailed contamination assessment targeted at such areas will be required as part of the scheme specific ground investigation to be recorded in the GIR and assessed again within the GDR section 'G7 Contamination and ground gas risks'.

6.6 Groundwater

The desk study information suggests that groundwater may be encountered beneath the site in any cuttings or other excavations. The shallowest groundwater strike of 1.7m BGL was encountered in area C of the site, next to the culvert accommodating Smite Brook underneath the A46.

A groundwater strike of 2.8m BGL recorded approximately 100m south of the overbridge location.

Groundwater entering excavations during construction and its effect on stability of excavation areas should be considered. A temporary drainage solution may be required with temporary side supports. The permanent drainage solution for the site must control groundwater in the vicinity of the retaining structures, carriageway and earthworks to prevent build-up of water which could adversely impact overall stability.

Where groundwater is encountered within proposed cut slopes it may be controlled during construction by groundwater pumping. Permanent drainage solutions may include counterfort drainage along the relevant sections of cut slope, which will capture any groundwater seepage. Appropriate carrier drains will also be installed along the verge to intercept this drainage. Scheme specific ground investigation should clarify the groundwater conditions for the various excavations across the scheme / proposed overbridge location, and hence the scheme that will require such drainage measures.

Surface Water

The desk study suggests that particular areas of the site are designated a high flood risk from surface water. The appropriate drainage solutions must be adopted for earthworks at these locations in order to prevent run-off and erosion of the slope, volumetric changes of any exposed cohesive material and run-off of surface water onto the carriageway.

6.7 Existing Geotechnical Problems

A review of HA GDMS, GDMS and the Groundsure report revealed two geotechnical defects on site as first listed in Section 1.5.

A report of large burrows (Badge Sets) at CH1020 (Area A) along the A46 mainline, mid-slope on 26/02/2021. This defect was deemed a Feature Class 2 meaning it is an at risk area and a Feature Grade 2, stating remedial intervention is not required, but preventative intervention can be required. Therefore, the defect may require an ecological assessment.

A report of a subsidence hole in drainage at the base of the slope due to erosion at CH800 (Area C). This defect was deemed a Feature Class 1D meaning it is a minor defect and a Feature Grade 3, stating remedial and preventative intervention can be required. It is recommended earthworks defects to be repaired where applicable.

6.8 Effects on Man–made Obstacles

The desk study highlights the presence of Grade II listed building Hungerley Hall Farmhouse. Current earthwork cutting design of the B4082 connector road between CH500 and CH600 requires a removal of approximately 4.5m height within 25m of the listed building and 10m from the farm outhouse buildings that are unlisted.

Due to space limitations, the need of a retaining structure should be considered around the cutting and to mitigate the risk of damaging the property.

In addition to the close proximity of a cutting to a listed building, the following additional constraints may affect the nature of the proposed works:

- Landfill deposits to the south of site between CH400 and CH700.
- Buried services, particularly in the vicinity of Walsgrave junction.
- Culvert beneath the A46 at CH800.
- Overhead power lines traversing the west flank of the site.
- A dam located approximately 100m off the south-east section of site.

6.9 Ground Investigation

A ground investigation proposal is to be produced within a Ground Investigation Scope Report (GISR) and issued separately to this report.

7 Comparison of Project Options and Risks

7.1 Anticipated Geotechnical Hazards

Based upon the preliminary review of information in this report, the following potential geotechnical hazards are anticipated.

- Encounter of Unexploded Ordnance (UXO) during ground investigation or construction including overbridge area from approximately CH1500 to CH1950.
- Landfill deposits underlying the site between CH400 and CH700 containing inert waste possibly derived from construction activities. Proven thickness between 0.5m and 9.1m.
- Artificial Ground which may be encountered throughout the scheme. Made Ground area identified underlying the A46
- Compressible and/or anisotropic material in Alluvium, soft deposits recorded underlying Area C although only 0.9m in thickness, could be proven thicker in other areas.
- Exposure of cohesive material within cuttings
- Construction of embankments using site-won cohesive material.
- High flood risk from surface water in the south part of site around CH800 in the vicinity of Smite Brook and Coombe Pool.
- Instability of deep excavations in granular material arising from Baginton Sand and Gravel and River Terrace Deposits.
- Ground contamination arising from the historic industrial land use in the south of site.
- Contamination of the ground and/or groundwater arising from the disturbance of historic landfill.
- Settlement arising from compressibility of landfill materials or decomposition of organics contained within the landfill.
- Buried services, particularly in the vicinity of Walsgrave junction.
- High groundwater table.
- Inadequate temporary and permanent drainage of earthworks.
- Inadequate temporary drainage for excavations.
- Damage to dam at Coombe Pool from construction/GI works.

7.2 Geotechnical Category

It is proposed that this scheme be classed as a Geotechnical Category 2 project, being treated accordingly for the investigation and decision making processes in accordance with CD622. There has been no change in category from that recommended in the Statement of Intent.

7.3 Preferred Routes / Options

Details of the preferred scheme option are provided in Section 1.1 of this report. The geotechnical risk register has identified high risk areas that will impact the proposed design.

7.4 Geotechnical Risk Register

This part of the certification process outlined in CD622 a risk assessment has been carried out based on the findings of this report.

The Geotechnical Risk Register considers the geotechnical risks and identifies the control measures to be implemented to reduce these risks, which includes the need for a site specific ground investigations followed by appropriate design.

The risks will be reviewed at the end of the ground investigation and design stages determine if any residual risks are inherent during construction.

The degree of risk (R) is determined by combining an assessment of the likelihood (L) of the hazard with an assessment of the severity (S) of the hazard. The scale against which the likelihood and severity are measured, and the resulting degree of risk determined is presented in Table 21, Table 22 and

Table 23 . Table 24 presents the risk register for the proposed scheme.

Table 21- Classification of Probability and Impact

Likelihood (L)		**Severity (S)**	
Almost certain	5	Catastrophic	5
Extremely likely	4	Major	4
Likely	3	Serious	3
Unlikely	2	Moderate	2
Extremely unlikely	1	Minor	1

Table 22- Risk Matrix

Likelihood	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
		Severity				

Table 23- Classification of Risk Rating

Risk Rating	**Response**
High (20-25)	Actively not permitted. Hazard to be avoided or risk to be reduced to tolerable level.
Medium (9-19)	Additional control measures needed to reduce risk rating to a level that is equivalent to a test of "reasonably required" for.
Low (1-8)	Ensure assumed control measures are maintained and reviewed as necessary.

Table 24- Geotechnical Risk Register

Risk ID	Hazard	Consequence	Likelihood	Severity	Risk	Proposed Mitigation Measures	Likelihood	Severity	Risk
1	Based on detailed UXO Risk Assessment undertaken by 1st Line Defence a medium risk area for Unexploded Ordnance identified and the remainder of the site as low risk.	Encountering unexploded ordnance during ground investigation or construction of overbridge and roundabouts.	3	4	12	A UXO Risk Management Plan and Site Specific UXO Awareness Briefings to be undertaken for all personnel conducting intrusive works. A non-intrusive UXO Magnetometer Survey and Target Investigation (where appropriate) Unexploded Ordnance (UXO) Specialists Presence on Site to support shallow intrusive works Intrusive Magnetometer survey of all Borehole and pile locations down to a maximum bomb penetration depth	1	4	4
2	Cohesive material within the Alluvium, Baginton Sand & Gravel / River terrace Deposits	Material with low strength, high compressibility and variable thickness and occurrence. Potential for excessive volumetric changes creating excessive / differential settlement of road pavements, earthworks or structures	3	3	9	Ground Investigation to confirm the thickness and distribution of any soft or loose compressible horizons. Geotechnical laboratory testing to confirm engineering properties for the purpose of design. Prepare GIR and GDR including finalisation of design recommendations. Design consideration including: excavation / replacement or ground improvement measures, column supported earthworks and piled foundations. Monitor settlements during construction .	2	3	6

Risk ID	Hazard	Consequence	Likelihood	Severity	Risk	Proposed Mitigation Measures	Likelihood	Severity	Risk
3	Landfill deposits/Made Ground Contaminated Land	Instability of deep excavations in landfill. Aggressive chemicals. Variable thickness, strength and compressibility of landfill material. Decomposition of organic matter. Impact on Health and Welfare of GI / construction workers.	4	3	12	Ground investigation to confirm the extents and dimensions of landfill deposits on site and any other potential problem areas. In the event that contamination is encountered, care shall be taken during formation of the boreholes to ensure potentially contaminated horizons are sealed to prevent cross contamination and creation of pollution migration pathways. Contamination testing to assess the levels of onsite contamination and the requirements during construction for dealing with contaminated material, i.e. in situ / ex situ treatment or excavation and replacement. Design options will need to be considered to minimise the interaction with any contamination. Testing should include BRE: Special Digest 1 tests and design to include appropriate concrete classification based upon this. Note that landfill and contaminated ground was anticipated at Binley junction, but the Ground Investigation indicated none were encountered. Appropriate ground treatment or foundation solutions, e.g. vibro columns, soil mixing or piles. Alternatively, substantial landfill deposits to be excavated and disposed of in the appropriate manner. This may have considerable cost implications. Voids arising from landfill removal to be infilled with engineered well compacted fill. This material may be sourced from cuttings on site or imported on site and is subject to acceptability criteria identified during the design.	2	3	6

Risk ID	Hazard	Consequence	Likelihood	Severity	Risk	Proposed Mitigation Measures	Likelihood	Severity	Risk
4	Instability of existing slopes	Increased loading and excavations on unstable earthworks during construction affecting the cutting or embankment. Potential for layers of high plasticity clay/soft or low strength soil/high water table/seepage leading to preferential pathway for failure within slopes.	3	3	9	Design to avoid the requirement of positioning heavy plant near crests of earthworks slopes. Adopt suitable working methodologies for construction. Short and long-term analysis during detailed design to ensure the slopes will have sufficient design resistance. All earthworks will have crest and toe drainage to support the long term stability. Existing earthworks defects recommended to be repaired where applicable.	1	3	3
5	Flooding	Flooding on the site during or after construction. Increased construction costs. Damage to structures, foundations and earthworks, including erosion of embankments and cut slopes. Maintenance liability.	4	4	16	Ensure adequate temporary and permanent drainage for earthworks and structures, particularly in areas where there is a known 'high' flood risk from surface water.	2	4	8
6	Instability of excavations caused by weak, unstable ground	Excavations in loose granular material or presence of running sand may be more susceptible to collapse particularly if ground water is present. Inappropriate temporary works design due to insufficient information on the ground conditions. Collapse of excavation and danger to construction workers. Increased cost and delays.	4	3	12	Ground investigation for the proposed site extents to investigate the nature, thickness and distribution of the underlying deposits. Any temporary works design to be undertaken by contractor will be based on site specific information on the ground conditions. Provision should be made for groundwater control during GI and/ or construction. Where possible, the requirement for significant excavations should be avoided at the design stage.	2	3	6

Risk ID	Hazard	Consequence	Likelihood	Severity	Risk	Proposed Mitigation Measures	Likelihood	Severity	Risk
7	Chemically/ Environmentally aggressive conditions.	Chemical attack and deterioration on concrete. Increased cost.	3	3	9	A full aggressivity assessment to be undertaken and applied to the design. Sulphate tests to be undertaken to BRE requirements.	2	3	6
8	Striking services underground or overhead during construction / ground investigation.	Danger to construction / ground investigation workers and disruption to services within the area. Increased cost and delays.	3	4	12	Contractor to obtain up to date and review statutory undertakers utility plans and undertaken on site detection for buried services prior to drilling. Establish site procedures to be undertaken in the event underground services are encountered, including risk assessment and method statement. E.g., Obtain up to date serve plans and records Undertake GPR surveys and mark out services prior to any investigations. Operate permit to dig system. Plan ground investigation to avoid buried services. All buried services are to be mapped and located prior to commencement of any intrusive works. Any potential service diversions should be identified at the planning stage and liaison with STATS provided commenced.	1	4	4
9	Shortfall of suitable fill material	Lithologies may not be conductive to the production of high-quality fill for re-use as part of the works. Degree of suitability of soils for re-use makes It difficult to achieve a cut-fill balance. May need to import fill for construction.	3	2	6	Detailed assessment for material suitability for re-use on site to be undertaken. Use of Performance Specification for construction to maximise opportunity to use site won fill. Contractors' responsibility to source suitable fill which meets the Performance Specification.	2	2	4

Risk ID	Hazard	Consequence	Likelihood	Severity	Risk	Proposed Mitigation Measures	Likelihood	Severity	Risk
10	Operations of Earthworks Haul Route, construction and ground investigation work adjacent to a live carriageway	Conflict of Earthworks/ construction/ GI vehicles with Public Highway.	3	4	12	Traffic Management to enable delivery of earthworks materials/side panels to site. Appropriate traffic management aided by construction / ground investigation sequence enabling best segregation of site operatives and machinery from traffic for safe and efficient working. Workforce to be made aware of risks and protection measures through toolbox talks, site notices etc.	2	4	8
11	Variation in soil / bedrock parameters / extents / depths	Impact on integrity of design Increased costs during construction where variations noted during construction or potential failure of design if variations not noticed during construction.	3	3	9	Carry out site specific intrusive ground investigation and upon receipt of data, prepare GIR and GDR including finalisation of design recommendations. Identify formations where a 'hard dig' hazard is anticipated and prepare for this in the excavation design and execution of intrusive ground investigation.	2	3	6
12	Variation in groundwater level	Impact on integrity of design, inundation of excavations Potential for design failure where rises in groundwater levels detrimentally impact temporary and permanent design. Additional costs to construction for dewatering temporary excavations.	3	3	9	Groundwater monitoring should be carried out during the investigation and for a minimum of 3 months following completion of the intrusive investigation.	2	3	6

Risk ID	Hazard	Consequence	Likelihood	Severity	Risk	Proposed Mitigation Measures	Likelihood	Severity	Risk
13	Piled Foundations	Failure or excessive settlement of piled foundations impacting integrity of structures. Structure maintenance or replacement required. Additional Costs. Medium risk of Potential UXO Disruption to users, possible road closures.	3	4	12	Site specific ground investigation to follow the guidance of EC7. Ensure characteristic parameters are cautious to account for presence of weaker horizons when designing. A UXO Risk Management Plan and Site Specific UXO Awareness Briefings to be undertaken for all personnel conducting intrusive works. A non-intrusive UXO Magnetometer Survey and Target Investigation (where appropriate) Unexploded Ordnance (UXO) Specialists Presence on Site to support shallow intrusive works Intrusive Magnetometer survey of all pile locations down to a maximum bomb penetration depth.	2	4	8
14	Disturbance of Protected Species	Coombe Pool designated a Site of Special Scientific Interest (SSSI) due to nesting island for Herons east of site. Potential for increased cost and delays if found to be present on site.	3	3	9	Ecology survey to be undertaken to establish what species, if any, are present across site. Establish site procedures to be undertaken in the event of protected species encountered during the works, including risk assessment and method statement.	2	3	6
15	The Culvert	Small area of earthworks cutting adjacent to culvert potentially affecting the structural integrity. Ground investigation boreholes drilling through the culvert.	2	3	6	Confirm the exact location of culvert before drilling boreholes for Ground Investigation and maintain a safe distance from the edge of the culvert while work is ongoing. Design to ensure that the culvert is not affected by earthworks.	1	3	3
16	The Dam	Small area of earthworks cutting adjacent to dam potentially affecting the structural integrity.	2	4	8	Acquire Dam Stability Report and confirm the exact location of the dam, design to ensure the dam is not affected by the earthworks and review and follow the report's recommendations.	1	4	4

Risk ID	Hazard	Consequence	Likelihood	Severity	Risk	Proposed Mitigation Measures	Likelihood	Severity	Risk
17	Grade II Listed Building	Earthworks at proximity of Grade II Listed building – Hungerley Hall Farmhouse that could damage its structural integrity.	3	3	9	Proposal of retaining wall to increase stability of earthworks and the surrounding soil to minimise the effect of the scheme on Hungerley Hall Farmhouse.	2	3	6
18	Watercourses	Construction / GI working near open water – The River Sowe, Smite Brook and Coombe Pool Potential for contaminant pathways to be created to watercourses	3	4	12	Construction / GI workers to avoid watercourses and maintain a safe distance. Care to be taken during construction working / GI to prevent contamination of the watercourses using clean drilling techniques if applicable and proper handling or disposal of waste / arisings / site won material.	2	4	8
19	Agricultural Land	Damage to crops	2	2	4	Construction / GI work to maintain a distance from agricultural land and any waste / arisings / site won material to be used or disposed of correctly.	1	2	2
20	Frost Susceptible Soils	Frost heave creating surface damage	3	3	9	Carry out intrusive ground investigation to ensure, so far is reasonably practicable, that sufficient information is available to identify geo-hazards and prepare embankment / foundation design. Upon receipt of data prepare GIR and GDR including finalisation of design recommendations. Design and final highway construction thickness should take account of frost heave risk.	2	3	6
21	Small amounts of asbestos encountered in landfill and during site walkover	Health risk to construction/GI workers	2	3	6	All workers to have undertaken asbestos awareness training and ensure any asbestos is properly disposed of.	1	3	3
22	Ground conditions susceptible to solubility/deterioration such as gypsum/halite within the Mercia Mudstone.	Potential for solution/deterioration of gypsum/halite resulting in excessive / differential settlement of road pavements, earthworks or structures.	2	2	4	Ground Investigation to identify any potential for solubility/deterioration from gypsum/halite. Monitor settlements during construction. To be considered in foundation design.	1	2	2

Risk ID	Hazard	Consequence	Likelihood	Severity	Risk	Proposed Mitigation Measures	Likelihood	Severity	Risk
23	The walkover survey was not undertaken along the roads and earthworks due to the need for temporary traffic management if working adjacent to live carriageways and complications with existing traffic management associated with Binley junction works.	Potential for new or worsened existing minor defects since last Principal Inspections.	2	2	4	Risk to be added to the Xactium Risk register and carried on to, inspected and assessed by the Delivery Integration Partner (DiP) at PCF Stage 3.	1	2	2
24	Drainage assessment was not carried out at this stage.	Potential for drainage defects that have not been identified.	2	2	4	Risk to be added to the Xactium Risk register and carried on to and assessed by the DiP at PCF Stage 3.	1	2	2

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APPENDIX B
ENVIRONMENTAL ASSESSMENT REPORT

A46 Coventry Junctions Upgrade (Walsgrave Junction)

Environmental Assessment Report
PCF Stage 2

Status: P03 S4

Document Ref: HE604820-ACM-EGN-WAL_SW_000_Z-RP-LE-0003

November 2021

A46 Coventry Junctions Upgrade (Walsgrave)

Environmental Assessment Report [EAR]

Report No: HE604820-ACM-EGN-WAL_SW_000_Z-RP-LE-0003

November 2021

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Highways England
2 Colmore Square
38 Colmore Circus
Birmingham
B4 6BN

AECOM
Sunley House
4 Bedford Park
Croydon
CR0 2AP

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Abbreviations

Abbreviation	Definition
AAWT	Annual Average Weekday Traffic
AEP	Annual Exceedance Probability
AIES	Assessment of Implications on European Sites
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
AQMA	Air quality management area
ARN	Affected road network
ASSI	Areas of Special Scientific Interest
BGL	Below Ground Level
BGS	British Geological Survey
BNL	Basic Noise Level
BMV	Best and most versatile
BNG	Biodiversity Net Gain
BOCC	Birds of Conservation Concern
BOD	Below Ordnance Datum
BS	British Standard
CDW	Construction and Demolition Waste
CCC	Coventry City Council
CEMP	Construction Environmental Management Plan
CoPA	Control of Pollution Act 1974
cSAC	Candidate for Special Area of Conservation
CSM	Conceptual Site Model
CWS	County Wildlife Site

Abbreviation	Definition
DCO	Development Consent Order
DEFRA	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
DM	Do Minimum
DS	Do Something
EAR	Environmental Assessment Report
EAST	Early Assessment and Sifting Tool
EEA	European Economic Area
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
END	Environmental Noise Directive
EQS	Environmental Quality Standards
FMfP	Flood Map for Planning
FY	Future Year
GCN	Great Crested Newt
GHG	Greenhouse Gas
GWD	Groundwater Directive
GWDTE	Groundwater dependent terrestrial ecosystems
HADDMS	Highways England Drainage Data Management System
HAPMS	Highways England Pavement Management System
HDV	Heavy Duty Vehicles
HEWRAT	Highways England Water Risk Assessment Tool
HER	Historic Environment Record
HGV	Heavy goods vehicle
HLC	Historic Landscape Characterisation
HRA	Habitat Regulations Assessment

Abbreviation	Definition
IAQM	Institute of Air Quality Management
LAQM.TG	Local Air Quality Management Technical Guidance
LCM	Leeds Coal Measures
LCT	Landscape Character Type
LGS	Local Geological Sites
LNC	Local Nature Conservation
LNR	Local Nature Reserve
LOAEL	Lowest Observed Adverse Effect Level
LPA	Local Planning Authority
LLFA	Lead Local Flood Authority
LWS	Local Wildlife Site
MAGIC	Multi-Agency Geographic Information for the Countryside
MCA	Mineral Consultation Area
MCZ	Marine Conservation Zones
MHCLG	Ministry of Housing, Communities and Local Government
NHLE	National Heritage List for England
MPA	Marine Protected Areas
MPAs	Minerals Planning Authorities
MSA	Mineral Safeguarding Area
NERC	Natural Environment and Rural Communities
NIA	Noise Important Area
NIR	Noise Insulation Regulations 1975
NNR	National Nature Reserve
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
NPFF	National Planning Policy Framework

Abbreviation	Definition
NPPF	National Planning Practice Guidance
NPSE	Noise Policy Statement for England
NPSNN	National Policy Statement for National Networks
NSE	Noise Sensitive Receptors
NSIP	Nationally Significant Infrastructure Project
NVS	Nitrate Vulnerable Zone
OS	Ordnance Survey
OY	Opening Year
PCM	Pollution Climate Mapping
PCF	Project Control Framework
PINS	Planning Inspectorate
PM_{10}	Particulate matter <10 microns in diameter
PPG	Planning Practice Guidance
PPV	Peak Particle Velocity
PRoW	Public Right of Way
pSAC	Potential Special Area of Conservation
pSPA	Potential Special Protection Areas
PSSR	Preliminary Sources Study Report
RBC	Rugby Borough Council
RCA	Regional Character Areas
RIS	Road Investment Strategy
RIS2	Road Investment Strategy, second investment period 2020-2025
RIS3	Road Investment Strategy, third investment period
RPG	Registered Park and Garden
SAC	Special Area of Conservation
SFRA	Strategic Flood Risk Assessments

Abbreviation	Definition
SGAR	Stage Gate Assessment Review
SINC	Sites of Importance for Nature Conservation
SNCI	Sites of Nature Conservation Importance
SNRHW	Stable non-reactive hazardous waste
SOAEL	Significant Observed Adverse Effect Level
SPA	Special Protection Areas
SRN	Strategic Road Network
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SWMP	Site Waste Management Plan
SPZ	Source Protection Zone
UKCP18	UK Climate Projections 2018
WDC	Warwickshire District Councils
Waste FD	Waste Framework Directive
WFD	Water Framework Directive
WHO	World Health Organisation
WPAs	Waste Planning Authorities
ZoI	Zone of Influence

Glossary of Terms

Term	Definition
Above Ordnance Datum (AOD)	The mean sea level at Newlyn (UK) used as a base measurement on Ordnance Survey Maps for contours.
Agricultural Land Classification (ALC)	ALC provides a nationally consistent and recognised method for assessing the potential productiveness of agricultural land. It classifies land into five grades, with Grade 3 subdivided into Subgrades 3a and 3b. The best and most versatile land is defined as Grades 1, 2 and 3a by policy guidance. This is the land which is most flexible, productive and efficient in response to inputs and which can best deliver future crops for food and non-food uses such as biomass, fibres and pharmaceuticals.
Aquifer	A body of rock through which appreciable amounts of water can flow
Assessment	An umbrella term for description, analysis and evaluation.
Balancing pond	Part of a drainage system that is used for temporarily storing and attenuating flood waters. Also Referred to as an Attenuation pond.
Biodiversity	Biological diversity, or richness of living organisms present in representative communities and populations.
Catchment	A drainage/basin area within which precipitation drains into a river system and eventually into the sea.
Conservation Area	Area of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance.
Contaminated Land	The 'Environment Protection Act 1990' defines contaminated land as 'any land which appears to the local authority as to be in such condition, by reason of substances, on or under the land, that significant harm is being caused or there is a significant possibility of such harm being caused; or pollution of controlled water is being, or likely to be caused.
Controlled waters	Rivers, streams, estuaries, lakes, canals, ditches, ponds and groundwater as far out as the UK territorial limit. The statutory definition is provided in section 104 (1) of the Water Resources Act 1991 and section 30A (d) of the Control of Pollution Act 1974.
Culvert	A metal, wooden, plastic, or concrete conduit through which surface water can flow under or across roads.
D3M	Dual three lane motorway

Term	Definition
Deposition (sediment)	The laying down of part, or all, of the sediment load of a stream on the bed, banks or floodplain which forms various sediment features such as bars, berms and floodplain deposits.
DMRB	Design Manual for Roads and Bridges – contains standards for the design of highways.
Ecological status	The state of a water body, derived from a number of factors, including: the abundance of aquatic flora and fauna, nutrient availability, salinity, temperature and chemical pollution levels.
Erosion	The removal of sediment or bedrock from the bed or banks of a channel by flowing water occurring mostly during high flows and flood events. Forms various river features such as scour holes and steep outer banks.
Floodplain	Land adjacent to a watercourse over which water flows or would flow in times of flood, but for defences in place.
Flood zones 1, 2 and 3	A flood zone area classification system devised by the EA: - flood zone 1: land outside the floodplain. There is little or no risk of flooding in this zone; - flood zone 2: the area of the floodplain where there is a low to medium flood risk; and - flood zone 3: the area of the floodplain where there is a high risk of flooding.
Fluvial	A term that relates to rivers and streams and the processes that occur within them.
Free-flow link	A link that allow the flow of vehicles from one road to another without requiring them to use a roundabout.
Guidelines for Landscape and Visual Impact Assessment (GLVIA)	A document published by the Landscape Institute providing detailed advice on the process of assessing the landscape and visual effects of developments and their significance.
Groundwater	Water below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.
Habitat	Term most accurately meaning the place in which a species lives, but also used to describe plant communities or agglomerations of plant communities, as used, for example in a Phase 1 Habitat Survey.

Term	Definition
L_{A10}	A noise index used to describe the noise level that is exceed for 10% of the time. In the UK it is the standard index used to describe road traffic noise between 06:00 and 24:00.
Landscape	Human perception of the land, conditioned by knowledge and identity with a place.
Landscape Character	A distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement. It creates the particular sense of place of different areas of the landscape.
Landscape Character Area (LCA)	Areas of homogenous landscape or townscape character. Typical components defining character include landform, land cover, settlement pattern, form and enclosure.
Local Character Type (LCT)	A form of landscape classification based on characteristics of the land.
Landscape Character Unit (LCU)	Areas of relatively uniform landscape or townscape character. Typical components defining character include landform, land cover, settlement pattern, form and enclosure.
L_{den}	An A-weighted noise index to describe overall annoyance. It is derived from noise levels from the day, evening and night periods. The evening and night periods are weighted to account for the increase in sensitivity at these times.
Listed Building	Building included on the list of buildings or special architectural or historic interest and afforded statutory protection under the 'Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997' and other planning legislation. Classified categories A – C(s).
Local Nature Reserve (LNR)	A non-statutory site of local importance for wildlife, geology, education or public enjoyment.
Local Planning Authority	The planning department within the local authority where a development is situated.
Landscape and Visual Impact Assessment (LVIA)	The process of evaluating the effect of a proposal upon the landscape and views of it.
Made Ground	Material deposited by man (i.e. not natural).

Term	Definition
MAGIC	Multi-agency geographical information for the countryside – interactive mapping and information tool provided by Defra.
Main River	A river maintained directly by the EA. They are generally larger arterial watercourses.
Mitigation	Measures including any process, activity, or design to avoid, reduce, remedy or compensate for adverse environmental impact or effects of a development.
National Character Area (NCA)	A natural subdivision of England based on a combination of landscape, biodiversity, geodiversity and economic activity.
Pollution prevention guidance	A series of guidance notes produced by the Environment Agency to advise industry and the public on legal responsibilities and good environmental practice.
Public Rights of Way (PRoW)	A highway where the public has the right to walk. It can be a footpath (used for walking), a bridleway (used for walking, riding a horse and cycling), or a byway that is open to all traffic (including motor vehicles).
RAMSAR	Site of Importance (International) to Water Birds. Designated under The Convention on Wetlands, signed in Ramsar, Iran, in 1971 and brought into force in Europe by Directive 79/409/EEC on the Conservation of Wild Birds (the Birds Directive).
Runoff	The flow of water over the ground surface.
Scheduled Monument	A monument which has been scheduled by the Scottish Ministers as being of national importance under the terms of the 'Ancient Monuments and Archaeological Areas Act 1979'.
Secondary aquifer	There are two types of secondary aquifer designations: Secondary A: 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. These are generally aquifers formerly classified as minor aquifers; and Secondary B: predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally water-bearing parts of the former non-aquifers.
Sediment	Organic and inorganic material that has precipitated from water to accumulate on the floor of a water body, watercourse or trap.

Term	Definition
Silt	Soil particles 0.002mm to less than 0.06mm in equivalent diameter
Sites of Special Scientific Interest (SSSI)	Areas of national importance. The aim of the SSSI network is to maintain an adequate representation of all natural and semi-natural habitats and native species across Britain. The site network is protected under the provisions of Sections 28 and 19 of the Wildlife and Countryside Act 1981 as well as the Amendment Act 1985 and the Environmental Protection Act 1990.
Special Area of Conservation (SAC)	An area designated under the EC Habitats Directive to ensure that rare, endangered or vulnerable habitats or species of community interest are either maintained at or restored to a favourable conservation status.
Special Protection Area (SPA)	An area designated under the Wild Birds Directive (Directive 74/409/EEC) to protect important bird habitats. Implemented under the Wildlife and Countryside Act 1981. Under the Habitats Directive, all SPAs will be proposed Special Area of Conservation.
Surface water	Waters including rivers, lakes, loughs, reservoirs, canals, streams, ditches, coastal waters and estuaries.
Sustainable drainage systems	Measures designed to control surface runoff close to its source, including management practices and control measures such as storage tanks, basins, swales, ponds and lakes. Sustainable drainage systems allow a gradual release of water and thereby reduce the potential for downstream flooding.
Tree Preservation Order (TPO)	An order made by a local planning authority in England to protect specific trees, groups of trees or woodlands in the interests of amenity.
Visual Amenity	Value of a particular place in terms of what is seen by visual receptors, taking account of all available views and their total visual experience. The assembly of components, which provide and attractive setting or backcloth for activities, to which value is attached in terms of what is seen.
Water Framework Directive (WFD)	Wide-ranging European environmental legislation (2000/60/EC). Addresses inland surface waters, estuarine, coastal waters and groundwater. The fundamental objective of the WFD is to maintain “high status” of waters where it exists, preventing any deterioration in the existing status of waters and achieving at least ‘good status’ in relation to all waters by 2015.

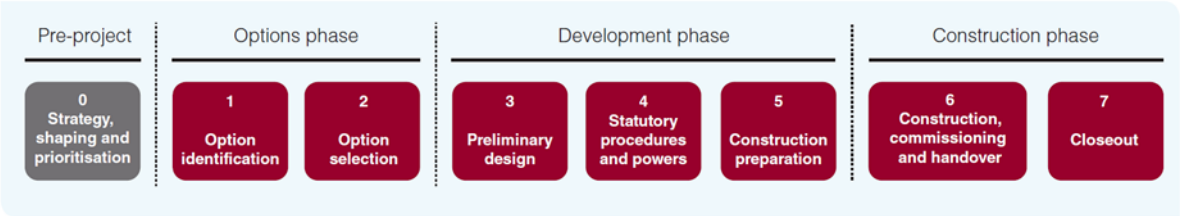
1 Introduction

1.1 Purpose of the project report

1.1.1 AECOM has been commissioned by Highways England to prepare this Project Control Framework (PCF) Environmental Assessment Report (EAR) for proposed improvement to the existing A46 Walsgrave junction (herein referred to as “the proposed scheme”). The proposed scheme is being developed to alleviate congestion and delays experienced at the junction, with the aim of improving journey times, journey time reliability and enhanced safety.

1.1.2 Highways England is responsible for the operation and maintenance of the Strategic Road Network (SRN) in England, which includes all motorways and major trunk roads. All Highways England major road projects are progressed through the Project Control Framework (PCF) which is split into various phases: Pre-project, Options, Development, and Construction – refer to Plate 1.1 (Highways England, 2018a). The four phases are divided into eight Stages, from Stage 0 (Strategy, Shaping, and Prioritisation) to Stage 7 (Closeout). The project is currently at PCF Stage 2 (the 'option selection' stage).

Plate 1.1: Major projects life cycle



1.1.3 This EAR presents the methodology and findings of the PCF Stage 2 studies and assessments carried out in respect of the proposed scheme, the purpose of which are to identify whether significant effects on the environment are likely to result from its construction and operation.

1.1.4 The main purpose of this EAR is to:

- Describe the proposed scheme options including any evolution of the proposed scheme design to date.
- Describe the methodology that was used within this environmental assessment. The assessment methodology used for the assessment has remained as outlined in the PCF Stage 2 Environmental Scoping Report (Highways England, 2021e) (hereafter referred to as the ‘Scoping Report’).
- Provide details of embedded mitigation and suggested essential mitigation measures which would be required to minimise the impact of adverse environmental effects as associated with the proposed scheme.
- Document the assessment of potential cumulative effects of the proposed scheme.
- Present the results from the environmental assessment process and explain the significance of any environmental effects identified.
- Identify key environmental issues associated with the proposed scheme options.
- Present the scope of the stakeholder consultation performed to date and the requirements for any further consultation.

1.1.5 Four proposed scheme options have been considered within this report, as described in Chapter 2: The Project. All figures and appendices are provided in Volume 2: Appendices.

1.1.6 The findings of this EAR will be used to inform the decision-making process regarding the selection of a preferred option.

1.1.7 This EAR will also inform the preparation of an Environmental Impact Assessment (EIA) (Screening) Determination which will confirm the potential for significant environmental effects and likely need for a statutory EIA. The potential for significant environmental effects resulting from the proposed scheme will be a factor in determining the consenting route for the preferred option. The consenting route will define the programme and scope of work to be undertaken at PCF Stage 3 (Preliminary Design).

1.2 Overview of the project

1.2.1 The project is a junction improvement scheme proposed by Highways England for the A46 Walsgrave junction.

1.2.2 An upgrade to the junction of the A46 Coventry Eastern bypass and the B4082, east of Walsgrave is being proposed by Highways England to ease congestion and reduce queuing along the A46 corridor east of Coventry. At this option selection stage four options are being considered for the upgrade to the existing junction.

1.2.3 The works to Walsgrave junction form part of a wider scheme of improvements to the A46, a non-continuous route which begins east of Bath and ends in Cleethorpes. This includes works to Binley junction, located approximately 1.1 miles (1.7 kilometres (km)) to the south of Walsgrave junction which is currently under construction. Binley junction is assumed to be operational in the do-minimum assessment for the proposed scheme. It also includes works at Newark. As the proposed works at Newark are located more than 80km to the north-east of Coventry, it is not considered further within this EAR. The A46 connects a number of major employment sites to the wider motorway network and forms a key element of the north-south travel to work area.

1.2.4 The A46 corridor also provides an alternative route for journeys between the East Midlands and the South West, avoiding the Birmingham Box, and forms part of the national SRN, linking the M6 and M69 with the M40 and the M5. The efficient and reliable performance of this corridor is therefore critical to Coventry city and the Warwickshire area.

1.2.5 The proposed scheme is one of a number of schemes set out under the Department for Transport (DfT) Road Investment Strategy (RIS) to be developed by Highways England during the RIS period of 2015 to 2020 as announced in the 2014 Autumn Statement.

1.2.6 The Highways England South Midlands Route Strategy Evidence Report (Highways England, 2014a) indicated that sections of A46 to the south and east of Coventry suffer from congestion and poor journey time reliability issues. These are likely to be exacerbated by future housing growth and economic aspirations. Many communities are located adjacent to the A46 and stakeholders have raised concerns regarding the pedestrian crossing points on and near the A46.

1.3 Legislative and policy framework

Brexit impact on EIA

1.3.1 As of exit day (11pm on 31 January 2020), the UK is no longer a European Union (EU) Member State. The European Union (Withdrawal) Act 2018 (EU(W)A 2018) provides for the European Communities Act 1972 (ECA 1972) to be repealed from exit day. In exercise of the powers in EU(W)A 2018, the UK government made the Environmental Assessments and Miscellaneous Planning (Amendment) (EU Exit) Regulations 2018 (SI 2018/1232). These regulations provide for the EIA Regulations to be amended with effect from 11pm on 31 December 2020. In particular, the amendments update references in the EIA Regulations to EU law, Member States and related terms to reflect the UK leaving the EU. The regulations do not make any substantive changes to the way the EIA regime will operate in England and Wales following the UK's exit from the EU.

1.3.2 The Environment Bill, first introduced in draft form in December 2018, was approved by Parliament in 9 September 2021. The Environment Act 2021 (The Stationary Office, 2021) sets out legislation to provide a post-Brexit environmental framework for the UK. As a summary, the Act includes new legislation such as: binding targets on air and water quality, biodiversity, and resource efficiency and waste reduction. This Act was given Royal Assent after the preparation of this report. Any changes to legislation, policy, or plans will be fully considered and implemented if necessary, during PCF Stage 3 delivery.

EIA Regulations

1.3.3 Under retained EU Law the regulation of relevance to the proposed scheme is the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (hereafter referred to as the 'EIA Regulations').

1.3.4 All relevant projects promoted by Highways England are required to be subjected to a process of determination in order to identify whether a project is likely to have a significant effect on the environment (and thereby require statutory EIA). The proposed scheme does not meet the criteria within Schedule I of the Town and Country Planning (EIA) Regulations 2017. The proposed scheme is categorised as a relevant project under Schedule 2 (10) (f) of the EIA Regulations and therefore, should be considered against the criteria listed in Schedule III of the Directive.

1.3.5 Upon completion of the option selection stage environment assessment and selection of a preferred option, an EIA (Screening) Determination will be prepared to confirm the potential for significant environmental effects for the selected option.

1.3.6 Should the preferred option be unlikely to result in significant environmental effects, this shall be recorded, and a publication of the screening decision made in accordance with the Highways Act 1980 (as amended). Highways England would then undertake a non-statutory environmental assessment and report the outcomes in an EAR at PCF Stage 3. The requirements of the EIA Directive are transposed into the Highways Act 1980 through the EIA (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017.

1.3.7 Should the preferred option be likely to result in significant environmental effects, an EIA in the format of an Environmental Statement must be undertaken in accordance with the EIA Regulations at PCF Stage 3. If the proposed scheme is deemed to be a Construction, Alteration or Improvement project that exceeds the relevant thresholds for size or is likely to result in significant effects on the environment, the proposed scheme would need to apply for a Development

Consent Order (DCO) under the Planning Act 2008 (as amended), where the requirements of the EIA Regulations are transposed through the Infrastructure Planning (EIA) Regulations 2017. If this was required, the proposed scheme would need to consider the National Policy Statement for National Networks (NPSNN) as the primary planning policy (DfT, 2014).

1.3.8 In accordance with Schedule 22 of the Planning Act 2008, it is considered that an EIA would be required for options 6, 7, 8 and 11 during PCF Stage 3. Options 6, 8 and 11 all exceed the 12.5 hectare (ha) threshold for construction and alteration highway projects that are not a motorway but where the speed limit for the highway is 50 mph or greater as set out in the Planning Act 2008. As such it is anticipated that options 6, 7, 8 and 11 would be considered Nationally Significant Infrastructure Projects (NSIP) requiring an EIA. Option 7 does not exceed the 12.5ha threshold for construction and alteration highway project, but may still require an EIA if the scheme is likely to result in significant adverse effects on the environment.

National Policy Statement for National Networks

1.3.9 Early planning reviews at PCF Stage 2 have indicated that all four Do-Something options (refer to Section 2.4) are likely to be considered NSIPs. In accordance with Schedule 22 of the Planning Act 2008, it is considered that an EIA would be required for options 6, 7, 8 and 11 during PCF Stage 3. Options 6, 8 and 11 all exceed the 12.5 hectare threshold for construction and alteration highway projects that are not a motorway but where the speed limit for the highway is 50 mph or greater as set out in the Planning Act 2008. As such it is anticipated that options 6, 7, 8 and 11 would be considered Nationally Significant Infrastructure Projects (NSIP) requiring an EIA. Option 7 does not exceed the 12.5 hectare threshold for construction and alteration highway project, but may still require an EIA if the scheme is likely to result in significant adverse effects on the environment.

1.3.10 In accordance with section 104(2)(a) of the Planning Act 2008, the Secretary of State is required to have regard to the relevant National Policy Statement (NPS), amongst other matters, when determining a DCO application. The relevant NPS for the proposed scheme is the NPSNN.

1.3.11 Published in 2014, the NPSNN sets out the need for, and Government's policies to deliver, development of NSIPs on the national road and rail networks in England. It provides planning guidance for promoters of nationally significant infrastructure projects on the road and rail networks, and the basis for the examination by the Examining Authority and decisions by the Secretary of State.

1.3.12 The assessments reported in Chapters 5 to 15 of this EAR have each considered the NPSNN guidance where applicable.

1.3.13 The NPS Accordance PCF product is also being prepared as part of PCF Stage 2, which will be based on the findings of the assessment reported in this EAR.

National Planning Policy Framework (NPPF)

1.3.14 The revised National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, MHCLG, 2021a) was published on 20 July 2021 and sets out the overarching development principles at a national level and outlines the presumption in favour of sustainable development.

1.3.15 Chapter 9 of the NPPF sets out the national policies for promoting sustainable transport, and paragraph 104 states that:

"Transport issues should be considered from the earliest stages of plan-making and development proposals, so that:

- the potential impacts of development on transport networks can be addressed;
- opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated;
- opportunities to promote walking, cycling and public transport use are identified and pursued;
- the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; and
- patterns of movement, streets, parking and other transport considerations are integral to the design of schemes and contribute to making high quality places."

1.3.16 Paragraph 105 then states:

"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."

1.3.17 Whilst the NPSNN is the primary source of policy guidance of relevance to NSIPs, the Secretary of State must have regard to any other matters that may be both 'important and relevant'. The requirements of the NPPF therefore remain of relevance and are often aligned with the requirements of the NPSNN.

1.3.18 The technical chapters provided in Chapters 5 to 15 of this EAR have each considered the NPPF and the policies relevant to each technical discipline.

Road Investment Strategy (RIS)

1.3.19 The DfT's RIS (DfT, 2020) sets out the long-term approach to improve England's SRN and provides the strategic vision, programme and investment plan to deliver improvements and alterations to specific roads.

1.3.20 The proposed scheme was one of a number of schemes set out under the DfT RIS to be developed by Highways England during the RIS period of 2015 to 2020 as announced in the 2014 Autumn Statement. The scheme is comprised of upgrades to Binley and Walsgrave junctions and is to be developed and delivered by Highways England during the RIS1 and RIS2 periods. Binley junction is currently in the construction phase.

Highways England Licence

1.3.21 The Secretary of State appointed Highways England Company Limited (the Licence holder) as a Strategic Highways Company by way of an Order in accordance with Section 1 of the Infrastructure Act 2015. The Licence under which Highways England operates, the Highways England Licence (DfT, 2015), sets out the Secretary of State's statutory directions and guidance to Highways England.

Under the Licence, Highways England is the highway authority, traffic authority and street authority for the SRN. It makes clear, to both Highways England and the wider community of road users and stakeholders, what Highways England is expected to achieve and how they must behave in discharging their duties and in delivering the vision and plans for the network, set out in the RIS.

1.3.22 Under Part 4.2g of The Highways England Licence and in accordance with the Infrastructure Act 2015, the Licence holder must "minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment." The Licence holder should and will as part of implementing this proposed scheme follow the conditions set out in Part 5.23 of the Act:

- "Ensure that protecting and enhancing the environment is embedded into its business decision-making processes and is considered at all levels of operations.
- Ensure the best practicable environmental outcomes across its activities, while working in the context of sustainable development and delivering value for money.
- Consider the cumulative environmental impact of its activities across its network and identify holistic approaches to mitigate such impacts and improve environmental performance.
- Where appropriate, work with others to develop solutions that can provide increased environmental benefits over those that the Licence holder can achieve alone, where this delivers value for money.
- Calculate and consider the carbon impact of road projects and factor carbon into design decisions and seek to minimise carbon emissions and other greenhouse gases from its operations.
- Adapt its network to operate in a changing climate, including assessing, managing and mitigating the potential risks posed by climate change to the operation, maintenance and improvement of the network.
- Develop approaches to the construction, maintenance and operation of the Licence holder's network that are consistent with the government's plans for a low carbon future.
- Take opportunities to influence road users to reduce the greenhouse gas emissions from their journey choices."

1.3.23 Under Section 5.24 of the Licence, Highways England must deliver these commitments and develop strategies and timescales as specified and published in Highways England's Delivery Plans.

Highways England Delivery Plan: 2020 – 2025

1.3.24 The Highways England Delivery Plan: 2020-2025 (Highways England, 2020a) sets out the main activities and describes how the road improvement schemes proposed will be delivered along with the requirements of a demanding Performance Specification. The performance goals outlined in the Highways England Strategic Business Plan: 2020 - 2025 (Highways England (2020b) align to the six outcome areas set out in the RIS. The proposed scheme should seek to achieve the following performance goals:

- Improving safety for all
- Providing fast and reliable journeys
- A well maintained and resilient network
- Delivering better environmental outcomes
- Meeting the needs of all users
- Achieving efficient delivery

Highways England Sustainable Development Strategy

1.3.25 The Highways England Sustainable Development Strategy (Highways England, 2017a) communicates Highways England's approach and priorities for sustainable development to its key stakeholders. By *"encouraging economic growth while protecting the environment and improving safety and quality of life for current and future generations"*, Highways England seeks to protect, manage and enhance the human and natural environment whilst ensuring value for money and efficiency is achieved in the development of schemes identified in the RIS. The design development of the proposed scheme has given regard to the principles contained in the Sustainable Development Strategy.

Highways England Environment Strategy

1.3.26 The Highways England Environment Strategy (Highways England, 2017b) sets the vision that will guide Highways England's environmental actions and activities over the five-year period outlined in the RIS (DfT, 2020). The document communicates the approach to securing environment improvement, founded on the following vision: *"A strategic road network working more harmoniously with its surroundings to deliver an improved environment"*. Through its Environmental Strategy, Highways England has identified a series of strategic levers and plans which place environment at the heart of design. These have been considered as part of the design-development and environmental assessment of the proposed scheme.

Highways England Biodiversity Plan

1.3.27 The Highways England Biodiversity Plan (Highways England, 2015a) forms a key component of the Highways England Environment Strategy (Highways England, 2017b) and seeks to ensure that existing and future road schemes are developed and managed in a way that positively supports biodiversity. The document acknowledges that highway verges and associated land have a key role in improving the quality of wildlife areas and connecting fragmented habitats. Through the EIA process, potential effects on ecological habitats and species have been considered and measures have been included within the proposed scheme design to avoid, mitigate and enhance biodiversity, refer to Chapter 8: Biodiversity. These have been developed in a way that furthers the objective of delivering a net biodiversity gain on the SRN by 2040.

1.3.28 The Biodiversity Plan was prepared to complement the RIS and has not yet been updated alongside RIS2. This document could therefore be superseded prior to PCF Stage 3.

Highways England Air Quality Strategy

1.3.29 The Highways England Air Quality Strategy (Highways England, 2017c) explains Highways England's strategy to improving air quality on the SRN, in order to deliver a cleaner network and improve the health of its neighbours and customers. The document identifies the importance of clean air and the need to explore new and innovative ways to tackle the impact that vehicle emissions have on air quality and human health.

1.3.30 The Air Quality Strategy was prepared to compliment the RIS and has not yet been updated alongside RIS2. This document could therefore be superseded prior to PCF Stage 3.

Highways England Net Zero Highways: Our 2030/ 2040/ 2050 Plan

1.3.31 The Highways England Net Zero Highways: Our 2030/ 2040/ 2050 Plan was published in July 2021 (Highways England, 2021a) and details how Highways England will take immediate and sustained action towards decarbonising England's motorways and A-roads, so that they can continue to bring significant benefits to motorists, communities and businesses in a net-zero future. Building on the work reducing carbon since 2015, the plan sets out a comprehensive roadmap to rapidly decarbonise the SRN. Highways England plan to achieve this by putting roads at the heart of Britain's net zero future through three key commitments; achieving net zero for Highways England's own operations by 2030, delivering net zero road maintenance and construction by 2040; and supporting net zero carbon travel on our roads by 2050. The plan aligns with the Paris Agreement (UNFCCC, 2016), the UK's commitment for a net zero economy by 2050, the Government's Decarbonising Transport strategy (Department for Transport, 2021) and the Committee on Climate Change's 6th Carbon Budget (Department for Business, Energy and Industrial Strategy (BEIS), accessed 2021).

1.3.32 The construction and operation of the Scheme will take place within the period covered by the plan. The plan sets out targets for construction emissions, many of which are due to be achieved during or before the construction period. The plan also sets out operational targets for UK roads managed by Highways England with targets set between the present day and 2050. The proposed scheme is expected to become operational no earlier than 2029 and will therefore be in operation throughout the plan's lifecycle.

2 The Project

2.1 Need for the project

2.1.1 The A46 corridor forms part of the national strategic highway network connecting the M1, M6, M69 with the M5 and provides links to the SRN and the rest of the country. The Highways England South Midlands Route Strategy Evidence Report (2014) indicated that sections of A46 to the south and east of Coventry suffer from congestion and poor journey time reliability issues. These are likely to be exacerbated by future housing growth and economic aspirations. Many communities are located adjacent to the A46 and stakeholders have raised concerns regarding the pedestrian crossing points on and near the A46.

2.1.2 The A46 has historically experienced safety performance issues in comparison to the rest of the SRN. The A46 south of Coventry was in the top 45% for total casualties and in the top 250 collision locations in England. Improvements at A45/ A46 Tollbar End junction, to the south of Coventry, to grade separate the A46 (N) to A45 (W) movements were completed in 2017. Conversion of a section of the M6 between junctions 2 and 4 into a Smart Motorway was completed in March 2020.

2.1.3 Walsgrave junction is one of two roundabouts east of Coventry and north of Tollbar End junction that are at grade, and as such are pinch points for traffic. The second roundabout is located to the east of Binley, to the south of Walsgrave junction. The Tollbar End and M6 Smart Motorway improvements have increased the pressure on Binley and Walsgrave junctions.

2.1.4 There are concerns that without further investment to reduce congestion on the A46, the benefits derived from the improvement works at Tollbar End junction would be limited. In particular, the current delays at the Binley and Walsgrave junctions could undermine the existing investment which has been made on A46 improvements.

2.1.5 Improvement works to Binley junction are under construction. Therefore, consideration is now being given to options to alter the existing Walsgrave junction to ease congestion and reduce queuing.

2.2 Project objectives

2.2.1 As detailed in section 1.3 of this EAR, the Secretary of State appointed Highways England Company Limited (the Licence holder) as a strategic highways company by way of an Order in accordance with Section 1 of the Infrastructure Act 2015. The licence under which Highways England operates sets out the Secretary of State's statutory directions and guidance to Highways England.

2.2.2 Under Part 4.2g of The Highways England Licence and in accordance with the Infrastructure Act 2015, the licence holder must "minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment." Part 5.23 of the act sets out the conditions the licence holder should follow (refer to 1.3.20 of this EAR).

2.2.3 To resolve the issues identified in 1.3.20 above, the following objectives have been identified:

- Support and facilitate economic growth, supporting employment and residential development opportunities
- Improve the operation and efficiency of the existing transport network
- Support employment and residential development opportunities
- Deliver capacity enhancements to the Strategic Road Network and improved operation and efficiency of the existing transport network

- Support for use of sustainable modes and reducing or minimising the negative impacts users, local communities and on the wider environment
- Improve connectivity and community cohesion to balance the needs of individuals and businesses that use and rely on the Strategic Road Network
- Ensure the road network is maintained to a safe and serviceable condition
- Consider operational maintenance on a holistic basis during the design stage and balance of cost versus disruption

2.2.4 The A46 corridor provides opportunities for economic growth and improved accessibility within Coventry and Warwickshire enabling the unlocking of sites for residential development and improving access to existing commercial areas.

2.2.5 Economic growth aspirations in the surrounding environment include:

- Up to 75,000 new homes and 94,500 jobs in Coventry and Warwickshire by 2031
- Prologis Ryton distribution park
- Coventry and Warwickshire Gateway Scheme
- Friargate, a 30-hectare mixed use regeneration project in Coventry city centre
- Ansty Park, high profile prestige business park site for Coventry and Warwickshire
- Whitley South, an extension of Jaguar Land Rover's existing site west of the A46 Tollbar junction

2.2.6 Details of other developments within the corridor and their status as the time of writing can be found in Chapter 15: Assessment of Cumulative Effects.

2.2.7 The A46 corridor also fulfils a key strategic role in linking the Advanced Manufacturing Sector within the Warwickshire Sub Region.

2.2.8 The proposed scheme seeks to support the following key performance indicators as stated in the Highways England Strategic Business Plan: 2015-2020 (2014):

- Making the network safe
- Supporting the smooth flow of traffic
- Encouraging economic growth
- Keeping the network in good condition
- Achieving real efficiency (cost savings on capital expenditure)
- Improving user satisfaction

2.2.9 Under Section 5.24 of the Licence, Highways England must deliver these commitments and develop strategies and timescales as specified and published in Highway's England Delivery Plans.

2.2.10 The proposed scheme is set out in Highways England's Delivery Plan 2015-2020 (2014). The Delivery Plan 2015-2020 builds on Highways England's Strategic Business Plan 2015-2020 (Highways England, 2014b), which was the response to the Government's road improvement scheme. The Strategic Business Case sets out the performance specification in eight key areas, one of which is developing better environmental outcomes. The Delivery Plan builds on this and Highways England provide a commitment to ensure "…that all activity on the Strategic Road Network is delivered in a manner that does not harm the environment; but instead delivers long term benefits to the natural and built environment, creating a sustainable future for all".

2.2.11 Alongside Highways England Value Management and Benefits team, a Value Management workshop was held early in PCF Stage 2 to confirm and agree the project objectives and critical success factors outcomes.

2.2.12 These have been identified based on the need being addressed, and other strategic objectives from the Highways England Licence the RIS (DfT, 2020) and the Highways England Delivery Plan: 2020-2025

2.2.13 Within the primary strategic objective of alleviating congestion and delays experienced at the junction by providing free-flow links for all movements (as described above), the wider project objectives are described in the scope in terms of Economy, Environment and Project Specific:

- Improve connectivity along the A46 corridor and form a key strategic role in linking the Advanced Manufacturing Sector within the Warwickshire Sub Region.
- Support regional economic growth
- Improve journey times for those using the junction
- Improve journey time reliability for those using the junction
- Improve the resilience of the motorway junction
- Improve the safety for road users
- Improve the maintainability of the network
- Increase road worker safety
- Seek opportunities to protect and enhance the environment
- Minimise adverse impacts on the environment

2.2.14 The proposed scheme is required to maximise biodiversity delivery, using Natural England's Biodiversity Metric 2.0 (as per E/1.1.1 in DMRB LA 108 Biodiversity, Revision 0 and 3.2.7 of DMRB LD 118 Biodiversity design, Revision 0) to provide a summary of the scale and nature of biodiversity changes associated with the proposed scheme (Highways England, 2020w; 2020x).

2.3 Project location

2.3.1 Walsgrave junction is located approximately 3.1 miles (5km) to the east of Coventry city centre and connects the B4082 and the A46. The A46 dual carriageway and the B4082 single carriageway are both affected by the works. Binley junction is approximately 1.1 miles (1.7km) to the south and the M6 and M69 are to the north. The location is shown in Figure 2.1: Location Plan in Appendix A. Figures

Current description of Walsgrave Junction

2.3.2 Upgrades to Walsgrave junction form part of a wider scheme of improvements along the A46, a non-continuous route which begins at east of Bath and ends in Cleethorpes and forms part of the Strategic Road Network. Walsgrave junction is an at-grade three arm roundabout connecting the A46 and B4082. It is one of two presently at-grade roundabouts (together with Binley junction; located 1.7km south of Walsgrave junction) along the A46 Coventry Eastern Bypass and has been identified as a cause of congestion along the corridor. In addition, the A46 corridor suffers from low peak hour speeds, high vehicle delay, poor journey time reliability and has several collision clusters at the existing at-grade junctions.

The surrounding area

2.3.3 The proposed scheme is situated within the Coventry City Council and Rugby Borough Council administrative areas. In the vicinity of the proposed scheme, the boundary between these two administrative areas is along the western side of the A46. The environmental constraints surrounding the proposed scheme are detailed in Figure 2.2: Environmental Constraints in Appendix A. Figures

2.3.4 To the west of Walsgrave junction, the area is densely populated. The University Hospital Coventry is located approximately 0.7 miles (1.2km) to the north. An area of land on the west side of the A46, from north of Walsgrave junction to where the

A46 crosses the River Sowe, has been allocated for development (H2:3) in The Coventry Local Plan 2011 to 2031 (Coventry City Council, 2016). This site is expected to deliver approximately 900 dwellings through future development proposals, which is approximately 3.7% of the homes the Local Plan sets out to provide before 2031. As this is not a committed development at this stage (refer to Chapter 15), this development allocation area has not been considered within this EAR. There are no other areas allocated for development in close proximity to the junction and there are no consented planning permissions within the area.

2.3.5 Nearby residential communities which are part of Walsgrave on Sowe and Binley are located to the north and south of the B4082, west of the A46. A residential property is also located at Hungerley Hall Farm approximately 140m north-west of the junction.

2.3.6 Clifford Bridge Academy and Pearl Hyde Primary School are situated approximately 380m and 840m from the existing junction respectively. A further five schools are within 1.2 miles (2km) of the junction.

2.3.7 Wyken Community Centre is located approximately 770m north-west of the existing junction. and Coventry and Warwickshire University Hospital is approximately 0.7 miles (1.2km) to the north.

2.3.8 Caludon Castle playing fields are situated 0.62 miles (1km) to north-west.

2.3.9 The junction is immediately adjacent to the Coventry City-Wide Air Quality Management Area (AQMA), which has been designated due to exceedances of the annual mean nitrogen dioxide (NO_2) objective.

Ecological receptors

2.3.10 There are no European protected sites (Special Protection Areas (SPAs), Special Areas of Conservation (SAC), or Wetlands of International Importance (Ramsar sites) within 1.2 miles (2km) or the existing junction. The nearest European protected site is Ensor's Pool SAC which is located over 7 miles (11.5km) to the north-west.

2.3.11 Coombe Pool Site of Special Scientific Interest (SSSI) is located adjacent to the existing Walsgrave roundabout. The SSSI lies within Coombe Country Park and contains 36 hectares (ha) of a pool (fed by Smite Brook), reed beds, and woodland. The site is known for its herons (it is the largest heronry in the county with 20 breeding pairs), wintering waterfowl, tufted duck, kingfisher, water rail, and grey wagtail. The woodland within the SSSI supports a diverse breeding bird community (tits, corvids, woodpecker (3 species) and warblers).

2.3.12 Three other SSSI are within 3.1 miles (5km) of the junction: Herald Way Marsh, Ryton and Brandon Gravel Pitts, and Brandon Marsh.

2.3.13 Stoke Floods Local Nature Reserve (LNR) is located approximately 900m south-west of the junction. The reserve has a large lake, reedbeds, and scrub next to the River Sowe. The site supports many wetland plants, flag and reed canary grass, and bird life is varied from many species of duck, seven species of warbler in the summer and occasional black tern and yellow wagtails. The reserve is one of the most important wetland sites in Coventry and is a wildlife oasis in an area of high intensity housing. Two other LNR are located within 3.1 miles (5km) of the junction: Willenhall Wood and Wyken Slough.

2.3.14 Seven local wildlife sites (LWS) are located within 1.2 miles (2km) of the junction, the closest of which is Gainford Rise LWS which is approximately 80m south of the existing Walsgrave roundabout.

Hydrological, flood risk and geological receptors

2.3.15 Smite Brook is culverted beneath the A46 approximately 50m to the south of Walsgrave junction. Smite Brook is an Ordinary Watercourse and designated under the Water Framework Directive (WFD).

2.3.16 River Sowe and Withy Brook are located within close proximity to the proposed scheme boundary. The River Sowe passes around the edge of Walsgrave on Sowe and is approximately 280m to the north-west of the existing junction. Smite Brook flows into the River Sowe approximately 500m downstream of where it emerges from the A46 embankment. The River Sowe is a designated Main River under the WFD.

2.3.17 Birchley Wood Brook is a tributary of Smite Brook and an ordinary watercourse. While the brook is not specifically designated under the WFD, it would be incorporated in the Smite Brook designation as a tributary.

2.3.18 There are a number of standing water bodies within 1.2 miles (2km) of the junction, including Coombe Pool SSSI, Herald Way Marsh SSSI/ Local Nature Reserve, Brandon Marsh SSSI, and Ryton and Brandon Gravel Pits SSSI.

2.3.19 There are also a number of unnamed ponds and field drains.

2.3.20 No SSSIs designated for geological or geomorphological interest have been identified within 1.2 miles (2km) of the junction.

Cultural heritage receptors

2.3.21 Designated heritage assets located within 500m of Walsgrave junction include:

- Coombe Abbey, Grade II* listed Park and Garden is less than 50m from Walsgrave junction and is situated within the Coombe Country Park. The park has been developed on the grounds of the old abbey which was enclosed in 1150 for sheep pasture. The abbey has now been converted into the Coombe Abbey hotel.
- Three Grade II listed buildings at the site of Hungerley Hall Farm, approximately 170m north of the junction. These listed buildings are associated with the late 17th – early 18th century Farmhouse.
- Walsgrave Hill Farmhouse, Grade II listed building is located approximately 200m east of the combined scheme boundary. The building is a 19th century farmhouse.

2.3.22 Other designated heritage assets located up to 0.62 miles (1km) from Walsgrave junction include:

- Two scheduled monuments at the site of Caludon Castle
- Two Grade I listed buildings
- One Grade II* listed building
- 16 Grade II listed buildings

Key traffic and transport receptors

2.3.23 No public rights of way cross the A46 near the junction. Nearby public rights of way include: R75x and R75b bridleways which are located approximately 0.9 miles (1.5km) to the north-east and footpaths R75y (1.48 miles (2.4km) to the north-east) and R145 (approximately 1.1 miles (1.7km) to the south).

2.3.24 The Sowe Valley Walk, a locally promoted walk, is situated approximately 280m west of the junction, and follows the River Sowe from Longford through to Willenhall. No footways or pavements are provided along the A46 or the B4082.

2.3.25 Footways are provided along Clifford Bridge Road and there is a crossing point on Clifford Bridge Road near Bridgeacre Gardens. The Sowe Valley Walk also passes beneath Clifford Bridge Road north of the junction with B4082.

2.3.26 A number of bus routes are serviced along Clifford Bridge Road, these include route numbers 26, 60, 60A, 86. 585, 585A and 585b.

2.4 Project description

2.4.1 Since the preparation of the Scoping Report an additional option has been added (Option 11), as is explained in Chapter 3: Assessment of Alternatives.

Do-Minimum

2.4.2 This is the current baseline and assumes that Binley construction is progressing. However, with this option there will be no capacity improvements to Walsgrave junction and Highways England will be required to put in place a long-term repair and maintenance strategy to maintain the serviceability of the existing structures.

Do-Something

2.4.3 Four options are being considered and have been assessed for the upgrade to the existing Walsgrave junction at this option selection stage. The options are shown in Figure 2.3: Option 6 to Figure 2.6: Option 11 in Appendix A. Figures

- Do-Something – Option 6
- Do-Something – Option 7
- Do-Something – Option 8
- Do-Something – Option 11

2.4.4 Further detail is provided below and on corresponding figures (Appendix A. Figures The proposed scheme boundary indicated is a combined indicative land take boundary for construction of all options assessed (and therefore indicates a worst-case overview of possible land take as identified at this stage of the project).

2.4.5 The proposed scheme is anticipated to have an Opening Year of 2027 and a Design Year (15 years after opening) of 2042 (refer to Table 2.1) however, air quality, noise and climate have used traffic modelling data from the earliest possible opening year of 2025 and design year of 2040 so that the results presented are consistent with the traffic data and are conservative.

Do-something – Option 6 – Full Grade Separated Junction

2.4.6 Option 6 is a grade separated junction approximately 1km to the north of the existing roundabout location. The geometry of this option allows a 70mph speed limit on the mainline dual carriageway.

2.4.7 The A46 mainline would be realigned through the existing Walsgrave roundabout for approximately 1.1 miles (1.8km) in length, approximately 225m west of the existing route, and approximately 1m above the existing ground level before re-joining the existing A46 approximately 1.1km north of the existing roundabout.

2.4.8 The full grade separated dumbbell junction would be approximately 830m north-west of the existing Walsgrave junction and would consist of north and southbound diverge and merge slip roads connecting to an overbridge with roundabouts at each end. The overbridge would be provided across the realigned A46 between the two roundabouts and would carry a two-lane single carriageway. The proposed height above the A46 mainline road level would be up to approximately 7m. A new link road, approximately 0.62 miles (1km) in length, would be provided between the western roundabout of the dumbbell junction and the existing roundabout on Clifford Bridge Road. This would be a two-lane single carriageway.

2.4.9 The existing sections of the B4082 and A46 that are no longer required would be grubbed up and returned to nature; however, it may be advantageous to re-use one carriageway from the eastern dumbbell to the south for accommodation works to re-provide access to Hungerley Hall Farm.

2.4.10 The proposed outline drainage strategy for Option 6 is for three attenuation ponds to be constructed to attenuate the increase in impermeable area, before discharging to the River Sowe to the west via new outfalls. The pond volumes will take into account 40% climate change. A new culvert may be required to carry flow under the proposed mainline and connector road. An extension to the culvert carrying Smite Brook under the B4082 would be required on both sides to support the proposed verge. This would involve an in-situ reinforced concrete extension of approximately 7m on the north side and approximately 3m on the south side of the culvert. The existing wingwalls and headwalls will also need to be removed and replaced with in-situ reinforced concrete wingwalls and headwalls.

2.4.11 The scheme footprint for Option 6 is 333,138m^2. The permanent land take required for this option outside of the highway boundary would be 192,825m^2. The temporary land take required for this option would be 86,358m^2. The layout of this option is shown on Figure 2.3: Option 6.

Do-Something – Option 7 – Left-in/ Left-Out Junction

2.4.12 Option 7 is a left-in/ left-out arrangement, allowing merging or diverging from the proposed A46 northbound carriageway. Access/ egress to the local road network from the southbound carriageway is removed.

2.4.13 In Option 7 the existing roundabout would be removed and the A46 mainline dual carriageway would be realigned to provide a continuous link for two lanes of traffic in both the north and southbound directions. The realignment would occur at approximately the same level as the existing A46 and would be approximately 1km in length and approximately 40m to the east of the existing roundabout. The proposed alignment would have a posted speed limit of 50mph.

2.4.14 Access to the northbound carriageway of the A46 would be maintained through the provision of a new northbound merge slip road from the B4082 to the A46 mainline. Similarly, egress would be maintained via a new northbound diverge slip road from the A46 mainline to the B4082. The northbound diverge and merge slip roads would be single lane and would require widening of the existing highway corridor north and south of the B4082 where it meets the existing Walsgrave roundabout. Access to and egress from the A46 southbound carriageway at this junction would no longer be possible.

2.4.15 The diverge lane from the A46 would begin approximately 200m south of the existing junction and would join the B4082 approximately 230m to the west of the existing junction. The northbound diverge would be introduced at approximately the same level as the existing A46.

2.4.16 The merge lane would join the B4082 approximately 230m west of the existing junction and join the A46 approximately 260m to the north. The northbound merge would be introduced at approximately the same level as the existing A46.

2.4.17 The existing Walsgrave roundabout and any other redundant land between the proposed slip roads would be grubbed up and returned to nature.

2.4.18 As part of the drainage strategy, a culvert extension on the west side of the A46 for the Smite Brook under the mainline A46 would be required. This would involve the introduction of a new precast concrete retaining wall approximately 1.2m high and 6.2m long, to be installed in front of the existing headwall to retain fill. No extension is required for the existing link road culvert.

2.4.19 The scheme footprint for Option 7 is 111,453m^2. The permanent land take required for this option outside of the highway boundary would be 7,177m^2. The temporary land take required for this option would be 28,006m^2. The layout of this option is shown on Figure 2.4: Option 7.

Do-Something – Option 8 – Left-In/ Left-Out Junction

2.4.20 Option 8 is also a left-in/ left-out arrangement, allowing merging or diverging from the proposed A46 northbound carriageway. Access/ egress to the local road network from the southbound carriageway is removed. The mainline in this option has a larger radius compared to option 7 to allow for a posted speed limit of 70mph on the proposed A46 through the junction.

2.4.21 The existing roundabout would be removed and the A46 mainline dual carriageway would be realigned to provide a continuous link for two lanes of traffic in both the north and southbound directions. The realignment would occur at the approximately the same level as at the existing A46 and would be approximately 1.4km in length and approximately 30m to the east of the existing roundabout.

2.4.22 Access to the northbound carriageway of the A46 would be maintained through the provision of a new northbound merge slip road from the B4082 to the A46 mainline. Similarly, egress would be maintained via a northbound diverge slip road from the A46 mainline to the B4082. The northbound diverge and merge slip roads would be single lane and would require widening of the existing highway corridor north and south of the B4082 where it meets the existing Walsgrave roundabout. Access to and egress from the A46 southbound carriageway would no longer be possible.

2.4.23 The diverge lane from the A46 would begin approximately 260m south of the existing junction and would join the B4082 approximately 230m to the west of the existing junction. The northbound diverge would be at approximately the same level as the existing A46.The merge lane would diverge from the B4082 approximately 230m west of the existing junction and join the A46 approximately 570m to the north. The northbound merge would be at approximately the same level as the existing A46.

2.4.24 The existing Walsgrave roundabout and any other redundant land between the proposed slip roads would be returned to nature. The road realignment would impact the listed buildings at Hungerley Hall Farm and require the demolition of the farmhouse. See Figure 2.5: Option 8 (Appendix A. Figures).

2.4.25 As part of the drainage strategy, an attenuation pond would be introduced just north-west of the existing junction to provide attenuation for the surface water runoff. This attenuation pond would be constructed to attenuate the increase in impermeable area and discharge to the River Sowe to the north-west of the pond via a new outfall. The pond volumes will take into account 40% climate change. A culvert extension to the east and west of the A46 would be required for the Smite Brook. This would involve an in-situ reinforced concrete extension of approximately 3m on the west side and approximately 4.5m on the east side of the culvert. The existing wingwalls and headwalls will also need to be removed and replaced with in-situ reinforced concrete wingwalls and headwalls. No extension is required for the existing link road culvert.

2.4.26 The scheme footprint for Option 8 is 223,636m^2. The permanent land take required for this option outside of the highway boundary would be 52,890m^2. The temporary land take required for this option would be 38,253m^2. Option 8 includes both temporary and permanent land take within the Coombe Pool SSSI, with approximately 1,850m2 permanent land take and approximately 2,850m^2 temporary land take. The layout of this option is shown on Figure 2.5: Option 8.

Do-Something – Option 11 – Full Grade Separated Junction

2.4.27 Option 11 is a grade separated junction approximately 800m to the north of the existing roundabout location. The geometry of this option allows a 50mph speed limit on the mainline dual carriageway.

2.4.28 The A46 mainline would be realigned through the existing Walsgrave roundabout for approximately 0.5 miles (800m), before tying back into the current alignment at the existing Hungerley Hall Farm accommodation bridge. The mainline then continues on the current alignment for approximately (850m) to allow for junction slip road tie ins.

2.4.29 The full grade separated dumbbell junction would be approximately 800m north of the existing Walsgrave junction roundabout and would consist of north and southbound diverge and merge slip roads connecting to an overbridge with roundabouts to the east and west. The overbridge would be provided across the A46 between the two roundabouts and would carry a two-lane single carriageway. The proposed height above the A46 mainline road level would be up to approximately 8m. A new B4082 link road, approximately 0.62 miles (1km) in length, would be provided between the western roundabout of the dumbbell junction and an existing section of the B4082 that leads to the existing roundabout on Clifford Bridge Road. This would be a two-lane single carriageway. The new link road will pass close to the A46 mainline carriageway between the A46 and Hungerley Hall Farm before being aligned further west away from the A46 to connect to the western dumbbell.

2.4.30 The existing sections of the B4082 and A46 roundabout that are no longer required would be grubbed up and returned to nature. The existing overpass (farm access) over the A46 close to Hungerley Hall Farm will be demolished, with access re-provided via the B4082 and dumbbell junction overbridge, subject to consultation with the current landowner.

2.4.31 The proposed outline drainage strategy for Option 11 is for three attenuation ponds to be constructed to attenuate the increase in impermeable area, before discharging to the River Sowe to the west via new outfalls. The pond volumes will take into account 40% climate change. A new culvert may be required to carry flow under the proposed connector road to maintain an existing drainage ditch.

2.4.32 The scheme footprint for Option 11 is 306,752m^2. The permanent land take required for this option outside of the highway boundary would be 94,553m^2. In addition, an allowance has been made for an environmental compensation area to the north of Coombe Pool SSSI of 37,020m^2. The temporary land take required for this option would be 23,678m^2. The layout of this option is shown on Figure 2.6.

2.5 Construction, operation, and long-term management

Construction programme and phasing

2.5.1 At PCF Stage 2 the proposed scheme is still in an early stage of development. Limited construction information is currently available. The following construction details are based on information provided by buildability advisors. Following appointment of the Delivery Integration Partner (DIP) at PCF Stage 3, further buildability information will be available to refine these details.

2.5.2 It is anticipated that construction of the chosen preferred option would commence as per the option below with works taking place over an approximate 18 - 22-month period. The opening year is anticipated to be 2027 (see Table 2.1 below).

Table 2.1: Outline Construction Programme

Option	Start Date	End Date	Duration / days	Notes
6	20/10/2025	06/09/2027	686 (Calendar Days) 464 (Working Days)	This program does not include statutory undertaker diversions lead in times. It assumes statutory undertaker diversions are carried out during the main works, however advance works such as diversions prior to DCO examination and Secretary of State decision may be possible.
7	20/10/2025	16/04/2027	543 (Calendar Days) 366 (Working days)	Currently no statutory undertaker diversions are required for this option. However, as a precaution 15 working days have been allowed within the main works for unforeseen statutory diversions.
8	20/10/2025	05/03/2027	501 (Calendar Days) 338 (Working days)	This program does not include statutory undertaker diversions lead in times. It assumes statutory undertaker diversions are carried out during the main works; however, advance works such as diversions prior to DCO examination and Secretary of State decision may be possible. 15 working days have been allowed during the main works for diversions.
11	20/10/2025	07/07/2027	535 (Calendar Days) 359 (Working days)	No statutory undertaker diversions are anticipated for this option.

Construction compound location

2.5.3 A construction compound of approximately 17,000m^2 is assumed to be required for each option and is expected to include temporary offices, compounds and storage areas. This is proposed to be located between the existing A46 and the proposed A46 alignment for option 6; between the B4082 and Smite Brook to the south-west of the existing Walsgrave roundabout for options 7 and 8 and to the north of Hungerley Hall Farm, with access off the existing B4082 for option 11.

Working hours - Construction

2.5.4 Professional judgement has been used to develop estimates of workforce numbers during proposed scheme construction. Approximately 120 workers per day has been assumed based on estimates provided by buildability advisors.

2.5.5 It is assumed that daytime and night-time working would be required. Working hours will need to be confirmed once a more detailed construction programme is available at PCF Stage 3, but the construction programme is currently based upon 5 days per week and 8 hours per day and all UK holidays.

Operation and long-term management

2.5.6 Operation of the proposed scheme would commence in the scheme opening year, anticipated to be 2027.

2.5.7 Examples of short-term maintenance activities are landscape management activities such as cutting grass and hedgerows, undertaken annually or bi-annually. Routine checks that signage and lighting is functioning correctly will also be carried out.

2.5.8 Examples of long-term maintenance activities include periodic landscaping works along with the monitoring of drainage features, clearing of blockages, and re-surfacing and white lining which may be required every five years.

3 Assessment of Alternatives

3.1 Assessment methodology

3.1.1 In line with Design Manual for Roads and Bridges (DMRB) LA 104 Environmental Assessment and Monitoring Revision 1 (Highways England, 2020c) alternative options have been explored since the inception of the project to ensure that possible solutions which offer the best outcomes across the objectives, as outlined within Section 2.2 of this EAR, are considered. The consideration of alternatives is a requirement of Directive 2014/52/EU (amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment) (herein referred to as the "EIA Directive").

3.2 Reasonable alternatives studied

Early option assessment

3.2.1 In July 2014, Highways England published the Route Strategic Options Report – A46 Coventry to M6 J2 Study, which identified four potential options associated with the Binley and Walsgrave junctions that could address congestion and poor journey time reliability issues at Binley and Walsgrave junctions along the A46. These included:

- Option 1: Improvements to the Binley junction by grade separation
- Option 2: Improvements to Walsgrave junction through relocation of the junction and grade separation
- Option 3: Improvements to or upgrade of M6 junction 2 and M6/ M69, and consideration of whether the links can be improved, and if there is sufficient capacity to cope with the planned growth
- Option 4: Improvements to both Binley and Walsgrave junctions as stated in Options 1 and 2 above

3.2.2 Option 4 was progressed, and design development was undertaken between mid-March to October 2016 in several stages. First, several designs for each of the two junctions were developed and evaluated against a number of metrics (safety, traffic throughput, impact on local network, environment, geotechnical issues, economic growth, cost, and stakeholder impact). The designs were then considered in a series of scenarios which comprised:

- Grade separation of Binley junction only (at either 50mph or 70mph)
- Two grade separation junctions at Binley and Walsgrave (at either 50mph or 70mph)

3.2.3 In October 2016, it was determined that development of Binley junction should continue with Walsgrave junction placed on hold until the local authorities were in a position to unlock the surrounding development land.

Walsgrave option development

3.2.4 In April 2018, design work for Walsgrave re-commenced and a review of the work completed as part of the early option assessment was undertaken. To ensure that identification of specific options was not biased by earlier work or limited to a narrow interpretation of the layout, options were developed within six design families, as outlined in Table 3.1.

Table 3.1: Descriptions of the six design families considered as part of the assessment of alternatives

Family	Description	Degree of Change
1	Do nothing/ Do minimum	None
2	Southbound dedicated bypass lane	Minor
3	Signalised junction	Minor to Moderate
4	Remodel for left-in and left-out to B4082	Moderate
5	Compact grade separated junction	Substantial
6	Full grade separation	Substantial

3.2.5 30 options were subsequently developed across the six family types to give a range of possible solutions. The options appraisal took into account:

- Safety
- Benefits to traffic
- Impact on the local network
- Environmental and geotechnical considerations
- Economic benefits
- Cost
- Effects on future stakeholders

3.2.6 The allowable geometries of the junction option alignments were severely constrained by the following existing significant features:

- Coombe Pool SSSI and the Coombe Abbey Grade II* Registered Park and Garden, located east of the junction
- Grade II listed buildings at Hungerley Hall Farm, located north-west of the junction
- Overhead 132kV power line and associated pylons, located west of the junction
- Floodplain associated with the River Sowe and Smite Brook

3.2.7 With respect to the consideration of potential environmental impacts, those options which would require the loss of large areas of Coombe Pool SSSI/ Coombe Abbey Grade II* Registered Park and Garden were discounted and not progressed further, as were options which would require complex construction works within Coombe Pool itself.

3.2.8 Six options initially selected at PCF Stage 1 were then extended to include 10 options taken forward for consideration in PCF Stage 1, with other options rejected due to notable disadvantages or weaknesses compared with the selected options.

3.2.9 Following on from Stage 1, three options were initially taken forward to PCF Stage 2 for consideration in this environmental assessment report, with seven options discounted.

3.2.10 Options 7 and 8 were recommended to be carried forward to Stage 2 because they would contribute to relieving the A46 of congestion, maintain or better safety by reducing conflicting traffic movements and, based on the current estimates, could be delivered within the scheme budget allowance. Option 8 allows the National Speed limit to be met as per the RIS.

3.2.11 Option 6 at stage 1 was ruled out as being too expensive however it was brought into consideration because it fulfils the DfT requirements for the National speed limit use and is a fully grade separated junction, allowing exit and entry from the strategic road network.

3.2.12 Option 7 provides a good balance between value for money and provision of local road connectivity. Option 8 provides the best balance between connectivity, safety and affordability.

3.2.13 Following initial environmental assessment and traffic modelling of the three selected options, a further fourth option was identified to be taken forward as part of PCF Stage 2. This option (Option 11) was initially similar to option W107 which was previously discounted because it was similar to Option 6, providing grade separation, but with the limited benefit of a 50mph bend past the SSSI. Refinements to the design, including bringing the alignment closer online to the existing A46 and realigning the connector road away from the River Sowe have improved the viability of the option.

3.2.14 As per the previous selection process, other options were discounted based on notable disadvantages or weaknesses compared with the chosen options. A full report on the options considered is included in Appendix D and Appendix E of the A46 Coventry Junctions Upgrade (Walsgrave) Stage Overview Assessment Report (Highways England, 2020v).

4 Environmental assessment methodology

4.1 Introduction

4.1.1 This PCF Stage 2 EAR presents an assessment of the various proposed scheme options as detailed in Chapter 2: The Project. This chapter provides an overview of topics covered and the methodologies applied.

4.2 Environmental scoping

4.2.1 The form and nature of the assessments carried out and reported in this EAR were considered as part of a scoping exercise, the outcomes of which are set out in the Scoping Report.

4.2.2 The Scoping Report identified the environmental issues requiring consideration in the assessment process and sets out the methodologies to be followed within individual topics of the subsequent environmental assessment. The Scoping Report noted that the following should be undertaken as part of the environmental assessment:

- identification and evaluation of features of environmental importance that could be affected by the proposed scheme
- analysis of the impacts and potential effects during construction and operation of the proposed scheme to the necessary level of detail
- identification of appropriate mitigation measures
- identification and assessment of the significance of effects
- identification and assessment of cumulative effects

4.2.3 Scoping was informed by desk studies using publicly available data sources to consider the baseline conditions at and around the proposed scheme. Site specific surveys and inspections have subsequently been undertaken to inform the EAR.

4.2.4 Scoping was undertaken following standards provided in DMRB LA 103 Scoping Projects for Environmental Assessment Revision 1 (Highways England, 2020d) and DMRB LA 104.

4.2.5 The scoping exercise concluded that the following topics would be relevant for further assessment and inclusion within the EAR:

- Air Quality
- Noise and Vibration
- Biodiversity
- Cultural Heritage
- Landscape and Visual
- Geology and Soils
- Material Assets and Waste
- Population and Human Health
- Road Drainage and the Water Environment
- Climate
- Consideration of Combined and Cumulative Effects

4.2.6 The Scoping Report was prepared prior to the additional consideration of Option 11. In accordance with the methodology in DMRB LA 103, it is not proposed to update the Scoping Report because the introduction of the new option is not considered to represent a material change for the following reasons.

- Physical characteristics and/ or location of the project - the location of Option 11 is predominantly within the combined scheme boundary of the other three options (6, 7 and 8) with an area of 49,654m² located outside of this. This includes an area of 36,279m² for an environmental

compensation area for Option 11. The land outside of the combined scheme boundary of options 6, 7 and 8 is within an area of arable land already considered as part of the physical characteristics of the scheme and Option 11 is similar in design to Option 6. No new receptors have been identified for Option 11.

- Environmental assessment assumptions e.g. the construction or design year – the environmental assessment assumptions including construction and design year are similar to those identified for Option 6, 7 and 8. The same traffic model prepared for Options 6, 7 and 8 will be used and the affected road network will remain the same.
- Level of understanding of the current state of the environment (baseline scenario) - the location of Option 11 is predominantly within the combined scheme boundary of the other three options (6, 7 and 8) and similar in design to Option 6 therefore the same baseline information collected for assessment of Options 6, 7 and 8, as described in the scoping report, will be used for Option 11.

4.2.7 The EIA Regulations require that a description of the likely significant effects should also include consideration of the emissions of heat and radiation as a result of the project. As noted in the Scoping Report, the proposed scheme is not anticipated to produce emissions of heat or radiation during either the construction or operational phase. The topics of heat and radiation are therefore scoped out of this EAR.

4.2.8 The EIA Regulations require the consideration of any likely significant effects on the environment of another European Economic Area (EEA) Member State. As noted in the Scoping Report, the Scheme would be implemented at a considerable distance from the nearest EEA States (Ireland and France), is not expected to have the potential to combine with other development projects to give rise to greater environmental effects beyond the study area defined, and would not increase greenhouse gas (GHG) emissions of a sufficient order to significantly contribute to global climate change (and thereby affect other EEA States). Accordingly, transboundary impacts are not considered further in this EAR.

4.2.9 The EIA Regulations also require the consideration of effects associated with the risk of major accidents and disasters. For the proposed scheme, the proposed options are similar in infrastructure development terms, therefore it is considered that the associated risk of event will be equally similar and will not affect decision making at this PCF stage. On this basis, consideration of major accidents and disasters is scoped out of further assessment.

4.2.10 It is considered highly unlikely that the proposed scheme would be demolished/ decommissioned after its design life as the road is likely to have become an integral part of the infrastructure in the area. In the unlikely event of the proposed scheme demolition/ decommissioning, this would be part of the relevant statutory process at that time, including EIA as appropriate. Demolition/ decommissioning of the proposed scheme has therefore been scoped out of the assessment.

4.3 Surveys and predictive techniques and methods

4.3.1 The aim of the assessment completed during PCF Stage 2 has been to ensure that:

- Features of environmental importance that could be affected by the proposed scheme are identified and evaluated.
- Analysis of the impacts and potential effects during construction and operation of the proposed scheme are undertaken.
- Appropriate mitigation measures are identified.

- The significance of effects are assessed.
- Cumulative effects are considered.

4.3.2 The scope of the environmental assessments in this EAR reflect the approaches set out in the Scoping Report. Site visits and surveys were carried out during March and April 2021 to inform the assessments of the potential impacts on biodiversity, landscape and visual and the road drainage and water environment.

4.3.3 The identification of study areas and assessments of environmental effects have been undertaken in accordance with DMRB LA 104, other relevant DMRB standards and other published guidance as applicable. Topic specific assessment methodologies are described within chapters 5 to 15 of this EAR.

4.3.4 All figures relating to the design and baseline information are provided in Appendix A. Figures

4.3.5 The topic assessments characterise and establish the potential significance of effects, taking into account the existing environmental baseline conditions and the options for junction alterations which form the proposed scheme. The value of the receptors and magnitude of the potential impacts are identified before the implementation of mitigation measures.

4.3.6 Figure 2.3: Option 6 to Figure 2.6: Option 11 show individual proposed scheme boundaries surrounding the land required temporarily for construction and permanently for each option. Figure 2.1: Location Plan shows all four option proposed scheme boundaries for ease of comparison (combined scheme boundary). The assessments in this EAR refer to the proposed scheme boundary as the combined boundary of all four proposed scheme options. This has primarily been for the description of baseline conditions. The assessments reported are specific to each option and relate to the respective individual proposed scheme boundaries.

4.3.7 Details of modelling and site surveys undertaken to inform the assessments within this EAR are summarised in Table 4.1 below.

Table 4.1: Modelling and site surveys

Environmental Topic	Construction	Operation
Air Quality	A qualitative assessment of construction dust has been undertaken. No site surveys have been undertaken.	A quantitative, simple assessment of operational traffic emissions has been undertaken. No site surveys have been undertaken.
Cultural Heritage	A qualitative assessment of the impacts of the proposed scheme on cultural heritage has been undertaken. No site surveys have not been undertaken	A qualitative assessment of the impact of proposed game on cultural heritage has been undertaken. No site surveys have been undertaken.
Landscape and Visual	A qualitative assessment of landscape and visual impacts has been undertaken. A site walkover survey to assess visibility was undertaken on 1 March 2021.	A qualitative assessment of landscape and visual impacts has been undertaken. A Zone of Theoretical Visibility has been produced, which illustrates locations that would have potential visibility of the proposed scheme.
Biodiversity	A qualitative assessment of the impact of the proposed scheme on	A qualitative assessment of the impact of the proposed scheme on

Environmental Topic	Construction	Operation
	biodiversity has been undertaken. An extended phase 1 habitat survey was undertaken in October 2020. Preliminary ecological site surveys have been undertaken for bats (preliminary bat roost walkover survey January 2021 and monthly activity surveys between April and September 2021), badgers (January 2021), barn owls (June to July 2021), and aquatic invertebrates (April 2021).	biodiversity has been undertaken. An extended phase 1 habitat survey was undertaken in October 2020. Preliminary ecological site surveys have been undertaken for bats (preliminary bat roost walkover survey January 2021 and monthly activity surveys between April and September 2021), badgers (January 2021), barn owls (June to July 2021), and aquatic invertebrates (April 2021).
Geology and Soils	A qualitative assessment of the impacts of the proposed scheme on geology and soils has been undertaken.	A qualitative assessment of the impacts of the proposed scheme on geology and soils has been undertaken.
Material Assets and Waste	A qualitative assessment of the impacts of the proposed scheme on materials and waste has been undertaken. No site surveys have been undertaken.	No assessment of operation effects has been undertaken. Operational effects have been scoped out as per the Scoping Report.
Noise and Vibration	A qualitative assessment of noise and vibration from construction related traffic has been undertaken. No site surveys have been undertaken.	A quantitative assessment of operational related traffic noise has been undertaken. No site surveys have been undertaken
Population and Human Health	A qualitative assessment of the impacts of the proposed scheme on population and human health has been undertaken. No site surveys have been undertaken.	A qualitative assessment of the impacts of the proposed scheme on population and human health has been undertaken. No site surveys have been undertaken.
Road Drainage and the Water Environment	A qualitative assessment of the impacts of the proposed scheme on road drainage and the water environment has been undertaken. A site walkover survey was undertaken in February 2021.	A qualitative assessment of the impacts of the proposed scheme on road drainage and the water environment has been undertaken. A site walkover survey was undertaken in February 2021.
Climate	A qualitative assessment of the impact of the proposed scheme on climate (greenhouse gas (GHG) emissions) and the vulnerability of the proposed scheme to climate change has been undertaken. No site surveys have been undertaken.	A qualitative assessment of the impact of the proposed scheme on climate (GHG emissions) and the vulnerability of the proposed scheme to climate change has been undertaken. No site surveys have been undertaken.

4.4 General assessment assumptions and limitations

4.4.1 The scope of assessment described in this EAR is based on information available at the time of preparation. The assessment has been undertaken using the third party and publicly available information described along with field survey work and data collection and modelling work as noted in Section 4.3 and described in Chapters 5 to 15.

4.4.2 This EAR has been prepared using the design drawings, proposed scheme boundary and land requirements shown Figure 2.1: Location Plan to Figure 2.6: Option 11.

4.4.3 The proposed scheme boundary is based on the combined area currently expected to be required for the construction of each option. The EAR references separate proposed scheme boundaries, provided for each option, as well as a combined scheme boundary as applicable.

4.4.4 This proposed scheme boundary for each option has been developed, using buildability advice; however, it may be subject to change as further buildability advice is incorporated, including the location of haul roads (if required) and the EAR identifies the need for further land take for environmental mitigation and/ or compensation. Currently, environmental compensation land is only indicated for Option 11.

4.4.5 The areas of land required for the proposed scheme, both temporarily or permanently, will be refined during later stages in the PCF process as a preferred option design emerges, alongside the collation of additional information from records, stakeholders and surveys.

4.4.6 Traffic modelling has been used to inform the modelling work undertaken as part of the air quality (Chapter 5) and noise and vibration (Chapter 9) assessments as detailed within this EAR. Traffic flows used in the assessment came from the strategic transport model, which is presented in the PCF Stage 2, (Highways England, 2020e).

4.4.7 To identify the effects of the proposed scheme on environmental features, it is important to understand the baseline at the year of construction commencement and at the year the proposed scheme becomes operational (i.e. the future baseline). The baseline conditions for these years may be different to the current conditions and such changes could alter the sensitivity of existing environmental receptors, as well as introduce new sensitive receptors. As the anticipated start of construction is 2025 and year of opening is 2027, there is some limitation in the forecasting of the future baseline situation within the topic Chapters 5 to 15.

4.4.8 A detailed construction programme has not been made available at the time of preparing this EAR. Details of construction activities and equipment are not expected to be available at the time of undertaking the assessments, nor will full details of material quantities be available. Where such data is not available professionally based assumptions have been made and stated in this EAR.

4.4.9 It is assumed that the first iteration of the Environmental Management Plan (EMP) will be prepared as part of the development of the proposed scheme at PCF Stage 3. It will include design, construction, and operational mitigation measures, which will be defined in part by the requirements which will arise from the technical assessments presented in the PCF Stage 3 EAR or Environmental Statement.

4.4.10 The construction of the proposed scheme would be subject to measures and procedures defined within the EMP and would include the implementation of industry standard practice and control measures for environmental impacts arising during construction.

4.4.11 Assumptions and limitations specific to each individual topic assessments (and the cumulative assessment) are set out in Chapters 5 to 15 of this EAR.

4.5 Significance criteria

4.5.1 Each technical topic has outlined the existing baseline conditions; identifying the receptors and resources likely to be impacted by the proposed scheme. Where appropriate, each receptor has been assigned a value (or sensitivity) to potential impacts, as set out in the methodology presented within each topic chapter.

4.5.2 The magnitude of the impact, or scale of change, in comparison to baseline conditions as a result of construction and/ or the operation of the proposed scheme is then subsequently determined, with consideration of any design and mitigation measures. Where it is not possible to quantify impacts, qualitative assessments have been carried out using reasoned argument and professional judgement. Where uncertainty exists, this is noted in each chapter of the EAR.

4.5.3 The effect of the proposed scheme is classified by combining the value or sensitivity of the receptor and the magnitude of impact. An example of how the significance of an effect may be classified is given in Table 4.2 which is reproduced from DMRB LA 104 Table 3.8.1.

Table 4.2: Matrix for determination of significance of effect (DMRB LA 104 Table 3.8.1)

		Magnitude of Impact (Degree of Change)				
Environmental Value (Sensitivity)		**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 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

4.5.4 Each topic may have its own method for classifying effects, based on the relevant standards, guidance, or accepted criteria. Topics which will use the below matrix include cultural heritage, geology and soils, population and human health, road drainage and the water environment and the assessment of cumulative effects. Landscape and visual, biodiversity, material assets and waste, people and human health, and climate will use a topic-specific classification system based on relevant DMRB standards, informed by other relevant guidance as appropriate. This is set out within each of the topic Chapters 5 to 15.

4.5.5 Where two significance categories are shown in the matrix, professional judgement has been used to derive a single category of significance and the evidence and rationale provided in this EAR.

4.5.6 Effects are generally considered significant if they are very large, large, and moderate. Generally, slight, and neutral effects are not considered to be significant.

5 Air Quality

5.1 Introduction

5.1.1 This chapter assesses the potential air quality impacts associated with the construction and operation of four options for the proposed scheme. The assessment follows the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA 105 Air Quality, Revision 0 (Highways England, 2019a). This chapter summarises the regulatory and policy framework related to air quality, describes the existing environment in the area surrounding the proposed scheme, details the methodology followed for the assessment and provides an assessment of each of the proposed scheme options to determine the likely significance of effects.

5.1.2 This chapter should be read in conjunction with Figure 5.1: Areas Potentially Affected by Dust Contamination to Figure 5.3: Air Quality Monitoring Locations

5.2 Legislative and policy framework

Planning policies

5.2.1 The NPPF advises that planning policies and decisions should sustain and contribute towards compliance with relevant air quality limit values and national objectives, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plans.

5.2.2 In accordance with the NPPF, the NPSNN relating to the applicant's assessment is the primary source of policy guidance regarding this assessment.

5.2.3 Statements 5.3 – 5.15 of the NPSNN specifically relate to air quality assessment and state that, the Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of a development will:

- Result in a zone or agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant.
- Affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision.

5.2.4 The National Planning Practice Guidance (PPG) (Ministry of Housing, Communities and Local Government, 2021b) provides a web-based resource in support of the NPPF. The PPG provides a summary of the air quality issues set out in the NPPF and goes on to note that assessments of the impact of proposed developments on air quality should include the following information:

- The existing air quality in the study area (existing baseline)
- The future air quality without the development in place (future baseline)
- The future air quality with the development in place (with mitigation) and whether it could be significantly affected during the construction and operational phases.

5.2.5 The guidance then advises that a planning application should proceed to decision with appropriate planning conditions or planning obligation, if the proposed development (including mitigation) would not lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or national objectives, or fail to comply with the requirements of the Conservation of Habitats and Species Regulations or other environmental policies and duties.

Air quality strategies and legislation

European Union limit values

5.2.6 The Ambient Air Quality and Cleaner Air for Europe Directive 2008/50/EC is transcribed into UK legislation by the Air Quality Standards Regulations 2010, which came into force in 2010. These air quality regulations were amended in 2019 for the EU Exit. The air quality limit values contained within are legally binding on the UK and have been set with the aim of avoiding, preventing or reducing harmful effects on human health and on the environment as a whole.

National air quality strategy

5.2.7 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland was initially published under the requirements of the Environment Act 1995. The most recent revision of the Strategy (Defra, 2011a) sets objectives for key pollutants as a tool to help local authorities manage local air quality improvements in accordance with EU legislation. Some of these objectives have been laid out within the Air Quality (England) Regulations 2000 and later amendments in 2002.

5.2.8 The air quality objectives are set down in regulation solely for the purposes of local air quality management. Under the local air quality management regime, local authorities have a duty to carry out regular assessments of air quality against the objective values and if it is unlikely that the objectives will be met in the given timescale, they must designate an AQMA and prepare an Air Quality Action Plan (AQAP) with the aim of achieving the objectives. The boundary of an AQMA is set by the governing local authority to define the geographical area that is to be subject to the management measures to be set out in a subsequent action plan. Consequently, it is not unusual for the boundary of an AQMA to include within it, relevant locations where air quality is not at risk of exceeding an objective.

5.2.9 The pollutants that are relevant for this assessment that have been set to protect human health are NO_2 and PM_{10} (particulate matter with an aerodynamic diameter of 10 microns or less). The limit values and Air Quality Strategy objectives for these two pollutants are the same. The air quality criteria are provided in Table 5.1. Particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$) achieves the air quality thresholds in the UK and does not need to be considered further unless PM_{10} is of concern for the proposed scheme.

Table 5.1: Air quality criteria for NO_2 and PM_{10}

Pollutant	Averaging Period	Concentration (µg/m³)
Nitrogen dioxide (NO_2)	Annual average	40
	1-hour average	200 (not to be exceeded more than 19 times per year)
Particulate matter (PM_{10})	Annual average	40
	24-hour average	50 (not to be exceeded more than 35 times a year)

5.2.10 New legislation will seek to shift the focus towards prevention of exceedances rather than tackling pollution when limits have been surpassed.

Coventry air quality action plan

5.2.11 Coventry is one of the towns and cities in England where NO_2 levels were forecast to exceed legal limits in 2021. The national plan requires local authorities to set out plans as to how they intend to achieve the limit value in the shortest possible time. Coventry City Council has worked closely with the Government's Joint Air Quality Unit to develop an air quality action plan to achieve compliance.

5.2.12 Modelling carried out for the local action plan (Coventry City Council, 2019aCC) identified four roads at risk of being non-compliant in 2021, these links are the Holyhead Road (compliance Pollution Climate Mapping (PCM) link 7647), the south-west section of the A4053 Ring Road (PCM link 37331), Foleshill Road (non PCM link) and Little Park Street (non PCM link). These links could become compliant with a Clean Air Zone plus additional measures or a package of transport measures (known as DS13L). The Government has agreed that the package of measures put forward would be effective in reducing NO_2 concentrations without the disbenefits that a Clean Air Zone would have created.

5.2.13 The Government has awarded the Council grant funding to deliver the package of measures (Coventry City Council, 2021). These include encouraging local trips to be made by walking or cycling rather than the car, greening the vehicle fleet and targeted junction and road layout changes.

5.3 Assessment methodology

5.3.1 The methodology for the air quality assessment follows DMRB LA 105. The overall aim of the methodology is to identify potential likely significant air quality effects and compliance risks with the Ambient Air Quality Directive for NO_2.

5.3.2 Four scheme options have been assessed. For descriptions of these options, please refer to Chapter 2: The Project. The four options are Option 6, Option 7, Option 8 and Option 11.

Construction

5.3.3 The assessment of construction dust impacts was undertaken qualitatively following DMRB LA 105, paragraphs 2.56-2.59. This has accounted for sensitive receptors situated within 200m of the construction site including residential premises, schools, hospitals and sensitive ecological features within designated sites. This area is the construction phase Study Area and is shown on Figure 5.1: Areas Potentially Affected by Dust Contamination. The construction dust risk potential was assessed according to the scale of the works proposed and distance of properties to the works. This was used to determine the level of mitigation required. Any dust impacts would decline rapidly with distance from the source and beyond 200m, any impacts are very unlikely to result in a significant effect.

Operation

5.3.4 For impacts on local air quality due to operation of the proposed scheme, DMRB LA 105 paragraph 2.1 requires the assessment to be made in the opening year with and without the proposed scheme in operation. The opening year will have the highest concentrations with the proposed scheme in operation as emissions will decrease in later years due to increasingly stringent emission legislation. Local air quality impacts were assessed for the following scenarios:

- Baseline (2018)
- Opening year (2025) Do-Minimum (without the proposed scheme)
- Opening year (2025) Do-Something (with each proposed scheme option)

5.3.5 The assessment was based on traffic model predictions for each scenario. This data was provided by the traffic modelling team. The data accounts for traffic flows of light- and heavy-duty vehicles and speeds for average daily conditions. Committed schemes were accounted for in the traffic models.

5.3.6 To determine the Study Area, DMRB LA 105 (paragraph 2.1) scoping criteria for local air quality assessment were applied to the road alignment and traffic data to define the affected road network (ARN) for the proposed scheme. The operational phase Study Area is described in Section 5.5 and shown on Figure 5.2. A road link qualifies as part of the ARN if one or more of the following is true:

- Road alignment changes by 5 metres or more
- Daily traffic flows change by 1,000 annual average daily traffic (AADT) flow or more
- Heavy-duty vehicle (HDV) flows change by 200 AADT or more, or
- Daily average speed change speed band.

5.3.7 To assess the impacts of each proposed scheme option on local air quality, air quality predictions were made at sensitive receptors located within 200m of affected roads. The receptor locations are shown on Figure 5.2 and Table 5.2. The types of sensitive receptors assessed for local air quality include:

- Human health receptors where relevant human exposure against the air quality criteria being assessed could occur. These include residential properties, schools, and hospitals.
- Qualifying features within 15m of road links in Defra's PCM model which are assessed for compliance with the Ambient Air Quality Directive for NO_2.
- Designated sites of ecological conservation importance such as SSSIs and LNRs that contain habitats sensitive to nitrogen deposition. The sites assessed are Coombe Pool SSSI, Herald Way Marsh SSSI and Willenhall Wood LNR.

Table 5.2: Air quality receptor locations

Receptor	Location
R1	Burbage, Hinckley
R2	Wood Lane, Shilton
R3	Grove Road, Ansty
R4	Hungerley Hall Farm- south (residential)
R5	Gainford Rise
R6	Kings Park Drive
R7	Woodpecker Close
R8	London Road, Tollbar End
R9	Roman Way
R10	Rocky Lane, Ashow
R11	Leamington Road, Ashow

Receptor	Location
R12	Warwick Road, Leek Wooton
R13	Wise Grove, Woodloes Park
R14	London Road
R15	Willenhall Lane / Brandon Road
R16	Brandon Road
R17	Binley Road / Brandon Road / Brinklow Road
R18	Clifford Bridge Road / Brinklow Road
R19	Clifford Bridge Road
R20	Clifford Bridge Road / Keswick Walk
R21	Clifford Bridge Road
R22	Hall Lane / Hinckley Road
R23	Dorchester Way / Clifford Bridge Road
R24	Fontmell Close
R25	Hungerley Hall Farm- main building (residential)
R26	Hungerley Hall Farm -north (outbuilding)
R27	Hungerley Hall Farm -west (outbuilding)
R28	Howes Lane

5.3.8 Highways England's DMRB air quality spreadsheet model (version V8_EFT10) was used to predict road source contributions to ambient annual mean concentrations at receptors within the Study Area for each scenario (LA 105 paragraph 2.28.1). The predictions were based upon traffic data (flows, speeds and proportions of HDVs) and distance between each road link and the receptor.

5.3.9 To generate estimates of total annual mean concentrations of the relevant pollutants (NO_x and PM_{10}), the predicted road traffic contributions were combined with background annual mean pollutant concentrations that are published by Defra. The background concentrations provide the contributions from sources not assessed explicitly in the model. NO_2 concentrations were calculated from the predicted NO_x concentrations using Defra's NO_x to NO_2 converter tool (v8.1).

5.3.10 Vehicle emissions are assumed to decrease in the future as cleaner vehicles enter the national fleet. The conservative gap analysis method for NO_x and NO_2 projections as described in LA 105 was used for the predictions at receptors at properties and designated habitats. The Defra projections were used for the compliance risk assessment as required by Defra.

5.3.11 The baseline model was verified in accordance with the LAQM.TG(16) procedure. Baseline concentration predictions for roadside monitoring sites were compared to monitoring data from local authorities for 2018 across the study area. Coventry City Council's monitoring sites LON8 and STL1 (see Figure 5.3) were excluded from the analysis due to LON8 being located behind a fence and STL1 being at a greater height than is assessed in the model and so these sites were not suitable for verification. However, Coventry City Council sites SHP1-3 are located close to the A45 and are suitable for inclusion in the model verification. The model adjustment factor used to adjust raw model outputs is presented in Table 5.3.

Table 5.3: Model adjustment factor and performance

Adjustment factor	RMSE pre-verification (µg/m^3)	RMSE post-verification (µg/m^3)	Fractional bias post verification
0.96	2.4	2.3	0.0

5.3.12 The model tended to slightly overestimate road contributed NOx. The accuracy of the model was considered via the calculation of the Root Mean Square Error (RMSE) and fractional bias as described in LAQM.TG(16). The RMSE was reduced marginally post verification demonstrating that the application of the adjustment factor had improved model performance. A RMSE of less than 4 µg/m^3 (10% of the objective/ limit value) indicates good agreement between modelled and measured concentrations.

5.3.13 The adjustment factor was applied to the predicted NOx concentrations prior to the conversion of road NOx to road NO_2 and the addition of NO_2 background concentrations to provide predicted total NO_2 concentrations at the receptors. The factor was also applied to the predicted road PM_{10} concentrations in the absence of any monitoring data within the study area with which to calculate a PM_{10} specific verification factor.

5.3.14 Table 5.4 contains details of the monitoring sites used within the verification and the adjusted model results. Modelled concentrations were within 10% of the measured values at half of the monitoring sites. All of the monitoring sites had predicted concentrations within 25% of the measured values.

Table 5.4: Comparison of modelled with measured NO_2 concentrations

Site	Monitored NO_2 (µg/m^3)	Modelled NO_2 after adjustment (µg/m^3)	% difference modelled / monitored
SHP1	28.0	27.0	-3.7
SHP2	29.5	26.4	-10.5
SHP3	33.5	34.4	2.8
S16	19.6	22.8	16.2

5.3.15 To determine the likelihood of exceeding 1-hour mean and 24-hour mean objectives and limit values for NO_2 and PM_{10} (respectively) (Table 5.1), guidance in LAQM.TG(16) was followed which relates annual mean concentrations to short-term concentrations. If the annual mean NO_2 concentration is less than 60 µg/m^3 or the annual mean PM_{10} concentration less than 31.9 µg/m^3, then the short-term criteria are unlikely to be exceeded. This assessment therefore focuses on annual mean concentrations as short-term concentrations can be estimated from these.

5.3.16 For the compliance risk assessment, PCM links that are within the ARN were identified. Annual mean NO_2 concentrations were predicted at 4m from the running lane of each PCM link for comparison with the Defra predictions for the opening year of 2025, this comparison is shown in Table 5.5. The two sets of results are broadly consistent with all DMRB modelled concentrations within 25% of the PCM predictions. Both sets of results demonstrate compliance with the limit value.

Table 5.5: Comparison of PCM with predicted NO_2 concentrations

PCM Link	Road Name	PCM Concentration 2025 (µg/m^3)	DMRB Predicted Concentration (µg/m^3)
6490	A4600	19.3	19.3
36504	A4600	23.1	24.9
73314	A45	22.3	29.2
7103	A4082	24.0	22.8
7118	A428	21.1	16.9
16467	A4600	19.9	19.8
77296	A4600	19.3	22.2
89266	A444	29.4	26.6

5.3.17 For the compliance risk assessment, concentrations were also predicted at the closest qualifying feature, such as a footpath, garden or building, to the road link. Concentrations at qualifying features were predicted in the opening year without the proposed scheme and also with each proposed scheme option. Compliance with the EU limit value was assessed for each qualifying feature.

5.3.18 For designated habitats, the pollutant of concern is nutrient nitrogen. The rate of nutrient nitrogen deposition is affected by NO_2 concentrations. These were calculated at 10m intervals out to a distance of 200m from the road centre, within the designated site and the deposition rate calculated from this. Transects were located in Coombe Pool SSSI, Herald Way Marsh SSSI and Willenhall Wood LNR. Deposition rates for grassland and similar habitats were used for Herald Way Marsh SSSI and rates for forests and similar habitats for Coombe Pool SSSI and Willenhall Wood LNR. Information on background levels of NO_2 and nitrogen deposition were obtained from Defra's background concentration maps and the Air Pollution Information System (APIS) website respectively. Critical loads were also obtained from the APIS website.

Significance of effect

Construction

5.3.19 DMRB LA 105 paragraph 2.103 advises that appropriate mitigation can be applied to reduce impacts from construction dust so that effects are likely to be not significant.

Operation

5.3.20 The assessment of the significance of air quality effects follows DMRB LA 105 (paragraphs 2.85-2.106). It provides the standard for determining the significance of effects for human health and designated habitat receptors and also for determining the compliance risk.

5.3.21 No likely significant air quality effects for human health would occur where:

- Predicted concentrations at all human health receptors are less than the air quality thresholds; and/ or
- Differences in concentrations due to the proposed scheme are imperceptible (<1% of the air quality threshold)

5.3.22 Where concentrations exceed the air quality threshold and concentrations are not imperceptible, then consideration is given to the number of receptors exceeding and the magnitude of change in concentrations to determine whether the impact is likely to be significant. A small change in concentrations is in the range > 0.4 to 2 µg/m^3. A medium magnitude change is in the range > 2 to 4 µg/m^3. A large magnitude change is > 4 µg/m^3. A significant effect can be adverse or beneficial.

5.3.23 The results from the local air quality and compliance risk assessment are evaluated in the context of relevant local air quality planning policy (e.g. NPSNN).

5.3.24 No likely significant air quality effect at designated sites would occur where:

- Predicted nitrogen deposition rates at ecological receptors are less than the lower critical load; and/ or
- Differences in deposition rates due to the proposed scheme are imperceptible (<1% of the lower critical load)

5.3.25 Where these criteria are not met, the results are provided to the biodiversity team to determine whether the effects are likely to be significant. The significance of the effects from the impacts presented in this chapter are addressed in Chapter 8: Biodiversity.

5.4 Assessment assumptions and limitations

5.4.1 The air quality assessment is based on modelled traffic data for each of the options and the latest Defra and Highways tools and guidance. The model predictions have been compared with and adjusted to bring it in-line with the 2018 monitoring data. This approach reduces the uncertainty in the predicted pollutant concentrations presented in this report.

5.4.2 The forecasting method used to predict future NO_2 concentrations at property receptors is the gap analysis methodology as described in LA 105 (paragraphs 2.47-2.55). This prediction methodology is more conservative than the Defra projections and assumes a slower rate of decrease in vehicle emissions in the future. The Defra projections were used for the compliance receptors (qualifying features) as required by Defra.

5.5 Study area

Construction

5.5.1 The construction dust risk assessment requires sensitive locations within 200m of the proposed scheme construction works to be identified. This area is shown on Figure 5.1: Areas Potentially Affected by Dust Contamination for each of the options.

Operation

5.5.2 The assessment of operational phase traffic effects uses a study area of 200m around roads likely to be affected by the proposed scheme. Affected road links are those that meet the criteria for changes to traffic flow or speed or road alignment as described in paragraph 5.3.6. If a road link is considered to be affected, then it is included in the study for further evaluation to understand the potential for likely significant air quality effects. The ARN is shown on Figure 5.2: Study Area for Traffic Impacts

5.5.3 The ARN includes the M69 (from the A5 to M6), the A46 (from the M6 to the A4177), the A45 (Tollbar End to A444) and certain urban roads in eastern Coventry near the Walsgrave junction.

5.5.4 The ARN is within four local authority areas. These are the City of Coventry (area to the west of the A46 and north of A45 in Coventry), the District of Rugby (the area to the east of the A46 and the M69), the District of Warwick (the A46 south of Coventry) and the Borough of Hinckley and Bosworth (M69 Junction 1).

5.5.5 There are three designated sites for nature conservation near the ARN. These are Coombe Pool SSSI, Herald Way March SSSI and Willenhall Wood LNR which are all near the A46. There are also two areas of ancient woodland near the ARN, Piles Coppice and Binley Common Farm Wood. Both of the ancient woodland sites are near Willenhall Wood LNR, near the A46 between Binley junction and Tollbar End.

5.6 Baseline conditions

Air quality management areas

5.6.1 The A46 Walsgrave Junction is adjacent to the Coventry City Council AQMA, which is an area encompassing the land within the administrative boundaries of the City of Coventry and is a few metres to the west of the A46 (Defra, 2021a). This has been declared due to exceedances of the annual mean NO_2 objective. The Coventry City AQMA includes or is adjacent to part of the ARN, namely the A46, A45 London Road, A45 Stonebridge Highway and certain urban roads in Binley and Walsgrave, west of the Walsgrave junction.

5.6.2 The District of Rugby and the District of Warwick have also declared AQMAs in some urban areas, but these do not include any roads in the ARN (Defra, 2021a). The Borough of Hinckley and Bosworth has not declared any AQMAs.

Measured concentrations

5.6.3 Table 6 presents annual mean NO_2 monitoring data at diffusion tube sites near the ARN. Monitoring was carried out by Highways England in 2016 and more recently by Coventry City Council (CCC, 2019a) and Rugby Borough Council (RBC, 2021). The monitoring locations are shown on Figure 5.3: Air Quality Monitoring Locations

5.6.4 Warwick District Council and Hinckley and Bosworth Borough Council did not have any monitoring sites near the ARN. Annual mean NO_2 concentrations were within the objective and limit value of 40 $\mu g/m^3$ at all monitoring sites near the ARN.

Table 5.6: Measured NO_2 concentrations

Site Name / ID	Location	Site Type	Year	Annual Mean (µg/m³)
Highways England				
A46_001	Grove Road	Roadside	2016	24
A46_002	Grove Road	Roadside	2016	22
A46_003	Farber Road	Roadside	2016	22
A46_004	Abbotsbury Close	Roadside	2016	19
A46_005	Valencia Road	Roadside	2016	25
A46_006	The Stoop	Roadside	2016	23
A46_009	Rugby Road	Roadside	2016	30
A46_010	Grange Ave	Roadside	2016	17
A46_011	Middle Ride	Roadside	2016	21
A46_013	London Road	Roadside	2016	38
A46_014	Selsey Close	Roadside	2016	26
A46_015	Fenside Ave	Roadside	2016	24
A46_016	Mylgrove	Roadside	2016	24
A46_017	Mill Hill	Roadside	2016	25
A46_020	Woodway Lane	Roadside	2016	34
Coventry City Council				
LON8	703 London Road	Roadside	2018	25.3
LON8	703 London Road	Roadside	2019	25.3
STL1	Stonehouse Lane	Roadside	2018	31.3
STL1	Stonehouse Lane	Roadside	2019	33.6
Rugby Borough Council				
S14	Village Hall Binley Woods	Urban background	2018	15.1
S14	Village Hall Binley Woods	Urban background	2019	16.8
S14	Village Hall Binley Woods	Urban background	2020	10.9
S16	Hotel, London Road (A45), Ryton	Roadside	2018	19.6
S16	Hotel, London Road (A45), Ryton	Roadside	2019	18.8
S16	Hotel, London Road (A45), Ryton	Roadside	2020	13.5

Predicted concentrations

5.6.5 In addition to the review of measured concentrations, modelling was carried out to assess baseline concentrations at the receptors selected for the local air quality assessment. Predicted annual mean NO_2 and PM_{10} concentrations in 2018 are presented in Table 5.7. Baseline concentrations in the designated sites are provided in Appendix B. Air Quality - Predicted Nitrogen Deposition Rates in Designated Sites

Table 5.7: Predicted annual mean concentrations in 2018

Receptor	NO_2 (µg/m^3)	PM_{10} (µg/m^3)
R1	13.8	15.4
R2	22.7	17.5
R3	18.5	16.5
R4	18.3	17.5
R5	16.8	17.1
R6	20.8	17.5
R7	19.8	17.2
R8	33.4	19.9
R9	23.3	17.7
R10	17.9	16.6
R11	18.5	16.1
R12	16.8	16.2
R13	24.8	17.4
R14	26.1	17.1
R15	19.1	16.8
R16	21.8	16.2
R17	31.4	17.4
R18	33.9	17.8
R19	20.9	15.9
R20	19.8	15.6
R21	23.6	16.2
R22	30.3	17.6
R23	23.9	16.5
R24	13.5	16.2
R25	17.8	17.3
R26	16.1	16.9
R27	16.1	16.9
R28	27.2	18.7

5.6.6 All of the predicted NO_2 concentrations are within the objective and limit values for annual mean and short-term concentrations. The highest annual mean concentration was at receptor R19 with 33.9 µg/m^3 which is well within the 40 µg/m^3 threshold.

5.6.7 All of the predicted PM_{10} concentrations are well within the annual mean and short-term objectives and limit values. The highest concentration was at receptor R8 with 17.7 µg/m^3 which is well within the annual mean threshold at 40 µg/m^3. In line with DMRB LA 105 (paragraphs 2.21.2-2.21.4), PM_{10} has not been considered further as concentrations are expected to be lower in the opening year and so would remain within the objectives and limit values. $PM_{2.5}$ concentrations are always less than PM_{10} concentrations due to it being a fraction of PM_{10} and so is well within the exposure reduction target of 20 µg/m^3.

Pollution climate mapping links

5.6.8 Defra's PCM model is a national-scale model designed to fulfil part of the UK's requirements (EU Directive 2008/50/EC and Air Quality Standards Regulations 2010) to report on the concentrations of particular pollutants in the atmosphere, including NO_2. The A46 and M69 which are both in the ARN are not included in this national model as these roads are considered to be rural and not to have human exposure nearby and so are compliant with the limit values.

5.6.9 Annual mean NO_2 concentrations for 2018 and 2019 from the PCM model on roads within the ARN are shown in Table 5.8, with PCM concentrations based on a reference year of 2018. Concentrations are within the limit value at all PCM links within the ARN except for one link, the A444 (A4114 to A45), which is exceeded by a small margin in the base year.

Table 5.8: PCM NO_2 concentrations

PCM Link	Road Name	Annual mean NO_2 (µg/m^3)	
		2018	2019
77296	A4600 Hinckley Road	27.6	26.4
6490	A4600 Hinckley Road	27.6	26.4
36504	A4600 Hinckley Road	33.1	31.7
73314	A45 London Road	34.0	32.0
7118	A428 Brandon Road	30.5	29.1
7103	A4082 London Road	34.4	33.0
89266	A444	42.4	40.5

5.6.10 Other PCM road links in Coventry had concentrations above the limit value in 2018. These roads included sections of the A4053 Ringway and the A444 (south of the M6). These roads are not within the ARN.

5.7 Potential impacts

Construction

5.7.1 Construction activities have the potential to give rise to adverse impacts from fugitive emissions of dust due to the realignment of roads, construction of new road links, and road re-surfacing. These are likely to be temporary in nature and would be localised.

5.7.2 There may also be increases in PM_{10} and NO_2 concentrations due to emissions from construction traffic and plant (non-road mobile machinery) and from traffic management measures during the construction phase. Emissions from plant have been scoped out of the assessment as the contribution is expected to be small and there are few receptors close to the construction site. Emissions from construction traffic and construction traffic management measures will be considered at a later stage when the selected option is assessed.

Operation

5.7.3 Overall, the proposed scheme aims to provide improvements to traffic congestion along this corridor. However, there is potential for effects on air quality at sensitive receptors located close to roads affected by each option.

5.7.4 Changes in the layout of the Walsgrave Junction may change the distance between sensitive receptors and road traffic, along with changes to the traffic flows and speeds through the junction. The proposals are likely to lead to changes in traffic movements in the wider area so there is the potential for changes in air quality at sensitive receptors located within 200m of affected roads.

5.8 Design, mitigation and enhancement measures

5.8.1 With regard to the construction phase, good practice mitigation measures will be identified and included in an Outline Environment Management Plan (OEMP). The measures detailed within the OEMP would be developed into a Construction Environmental Management Plan (CEMP) by the construction contractor which would be implemented for the duration of the proposed scheme construction phase. The final selection of the most appropriate mitigation measures, including specific mitigation measures as related to construction phase heavy goods vehicle (HGV) movements and construction phase traffic management, will be considered at later stages in the design process once further information on changes to traffic flows becomes available.

5.8.2 Specific air quality mitigation measures for the operational phase are not proposed at this option assessment stage.

5.9 Assessment of likely significant effects

Construction

5.9.1 Dust soiling affecting the amenity of properties and increased PM_{10} concentrations affecting human health is a potential issue in areas within 200m of the proposed scheme construction works boundary. Residential properties are within 200m of the proposed scheme boundary with each of the options. Properties in Valencia Road, Florence Road, Sevilla Close, Gainford Rise, Tylney Close, Hepworth Road and Hungerley Hall Farm are closest to the proposed scheme boundary with many within 100m and could be affected by all four options. Properties in Sturminster Close, Fontmell Close, Abbotsbury Close and Bridport Close are within 100 - 200m of the proposed scheme boundary with Option 6.

5.9.2 Coombe Pool SSSI is adjacent to the proposed scheme boundary with each of the options and could have increased dust deposition rates during construction.

5.9.3 The construction dust risk potential from the proposed scheme, without mitigation, is considered to be large with all four options due to the size of the proposed scheme and location of sensitive receptors. Properties within 100m of construction activities are of high sensitivity. Appropriate mitigation for this level of risk will be included in the OEMP which will reduce the impact to being not significant.

Operation

5.9.4 This section provides predictions regarding the air quality effects of each proposed scheme option on sensitive receptors for human health during the opening year of 2025. The results for designated habitats are included in Appendix B. Air Quality - Predicted Nitrogen Deposition Rates in Designated Sites

Option 6

5.9.5 Predicted annual mean NO_2 concentrations and changes due to operation of the proposed scheme are presented in Table 5.9. Concentrations in the base year of 2018 are also shown for comparison.

Table 5.9: Predicted annual mean NO_2 concentrations with Option 6

Receptor	Base year 2018 (µg/m³)	Do-Minimum 2025 (µg/m³)	Do-Something 2025 (µg/m³)	Change (µg/m³)
R1	13.8	11.6	11.6	0.0
R2	22.7	19.8	20.2	0.3
R3	18.5	15.7	15.8	0.1
R4	18.3	15.0	16.1	1.1
R5	16.8	14.0	14.3	0.4
R6	20.8	16.8	17.2	0.4
R7	19.8	16.5	16.8	0.3
R8	33.4	28.4	29.4	1.0
R9	23.3	19.5	19.6	0.1
R10	17.9	14.9	14.9	0.1
R11	18.5	15.4	15.4	0.0
R12	16.8	14.1	14.1	0.0
R13	24.8	20.7	20.8	0.1
R14	26.1	21.8	21.9	0.1
R15	19.1	15.9	15.9	0.0
R16	21.8	18.2	18.2	0.1
R17	31.4	25.6	26.2	0.6
R18	33.9	26.7	27.7	0.9
R19	20.9	17.2	17.2	0.1
R20	19.8	16.8	16.2	-0.6
R21	23.6	20.0	19.6	-0.4
R22	30.3	24.8	24.2	-0.5
R23	23.9	20.4	19.6	-0.8
R24	13.5	11.2	12.5	1.3
R25	17.8	14.6	16.2	1.5
R26	16.1	13.3	16.3	3.0
R27	16.1	13.5	21.5	8.0
R28	27.2	22.4	22.6	0.2

5.9.6 All of the predicted concentrations are within the objective and limit value both with and without Option 6 in the opening year, including those at Hungerley Hall Farm.

5.9.7 At Hungerley Hall Farm, a large increase in concentrations was predicted at receptor R27. This receptor is located on the western corner of the outbuildings, closest to the new alignment of the A46. A medium magnitude increase was predicted at receptor R26 which is on the northern corner of the outbuildings. Small increases were predicted at receptors R4 and R25 which are located at the Farm's residential building.

5.9.8 Small increases were also predicted at receptors R8 located next to the Tollbar End junction, R17 located near the Binley Road/ Brandon Road/ Brinklow Road junction, R18 located near the Brinklow Road/ Clifford Bridge Road junction and R24 near the A46. These small increases are due to increases in traffic flows or changes in road alignment for receptor R24. Small decreases in concentrations due to reductions in traffic flows were predicted at receptors R20, R22 and R23 which are located near Clifford Bridge Road or Hinckley Road. All other changes were imperceptible.

Option 7

5.9.9 Predicted annual mean NO_2 concentrations and changes due to operation of Option 7 are presented in Table 5.10. Concentrations in the base year of 2018 are also shown for comparison.

Table 5.10: Predicted annual mean NO_2 concentrations with Option 7

Receptor	Base year 2018 (µg/m³)	Do-Minimum 2025 (µg/m³)	Do-Something 2025 (µg/m³)	Change (µg/m³)
R1	13.8	11.6	11.6	0.0
R2	22.7	19.8	20.1	0.3
R3	18.5	15.7	15.8	0.1
R4	18.3	15.0	15.6	0.6
R5	16.8	14.0	14.3	0.3
R6	20.8	16.8	17.2	0.5
R7	19.8	16.5	16.9	0.3
R8	33.4	28.4	29.4	1.0
R9	23.3	19.5	19.6	0.1
R10	17.9	14.9	14.9	0.1
R11	18.5	15.4	15.4	0.0
R12	16.8	14.1	14.1	0.0
R13	24.8	20.7	20.8	0.1
R14	26.1	21.8	21.9	0.1
R15	19.1	15.9	15.9	0.1
R16	21.8	18.2	18.4	0.2
R17	31.4	25.6	25.9	0.2
R18	33.9	26.7	27.2	0.4
R19	20.9	17.2	17.0	-0.1
R20	19.8	16.8	16.4	-0.4
R21	23.6	20.0	19.8	-0.2
R22	30.3	24.8	24.5	-0.3
R23	23.9	20.4	20.0	-0.4
R24	13.5	11.2	11.2	0.0
R25	17.8	14.6	15.1	0.5
R26	16.1	13.3	13.7	0.4
R27	16.1	13.5	13.7	0.2
R28	27.2	22.4	22.5	0.2

5.9.10 All of the predicted concentrations are within the objective and limit value both with and without Option 7 in the opening year, including those at Hungerley Hall Farm.

5.9.11 Small increases in concentrations were predicted at receptors R4 and R25 located at the residential building at Hungerley Hall Farm, receptor R6 located in Kings Park Drive near the A46 and at receptor R8 located in London Road near the Tollbar End junction, all due to changes in traffic flows. All other changes were imperceptible.

Option 8

5.9.12 Predicted annual mean NO_2 concentrations and changes due to operation of Option 8 are presented in Table 5.11. Concentrations in the base year of 2018 are also shown for comparison.

Table 5.11: Predicted annual mean NO_2 concentrations with Option 8

Receptor	Base year 2018 (µg/m³)	Do-Minimum 2025 (µg/m³)	Do-Something 2025 (µg/m³)	Change (µg/m³)
R1	13.8	11.6	11.6	0.0
R2	22.7	19.8	20.1	0.3
R3	18.5	15.7	15.8	0.1
R4	18.3	15.0	demolished	-
R5	16.8	14.0	14.5	0.5
R6	20.8	16.8	17.3	0.5
R7	19.8	16.5	16.9	0.4
R8	33.4	28.4	29.5	1.1
R9	23.3	19.5	19.6	0.1
R10	17.9	14.9	14.9	0.1
R11	18.5	15.4	15.4	0.0
R12	16.8	14.1	14.1	0.0
R13	24.8	20.7	20.8	0.1
R14	26.1	21.8	21.9	0.1
R15	19.1	15.9	15.8	0.0
R16	21.8	18.2	18.3	0.1
R17	31.4	25.6	25.9	0.2
R18	33.9	26.7	27.1	0.4
R19	20.9	17.2	17.1	-0.1
R20	19.8	16.8	16.4	-0.3
R21	23.6	20.0	19.8	-0.3
R22	30.3	24.8	24.4	-0.3
R23	23.9	20.4	20.0	-0.4
R24	13.5	11.2	11.2	0.0
R25	17.8	14.6	demolished	-
R26	16.1	13.3	15.7	2.4
R27	16.1	13.5	15.1	1.6
R28	27.2	22.4	22.5	0.2

5.9.13 All of the predicted concentrations are within the objective and limit value both with and without the Option 8 proposed scheme in the opening year, including those at Hungerly Hall Farm, part of which would be demolished to make space for the new alignment of the A46.

5.9.14 At Hungerley Hall Farm, a medium magnitude increase was predicted at R26 which is located at the northern corner of the outbuildings. A small magnitude increase was predicted at receptor R27 which is located on the eastern corner of the outbuildings. Receptors R4 and R25 are located on the residential building and would be demolished with the proposed scheme. These changes are due to road realignment. Small increases due to increases in traffic flows are predicted at receptors R5 in Gainford Rise near the proposed scheme, R6 in Kings Park Drive near the A46 and R8 in London Road near the Tollbar End junction. All other changes were imperceptible.

Option 11

5.9.15 Predicted annual mean NO_2 concentrations and changes due to operation of Option 11 are presented in Table 5.12. Concentrations in the base year of 2018 are also shown for comparison.

Table 5.12: Predicted annual mean NO_2 concentrations with Option 8

Receptor	Base year 2018 (µg/m³)	Do-Minimum 2025 (µg/m³)	Do-Something 2025 (µg/m³)	Change (µg/m³)
R1	13.8	11.6	11.6	0.0
R2	22.7	19.8	20.1	0.3
R3	18.5	15.7	15.8	0.1
R4	18.3	15.0	15.8	0.8
R5	16.8	14.0	14.0	0.0
R6	20.8	16.8	17.1	0.3
R7	19.8	16.5	16.8	0.3
R8	33.4	28.4	29.2	0.8
R9	23.3	19.5	19.6	0.1
R10	17.9	14.9	14.9	0.0
R11	18.5	15.4	15.4	0.0
R12	16.8	14.1	14.1	0.0
R13	24.8	20.7	20.8	0.1
R14	26.1	21.8	21.9	0.1
R15	19.1	15.9	15.9	0.0
R16	21.8	18.2	18.3	0.1
R17	31.4	25.6	26.2	0.6
R18	33.9	26.7	27.8	1.1
R19	20.9	17.2	17.2	0.0
R20	19.8	16.8	16.2	-0.6
R21	23.6	20.0	19.7	-0.3
R22	30.3	24.8	24.3	-0.5
R23	23.9	20.4	19.6	-0.8
R24	13.5	11.2	11.2	0.0
R25	17.8	14.6	15.3	0.7
R26	16.1	13.3	13.9	0.6
R27	16.1	13.5	13.8	0.3
R28	27.2	22.4	22.5	0.1

5.9.16 All of the predicted concentrations are within the objective and limit value both with and without the Option 11 proposed scheme in the opening year, including those at Hungerly Hall Farm.

5.9.17 At Hungerley Hall Farm, small magnitude increases were predicted at the residential building (R4 and R25) and the northern corner of the outbuildings (R26). The change at the western corner of the outbuildings (R27) was imperceptible.

5.9.18 Small increases are predicted at receptor R8 in London Road near the Tollbar End junction and R17 and R18 both of which are near Brinklow Road, due to increases in traffic flows. Small decreases are predicted at R20 and R23 both near Clifford Bridge Road and at R22 on Hinckley Road due to decreases in traffic flows. All other changes were imperceptible.

Operational phase – compliance risk assessment

5.9.19 Predicted annual mean NO_2 concentrations at the qualifying feature that is expected to have the highest concentrations near each PCM link in the ARN are shown in Table 5.13 for Option 6. There are no qualifying features within 15m of PCM links 9266 and 77296 that are within the ARN.

Table 5.13: Predicted NO_2 concentrations at PCM links for Option 6 in 2025

PCM Link	Receptor and Road Name	Do-Minimum (µg/m³)	Do-Something (µg/m³)	Change (µg/m³)
6490	Q1 -A4600	21.3	20.1	-1.2
36504	Q2- A4600	27.7	26.3	-1.4
7118	Q3- A428	18.4	18.5	0.1
7103	Q4 -A4082	26.8	27.0	0.2
73314	Q5 -A45	35.4	36.0	0.6

5.9.20 All of the predicted concentrations are within the limit value. This indicates that there is a low risk of non-compliance with the limit values for Option 6 and thus an AQAP is not required.

5.9.21 Predicted annual mean NO_2 concentrations at the qualifying feature that is expected to have the highest concentrations near each PCM link is shown in Table 5.14 for Option 7. There are no qualifying features within 15m of PCM links 9266 and 77296 that are within the ARN.

Table 5.14: Predicted NO_2 concentrations at PCM links for Option 7 in 2025

PCM Link	Receptor and Road Name	Do-Minimum (µg/m³)	Do-Something (µg/m³)	Change (µg/m³)
6490	Q1 -A4600	21.3	20.6	-0.7
36504	Q2- A4600	27.7	27.0	-0.7
7118	Q3- A428	18.4	18.8	0.4
7103	Q4 -A4082	26.8	27.1	0.3
73314	Q5 -A45	35.4	35.9	0.5

5.9.22 All of the predicted concentrations are within the limit value. This indicates that there is a low risk of non-compliance with the limit values for Option 7 and thus an AQAP is not required.

5.9.23 Predicted annual mean NO_2 concentrations at the qualifying feature that is expected to have the highest concentrations near each PCM link is shown in Table 5.15 for Option 8. There are no qualifying features within 15m of PCM links 9266 and 77296 that are within the ARN.

Table 5.15: Predicted NO_2 concentrations at PCM links for Option 8 in 2025

PCM Link	Receptor and Road Name	Do-Minimum (µg/m³)	Do-Something (µg/m³)	Change (µg/m³)
6490	Q1 -A4600	21.3	20.5	-0.8
36504	Q2- A4600	27.7	26.9	-0.8
7118	Q3- A428	18.4	18.6	0.2
7103	Q4 -A4082	26.8	27.1	0.3
73314	Q5 -A45	35.4	36.0	0.6

5.9.24 All of the predicted concentrations are within the limit value. This indicates that there is a low risk of non-compliance with the limit values for Option 8 and thus an AQAP is not required.

5.9.25 Predicted annual mean NO_2 concentrations at the qualifying feature that is expected to have the highest concentrations near each PCM link is shown in Table 5.16 for Option 11. There are no qualifying features within 15m of PCM links 9266 and 77296 that are within the ARN.

Table 5.16: Predicted NO_2 concentrations at PCM links for Option 11 in 2025

PCM Link	Receptor and Road Name	Do-Minimum (µg/m³)	Do-Something (µg/m³)	Change (µg/m³)
6490	Q1 -A4600	21.3	20.3	-1.1
36504	Q2- A4600	27.7	26.5	-1.2
7118	Q3- A428	18.4	18.5	0.1
7103	Q4 -A4082	26.8	27.0	0.2
73314	Q5 -A45	35.4	35.9	0.4

5.9.26 All of the predicted concentrations are within the limit value. This indicates that there is a low risk of non-compliance with the limit values for Option 11 and thus an AQAP is not required.

Significance of effects

5.9.27 The significance of the operational effects on local air quality on human health receptors for each option has been evaluated. All predicted concentrations with each of the four options and with the Do-Minimum scenario are within the thresholds. No likely significant effects are expected with any of the options.

5.9.28 All predicted NO_2 concentrations at qualifying features near PCM links that are within the ARN are within the EU limit value. There is a low risk of non-compliance with the EU Directive with each of the four options.

5.9.29 No significant effects are expected due to changes in air quality with any of the options.

Monitoring

5.9.30 As no significant effects have been identified for any option in the air quality assessment, no monitoring of significant effects is required.

6 Cultural Heritage

6.1 Introduction

6.1.1 This chapter of the environmental assessment report presents the outcome of an assessment of the likely effects from the proposed scheme on cultural heritage, including archaeological remains, historic buildings and historic landscapes.

6.1.2 The assessment has been prepared in accordance with DMRB LA 104 and DMRB LA 106 Cultural Heritage Assessment Revision 1 (Highways England, 2020c; Highways England 2020f).

6.1.3 This chapter should be read in conjunction with Figure 6.1: Designated Heritage Assets and Figure 6.2: Non-Designated Heritage Assets.

6.2 Legislative and policy framework

National legislation

6.2.1 Legislation which is relevant to cultural heritage for this area and considered as part of the assessment includes:

- H.M. Government, Ancient Monuments and Archaeological Areas Act 1979.
- H.M. Government Planning (Listed Buildings and Conservation Areas) Act 1990.

6.2.2 The Ancient Monuments and Archaeological Areas Act 1979 imposes a requirement for Scheduled Monument Consent for any works of demolition, repair, and alteration that might affect a Scheduled Monument. For non-designated archaeological assets, protection is afforded through the development management process as established both by the Town and Country Planning Act 1990 and the NPPF.

6.2.3 The Planning (Listed Buildings and Conservation Areas) Act 1990 (referred to as the Act) sets out the principal statutory provisions which must be considered in the determination of any planning application affecting listed buildings or conservation areas. Section 66 of the Act states that in considering whether to grant planning permission for development which affects a listed building or its setting, the local planning authority or, as the case may be, the Secretary of State, shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses. By virtue of Section 1(5) of the Act a listed building includes any object or structure within its curtilage.

6.2.4 Conservation areas are areas of special architectural or historic interest, the character or appearance of which is desirable to preserve or enhance. Section 72 requires that special attention should be paid to the desirability of preserving or enhancing the character or appearance of conservation areas.

6.2.5 The Act also deals with required consents. Work to demolish, alter or extend listed buildings and certain works within conservation areas is restricted without appropriate consents.

National Policy Statement for National Networks

6.2.6 Section 5 of the NPSNN sets out the need and government policies for nationally significant road projects for England. It deals with the requirements in relation to the historic environment. As with the NPPF, it requires the significance of affected assets to be assessed as a material consideration in the decision-making process. For EIA development it requires the identification of likely significant effects to heritage assets.

National Planning Policy

6.2.7 The NPPF provides the guiding principles for conserving and enhancing the historic environment. Section 16 sets out criteria which should be considered when assessing the significance of cultural heritage assets, and the place of the historic environment within plan making and the determination of planning applications.

6.2.8 The PPG provides a web-based resource in support of the NPPF, with particular guidance on matters relating to protecting the historic environment in the section 'Conserving and Enhancing the Historic Environment'. This provides a definition of cultural heritage significance as being the sum of an asset's interests which can be 'archaeological, architectural, artistic and historic'.

Highways England policy

Highways England Delivery Plan 2020 - 2025

6.2.9 Chapter 6 details how Highways England will utilise the Environment and Wellbeing Fund to design roads that work harmoniously with their surroundings. For the historic environment this would include the ability to improve the setting and condition of heritage assets in their ownership, or those negatively affected by their network. It states that the fund could be used to relocate heritage features to protect them for future generations.

Local policy

Coventry Local Plan 2011-2031

6.2.10 The Coventry Local Plan 2011-2031 was formerly adopted in 2017. Section 9 deals with minimising impact upon heritage assets and their settings. Policies of relevance to heritage assets include HE1 (Conservation Areas) and HE2 (Conservation and Heritage Assets). Policy HE2 states that 'demolition or destruction of heritage assets will be resisted; proposals to demolish a heritage asset will therefore need substantial justification. The greater the damage to the significance of the asset, the greater the justification required, and the public benefit needed to outweigh such damage.

Rugby Borough Council Local Plan 2011-2031

6.2.11 The Rugby Borough Local Plan provides guidance on development within the historic environment. The policies included within the document that consider the historic environment include: Policy SDC3 Protecting and Enhancing the Historic Environment; Policy GP3: Previously Developed Land and Conversions.

Coombe Abbey Conservation Area Appraisal (Rugby Borough Council, 2010)

6.2.12 This document is an appraisal of the Coombe Abbey Conservation Area. The principal objectives of the document are to define and record the special interest of the conservation area to ensure there is understanding of what is worthy of preservation and to assess the action that may be necessary to safeguard this area and put forward proposals for its enhancement.

Other guidance

6.2.13 This assessment follows the principles of key guidance for the assessment of cultural heritage, including the following:

- DMRB LA 104
- DMRB LA 106
- Historic England Good Practice Advice Note GPA2, Managing Significance in Decision-Taking in the Historic Environment (Historic England, 2015).
- Historic England Good Practice Advice Note GPA3, The Setting of Heritage Assets (Historic England 2017).
- Chartered Institute for Archaeologists (CIfA), Code of Conduct (CIfA, 2019) and Standard and Guidance for Historic Environment Desk-Based Assessment (CIfA, 2020a).

6.2.14 The assessment is, however, a simple assessment which is entirely desk-based. In that respect, a proportionate approach has been taken and the full methodologies outlined in the above documents have not been completed at this assessment stage (see section 6.4).

6.3 Assessment methodology

6.3.1 The following DMRB standards have been applied in the assessment to identify the value and significance of cultural heritage assets and to identify and evaluate the potential impacts and effects that construction and operation of the proposed scheme options would likely have on these assets:

- DMRB LA 104
- DMRB LA 106
- DMRB LA 116 Cultural Heritage Assessment Management Plans (Highways England, 2020g) has also been used in the assessment to guide the development of mitigation measures.

Value of heritage assets

6.3.2 The value of a building, monument, area, site, place or landscape reflects its significance as a heritage asset and therefore its sensitivity to change.

6.3.3 The NPPF defines the significance of heritage assets as “The value of a heritage asset to this and future generations because of its heritage interest. Significance derives not only from a heritage asset’s physical presence, but also from its setting.” It also sets out criteria which should be considered when assessing the significance of cultural heritage assets, which include archaeological, architectural, artistic and historic values.

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

6.3.5 Professional judgement has been used to identify the value and significance of assets guided by legislation, national planning policy, CIfA standards, official designations, and the assessment criteria contained in Section 3 of DMRB LA 104 (reproduced in Table 6.1).

Table 6.1: Environmental value (sensitivity) and descriptions (taken from DMRB LA 104 Table 3.2N)

Value (sensitivity) of receptor/ resource	Typical description
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Magnitude of impact criteria

6.3.6 Impacts have been identified by reviewing the identified sites, features and areas (heritage assets) within the defined study areas (see Section 6.5) against the form and extent of the proposed scheme, in order to establish which assets would be affected by its construction and operation.

6.3.7 Impacts identified in the assessment relate to the predicted changes to key elements of an asset and/ or its setting. These can, for example, derive from temporary or permanent actions such as the physical destruction of buried archaeology during construction works, and the introduction of new highway infrastructure into the setting of a historic building.

6.3.8 The magnitude of impact has been assessed using the criteria contained in DMRB LA 104 (Table 6.2).

Table 6.2: Magnitude of impact and typical descriptions (taken from DMRB LA 104 Table 3.4N)

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

Significance of effect

6.3.9 The identification of the likely significant effects on cultural heritage assets has relied on reasoned argument, the professional judgement of competent experts, and consultation with stakeholders. It has also been informed by knowledge and experience gained from assessments of similar highway schemes.

6.3.10 The assignment of effects has involved combining the value of an asset with the predicted magnitude of impact, guided by the significance matrix set out in DMRB LA 104 (Table 6.3). Moderate, large or very large effects are considered to be significant, whereas negligible and slight effects are considered to be not significant.

Table 6.3: Significance of effect matrix (taken from DMRB LA 104 Table 3.8.1)

		Magnitude of Impact (change)				
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
Environmental value (sensitivity)	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or 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

6.4 Assessment assumptions and limitations

6.4.1 The assessment is based on data received from databases held and maintained by Historic England, Coventry City Council and Warwickshire County Council. It has been assumed that the data is appropriate for use.

6.4.2 These data only lists known archaeological sites or significant historic landscape features. Therefore, there is a possibility for the discovery of previously unrecorded archaeological remains.

6.4.3 The areas associated with the proposed scheme have not been subject to a cultural heritage site walkover. It is anticipated that a site walkover will be undertaken at the next stage of the design process (at preliminary design stage).

6.4.4 Due to limited data availability and design development at this early stage, it is not possible to accurately determine the impacts that the final design(s) would have on archaeological remains. In addition, specific route options may impact on buried and previously unrecorded archaeological remains, or other heritage assets that have not yet been identified or recorded in heritage datasets.

6.4.5 The Stage 2 EAR has not been undertaken as a full desk-based assessment, so a full setting assessment of heritage assets following the methodology outlined in Historic England's Good Practice Advice Note 3; The Setting of Heritage Assets (Historic England, 2017) has not yet been undertaken. It is anticipated that a site walkover will be undertaken at the next stages of the design process.

6.5 Study area

6.5.1 Section 3 of DMRB LA 106 defines a study area "according to the sensitivity of the receiving environment and the potential impacts of the project". The standard continues:

"Where a new road is proposed the study area shall include the footprint of the scheme plus any land outside that footprint which includes any heritage assets which could be physically affected.

The study area should include the settings of any designated or other cultural heritage resource in the footprint of the scheme, or within the zone of visual influence or potentially affected by noise.

The study area used in the assessment shall be agreed with the Overseeing Organisation" (Highways England, 2020f, LA 106, 3.5-3.7b).

6.5.2 The proposed study area for the EAR was outlined in the Stage 2 Scoping Report. It has been designed to inform the potential and nature of archaeological remains that may be present within the proposed scheme boundary, as well as the potential for impacts to heritage assets within and outside the proposed scheme boundary through changes to their settings. The study area therefore extends beyond areas of physical impact.

6.5.3 A study area of 1km around the combined proposed scheme boundary has been adopted for consideration of designated heritage assets. A study area of 300m around the combined proposed scheme boundary has been adopted for the consideration of non-designated heritage assets and to inform on the archaeological context.

6.6 Baseline conditions

Designated assets

6.6.1 The 1km study area for designated assets contained 30 designated heritage assets. These include three scheduled monuments (one of which is also a Grade I listed building); two Grade I listed buildings; two Grade II* listed building; one Grade II* Registered Park and Garden (RPG), 21 Grade II listed buildings and one conservation area. These assets are detailed in Table 6.4 and shown on Figure 6.1: Designated Heritage Assets

6.6.2 There are no World Heritage Sites or Registered Battlefields within the study area.

6.6.3 Of the 30 identified designated heritage assets, five are located within the combined proposed scheme boundary. A small section of the western extent of the Coombe Abbey Grade II* RPG [National Heritage List for England (NHLE) 1000408] and Conservation Area falls within the combined proposed scheme boundary, comprising planting along the parkland boundary.

6.6.4 The Grade II listed Hungerley Hall Farmhouse [NHLE 1265694], the barn approximately 50m north of Hungerley Hall Farmhouse [NHLE 1226789], and the granary, cowshed and stable approximately 15m north-west of Hungerley Hall Farmhouse [NHLE 1265638] are all located entirely within the combined proposed scheme boundary. The Farmhouse is of probably late 17th and early 18th century origins with mid-18th to late-19th century additions and alterations. The barn and the granary, cowshed, and stable are of mid- to late- 18th century. Further buildings within the farm complex, and subservient in use to the farmhouse and its listed buildings, can be shown through analysis of historic Ordnance Survey maps to pre-date 1948. These buildings are therefore considered to be curtilage listed buildings as per the definition provided in the Planning (Listed Buildings and Conservation Areas) Act 1990 and the guidance in Historic England Advice Note 10; Listed Buildings and Curtilage (Historic England, 2018).

6.6.5 It should be noted that the location of Hungerley Hall Farmhouse in Historic England's mapping on the National Heritage List for England (NHLE) is incorrect. The building is located at NGR: SP 38425 79476, which is approximately 30m south of its recorded location.

Table 6.4: Designated heritage assets within the 1km study area

Asset ID	Designation and Grade	NGR	Name	Description
1076632	Listed Building Grade II	SP 38023 78577	6 Brinklow Road	Late-16th century or early 17th century timber-frame house with whitewashed brick nogging. Two storeys with a single storey back wing.
1233531	Listed Building Grade II	SP 39389 80853	Walsgrave Hill Farmhouse	Late-18th century brick-built farmhouse on a plinth. Two storeys plus and attic with a 19th century one-bay extension to the left and an 18th century wing to the rear. Windows are predominantly 24-pane, 3-light casements, and those to ground floor have gauged brick arches, whilst those to first floor with segmented brick arches.
1265638	Listed Building Grade II	SP 38389 79499	Granary, Cowshed and Stable Range Approx. 15m north-west of Hungerley Hall Farmhouse	Mid- to late-18th century granary, cowshed and stable range. The building is L-shaped and constructed in red brick with plain-tile roofs. The stable projects forward on right. The granary is of two-storeys to left. The Cowshed is single storey to the centre and the stable is of two-storeys with 4 stable doors to the ground floor and shuttered windows above.
1342892	Listed Building Grade II	SP 38024 80748	White House	Early- to mid-19th century frontage to an earlier house. It is of whitewashed brick with a Welsh slated roof. Two storeys, with sash windows with glazing bars in reveals.
1076630	Listed Building Grade II	SP 37675 78559	The Vicarage	A vicarage comprising a late-18th century west block, and earlier remodelled 16th century front block and a 19th century porch. The building is of two storeys with cement rendering and two full-height canted bays with sash windows on the west block and casement windows to the front block.
1233703	Listed Building Grade II	SP 38948 78945	Wall to south of the Woodlands, Coombe Abbey	Boundary wall to The Woodlands built by Lancelot (Capability) Brown in c1770-78, with later alterations. 2-3m in height in red brick with coping in part and remains of bases for urns. Together with a wall to the north of The Woodlands, this cut off the area of land bordering The Pool which Brown had formed into a Menagerie. The area is named as such in a plan of 1778.

Asset ID	Designation and Grade	NGR	Name	Description
1342904	Listed Building Grade II	SP 37791 78325	22 Brandon Road	18th century house in red brick with a tiled roof. Two storeys with flush casement windows with glazing bars under rusticated stone lintels.
1076633	Listed Building Grade II	SP 38032 78577	8 Brinklow Road	Late-16th century or early 17th century timber frame house on a stone plinth, with red brick nogging. Two storeys and an attic.
1233532	Listed Building Grade II*	SP 39609 78948	West Lodge	A late-18th century lodge, now a house. Constructed in sandstone ashlar with some brick to the end walls. Two storeys to the main range with single-storey, one-bay wings to either side in style of a Roman triumphal arch. Parapet to flanking wings with urns to the left and right corners of main range, decorated with festoons.
1076634	Listed Building Grade II	SP 38037 78576	10 and 12 Brinklow Road	16th century timber-framed houses refronted with red brick, No 10 refaced with whitewashed pebbledash. Tiled roof. Timber frame exposed at left angle and side elevation. Single storey and attics.
1034897	Listed Building Grade II	SP 39570 78266	Old Lodge Farm, barn approx. 10m south of Farmhouse	17th century timber-framed barn with 19th century rebuilding and brick infill. Five-bays long with an old plain-tile roof. Included for group value.
1276493	Listed Building Grade II	SP 38842 79058	Wall to north of the Woodlands, Coombe Abbey and Attached Farm buildings	Boundary wall by Lancelot (Capability) Brown of c.1770-78, with later alterations. Red brick with copings in part. This wall extends north and north-west of The Woodlands to the edge of The Pool. The wall was originally built by Brown together with that to south of The Woodlands to cut off the area of land bordering The Pool forming a Menagerie. Attached to the western side of this wall a range of single storey outbuildings in red brick with plain tile roofs. These buildings were built to serve the Menagerie, to provide feed storage and winter quarters for the exotic animals kept here.

Asset ID	Designation and Grade	NGR	Name	Description
1265694	Listed Building Grade II	SP 38425 79476	Hungerley Hall Farmhouse	A Probable late-17th to early 18th century farmhouse with mid-18th century extensions and late-18th or 19th century alterations. Two storeys and a cellar in red brick with a complex plan. The main front faces the garden. The differences in brickwork together with interior evidence suggest that a timber-framed 3-unit-plan house was extended on either end in brick in mid-18th century, then the framing was re-fronted in brick in the late-18th or 19th century.
1233663	Listed Building Grade II	SP 38866 79075	Menagerie Farm buildings to north west of the Woodlands	Menagerie farm buildings by Lancelot (Capability) Brown in c.1778. Built to serve the Menagerie. Comprising two red brick ranges with plain tile roofs linked by a gate. The larger northern range has a two-storey wing to the west, containing carriage arches, and stables. The smaller southern range has two cart entrances. These buildings are extremely rare, they were built to store food and bedding for the animals in the Menagerie, and they also provided space for sheltered winter accommodation for these exotic beasts.
1076631	Listed Building Grade II	SP 37945 78578	1 and 2 Brinklow Road	17th century timber framed house with whitewashed brick nogging, refaced in the 18th century and with a 19th century red brick rear addition.
1087021	Listed Building Grade II	SP 37163 79034	Stoke House	Early- to mid-19th century Stucco house with a Welsh slated roof. Three storeys with a 1st floor simplified entablature, frieze and bracketed cornice at eaves.
1233533	Listed Building Grade II*	SP 38862 78998	The Woodlands	Late-18th century hunting lodge, now a house, with 19th century additions. Probably by Capability Brown. Constructed in sandstone ashlar, with some brick. Complex plan with polygonal wing to left, central range and projecting cross-wing to right.
1335842	Listed Building Grade II	SP 38044 80783	14 School House Lane	16th or early-17th century timber framed house with whitewashed plaster infilling, and a medieval tiled roof.

Asset ID	Designation and Grade	NGR	Name	Description
1342922	Listed Building Grade II	SP 37826 78281	34 Brandon Road	17th century, or earlier, house that has been slightly altered. Two storeys of whitewashed pebbledash, and an old tiled roof. Timber framework exposed internally.
1034896	Listed Building Grade II	SP 39553 78295	Old Lodge Farmhouse	Early 17th century brick-built farmhouse with a large late-19th century addition to the rear. T-plan with wing to rear, extended to L-plan with wing on left to rear, facing farmyard. Two storeys and an attic with a symmetrical main front to the garden.
1226789	Listed Building Grade II	SP 38422 79528	Barn approx. 50m north of Hungerley Hall Farmhouse	Mid-18th century red brick barn with some decorative flared headers. It contains a central double doorway with an opening to the upper right.
1076629	Listed Building Grade I	SP 37729 78493	Church of St Bartholomew	A church built in 1771-3 for William Lord Craven of Coombe Abbey. The nave, sanctuary apse, and recessed west porch are attributed to Robert Adam and constructed in ashlar with cement slurry. There is a north transept leading to vestry with semi-circular ends.
1076645	Listed Building Grade I and Scheduled Monument	SP 37379 80159	Remains of Caludon Castle	A castle, or fortified manor, dating to c.1354, or earlier. John Segrave was granted a licence to crenellate 1305 and another was granted in 1354. The castle was vacant after the banishment of Thomas Mowbray, Duke of Norfolk in 1398, but was rebuilt in c.1580 by Henry Lord Berkeley. Ruined again by the later 17th century. Only one wall remains containing pointed arched windows and some remnants tracery. Also a scheduled monument.
1276492	Listed Building Grade II	SP 39334 79334	Boat House on south side of the Pool, Combe Abbey	A boat house on the south side of The Pool, built in c1770-78, probably by Lancelot (Capability) Brown, with later alterations. The building is single storey in red brick with an open end to The Pool and an entrance door opposite.

Asset ID	Designation and Grade	NGR	Name	Description
1365086	Listed Building Grade II	SP 38692 77640	The Cocked Hat Restaurant and Hotel, Binley Common House, Rugby Road	Shown on Ordnance Survey map as Binley Common Farm. It was a farmhouse but is now a restaurant and hotel. The building is 17th century with mid- to late-19th century additions and alterations, and late 20th century alterations. It is two storeys and attic in Flemish bond brick with a sandstone plinth and moulded string course and quoins, under a hipped plain-tiled roof.
1000408	Registered Park and Garden Grade II* Conservation Area	SP 40102 79655	Coombe Abbey	Late-18th century park landscaped by Lancelot Brown with structures designed by Henry Holland, together with mid- and late-19th century formal gardens laid out by William Andrews Nesfield and William Miller which incorporate elements of late-16th and early 17th century formal gardens. Contains a number of listed buildings.
1014044	Scheduled Monument	SP 37359 80138	Caludon Castle: a moated site and part of an associated water management system	Caludon Castle is a well-preserved example of a moated site together with an associated water management system, also a Grade I listed building. The moated site retains structural and artefactual evidence for the original house which existed from the end of the 12th century, and for the later rebuilding and additions in the mid-14th century, and early post-medieval period. Additionally, the existence of the pool to the north of the moated site provides evidence for the wider setting of the house and is a signifier of the and social status of its occupants.
1014045	Scheduled Monument	SP 37403 79960	Moated site 190m south of Caludon Castle	The moated site 190m south of Caludon Castle is a well-preserved example. The moated island retains structural and artefactual evidence for buildings and other structures. The interest of the moated site is enhanced by its close proximity to Caludon Castle.

6.6.6 The type and scale of intervening modern built development between the majority of these assets and the proposed scheme means that significant effects through change to setting are unlikely to occur. The following assets are those where there is considered to be potential for significant effects due to the proposed scheme:

- The group of three Grade II listed buildings at Hungerley Hall Farm [NHLE 1265638; 1265694; 1226798].
- Coombe Abbey Grade II* Registered Park and Garden [NHLE 1000408] and Conservation Area and key designated buildings it contains.
- Walsgrave Hill Farm [NHLE 1233531].

6.6.7 The group of three Grade II listed buildings at Hungerley Hall Farm [NHLE 1265638; 1265694; 1226789] have illustrative historic and architectural interest as a functional collection of buildings. These buildings comprise a farmhouse and farmyard that demonstrates the local vernacular architectural style, as well as the development and expansion of farm buildings throughout the 18th century. The farmhouse has architectural and archaeological interest relating to its construction in the late 17th century and later phases of development, which demonstrates its historical development in tandem with the expansion of its farm. The buildings have group value with each other and with other non-designated ranges within the farmyard, some of which are curtilage listed, but all of which contribute to the setting and significance of the listed buildings as a discrete working farm. The group of buildings is set within fields which provide the building with a green buffer between the built development of Walsgrave to its north-west side and the existing A46 to its south-east side. This contributes to understanding of its function. The principal elevation of the farmhouse faces south-east away from the farmyard and over its private garden. The existing A46 (in a tree-lined cutting) is approximately 70m from this elevation.

6.6.8 Coombe Abbey RPG [NHLE 1000408] and Conservation Area have historic, architectural, archaeological and artistic interest as a designed landscape forming the setting of Coombe Abbey (Grade I listed building). The abbey originated in the 12th century as a monastic foundation but became a stately home in the ownership of John Hartington some 50 years after the dissolution in the 16th century. It has undergone several phases of development through the intervening centuries and is now a hotel. Coombe Abbey is set within the Grade II* RPG which is also a conservation area. Key landscape features within the park include formal avenues, undeveloped fields, pleasure grounds, woodland and the large lake which encircles the group of buildings known as the Menagerie. Key national landscape architects and architects are associated with the parkland, including Lancelot 'Capability' Brown, Henry Holland, William Andrews Nesfield and William Miller. The Coombe Abbey Conservation Appraisal identifies a series of key views of and within the park (Rugby Council 2010, 22). These are generally inward-looking views of key built and designed features within the parkland, rather than views designed to look out beyond the park's boundaries. The importance of the rural aspect in views out of the park is expressed elsewhere in the appraisal (Rugby Council 2010, 5) and is a well-known feature of Lancelot Brown's garden design schemes which took advantage of views beyond the park to enhance to the grounds within. The conservation area appraisal notes that to the north and north-east views are of the surrounding agricultural land, whilst to the south the views are across the A427 towards Birchley Wood, The Grove and New Close Wood. It states that 'the wider countryside setting is at times read in conjunction with the land within the park, whilst at the times impact of the surrounding land is limited by the enclosure created by planting within the garden' (Rugby Council 2010, 6).

6.6.9 Walsgrave Hill Farm [NHLE 1233531] has illustrative historic interest and architectural interest as an example of a large, late 18th century, polite farmhouse, built in brick. It is associated with its brick-built farmstead ranges to the north-east side, together with larger modern agricultural sheds and silos. The historic farmstead ranges are likely to be curtilage listed buildings as they predate 1948 and served a purpose subservient to the listed farmhouse. The farmstead is set within agricultural fields that contribute to understanding of its function. The principal elevation of the farmhouse faces south-west over its garden which is bounded by mature trees. These limit views between the farmhouse and the existing A46.

Non-designated assets

6.6.10 There are no locally listed buildings within 300m of the proposed scheme boundary (Coventry City Council Planning Website, 2021).

6.6.11 Two historic environment records cover the study area: the Coventry Historic Environment Record (HER) and the Warwickshire HER.

6.6.12 There are 26 non-designated heritage assets recorded within the 300m study area. In addition to the recorded non-designated heritage assets, the Warwickshire HER has recorded a number of areas of ridge and furrow within the study area, a number of which extend into the combined proposed scheme boundary. These assets are detailed in Table 6.5 and shown on Figure 6.2: Non-Designated Heritage Assets

6.6.13 There are four assets recorded within the combined proposed scheme boundary. These comprise an area of post-medieval ridge and furrow [MCT891] which was located along the existing B4208 towards the west of the combined proposed scheme boundary, and an area of ridge and furrow which extends into the combined proposed scheme boundary towards the north-west mapped by the Midlands Open Fields Project carried out in the 1990s (see Figure 6.2: Non-Designated Heritage Assets

6.6.14 The post-medieval ridge and furrow [MCT891] has been entirely destroyed as a result of the construction of the existing road network.

6.6.15 The assets recorded within the study area primarily consist of medieval to post-medieval ridge and furrow earthworks identified through examination of aerial photographs and previous archaeological investigations. The remaining assets within the study area comprise post-medieval landscape features identified on historic mapping such as roads, streams, the site of a former sheepwash, a fishpond and quarry pits.

6.6.16 There is one Archaeological Constraint Area [DCT1176] recorded within the study area comprising an area of ridge and furrow located approximately 50m west of the combined proposed scheme boundary.

Table 6.5: Non-designated assets within the 300m study area

HER UID	Period	Name	Description
DCT1176	N/A	Archaeological Constraint Area	Area of ridge and furrow north of Clifford Bridge Road allotments
MCT15261	Post-medieval	Road	Road on the 1888 OS map; no Tithe Map available
MCT15391	Post-medieval	River Sowe	River Sowe on the 1888 OS map; no Tithe Map available
MCT15955	Post-medieval	Stream	Stream at Walsgrave on the 1887 OS map; no Tithe map available
MCT15956	Post-medieval	Pingle	Pingle at Walsgrave on the 1887 OS map; no Tithe map available
MCT15973	Post-medieval	Sheepwash	Sheepwash at Walsgrave on the 1887 OS map; no Tithe map available
MCT15982	Post-medieval	Old Quarry?	?Old Quarry at Walsgrave on the 1887 OS map; no Tithe map available
MCT16039	Post-medieval	Road	Road at Walsgrave on the 1887 OS map; no Tithe map available
MCT16043	Post-medieval	Stream	Stream at Walsgrave on the 1887 OS map; no Tithe map available
MCT16045	Post-medieval	High Bridge	High Bridge at Walsgrave on the 1887 OS map; no Tithe map available
MCT16481	Medieval – post-medieval	Ridge and Furrow	Ridge and Furrow earthworks recorded during a watching brief.
MCT16482	Medieval – post-medieval	Ridge and Furrow	Ridge and furrow recorded during a watching brief in 1993/4. It is visible as an earthwork on 2005 aerial photographs.
MCT16484	Unknown	Deposit of Charcoal. Coventry Pipeline Phase 2	Undated charcoal deposit
MCT581	Medieval	Area of ridge and furrow, Walsgrave on Sowe	An area of ridge and furrow cultivation that was visible on a 1977 aerial photograph was evaluated in 2002 but no dating evidence was found.
MCT60	Post-medieval	Post-medieval coin	An Elizabethan coin (1588-1603) was found in the Binley area.
MCT65	Medieval	Ridge and Furrow. Playing fields; South of Caludon	Possible medieval ridge and furrow following a North - South Orientation. Cropmark.

HER UID	Period	Name	Description
MCT891	Post-medieval	Ridge and Furrow. Coventry Eastern Bypass Site 3	A small area of ridge and furrow was recorded during a field investigation in this area. Post-1800 finds of coins and a belt buckle were also found. Asset has been entirely destroyed.
MWA6853	Post-medieval	Fishpond	The site of a fishpond used for the breeding and storage of fish. It is marked on the Ordnance survey map of 1886. It dates to the Imperial period, and is situated north of Luttleton Close, Binley Woods.
MWA3732	Post-medieval	Site of brickworks 400m south of The Woodlands	The site of brick and tile works dating to the Imperial period which were indicated on an estate map of 1823. No surface evidence remains. The site is south of the south-west end of Coombe Country Park.
MWA8193	Post-medieval	The Menagerie within Coombe Abbey Deer Park	The site of a menagerie or zoo associated within the Coombe Abbey estate. It dated to the Imperial period and was situated within Coombe Abbey Deer Park.
MWA3733	Post-medieval	Quarry within Coombe Abbey Deer Park	The site of a gravel pit from which gravel was extracted during the post-medieval period. It is marked on an estate map of 1823. The gravel pit was situated inside Coombe Abbey Deer Park.
MWA6724	Post-medieval	Site of Gravel Pit SW of Walsgrave Hill	The site of a gravel pit from which gravel was extracted during the Imperial period. The site is marked on the Ordnance Survey map of 1886. It was situated 500m south west of Walsgrave Hill
MWA3720	Modern	High Bridge, Walsgrave on Sowe	The site of a modern bridge. A map of 1823 suggests that this might be the site of an earlier bridge. The site is located 700m west of Walsgrave Hill.
MWA8277	Medieval	Ridge and furrow, Coventry Eastern Bypass Site 4	The remains of Medieval ridge and furrow cultivation which survived as earthworks. Much of the ridge and furrow has been destroyed by recent road building and pipeline installation. The site is located north west of Walsgrave Hill.

HER UID	Period	Name	Description
MWA31267	Unknown	Walsgrave Hill Trig Point, Combe Fields	Trig point pillar
MWA3737	Post-medieval	Possible quarry, 'Marlpit Close', Walsgrave on Sowe	The possible site of a marl pit dating to at least the Imperial period as suggested by documentary evidence. Evidence of ridge and furrow cultivation also exists in this area and survives as earthworks. These features are situated 500m north of Walsgrave Hill.
MWA4788	Post-medieval	Turnpike road from Markey Harborough to Coventry	A toll road that was in use during the Imperial period. Travellers had to pay a toll to use the road. It ran from Coventry to Market Harborough.
N/A	Medieval – post-medieval	Ridge and furrow	Areas of ridge and furrow identified from the Midlands Open Fields Project carried out in the 1990s.

6.6.17 In addition, located outside of the study area, approximately 340m east of the combined proposed scheme boundary, is a possible Roman enclosure [MWA19114] identified as cropmarks through aerial photograph analysis.

6.6.18 The following assets are those where there is considered to be potential for significant effects as a result of the proposed scheme:

- Ridge and furrow identified from the Midlands Open Fields Project carried out in the 1990s (see Figure 6.2: Non-Designated Heritage Assets
- Post-medieval road [MCT15261]
- Former turnpike road [MWA4788]

6.6.19 The ridge and furrow identified as part of the Midlands Open Fields Project is undated but could be of medieval to post-medieval date. The asset has archaeological interest with the potential to enhance understanding of medieval and/ or post-medieval agricultural practices which could contribute to local research.

6.6.20 The post-medieval road [MCT15261] has been identified on the 1888 Ordnance Survey (OS) map and largely follows the route of the existing B4027. The asset has historical interest as it forms part of the post-medieval road network of the local area.

6.6.21 The former turnpike road [MWA4788] was established between 1750 - 51 and largely follows the route of the existing B4428/ B4027. The asset has historical interest as it forms part of the post-medieval road network of the local area.

Previous archaeological investigations

6.6.22 13 archaeological investigations have been previously undertaken within the study area, six of which extend into the combined proposed scheme boundary (refer to Figure 6.2: Non-Designated Heritage Assets

6.6.23 Figure 6.3: Previous Archaeological Events

6.6.24 A geophysical survey was undertaken in 2009 [ETC492] which identified evidence for ridge and furrow cultivation. The results of this survey were not available at the time of writing; however, the HER record indicates that the survey area extends into the combined proposed scheme boundary and as such, it is likely that the ridge and furrow also extends into the combined proposed scheme boundary.

6.6.25 Archaeological investigations [ECT37]; [ECT63]; [ECT76] undertaken as part of the Coventry Eastern Bypass in 1987 - 8 and 1994 identified a number of areas of ridge and furrow including [MWA8277] located towards the north of the combined proposed scheme boundary and [MCT891] located within the combined proposed scheme boundary.

6.6.26 An archaeological watching brief [ECT93] undertaken as part of the Coventry Pipeline Phase 2 in 1993 - 4 identified a series of ridge and furrow earthworks [MCT16481]; [MCT16482] located towards the north of the combined proposed scheme boundary.

Historic landscape characterisation

6.6.27 The historic landscape character of the combined proposed scheme boundary has been recorded as part of the Coventry Historic Landscape Characterisation (HLC) Project (Coventry City Council, 2013) and the Warwickshire HLC Project (Warwickshire County Council, 2010) and is shown on Figure 6.4: Historic Landscape Character Areas

6.6.28 The combined proposed scheme boundary is characterised in the Coventry HLC as largely 'Fieldscapes' with a small area of 'Open Land' towards the south-western boundary and a small area of 'Settlement' towards the western boundary. The 'Fieldscapes' character relates to the small irregular fields which covers the majority of the combined proposed scheme boundary. The 'Open Land' character area relates to an area of rough grassland/ scrub which runs along the south-western edge of the combined proposed scheme boundary. The 'Settlement' character area relates to Hungerley Hall Farm which is located on the western extent of the combined proposed scheme boundary.

6.6.29 The Coventry HLC Project has used the HLC data to compile 46 Character Areas, by linking those areas that are similar in character and which adjoin each other. Two such Character Areas are recorded within the proposed scheme boundary.

6.6.30 Character Area 28 – South Stowe covers the area of the combined proposed scheme boundary from the A46/ B4082 roundabout, extending north. Documentary evidence indicates that this area of land has always been largely open in character, forming part of the Sowe and Stoke open field systems and common meadows during the medieval period. The area was enclosed in the 17th and 18th centuries and by the late 18th century, the majority of the character area comprised small, enclosed fields. The character area has remained largely unchanged since and is surrounded on all sides by residential development.

6.6.31 Character Area 9 – East Binley covers the area of the combined proposed scheme boundary from the A46/ B4082 roundabout, extending south. Historic mapping shows that the area comprised almost entirely of enclosed fields in the mid-18th century with a small number of houses forming the historic core of Binley village, which dates back to the medieval period. The agricultural landscape remained unchanged until 1925 - 36 when residential development started to expand across the area and by 2005 most of the area was residential. This area now consists predominantly of residential settlement on the eastern fringe of Coventry with a narrow strip of woodland and open land towards the north-east.

6.6.32 The combined proposed scheme boundary is charactered in the Warwickshire HLC as 'Fieldscapes'. This relates to the large irregular fields and re-organised piecemeal enclosures located towards the north of the combined proposed scheme boundary. This land has remained largely unchanged since the first edition OS map except for some changes in the field pattern.

Archaeological potential

6.6.33 A possible Roman enclosure has been identified approximately 340m east of the combined proposed scheme boundary and there is the potential for further Roman remains to be located within the combined proposed scheme boundary.

6.6.34 Ridge and furrow earthworks, likely dating to the medieval or post-medieval periods have been recorded within, and within close proximity to, the combined proposed scheme boundary. There is therefore the potential for further ridge and furrow earthworks dating to the same periods, to be located within the combined proposed scheme boundary.

Consultation

6.6.35 Early-stage consultation with Historic England was recommended in the Stage 1 EAR and the Stage 2 Scoping Report due to the scale and nature of potential impacts to designated heritage assets that may result from at least one of the proposed scheme options under consideration. Consultation was undertaken with Historic England, via a virtual meeting platform on 3 December 2020, regarding the potential impacts of the proposed scheme options on the designated heritage assets at Coombe Abbey, a Grade II* RPG (also a conservation area), as well as three Grade II listed buildings at Hungerley Hall Farm, which are located within 200m of the existing A46 alignment.

6.6.36 The consultation included presentation of the options under consideration (refer to Chapter 2) and discussion of the benefits and disbenefits of each in terms of impact upon cultural heritage assets and in terms of how well each achieves the client's project aims.

6.6.37 Historic England expressed a preference for Option 6. This option was deemed to achieve the best balance between the client's project aims and minimising potential impacts to cultural heritage assets. Option 7 was deemed to be the least impactful to cultural heritage assets, but it was recognised that the option does not fully achieve the client's project aims. Option 8 was deemed to be the most impactful to cultural heritage assets and it was deemed to be unsupportable from the perspective of Historic England owing to the requirement to demolish the Grade II listed Hungerley Hall Farmhouse. Paragraphs 193 - 196 of the NPPF dictate that such demolition would require clear and convincing justification that demonstrated that the demolition was 'necessary to achieve substantial public benefits that outweigh that harm or loss'. Historic England highlighted that the demolition could not be deemed to be 'necessary' when Option 6 can achieve the same public benefits without demolition of a listed building.

6.6.38 Consultation also highlighted that, should Option 8 be taken forward, a mitigation proposal that sought to demolish the Grade II Listed Hungerley Hall Farmhouse and rebuild it elsewhere would be unlikely to sufficiently mitigate the harm caused through demolition and the loss of the building's setting within its associated farmstead.

6.6.39 Option 11 was developed after the consultation meeting and therefore consultation has not been undertaken regarding Option 11. The features of this option are similar to aspects of Options 6 and 7. The Option does not require the demolition of any listed buildings and therefore it is assumed that Historic England would view this option to be preferrable to Option 8, and similar to Options 6 and 7.

6.7 Potential impacts

6.7.1 There are a number of potential effects from the proposed scheme on the historic environment, which vary between the options being considered.

Construction

6.7.2 The potential impacts during the construction phase may include:

- Permanent physical impact on archaeological remains and built heritage assets, either through removal, accidental damage, vibration or change, for example through installation of noise mitigation features on historic buildings.
- Temporary impacts through changes to the settings of heritage assets due to construction-related features and activity, such as construction traffic movements, lighting and noise, for example.
- Permanent impacts through changes to the settings of heritage assets resulting from the presence of the proposed scheme within an asset's setting.

Operation

6.7.3 No physical impacts to heritage assets are anticipated as a result of operation of the proposed scheme.

6.7.4 Potential impacts from operation are therefore limited to:

- Permanent impacts through changes to the setting of heritage assets which may arise through, for example, changes in the pattern and frequency of traffic movements, permanent scheme lighting and noise.

6.8 Design, mitigation and enhancement measures

6.8.1 Mitigation is currently being considered as part of the design-development of the proposed scheme. This includes:

- Refinement of the alignment of the proposed scheme to avoid assets, where possible.
- Minimising overall land take requirements to reduce the extent to which the proposed scheme could affect known and potential cultural heritage assets.
- Considering the horizontal and vertical alignment of the proposed scheme to reduce its visual prominence.
- The careful siting of signage and lighting to reduce visual intrusion.
- The sympathetic use of landscaping, earthworks and barriers to reduce visual and noise effects on cultural heritage assets.
- Historic building recording and historic landscape recording in advance of proposed scheme construction, to provide a permanent documentary record of assets in their current form and condition.
- Archaeological investigations in advance of, or during, the proposed scheme construction in order to provide a permanent documentary record of archaeological remains in their current form and condition.
- Preservation in situ of archaeological remains prior to and during construction comprising protective fencing and/or burying/sealing beneath fill material.

- Installation of physical protection or screening measures, or the temporary removal of assets and reinstatement following the completion of construction works.
- Dissemination of the results of all surveys in an appropriate format and supporting archive.

6.9 Assessment of effects

6.9.1 The baseline information identified the following designated heritage assets as those which may experience significant effects as a result of the proposed scheme:

- The group of three Grade II listed buildings at Hungerley Hall Farm [NHLE 1265638; 1265694; 1226798].
- Coombe Abbey Grade I Registered Park and Garden [NHLE 1000408] and Conservation Area and key designated buildings it contains.
- Walsgrave Hill Farm [NHLE 1233531].

6.9.2 The baseline information identified the following non-designated heritage assets as those which may experience significant effects as a result of the proposed scheme:

- Ridge and furrow identified from the Midlands Open Fields Project carried out in the 1990s (see Figure 6.2).
- Post-medieval road [MCT15261].
- Former turnpike road [MWA4788].

6.9.3 In addition, the baseline information has identified the potential for previously unrecorded archaeological remains to exist within the combined proposed scheme boundary.

Construction

6.9.4 The Grade II listed Hungerley Hall Farmhouse [NHLE 1265694] is an asset of **high value**. It is located within the area required for the construction or operation of the proposed scheme for all four options. The following temporary, construction phase effects are anticipated:

- Option 6 involves significant construction traffic in the vicinity of the farmhouse during construction of the new road alignment and removal of the existing A46. Views of construction traffic in proximity to the house and noise and vibration effects are anticipated although the exact details of the construction are not presently known. This is considered to be a **negligible** impact, resulting in a **slight adverse** effect for the duration of the construction period. This is not significant.
- Option 7 is not considered to result in any temporary construction phase impacts to the listed farmhouse due to the anticipated works being largely limited to the existing A46 corridor. This is assessed as **no change** and a **neutral** effect, which is not significant.
- Option 8 involves the demolition of the listed farmhouse which is likely to take place early in the construction programme. Therefore, no temporary impacts are identified in relation to this option. This is assessed as **no change** and a **neutral** effect, which is not significant.

- Option 11 involves significant construction traffic in the vicinity of the farmhouse during construction of the new road alignment. Views of construction traffic in proximity to the house and potentially noise and vibration effects are anticipated although the exact details of the construction are not presently known. This is considered to be a **negligible** impact, resulting in a **slight adverse** effect for the duration of the construction period. This is not significant.

6.9.5 The following permanent construction phase effects are anticipated:

- Option 6 involves the removal of the existing A46 from its present location to the south-east of the house, and its relocation to the north-west of the house beyond the granary in the farmyard. Whilst the road would be moving close to the asset, the removal of the road from views from the farmhouse's principal elevation is considered to be a **negligible** impact to the setting and significance of the farmhouse, resulting in a **slight beneficial** effect, which is not significant.
- Option 7 is not considered to result in any permanent construction phase impacts to the listed farmhouse. This is assessed as **no change** and a **neutral** effect, which is not significant.
- Option 8 involves the demolition of the listed farmhouse and the total loss of its heritage value. This is a **major** impact, resulting in a **very large adverse** effect, which is significant.
- Option 11 involves the removal of part of the field immediately adjacent to the garden to the south of the house, which forms part of the asset's setting. The Option brings the existing road infrastructure closer to the asset, although it will be in cutting at this location, minimising views of the road in key views from the building's principal south-eastern elevation. This is considered to be a **minor** impact to the setting and significance of the farmhouse, resulting in a **moderate adverse** effect, which is significant.

6.9.6 The Grade II listed barn approximately 50m north of Hungerley Hall Farmhouse [NHLE 1226789] is an asset of **high value**. It is located within the area required for the construction or operation of the proposed scheme for all four options. The following temporary effects are anticipated in relation to construction of the proposed scheme:

- Option 6 involves construction traffic in proximity to the listed barn during construction of the new road alignment. Views of construction traffic in proximity to the barn and noise and vibration effects are anticipated although the exact details of the construction are not presently known. This is considered to be a **negligible** impact, resulting in a **slight adverse** effect for the duration of the construction period. This is not significant.
- Option 7 is not considered to result in any temporary construction phase impacts to the listed barn due to the anticipated works being largely limited to the existing A46 corridor. This is assessed as **no change** and a **neutral** effect, which is not significant.
- Option 8 involves construction traffic in proximity to the listed barn during construction of the new road alignment. Views of construction traffic in proximity to the barn, and noise and vibration effects are anticipated although the exact details of the construction are not presently known. This is considered to be a **negligible** impact, resulting in a **slight adverse** effect for the duration of the construction period. This is not significant.

- Option 11 is not considered to result in any temporary construction phase impacts to the listed barn due to the anticipated works being located to the south of the Hungerley Hall Farm complex. This is assessed as **no change** and a **neutral** effect, which is not significant.

6.9.7 The following permanent construction phase effects are anticipated in relation to the physical presence of the proposed scheme:

- Option 6 brings the new road alignment immediately adjacent to the asset which would detract from the asset's setting through the scale and proximity to this out of character infrastructure within its setting. This is considered to be a **moderate** impact, resulting in a **large adverse** effect, which is significant.
- Option 7 is not considered to result in any permanent construction phase impacts to the listed barn. This is assessed as **no change** and a **neutral** effect, which is not significant.
- Option 8 brings the new road alignment closer to the asset than its existing location which would detract from the asset's setting through the proximity to this out of character infrastructure within its setting. It also involves the demolition of the listed farmhouse within the complex which makes a key contribution to the setting and significance of the listed barn as the functional and visual focus of the farmstead. This combination of negative impacts is considered to be a **major** impact, resulting in a **large adverse** effect, which is significant.
- Option 11 is not considered to result in any permanent construction phase impacts to the listed barn. This is assessed as **no change** and a **neutral** effect, which is not significant.

6.9.8 The Grade II listed granary, cowshed and stable approximately 15m north-west of Hungerley Hall Farmhouse [NHLE 1265638] is an asset of **high value**. It is located within the area required for the construction or operation of the proposed scheme for all four options. The following temporary effects are anticipated in relation to construction of the proposed scheme:

- Option 6 involves significant construction traffic in very close proximity to the listed granary during construction of the new road alignment. This proximity carries the risk of vibration impacts, as well as noise and views of construction traffic, although the exact details of the construction are not presently known. This is considered to be a **minor** impact, resulting in a **moderate adverse** effect for the duration of the construction period. This is significant.
- Option 7 is not considered to result in any temporary construction phase impacts to the listed granary due to the anticipated works being largely limited to the existing A46 corridor. This is assessed as **no change** and a **neutral** effect, which is not significant.
- Option 8 involves construction traffic in proximity to the listed granary during construction of the new road alignment. Views of construction traffic in proximity to the granary, and noise and vibration effects are anticipated although the exact details of the construction are not presently known. This is considered to be a **negligible** impact, resulting in a **slight adverse** effect for the duration of the construction period. This is not significant.
- Option 11 is not considered to result in any temporary construction phase impacts to the listed granary due to the anticipated works being located to the south of the Hungerley Hall Farm complex. This is assessed as **no change** and a **neutral** effect, which is not significant.

6.9.9 The following permanent construction phase effects are anticipated in relation to the physical presence of the proposed scheme:

- Option 6 brings the new road alignment immediately adjacent to the asset which would detract from the asset's setting through the scale and proximity to this out of character infrastructure within its setting. This is considered to be a **moderate** impact, resulting in a **large adverse** effect, which is significant.
- Option 7 is not considered to result in any permanent construction phase impacts to the listed farmhouse. This is assessed as **no change** and a **neutral** effect, which is not significant.
- Option 8 brings the new road alignment closer to the asset than the existing which would detract from the asset's setting through the proximity to this out of character infrastructure within its setting. It also involves the demolition of the listed farmhouse within the complex which makes a key contribution to the setting and significance of the listed barn as the functional and visual focus of the farmstead. This combination of negative impacts is considered to be a **major** impact, resulting in a **large adverse** effect, which is significant.
- Option 11 is not considered to result in any permanent construction phase impacts to the listed granary. This is assessed as **no change** and a **neutral** effect, which is not significant.

6.9.10 The Grade II* Combe Abbey RPG and Conservation Area is an asset of **high value**. It lies partially within the area required for the construction or operation of the proposed scheme. The following temporary effects are anticipated in relation to construction of the proposed scheme:

6.9.11 All four options involve the potential removal of some of the mature planting along the western boundary of the parkland, although the extent of this is yet to be confirmed. It is assumed that replacement planting will be introduced following completion of construction works which will be substantially mature within a period of 15 years (Chapter 7: Landscape and Visual

6.9.12 The following permanent construction phase effects are anticipated in relation to the physical presence of the proposed scheme:

- Option 6 involves the potential for a new 'dumbbell' junction to be visible from within the parkland. Further research through site visits and visualisation would be necessary to fully assess this impact. However, this option also pushes the new road alignment further away from the boundary of the parkland than its present extent. A cautious assessment therefore considers this to be **negligible** impact, resulting in a **slight** effect, which is not significant. Depending on the detailed design, this could be beneficial or adverse.
- Option 7 is not considered to result in any permanent construction phase impacts to the parkland. This is assessed as **no change** and a **neutral** effect, which is not significant.
- Option 8 pushes the new road alignment further away from the boundary of the parkland than its present extent. A cautious assessment therefore considers this to be **negligible**, resulting in a **slight** beneficial effect, which is not significant.
- Option 11 involves the potential for a new 'dumbbell' junction to be visible from within the parkland. Further research through site visits and visualisation would be necessary to fully assess this impact. A cautious assessment therefore considers this to be **negligible** impact, resulting in a **slight adverse** effect, which is not significant.

6.9.13 The Grade II listed Walsgrave Hill Farm [NHLE 1233531] is a designated asset of **high value**. The farm is only anticipated to experience impacts through change to its setting in relation to Options 6 and 11. The following temporary construction phase impacts are anticipated:

- Options 6 and 11 are likely to involve the presence of construction vehicles within the asset's setting and potentially present in views from the farmhouse's principal elevation. However, there is currently screening between the asset and the proposed scheme in the form of boundary planting within the asset's garden. Also, the exact details of construction of the proposed scheme are not yet known. A cautious assessment therefore considers this to be a **negligible** impact, resulting in a **slight adverse** effect, which is not significant.

6.9.14 The following permanent construction phase impacts are anticipated:

- Options 6 and 11 involve the presence of large new 'dumbbell' type junctions within the agricultural fields that form part of the setting of the asset and contribute to its understanding. The new junction would be out of character development within its setting that detracts from its architectural interest. However, there is currently screening between the asset and the proposed scheme in the form of boundary planting within the asset's garden. A cautious assessment therefore considers this to be a **negligible** impact, resulting in a **slight adverse** effect, which is not significant.

6.9.15 The medieval to post-medieval ridge and furrow identified from the Midlands Open Fields Project is a non-designated asset of **low value**. All of the options for the proposed scheme would not directly impact this asset. This is assessed as **no change** and a **neutral** effect, which is not significant.

6.9.16 The post-medieval road [MCT15261] is a non-designated asset of **low value**. All of the options for the proposed scheme would not directly impact this asset and it has already been impacted due to the existing road layout. Therefore, the proposed scheme is not likely to result in an effect. This is assessed as **no change** and a **neutral** effect, which is not significant.

6.9.17 The former turnpike road [MWA4788] is a non-designated asset of **low value**. All of the options for the proposed scheme would not directly impact this asset and it has already been impacted due to the existing road layout. Therefore, the proposed scheme is not likely to result in an effect. This is assessed as **no change** and a **neutral** effect, which is not significant.

6.9.18 All of the options for the proposed scheme may result in physical impacts to previously unrecorded archaeological remains during the construction phase. The presence or absence of any such remains would need to be determined through a programme of archaeological investigation. The value of these remains and the potential impact is unknown at this stage.

6.9.19 The historic landscape within the combined proposed scheme boundary is largely characterised as Fieldscapes, comprising small to large irregular fields established by the 18th century, either side of the existing road network and is of **low value**. The combined proposed scheme boundary is located on the eastern edge of extensive residential development and the Fieldscapes extend for some distance towards the east, segmented by existing road networks. All of the options for the proposed scheme will impact on the historic landscape. The magnitude of this effect cannot be determined until more details of the proposed scheme are developed. However, it is anticipated that the overall effect will not be significant.

Operation

6.9.20 Operational impacts resulting from the proposed scheme are limited to effects arising through increased/ different traffic movements, lighting, dust and noise.

6.9.21 All options involve increases in the presence of mainline carriageway lighting columns and Options 6, 8 and 11 also include new slipway lighting columns and connecter road lighting columns. In the case of Options 6, 8 and 11 the new lighting will be in closer proximity to the group of Grade II listed buildings at Hungerley Hall Farm than the existing lighting on the A46, whilst in the case of Option 7 it will extend to the point where the lighting will be on the road section directly opposite the principal elevation of the farmhouse where it is not currently. Likewise, Options 6, 8 and 11 will bring operational traffic noise closer to the remaining listed buildings at Hungerley Hall Farm than the existing. Whilst this is the case, these changes are not anticipated to increase the permanent construction phase impacts reported above and therefore the operational effects for these assets remain as at construction. This is because night-time views are not a feature of the assets that contributes to their significance, whilst noise is already a feature of their setting through the existing A46 and their use as a working farm. Any increased adverse impacts are not therefore sufficient to raise the overall level reported above at construction.

6.9.22 In relation to the **high value** Coombe Abbey Grade II* RPG, however, the increase in lighting levels is considered to increase the reported permanent construction phase effects in relation to Options 6 and 11 due to the lighting of the 'dumbbell' junction as a new feature in the landscape outside the park and its potential visibility in night-time views from within the park which may be more apparent than in daytime views. Further research through site visits and visualisation would be necessary to fully assess this impact. A cautious assessment therefore considers this to be a **moderate** impact, resulting in a **moderate adverse** effect, which is significant. Traffic and noise changes are not anticipated to result in further impacts to this asset.

6.9.23 In relation to the Grade II listed Walsgrave Hill Farm [NHLE 1233531], the increase in lighting levels is not considered to increase the permanent construction phase impacts reported above due to the night-time views not being an important designed aspect of the asset. The effects to this asset therefore remain as at construction. Traffic and noise changes are not anticipated to result in further impacts to this asset.

6.9.24 In relation to non-designated heritage assets, there will be no additional physical impacts as a result of the operation of the proposed scheme.

Monitoring

6.9.25 The proximity of Option 6 to the Grade II listed granary, cowshed and stable approximately 15m north-west of Hungerley Hall Farmhouse [NHLE 1265638] could result in accidental damage through construction activities or construction-related vibration, undermining and subsidence. These aspects of the proposed scheme would require careful modelling and monitoring during construction. The same may be required in relation to Option 11 and its potential to cause construction-related vibration to Hungerley Hall Farmhouse [NHLE 1265694], but further assessment is needed in order to determine whether vibration effects would be likely to occur with Option 11.

6.9.26 All of the options for the proposed scheme may result in physical impacts to previously unrecorded archaeological remains as a result of construction activities. Monitoring is not a requirement at this stage as further assessment is needed in order to determine the presence or absence of any such remains. It is anticipated that any necessary archaeological mitigation works would be carried out in advance of construction activities, and/or as a watching brief during construction.

7 Landscape and Visual

7.1 Introduction

7.1.1 The proposed scheme involves the upgrade of A46 Walsgrave junction, to the east of Coventry, with the purpose of reducing congestion, queueing and delays. At PCF Stage 2, four options (Options 6, 7, 8 and 11) for the junction modification are being considered and in this EAR chapter, each is assessed in relation to landscape and visual effects. The proposed scheme is located on the edge of the residential area of Binley/ Walsgrave in the eastern part of Coventry and rural landscape of Warwickshire to the east.

7.1.2 Landscape effects relate to the direct physical changes to the fabric and individual elements of the landscape. They also relate to the potential indirect changes to the wider patterns of land use, land cover and the arrangement of landscape features which determine the character and the aesthetic and perceptual qualities of the landscape. As defined in the Guidelines for Landscape and Visual Impact Assessment 3rd Edition, 2013 (GLVIA3) the term landscape also encompasses urban landscape, often referred to as townscape. For the purpose of this scoping report the term landscape is adopted and may include areas of townscape.

7.1.3 Visual effects relate to potential changes in the composition, quality and amenity value of existing views as a result of the change or loss of existing landscape elements, and the introduction of new elements.

7.1.4 The assessment has been prepared in accordance with DMRB LA 104 and DMRB LA 107 Landscape and Visual Effects Revision 2 (Highways England, 2020c; 2020h).

7.1.5 There are likely to be some overlaps between landscape and visual effects in relation to other disciplines such as Cultural Heritage, Ecology or Noise. The potential effects on these aspects of the environment are reported in separate chapters and are also referenced in the landscape and visual section where relevant.

7.1.6 This chapter should be read in conjunction with Figure 7.1: Study Area and Viewpoint Locations to Figure 7.15: Viewpoint 11: Recreational receptors at Coombe Abbey Park.

7.2 Legislative and policy framework

7.2.1 Landscape and visual's importance are recognised at all levels: locally (in policy making), nationally (for example in large scale infrastructure development), and internationally (the European Landscape Convention 2000 (Ref. 7-1)). The European Landscape Convention helps promote best practice in the planning, protection, and management of landscapes.

7.2.2 The definition of landscape takes account of the European Landscape Convention, which regards landscape as a resource in its own right, resulting from the interplay of its physical, natural, and cultural components:

> "Landscape is an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors"'

7.2.3 It is also recognised that landscapes are changing and evolving as a result of a range of pressures, and will continue to do so, creating new landscapes. There is a need to accommodate such changes in a sustainable manner and landscape and visual impact assessment has an important contribution to make in achieving this.

7.2.4 Landscape within the local planning policy remains an important consideration for Coventry City Council and Rugby Borough Council, as well as at the regional level to Warwickshire County Council. The Coventry Local Plan (2011-2031) includes environmental policies relating to green belt and environmental protection, elements relevant to the proposed scheme include:

- Policy GB1: Green Belt and Local Green Space: under this policy Land south at Walsgrave Hill Farm (residential) was removed from the green belt.

7.2.5 Warwickshire County Council has also produced a suite of landscape character assessments reports for the whole of Warwickshire. The proposed scheme lies within an enhancement zone which identifies that highway landscape should be strong linked to the surrounding landscape pattern and that heathland could form part of highway diversification (Warwickshire Landscape Guidelines, p32 and p33).

7.2.6 Coventry City's "The New Coventry Local Development Plan (2011-2031)" (Ref. 7-3) provides key design criteria and considerations regarding landscape design within new developments.

7.2.7 Rugby Borough Council's Local Plan 2011-2031 Draft publication (2016) (Ref. 7-4) highlights landscape policy within NE4: Landscape Protection and Enhancement ensuring landscape character is protected and enhanced through new developments.

7.3 Assessment methodology

7.3.1 This chapter has been prepared with reference to DMRB LA 107 and, where appropriate, the GLVIA. DMRB LA 107 indicates that assessment should identify likely significant landscape and visual effects. Tables 3.22 and 3.24 in DMRB LA 107 set out typical criteria defining landscape sensitivity and magnitude respectively and Tables 3.41 and 3.43 for visual sensitivity and magnitude of visual effects respectively.

7.3.2 PCF stage 1 and 2 are within the optioneering phase of the proposed scheme. The PCF Stage 2 EAR assesses and compares the four options in relation to the significance of effects of the proposed scheme on the landscape as a resource, and people's views and visual amenity as part of the iterative steps in assessment and design development informed by stakeholder consultation.

7.3.3 The assessment is informed by baseline studies, proportionate to the context of the project at this stage. The landscape baseline establishes the relative value of the landscape, either as a whole or individual components, that contribute to its character and will be informed by field surveys. The visual baseline establishes the various categories of visual receptors, their locations and quantity, value of the view, as well as the sensitivity of each receptor.

7.3.4 At PCF stage 2 the assessment describes the potential changes to the landscape character in comparison to the baseline scenario in sufficient detail to inform the optioneering process.

7.3.5 The visual baseline has been informed by field surveys and production of a Zone of Theoretical Visibility (ZTV) for each option. The list of identified visual receptors for inclusion, or those proposed for scoping out from further assessment, is included in Table 7.5.

7.3.6 Site photography has been undertaken in line with Landscape Institute Technical Guidance Note – Visual Representation of Development Proposals Technical Guidance Note 06/19 suitable for Type 1 Annotated Photograph visualisations.

7.3.7 Visual assessment has recorded the degree of change in the composition of the view available from selected receptors/ viewpoints in comparison to the baseline scenario by taking into account scale, geographical extent, duration and reversibility.

7.3.8 The potential significant effects have been identified by a combination of sensitivity and magnitude, based on the criteria presented in DMRB LA 104, together with professional judgment. The approach to assigning significance of effect relies on reasoned argument, the professional judgement of competent experts and using effective consultation to ensure the advice and views of relevant stakeholders are taken into account (Highways England, 2020c). No consultation has yet been undertaken as part of Stage 2. This consultation will be undertaken after the EAR has been prepared and will be used to inform the assessment at future stages.

7.3.9 All effects are adverse unless stated otherwise. Under DMRB LA 104, significant effects typically comprise residual effects that are within the moderate, large or very large categories.

Assessment stages and figures

7.3.10 DMRB LA 107 "Landscape and visual effects" identifies that assessment of changes should occur at the following project stages:

- Construction
- Year 1 (opening year)
- Year 15 (design year)

7.3.11 Assessment of potential effects against the baseline situation considers:

- Seasonal differences with or without the project including summer with foliage and winter without foliage.
- Both day and night-time situations with or without the project.
- A winter scenario in the year of opening, and a summer scenario: fifteenth year of operation to traffic.
- Landscape character types and/ or landscape character areas.
- The opinions and consensus of the local public and different interest groups, their perception of the landscape, the value they place it and assessment of the change the project will incur.

7.3.12 The assessment should be read in conjunction with the following figures:

- Figure 7.1: Study Area and Viewpoint Locations
- Figure 7.2: Topography
- Figure 7.3: Landscape Context
- Figure 7.4 Landscape Designations
- Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave
- Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave
- Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave
- Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave
- Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley
- Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave
- Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave
- Figure 7.12: Viewpoint 8: Residential receptor at Oak Farm nurseries.
- Figure 7.13: Viewpoint 9: Recreational receptors along the section of Centenary Way close to Coombe Abbey Park

- Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill
- Figure 7.15: Viewpoint 11: Recreational receptors at Coombe Abbey Park

7.4 Assessment assumptions and limitations

7.4.1 A site visit was undertaken by two Landscape Architects on 1 March 2021 to assess the existing character of the landscape and record views from representative photo viewpoints. These views were identified and recorded at 11 locations within the study area (refer to Figure 7.1: Study Area and Viewpoint Locations to Figure 7.15: Viewpoint 11: Recreational receptors at Coombe Abbey Park. Appendix A).

7.4.2 No major technical difficulties or practical problems were encountered in carrying out the Landscape and Visual Impact Assessment. The initial site visit was conducted in the winter which allows assessment based on broadleaf vegetation not in leaf and represents the most open views. Potentially significant differences between seasonal views have been outlined where relevant within the assessment and taken into consideration in assessing the impacts and reaching conclusions. The site visit was undertaken in weather with moderate to poor visibility of at least 2km, but with some distant fogging in views beyond that. The conditions are not considered to represent an issue which prevents or compromises the assessment, not least because the principal viewpoints are at locations within 1km of the proposed scheme, from which there was adequate visibility.

7.4.3 The identified potential significant effects are based on the designs available at the time of production of the environmental assessment report and may need adjustment, should the designs change considerably.

7.5 Study area

7.5.1 The study area for the landscape assessment has been established by a combination of potential visibility of the proposed scheme and professional judgement. Based on these criteria a study area of 1km from the edge of the combined footprint of the four considered options has been used in this EAR report. The visibility of the proposed scheme has been defined by a computer-generated ZTV verified by the site visit.

7.5.2 Beyond the extent of the study area, it is considered that the proposed scheme will unlikely give rise to any significant effects on landscape and visual receptors due to distance and presence of screening features.

7.6 Baseline conditions

Landscape baseline conditions

7.6.1 Landscape baseline conditions were established by desktop studies and a site visit, with the purpose of identifying landscape elements and receptors that may be significantly affected by the proposed scheme. Landscape character assessment is hierarchical from the national, regional, local and site or scheme specific level.

7.6.2 The proposed scheme lies on the boundary of Natural England's National Character Area (NCA) 97: Arden and NCA 96: Dunsmore and Feldon. Arden comprises farmland and former wood-pasture lying to the south and east of Birmingham between the River Tame and the River Avon in Warwickshire and North Worcestershire. The landscape of the lower-lying central area is gently rolling with small fragmented, semi-natural and ancient woodlands. Mature oaks are characteristic features of hedgerows forming distinctive field boundaries.

Historic parklands and narrow river corridors are frequent features in the vicinity of the urbanised area.

7.6.3 Mixed land use including residential, agricultural and industrial are typical of the Arden NCA. The NCA profile highlights the presence of a mixture of transport corridors such as road, rail, air and canals in Arden, whilst indicating growing pressure upon the existing infrastructure near Coventry.

7.6.4 Dunsmore and Feldon are predominantly rural, agricultural landscapes, crossed by numerous small rivers and tributaries and varying between a more open character in the Feldon area and a wooded character in Dunsmore.

7.6.5 The proposed scheme and study area are located on the border of two Local Authorities: Coventry City Council and Rugby Borough Council. Coventry City Council has not published any Landscape Character Assessments relating to the study area.

7.6.6 Warwickshire County Council has published “Landscape Assessment of the Borough of Rugby Sensitivity and Condition Study” (2006). This assessment divides the area into ten landscape character types (LCTs) which are derived from underlying landscape description units.

7.6.7 The study area encompasses Dunsmore Parklands Landscape Character Type (LCT). The landform of Dunsmore Parklands LCT is gently rolling with frequent parklands and tree belts. Hedgerows and wooded streamlines combine with copses to create a local enclosure. Field pattern is generally of a large scale and poorly defined in some places, allowing middle-distance views to wooded skylines. However, the visibility is generally restricted by tree cover and the rolling topography but increases in less wooded parts of the LCA.

7.6.8 The LCA report indicates an overall moderate sensitivity of Dunsmore Parklands LCT, with areas of high sensitivity associated with Binley/ Walsgrave Woods. The overall sensitivity is defined as moderate, as a result of both cultural (time depth) and ecological factors, primarily ancient woodlands. As the study area for the proposed scheme forms a small part of the larger LCT, the sensitivity of it may differ according to the specific key characteristics and value. There are two ancient woodlands partially within the study area.

Landscape key characteristics and value of the study area

7.6.9 The landscape elements within the study area predominantly comprise agricultural land, the designed parkland of Coombe Abbey; and dense residential areas of Binley/ Walsgrave, which form the urban edge of Coventry. In the north of the study area, large scale industrial and commercial buildings and the University Hospital of Coventry and Warwickshire are prominent elements which emphasise the urban fringe influence from within the wider rural landscape.

7.6.10 The existing corridor of the A46 cuts through the study area and landscape, offset from the residential areas. It is relatively well wooded, partially contained by landform and its influence on landscape character within the study area is limited, although its location has redefined field boundaries and it creates a linear element and barrier which cuts across the landscape pattern. The existing highway is unlit and away from the urban area, lighting in the wider landscape is limited, although the influence of the urban lighting extends over most of the study area.

7.6.11 The geological sequence of solid rock formations known in the area ranges in age from Cambrian to Jurassic overlain by drift deposits of Quaternary age. The study area forms part of the Warwickshire Coal Field and Binley/ Walsgrave developed as a result of mining of the coal deposits. The topography of the study area is undulating within a relatively well defined slope falling south and westwards from

higher land associated with Walsgrave Hill at 92m AOD and the edge of Coombe Abbey Park through to the River Sowe adjacent to the B4082 lying at 70m AOD.

7.6.12 Woodland, hedgerows and arable land, form the primary habitats within the study area. The watercourses of the River Sowe and Smite Brook also contribute both ecologically and in terms of forming an important, natural, sinuous element. The large lake at Coombe Abbey is designated as Coombe Pool SSSI. Woodland within the study area is primarily located along the River Sowe and on the western fringes of Coombe Abbey and to a lesser extent along the existing alignment of the A46. Stoke Floods LNR lies in the south-eastern corner of the study area, beyond intervening housing.

7.6.13 The proposed scheme adjoins Coombe Abbey Grade II* Registered Park and Garden located within Coombe Abbey Park. The Registered Park and Garden was built at the end of the 17th century and incorporates 17th, 18th and 19th-century garden features. The western boundary of the Country Park adjacent to the proposed scheme comprises a wide woodland belt that obstructs long views into the central area of the Country Park.

7.6.14 There is a range of listed buildings within the study area. Several listed buildings are located within the Coombe Abbey Park. These and other listed buildings are however visually detached from the proposed scheme due to the screening provided by built form, woodland and landform. The exception to this is three Grade II listed buildings, located at Hungerley Hall Farm.

7.6.15 Away from the dense urban areas of Binley/ Walsgrave the study area is perceived equally as rural containing the corridor of the River Sowe and as parkland associated with Coombe Abbey. The pattern is of linear, narrow fields associated with the River Sowe and larger irregular and sometimes large fields within the wider landscape, bounded by hedgerows. The urban areas of the study area are extremely dense and have an abrupt, well defined edge defined in part by the floodplain of the River Sowe and low-lying land adjacent to it. Tranquillity is present within Coombe Abbey but reduces closer to the urban fringe, in part due to the movement and noise associated with the A46 corridor although it is relatively well screened from within the wider study area, the most open views being from Walsgrave Hill and the elevated edge of Coombe Abbey Park. There is no public access to the western edges of Coombe Abbey Park, nearest to the proposed scheme.

7.6.16 The study area contains no land of designated landscape value reflected at a national or county level. The condition of landscape elements is generally good to fair. Some of the hedges in the vicinity of Walsgrave Hill are degraded and gappy but the agricultural land is well managed and elsewhere hedgerows and woodland are intact and contribute to landscape character.

7.6.17 The study area has evident value as a strong rural edge to the urban area, which is not degraded and remains intact, in part due to the presence of Coombe Abbey Park. The A46 has limited influence on this value but does form a barrier to movement and access from neighbouring residential areas, such that the majority of usage of open space is linear and along the River Sowe.

Landscape future baseline

7.6.18 There are no consented planning permissions within the study area which would result in a change in the future baseline.

7.7 Option 6: Potential landscape effects

Construction

7.7.1 The Option 6 main carriageway would be further from Coombe Abbey Grade II* Registered Park and Garden than the current alignment, but the increased highway footprint will negate the benefit of reduced proximity.

Operation year 15

7.7.2 Construction of Option 6 will be in close proximity to and will entail partial removal of hedgerows and hedgerow trees forming the field boundaries east of, and parallel to, the River Sowe. Figure 2.3 Option 6 indicates that sections of hedgerow could potentially be retained between the B4082 access road to the dumbbell roundabouts and the main highway.

7.7.3 Construction activity including earthmoving, materials placement and removal will occur within land, which is currently open and agricultural, forming a buffer between the existing A46 alignment and residential/ recreational areas on the eastern edge of Binley/ Walsgrave. The change of land use, the introduction of construction machinery, formation of earthworks and use of compounds will bisect the open land and temporarily become the key characteristic between Binley/ Walsgrave and the existing alignment of the A46.

Operation year 1

7.7.4 In year 1, the footprint of the proposed scheme will occupy a central area of the land between the urban edge of Binley/ Walsgrave and the existing A46. The scale and extent of highway infrastructure in year 1 will increase highway land use and influence between Binley/ Walsgrave and the current alignment of the A46, bringing the highway closer to residential areas. The most prominent elements of the proposed scheme would be the realigned section of the A46, centrally between the existing alignment and the residential edge of Binley/ Walsgrave and the new dumbbell junction arrangement in the north of the study area.

7.7.5 The natural topography will be altered in a way which emphasises the highway cutting across and through the landscape. Secondary access and on/ off slip roads will further fragment the field pattern and reduce tranquillity through movement and noise. Agricultural land will be fragmented and the value of the rural buffer to the edge of Binley/ Walsgrave will be eroded. The listed buildings at Hungerley Hall Farm will be further compromised by the proximity of the realigned A46.

7.7.6 Conversely, Option 6 will align the main A46 highway further from Coombe Abbey Park and unite Hungerley Hall Farm with the wider agricultural fields to the east. The former alignment of the A46 will be reduced to a farm access.

7.7.7 Lengths of hedgerow between the B4082 access and the realigned main carriageway and the narrow width between the two will result in severed land which may become unusable for agriculture but may be of value in terms of landscape integration and ecological functions.

7.7.8 The dumbbell roundabouts will be lit, for safety reasons, and at night this will extend urban influences into the study area and in closer proximity to Coombe Abbey Park. The lighting columns will add to the urbanising influence of the junction during daytime along with the elevation of the junction.

7.7.9 At year 15, mitigation planting on severed land within the footprint of the highways and associated with the ancillary roads on/ off slips and dumbbell junction would be maturing to reduce the magnitude of effect on landscape character derived from increased highway infrastructure. Effect from lighting described in year 1 would become more localised in day time due to reduced visibility of the columns

as intervening screening vegetation matures but night-time effects would remain due to increased lighting and light spill remaining visible at night in an otherwise largely unlit context beyond the urban edge.

7.7.10 The woodland and hedgerow planting would strengthen the presence of this key characteristic within the study area although there would be a reduction in openness and of open agricultural land, both from the increased extent of highway and the associated mitigation.

7.7.11 Planting undertaken as mitigation would add to the maturing woodland within the existing soft estate of the A46 highway, which would be retained.

7.7.12 The beneficial effect on landscape character derived from rural land on the urban fringe would be partially restored and the balance of reinstatement of key characteristics would reduce the magnitude of effect.

7.8 Option 7: Potential landscape effects

Construction

7.8.1 With the exception of the compound, other construction of the proposed scheme would largely be confined within the existing highway boundary and involve minimal land take. Vegetation removal during construction would be localised but include incursion into the Coombe Pool SSSI albeit effects on landscape character from that would be localised. The most prominent elements of construction would be the compound adjacent to Smite Brook to the south of the B4082, adjacent to Gainford Rise Open Space.

Operation year 1

7.8.2 The footprint of the proposed scheme will predominantly occupy land within the existing highway boundary of the A46. Additional land beyond the current highway boundary will be required on the western boundaries of the proposed scheme to the north and south of the B4082. However, this will extend a maximum of approximately 25m beyond the current boundary such that, overall, the footprint of the proposed scheme will be similar to the existing A46 corridor whilst achieving the new junction arrangement without a roundabout.

7.8.3 Some vegetation will be removed to achieve landform grading into the additional land take areas but will be minimal in extent. There would be no loss of land and trees within Coombe Pool SSSI. In comparison with the baseline, the scale and extent of highway infrastructure in Year 1 will be very similar and no elements of landscape value would be lost.

7.8.4 Incursion into open countryside would be minimal and Option 7 would not bring the highway noticeably closer to residential areas or extend the influence of highway infrastructure on local landscape character within the study area. Agricultural land will not be fragmented and the value of the rural buffer to the edge of Binley/ Walsgrave will not be eroded. The relationship of the listed buildings at Hungerley Hall Farm with the A46 will resemble the baseline situation. Option 7 will not entail additional lighting to the modified junction and visibility of traffic using the junction will be similar to the baseline.

Operation year 15

7.8.5 At year 15, mitigation planting would re-establish vegetation lost to the proposed scheme within the footprint of the highway.

7.9 Option 8: Potential landscape effects

Construction

7.9.1 Construction of the proposed scheme would extend the existing highway boundary both to the west and east, with the majority of temporary land take to the west in the vicinity of the Smite Brook, to house the site compound. Hungerley Hall Farmhouse will be demolished and the new mainline highway will change from the current situation, of being to the east of the farm, to the west.

7.9.2 Vegetation removal during construction would be localised but include incursion into the Coombe Pool SSSI, albeit effects on landscape character from that would be localised. The most prominent elements of construction would be the compound adjacent to Smite Brook to the south of the B4082 and incursion into land and landform modification in the vicinity of Hungerley Hall Farm.

7.9.3 Overall, effects from Option 8 on landscape character within the study area during construction would result from introduction of uncharacteristic localised construction activity in the immediate context of the existing A46 corridor and the presence of the temporary compound. There would be only slight loss or damage to existing landscape character of one (maybe more) key features and elements. Addition of new uncharacteristic, noticeable features or elements such as construction activity, the compound and earthmoving and change in land use would form the main source of landscape effects.

Operation year 1

7.9.4 The footprint of the proposed scheme will occupy land beyond the existing highway boundary of the A46, both for the realigned carriageway and an attenuation pond as well as land for grading out of the highway landform. The additional land will be required on the western boundaries of the proposed scheme to the north and south of the B4082 as well as to the east within the Coombe Pool SSSI.

7.9.5 The highway footprint will therefore be appreciably larger than the baseline but located in close proximity to and within the existing corridor of the A46, thereby localising effects on landscape character.

7.9.6 Some vegetation will be removed to achieve landform grading into the additional land take areas, increasing visibility of the new junction and its influence on landscape character. It will include land and trees within Coombe Pool SSSI. In comparison with the baseline, the scale and extent of highway infrastructure in Year 1 will be increased and some elements of landscape value (the ecological effect on the SSSI are assessed in the ecology section of this EAR) would be lost.

7.9.7 Option 8 would extend the influence of highway infrastructure on local landscape character within the study area. Agricultural land will be lost but fields will not be fragmented and the value of the rural buffer to the edge of Binley/ Walsgrave will not be eroded. The relationship of the remaining listed buildings, at Hungerley Hall Farm, with the A46 will be worsened compared to the baseline situation as a result of increased proximity. Option 8 will not entail additional lighting to the modified junction.

Operation year 15

7.9.8 At year 15, mitigation planting on land adjacent to Coombe Pool SSSI would re-establish vegetation lost to the proposed scheme within the footprint of the highway. Other mitigation planting will integrate the new junction into the landscape context.

7.10 Option 11: Potential landscape effects

Construction

7.10.1 Construction of the proposed scheme would involve land take outside of the existing highway boundary both for the compound to the north of Hungerley Hall Farm and for works to create the B4082 access link and associated dumbbell roundabouts. Vegetation removal during construction would be localised and effects on landscape character would also be localised. The most prominent elements of construction would be the compound to the north of Hungerley Hall Farm and the creation of the B4082 access link and dumbbell roundabouts, all of which would require landform modification and within the northern section of the B4082 and around the dumbbell junction, creation of embankments. There will be machinery, vegetation removal and earthworks both within the existing A46 corridor and land beyond it.

Operation year 1

7.10.2 The footprint of the proposed scheme will predominantly occupy land within the existing highway boundary of the A46 but include the B4082 link and associated dumbbell junction as elements beyond the existing highway. Traffic using the B4082 and the revised junction will be within land closer to the River Sowe and Coombe Abbey Park.

7.10.3 There would be no permanent loss of land and trees within Coombe Pool SSSI. In comparison with the baseline, the scale and extent of highway infrastructure in Year 1 will be greater than the baseline, include lighting on the dumbbell junction and permanent landform modification which is slightly incongruous within the context. Loss of elements of landscape value would be of negligible magnitude.

7.10.4 Incursion into open countryside would be localised but Option 11 would bring the highway noticeably closer to residential areas and extend the influence of highway infrastructure on local landscape character within the study area. However, the extent to which agricultural land will be fragmented will be limited and effects on the value of the rural buffer to the edge of Binley/ Walsgrave will be minor. The relationship of the listed buildings at Hungerley Hall Farm with the A46 will resemble the baseline situation but with increased proximity.

Operation year 15

7.10.5 At year 15, mitigation planting would re-establish vegetation lost to the proposed scheme within the footprint of the highway and increase integration of the modified landform (the B4082 access link and the dumbbell junction) and new highway beyond the baseline footprint.

7.11 Summary of potential landscape effects

7.11.1 The key landscape impacts and effects relating to each option are tabulated in Table 7.1 to

7.11.3 Table 7.4 , including judgements on sensitivity of the receptor and magnitude of effect, to allow comparison between the significance of effect at the various stages of the proposed scheme for each option.

Table 7.1: Option 6 Potential landscape effects

Landscape Receptor	Sensitivity of Receptor	Option 6: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Landscape Effect
Individual landscape elements (woodland, agricultural land, tree and hedgerows).	Low	- partial loss or noticeable changes to existing landscape character derived from trees, hedgerows and woodland in the southern section adjacent to and south of Hungerley Hall Farm. - more extensive loss of hedgerows, established field pattern and trees in the vicinity of the dumbbell junction to the north and within the narrow fields adjacent to the River Sowe. - change from agricultural use to construction use. Summary: The landscape elements to be removed are partially associated with the existing A46 corridor but also potentially include sections of long-established hedgerows, multiple field boundaries and mature individual trees. In combination with widespread construction activity as a new element, potential effects on landscape elements would be moderate adverse magnitude.	Slight
Dunsmore Parkland LCT	Medium	Overall, effects on landscape character from Option 6 within the study area during construction as a result of: - introduction of uncharacteristic widespread construction activity simultaneous to the continued use of the existing A46. - partial loss or noticeable changes to existing landscape character or distinctive features or elements and/ or addition of new uncharacteristic, noticeable features or elements such as construction activity, compounds and earthmoving and change in land use. - addition of new uncharacteristic, noticeable features or elements such as construction compounds and earthmoving. - construction traffic and machinery. - Effects on the wider Dunsmore Parkland LCT and the wider urban area of Binley/ Walsgrave as a result of slight loss or damage to existing landscape character and addition of new uncharacteristic features and elements. Summary: Potential effects would be minor adverse magnitude.	Slight
Individual landscape elements (woodland, agricultural land, tree and hedgerows).	Low	- Mitigation planting to replace or replicate elements lost to the proposed scheme would be immature in year 1 and not contribute to landscape character. - Loss or fragmentation of agricultural land would be apparent. Summary: Potential effects would be moderate adverse magnitude.	Slight

Landscape Receptor	Sensitivity of Receptor	Option 6: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Landscape Effect
Dunsmore Parkland LCT	Medium	Overall, effects on landscape character from Option 6 within the study area are likely to be as a result of: - the introduction of increased highway infrastructure - agricultural land severance - loss or modification of landscape elements of value. - partial loss or noticeable damage to existing landscape character or distinctive features or elements and addition of new uncharacteristic, noticeable features or elements associated with the main highways, access roads and on off slip roads as well as the introduction of the relatively large dumbbell junction, proportionally to the context of the existing highway footprint, which encroaches in proximity to the River Sowe. - Widespread change in character beyond the existing highway. Summary: Effects on the wider Dunsmore Parkland LCT and the wider urban area of Binley Walsgrave would be minor adverse magnitude, representing slight loss or damage to existing landscape character and increased highway infrastructure and elements.	Slight
Individual landscape elements (woodland, agricultural land, tree and hedgerows).	Low	- Mitigation planting to replace or replicate elements lost to the proposed scheme would be maturing to redefine elements lost to the proposed scheme and will contribute to landscape character. - Loss or fragmentation of agricultural land would be less apparent. Summary: Potential effects would be minor adverse magnitude.	Slight
Dunsmore Parkland LCT	Medium	- Mitigation planting will reduce the influence of highway infrastructure, land severance and the loss or modification of landscape elements of value. - The proposed scheme would be better integrated into the landscape through new planting. - The reduction in rural character would remain as a result of access roads and on off slip roads as well as the introduction of the dumbbell junction. - Lighting from the dumbbell roundabouts would remain an adverse element at night. Summary: Effects on the wider Dunsmore Parkland LCT and the wider urban area of Binley/Walsgrave would be minor adverse magnitude, representing slight loss or damage to existing landscape character and increased highway infrastructure and elements.	Slight

Table 7.2: Option 7 Potential landscape effects

Landscape Receptor	Sensitivity of Receptor	Option 7: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Landscape Effect
Individual landscape elements (woodland, agricultural land, tree and hedgerows).	Low	- Localised loss of trees and within the existing highway corridors of the B4082 and A46. - Localised and limited change from agricultural use to construction of the highway - Presence of the compound adjacent to Smite Brook, changing land use. Summary: The landscape elements to be removed are partially associated with the existing A46 corridor or B4082 but also potentially include some short sections of long-established hedgerows and mature individual trees. Much of the woodland and individual trees can be replicated. Numbers lost would be low and largely of highway vegetation. In combination with loss of agricultural land, potential effects would be negligible adverse magnitude.	Slight
Dunsmore Parkland LCT	Medium	Overall, effects on landscape character from Option 7 within the study area are likely to be a result of: - introduction of uncharacteristic widespread construction activity simultaneous to the continued use of the existing A46. - partial loss or noticeable changes to existing landscape character or distinctive features or elements and/or addition of new uncharacteristic, noticeable features or elements such as construction activity, compounds and earthmoving and change in land use. - addition of new uncharacteristic, noticeable features or elements such as construction, the compound and earthmoving, construction traffic and machinery. - effects on the wider Dunsmore Parkland LCT and the wider urban area of Binley/Walsgrave as a result of loss of elements or damage to existing landscape character. Summary: Effects would be of minor adverse magnitude.	Slight

Landscape Receptor	Sensitivity of the Receptor	Option 7: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Landscape Effect
Individual landscape elements (woodland, agricultural land, tree and hedgerows).	Low	- barely noticeable changes to existing landscape character derived from loss of trees, hedgerows and woodland. - Immature planting substituting that lost to the proposed scheme but not contributing to character reinstatement. Summary: Changes in character are very localised and the footprint of the highway barely changed compared to the baseline. Vegetation reduction in combination with loss of agricultural land would result in potential effects of negligible adverse magnitude.	Neutral
Dunsmore Parkland LCT	Medium	Overall, effects on landscape character from Option 7 within the study area are likely to be a result of: - negligible loss or damage to existing landscape character and - very localised increased influence of the modified junction. Summary: Effects would be of negligible adverse magnitude in year 1.	Neutral
Landscape Receptor	**Sensitivity of Receptor**	**Option 7: Key effects and indicative Magnitude of Change in Year 15**	**Likely Significance of Landscape Effect**
Individual landscape elements (woodland, agricultural land, tree and hedgerows).	Low	- Reinstatement of woodland/ hedgerows comparable to the baseline. - Change from agricultural use to highway use very localised. Summary: Much of the woodland and individual trees lost to the proposed scheme would be replicated and contribute to highway integration and reduced influence on local character. Potential effects would be negligible adverse magnitude.	Neutral
Dunsmore Parkland LCT	Medium	Overall, effects on landscape character from Option 7 would be similar or indistinguishable to the baseline. Summary: Much of the woodland and individual trees lost to the proposed scheme would be replicated and contribute to highway integration and reduced influence on local character. In combination with negligible loss of agricultural land, potential effects would be negligible adverse magnitude.	Neutral

Table 7.3: Option 8 potential landscape effects

Landscape Receptor	Sensitivity of Receptor	Option 8: Key effects & indicative Magnitude of Change in Construction	Likely Significance of Landscape Effect
Individual landscape elements (woodland, agricultural land, tree and hedgerows).	Low	- Localised loss of trees within the existing highway corridors of the B4082 and A46. - Localised and limited change from agricultural use to construction of the highway - Presence of the compound adjacent to Smite Brook, changing land use. Summary: The landscape elements to be removed are partially associated with the existing A46 corridor or B4082 but also potentially include some short sections of long-established hedgerows and mature individual trees. Much of the woodland and individual trees can be replicated. Numbers lost would be low and largely of highway vegetation. In combination with loss of agricultural land, potential effects would be minor adverse magnitude.	Slight
Dunsmore Parkland LCT	Medium	Overall, effects on landscape character from Option 8 within the study area are likely to be as a result of: - introduction of uncharacteristic widespread construction activity simultaneous to the continued use of the existing A46. - partial loss or noticeable changes to existing landscape character or distinctive features or elements and/ or addition of new uncharacteristic, noticeable features or elements such as construction activity, compounds and earthmoving and change in land use. - addition of new uncharacteristic, noticeable features or elements such as construction, the compound and earthmoving, construction traffic and machinery. - Effects on the wider Dunsmore Parkland LCT and the wider urban area of Binley/ Walsgrave as a result of negligible loss or damage to existing landscape character. Summary: Effects from the compound, vegetation removal and construction activity beyond the current highway influenced area would be of negligible adverse magnitude.	Neutral

Landscape Receptor	Sensitivity of Receptor	Option 8: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Landscape Effect
Individual landscape elements (woodland, agricultural land, tree and hedgerows).	Low	As for Option 7, but with an insignificant increase in reduced characteristic elements as a result of a slightly larger footprint derived from cutting widths and offline extent from the existing carriageway.	Neutral
Dunsmore Parkland LCT	Medium	As for Option 7, but with a negligible increase in reduced characteristic elements as a result of a slightly larger footprint.	Neutral
Landscape Receptor	**Sensitivity of Receptor**	**Option 8: Key effects and indicative Magnitude of Change in Year 15**	**Likely Significance of Landscape Effect**
Individual landscape elements (woodland, agricultural land, tree and hedgerows).	Low	As for Option 7.	Neutral
Dunsmore Parkland LCT	Medium	As for Option 7.	Neutral

Table 7.4: Option 11 Potential landscape effects

Landscape Receptor	Sensitivity of Receptor	Option 11: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Landscape Effect
Individual landscape elements (woodland, agricultural land, tree and hedgerows).	Low	- Localised loss of trees within the existing highway corridors of the B4082 and A46 and more loss of field boundaries/ hedgerows/ trees in the vicinity of the dumbbell junction to the north. - Localised and limited change from agricultural use to construction of the highway modifications south of Hungerley Hall Farm and more extensive change in character and construction in the vicinity of the dumbbell junction to the north. - Presence of the compound north of Hungerley Hall Farm, temporarily changing land use. Summary: Adjacent to and to the south of Hungerley Hall Farm, the landscape elements to be removed are partially associated with the existing A46 corridor or B4082 but also potentially include some short sections of long-established hedgerows and mature individual trees. Much of the woodland and individual trees can be replicated. Numbers lost would be low and largely of highway vegetation. To the north of Hungerley Hall Farm the construction footprint of the dumbbell junction extends more widely beyond the current highway boundary and the presence of the construction compound would add to the temporary change in landscape character. However, loss of agricultural land and field boundary vegetation would remain localised and result in an adverse effect on individual landscape elements of overall minor magnitude.	Slight
Dunsmore Parkland LCT	Medium	Overall, Option 11 construction effects on landscape character within study area likely result of: - introduction of uncharacteristic widespread construction activity simultaneous to continued use of existing A46. - partial loss or noticeable changes to existing landscape character or distinctive features or elements and/or addition of new uncharacteristic, noticeable features or elements such as construction activity, compounds and earthmoving and change in land use. - addition of new uncharacteristic, noticeable features or elements such as construction, the compound and earthmoving, construction traffic and machinery. - effects on the wider Dunsmore Parkland LCT and the wider urban area of Binley/ Walsgrave as a result of loss of elements or damage to existing landscape character. Summary: The construction compound and formation of the dumbbell junction and on/ off slip roads construction would result in the majority of construction impacts, extending beyond the existing A46 corridor and encompassing two fields. However, effects would remain localised such that at the scale of the LCT, effects would be of minor adverse magnitude.	Slight

Landscape Receptor	Sensitivity of Receptor	Option 11: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Landscape Effect
Individual landscape elements (woodland, agricultural land, tree and hedgerows).	Low	- noticeable changes to existing landscape character derived from loss of trees, hedgerows and woodland, but remaining localised to the existing A46 corridor. - Immature planting substituting that lost to the proposed scheme but not contributing to character reinstatement. Summary: Changes in character are very localised and the footprint of the highway extended. But the scale of vegetation loss and loss of agricultural land is localised and would result in potential effects of negligible adverse magnitude.	Slight
Dunsmore Parkland LCT	Medium	Overall, effects on landscape character from Option 11 within the study area are likely to be a result of: - negligible loss or damage to existing landscape character - lighting of the dumbbell junction would increase urbanisation locally. - reduction in tranquillity both from the lighting and the increased traffic presence and movement perceptible within the LCT. Summary: Effects would be of negligible adverse magnitude in year 1.	Slight
Landscape Receptor	**Sensitivity of Receptor**	**Option 11: Key effects and indicative Magnitude of Change in Year 15**	**Likely Significance of Landscape Effect**
Individual landscape elements (woodland, agricultural land, tree and hedgerows).	Low	- Reinstatement of woodland/ hedgerows comparable to the baseline. - Ongoing but localised change in landscape character derived from the intensification of highway infrastructure and activity including the dumbbell junction, slip roads and access road from the B4082. - lighting of the dumbbell junction beyond the perceived urban edge will remain an influence on the LCT. Summary: Much of the woodland and individual trees lost to the proposed scheme would be replicated and contribute to highway integration and reduced influence on local character. Potential effects on individual landscape elements (trees/ hedgerows/ agricultural land) would be of negligible adverse magnitude.	Neutral

Dunsmore Parkland LCT	Medium	- Ongoing but localised change in landscape character derived from the intensification of highway infrastructure and activity including the dumbbell junction, slip roads and access road from the B4082. - lighting of the dumbbell junction beyond the perceived urban edge will remain an influence on the LCT. - Lighting of the dumbbell junction would increase urbanisation locally. - There would ongoing reduction in tranquillity both from the lighting and the increased traffic presence and movement. Overall, effects on landscape character from Option 11 would primarily remain as a result of the dumbbell junction its on/ off slips and access to the B4082. Summary: Much of the woodland and individual trees lost to the proposed scheme would be replicated and contribute to highway integration and reduced influence on local character. In combination with negligible loss of agricultural land, potential effects would be negligible adverse magnitude.	Neutral

7.12 Visual baseline conditions

7.12.1 The study area is centred on the existing road corridor of the A46. A considerable length of this road corridor is located in cutting with views blocked by a combination of the cutting and tree belts, creating a continuous corridor with occasional gaps that allow for views from the road corridor and conversely of the highway from within the wider landscape. The existing A46 is not visible from publicly accessible areas of Coombe Abbey Park.

7.12.2 To the north-east of the study area elevated views are experienced from Walsgrave Hill, including along the A46 corridor. To the west of the A46 views comprise mainly of arable fields with few boundary features allowing for longer views. In the west of the study area views are foreshortened by dense residential development and the tree belts along the River Sowe, which block or partially screen views of the A46 from the residential edge of Binley/ Walsgrave.

7.12.3 Views to the south of the existing A46 Walsgrave junction are heavily restricted by woodland belts along the highway on both sides. The Coventry and Warwickshire University Hospital located in the north of the study area is five storeys tall and some views towards the existing A46 corridor are likely to be available from the upper storeys of the hospital. High voltage overhead power lines cross the study area and are a detracting feature, particularly the pylons. Within the urban areas of the study area views are contained within the built form and vegetation along with a tight network of residential roads.

7.12.4 Overall, the visual context of the proposed scheme is mixed, with short distance views being prevalent and longer views available from higher ground in the north-eastern part of the study area. The A46 corridor is, as a result of the location in cutting and/ or planting within the highway boundary, generally well screened and of low visibility within the study area.

Representative range of visual receptors within the study area

7.12.5 Representative visual receptors within the study area are set out in Table 7.5 and are intended to capture the range of viewers and potential typical views of the proposed scheme. A site visit to assess visibility was undertaken on 1 March 2021 and this has informed the final choice of viewpoints to be assessed in the PCF Stage 2 EAR.

Table 7.5: Representative range of visual receptors

Visual receptor /viewpoint	Scoped in/ out	Rationale	Sensitivity
1. Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	In	The views from these residential properties are partially screened by woodland but due to the proximity to the proposed scheme, these receptors are proposed for further assessment.	High (Static view from dense residential area)

Visual receptor /viewpoint	Scoped in/ out	Rationale	Sensitivity
2. Recreational receptors in the River Sowe open space, Binley/ Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	In	Views are partially screened by vegetation along the River Sowe, however, due to the proximity of the proposed scheme, this receptor is proposed for inclusion in the EAR.	Low (Views by users of local public open spaces).
3. Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	In	The views from these residential properties are partially screened by woodland but due to the proximity to the proposed scheme, these receptors are proposed for further assessment.	High (Static view from dense residential area)
4. Residential receptors at Valencia Road, Binley/ Walsgrave. (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	Out	Unlikely to be any change in the view at ground level or first floor level, in summer or winter, due to distance and intervening vegetation. No change.	High (Static view from dense residential area)
5. Recreational receptors Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley).	In	Views are partially screened by vegetation along the Smite Brook, however, due to the proximity of the proposed scheme, this receptor is proposed for inclusion in the EAR.	Low (Views by users of local public open spaces).
6. Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	In	Views are partially screened by vegetation but are proposed for further assessment in the EAR due to their sensitivity and proximity to the proposed scheme.	High (Static view from dense residential area)

Visual receptor /viewpoint	Scoped in/ out	Rationale	Sensitivity
7. Residential receptors at Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave).	In	Views are partially screened by vegetation but are proposed for further assessment in the EAR due to their sensitivity and proximity to the northern end of the proposed scheme.	High (Static view from dense residential area)
8. Residential receptor at Oak Farm nurseries. (Refer to Figure 7.12: Viewpoint 8: Residential receptor at Oak Farm nurseries.).	Out	Unlikely to be any change in the view at ground level or first floor level, in summer or winter, due to distance and intervening vegetation. No change.	Moderate (Static views from less populated residential area)
9. Recreational receptors along the section of Centenary Way close to Coombe Abbey Park. (Refer to Figure 7.13: Viewpoint 9: Recreational receptors along the section of Centenary Way close to Coombe Abbey Park).	Out	Views are fully screened by vegetation and landform as illustrated by Figure 7.13. No change.	High (Views by users of nationally important PRoW/ recreational trails)
10. Recreational receptors on the PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	In	Views are partially screened by vegetation along the A46, but due to the elevated nature of the viewpoint and relative proximity to the proposed scheme, the receptor is proposed for further assessment in the EAR.	Low (Users of local public open spaces/ PRoW).
11. Recreational receptors at Coombe Abbey Park. (Refer to Figure 7.15: Viewpoint 11: Recreational receptors at Coombe Abbey Park).	Out	Views are fully screened by woodland within Coombe Abbey Park as illustrated by Figure 7.15. No change.	High (Views by users of public open spaces for enjoyment of the countryside (e.g. country parks);

Visual receptor /viewpoint	Scoped in/ out	Rationale	Sensitivity
Ref A. Residential receptors at Hungerley Hall Farm Grade II Listed Building, Binley/ Walsgrave	In	This receptor is located close to the proposed scheme and therefore it is proposed for further assessment in the EAR. It is not a publicly accessible location and no images have been captured at this stage.	High (Static view from listed buildings)
Ref. B. Employment receptors at University Hospital, Walsgrave	In	Due to the height of the building (4-5 storeys) and the proximity to the proposed scheme, the receptor is proposed for inclusion in the EAR assessment. It is not a publicly accessible location and no images have been captured at this stage.	Low (Views by indoor workers)
Ref C: Residential receptors located within built-up areas of Binley/ Walsgrave surrounded by other buildings or screened by vegetation or landform.	In	The views from these residential properties are partially screened by intervening buildings and woodland on the edge of the urban area but due to the proximity to the proposed scheme, these receptors are proposed for further assessment.	High (Static view from dense residential area)
Ref. D. Residential receptors at Barrow Close, Walsgrave	Out	This receptor is representative of residents of Barrow Close but is distant from the post scoping definition of the scheme boundary and is no longer in proximity to the proposed scheme. No further assessment in the EAR is proposed, as it is unlikely to be affected significantly.	High (Static view from dense residential area)
Ref E. Employment receptors at business unit (formerly Toys R Us) adjacent to the A46, Walsgrave.	Out	The views from these receptors are scoped out due to the screening provided by woodland adjacent to the business unit.	Low (Views by indoor workers)

7.13 Option 6: Potential visual effects

7.13.1 The most prominent elements of construction would be associated with vegetation removal opening up views; the compound between the River Sowe and existing A46 corridor; realignment of the sections of the A46; the B4082 access link close to the River Sowe; and the new dumbbell junction arrangements.

7.13.2 The widespread change of land use, the introduction of construction machinery, formation of earthworks and use of compounds will change the views available from visual receptors. During the construction period several sensitive groups of receptors, including people at residential properties are likely to experience short term adverse visual effects.

7.13.3 In year 1 the highway elements influencing visual amenity would be: traffic on the highways more openly visible as a result of loss of screening/ increased proximity; the scale and extent of additional highway of the realigned A46 corridor; the B4082 access link; the new dumbbell junction arrangements, including lighting; and ancillary infrastructure elements such as fencing, attenuation ponds and access tracks.

7.13.4 In year 15 there would be some degree of mitigation of visual effects achieved through screen planting or reinstated landscape elements such as woodland, hedgerows and individual trees. The most prominent highway elements influencing visual amenity would be traffic on the highways more openly visible as a result of proximity; and the new dumbbell junction arrangements, including lighting.

7.14 Option 7: Potential visual effects

7.14.1 The most prominent elements of construction would be associated with the compound between the Smite Brook and the existing B4082 corridor, visible from parts of Gainford Rise Open Space; earthworks and vegetation removal to the localised realignment of the sections of the A46 western boundary; earthworks and vegetation removal to the boundary of the B4082.

7.14.2 The localised change of land use, the introduction of construction machinery, formation of earthworks and use of compounds will change the views available from visual receptors. During the construction period several sensitive groups of receptors, including people at residential properties are likely to experience short term adverse visual effects.

7.14.3 In year 1 the highway elements influencing visual amenity would be: traffic on the revised junction being more openly visible as a result of loss of screening and localised increased proximity; and increased visibility of vehicles on the B4082 as a result of vegetation loss.

7.14.4 In year 15 there would be a high degree of mitigation of visual effects achieved through screen planting or reinstated landscape elements such as woodland, hedgerows and individual trees. At year 15 there would be an effect on visual amenity comparable to the baseline, albeit with vegetation being less mature.

7.15 Option 8: Potential visual effects

7.15.1 The most prominent elements of construction would be associated with; the compound between the Smite Brook and the existing B4082 corridor visible from the adjacent public open space; earthworks and vegetation removal to the localised realignment of the sections of the A46 western and eastern boundaries; and earthworks and vegetation removal to the boundary of the B4082.

7.15.2 The localised change of land use, the introduction of construction machinery, formation of earthworks and use of compounds will change the views available from visual receptors. During the construction period several sensitive groups of receptors, including people at residential properties are likely to experience short term adverse visual effects.

7.15.3 In year 1 the highway elements influencing visual amenity would be: traffic on the revised junction being more openly visible as a result of loss of screening and localised increased proximity; and increased visibility of vehicles on the B4082 as a result of vegetation loss.

7.15.4 In year 15 there would be a high degree of mitigation of visual effects achieved through screen planting or reinstated landscape elements such as woodland,

hedgerows and individual trees. At year 15 there would be an effect on visual amenity comparable to the baseline, albeit with vegetation being less mature.

7.16 Option 11: Potential visual effects

7.16.1 The most prominent elements of construction would be associated with vegetation removal opening up views; the compound between the River Sowe and existing A46 corridor; realignment/ localised modification of the sections of the A46; the B4082 access link and the new dumbbell junction.

7.16.2 The localised change of land use, the introduction of construction machinery, formation of earthworks and use of compounds will change the views available from visual receptors. During the construction period several sensitive groups of receptors, including people at residential properties are likely to experience short term adverse visual effects.

7.16.3 In year 1 the highway elements influencing visual amenity would be: traffic on the highways more openly visible as a result of loss of screening/ increased proximity; the scale and extent of additional highway of the realigned A46 corridor; the B4082 access link; the new dumbbell junction arrangement including lighting; and ancillary infrastructure elements such as fencing, attenuation ponds and access tracks.

7.16.4 In year 15 there would be some degree of mitigation of visual effects achieved through screen planting or reinstated landscape elements such as woodland, hedgerows and individual trees. The most prominent highway elements influencing visual amenity would be traffic on the highways more openly visible as a result of proximity; and the new dumbbell junction arrangements, including lighting.

7.17 Summary of visual effects

7.17.1 The key visual impacts and effects relating to each option are tabulated in Table 7.6 to Table 7.9, including judgements on sensitivity of the receptor and magnitude of effect, to allow comparison between the significance of effect at the various stages of the proposed scheme for each option.

Table 7.6: Option 6 potential visual effects

Visual Receptor	Sensitivity of Receptor	Option 6: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Viewpoint 1: Fontmell / Abbotsbury Close, Binley/ Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views partially screened by trees/ shrubs along the River Sowe. - Existing views largely rural with limited influence from the existing A46, which is well screened. - Medium proximity to elements of the proposed scheme in the middle ground. - Large number of potential viewers. - Views altered by localised hedgerow/ tree removal. - Views of earthmoving/ construction of the B4082 access link. - - Views of the construction compound in the middle ground. - Machinery/ vehicles and construction activity. Summary: Given the scale and extent of change in the middle ground and allowing for some degree of mitigation from retained vegetation there is potential for effects of major magnitude in winter and moderate in summer.	Very Large (winter) Large (summer)
Viewpoint 2: Open space, Binley/ Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	Low	- Screening of views, hedgerow removal and construction activity as described for VP1 - Close proximity to elements of the proposed scheme in the foreground. - Medium number of potential viewers. - Views of earthmoving/ construction of the B4082 access link, attenuation pond and the dumbbell roundabouts. - Views of construction of elevated A46 realigned mainline – closer to the viewer. Summary: Given the scale and extent of change in the foreground and localised open views between retained vegetation there is potential for effects of major magnitude.	Moderate

Visual Receptor	Sensitivity of Receptor	Option 6: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Viewpoint 3: Fontmell / Abbotsbury Close, Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views partially screened by trees/ shrubs along the River Sowe. - Visible elements as described for VP1 - View largely rural with limited influence from the existing A46, which is well screened. - Medium proximity to elements of the proposed scheme in the middle ground. - Large number of potential viewers. Summary: Given the scale and extent of change in the middle ground and allowing for some degree of mitigation from retained vegetation there is potential for effects of moderate magnitude.	Large
Viewpoint 5: Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley).	Low	- Views are partially screened by vegetation along the Smite Brook in the foreground. - Views of construction activity substantially screened by middle ground intervening vegetation along the B4082, to be largely retained. - Unlikely to be any views, proposed scheme fully screened by intervening vegetation even in winter. Summary: Unlikely to be any change in the view, in summer or winter, due to distance and intervening vegetation. No change.	Neutral
Viewpoint 6: Royston Close and Gainford Rise, Binley/ Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	High	- Views substantially screened by tree cover, within the B4082/ A46 corridor, to be largely retained. - Proposed scheme in the middle distance at its closest - Potential for some vegetation loss to be apparent. Any views limited to tall construction elements if present. Summary: Unlikely to be any noticeable change in the view at ground level or first floor level, in summer or winter, due to distance and intervening vegetation. Potential for temporary glimpses of machinery during the B4082 modification but very localised. Potential for effects of negligible magnitude.	Slight

Visual Receptor	Sensitivity of Receptor	Option 6: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Viewpoint 7: Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave).	High	- Views substantially screened by tree cover, within the A46 corridor, mostly to be retained. - Proposed scheme in the middle to far distance at its closest - Potential for some vegetation loss within the view to the south of the accommodation overbridge. - Unlikely to be any views, proposed scheme fully screened by intervening vegetation even in winter. Summary: Potential for localised change in the view due to vegetation removal and temporary glimpses of machinery at the junction with the existing A46 modification but very localised. Potential for effects of negligible magnitude.	Slight
Viewpoint 10: PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	Low	- Views are substantially screened by vegetation along the A46 - Elevated viewpoint but relatively distant from the main elements of the proposed scheme. - Intervening landform to be retained. - Potential for some vegetation loss to be apparent. - Potential views of some elements of construction of the dumbbell roundabout junction. Summary: Unlikely to be any noticeable change in the view in summer or winter, due to distance and intervening vegetation. Potential for temporary glimpses of machinery during the B4082 modification but very localised. Potential for effects of negligible magnitude.	Slight

Visual Receptor	Sensitivity of Receptor	Option 6: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Ref A. Hungerley Hall Farm, Binley /Walsgrave (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	High	- Residential receptor, not publicly accessible location and no images have been captured at this stage. - Major construction of the realigned A46 in close proximity. - Construction compound openly visible to the north of the farm buildings. - Construction activity will dominate the view and position the residents between the operational A46 and construction activity of the new alignment. - All aspects of the proposed scheme visible due to the elevation and proximity of the buildings. Summary: Given the scale and extent of change in the view adjacent to the viewer with no degree of mitigation there is potential for effects of major magnitude.	Very Large
Ref. B. Employment receptors at University Hospital, Walsgrave	Low	- Indoor worker receptors, not publicly accessible location and no images have been captured at this stage. - Major construction of the realigned A46 would be visible in the middle to far distance as part of a wide panorama. - Construction activity will be openly visible. - All aspects of the proposed scheme visible due to the elevation of the buildings. Summary: The scale and extent of change in the view would be relatively distant and localised within a wide panorama. No mitigation possible due to elevation. Potential for effects of moderate magnitude.	Slight

Visual Receptor	Sensitivity of Receptor	Option 6: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Ref C: Binley/ Walsgrave.	High	- Views substantially screened by tree cover, within the A46 corridor, to be retained. - Proposed scheme in the middle distance at its closest - Unlikely to be any ground level views, even in winter. - Potential for narrow views from upper floors but substantially screened by intervening buildings, residents of which are assessed in VPs 1/3/6/7. Summary: Unlikely to be any change in the view at ground level. Potential glimpsed first floor level views, in summer or winter. Potential for effects of negligible magnitude.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 6: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Visual Effect
Viewpoint 1: Fontmell / Abbotsbury Close, Binley/ Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views of the B4082 access link with the mainline highway on embankment beyond. - Vehicles visible in the middle ground. Summary: Given the scale and extent of change in the middle ground and allowing for some degree of mitigation from retained vegetation there is potential for effects of major magnitude in winter and moderate in summer.	Very Large (winter) Large (summer)

Visual Receptor	Sensitivity of the Receptor	Option 6: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Visual Effect
Viewpoint 2: Open space, Binley/ Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	Low	- Close proximity to the B4082 access link, attenuation pond and the dumbbell roundabouts including lighting columns. - Views of elevated A46 realigned mainline. - Vehicles visible in the fore and middle ground. - Lighting on the dumbbell junction visible at night Summary: Given the scale and extent of change in the foreground and localised open views between retained vegetation there is potential for effects of major magnitude.	Moderate
Viewpoint 3: Fontmell / Abbotsbury Close, Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views of the B4082 access link. - Views of elevated A46 realigned mainline. - Vehicles visible in the middle ground. Summary: Given the scale and extent of change in the middle ground and allowing for some degree of mitigation from retained vegetation there is potential for effects of moderate magnitude.	Large
Viewpoint 5: Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley).	Low	- Unlikely to be any views, proposed scheme fully screened by intervening vegetation even in winter. Summary: Unlikely to be any change in the view, in summer or winter, due to distance and intervening vegetation. No change.	Neutral

Visual Receptor	Sensitivity of the Receptor	Option 6: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Visual Effect
Viewpoint 6: Royston Close and Gainford Rise, Binley/ Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	High	- Views substantially screened by tree cover, within the B4082/ A46 corridor, to be largely retained. - Proposed scheme in the middle distance at its closest Summary: Unlikely to be any change in the view at ground level or first floor level, in summer or winter, due to distance and intervening vegetation. No change.	Neutral
Viewpoint 7: Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave).	High	- Unlikely to be any daytime views, proposed scheme fully screened by intervening vegetation even in winter. - Lighting on the dumbbell junction likely to be visible at night. Summary: Unlikely to be any noticeable change in the view in summer or winter, due to distance and intervening vegetation. Potential for lighting visibility but within the context of other urban light sources in Binley/Walsgrave such that there would be no change in visual amenity.	Neutral
Viewpoint 10: PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	Low	- Views are substantially screened by vegetation along the A46 and intervening landform. - Potential views of lighting at night on the dumbbell roundabout junction. Summary: Unlikely to be any noticeable change in the view in summer or winter, due to distance and intervening vegetation. Potential for lighting visibility but within the context of other urban light sources in Binley/Walsgrave such that there would be no change in visual amenity.	Neutral

Visual Receptor	Sensitivity of the Receptor	Option 6: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Visual Effect
Ref A. Hungerley Hall Farm, Binley/ Walsgrave (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	High	- Views of the proposed scheme will be open in year 1 with little screening by mitigation planting but some mitigation by landform looking southwards, where the mainline carriageway is partially in cutting. Looking northwards the mainline and B4082 access are both elevated on embankment and will be prominent in Year 1. Summary: Elements of the proposed scheme likely to remain visible as a result of extent and proximity. Given the scale and extent of change in the view adjacent to the viewer with mitigation ineffective in year 1, there is potential for effects of moderate magnitude.	Large
Ref. B. Employment receptors at University Hospital, Walsgrave	Low	- The realigned A46 would be visible in the middle to far distance as part of a wide panorama. - All aspects of the proposed scheme visible due to the elevation of the buildings. Summary: The scale and extent of change in the view would be relatively distant and localised within a wide panorama. Potential for effects of minor magnitude.	Slight
Ref C: Binley/ Walsgrave.	High	- Views substantially screened by tree cover, within the A46 corridor, to be retained. - Unlikely to be any ground level views, even in winter. Summary: Unlikely to be any visibility of the proposed scheme at ground or first floor level. No change.	Neutral

Visual Receptor	Sensitivity of the Receptor	Option 6: Key effects and indicative Magnitude of Change in Year 15	Likely Significance of Visual Effect
Viewpoint 1: Fontmell / Abbotsbury Close, Binley/ Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Screening by trees/ shrubs along the River Sowe supplemented by mitigation within the highway boundary of the proposed scheme. - Mitigation planting between the viewer and the proposed scheme likely to be a minimum of 5m in height and provide filtered screening in winter and substantial screening in summer. Summary: Allowing for some degree of screening from retained vegetation and mitigation planting within the proposed scheme there is potential for effects of minor magnitude.	Slight
Viewpoint 2: Open space, Binley/ Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	Low	- Screening by trees/ shrubs along the River Sowe supplemented by mitigation within the highway boundary of the proposed scheme. - Views of the B4082 access link, attenuation pond and the dumbbell roundabouts heavily filtered by mitigation planting between the viewer and the proposed scheme likely to be a minimum of 5m in height and provide filtered screening in winter and substantial screening in summer. - Filtered views of vehicles on the elevated A46 realigned mainline. - Lighting on the dumbbell junction visible at night Summary: Allowing for some screening from existing vegetation in the foreground and mitigation planting there is potential for effects of minor magnitude during daytime and at night (lighting on the dumbbell roundabouts).	Slight
Viewpoint 3: Fontmell / Abbotsbury Close, Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/	High	- Screening by trees/ shrubs along the River Sowe supplemented by mitigation within the highway boundary of the proposed scheme. - Views of the B4082 access link, attenuation pond and the dumbbell roundabouts heavily filtered by mitigation planting between the viewer and the proposed scheme likely to be a minimum of 5m in height and provide filtered screening in winter and substantial screening in summer. - Filtered views of vehicles on the elevated A46 realigned mainline. - Lighting on the dumbbell junction visible at night	Slight

Visual Receptor	Sensitivity of the Receptor	Option 6: Key effects and indicative Magnitude of Change in Year 15	Likely Significance of Visual Effect
Abbotsbury Close, Binley/ Walsgrave).		Summary: Given the scale and extent of change in the middle ground and allowing for some degree of mitigation from retained vegetation there is potential for effects of minor magnitude during daytime and at night (lighting on the dumbbell roundabouts).	
Viewpoint 5: Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley).	Low	- Unlikely to be any views, proposed scheme fully screened by intervening vegetation even in winter. Summary: Unlikely to be any change in the view, in summer or winter, due to distance and intervening vegetation. No change.	Neutral
Viewpoint 6: Royston Close and Gainford Rise, Binley/ Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	High	- Views substantially screened by tree cover, within the B4082/ A46 corridor, to be largely retained. Summary: Unlikely to be any noticeable change in the view at ground level or first floor level, in summer or winter, due to distance and intervening vegetation. Potential for effects of negligible magnitude.	Slight
Viewpoint 7: Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave).	High	- Views of the dumbbell roundabouts heavily filtered by mitigation planting between the viewer and the proposed scheme likely to be a minimum of 5m in height and coupled with existing vegetation will provide substantial screening in winter and screening in summer. - Unlikely to be any daytime views, proposed scheme fully screened by intervening vegetation even in winter. - Lighting on the dumbbell junction visible at night Summary: Potential for lighting on the dumbbell junction visible at night. Other elements of the proposed scheme fully screened. Potential for effects of negligible magnitude.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 6: Key effects and indicative Magnitude of Change in Year 15	Likely Significance of Visual Effect
Viewpoint 10: PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	Low	- Views are substantially screened by vegetation along the A46 and intervening landform. Summary: Unlikely to be any noticeable change in the view in summer or winter, due to distance and intervening vegetation. Potential for lighting visibility but within the context of other urban light sources in Binley/Walsgrave such that there would be no change in visual amenity.	Neutral
Ref A. Hungerley Hall Farm, Binley /Walsgrave (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	High	- Views of the proposed scheme will be filtered and substantially screened by mitigation planting. Summary: Elements of the proposed scheme likely to remain visible as a result of extent and proximity. Given the scale and extent of change in the view adjacent to the viewer with mitigation ineffective in year 1, there is potential for effects of moderate magnitude.	Moderate
Ref. B. Employment receptors at University Hospital, Walsgrave	Low	- The realigned A46 would be visible in the middle to far distance as part of a wide panorama. - All aspects of the proposed scheme visible due to the elevation of the buildings. Summary: The scale and extent of change in the view would be relatively distant and localised within a wide panorama and softened and partially screened by year 15. Potential for effects of minor magnitude.	Slight
Ref C: Binley/ Walsgrave.	High	- Views substantially screened by tree cover, within the A46 corridor, to be retained. - Unlikely to be any ground level views, even in winter. - Mitigation planting will by year 15 effectively screen these more distant and limited views such that effects on visual amenity are neutral. Summary: Unlikely to be any visibility of the proposed scheme at ground or first floor level. No change.	Neutral

Table 7.7: Option 7 potential visual effects

Visual Receptor	Sensitivity of the Receptor	Option 7: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Viewpoint 1: Fontmell / Abbotsbury Close, Binley/ Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views partially screened by trees/ shrubs along the River Sowe. - View largely rural with limited influence from the existing A46, which is well screened. - Medium proximity to elements of the proposed scheme in the middle ground. - Views altered by localised hedgerow/ tree removal within the existing corridor of the A46. - Views of earthmoving/ construction of the modification of the B4082. - Views of construction of A46 realigned mainline – to the rear of Hungerley Hall Farm. - Machinery/ vehicles and construction activity forming a partial element of the view largely in the background - Compound largely screened by intervening vegetation along the B4082. Summary: Given the scale and extent of change in the middle ground and allowing for some degree of mitigation from retained vegetation there is potential for effects of minor magnitude.	Moderate
Viewpoint 2: Open space, Binley/ Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	Low	- Proposed scheme distant and oblique from the viewpoint. - Views screened by trees/ shrubs along the River Sowe and intervening landform. - Views of earthmoving/ construction of the junction modification unlikely. Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral

Visual Receptor	Sensitivity of the Receptor	Option 7: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Viewpoint 3: Fontmell / Abbotsbury Close, Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Proposed scheme distant and oblique from the viewpoint. - Views screened by trees/ shrubs along the River Sowe and intervening landform. - Views of earthmoving/ construction of the junction modification unlikely. Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral
Viewpoint 5: Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley).	Low	- Views are partially screened by vegetation along the Smite Brook in the foreground. - Views of the construction compound would be extensive within the view, partially filtered through the vegetation along Smite Brook in summer. - Construction activity on the junction substantially screened by middle ground intervening vegetation along the B4082 to be retained. Summary: Given the scale and extent of change in the fore to middle ground and allowing for some degree of mitigation from retained vegetation there is potential for effects of major magnitude derived from the compound.	Moderate
Viewpoint 6: Royston Close and Gainford Rise, Binley/ Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	High	- Views substantially screened by tree cover along the Smite Brook and within the B4082/ A46 corridor, to be retained. - The compound will be substantially or completely screened by dense intervening vegetation. Summary: Unlikely to be any noticeable change in the view at ground level or first floor level, in summer or winter, due to intervening vegetation. Potential for effects of maximum negligible magnitude from potential glimpses of the compound in winter.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 7: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Viewpoint 7: Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave).	High	- Proposed scheme distant and oblique from the viewpoint. - Views screened by trees/ shrubs along the River Sowe and intervening landform. - Views of earthmoving/ construction of the junction modification unlikely. Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral
Viewpoint 10: PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	Low	- Views are substantially screened by vegetation along the A46 - Elevated viewpoint but relatively distant from the main elements of the proposed scheme. - Intervening landform to be retained. Summary: Unlikely to be any change in the view in summer or winter, due to intervening vegetation and landform. No change.	Neutral
Ref A. Hungerley Hall Farm, Binley /Walsgrave (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	High	- Residential receptor, not publicly accessible location and no images have been captured at this stage. - Construction of the realigned A46 in close proximity to the east will be prominent in close proximity. - Vegetation loss along the B4082 will create views of the compound. Summary: Given the scale and extent of change in the view adjacent to the viewer with no degree of mitigation there is potential for effects of moderate magnitude.	Large
Ref. B. Employment receptors at University Hospital, Walsgrave	Low	- Proposed scheme distant and oblique from the viewpoint. - Views screened by trees/ shrubs along the River Sowe and intervening landform.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 7: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
		- Views of earthmoving/construction of the junction modification likely, but relatively localised and distant. Summary: Visibility of the proposed scheme in summer or winter, localised and distant. Negligible magnitude.	
Ref C: Binley/ Walsgrave.	High	- Views substantially screened by tree cover, within the A46 corridor along the Smite Brook and along the B4082, to be substantially retained. - Potential for narrow views from upper floors but substantially screened by intervening buildings, residents of which are assessed in VPs 1/6. Summary: Unlikely to be any change in the view at ground level. Potential glimpsed first floor level views, in summer or winter. Potential for effects of negligible magnitude.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 7: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Visual Effect
Viewpoint 1: Fontmell / Abbotsbury Close, Binley/ Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views of the junction likely to be very limited and localised. Summary: The majority of the view would remain unchanged. However, there would be localised partial visibility of the revised junction. Given limited scale and extent of change in the middle and background and allowing for some degree of mitigation from retained vegetation there is potential for effects of minor magnitude.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 7: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Visual Effect
Viewpoint 2: Open space, Binley/ Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	Low	- Views of the junction and realigned A46 unlikely. Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral
Viewpoint 3: Fontmell / Abbotsbury Close, Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views of the junction and realigned A46 unlikely. Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral
Viewpoint 5: Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley).	Low	- Views of the modified junction would be increased as a result of vegetation removal in the middle ground of the eastern section of the B4082, to the south. - Although partially in cutting there would be visibility of HGVs/ high sided vehicles and lighting columns. Summary: Given the scale and extent of change in the middle ground there is potential for effects of moderate magnitude.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 7: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Visual Effect
Viewpoint 6: Royston Close and Gainford Rise, Binley/ Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	High	- Views substantially screened by tree cover along the Smite Brook and within the western section of the B4082/A46 corridor, to be retained. Summary: Unlikely to be any noticeable change in the view at ground level or first floor level, in summer or winter, due to intervening vegetation. No change.	Neutral
Viewpoint 7: Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave).	High	Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral
Viewpoint 10: PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	Low	- Views are fully screened by intervening landform and vegetation. Summary: Unlikely to be any change in the view in summer or winter, due to intervening vegetation. No change.	Neutral

Visual Receptor	Sensitivity of the Receptor	Option 7: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Visual Effect
Ref A. Hungerley Hall Farm, Binley /Walsgrave (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	High	- The realigned A46 will be prominent in close proximity to the east and there will be a reduction in the garden within views from the property. - Vegetation loss along the B4082 will create additional views of traffic on it compared to the baseline, although it remains in partial cutting. Summary: Given the scale and extent of change in the view adjacent to the viewer with no degree of mitigation there is potential for effects of moderate magnitude.	Large
Ref. B. Employment receptors at University Hospital, Walsgrave	Low	- The realigned A46 would be visible in the middle to far distance, as part of a wide panorama. - All aspects of the proposed scheme visible due to the elevation of the buildings. - The increased visibility of the proposed scheme compared to the baseline will be very localised and form a negligible change in the view. Summary: The scale and extent of change in the view would be relatively distant and localised within a wide panorama. At year 1 mitigation would be ineffective due to the elevation of the viewpoint. However, given the distance, potential effects would be of negligible magnitude.	Slight
Ref C: Binley/ Walsgrave.	High	- Unlikely to be any ground level views, even in winter. - Potential for narrow views from upper floors but substantially screened by intervening buildings, residents of which are assessed in VPs 1/3/6/7. Summary: Unlikely to be any change in the view at ground level. Potential glimpsed first floor level views, in summer or winter. Potential for effects of negligible magnitude.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 7: Key effects and indicative Magnitude of Change in Year 15	Likely Significance of Visual Effect
Viewpoint 1: Fontmell / Abbotsbury Close, Binley/ Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Vegetation planted to mitigate loss along the eastern section of the B4082 modification and to the rear of Hungerley Hall Farm would provide effective mitigation, once 5m in height. - Mitigation planting will reduce highway influence to baseline levels. Summary: The majority of the view would remain unchanged and the revised junction would be substantially screened. Given limited scale and extent of change in the middle and background and allowing for a high degree of mitigation from mitigation planting, in summer and winter, there is potential for effects of negligible magnitude.	Slight
Viewpoint 2: Open space, Binley/ Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	Low	Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral
Viewpoint 3: Fontmell / Abbotsbury Close, Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/	High	Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral

Visual Receptor	Sensitivity of the Receptor	Option 7: Key effects and indicative Magnitude of Change in Year 15	Likely Significance of Visual Effect
Abbotsbury Close, Binley/ Walsgrave).			
Viewpoint 5: Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley).	Low	- Views of the modified junction would be substantially screened as a result of mitigation planting in the middle ground of the eastern section of the B4082, to the south. Summary: Given the scale and extent of change in the middle ground there is potential for effects of negligible magnitude.	Neutral
Viewpoint 6: Royston Close and Gainford Rise, Binley/ Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	High	- Views substantially screened by tree cover along the Smite Brook and within the western section of the B4082/ A46 corridor, to be retained. Summary: Unlikely to be any noticeable change in the view at ground level or first floor level, in summer or winter, due to intervening vegetation. No change.	Neutral
Viewpoint 7: Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave).	High	Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral

Visual Receptor	Sensitivity of the Receptor	Option 7: Key effects and indicative Magnitude of Change in Year 15	Likely Significance of Visual Effect
Viewpoint 10: PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	Low	- Views are fully screened by intervening landform and vegetation. Summary: Unlikely to be any change in the view in summer or winter. No change.	Neutral
Ref A. Hungerley Hall Farm, Binley /Walsgrave (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	High	- Views of the realigned A46 will be substantially screened by mitigation planting. - Views of the modified B4082 will be substantially screened by mitigation planting. Summary: Both elements of the proposed scheme are in cutting and with the addition of maturing mitigation planting the situation would closely resemble the baseline, resulting in effects of negligible magnitude.	Slight
Ref. B. Employment receptors at University Hospital, Walsgrave	Low	- Mitigation planting will by year 15, integrate the modified junction into the view, comparable to the baseline. Summary: The mitigation planting would reduce visibility to that of the baseline. No change.	Neutral
Ref C: Binley/ Walsgrave.	High	- Unlikely to be any ground level views, even in winter. - Potential for narrow views from upper floors but substantially screened by intervening buildings, residents of which are assessed in VPs 1/3/6/7. Summary: Unlikely to be any change in the view at ground level. Potential glimpsed first floor level views, in summer or winter. Potential for effects of negligible magnitude.	Slight

Table 7.8: Option 8 potential visual effects

Visual Receptor	Sensitivity of the Receptor	Option 8: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Viewpoint 1: Fontmell / Abbotsbury Close, Binley/ Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views partially screened by trees/ shrubs along the River Sowe. - Medium proximity to elements of the proposed scheme in the middle and background. - Views altered by extensive hedgerow/ tree removal within the existing corridor of the A46 to the rear of Hungerley Hall Farm and on the eastern part of the B4082. - Views of earthmoving/ construction of the modification of the B4082, creation of an attenuation pond. - Views of construction of A46 realigned mainline – to the rear of Hungerley Hall Farm. - Views of demolition of a building at Hungerley Hall Farm. - Machinery/ vehicles and construction activity forming a prominent element of the view, albeit largely in the background - Compound largely screened by intervening vegetation along the B4082 to be retained. Summary: Given the scale and extent of change in the middle ground and allowing for some degree of mitigation from retained vegetation there is potential for effects of moderate magnitude.	Moderate
Viewpoint 2: Open space, Binley/ Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	Low	- Views of earthmoving/ construction of the junction modification unlikely or very limited. Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral

Visual Receptor	Sensitivity of the Receptor	Option 8: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Viewpoint 3: Fontmell / Abbotsbury Close, Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views of earthmoving/ construction of the junction modification unlikely. Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral
Viewpoint 5: Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley	Low	- Views of the construction compound would be extensive within the view, partially filtered through the vegetation along Smite Brook in summer. - Construction activity on the junction visible due to removal of middle ground intervening vegetation along the B4082. Summary: Given the scale and extent of change in the fore to middle ground and as a result of removal of vegetation there is potential for effects of major magnitude derived from the compound and junction works.	Moderate
Viewpoint 6: Royston Close and Gainford Rise, Binley/ Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	High	- Views substantially screened by tree cover along the Smite Brook. - Vegetation loss within the B4082/ A46 corridor likely to be apparent within the background but operations on the highway would remain screened in summer and winter due to density of intervening vegetation. - The compound will be substantially or completely screened by dense intervening vegetation. Summary: Unlikely to be any noticeable view of construction at ground level or first floor level, in summer or winter, due to intervening vegetation. Potential reduction in density of tree cover within the background. Potential for effects of maximum negligible magnitude from potential glimpses of the compound in winter.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 8: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Viewpoint 7: Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave).	High	- Proposed scheme distant and oblique from the viewpoint. - Views screened by trees/ shrubs along the River Sowe and intervening landform. - Views of earthmoving/ construction of the junction modification unlikely. Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral
Viewpoint 10: PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	Low	- Views are substantially screened by vegetation along the A46 - Elevated viewpoint but relatively distant from the main elements of the proposed scheme. - Intervening landform to be retained. Summary: Unlikely to be any change in the view in summer or winter, due to intervening vegetation and landform. No change.	Neutral
Ref A. Hungerley Hall Farm, Binley /Walsgrave (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	High	- Construction of the realigned A46 in close proximity to the east will be prominent in close proximity and include demolition of a listed building. The residential building at Hungerley Hall Farm will be demolished during these works. - Vegetation loss along the B4082 will create views of the compound. - Vegetation loss along the western edge of the A46 will open views of the highway during construction of the off-line section. - Works will be in close proximity but not encompass the receptor. Summary: Given the scale and extent of change in the view adjacent to the viewer with no degree of mitigation there is potential for effects of moderate magnitude.	Large

Visual Receptor	Sensitivity of the Receptor	Option 8: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Ref. B. Employment receptors at University Hospital, Walsgrave	Low	- Proposed scheme distant and oblique from the viewpoint. - Views screened by trees/ shrubs along the River Sowe and intervening landform. - Views of earthmoving/ construction of the junction modification distant but noticeable due to the extent of landform modification and tree removal. Summary: Some distant visibility of the proposed scheme in summer and winter, albeit distant. Minor magnitude.	Slight
Ref C: Binley/ Walsgrave.	High	- Views substantially screened by tree cover, within the A46 corridor along the Smite Brook and along the B4082, to be substantially retained. - Potential for narrow views from upper floors but substantially screened by intervening buildings, residents of which are assessed in VPs 1/6. Summary: Unlikely to be any change in the view at ground level. Potential glimpsed first floor level views, in summer or winter. Potential for effects of negligible magnitude.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 8: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Visual Effect
Viewpoint 1: Fontmell / Abbotsbury Close, Binley/ Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views of the junction likely to be limited and somewhat localised. - Vegetation loss to the rear of Hungerley Hall Farm and along the B4082 close to the junction will reduce tree cover within the view. - Attenuation pond likely to be visible along with highway boundary fencing. Summary: The majority of the view would remain unchanged. However, there would be localised visibility of the revised junction and associated elements such as the attenuation pond. Changes will be of localised scale and extent of change in the middle and background. There will be some degree of mitigation from retained vegetation but given the increased visibility of highway infrastructure and vehicles there is potential for effects of minor magnitude.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 8: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Visual Effect
Viewpoint 2: Open space, Binley/ Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	Low	- Views of the junction and realigned A46 unlikely. Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral
Viewpoint 3: Fontmell / Abbotsbury Close, Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views of the junction and realigned A46 unlikely. Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral
Viewpoint 5: Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley).	Low	- Views of the modified junction would be increased as a result of vegetation removal in the middle ground of the eastern section of the B4082, to the south. - Although partially in cutting there would be visibility of HGVs/ high sided vehicles and lighting columns. Summary: Given the scale and extent of change in the middle ground there is potential for effects of moderate magnitude.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 8: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Visual Effect
Viewpoint 6: Royston Close and Gainford Rise, Binley/ Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	High	- Views substantially screened by tree cover along the Smite Brook and within the western section of the B4082/ A46 corridor, to be retained. Summary: Unlikely to be any noticeable change in the view at ground level or first floor level, in summer or winter, due to intervening vegetation. No change.	Neutral
Viewpoint 7: Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave).	High	Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral
Viewpoint 10: PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	Low	- Views are fully screened by intervening landform and vegetation. Summary: Unlikely to be any change in the view in summer or winter. No change.	Neutral

Visual Receptor	Sensitivity of the Receptor	Option 8: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Visual Effect
Ref A. Hungerley Hall Farm, Binley /Walsgrave (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	Moderate	- The realigned A46 will be prominent in close proximity to the east. - Vegetation loss along the B4082 will create additional views of traffic on it compared to the baseline, although it remains in partial cutting. Summary: The residential property is not present in year 1 and effects are therefore assessed for farm workers. Given the scale and extent of change in the view adjacent to the viewer with no degree of mitigation there is potential for effects of moderate magnitude.	Moderate
Ref. B. Employment receptors at University Hospital, Walsgrave	Low	- The realigned A46 would be visible in the middle to far distance, as part of a wide panorama. - All aspects of the proposed scheme visible due to the elevation of the buildings. - The increased visibility of the proposed scheme compared to the baseline will be very localised and form a negligible change in the view. Summary: The scale and extent of change in the view would be relatively distant and localised within a wide panorama. At year 1 mitigation would be ineffective due to the elevation of the viewpoint. However, given the distance, potential effects would be of negligible magnitude.	Slight
Ref C: Binley/ Walsgrave.	High	- Unlikely to be any ground level views, even in winter. - Potential for narrow views from upper floors but substantially screened by intervening buildings, residents of which are assessed in VPs 1/3/6/7. Summary: Unlikely to be any change in the view at ground level. Potential glimpsed first floor level views, in summer or winter. Potential for effects of negligible magnitude.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 8: Key effects and indicative Magnitude of Change in Year 15	Likely Significance of Visual Effect
Viewpoint 1: Fontmell / Abbotsbury Close, Binley/ Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Vegetation planted to mitigate loss along the eastern section of the B4082 modification and to the rear of Hungerley Hall Farm would provide effective mitigation, once 5m in height. - Mitigation planting will reduce highway influence to baseline levels. Summary: The majority of the view would remain unchanged and the revised junction would be substantially screened. Given limited scale and extent of change in the middle and background and allowing for a high degree of mitigation from mitigation planting, in summer and winter, there is potential for effects of negligible magnitude.	Slight
Viewpoint 2: Open space, Binley/ Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	Low	- Views of the junction and realigned A46 unlikely. Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral
Viewpoint 3: Fontmell / Abbotsbury Close, Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views of the junction and realigned A46 unlikely. Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral

Visual Receptor	Sensitivity of the Receptor	Option 8: Key effects and indicative Magnitude of Change in Year 15	Likely Significance of Visual Effect
Viewpoint 5: Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley).	Low	- Views of the modified junction would be substantially screened as a result of mitigation planting in the middle ground of the eastern section of the B4082, to the south. Summary: Given the scale and extent of change in the middle ground there is potential for effects of negligible magnitude.	Slight
Viewpoint 6: Royston Close and Gainford Rise, Binley/ Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	High	- Views substantially screened by tree cover along the Smite Brook and within the western section of the B4082/A46 corridor, to be retained. Summary: Unlikely to be any noticeable change in the view at ground level or first floor level, in summer or winter, due to intervening vegetation. No change.	Neutral
Viewpoint 7: Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave	High	Summary: Unlikely to be any visibility of the proposed scheme in summer or winter, due to intervening vegetation and distance. No change	Neutral
Viewpoint 10: PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	Low	- Views are fully screened by intervening landform and vegetation. Summary: Unlikely to be any change in the view in summer or winter. No change.	Neutral

Visual Receptor	Sensitivity of the Receptor	Option 8: Key effects and indicative Magnitude of Change in Year 15	Likely Significance of Visual Effect
Ref A. Hungerley Hall Farm, Binley /Walsgrave (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	Moderate	- No residential property will remain post construction – sensitivity therefore moderate (terminology in DMRB LA 107), equivalent to a working farm. - Views of the realigned A46 will be substantially screened by mitigation planting. - Views of the modified B4082 will be substantially screened by mitigation planting. - Effects from the loss of the listed building assessed in the Cultural Heritage chapter. Summary: Both elements of the highway of the proposed scheme are in cutting and with the addition of maturing mitigation planting the situation would return to something similar to the baseline. However, the increased proximity and potential for some elements to be seen – for example the attenuation pond, would result in effects of minor magnitude.	Slight
Ref. B. Employment receptors at University Hospital, Walsgrave	Low	- Mitigation planting will by year 15, integrate the modified junction into the view, comparable to the baseline. Summary: The mitigation planting would reduce visibility to that of the baseline. No change.	Neutral
Ref C: Binley/ Walsgrave.	High	- Unlikely to be any ground level views, even in winter. - Potential for narrow views from upper floors but substantially screened by intervening buildings, residents of which are assessed in VPs 1/3/6/7. Summary: Unlikely to be any change in the view at ground level. Potential glimpsed first floor level views, in summer or winter. Potential for effects of negligible magnitude.	Slight

Table 7.9: Option 11 potential visual effects

Visual Receptor	Sensitivity of the Receptor	Option 11: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Viewpoint 1: Fontmell / Abbotsbury Close, Binley/ Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views partially screened by trees/ shrubs along the River Sowe. - Views largely rural with limited influence from the existing A46, which is well screened. - Medium proximity to elements of the proposed scheme in the middle ground. - Large number of potential viewers. - Views altered by substantial tree removal in construction along the north side of the B4082 in particular and along the nearside edge of the A46, to the rear of Hungerley Hall Farm. - Views of earthmoving/ construction of the B4082 access link and along the A46 in the vicinity of Hungerley Hall Farm. - Views of the construction compound within the middle ground. - Views of construction of the dumbbell junction will be very oblique and minimal from this location. - Machinery/ vehicles, soil stripping, traffic management and construction activity visible. Summary: In the vicinity of Hungerley Hall Farm, construction will entail the removal of the existing screening vegetation close to the existing A46 within the background and the construction compound in the middle ground. In summer views will be partially filtered by intervening vegetation but still prominent. To the north of Hungerley Hall Farm, change will be less prominent, comprising oblique views of the B4082 access earthworks and the creation of the elevated dumbbell junction. From residential locations, views will be background and through vegetation within gardens, along the River Sowe and less so within the fields beyond, where hedges are low and contain few trees. Considering the scale and extent of change there is potential for effects of moderate magnitude in winter and minor in summer.	Large (winter) Moderate (summer)

Visual Receptor	Sensitivity of the Receptor	Option 11: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Viewpoint 2: Open space, Binley/ Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	Low	- Views of construction/ machinery/ haul roads and earthworks principally related to the dumbbell junction in the right-hand side middle to background. - Medium number of potential viewers. - Views of earthmoving/ construction of the B4082 access link across the panorama looking southwards and of the A46 mainline works towards the accommodation bridge looking northwards. Summary: Given the scale and extent of change in the view albeit from only localised views through limited gaps in retained vegetation predominantly in winter, there is potential for effects on visual amenity of moderate magnitude.	Slight
Viewpoint 3: Fontmell / Abbotsbury Close, Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views partially screened by trees/ shrubs along the River Sowe. - Visible elements as described for VP2 - View largely rural with limited influence from the existing A46, which is well screened. - Elements of the proposed scheme in the background with retained middle ground. - Large number of potential viewers. Summary: Given the scale and extent of change in the background and allowing for some degree of mitigation from retained vegetation and distance there is potential for effects of moderate magnitude in winter and minor in summer.	Moderate (winter) Slight (summer)

Visual Receptor	Sensitivity of the Receptor	Option 11: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Viewpoint 5: Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley).	Low	- Views are partially screened by vegetation along Smite Brook in the foreground. - Views of construction activity substantially screened by middle ground intervening vegetation along the B4082, most of which will be retained. - Unlikely to be any views, proposed scheme fully screened by intervening vegetation even in winter. Summary: Unlikely to be any change in the view, in summer or winter, due to distance and intervening vegetation. No change.	Neutral
Viewpoint 6: Royston Close and Gainford Rise, Binley/ Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	High	- Views substantially screened by tree cover, within the B4082/ A46 corridor, to be largely retained. - Proposed scheme in the middle distance at its closest - Potential for some vegetation loss to be apparent. - Any views limited to tall construction elements if present. Summary: Unlikely to be any noticeable change in the view at ground level or first floor level, in summer or winter, due to distance and intervening vegetation. Potential for temporary glimpses of machinery and loss of vegetation during the B4082 modification but very localised. Potential for effects of negligible magnitude.	Slight
Viewpoint 7: Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave).	High	- Views substantially screened by tree cover, within the A46 corridor, mostly to be retained. - Proposed scheme in the middle to far distance at its closest - Potential for some vegetation loss within the view, locally to the north and the south of the accommodation overbridge. - Potential visibility of taller machinery and earthworks as a perceptible component of the view in winter predominantly. Summary: Potential for very localised change in the view due to vegetation removal and temporary glimpses of machinery associated with the existing A46 modification as it merges to the dumbbell junction but very localised. Potential for effects of negligible magnitude.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 11: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
Viewpoint 10: PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	Low	- Views are substantially screened by vegetation along the A46 - Elevated viewpoint but relatively distant from the proposed scheme. - Intervening landform to be retained. - Potential for some vegetation loss to be apparent. - Potential views of some elements of construction of the dumbbell roundabout junction, particularly involving tall machinery. Summary: Unlikely to be any noticeable change in the view in summer or winter, due to distance and intervening vegetation. Potential for temporary glimpses of machinery during the A46 modification north of the dumbbell roundabout but very localised within a wide panorama from a distant viewpoint. Potential for effects of negligible magnitude.	Slight
Ref A. Hungerley Hall Farm, Binley /Walsgrave (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	High	- Residential receptor, not publicly accessible location and no images have been captured at this stage. - Major construction of the realigned A46 in close proximity. - Construction activity will dominate the view and position the residents between the operational A46 and construction activity of the new alignment. - All aspects of the proposed scheme visible due to the elevation and proximity of the buildings. Summary: Given the scale and extent of change in the view adjacent to the viewer with no degree of mitigation there is potential for effects of major magnitude.	Very Large
Ref. B. Employment receptors at University Hospital, Walsgrave	Low	- Indoor worker receptors, not publicly accessible location and no images have been captured at this stage.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 11: Key effects and indicative Magnitude of Change in Construction	Likely Significance of Visual Effect
		- Construction of the dumbbell junction and merge to the A46 would be the most prominent elements, visible in the middle to far distance as part of a wide panorama. - Construction activity will be openly visible but localised. - The majority of the proposed scheme construction will be visible due to the elevation of the buildings. Summary: The scale and extent of change in the view would be relatively distant and localised within a wide panorama. No mitigation possible due to elevation. Potential for effects of moderate magnitude.	
Ref C: Binley/ Walsgrave.	High	- Views substantially screened by tree cover, along the B4082, within the A46 corridor and along the River Sowe and Smite Brook, to be retained. - Proposed scheme in the middle distance at its closest - Unlikely to be any ground level views, even in winter. - Potential for narrow views of some construction activity or the site compound from upper floors but substantially screened by intervening buildings, residents of which are assessed in Viewpoints 1/ 3/ 6/ and 7. Summary: Unlikely to be any change in the view at ground level. Potential glimpsed first floor level views, in summer or winter. Potential for effects of negligible magnitude.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 11: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Landscape Effect
Viewpoint 1: Fontmell / Abbotsbury Close, Binley/ Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views of the elevated embankment section of the B4082 access link as it approaches the dumbbell junction. - Oblique Views of the dumbbell junction, principally the western roundabout and associated lighting columns and lights at night. - Some screening by landform of vehicles within B4082 section in cutting. - No visibility (or very limited visibility of upper section of HGVs) of vehicles on the A46 mainline in the background due to intervening landform. Summary: Given the scale and extent of change in the background and allowing for some degree of mitigation from retained vegetation there is potential for effects of moderate magnitude in winter and minor in summer.	Large (winter) Moderate (summer)
Viewpoint 2: Open space, Binley/ Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	Low	- Middle distance views of the elevated section of the B4082 access link and the dumbbell roundabouts including lighting columns. - No visibility (or very limited visibility of the upper section of HGVs) of vehicles on the A46 mainline in the background due to intervening landform. - Lighting on the dumbbell junction visible at night Summary: Given the scale and extent of change in the middle/background and localised open views between retained vegetation there is potential for effects of moderate magnitude moderate magnitude in winter and minor in summer.	Slight (winter/ summer)
Viewpoint 3: Fontmell / Abbotsbury Close, Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Views as described for Viewpoint 2 but with additional intervening screening along the River Sowe. Summary: Given the scale and extent of change in the middle ground and allowing for a high degree of mitigation from retained vegetation there is potential for effects of minor magnitude in winter and negligible in summer.	Slight (winter)

Visual Receptor	Sensitivity of the Receptor	Option 11: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Landscape Effect
Viewpoint 5: Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley).	Low	- Unlikely to be any views, proposed scheme fully screened by intervening vegetation even in winter. Summary: Unlikely to be any change in the view, in summer or winter, due to distance and intervening vegetation. No change.	Neutral
Viewpoint 6: Royston Close and Gainford Rise, Binley/ Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	High	- Views substantially screened by tree cover, within the B4082/ A46 corridor, to be largely retained. Summary: Unlikely to be any change in the view at ground level or first floor level, in summer or winter, due to distance and intervening vegetation. No change.	Neutral
Viewpoint 7: Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave).	High	- Proposed scheme fully screened by intervening vegetation and landform even in winter. - Unlikely to be any daytime views of the highway or vehicles assuming retention of some vegetation within the RLB, - Lighting on the dumbbell junction likely to be visible at night but very obliquely from this location Summary: Potential for effects of negligible magnitude derived from lighting at night but in the context of other lighting adjacent to the viewpoint there would be no change in visual amenity.	Neutral

Visual Receptor	Sensitivity of the Receptor	Option 11: Key effects and indicative Magnitude of Change in Year 1	Likely Significance of Landscape Effect
Viewpoint 10: PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	Low	- Potential views of lighting at night on the dumbbell roundabout junction. Summary: Unlikely to be any noticeable change in the view, in summer or winter during the day, due to distance and intervening vegetation. Potential for visibility of lighting at night but in the context of other lighting adjacent to the scheme there would be no change in visual amenity.	Neutral
Ref A. Hungerley Hall Farm, Binley /Walsgrave (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	High	- Views of the proposed scheme will be open in year 1 with little screening by mitigation planting but some mitigation of the A46 mainline by landform (carriageway in cutting) with effects from visibility of vehicles on the raised B4082 access link embankment and on the raised dumbbell junction. Summary: Elements of the proposed scheme likely to remain visible as a result of extent and proximity. Given the scale and extent of change in the view adjacent to the viewer with mitigation ineffective in year 1, there is potential for effects of moderate magnitude.	Large
Ref. B. Employment receptors at University Hospital, Walsgrave	Low	- The realigned A46 would be visible in the middle to far distance as part of a wide panorama. - All aspects of the proposed scheme visible due to the elevation of the buildings. Summary: The scale and extent of change in the view would be relatively distant and localised within a wide panorama. Potential for effects of minor magnitude.	Slight
Ref C: Binley/ Walsgrave.	High	- Views substantially screened by retained tree cover within A46 corridor. - Unlikely to be any ground level views, even in winter. Summary: Unlikely to be any visibility of the proposed scheme at ground or first floor level. No change.	Neutral

Visual Receptor	Sensitivity of the Receptor	Option 11: Key effects and indicative Magnitude of Change in Year 15	Likely Significance of Landscape Effect
Viewpoint 1: Fontmell / Abbotsbury Close, Binley/ Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Screening by trees/ shrubs along the River Sowe supplemented by mitigation within the highway boundary of the proposed scheme. - Mitigation planting between the viewer and the proposed scheme likely to be a minimum of 5m in height and provide filtered screening in winter and substantial screening in summer. Summary: Allowing for some degree of screening from retained vegetation and mitigation planting within the proposed scheme there is potential for effects of minor magnitude.	Slight
Viewpoint 2: Open space, Binley/ Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	Low	- Screening by trees/ shrubs along the River Sowe supplemented by mitigation within the highway boundary of the proposed scheme. - Views of the B4082 access link, attenuation pond and the dumbbell roundabouts heavily filtered by mitigation planting between the viewer and the proposed scheme likely to be a minimum of 5m in height and provide filtered screening in winter and substantial screening in summer. - Filtered views of vehicles on the elevated A46 realigned mainline. - Lighting on the dumbbell junction visible at night Summary: Allowing for some screening from existing vegetation in the foreground and mitigation planting there is potential for effects of minor magnitude during daytime and at night (lighting on the dumbbell roundabouts).	Slight

Visual Receptor	Sensitivity of the Receptor	Option 11: Key effects and indicative Magnitude of Change in Year 15	Likely Significance of Landscape Effect
Viewpoint 3: Fontmell / Abbotsbury Close, Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	High	- Screening by trees/ shrubs along the River Sowe supplemented by mitigation within the highway boundary of the proposed scheme. - Views of the B4082 access link, attenuation pond and the dumbbell roundabouts heavily filtered by mitigation planting between the viewer and the proposed scheme likely to be a minimum of 5m in height and provide filtered screening in winter and substantial screening in summer. - Filtered views of vehicles on the elevated A46 realigned mainline. - Lighting on the dumbbell junction visible at night Summary: Given the scale and extent of change in the middle ground and allowing for some degree of mitigation from retained vegetation there is potential for effects of minor magnitude during daytime and at night (lighting on the dumbbell roundabouts).	Slight
Viewpoint 5: Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley).	Low	- Unlikely to be any views, proposed scheme fully screened by intervening vegetation even in winter. Summary: Unlikely to be any change in the view, in summer or winter, due to distance and intervening vegetation. No change.	Neutral
Viewpoint 6: Royston Close and Gainford Rise, Binley/ Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	High	- Views substantially screened by tree cover, within the B4082/ A46 corridor, to be largely retained. Summary: Unlikely to be any noticeable change in the view at ground level or first floor level, in summer or winter, due to distance and intervening vegetation. Mitigation would restore vegetation to baseline levels with no change in visual amenity.	Neutral

Visual Receptor	Sensitivity of the Receptor	Option 11: Key effects and indicative Magnitude of Change in Year 15	Likely Significance of Landscape Effect
Viewpoint 7: Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave).	High	- Views of the dumbbell roundabouts heavily filtered by mitigation planting between the viewer and the proposed scheme likely to be a minimum of 5m in height and coupled with existing vegetation will provide substantial screening in winter and screening in summer. - Unlikely to be any daytime views, proposed scheme fully screened by intervening vegetation even in winter. - Lighting on the dumbbell junction visible at night Summary: Potential for lighting on the dumbbell junction visible at night. Other elements of the proposed scheme fully screened. Potential for effects of negligible magnitude.	Slight
Viewpoint 10: PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	Low	- Views are substantially screened by vegetation along the A46 and intervening landform. Summary: Unlikely to be any noticeable change in the view at ground level or first floor level, in summer or winter, due to distance and intervening vegetation. Potential for temporary glimpses of machinery during the B4082 modification but very localised. Potential for effects of negligible magnitude.	Slight
Ref A. Hungerley Hall Farm, Binley /Walsgrave (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	High	- Views of the proposed scheme will be filtered and substantially screened by mitigation planting. Summary: Elements of the proposed scheme, such as lighting columns are likely to remain visible as a result of extent and proximity. However, by year 15 mitigation would be effective in reducing visibility and restoring visual amenity close to baseline levels such that, there is potential for effects of minor magnitude.	Slight

Visual Receptor	Sensitivity of the Receptor	Option 11: Key effects and indicative Magnitude of Change in Year 15	Likely Significance of Landscape Effect
Ref. B. Employment receptors at University Hospital, Walsgrave	Low	- The realigned A46 and dumbbell junction would be visible in the middle to far distance as part of a wide panorama. - All aspects of the proposed scheme visible due to the elevation of the buildings. Summary: The scale and extent of change in the view would be relatively distant and localised within a wide panorama and softened and partially screened by year 15. Potential for effects of negligible magnitude.	Slight
Ref C: Binley/ Walsgrave.	High	- Views substantially screened by tree cover, within the A46 corridor, to be retained. - Unlikely to be any ground level views, even in winter. - Mitigation planting will by year 15 effectively screen these more distant and limited views such that effects on visual amenity are neutral/negligible. Summary: Unlikely to be any change in the view at ground level. Potential glimpsed first floor level views, in summer or winter. Potential for effects of negligible magnitude.	Slight

7.18 Design, mitigation and enhancement measures

7.18.1 Landscape and visual effects would be mitigated or reduced through environmental design measures embedded into the proposed scheme where possible to reduce significance of effects identified within the EAR. Potential mitigation measures would include, for example:

- Protection of retained vegetation during construction following current best practice.
- Where bunds are proposed as part of permanent works, they would be constructed as early as practicable to provide screening to the construction activities.
- Restoration of existing landscape pattern including hedgerows along field boundaries.
- Planting of trees and shrub planting to create screening of the proposed scheme.
- Land used for compounds or haul roads will be returned to the former state once construction has been completed.
- Highway within cutting where appropriate.
- Retention of existing vegetation within the corridor of the A46 where the highway modification does not result in its removal.
- Reduction in the width and reuse/ greening of the existing A46 carriageway as a local access and NMU facility.
- Temporary lighting limited and using motion sensor triggers where appropriate.
- Permanent lighting using low light spill, targeted light.

7.18.2 Potential landscape and visual mitigation of operational effects will include environmental design measures and integration of a landscape and environmental strategy illustrated on a series of environmental masterplans for the proposed scheme.

7.19 Assessment of likely significant effects

7.19.1 Table 7.10 to Table 7.13 identify the likely landscape and visual effects at all stages of the proposed scheme for each option. All effects are adverse and those in bold are significant, as defined by the categories in DMRB LA 104.

Table 7.10: Summary of likely landscape effects

	Likely Significance of Landscape Effect in Construction			
Landscape Receptor	Option 6	Option 7	Option 8	Option 11
Individual landscape elements	Slight	Slight	Slight	Slight
Dunsmore Parkland LCT	Slight	Slight	Slight	Slight
	Likely Significance of Landscape Effect in Year 1			
Landscape Receptor	Option 6	Option 7	Option 8	Option 11
Individual landscape elements	Slight	Slight	Slight	Slight
Dunsmore Parkland LCT	Slight	Neutral	Neutral	Slight
	Likely Significance of Landscape Effect in Year 15			
Landscape Receptor	Option 6	Option 7	Option 8	Option 11
Individual landscape elements	Slight	Neutral	Neutral	Neutral
Dunsmore Parkland LCT	Slight	Neutral	Neutral	Neutral

Table 7.11: Summary of likely visual effects in construction

Visual Receptor /Viewpoint	Option 6	Option 7	Option 8	Option 11
No. 1. Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	Very Large (W) Large (S)	Moderate	Moderate	Large (winter) Moderate (summer)
No. 2. Recreational receptors in the River Sowe open space, Binley /Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	Moderate	Neutral	Neutral	Slight
No. 3. Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	Large	Neutral	Neutral	Moderate (winter) Slight (summer)
No. 4. Residential receptors at Valencia Road, Binley/ Walsgrave. (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	Neutral	Neutral	Neutral	Neutral
No. 5. Recreational receptors Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley).	Neutral	Moderate	Moderate	Neutral
No. 6. Residential receptors at Royston Close and Gainford Rise, Binley/Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	Slight	Slight	Slight	Slight
No. 7. Residential receptors at Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave).	Slight	Neutral	Neutral	Slight

Visual Receptor /Viewpoint	Option 6	Option 7	Option 8	Option 11
No. 8. Residential receptor at Oak Farm nurseries. (Refer to Figure 7.12: Viewpoint 8: Residential receptor at Oak Farm nurseries.).	Neutral	Neutral	Neutral	Neutral
No. 9. Recreational receptors along the section of Centenary Way close to Coombe Abbey Park. (Refer to Figure 7.13: Viewpoint 9: Recreational receptors along the section of Centenary Way close to Coombe Abbey Park).	Neutral	Neutral	Neutral	Neutral
No. 10. Recreational receptors on the PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	Slight	Neutral	Neutral	Slight
No. 11. Recreational receptors at Coombe Abbey Park. (Refer to Figure 7.15: Viewpoint 11: Recreational receptors at Coombe Abbey Park).	Neutral	Neutral	Neutral	Neutral
Ref A. Residential receptors at Hungerley Hall Farm Grade II Listed Building, Binley/Walsgrave	Very Large	Large	Large	Very Large
Ref. B. Employment receptors at University Hospital, Walsgrave	Slight	Slight	Slight	Slight
Ref C: Residential receptors located within built-up areas of Binley/Walsgrave surrounded by other buildings or screened by vegetation or landform.	Slight	Slight	Slight	Slight
Ref. D. Residential receptors at Barrow Close, Walsgrave	Neutral	Neutral	Neutral	Neutral
Ref E. Employment receptors at business unit (Toys R Us) adjacent to the A46, Walsgrave.	Neutral	Neutral	Neutral	Neutral

Table 7.12: Summary of likely visual effects in year 1

Visual Receptor /Viewpoint	Option 6	Option 7	Option 8	Option 11
No. 1. Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	Very Large (W) Large (S)	Slight	Slight	Large (winter) Moderate (summer)
No. 2. Recreational receptors in the River Sowe open space, Binley /Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	Moderate	Neutral	Neutral	Slight (winter/ summer)
No. 3. Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	Large	Neutral	Neutral	Slight (winter)
No. 4. Residential receptors at Valencia Road, Binley/ Walsgrave. (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	Neutral	Neutral	Neutral	Neutral
No. 5. Recreational receptors Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley).	Neutral	Slight	Slight	Neutral
No. 6. Residential receptors at Royston Close and Gainford Rise, Binley/Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	Neutral	Neutral	Neutral	Neutral
No. 7. Residential receptors at Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave).	Slight	Neutral	Neutral	Neutral

Visual Receptor /Viewpoint	Option 6	Option 7	Option 8	Option 11
No. 8. Residential receptor at Oak Farm nurseries. (Refer to Figure 7.12: Viewpoint 8: Residential receptor at Oak Farm nurseries.).	Neutral	Neutral	Neutral	Neutral
No. 9. Recreational receptors along the section of Centenary Way close to Coombe Abbey Park. (Refer to Figure 7.13: Viewpoint 9: Recreational receptors along the section of Centenary Way close to Coombe Abbey Park).	Neutral	Neutral	Neutral	Neutral
No. 10. Recreational receptors on the PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	Slight	Neutral	Neutral	Neutral
No. 11. Recreational receptors at Coombe Abbey Park. (Refer to Figure 7.15: Viewpoint 11: Recreational receptors at Coombe Abbey Park).	Neutral	Neutral	Neutral	Neutral
Ref A. Residential receptors at Hungerley Hall Farm Grade II Listed Building, Binley/Walsgrave	Large	Large	Moderate	Large
Ref. B. Employment receptors at University Hospital, Walsgrave	Slight	Slight	Slight	Slight
Ref C: Residential receptors located within built-up areas of Binley/Walsgrave surrounded by other buildings or screened by vegetation or landform.	Neutral	Slight	Slight	Neutral
Ref. D. Residential receptors at Barrow Close, Walsgrave	Neutral	Neutral	Neutral	Neutral
Ref E. Employment receptors at business unit (Toys R Us) adjacent to the A46, Walsgrave.	Neutral	Neutral	Neutral	Neutral

Table 7.13: Summary of likely visual effects in year 15

Visual Receptor /Viewpoint	Option 6	Option 7	Option 8	Option 11
No. 1. Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/Walsgrave (Refer to Figure 7.5: Viewpoint 1: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	Slight	Slight	Slight	Slight
No. 2. Recreational receptors in the River Sowe open space, Binley /Walsgrave (Refer to Figure 7.6: Viewpoint 2: Recreational receptors in the River Sowe open space, Binley/ Walsgrave).	Slight	Neutral	Neutral	Slight
No. 3. Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/Walsgrave (Refer to Figure 7.7: Viewpoint 3: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave).	Slight	Neutral	Neutral	Slight
No. 4. Residential receptors at Valencia Road, Binley/ Walsgrave. (Refer to Figure 7.8: Viewpoint 4: Residential receptors at Valencia Road, Binley/ Walsgrave).	Neutral	Neutral	Neutral	Neutral
No. 5. Recreational receptors Gainford Rise Open Space, Binley (Refer to Figure 7.9: Viewpoint 5: Recreational receptors in Gainford Rise Open Space, Binley).	Neutral	Neutral	Neutral	Neutral
No. 6. Residential receptors at Royston Close and Gainford Rise, Binley/Walsgrave. (Refer to Figure 7.10: Viewpoint 6: Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave).	Slight	Neutral	Neutral	Neutral
No. 7. Residential receptors at Farber Road, Walsgrave. (Refer to Figure 7.11: Viewpoint 7: Residential receptors at Farber Road, Walsgrave).	Slight	Neutral	Neutral	Slight

Visual Receptor /Viewpoint	Option 6	Option 7	Option 8	Option 11
No. 8. Residential receptor at Oak Farm nurseries. (Refer to Figure 7.12: Viewpoint 8: Residential receptor at Oak Farm nurseries.).	Neutral	Neutral	Neutral	Neutral
No. 9. Recreational receptors along the section of Centenary Way close to Coombe Abbey Park. (Refer to Figure 7.13: Viewpoint 9: Recreational receptors along the section of Centenary Way close to Coombe Abbey Park).	Neutral	Neutral	Neutral	Neutral
No. 10. Recreational receptors on the PRoW R75X at Walsgrave Hill. (Refer to Figure 7.14: Viewpoint 10: Recreational receptors at public right of way (PRoW) R75X at Walsgrave Hill).	Slight	Neutral	Neutral	Slight
No. 11. Recreational receptors at Coombe Abbey Park. (Refer to Figure 7.15: Viewpoint 11: Recreational receptors at Coombe Abbey Park).	Neutral	Neutral	Neutral	Neutral
Ref A. Residential receptors at Hungerley Hall Farm Grade II Listed Building, Binley/Walsgrave	Moderate	Slight	Slight	Slight
Ref. B. Employment receptors at University Hospital, Walsgrave	Slight	Neutral	Neutral	Slight
Ref C: Residential receptors located within built-up areas of Binley/Walsgrave surrounded by other buildings or screened by vegetation or landform.	Slight	Slight	Slight	Slight
Ref. D. Residential receptors at Barrow Close, Walsgrave	Neutral	Neutral	Neutral	Neutral
Ref E. Employment receptors at business unit (Toys R Us) adjacent to the A46, Walsgrave.	Neutral	Neutral	Neutral	Neutral

7.20 Conclusion

7.20.1 The study area contains no land of designated landscape value reflected at a national or county level. The condition of landscape elements is generally good to fair. Some of the hedgerows in the vicinity of Walsgrave Hill are degraded and gappy but the agricultural land is well-managed and hedgerows and woodland contribute to landscape character within a locally strong pattern.

7.20.2 There is evident value as a strong rural edge to the urban area of Coventry, comprising the dense housing of Binley and Walsgrave as well as commercial/ industrial and institutional buildings such as the University Hospital. The landscape, unlike many urban fringe areas, is not degraded and remains intact, in part owing to the presence of Coombe Abbey Park. Published landscape character assessment covering the Study Area identifies the Dunsmore Parkland LCT as medium or moderate sensitivity and assessment of the study area using the criteria in DMRB LA 107 indicates that it is appropriate for the study area.

7.20.3 The A46 has limited influence on landscape value or visual amenity, being well defined within cutting and/ or established tree cover within the highway boundary. It forms a barrier to movement and access from neighbouring residential areas such that much of the usage of open space is linear, along the River Sowe and Smite Brook, albeit there is some connectivity to Coombe Abbey Park via Brinklow Road and PRoW R75X at Walsgrave Hill. Overall, the visual context of the proposed scheme is mixed, with short distance views being prevalent and longer views available from higher ground in the north-eastern part of the study area.

7.20.4 All options would involve greater effects on landscape character and visual amenity during construction due to the removal of vegetation, the presence of the construction compound, vehicle and machinery activity and earthworks changing land use.

7.20.5 Landscape and visual effects will be mitigated or reduced through environmental design measures embedded into the proposed scheme once selected and the effects identified within the EAR will refer to residual effects that cannot be mitigated further. In year 1 of operation mitigation planting will be ineffective both as a visual screen or in terms of landscape integration, due to immaturity of the trees and shrubs within the mitigation planting. By year 15 there would be substantial screening and landscape integration derived from the maturing planting.

7.20.6 Option 6 has a significantly larger footprint than the three other options and this is reflected in increased scale and extent of effects on landscape character and visual amenity at all stages of the assessment. Compared to the other options there would be greater change in both landscape character and visual amenity within the study area at all stages as a result of the realigned A46, the B4082 access and the elevated dumbbell roundabouts junction. The overall effect on the much wider landscape character type would be similar to the other options, given that only a small part of the LCT is impacted. However, the change in character of the landscape buffer to the urban edge derived from Option 6 is greater than the other three options.

7.20.7 Option 7 is, in landscape and visual terms, a minor change to the existing junction with minimal loss of vegetation and the greatest effects on landscape character and visual amenity derived from the temporary construction compound. On completion in year 1 and certainly by year 15 any effects on landscape character and visual amenity would be similar to the baseline. Option 8 is a slightly more intrusive and extensive version of Option 7, with slightly increased earthworks,

demolition of Hungerley Hall Farm and greater vegetation loss, including from within the fringes of Coombe Abbey Park.

7.20.8 Option 11 is a less intrusive version of Option 6. It reduces the magnitude and significance of visual effects on a number of key receptors at all stages and has a lesser effect on landscape character than Option 6 by year 15.

7.20.9 Overall, there would be no significant effects on landscape character from any option. Significant visual effects would occur in construction for all options due to visibility of the compounds and other construction elements, although Option 6 will impact a wider range of receptors and locations than options 7 and 8 or 11. In operation year 1, significant effects on visual amenity would occur at Viewpoints 1, 2 and 3 for Option 6 and at Viewpoint 1 for Option 11 but there would be no significant effects from Options 7 and 8. In year 15 there would be residual significant effects from Option 6 at Hungerley Hall Farm but none for Options 7, 8 and 11.

8 Biodiversity

8.1 Introduction

8.1.1 This chapter presents the outcomes of an assessment of likely significant effects on biodiversity, associated with the construction and operation of four options for the proposed scheme, for the purpose of comparison of the options at PCF Stage 2. This is to inform the selection process for a preferred option for the scheme, which would be taken forward and developed as a preliminary design at PCF Stage 3.

8.1.2 The assessment has been prepared in accordance with DMRB LA 104 and DMRB LA 108 Biodiversity Revision 1 (Highways England, 2020c; 2020i).

8.1.3 This chapter should be read in conjunction with Figure 8.1: Ecology Designated Sites to Figure 8.5: Phase 1 Habitat Survey Option 11.

8.2 Legislative and policy framework

8.2.1 Legislation and polices that apply to biodiversity in relation to protected and notable sites, habitats and species relevant to the proposed scheme and are considered as part of this assessment are summarised below.

Legislation

The Conservation of Habitats and Species Regulations 2017 (as amended)

8.2.2 The Conservation of Habitats and Species Regulations is the principal means by which the European Habitats Directive is transposed in England and Wales.

8.2.3 The regulations provide for the designation and protection of a national site network of European Sites (formerly known as Natura 2000), the protection of European protected species such as bats and great crested newts (which are potentially present within the Scheme), and other controls for the protection of European Sites. The Wildlife and Countryside Act 1981 (as amended)

8.2.4 The Wildlife and Countryside Act (as amended) is the principal piece of UK legislation relating to the protection of wildlife. The Act gives protection to native species (especially those under threat such as bats, water vole and great crested newts which are potentially present within the proposed scheme), controls the release of non-native species (present within the proposed scheme) and enhances the protection of SSSIs.

The Countryside and Rights (CRoW) of Way Act 2000 (Her Majesty's Stationery Office (HMSO), 2000)

8.2.5 The CROW Act increases measures for the management and protection for SSSI and strengthens wildlife enforcement legislation.

The Natural Environment and Rural Communities (NERC) Act 2006

8.2.6 Section 41 (S41) of the NERC Act requires the Secretary of State to publish a list of 'priority' habitats and species which are of principal importance for the conservation of biodiversity in England. The list reflects the habitats and species in England identified as requiring action and continue to be regarded as conservation priorities in the UK Post-2010 Biodiversity Framework Joint Nature Conservation Committee (JNCC) guidance (JNCC/Defra, 2012).

The Protection of Badgers Act 1992

8.2.7 Badgers (*Meles meles*) and their setts (burrows) are protected under this Act. Licences to permit otherwise prohibited actions may be granted under Section 10 of this Act for various purposes.

The Hedgerows Regulations 1997

8.2.8 The intention of the Hedgerow Regulations is to protect important countryside hedges from destruction or damage.

The Water Environment (WFD) (England and Wales) Regulations 2017

8.2.9 The purpose of these Water Environment (WFD) Regulations is to prevent deterioration, enhance status of aquatic ecosystems and associated wetlands, whilst promoting sustainable water use.

National Planning Policy

NPSNN

8.2.10 The NPSNN states that as a general principle, and subject to specific policies, development should avoid significant harm to biodiversity (and geological conservation interests), including through mitigation and consideration of reasonable alternatives. (NPSNN paragraph 5.25).

NPPF

8.2.11 Chapter 15 of the NPPF 'Conserving and enhancing the natural environment' sets out the Government view on how local planning authorities should balance nature conservation with development and helps ensure that Government meets its biodiversity commitments with regard to the operation of the planning system.

The National PPG

8.2.12 The national PPG provides further guidance for local planning authorities on assessing the significance of nature conservation and biodiversity effects and pursuing the NPPF requirements to conserve and enhance the natural environment and reduce pollution (PPG Biodiversity, geodiversity and ecosystems, paragraphs 009 – 035).

Highways England Biodiversity Plan

8.2.13 The Highways England Biodiversity Plan provides a framework for identifying how Highways England intends to take biodiversity initiatives forward within the RIS period. Its objectives are that by 2020, Highways England aims to reduce no net loss of biodiversity, and that by 2040 it must deliver a net gain in biodiversity.

RIS 2 for the 2020/2025 Road Period (DfT, 2020)

8.2.14 The RIS for the 2020-2025 states 'ensure no net loss across Highways England's activities in RP2 and continue progress towards the target of delivering a net gain in biodiversity by 2040'.

Highways England Delivery Plan - 2020-2025

8.2.15 The Highways England Delivery Plan (2020-2025) states that Highways England will work to ensure there is no net loss of biodiversity across activities by 2025, progressing towards a target of delivering no net loss of biodiversity by 2025 and a net gain in biodiversity by 2040. Highways England will use Designated Funds to maximise delivery of biodiversity, for example by creating new or enhancing existing habitats.

Local Planning Policy

Coventry Local Plan 2011 to 2031

8.2.16 The Coventry Local Plan (2011 – 2031) contains policies, designations and allocations which will be used to shape development and to determine planning applications in Coventry. Green environment policies applicable to biodiversity include: Policy GE1 Green infrastructure and Policy GE3: Biodiversity, Geological, Landscape and Archaeological Conservation.

Rugby Borough Council Local Plan 2011 - 2031

8.2.17 The Rugby Borough Council Local Plan (2011 – 2031) sets out the Council's policies and proposals to support the development of the Borough through to 2031. This includes a number of natural environment policies applicable to biodiversity including: NE1 Protecting designated biodiversity and geodiversity assets; NE2: Strategic Green and Blue Infrastructure; and NE3 Landscape Protection and Enhancement.

Warwickshire, Coventry and Solihull Local Biodiversity Action Plans (LBAP)

8.2.18 The Local Biodiversity Action Plan (LBAP) which covers the proposed scheme is the Warwickshire, Coventry and Solihull LBAP. It provides action plans for local priority habitats and species.

Warwickshire, Coventry and Solihull Green Infrastructure Strategy (2013)

8.2.19 Biodiversity offsetting, as set out in the Warwickshire, Coventry and Solihull Green Infrastructure Strategy (2013) is to be implemented where development proposals cannot avoid negative impacts on existing biodiversity.

8.3 Assessment methodology

General approach

8.3.1 A qualitative ecological assessment was undertaken based upon the following documents:

- DMRB LA 108 - to inform the approach to the assessment of impacts
- DMRB LA 104
- DMRB LD 118: Biodiversity design Revision 1 (Highways England, 2020j)
- The Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment for the UK and Ireland (2019) - to supplement the criteria applied from the DMRB.

8.3.2 Desk studies and field surveys were undertaken in line with DMRB LD 118 Biodiversity design, the approach outlined in the CIEEM Guidelines for Preliminary Ecological Appraisal (2017) and other professional technical guidance and standards (where applicable and referenced in the supporting biodiversity baseline reports in Appendix C. Biodiversity Baseline Reports

8.3.3 The biodiversity and ecological conservation paragraphs 5.20-5.38, pages 51-55 of the NPSNN provides strategic and non-locationally specific guidance on considering the impacts and the level of significant effect a development will have on important ecological features and providing effective mitigation.

8.3.4 The purpose of the assessment is to identify any potential significant effects on important ecological features which are likely to arise from construction and/ or operation of the proposed scheme options. Important ecological features are ecological features (that is, habitats, species or ecosystems) of notable quality or extent. Important ecological features are otherwise referred to or known as *ecological receptors*.

8.3.5 The biodiversity assessment has been undertaken as follows:

- Defining the Study Area of the assessment, considering the zone of potential influence of the proposed scheme. The zone of influence is the area over which ecological features may be affected by biophysical changes because of the proposed scheme and associated activities. It differs for different ecological features (see Section 8.5).
- Confirm details of the location and nature of any nature conservation designations present in the Study Area (refer to Section 8.5 for definition of the Study Area) and refine understanding of potential impact pathways associated with the proposed scheme options.
- Desk study information and field-based assessments for designated sites, habitats and species (where applicable) to determine the ecological baseline for the Study Area.
- Determine the nature conservation importance of each ecological feature recorded during the desk study and field-based assessment (where available) and determine which of these features of conservation importance could potentially be impacted by the proposed scheme. In turn, this is to refine the likely nature conservation importance and biodiversity risks and constraints associated with the proposed scheme options.
- Assessment of the potential impacts arising from the proposed scheme. The assessment considers any agreed outline mitigation measures, which is to be updated and refined following further surveys and design at the next stage of assessment.
- Determine the significance of any residual effects and propose outline compensation measures to address residual significant effects where applicable.
- Identify opportunities for biodiversity enhancements where possible within the limits of the proposed scheme boundary.

8.3.6 Four scheme options have been assessed. For descriptions of these options, please refer to Chapter 2: The Project. The four options are Option 6, Option 7, Option 8 and Option 11 and are shown in the figures which illustrate this chapter (Figure 8.1: Ecology Designated Sites to Figure 8.5: Phase 1 Habitat Survey Option 11). Results of the biodiversity assessment are presented for each option where applicable.

Establishing baseline conditions

8.3.7 The following biodiversity data sources were used in the assessment to establish the baseline environment:

- Online resources including Mult Agency Geographic Information for the Countryside (MAGIC) website (http://www.magic.gov.uk)
- Desk study data from Warwickshire Biological Records Centre (WBRC) (as reported in the Preliminary Ecological Appraisal Report (PEA) 2020 (**Appendix C**. Biodiversity Baseline Reports
- PEA (including Extended Phase 1 Habitat Survey) 2020 (Highways England, 2020t);
- **Appendix C**. Biodiversity Baseline Reports
- Bat Roost Assessment Report 2021
- **Appendix C**. Biodiversity Baseline Reports
- Confidential Badger Survey Report 2021
- **Appendix C**. Biodiversity Baseline Reports
- Bat Activity Survey Report 2021
- **Appendix C**. Biodiversity Baseline Reports
- Barn owl Survey Report 2021

- **Appendix C**. Biodiversity Baseline Reports
- Aquatic Invertebrate Survey Report 2021 **Appendix C**. Biodiversity Baseline Reports

Significance of effects

8.3.8 For the purpose of the ecological impact assessment, the framework established in the DMRB standard LA 108 Section 3 provides the basis for assessment, supplemented by CIEEM current good practice guidance and methods (as per DMRB LA 108 paragraphs 3.10 and 3.11.1).

8.3.9 Relevant ecological features requiring assessment have been assigned ecological importance at a geographical scale, with reference to DMRB Table 3.9 Biodiversity resource importance in LA 108, Section 41 of the Natural Environment and Rural Communities Act 2006 and as shown in Table 8.1 of this report, and a range of published guidance and information sources, supported by professional judgement.

8.3.10 Importance was determined based on the following geographical contexts:

- International
- UK or National (England)
- Regional (East Midlands)
- County (Warwickshire)
- Local (Coventry)
- Negligible (less than Local)

Table 8.1: Criteria to determine ecological importance (DMRB LA 108 Table 3.9)

Importance Criteria	
International or European Importance	
Sites	Sites including: 1) European sites: Sites of Community Importance (SCIs); Special Protection Areas (SPAs); potential SPAs (pSPAs); Special Areas of Conservation (SACs); Candidate or possible SACs (cSACs or pSACs); Wetlands of International Importance (Ramsar sites). 2) Biogenetic Reserves, World Heritage Sites (where recognised specifically for their biodiversity value) and Biosphere Reserves. 3) areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such.
Habitats	N/A
Species	Resident, or regularly occurring, populations of species which can be considered at an international or European level where: 1) the loss of these populations would adversely affect the conservation status or distribution of the species at an international or European scale; or 2) the population forms a critical part of a wider population at this scale; or

Importance Criteria	
	3) the species is at a critical phase of its life cycle at an international or European scale.
UK or National importance	
Sites	Sites including: 1) Sites of Special Scientific Interest (SSSIs) or Areas of Special Scientific Interest (ASSIs); 2) National Nature Reserves (NNRs); 3) National Parks; 4) Marine Protected Areas (MPAs) including Marine Conservation Zones (MCZs); or 5) areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such.
Habitats	Habitats including: 1) areas of UK BAP priority habitats; 2) habitats included in the relevant statutory list of priority species and habitats; and 3) areas of irreplaceable habitats including: a) ancient woodland; b) ancient or veteran trees; c) blanket bog; d) limestone pavement; e) sand dunes; f) salt marsh; g) lowland fen. 4) areas of habitat which meet the definition for habitats listed above but which are not themselves designated or listed as such.
Species	Resident, or regularly occurring, populations of species which can be considered at an international, European, UK or national level where: 1) the loss of these populations would adversely affect the conservation status or distribution of the species at a UK or national scale; or 2) the population forms a critical part of a wider population at this scale; or 3) the species is at a critical phase of its life cycle at a UK or national scale.
Regional importance	
Sites	Designated sites (non-statutory) including heritage coasts.
Habitats	Areas of habitats identified (including for restoration) in regional plans or strategies (where applicable).
Species	Species including: 1) resident, or regularly occurring, populations of species which can be considered at an international, European, UK or national level where: a) the loss of these populations would adversely affect the conservation status or distribution of the species at a regional scale; or b) the population forms a critical part of a wider regional population; or c) the species is at a critical phase of its life cycle;

Importance Criteria	
	2) Species identified in regional plans or strategies.
County or equivalent authority importance	
Sites	Wildlife / nature conservation sites designated at a county (or equivalent) level including: 1) Local Wildlife Sites (LWS); 2) Local Nature Conservation Sites (LNCS); 3) Local Nature Reserves (LNRs); 4) Sites of Importance for Nature Conservation (SINCs); 5) Sites of Nature Conservation Importance (SNCIs); 6) County Wildlife Sites (CWSs);
Habitats	Areas of habitats identified in county or equivalent authority plans or strategies (where applicable).
Species	Species including: 1) resident, or regularly occurring, populations of species which can be considered at an international, European, UK or national level where: a) the loss of these populations would adversely affect the conservation status or distribution of the species at a county or unitary authority scale; or b) the population forms a critical part of a wider county or equivalent authority area population, e.g. metapopulations; or c) the species is at a critical phase of its life cycle. 2) Species identified in a county or equivalent authority area plans or strategies.
Local importance	
Sites	Wildlife/ nature conservation sites designated at a local level including: 1) Local Wildlife Sites (LWS); 2) Local Nature Conservation Sites (LNCS); 3) Local Nature Reserves (LNRs); 4) Sites of Importance for Nature Conservation (SINCs); 5) Sites of Nature Conservation Importance (SNCIs); 6) Sites of Local Nature Conservation Importance (SLNCIs).
Habitats	Areas of habitat considered to appreciably enrich the habitat resource within the local context including features of importance for migration, dispersal, or genetic exchange.
Species	Populations/ communities of species considered to appreciably enrich the habitat resource within the local context including features of importance for migration, dispersal or genetic exchange.

8.3.11 In line with DMRB LA 108 section 3.10, the level of impact was determined by the assessment of the following characteristics:

- Positive or negative (e.g. adverse/ beneficial)
- Duration (e.g. permanent/ temporary)
- Reversibility (e.g. irreversible/ reversible)
- Extent/ magnitude
- Frequency and timing.

8.3.12 The level of impacts on important ecological features has been reported in accordance with the criteria provided in Table 3.11 of DMRB LA 108, as shown in Table 8.2.

Table 8.2: Level of impact and descriptions (DMRB LA 108 Table 3.11)

Level of impact (change)		**Typical description**
Major	Adverse	1) Permanent/ irreversible damage to a biodiversity resource; and 2) the extent, magnitude, frequency, and/ or timing of an impact negatively affects the integrity or key characteristics of the resource.
	Beneficial	1) Permanent addition of, improvement to, or restoration of a biodiversity resource; and 2) the extent, magnitude, frequency, and/ or timing of an impact positively affects the integrity or key characteristics of the resource.
Moderate	Adverse	1) Temporary/ reversible damage to a biodiversity resource; and 2) the extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource
	Beneficial	1) Temporary addition of, improvement to, or restoration of a biodiversity resource; and 2) the extent, magnitude, frequency, and/ or timing of an impact positively affects the integrity or key characteristics of the resource.
Minor	Adverse	1) Permanent/ irreversible damage to a biodiversity resource; and 2) the extent, magnitude, frequency, and/ or timing of an impact does not affect the integrity or key characteristics of the resource.
	Beneficial	1) Permanent addition of, improvement to, or restoration of a biodiversity resource; and 2) the extent, magnitude, frequency, and/ or timing of an impact does not affect the integrity or key characteristics of the resource.
Negligible	Adverse	1) Temporary/ reversible damage to a biodiversity resource; and 2) the extent, magnitude, frequency, and/ or timing of an impact does not affect the integrity or key characteristics of the resource.
	Beneficial	1) Temporary addition of, improvement to, or restoration of a biodiversity resource; and 2) the extent, magnitude, frequency, and/ or timing of an impact does not affect the integrity or key characteristics of the resource
No change		No observable impact, either positive or negative.

8.3.13 The 'importance of the ecological feature' and 'level of impact' were used to determine the significance of effect based on Table 3.13 of DMRB LA 108, and the principles of DMRB LA 104, as shown in Table 8.3 below.

8.3.14 Significant effects typically comprise effects that remain with moderate, large or very large categories once mitigation has been considered.

Table 8.3: Significance of effects matrix (DMRB LA 108 Table 3.13)

Resource importance	**Level of impact**				
	No change	**Negligible**	**Minor**	**Moderate**	**Major**
International or European importance	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
UK or national importance	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
Regional importance	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
County or equivalent authority importance	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
Local importance	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

8.3.15 Potential impacts and effects on designated sites, ancient woodland and veteran trees through changes in air quality have been assessed following DMRB LA 105 Air Quality. Refer to Chapter 5: Air Quality

8.4 Assessment assumptions and limitations

8.4.1 This assessment is made at the options development stage and considers the effects of several options. The option designs have not been fully developed at this stage and a chosen preferred option will be taken forward and developed in more detail. The preferred option will include an outline environmental masterplan, which would show the actual limits of the scheme and the habitats to be retained and created as part of the proposed scheme. The assessment acknowledges uncertainties and is based on currently available information, which may be subject to further change at future PCF stages.

8.4.2 The following assessment assumptions and limitations have been noted during the proposed scheme biodiversity assessment:

- Additional land areas: there will be areas required for the proposed scheme which are yet to be defined (e.g. construction compounds, drainage attenuation areas, floodplain compensation areas, and ecological mitigation or compensation areas if applicable). Impacts associated with such additional land-take requirements have not been assessed. All land take required for the scheme will be considered during the environmental assessment at PCF Stage 3.

- Areas of habitat to be retained: There may be potential for some areas of habitat within the proposed scheme boundary for each option to be retained; however, at present such opportunities are not fully defined. Therefore, a precautionary assessment has been undertaken which assumes that all habitat within the proposed scheme boundary encompassing each option would be lost through construction. However, potential opportunities to retain existing habitats within the landscape design have been noted where possible. It is currently assumed as part of the assessment that the veteran tree within the proposed scheme boundary would be retained.
- On-and off-site areas of habitat available for mitigation and enhancement: Areas of potential habitat available for mitigation and enhancement are yet to be confirmed. There has been no consultation with stakeholders to identify potential sites within or adjacent to the proposed scheme for each option that may be available.
- Biodiversity baseline information: The assessment is based on the baseline information available at the time as outlined in section 8.5 below. Further updating and additional surveys would be carried out where necessary to inform the ecological assessment of the chosen preferred option.
- Access to the Highways England soft estate: Access was not possible to the Highways England soft estate for the extended Phase 1 habitat survey or badger survey; however, an assessment was made for potential ecological constraints from adjacent land and desk study information and recommendations for further survey made where/ as appropriate.
- Consultation response: No consultation response has been received from Natural England at this stage. Warwickshire Wildlife Trust and Birmingham and Black Country Wildlife Trust were also contacted; however, no response has yet been received.
- Design assumptions: The following design assumptions have been made for each option to inform the biodiversity assessment:

Option 6:

- Three proposed attenuation ponds to be created
- Listed buildings at Hungerley Hall Farm to be retained
- Redundant area of the A46 to be landscaped and returned to nature
- Existing overpass (farm access) to Hungerley Hall Farm, over the A46, to be demolished
- Culvert extension required carrying Smite Brook under the B4082 to support the proposed new road verge
- Proposed culvert carrying water underneath the proposed mainline and connector road
- Existing overpass over the A46 to the north to remain

Option 7:

- Headwall extension to the existing culvert at Smite Brook
- Listed buildings at Hungerley Hall Farm to remain
- Existing overpass (farm access) to Hungerley Hall Farm to remain

Option 8:

- Culvert extension required to the Smite Brook
- One proposed attenuation pond
- The existing Hungerley Hall Farmhouse (listed building) to be demolished but other listed buildings at Hungerley Hall Farm remain
- New proposed overpass (farm access) to be constructed

Option 11:

- No modification to the Smite Brook culvert
- Three proposed attenuation ponds to be created
- Listed buildings at Hungerley Hall Farm to remain
- Existing overpass (farm access) to Hungerley Hall Farm, over the A46, to be demolished
- Existing overpass over the A46 to the north to remain
- The existing A46 roundabout will be decommissioned and returned to nature
- Proposed culvert maintaining existing drainage ditch by the dumbbell roundabout

- Assessment of air quality impacts on non-statutory designated sites: DMRB LA 105 Air Quality states that internationally, nationally and locally designated sites of ecological conservation importance on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity (known as designated habitats) within 200m of the ARN shall be included in the air quality assessment. However, only sites that are sensitive to nitrogen deposition have been included in the assessment. Additionally, it is not necessary to address every local wildlife site within 200m of the ARN. Only sites adjacent to the A46 with sensitive habitats to nitrogen deposition were included in the assessment. The scale of change was not sufficient to determine likely significant effects on those statutory sites and ancient woodlands within 200m of the existing A46; therefore, it is unlikely there would be significant changes to any sensitive habitats potentially present within non-statutory sites in the wider area as a result of changes in air quality.

8.5 Study area

8.5.1 DMRB LA 108 section 3 emphasises that the scope of ecological assessments will vary according to the nature of the individual proposed scheme being assessed. The Study Area used captures all areas where likely significant effects could occur in the zone of influence of the proposed scheme, throughout the life of the project. The biodiversity Study Areas have been selected in view of good practice and the distances that statutory consultees would typically expect to be considered for identification of features external to the proposed scheme boundary that could be affected. This is informed by published standards, guidance and professional judgement.

8.5.2 The desk study identified national and local statutory and non-statutory nature conservation designations up to 2km from the proposed scheme boundary encompassing all options. As part of the desk study review, a search for International Sites (e.g. SACs and SPAs) up to 30km from the proposed scheme was carried out to identify those sites where bats are a primary reason for designation, where potential impact pathways are present with regard to birds, or where potentially present within 200m of the ARN.

8.5.3 The desk study determined an appropriate Study Area for important ecological features requiring assessment and were subject to or recommended for field survey (where applicable). The Study Areas applied for the desk study and recommended field surveys (where applicable) are summarised in Table 8.4: Summary of ecological study areas. The term ‘proposed scheme boundary’ is used to describe a composite area which encompasses the maximum extent of all four options, i.e. greater than that of individual options, which are discussed separately.

Table 8.4: Summary of ecological study areas

Study/ Survey	Date	Study Area	Appendix (for further details)
Desk Study	2020	International statutory designated sites up to 30km from the proposed scheme boundary* All other statutory and non-statutory designated sites and non-designated sites of interest and protected/ notable species records up to 2km from the proposed scheme boundary.	Appendix C.1
Extended Phase 1 Habitat	2020	Up to 50m from the proposed scheme boundary Including appraisal for protected and notable species, and invasive species.	Appendix C.1
Preliminary bat roost and habitat assessment	2021	Up to 50m from the proposed scheme boundary	Appendix C.1 Appendix C.2
Badger	2021	Up to 500m (i.e. 250m either side of the centre line). The centre line was taken as centre of the four options combined. To the western side, the River Sowe is large enough river to form the boundary of badger territories.	Confidential Appendix C.3
Bat Activity Surveys	2021	The proposed scheme plus adjacent area, based on representative transects (see Appendix C.4).	Appendix C.4
Barn owl (*Tyto alba*) surveys	2021	Up to 1.5km from the proposed scheme boundary	Appendix C.5
Aquatic invertebrate surveys	2021	Up to 50m from the proposed scheme boundary	Appendix C.6

*The term 'proposed scheme boundary' referenced here relates to the boundary which encompasses all proposed scheme options.

8.6 Baseline conditions

8.6.1 A summary of the ecological features (designations, habitats and species) of likely or potential relevance to the assessment are summarised below.

Designated sites

8.6.2 There are no International sites; SPAs, SACs or Wetlands of International Importance (Ramsar sites), within 2km of the proposed scheme, no International sites with bats as a primary qualifying interest feature within 30km and no International designated sites within 200m of the ARN. Ensor's Pool SAC is the

nearest International site, approximately 12km to the north-west. It is an enclosed still water site designated for white-clawed crayfish *Austropotamobius pallipes*. The population was lost due to illegal introduction of signal crayfish and no white-clawed crayfish were recorded in a survey of Ensor's Pool by Natural England in 2015. There are no impact pathways from the proposed scheme to this SAC directly, or indirectly by water or air. All other International sites are more than 40km away and too remote for any pathway for impact. All International sites are therefore screened out from further assessment. This is reported in a separate Habitat Regulations Assessment, No Likely Significant Effects Report [Highways England, 2021b].

8.6.3 Four statutory designated sites are located within 2km of the proposed scheme boundary encompassing all options; Coombe Pool SSSI, Stoke Floods LNR, Herald Way Marsh SSSI/ Herald Way Marsh (Claybrook Marsh) LNR and Willenhall Woods LNR - see Figure 8.1: Ecology Designated Sites and Table 8.5: Statutory and non-statutory designated sites within 2km of the proposed scheme boundary scoped into the assessment for details.

8.6.4 Non-statutory designated sites within 2km of the proposed scheme boundary are shown on Figure 8.1: Ecology Designated Sites, comprising LWS; potential LWS (pLWS) and ancient woodland (as recorded on the Ancient Woodlands Inventory), plus Ecosites which are additional to the LWS and have value for biodiversity at Local scale.

8.6.5 Table 8.5: Statutory and non-statutory designated sites within 2km of the proposed scheme boundary scoped into the assessment details statutory and non-statutory sites scoped into the assessment. Those sites scoped into the assessment were primarily those sites;

- Within or immediately adjacent to the proposed scheme boundary plus 50m buffer where direct disturbance or edge effects were possible.
- Located up to 200m from the ARN for statutory designated sites and ancient woodlands with habitats sensitive to changes in air quality (refer to Section 8.4 Assessment assumptions and limitations for further details on the approach).
- Located up to 200m from the proposed scheme boundary (where it was considered there was potential for indirect effects (for example through construction disturbance such as dust or noise).
- Located up to 2km downstream, with hydrological links between the designated site and the proposed scheme, where there is potential for indirect pollution effects on water dependent habitats or changes in hydrological regime including frequency of flooding.
- With habitat connectivity facilitating movement of species between the designated sites and the proposed scheme and where potential severance may occur.
- Or a combination of the above.

8.6.6 All other designated sites shown on Figure 8.1: Ecology Designated Sites and not referenced in Table 8.5: Statutory and non-statutory designated sites within 2km of the proposed scheme boundary scoped into the assessment were scoped out of requiring further assessment, mainly because of distance from disturbance during construction, or because they were isolated from the proposed scheme by extensive urban development.

Table 8.5: Statutory and non-statutory designated sites within 2km of the proposed scheme boundary scoped into the assessment

Site Name/ designation	Reason for designation	Distance from the proposed scheme boundary – Option 6	Distance from the proposed scheme boundary – Option 7	Distance from the proposed scheme boundary – Option 8	Distance from the proposed scheme boundary – Option 11	Scoped in (including rationale)
Statutory designated sites						
Coombe Pool SSSI	The pool is fed by the Smite Brook and includes the pool of 36 hectares, reedbeds and woodland. Coombe Pool is one of the most important ornithological sites in Warwickshire for its herons (*Ardea cinerea*), and other breeding birds, and for its wintering wildfowl.	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	Scoped in: Adjacent to the proposed scheme boundary
Stoke Floods LNR	The reserve has a large lake, reedbeds and scrub next to the River Sowe. The lake is the result of mining subsidence and supports many wetland plants such as yellow flag *Iris pseudacorus* and reed canary grass *Phalaris arundinacea*. Bird life is varied from many species of duck, seven species of warbler in the summer and occasional unusual migratory visitors such as black tern (*Chlidonias niger*) and yellow wagtails (*Motacilla flava*).	593m to the south-west of the proposed scheme boundary	593m to the south-west of the proposed scheme boundary	593m to the south-west of the proposed scheme boundary	659m to the south-west of the proposed scheme boundary	Scoped in has hydrological links to the proposed scheme (downstream of it)

Site Name/ designation	Reason for designation	Distance from the proposed scheme boundary – Option 6	Distance from the proposed scheme boundary – Option 7	Distance from the proposed scheme boundary – Option 8	Distance from the proposed scheme boundary – Option 11	Scoped in (including rationale)
Herald Way Marsh SSSI / Herald Way LNR	The site contains a range of wetland communities which are scarce in the county. They range from open water through swamp and fen to marsh, as well as areas of grassland, scrub and woodland. However, the site has been designated for its assemblage of invertebrates, a number of which are nationally rare.	1526m to the south of the proposed scheme boundary	1519m to the south of the proposed scheme boundary	1515m to the south of the proposed scheme boundary	1519m to the south of the scheme boundary	Scoped in Potential air quality impacts on this site as it is within 200m of the ARN.
Willenhall Woods LNR	Mixed, deciduous, ancient and semi-natural woodland covering nine hectares	2482m to the south-west of the proposed scheme boundary	2477m to the south-west of the proposed scheme boundary	2474m to the south-west of the proposed scheme boundary	2477m to the south-west of the proposed scheme boundary	Scoped in Potential air quality impacts on this site is within 200m of the ARN.
Non-statutory designated sites						
Sowe Valley Dorchester Way LWS	Designated as part of the Sowe Valley Dorchester Way LWS. The river includes a considerable area of floodplain. A good variety of bird species. Strong colony of water vole (*Arvicola amphibius*). Aquatic and emergent bankside vegetation.	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	43m to the north-west of the proposed scheme boundary	Scoped in Adjacent to the proposed scheme boundary

Site Name/ designation	Reason for designation	Distance from the proposed scheme boundary – Option 6	Distance from the proposed scheme boundary – Option 7	Distance from the proposed scheme boundary – Option 8	Distance from the proposed scheme boundary – Option 11	Scoped in (including rationale)
Gainford Rise LWS	Floristically rich grassland with invertebrate interest	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	Scoped in Adjacent to the proposed scheme boundary
Stoke Floods LWS	The site has a large lake, reedbeds and scrub next to the River Sowe. The lake is the result of mining subsidence and supports many wetland plants such as yellow flag and reed canary grass. Bird life is varied from many species of duck, seven species of warbler in the summer and occasional unusual migratory visitors such as black tern and yellow wagtails.	445m to the south-west of the proposed scheme boundary	449m to the south-west of the proposed scheme boundary	449m to the south-west of the proposed scheme boundary	502m 449m to the south-west of the proposed scheme boundary.	Scoped in Has hydrological links to the proposed scheme (downstream)
Sowe Valley Stoke Aldermoor to London Road LWS	The site covers areas of open land bordering the River Sowe with high habitat diversity, with woodland (ancient and plantation), scrub, semi-improved grassland, tall herb, fen, mire and open water. The site is important botanically.	1837m to the south-west of the proposed scheme boundary	1842m to the south-west of the proposed scheme boundary	1842m to the south-west of the proposed scheme boundary	1886m to the south-west of the proposed scheme boundary	Scoped in Has hydrological links to the proposed scheme (downstream flooding only)

Site Name/ designation	Reason for designation	Distance from the proposed scheme boundary – Option 6	Distance from the proposed scheme boundary – Option 7	Distance from the proposed scheme boundary – Option 8	Distance from the proposed scheme boundary – Option 11	Scoped in (including rationale)
Hungerley Hall Farm Ecosite	Floristically rich grassland with invertebrate interest.	Within and adjacent to proposed scheme boundary	Within and adjacent to proposed scheme boundary	Within and adjacent to proposed scheme boundary	Within and adjacent to proposed scheme boundary	Scoped in Within and adjacent to the proposed scheme boundary
River Sowe Ecosite	River with aquatic, emergent and bankside vegetation.	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	Scoped in Adjacent to the proposed scheme boundary
Coombe Abbey Pool (part of the Coombe Pool SSSI) Ecosite	This ecosite includes areas designated as SSSI. Designated for its ornithological interest, particularly large heronry. Water vole and otter (*Lutra lutra*) are known to be using the site. The site is good for invertebrates (butterflies and moths).	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	Scoped in Adjacent to the proposed scheme boundary
Smite Brook, Headwater and Tributaries. Tributary of the River Sowe Ecosite	Includes a small area of Smite Brook. A linear site which runs through Coombe Pool SSSI. A tributary of the River Sowe with historical records of white-clawed crayfish, otter and water vole.	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	Adjacent to proposed scheme boundary	43m to the north-west of the proposed scheme boundary	Scoped in Adjacent to the proposed scheme boundary and has hydrological

Site Name/ designation	Reason for designation	Distance from the proposed scheme boundary – Option 6	Distance from the proposed scheme boundary – Option 7	Distance from the proposed scheme boundary – Option 8	Distance from the proposed scheme boundary – Option 11	Scoped in (including rationale)
						links to the scheme
Stoke Floods Ecosite	The site has a large lake, reedbeds and scrub next to the River Sowe. The lake is the result of mining subsidence and supports many wetland plants such as yellow flag and reed canary grass. Bird life is varied from many species of duck, seven species of warbler in the summer and occasional unusual migratory visitors such as black tern and yellow wagtails.	445m to the south-west of the proposed scheme boundary	449m to the south-west of the proposed scheme boundary	449m to the south-west of the proposed scheme boundary	501m to the south-west of the proposed scheme boundary	Scoped in Has hydrological links to the proposed scheme (downstream)
Sphinx Golf Course Ecosite	The site comprises amenity grassland with areas of broad-leaved plantation and scattered trees. River Sowe runs along the eastern site boundary.	1331m to the south-west of the proposed scheme	1335m to the south-west of the proposed scheme	1335m to the south-west of the proposed scheme	1385m to the south-west of the proposed scheme	Scoped in Has hydrological links to the proposed scheme (downstream flooding only)
Aldermoor Fields Ecosite	Aldermoor Fields covers areas of open land bordering the River Sowe with high habitat diversity, with woodland (ancient and plantation), scrub, semi-improved grassland, tall herb,	1836m to the south-west of the proposed scheme	1841m to the south-west of the proposed scheme	1841m to the south-west of the proposed scheme	1885m to the south-west of the proposed scheme	Scoped in Has hydrological links to the proposed scheme

Site Name/ designation	Reason for designation	Distance from the proposed scheme boundary – Option 6	Distance from the proposed scheme boundary – Option 7	Distance from the proposed scheme boundary – Option 8	Distance from the proposed scheme boundary – Option 11	Scoped in (including rationale)
	fen, mire and open water. The site is important botanically.					(downstream flooding only)
Binley Common Farm Wood Ancient Woodland (and potential LWS)	On Natural England's Ancient Woodland Inventory.	Adjacent to ARN	Adjacent to ARN	Adjacent to ARN	Adjacent to ARN	Scoped in Potential air quality impacts on this site as a result of the proposed scheme. Within 200m of the ARN.
Piles Coppice Ancient Woodland (and LWS)	On Natural England's Ancient Woodland Inventory. The sandy conditions result in a woodland type that is rare in the county. The Lobster *Stauropus fagi and* orange footman *Eilema sororcula* moths which were considered extinct in Warwickshire were found here in 2018.	Adjacent to ARN	Adjacent to ARN	Adjacent to ARN	Adjacent to ARN	Scoped in Potential air quality impacts on this site as a result of the proposed scheme. Within 200m of the ARN.

Habitats

8.6.7 The proposed scheme boundary of the combined options includes the existing A46 road, with associated road verges; hedgerows, woodland, amenity grassland and arable farmland. The surrounding landscape beyond the proposed scheme boundary comprises various semi-natural and man-made habitats. It is predominantly arable land to the north and east of the proposed scheme boundary, with a mixture of suburban development, woodland and recreational land to the west, beyond the River Sowe.

8.6.8 The following habitats were present on or within 50m of the proposed scheme boundary encompassing all options, as part of the Study Area, as shown in Figure 8.2: Phase 1 Habitat Survey Option 6 to Figure 8.5: Phase 1 Habitat Survey Option 11 The four figures show identical habitat mapping but overlaid with options 6, 7, 8 and 11 respectively. Further details of habitats can be found in the PEA report within Appendix C.1, including the target notes numbered on the figures. The habitats recorded are:

- Broad-leaved woodland – semi-natural woodland
- Broad-leaved – plantation woodland
- Hedgerows – all types
- Neutral grassland unimproved
- Neutral grassland – semi-improved
- Improved grassland
- Scrub – dense or continuous
- Tall ruderal
- Running water
- Cultivated or disturbed land – amenity grassland
- Cultivated or disturbed land – arable
- Buildings and hard-standing
- Other habitat - private gardens

8.6.9 One veteran tree record was provided from WBRC west of the River Sowe. A potential veteran oak tree was identified at Hungerley Hall Farm (Tree 16 in Appendix C.2). There are many veteran trees recorded on the Ancient Tree Inventory from Coombe Country Park, all in the historic parkland east of the Coombe Pool, but none within 50m of the proposed scheme boundary.

8.6.10 The proposed scheme lies on the boundary of Natural England's NCA 97: Arden and NCA 96: Dunsmore and Feldon. Mixed land use including residential, agricultural and industrial are typical of the Arden NCA. The NCA profile highlights the presence of a mixture of transport corridors such as road, rail, air and canals in Arden, whilst indicating growing pressure upon the existing infrastructure near Coventry. Dunsmore and Feldon are predominantly rural, agricultural landscapes, crossed by numerous small rivers and tributaries and varying between a more open character in the Feldon area and a wooded character in Dunsmore. Refer to Chapter 7: Landscape for further details. Development is also proposed within the study area for the proposed scheme. An area of land on the west side of the A46, from north of Walsgrave junction to where the A46 crosses the River Sowe, has been allocated for development (H2:3) in The Coventry Local Plan 2011 to 2031 (see Chapter 2: Section 2.3).

Species

8.6.11 A summary of baseline results for protected and notable species scoped into the assessment has been provided in Table 8.6 below. Further details are provided in the PEA report (Appendix C.1) and baseline reports where available (Appendix C.2 to C.6). Western European hedgehog (*Erinaceus europaeus*) and hazel dormouse (*Muscardinus avellanarius*) were scoped out of further surveys as detailed in the PEA report (Appendix C.1). Hazel dormouse is not recorded in the Study Area and there is very little suitable habitat. Hedgehog may be present at low abundance associated with field boundaries and woodland edge; however, the predominantly arable area is mostly unfavourable.

Table 8.6: Summary of baseline details for protected and notable species within the study area

Protected/ notable species **Source and date**	**Summary of findings**	**Presence likely**
Roosting bats Bat Roost Survey Report 2021 (Appendix C.2)	*Desk study* WBRC provided records of nine bat species from within 2km of the proposed scheme, which included *Pipistrellus* spp. (common (*Pipistrellus pipistrellus*), soprano (*Pipistrellus pygmaeus*) and Nathusius' (*Pipistrellus nathusii*)), brown long-eared (*Plecotus auratus*), Daubenton's (*Myotis daubentonii*), Natterer's (*Myotis nattereri*), noctule (*Nyctalus noctula*), serotine (*Eptesicus serotinus*) and whiskered (*Myotis mystacinus*). The nearest roost record is from 2018, a tree roost recorded from Coombe Country Park. A Natural England European Protected Species licence has previously been granted for bats, approximately 1.45km to the south-east of the Proposed Scheme. *Field survey* Ongoing bat surveys as part of the 2021 surveys for PCF Stage 2 have identified the following trees, buildings and structures within 50m of the proposed scheme boundary: Trees: • 6 with high roost suitability • 47 with moderate roost suitability • 16 with low roost suitability The majority are within Coombe Pool SSSI. No evidence of bats found during tree climbing inspections. Buildings (located at Hungerley Hall Farm): • 2 with high roost suitability • 1 with moderate roost suitability • 1 with low roost suitability • 3 with negligible roost suitability Structures (bridges): • 1 with moderate roost suitability (brick overflow sluice between Smite Brook and Coombe Pool – two arches). • 1 with negligible roost suitability over the River Sowe.	Yes

Protected/ notable species Source and date	Summary of findings	Presence likely
Foraging and commuting bats PEA 2020 (Appendix C.1) Bat Roost Survey Report (Appendix C.2) Bat Activity Survey Report (Appendix C.4)	*Field survey* Habitat suitability for foraging and commuting bats assessed overall as Moderate suitability. Habitats within the Study Area provide good foraging and commuting opportunities for all species of bats recorded in Warwickshire, including rare species such as barbastelle(*Barbastella barbastellus)* and Nathusius was recorded at Coombe Pool, Coombe Pool Country Park in 2021). The 2021 surveys found four bat species to be present in the proposed scheme boundary including common pipistrelle, soprano pipistrelle, noctule and Daubenton's.	Yes
Badgers Badger Survey Report 2021 (Appendix C.3)	Badger surveys conducted found evidence of badger presence including setts. Due to the confidential nature of badger records please see confidential badger report for further details.	Yes
Great-crested newts PEA 2020 (Appendix C.1)	*Desk study* Seven ponds identified within 500m of the proposed scheme boundary. Recent records for great crested newt (*Triturus cristatus*) have been returned in the vicinity of ponds within 500m.	Yes
Reptiles PEA 2020 (Appendix C.1)	*Desk study* Recent records for grass snake (*Natrix helvetica*) have been recorded in the vicinity of Coombe Pool, although the most suitable habitat is adjacent to the Pool itself and in some of the southern parts of Coombe Country Park. *Field survey* An area of scrub and grassland habitat within Coombe Pool Park providing woodland fringe, bramble thickets and clearings identified as suitable for reptiles. This site provides mosaic of habitats including a range of basking, foraging and sheltering habitat for reptiles. No other habitats (such as woodland, arable farmland or scrub) within the survey area are deemed suitable for reptiles.	Yes

Protected/ notable species Source and date	Summary of findings	Presence likely
Barn owl Barn Owl Survey Report (Appendix C.5)	*Desk study* One recent record of a barn owl roost site associated with Coombe Country Park. During the habitat survey two anecdotal records of Barn owl were provided independently by two local residents. One record was of barn owl regularly hunting west of the River Sowe and the other was associated with Coombe Abbey. *Field survey* Habitats: Only small areas of suitable foraging habitat within 1.5km Survey Area. Only significant extent of good habitat is located at Coombe Country Park; an area of managed wildlife meadow, which contains scattered trees including dead tree that provide roosting and nesting opportunities. Barn Owls have been observed at this location by country park staff. The rest of the country park grassland is heavily managed by sheep grazing and mowing and therefore not suitable foraging habitat. Nesting Sites: No confirmed evidence of nesting. There are four farms within the 1.5km survey area (Walsgrave Hill Farm, Hungerley Hall Farm, Hill Fields Farm and Old Lodge Farm) were considered to have barn owl potential. No evidence of barn owl was observed at Walsgrave Hill Farm. The other farms were only partially or not fully surveyed and therefore assumed to provide potential nesting opportunities. There are nine trees with potential features suitable for barn owls. However, none displayed any evidence of current or recent use.	Yes
Other bird species PEA 2020 (Appendix C.1)	*Desk study* Breeding heron and breeding and wintering water bird species are the reason for designation of Coombe Pool SSSI. *Field survey* Habitats within the proposed scheme have the potential to support bird species.	Yes
Riparian mammals PEA 2020 (Appendix C.1)	*Desk study* Recent records from the data search indicate the river is used by otters. Anecdotal records from two local residents indicate an otter is using the River Sowe and one resident reported that an otter had raised cubs, although outside the area of the 2020 habitat survey.	Yes

Protected/ notable species Source and date	Summary of findings	Presence likely
	Field survey Three watercourses in close proximity to the proposed scheme were identified as potentially suitable for foraging and commuting otters and for water voles: • Coombe Pool SSSI and Coombe Country Park drains (with links to Smite Brook) • Smite Brook • River Sowe	
Aquatic macro-invertebrates Aquatic Invertebrate Survey Report (Appendix C.6)	*Desk study* No notable records returned from desk study information. *Field survey* The three watercourses within the Study Area (River Sowe, Smite Brook and Coombe Pool Drain) were considered to have suitable aquatic invertebrate habitats.2021 field surveys found 'no species of invertebrates that were of conservation concern and none found during the survey are included in section 41 of the NERC act for England and accordingly no measures are needed to be in place for the Survey Area to protect any species further.	Yes
Invasive species PEA 2020 (Appendix C.1) Aquatic Invertebrate Survey Report (Appendix C.6)	*Desk study* Records for Japanese Knotweed (*Fallopia japonica*) were returned from the desk study in the vicinity of the proposed scheme. *Field survey* Himalayan Balsam (*Impatiens glandulifera*) found in the vicinity of the River Sowe during this survey. No other invasive plant species were found on site. *Rhododendron ponticum* is present in woodland within Coombe Pool SSSI. The Aquatic invertebrate surveys found invasive species to be present including *Crangonyx pseudogracilis* and *Potamopyrgus antipodarum* which were found to be widespread throughout the Survey Area. A further three invasive species were recorded (*Dikerogammarus haemobaphes, Orconectes limosus*, and *Physella acuta);* however, their distribution and abundance was lower. The demon shrimp (*Dikerogammarus haemobaphes*) and spiny cheeked crayfish (*Oronectes limosus*) were both found to be present in Smite brook both of which have the potential to modify aquatic assemblages.	Yes

8.7 Importance of ecological features

8.7.1 The importance of ecological features within the Study Area as identified in Section 8.6 have been assessed in accordance with the guidance detailed in Section 8.3.

8.7.2 Table 8.7 summarises the ecological features identified in the Study Area and, along with rationale, details the importance assigned to each. The most important feature is the Coombe Pool SSSI, designated for its open water and bird interest, but part of a historic parkland with associated broadleaved semi-natural woodland. The River Sowe and associated designated sites are important at County scale, for the species and habitats associated with them and because of the connectivity they provide between other features, especially within the urban area.

8.7.3 The habitats which would be directly affected by one or more of the options are of importance mainly at local scale, however, it is noted that broadleaved semi-natural woodland within the SSSI is a priority habitat. Among these are the existing A46 soft estate, which is mainly scrub and developing woodland, plus areas of grassland. There is some semi-improved grassland in riverside fields and next to Hungerley Hall Farm, which is of importance at local scale because of the limited extent of grassland in the predominantly arable farmland. Other habitats include some species-poor hedges in predominantly arable farmland, which provide some connectivity with the soft estate. Within the farmland the main features of note are the few large mature trees, mostly associated with Hungerley Hall Farm. These all have potential for use by bats (see Appendix C.2), farmland birds and invertebrates, in addition to being historic features in the landscape. Individually they are considered to be important at local scale, whilst collectively as part of the local resource of old trees including at least one potential veteran tree they may be up to County importance.

Table 8.7: Importance of ecological features scoped into the assessment

Designated site/ habitat/ species	Ecological feature	Rationale	Importance
Statutory designated sites	Coombe Pool SSSI	SSSIs denote a protected area in the UK which is legally protected. The features for which it has been designated meet the published national criteria for selection.	UK or National
	Stoke Floods LNR	Nature reserve designated by Warwickshire and/ or the local authority.	County
	Herald Way Marsh SSSI/ Herald Way Marsh (Claybrook Marsh) LNR	SSSIs denote a protected area in the UK which is legally protected. The features for which it has been designated meet the published national criteria for selection. LNRs are designated by the local authority and generally valued up to District or County level. However, the site overlaps with the SSSI. The higher valuation of UK/ National is therefore assigned to Herald Way Marsh/ Claybrook Marsh.	UK or National
	Willenhall Woods LNR	LNRs are designated by the local authority and generally valued up to County level.	County
Non-statutory designated sites	Sowe Valley Dorchester Way LWS	LWS designated in Warwickshire.	County
	Gainford Rise LWS	LWS designated in Warwickshire.	County
	Stoke Floods LWS	LWS designated in Warwickshire.	County
	Sowe Valley Stoke Aldermoor to London Road LWS	LWS designated in Warwickshire.	County
	Hungerley Hall Farm Ecosite	Local Ecosite designated in Warwickshire.	Local
	River Sowe Ecosite	Local Ecosite designated in Warwickshire.	Local
	Coombe Abbey Pool (part of the Coombe Pool SSSI) Ecosite	Local Ecosite designated in Warwickshire. Overlaps with SSSI designation – see above.	County

Designated site/ habitat/ species	Ecological feature	Rationale	Importance
	Smite Brook, Headwater and Tributaries. Tributary of the River Sowe Ecosite	Local Ecosite designated in Warwickshire.	Local
	Stoke Floods Ecosite	Local Ecosite designated in Warwickshire.	Local
	Sphinx Golf Course Ecosite	Local Ecosite designated in Warwickshire.	Local
	Aldermoor Fields Ecosite	Local Ecosite designated in Warwickshire.	Local
	Binley Common Farm Wood Ancient Woodland (and potential LWS)	Irreplaceable habitat – ancient woodland.	UK or National
	Piles Coppice Ancient Woodland (and LWS)	Irreplaceable habitat – ancient woodland.	UK or National
Habitats These habitats form part of the Warwickshire, Coventry and Solihull green infrastructure corridor and strategy. The proposed scheme is located within the strategic grassland and strategic woodland areas (Warwickshire Museum and	Broad-leaved woodland – semi-natural	Broadleaved semi-natural woodland within Coombe Pool SSSI is lowland mixed deciduous woodland, a priority habitat, albeit a long-established historic planting, with non-native trees and other ornamentals, including invasive rhododendron.	County
	Broad-leaved – plantation woodland	Not priority habitat and the type is relatively widespread locally. Areas affected by the Scheme are planted highway soft estate.	Local
	Veteran tree	Irreplaceable due to age	County
	Hedgerows – all types	Whilst not species-rich most hedgerows present are categorised as high distinctiveness on the Warwickshire green infrastructure database and they contribute to a local network of hedgerows.	County
	Neutral grassland unimproved	Within LWS on west side of River Sowe	County
	Neutral grassland – semi-improved	Within Hungerley Hall Farm ecosite, has potential for recovery of condition	Local
	Improved grassland	Area of permanent pasture within Hungerley Hall Farm ecosite, has potential for recovery of condition	Local
	Scrub – dense or continuous	Not priority habitat and relatively widespread locally.	Local
	Tall ruderal	Not priority habitat and relatively widespread locally, important at site scale.	Local
	Running water		Local

Designated site/ habitat/ species	Ecological feature	Rationale	Importance
Natural Environment, 2013).	Cultivated or disturbed land – amenity grassland	Not priority habitat and relatively widespread locally, important at site scale only.	Local
	Cultivated or disturbed land – arable	Arable land contributes to the NCA profile but is important for biodiversity at site scale only.	Local
	Buildings and hard-standing	This habitat has minimal inherent importance for biodiversity, except buildings when providing roost or nesting for bats or birds.	Local
	Other habitat – private gardens	Not priority habitat and widespread locally, important at site scale only.	Local
Species	Bats	Based on the information gathered to date there is potential for protected and notable species within and/ or in close proximity to the proposed scheme boundary. Some of these species are identified in the local biodiversity action plan (Warwickshire Wildlife Trust, 2021). Presence of these species is considered to be important at local scale based on the information gathered to date. Only low activity of bats recorded in the vicinity of the proposed scheme, roost potential, many in Coombe Pool SSSI, plus potential at Hungerley Hall farm.	County
	Badgers	Present but only likely to affect one social group	Local
	Great crested newts	Present, but distant from the proposed scheme and ponds relatively isolated.	Local
	Reptiles	Habitat potential in part of Coombe country park, poor elsewhere	Local
	Barn owl	Present in area, foraging in Sowe valley and potentially also Coombe country park, important as urban area of Coventry not suitable.	County
	Other birds	Assemblage likely to reflect habitat availability in the local farmland, increased due to bird interest of woodland of Coombe Pool SSSI. Waterbirds feature of SSSI	County, water birds National
	Riparian mammals	Otter present in Sowe valley and potentially could access Coombe Pool.	County
	Aquatic macroinvertebrates	Typical assemblage for watercourses, albeit with several invasive species present.	Local

8.8 Future Baseline

8.8.1 If the proposed scheme is not progressed, traffic congestion is expected to increase at the A46 Walsgrave junction. The adjacent land uses would not be affected by the upgrading of the A46 Binley junction to the south, nor by the change in traffic at the A46 Walsgrave junction. In the next few years, the adjacent farmland would be likely to continue in arable production east of the A46 and similarly at Hungerley Hall, where there is arable, plus some livestock grazing in the River Sowe valley. The highway would continue to be a barrier to movement of wildlife, except at the few locations where safe crossings are available, including the Hungerley Hall overbridge.

8.8.2 Further into the future, it is difficult to forecast the land use. There are pressures for continued urban development east of Coventry, on both sides of the A46. If those progress it would take land out of agriculture, especially to the north of the area affected by the scheme, leading to loss of farmland habitat and more built infrastructure. Depending on the type of development, it could also provide some opportunities for habitat creation, albeit on a reduced area. There is significant uncertainty about future changes in UK agriculture post-Brexit. Whilst the land could continue to be farmed as it is now, a shift to other usage is also possible, including afforestation (e.g. for carbon capture, amenity and/or timber production).

8.9 Potential impacts

Construction

8.9.1 Potential impacts from construction of the proposed scheme on ecological features are considered to include the following:

8.9.2 Permanent and temporary land-take resulting in habitat loss for new road alignment construction and construction compounds. Habitat areas may be of value to various species including bats, badgers, birds, amphibians and reptiles.

8.9.3 Temporary obstruction or severance of foraging and commuting routes for wildlife.

8.9.4 Temporary disturbance (both displaced and physical disturbance) to wildlife, habitats and designated sites from indirect impacts such as noise, pollution, sedimentation, dust, and lighting.

Operation

8.9.5 During operation, there would be an ongoing risk of mortality of wildlife due to collision with motor vehicles.

8.9.6 Without mitigation in the scheme design there would be potential for pollution from highway drainage and spillages.

8.9.7 There would be potential for emissions from traffic to increase nitrogen deposition on adjacent habitats and indirectly affect the composition of vegetation.

8.10 Design, mitigation and enhancement measures

8.10.1 Environmental considerations will be taken into account during the development of the proposed scheme design, including minimising land take and severance of land. The design will aim to avoid loss of land from designated sites and habitats and minimise it where loss cannot be avoided.

8.10.2 A key consideration next to the Coombe Pool SSSI is the space required to safely construct the scheme while the A46 continues to operate through the existing junction. Some loss of woodland from the soft estate is expected there, but the design would aim to avoid or minimise land take within the SSSI. If loss from the SSSI cannot be avoided, reduction of woodland area could be mitigated, over time,

by extension of woodland north of Coombe Pool SSSI between the country park boundary and the existing A46, although that would require additional land take of arable land, which has not been confirmed at this stage.

8.10.3 Option 6 involves works within the River Sowe floodplain and immediately adjacent to the riverbank, which would increase flood risk off-site. Significant mitigation measures would be required to reduce the flood risk, which could include significantly reducing ground levels to the north of the scheme or re-engineering the River Sowe. However, the extent and detail of the works required are not yet known and have not been considered as part of this assessment. It would involve at least temporary loss of additional arable land, part of the riparian corridor and possible loss of hedges, trees and grassland. The overall impact would depend on the extent of land-take required and whether the affected area was returned to unrestricted agriculture or to new habitats of greater benefit for biodiversity.

8.10.4 Option 8 would also require mitigation to reduce the associated risk of flooding; however, this could be limited to introducing a bund along the eastern edge of the scheme, increasing road levels, and/or reducing levels adjacent to the road. Options for flood mitigation have not been designed at this stage and may not require a bund. If it was required, however, measures such as steepening slope or use of a retaining wall would be used to avoid any increase in land take from the woodland within Coombe Pool SSSI. Options 7 and 11 require no additional mitigation with regard to flood risk.

8.10.5 At the next stage of the assessment there is opportunity for the landscape design to include landscaping of redundant carriageway and the roundabout for Option 6, 8 and 11 (respectively). Additionally, as detailed in Chapter 7 Landscape and Visual, there is potential for restoration of existing landscape pattern including hedgerows along field boundaries which would also benefit biodiversity. Potential mitigation would also include protection of retained vegetation and planting of trees and shrubs of native species of benefit to local wildlife.

8.10.6 The A46 is at least a partial barrier to movement of mammals and other species, so existing bridges, especially farm accommodation bridges, are important for connectivity. Depending on the option selected, continuity of the existing bridge, or provision of a new one should be considered during design development and assessed. There are two farm accommodation overbridges on the Coventry Eastern Bypass between the M6 and A444; one at Hungerley Hall Farm and another at Farber Road at the north end of the Scheme. The former would be replaced by a new junction in Options 6 and 11.

8.10.7 An initial biodiversity metric assessment has been carried out for each option at PCF Stage 2 to enable existing habitats and potential losses to be taken into account in this assessment. Opportunities to minimise loss and, where possible achieve potential net gains for nature conservation and biodiversity will be sought throughout design development, in accordance with requirements for biodiversity net gain at that stage.

8.10.8 The proposed scheme will seek to mitigate and compensate for any potential significant adverse effects identified, with the aim of reducing where possible residual impacts on identified features to the point where they are no longer considered to be significant adverse.

8.10.9 The first iteration of an EMP will be prepared as part of the development of the proposed scheme at PCF Stage 3. It will include design, construction and operational mitigation measures, which will be defined in part by the requirements which will arise from the technical assessments presented in the PCF Stage 3 EAR or Environmental Statement. The EMP will be prepared and implemented by

the Principal contractor and will likely include a range of best practice measures associated with mitigating potential biodiversity impacts; for example, provision of compensatory habitat to replace that lost, sensitive lighting design to prevent long term impacts to bats, ring fencing ponds, restricting work in root protection zones, adding specific measures to avoid water pollution, and retaining where possible, or mitigating for any lost, bat roosts and badger setts (where applicable).

8.10.10 Specific design mitigation or potential enhancement measures will be considered further at later stages of the assessment upon receipt of further ecological baseline information; and agreed with stakeholders (where applicable).

8.10.11 Standard environmental best practice and mitigation would be implemented to ensure construction and operation of the proposed scheme complies with legislation relating to protected species. It would also aim to ensure the proposed scheme does not compromise the local conservation status of ecological features present within or in the vicinity of the proposed scheme. Where protected species licences are required, these would be sought from Natural England in advance of the works. The construction programme would be developed taking into account the relevant seasonal constraints on mitigation for species.

8.10.12 Prior to commencement of construction, a CEMP would be produced as part of the overarching EMP. This would identify risks of environmental harm and set out method statements, designs and protocols to minimise the risk of pollution events or other environmental harm during the construction period.

8.10.13 Site vegetation clearance would aim to avoid the nesting bird period i.e. March to September (inclusive). Any vegetation clearance proposed within the nesting season would be checked in advance for the presence of any nest by a suitably qualified ecologist/ Ecological Clerk of Works (ECoW). If active nests are found, then appropriate buffer zones would be put in place and the area monitored until the young birds fledged and the ECoW confirmed that clearance or other potentially disturbing work could proceed.

8.10.14 As outlined in Chapter 5: Air Quality, a range of standard control measures to control dust from construction activities would be put in place and these would be applied to protect sensitive ecological receptors, especially the SSSI. No specific air quality mitigation measures are proposed for the operational phase at this option assessment stage.

8.10.15 As detailed in Chapter 7: Landscape and visual, there is potential for permanent lighting to use low light spill lighting, which would also be of benefit to species such as bats. Refer to Guidance Note on Bats and artificial lighting in the UK (BCT, Institute of Lighting professionals, 2018), especially if lighting is required near woodland and/ or the River Sowe.

8.10.16 As detailed in Chapter 13: Road Drainage and the Water Environment, best practice measures in regard to pollution prevention control measures will be in place during construction. The proposed scheme design will incorporate flood mitigation and sustainable drainage systems. There is opportunity at the next stage of assessment for these to be designed to benefit biodiversity through use of wildflower grassland seeding and potentially including wetland areas in ditches and attenuation basins.

- A monitoring programme would also be implemented during the following phases of the proposed scheme:
- During the 12-month period prior to construction, pre-construction surveys would be carried out as necessary to update the baseline surveys carried out in or for PCF Stage 3; including badger, bat roost potential, bat activity if needed to confirm roosts, invasive species to identify the need for

controls during works, any habitat survey required to update Biodiversity Net Gain calculations and any other requirements identified during stage 3.
- During construction (as specified by the EMP/ CEMP)
- 5-year aftercare period following completion of construction (i.e. detailed within the Handover Environmental Management Plan (HEMP) which would contain essential environmental information needed by the body responsible for the future maintenance and operation of the proposed scheme). This would include reporting on the extent and condition of habitats retained and created as part of the scheme, both to inform the HEMP and to confirm progress of habitats towards the target conditions for use in Biodiversity Net Gain calculation and reporting.

8.10.17 Monitoring details are to be confirmed at a later stage of the assessment once further baseline details are known.

8.11 Assessment of likely significant effects

8.11.1 The potential impacts and effects of the proposed scheme on the relevant ecological features are summarised in Table 8.8 (construction) and Table 8.9 (operations), based on the information available at this stage (PCF Stage 2). Additional explanation is outlined in the sections below, dealing with construction impacts followed by operation impacts from traffic using the scheme. At this stage the assessment is provisional based on the option designs as presented. Mitigation measures would be included in the EMP and those would ensure pollution control and other requirements. Opportunities for design indicated in Section 8.9 have not been developed at this stage and do not form part of the assessment here.

8.11.2 The main issues considered are:

- Loss of woodland from Coombe Pool SSSI
- Loss and severance of farmland at Hungerley Hall Farm, adjacent to the River Sowe
- Loss of habitats in association with the River Sowe floodplain
- Increased culverting of Smite Brook
- Loss of potential bat roosts
- Loss of a main badger sett
- Loss of potential barn owl nesting sites

Construction

Designated sites

Direct impacts – Habitat loss

8.11.3 Options 6, 7, 8 and 11 have the potential to require some land take, either temporarily (in the case of Options 6, 7 & 11) or permanently (in the case of Option 8), from woodland within Coombe Pool SSSI. If there is any loss of woodland from the SSSI it would conflict with relevant planning and designation policies. There would be an adverse temporary or permanent impact on the SSSI as a result of construction of any of the Options. It is assumed that the integrity and key characteristics of Coombe Pool SSSI would remain unaffected. This is because it is the waterbody and wetland margin which is important for wetland birds of the SSSI. Even if there is loss of a narrow band of woodland at the western edge, most would remain and would continue to screen the birds using the waterbody (for which the site is designated) from the construction activities of any of the four options. Therefore, the functional integrity of the feature for which the SSSI is designated would remain with all options, but there would be a loss of area within the designated site, affecting mature semi-natural woodland (priority habitat).

8.11.4 There is assumed to be no loss of area of the SSSI as a result of Option 6, 7 or 11, but there would be construction up to the SSSI boundary, which could result in temporary loss of or damage to trees within the site. Temporary damage of the root zone within the SSSI would not result in any loss of woodland soil and while the health of some existing trees could be affected the small species and natural regeneration would be unaffected. Any temporary habitat damage would be compensated by remedial management, such as thinning or pruning to reduce the risk of windthrow damage and woodland planting. Planting would take more than 15 years to develop to the stage of young woodland and much longer to mature. Mature woodland would take many decades to develop. Any area of damage would be small compared to the total woodland area. The impact would be from the western boundary of the site, next to the A46, and the loss would not include any severance of habitats. Because of this the impact on woodland is considered likely to be minor adverse for Option 6, 7 and 11 on Coombe Poole SSSI (of UK or National Importance). On this basis there would be up to a **moderate effect (significant)** initially but reducing to a **slight effect (not significant)** once replacement habitat has developed in the long-term.

8.11.5 However, with Option 8 there is assumed to be encroachment into the woodland within the SSSI, due to construction of the embankment, which would potentially result in some permanent loss of area of the SSSI and would represent a permanent loss of the historic boundary of Coombe Park. This would be a loss of approximately 0.45ha of a 51.3ha site. Of this the Pool is 36ha, and woodland approximately 15ha, so the loss of woodland would represent nearly 3% of the total. This loss is not thought to compromise the functionality of the woodland (functional integrity of the woodland ecosystem). The loss would be from a limited section of the woodland edge close to the existing highway. In addition, however, with Option 8 there would be an adjacent area of temporary damage to root zones, as described for Options 6, 7 and 11, which would be recoverable. Therefore Option 8 is assessed to have a minor adverse permanent impact on Coombe Poole SSSI (of UK or National importance), resulting potentially in a **moderate effect (significant),** depending on the compensation included in the design and the time scale considered. As the effect would be on woodland priority habitat within a SSSI a bespoke package of compensation would be required.

8.11.6 There would be no habitat loss associated with any other statutory designated sites.

8.11.7 Options 6, 8 and 11 would require some permanent land take from within Hungerley Hall Farm Ecosite. Hungerley Hall Farm Ecosite is designated for its semi-improved grassland (although the PEA 2020 Appendix C.1 reclassified this as improved grassland) in a riverside field and by the farm buildings, both of which may be impacted by the proposed scheme. Whilst neither area of grassland is in good condition for biodiversity, there would be potential for enhancement through changes in the management without the proposed scheme. In all three options the functional integrity of the site would be permanently lost as a result of construction. Therefore, Option 6, 8 and 11 are assessed to have a major adverse impact on Hungerley Hall Farm Ecosite (of Local importance), resulting potentially in a **slight effect (not significant)**.

8.11.8 Option 6, 7 and 8 propose a culvert extension and/ or head wall to Smite Brook Ecosite. This may result in loss of open channel and an adverse effect on the Smite Brook Ecosite, although the existing culvert under the A46 would remain unchanged. Therefore, Option 6, 7 and 8, due to the increase in the length of culverted watercourse, are assessed to have a moderate adverse impact on Smite Brook Ecosite (of Local importance), resulting potentially in a **slight effect (not significant)**.

8.11.9 None of the options are anticipated to directly impact any other LWS or Ecosites due to the distance from scheme works.

Indirect impacts – Pollution runoff and dust from construction activities; and effects on hydrology

8.11.10 Coombe Poole SSSI is adjacent to the construction site boundary with each of the options and, as stated in Chapter 5: Air quality, could experience increased dust deposition rates during construction, however, best practice control measures to control dust would be in place as included in an EMP and no effects on vegetation are likely. There would be no risk of siltation or other water pollution within the Coombe Pool because it is upstream of the construction area in all options, with no pathway for impact. Standard water pollution prevention measures would protect the Smite Brook downstream of the SSSI. Emissions would have negligible impacts on the SSSI, and a **neutral or slight effect (not significant).**

8.11.11 Options 6, 7, 8 and 11 may require works within or adjacent to Smite Brook watercourse, which has hydrological links to Stoke Floods LNR downstream; therefore, there is potential for indirect effects on this designated site from construction of the proposed scheme, if there was siltation due to runoff during construction or other pollution. Standard pollution control measures would be implemented as part of the EMP to avoid significant effects on Smite Brook and downstream sites.

8.11.12 There are no known hydrological links between Smite Brook and Herald Way Marsh SSSI and with a distance of approximately 1.5km south of the proposed scheme, it is unlikely that there would be direct impacts or indirect impacts from the proposed scheme. Therefore, there would be a **neutral effect (not significant)** on Herald Way Marsh SSSI with all options.

8.11.13 A hydraulic flood model has been produced for the Options. Initial flood modelling using a 70% climate change allowance showed that Options 6, 7, and 8 would require mitigation to reduce the associated risk of flooding. The flood model was then re-run with a 32% climate change allowance as per latest Environment Agency guidance. This showed that there were no on or off-site impacts for option 7, requiring no further mitigation. Model results for Option 8 showed flood risk impacts, requiring mitigation which could include a bund along the eastern edge of the scheme to a level of 74.2m Above Ordnance Datum (AOD), increasing road levels, and/or reducing levels adjacent to the road. Option 11 requires no additional mitigation with regard to flood risk. Options 6 includes construction in the floodplain and, if not mitigated during the development of the design, would affect off-site water levels during extreme flood events. However, for the continuity of water-dependent habitats in or adjacent to the river, it is the normal water regime which is most relevant to the vegetation, i.e., typical, frequently occurring spates and dry spells, rather than the extreme events, although the extreme events do cause periodic changes within the channel, e.g. erosion and deposition of sediment. The effects on habitats would be negligible compared to existing conditions. Therefore, with all options, there is expected to be a neutral or slight effect (not significant) on Stoke Floods LNR.

8.11.14 There are no indirect impacts anticipated on any other statutory or non-statutory designated sites due to no hydrological links or the distance away. Where sites are located adjacent to the proposed scheme or have hydrological links (downstream), such as for example, Smite Brook Ecosite and the River Sowe EcoSite; standard water pollution prevention control measures and best practice measures to control dust, would be in place during construction. Therefore, there are **neutral effects (not significant)** on all other statutory and non-statutory designated sites.

Habitats

Direct impacts – Habitat loss and severance

8.11.15 All the options would require permanent and temporary land take, resulting in habitat loss for new road alignment construction.

8.11.16 Option 6 would result in the largest area of habitat loss. Most of this would be arable land, but there would also be permanent loss of improved grassland habitat from the Hungerley Hall Farm Ecosite and severance of hedges. As well as potential loss or disturbance of some broad leaved semi-natural woodland habitat from Coombe Pool SSSI (see above), there would be loss of young plantation woodland within the soft estate of the A46. The greatest difference of Option 6 is that by creating a new alignment for the A46 and with a connecting road to the new junction to the north, it would fragment the farmland between the existing A46 and the River Sowe and take the A46 much closer to the river corridor.

8.11.17 Option 11 has a smaller footprint than Option 6, however the types of habitats lost associated with both options would be similar. Option 11 proposes an online alignment for the A46 creating a new dumbbell junction, as per Option 6 but with a new single carriageway B4082 running adjacent to the west of the A46. This would fragment the farmland between the existing A46 and the River Sowe and take the A46 closer to the river corridor; however, the land-take would be smaller than that of Option 6.

8.11.18 Options 7 and 8 have a much smaller footprint than Option 6 and 11 but would still result in habitat loss. Both would result in the permanent loss of grassland habitat from the Hungerley Hall Farm Ecosite, potential loss of broad leaved semi-natural woodland habitat from Coombe Pool SSSI and plantation woodland associated with the A46 soft estate. Option 8 would require permanent loss of semi-natural broadleaved woodland within the SSSI boundary.

8.11.19 Figure 8.2: Phase 1 Habitat Survey Option 6 to Figure 8.5: Phase 1 Habitat Survey Option 11 show the habitats within the proposed scheme boundary for each option. At the current stage of design, which does not include details of construction area, drainage, retained vegetation or landscaping within the proposed scheme boundary, it is assumed that all vegetation within the boundary would be lost, except where stated.

8.11.20 It is assumed that none of the options would result in the loss of the veteran tree within the proposed scheme boundary near Hungerley Hall Farm.

8.11.21 There would be a reduction of open watercourse channel at Smite Brook in association with culvert works proposed for Option 6, 7 and 8, greatest with Option 8. No works to the culvert are proposed for Option 11.

8.11.22 Given the above, with Option 6 there is potentially a major adverse impact on farmland habitats given the extent of permanent habitat loss and severance which is important at County scale, resulting in a **moderate effect (significant)**. Option 11 although resulting in a smaller scale of habitat loss will still create habitat loss and severance which is important at Local scale, resulting in a **slight effect (not significant).** With Option 7 and 8, there is a smaller extent of permanent habitat loss and severance in comparison to Options 6 and 11. Therefore, with Option 7 and 8, there is a moderate adverse impact on habitats, resulting potentially in a **slight effect (not significant)**.

8.11.23 Potential for habitat creation as part of the scheme is not taken into account at this stage. Losses of plantation woodland, amenity grassland and hedgerows could be compensated, at least partially, by habitat which would be created within the soft estate, on the cuttings, embankments, verges and in and around attenuation

basins. The time required for new habitats to develop depends on the habitat. Species-poor amenity grassland may only take a year or two, wildflower grasslands are well-established within four years and are expected to have achieved at least moderate condition within ten years. Hedgerows develop within ten years, after which their structure will be improved by laying and subsequent management. Woodland will take more than 30 years to develop. To develop woodland into priority habitat would take many decades more.

Indirect impacts – Pollution runoff and dust from construction activities

8.11.24 There are no indirect impacts anticipated on any habitats. Standard water pollution prevention control measures and best practice measures to control dust would be in place during construction.

Species

8.11.25 All four options have the potential to impact protected and notable species through habitat loss or disturbance.

8.11.26 The impacts on species are discussed first in turn and then an assessment given overall on the likely significance of effects on species.

Direct impact – Habitat loss (destruction and severance of wildlife corridor impeding species movement) and direct mortality from construction activities

Bats (roosting, foraging and commuting)

8.11.27 All four options have the potential to impact the local bat population as there are trees in Coombe Pool woodland deemed to have suitability for roosting bats which may be impacted (Appendix C.2) and loss of such trees would reduce the availability of potential roosting sites. As stated in 8.11.3-8, Option 8 would involve direct loss of woodland, and hence loss of some mature trees – an opportunity cost because even trees which are not currently suitable as roosts may become so over time. All four options would potentially affect the root zone of retained trees in Coombe Pool woodland, such that they may need to be felled or pruned, leading to a reduction of potential roosts. Conversely, impacts on tree root zones could also reduce the condition of trees and lead to an increase in dead wood, of potential value for bats to roost and feed.

8.11.28 Several mature trees in hedges and fields also have potential for use by bats. These are also important as potential roosting sites, for bats to use while out foraging, as well as potential breeding sites. Loss of mature trees in hedges and fields would represent a permanent loss of existing or potential future roosting resources for bats. Loss of hedges, notably with Options 6 and 11, would reduce the availability of these for foraging and commuting, including access to foraging opportunities on grassland at Hungerley Hall and next to the River Sowe.

8.11.29 Options 6 and 11 would result in habitat loss and severance across the landscape bringing a new road closer to the River Sowe, adversely impacting foraging and commuting bats, although the existing lit junction of the A46 at Walsgrave would be unfavourable for movement of bats between the Coombe Pool woodland and the River Sowe valley. The A46 is likely to be at least a partial barrier to the movement of bats within the landscape and would continue to be so with all the Options. The proposed demolition of the overpass (farm access) to Hungerley Hall Farm, over the A46, may potentially remove a navigational route for bats across the landscape and over the new aligned A46.

8.11.30 Option 8 would result in the demolition of the Hungerley Hall farmhouse. This building was given a preliminary survey in January 2021. Of the seven buildings externally assessed, two were found to have high suitability for bat roosts, one to

have moderate suitability and one to have low suitability to support roosting bats. Further surveys will be carried out to determine bat roosting activity in this area.

Badgers

8.11.31 All four options would remove some grassland and woodland habitats potentially used by foraging badgers. Badger setts have been recorded in the vicinity of the proposed scheme and there is potential for setts to be directly lost as a result of construction of all options. With Options 8 and 11 there is the potential for the loss of a main sett which would require appropriate additional mitigation measures, including replacement sett creation, and would require a licence from Natural England for closure of the sett.

8.11.32 Options 6 and 11 would include the demolition of the overpass (farm access) to Hungerley Hall Farm, over the A46, which in turn would directly impact the movement of badgers either side of the new aligned A46. It is to be noted that the existing A46 does not have a central concrete barrier, so crossing by mammals is dangerous, but possible. If Options 6 and 11 include central barriers there would be complete, permanent severance except if an overpass is provided where the Options are in cutting and/or underpasses where the Options are on embankment.

Great crested newts

8.11.33 Seven ponds were identified within 500m of the proposed scheme, with two of these ponds east of the A46 confirmed to have great crested newt presence from environmental DNA sampling in 2016 (Appendix C.1). No ponds would be lost or be directly impacted as a result of any of the options. However, there is potential for terrestrial great crested newt habitat to be lost or damaged in association with Option 6, 8 and 11; with the greatest land take in association with Options 6 and 11, due to the proximity of a new roundabout for the junction at the north end in both options.

8.11.34 The Natural England Risk Assessment Calculator Tool currently indicates a low risk of an offence being committed from development of both Options 6, 8 and 11. This is due to the known great crested newt ponds being located more than 250m from the proposed scheme and with less than 5ha of habitat to be directly lost or damaged as a result of construction activities from either option (losses from arable and the vegetated cutting slopes of the existing A46). With most of the favourable terrestrial habitat for great crested newts lying east or north of the ponds, and hence a low risk of harm to individuals, a mitigation licence from Natural England may not be required, and works could potentially proceed under a precautionary method of works. This approach and assessment would need to be confirmed following further surveys at PCF Stage 3.

Reptiles

8.11.35 There are records of reptiles in association with Coombe Pool and suitable habitat for reptiles noted within an area of scrub and grassland in Coombe Pool (Target Note 50, Appendix C.1), although that area would not be affected by any of the Options. The existing woodland boundary on the south side of the Coombe Country Park is likely to be the limit of any reptile population there.

8.11.36 Depending on the proximity to the River Sowe, Option 6 also has some potential to affect potential reptile habitat in the river corridor.

Barn owl

8.11.37 There are records of barn owl in association with Coombe Country Park and the wider landscape (Appendix C.1), in particular, hunting over riverside grassland and scrub west of the River Sowe.

8.11.38 Options 6 and 11 have the most land take and severance of habitat in comparison to Option 7 and 8; which in turn impacts proportionally on available barn owl foraging habitat. The main issue would be the raising of the highway on embankment through the floodplain, which would increase risk of mortality. Currently, the A46 in this section is in cutting, with scrub and developing woodland on both sides, which would aid crossing of the road at a safe height above traffic.

8.11.39 Three farm buildings located at Hungerley Hall Farm were assessed to have barn owl nesting potential. Hungerley Hall Farmhouse is proposed for demolition in association with Option 8. Construction noise and activity from other options would have potential to disturb nesting barn owls if present. All other potential barn owl nesting sites would not be directly impacted by the proposed scheme.

Other birds

8.11.40 The main areas of value for birds are the open water and woodland of Coombe Pool and the valley of the River Sowe. Both these areas are ecological constraints on the proposed scheme, particularly with Options 6, 8 and 11. The rest of the area is largely open farmland and bisected by the existing A46.

8.11.41 As stated above, due to the landform and existing woodland screen of Coombe Pool from the A46, there would be negligible impact on birds using the open water of the pool and its associated reedbeds. The primary reason for the designation of the SSSI is a heronry and the population of other breeding water birds and the site is also important for wintering water birds, with nationally important numbers of shoveller (*Anas clypeata)*. Feeding areas for water birds would not be affected and the landform and woodland would screen construction activity. The woodland directly affected by the options would not be a feeding area for the species using the 36ha Pool but is part of the habitat resource which supports woodland bird species of Local importance. The woodland is also noted as a winter roost for other birds, particularly for blackbirds (*Turdus merula)*, also for redwings (*T. iliacus*), fieldfares (*T. pilaris*) and greenfinches (*Carduelis choltis*), all of which would forage in and around the woodland. Option 8 would lead to the loss of approximately 0.45ha of woodland and hence reduced opportunity for feeding by the woodland species, a permanent impact. This loss could be compensated by woodland planting as part of the proposed scheme, although it would take about 10 - 15 years for replacement habitat to reach the stage of young woodland, with foraging potential for the woodland birds named above. Further assessment would be carried out at PCF Stage 3.

Riparian mammals

8.11.42 Recent records indicate the River Sowe is used by otter. The following watercourses are considered potentially suitable for foraging and commuting otter, which are relevant to all Options:

- Coombe Pool SSSI & Coombe Country Park drains (links to Smite Brook)
- Smite Brook
- River Sowe

8.11.43 There is potentially suitable habitat for water vole on the River Sowe, but the shaded channels of the Smite Brook and tributaries within the woodland at Coombe Country Park do not have emergent vegetation and would not be likely to support water vole. As per the habitats section above, culvert extension and/ or headwall works are proposed in association with Smite Brook with Option 6, 7 and 8. Therefore, there is potential for adverse impacts on passage of otter during construction in association with all options. With Option 6 the proximity of the roads to the River Sowe would potentially increase disturbance and severance of riparian habitats. Further surveys and assessment are required at PCF Stage 3.

Aquatic macroinvertebrates

8.11.44 Construction activities for all four options are located in close proximity to Smite Brook and so have the potential to increase risk of siltation and pollution, affecting aquatic macroinvertebrate populations present in these watercourses. As stated above, however standard pollution control measures would be applied via the EMP to avoid or minimise this risk.

Invasive species

8.11.45 It is an offence to spread or allow spread of invasive non-native species (as listed under Schedule 9 of the Wildlife and Countryside Act 1981 as amended) into the wild. Invasive species would be managed according to the EMP and any supporting Biosecurity Management Plan. Treatment and control of invasive plants would be implemented through the EMP, to avoid the spread of invasive plant species during proposed scheme construction of any of the options.

Overall assessment of direct impacts from construction for species

8.11.46 Given the above, Option 6 is assessed to potentially have up to major adverse impact on populations of species of Local to County importance in the absence of additional mitigation measures, resulting in up to a **moderate effect (significant).** With this option there is extensive land take required and removal of the existing Hungerley Hall Farm accommodation overbridge (which currently likely acts as a wildlife corridor over the A46), would potentially adversely impact species, such as bats, badgers and great crested newts, without additional mitigation measures. Option 11 will result in less habitat loss and the existing A46 will remain in a cutting; however, the junction will be raised up on an embankment and the existing overbridge will still be removed so it will potentially adversely impact species. With Option 8, demolition of the farmhouse at Hungerley Hall Farm and the offline alignment would also potentially adversely impact species. Therefore, Option 11 and 8, is also assessed to potentially have up to major adverse impact on populations of species of Local to County importance in the absence of additional mitigation measures, resulting in up to a **moderate effect (significant).**

8.11.47 Option 7 is assessed to potentially have up to a moderate adverse impact on species in the absence of additional mitigation measures, resulting in a **slight effect (not significant).** Option 7 has less land take in comparison to Option 6, 8 and 11; additionally, the existing overpass (farm access) is to remain allowing movement of species to land either side of the A46. Therefore, the level of impact of Option 7 on species is considered potentially to be less than that of Options 6, 8 and 11.

Indirect impacts – Disturbance from construction activities (noise, air, and water pollution and construction lighting)

8.11.48 Standard water pollution prevention control measures and best practice measures to control dust, would be in place during construction. Construction noise and human activity close to the River Sowe could have the potential to disturb otter with Option 6, although the riparian zone is subject to recreational disturbance, mainly on the west side of the river and this would only be likely to disturb otter if there was a resting place or breeding site nearby. Option 11 is further from the river than Option 6 and is not considered to be within the riparian zone of the River Sowe (it is >50m away). There would be potential for adverse effects on bat roosts if temporary construction lighting is required close by, although best practice measures would be in place during construction to avoid or minimise light spill onto sensitive areas. Further assessment is required for all options regarding potential impacts from construction disturbance on roosting bats, barn owl, badgers and otter. There is potential for there to be up to a moderate adverse impact on species

during construction, resulting in a **slight effect (not significant)**. Highway lighting can have adverse impacts on the abundance of invertebrates, including moths. There would be potential to reduce the impacts of lighting at later stage of design, by using lighting to minimise light spill, using warm white LED lighting rather than cool white. Moving the junction north (Options 6 and 11) may allow existing lighting to be removed next to Coombe Pool SSSI.

Operation – Designated sites

Direct impacts – nitrogen deposition from changes in air quality and emissions

8.11.49 There are three designated sites for nature conservation near the ARN. These are Coombe Pool SSSI, Herald Way March SSSI/ LNR and Willenhall Woods LNR which are all near the A46. There are also two areas of ancient woodland near the ARN, Piles Coppice and Binley Common Farm Wood. Both of the ancient woodland sites are near Willenhall Wood LNR, near the A46 between Binley junction and Tollbar End.

8.11.50 Traffic emits oxides of nitrogen (NOx) which can be deposited on vegetation and soil as nitrogen in the form of nitrates. Nitrogen deposition can change species composition, reduce species richness and increase plant production, with the greatest impact being on nutrient poor ecosystems and species (such as lichens and bryophytes) (APIS, 2021).

8.11.51 Predictions of nitrogen deposition rates at the designated sites have been made for the base year (2018) and opening year (2025) with the proposed scheme (Do-Something) and without the proposed scheme (Do-Minimum). Refer to Chapter 5: Air Quality, for details. An assessment of potential effects on sensitive habitats within the SSSIs, other designated sites and ancient woodland is provided below.

<u>Coombe Pool SSSI</u>

8.11.52 There are no critical loads for deposition of nitrogen to the site interest features present within Coombe Pool SSSI (APIS, 2021a). The majority of lowland freshwater bodies are phosphate limited. Therefore, operational traffic associated with the proposed scheme will not affect the ability of the SSSI to meet its conservation objectives. The woodland is not an interest feature of the SSSI, nor is it ancient woodland. It is classified as lowland mixed deciduous woodland and so, because this is a priority habitat, air quality modelling has been carried out. The critical load for broadleaved woodland is 10-20kgN/ha/yr.

8.11.53 The width of the woodland within the SSSI is approximately 65m and at the A46 Walsgrave junction it is about 30m from the highway. The modelled baseline nitrogen deposition is 38.2kgN/ha/yr at the edge of the site closest to the highway, decreasing to 36.8kgN/ha/yr beyond at 70m, which is well above the critical load throughout. The modelled difference in the baseline across the woodland is 1.4kgN/ha/yr (0 to 70m). The 'do minimum' option has less than 0.1kgN/ha/yr effect on the Nitrogen deposition. The four 'do something' options differ in the degree of modelled change in Nitrogen deposition within the woodland of the SSSI. Option 6 shows a decrease of –0.2 to 0 kgN/ha/yr. The other options show increases in Nitrogen deposition, with progressive increase in Nitrogen from Option 11 (0.3 to 0 kgN/ha/yr), to Option 7 (0.8 to 0.1 kgN/ha/yr) and Option 8 (1.7 to 0.1 kgN/ha/yr), which shows the greatest increase in Nitrogen deposition.

8.11.54 Where increases in Nitrogen deposition are less than 1% of the critical load (in this case 0.1kgN/ha/yr) effects can be assessed as not significant. When the increase is greater and especially when the critical load is already exceeded the vegetation may show eutrophication and further consideration is needed. In accordance with

DMRB LA105 further assessment is required if Nitrogen deposition is expected to increase by more than 0.4 kgN/ha/yr.

8.11.55 As modelling indicates there is currently a decrease of Nitrogen deposition across the woodland of about 1.4kgN/ha/yr and about 1kgN/ha/yr of that is in the first 30-40m from the highway, there could be evidence of eutrophication in the composition of the woodland flora, such as reduced species, or increased abundance of species favoured by increased nitrate, such as nettle (*Urtica dioica*). The habitat survey carried out to date does not indicate any obvious trend of eutrophication in the field layer across the woodland. The vegetation does not appear to show any significant response in composition with changes in Nitrogen deposition of 1kgN/ha/yr or more. This is in accord with the Natural England report (Natural England, 2016) on assessing effects of small increments of atmospheric nitrogen deposition because for woodland, the "lack of an overall relationship between species richness and N deposition makes it difficult to assume a dose-response relationship to broad-scale N deposition in woodlands over a national gradient, however, it seems likely that the edges of the woodlands are likely to be more strongly affected by a nearby pollutant source".

8.11.56 Option 11 shows an increase of Nitrogen deposition of 0.1kgN/ha/yr at 20m into the site and even at the edge at 0.3kgN/ha/yr it would be unlikely to have any detectable effect on the woodland vegetation, based on available information from the site and because it is below the 0.4kgN/ha/yr used to trigger assessment in DMRB LA 105. There is lower confidence with Option 7 and 8, especially as the increase in Nitrogen deposition in the 0-10m zone (1.7kgN/ha/yr) for Option 8 exceeds the difference in Nitrogen deposition across the whole woodland in the baseline. With Options 7 and 8 there may be a response in the vegetation from eutrophication, especially if the canopy is opened up in the 15m root zone area. If Option 7 or 8 was selected further survey of the woodland would be needed to determine the sensitivity of the woodland in more detail.

8.11.57 At this stage is it considered that the predicted Nitrogen deposition from Options 6 and 11 would have a negligible adverse impact on the woodland within Coombe Pool SSSI, resulting in a **neutral effect (not significant**). Options 7 and 8 would have a minor adverse impact, leading to a **slight effect**, but there is lower confidence in this. It would affect the condition of the woodland priority habitat, although it would not affect the ornithological features for which the SSSI is designated as the ornithological features for which the site is designated are not dependent on the woodland habitat.

Herald Way Marsh SSSI

8.11.58 These are marshy wetland communities, which support important invertebrate communities, present within the SSSI that are potentially sensitive to nitrogen deposition (APIS, 2021b). The main habitat present in the SSSI is open water surrounded by swamp and lowland fen communities. Fens are relatively insensitive to nitrogen deposition because they are naturally high nitrogen environments, such that the critical load is fairly high (15 - 30kgN/ha/yr) for base-rich fens (APIS, 2021c). Currently, the modelled baseline is 13.5 - 11.7kgN/ha/yr which will decrease to 13.4-11.8kgN/ha/yr by the opening year of 2025. As these are less than the lower critical load, nitrogen deposition is not having a significant effect on this SSSI in the base or opening years.

8.11.59 Predicted nitrogen deposition rates due to the proposed scheme are expected to increase by a maximum of 0.1kgN/ha/yr within 30m of the proposed scheme boundary for all Options. Deposition rates would remain less than the lower critical load with each of the Options in operation. Therefore, according to the process in

LA 105, there would be a negligible adverse impact from operation on the Herald Way Marsh SSSI, resulting in a **neutral effect (not significant)**.

Willenhall Woods LNR

8.11.60 Willenhall Woods LNR is a mixed deciduous woodland. The critical load for broadleaved woodland, applicable also to mixed deciduous woodland, is 10 - 20kgN/ha/yr and is currently significantly exceeded, as baseline deposition is 39.3 - 36.2kgN/ha/yr. 1% of the lower critical load is 0.1kgN/ha/yr, changes up to this level are not significant.

8.11.61 With Option 11, the Scheme is predicted to increase deposition rates by 0.1kgN/ha/yr at the site boundary. Therefore, there would be a potential negligible adverse impact from operation on the Willenhall Woods LNR, resulting in a **neutral effect (not significant)**.

8.11.62 With Options 6, 7 and 8, the Scheme is predicted to increase deposition rates by 0.2kgN/ha/yr at the site boundary and 0.1kgN/ha/yr at 10m from the site boundary (Options 6 and 7) or at 20m (Option 8). Therefore, there would be a potential negligible adverse impact from operation on the Willenhall Woods LNR, resulting in a **neutral effect (not significant)**.

Ancient woodland - Binley Common Farm Wood and Piles Coppice

8.11.63 Binley Common Farm Wood and Piles Coppice are mixed deciduous woodlands with critical loads 10 - 20kgN/ha/yr. Piles Coppice and Binley Common Farm Wood are 30m and 10m further away respectively than Willenhall Wood LNR, on the opposite side of the A46, so would have a slightly lower deposition rate than Willenhall Wood due to the greater distance between the site and the A46. The predicted nitrogen deposition rates in these ancient woodlands has been estimated, using the relative distance information, from the results provided for Willenhall Wood. The predicted deposition rate in Binley Common Farm Wood at 0m from the site boundary (i.e. the maximum deposition rate) would be the similar to that at 10m at Willenhall Wood. The predicted rate in Piles Coppice at 0m from the site boundary would be similar to that at 30m from the boundary at Willenhall Wood. With Options 6, 7 and 11, the site boundaries of these two woodlands nearest to the highway would have a change of 0.1 kgN/ha/yr, which is 1% of the lower critical load and so would not exceed the 1% threshold (below which effects of nitrogen can considered to be negligible (not significant) without the need for further ecological assessment). With Option 8, Binley Common Farm Wood would have a 0.2 kgN/ha/yr change at the site boundary whilst Piles Coppice would have a 0.1 kgN/ha/yr change. These small changes would be unlikely to produce any detectable change in vegetation, in view of the limited response in the woodland vegetation in Coombe Pool woodland and the small area affected by any changes. Nonetheless, if Option 8 was selected further assessment would be needed. At this stage, modelling indicates there would be a negligible adverse impact from operation on the ancient woodlands, resulting in a neutral effect (not significant) with all the options, but with lower confidence for Option 8.

Direct impacts – surface water run-off pollution/ sedimentation

8.11.64 The existing road within the area of the proposed scheme options discharges to the surface watercourses Smite Brook and River Sowe with no current water quality mitigation or attenuation of runoff rates. Options 6, 8 and 11 include attenuation ponds to ensure no increase in runoff rates from the new impermeable areas. The attenuation ponds also provide water quality mitigation with improvements in suspended sediment, and dissolved pollutants.

8.11.65 The drainage design and water treatment of all options would result in a negligible adverse impact on designated sites (located adjacent to the proposed scheme and/ or with hydrological links downstream), resulting in **neutral effect (not significant)**. Refer to Chapter 13: Road Drainage and the Water Environment.

Habitats

Direct impacts – surface water run-off pollution/ sedimentation

8.11.66 The drainage design and water treatment of all options would result in negligible adverse impacts from surface run-off and pollution on habitats from operation of the proposed scheme, resulting in a **neutral effect (not significant)**. Refer to Chapter 13: Road Drainage and the Water Environment.

Species

Direct and indirect impacts – species mortality from collision with operational traffic; and/ or disturbance from lighting

8.11.67 All the options have potential for mortality of wildlife from operational traffic e.g. collision with motor vehicles, impacting faunal species such as badgers, bats, birds and reptiles; and disturbance to nocturnal species from lighting of the operational scheme.

8.11.68 Further surveys and ecological baseline information is required at PCF Stage 3 to inform the environmental assessment of the preferred option.

8.11.69 Option 6 has the most extensive new off-line road alignment, in comparison to Option 8, 7 and 11, potentially impeding movement of species across the landscape and risking species collision with operational traffic.

8.11.70 The demolition of the existing accommodation overbridge access to Hungerly Hall Farm as part of Option 6 and 11 would remove a wildlife corridor across the A46 potentially impeding movement of species across the landscape and increase the risk of wildlife mortality from collision with operational traffic.

8.11.71 The impact of Option 7 and 8 on species is considered potentially to be less than that of options 6 and 11 given the proposed scheme aligning more closely with the existing A46, and the farm overpass also be retained or a new one created allowing safe passage of species over the A46.

8.11.72 Main carriageway lighting columns are proposed for all options with additional lighting at the new dumbbell roundabouts for Options 6 and 11. The lighting design would require further consultation with the Guidance Note on Bats and artificial lighting in the UK (BCT, Institute of Lighting professionals, 2018).

8.11.73 Any use of concrete barriers in the central reserve represents a substantial permanent barrier to the movement of badgers, reptiles and amphibians. The junction would have to be lit, but the type of lighting would be improved to minimise light spill onto adjacent areas to mammals except bats. With much of the existing scheme and the options in cutting there would be little or no scope for mammal underpasses. This would be assessed in more detail at PCF Stage 3, with particular attention to avoidance of light spill into woodland at Coombe Pool, the River Sowe, Smite Brook and trees and buildings with bat roost suitability.

8.11.74 As the scheme would largely be in cutting for Options 7 and 8, as is the existing A46, this would help to encourage birds and possibly bats to fly across at a safe height above traffic. The risk of wildlife mortality would be greater where the scheme is on embankment. This is the case for much of Option 6 and the potential for mortality would be increased due to the proximity of Option 6 to the River Sowe, a wildlife corridor and because of the greater overall width of Option 6 compared to Options 7 and 8. Option 11 leaves much of the existing A46 in cutting but raises

the realigned B4082 (northern end where it rises to join the new dumbbell junction) and slip roads to the new dumbbell junction being on embankment, this will pose less of a risk than Option 6 but still a greater risk than Options 7 and 8. The existing A46 and all four options would be at least partial barriers to movement of wildlife between Coombe Pool and the River Sowe valley, increasing the existing severance of the A46 around Coventry.

8.11.75 Given the above effects of severance, Options 6 and 11 are assessed to potentially have up to a major adverse impact on species evaluated as important at County scale (bats, birds including barn owl) as a result of operational activities, resulting in a **moderate effect (significant).** Option 7 and 8 are considered to potentially have a moderate adverse impact on species as a result of operational activities, resulting in a **slight effect (not significant)**.

8.12 Summary assessment of likely significant effects

8.12.1 Refer to Table 8.8 and Table 8.9 for a summary of assessment of likely significant effects on biodiversity during construction and operation for each option. The table shows that the likely significant effects from the construction of the scheme are:

- Loss of woodland from the edge of Coombe Pool SSSI for Option 8 and possible damage with Options 6, 7 and 11.
- Land take for Option 6 at Hungerley Hall Farm, adjacent to River Sowe.
- Severance for Options 6 and 11 due to the removal of the overbridge at Hungerley Hall Farm.
- There is potential for increased wildlife (such as bat, barn owl and badger) mortality due to traffic to have a significant effect on some species populations, depending on status with Options 6, 8 and 11.

Red, Amber, Green status indicators have been given to rate the performance of each option for biodiversity.

- Red – Worst performing option (moderate or major adverse impact on objective/ criteria, which is significant)
- Amber – Next best performing option (minor or moderate adverse impact on objective/ criteria, which may be significant or not significant depending on the ecological importance of the feature / geographical scale of the impact)
- Green – Best performing option (no or negligible impact, which is not significant)

Note: Where the performance of the option is equal the rating is the same.

Table 8.8: Summary assessment of likely significant effects on biodiversity – Construction phase

Designated site/ habitat/ species	Ecological feature	Importance	Impact	Level of impact				Significance of effect				Overall Significance			
				Option 6	Option 7	Option 8	Option 11	Option 6	Option 7	Option 8	Option 11	Option 6	Option 7	Option 8	Option 11
Designated site	Coombe Pool SSSI	UK or National	Habitat loss	Minor adverse		Moderate adverse	Minor adverse	Options 6 and 7 Moderate in the construction period; potentially reducing to slight once habitat has developed (5-15 years recovery from indirect impacts on habitat quality)		Moderate due to permanent loss	Moderate in the construction period; potentially reducing to slight once habitat has developed (5-15 years recovery from indirect impacts on habitat quality)	Significant temporary effect		Significant effect	Significant temporary effect
	Stoke Floods LNR	County	Disturbance through particulate loading/ pollution surface runoff from construction; and hydrological changes	Negligible (located approximately 600m from the proposed scheme; hydrological links to the proposed scheme via Smite Brook and the River Sowe. However, pollution prevention control measures would be in place. Option 6 changes in flood frequency would be subject to flood compensation provisions)				Neutral all options				Not significant			
	Herald Way Marsh SSSI/ Herald Way Marsh (Claybrook Marsh) LNR	UK or National	Disturbance through particulate loading/ pollution surface runoff from construction	No impact (the site is located > 1.5km from the proposed scheme with no hydrological links to the proposed scheme)				Neutral all options				Not significant			
	Willenhall	County	Disturbance	No impact				Neutral all options				Not significant			

	Woods LNR		through particulate loading/ pollution surface runoff from construction	(the site is located >2km from the proposed scheme with no hydrological links to the proposed scheme)										
	Hungerley Hall Farm Ecosite	Local	Habitat loss	Major adverse (complete severance of Hungerley Hall Farm Ecosite)	No impact	Major adverse (smaller area impacted in comparison to Option 6)	Major adverse (severance of Hungerley Hall Farm Ecosite, but less than Option 6)	Slight	Neutral	Slight	Slight	Not significant (direct loss of habitat; however, not significant given the geographical scale of the impact)	Not significant	Not significant (direct loss of habitat; however, not significant given the geographical scale of the impact)
	Smite Brook, Headwater and Tributaries. Tributary of the River Sowe Ecosite	Local	Habitat loss	Moderate adverse (Options 6, 7 and 8 require a culvert extension or headwall to Smite Brook)			No impact (retaining existing culvert)	Slight effect Options 6, 7, 8			Neutral Option 11	Not significant (potential direct loss of channel; however, not significant given the geographical scale of the impact)		Not significant
			Disturbance through particulate loading/ pollution surface runoff from construction	No impact (located adjacent to the proposed scheme. However, standard water pollution prevention control measures and best practice measures to control dust would be in place pollution prevention controls in place)				Neutral all options				Not significant		
	Sowe Valley Dorchester Way LWS	County	Disturbance through particulate loading/ pollution surface runoff from construction	No impact (sites are located adjacent to the proposed scheme or have hydrological links to the proposed scheme (downstream). However, standard water pollution prevention control measures and best practice measures to control dust would be in place).				Neutral all options all sites				Not significant		
	Gainsford Rise LWS	County												
	Stoke Floods LWS	County												
	Sowe Valley Stoke Aldermoor to London Road LWS	County												
	River Sowe Ecosite	Local	Potential habitat loss at outfalls	Minor adverse (3	No impact	Minor adverse (1	Minor adverse (1	Slight	Neutral	Slight	Slight	Not significant (potential	Not significant	

				potential outfalls)		potential outfall)	potential outfall)					temporary loss)	
	Coombe Abbey LWS	County	No impact	No impact				Neutral all options				Not significant	
	Sphinx Golf Course Ecosite	Local	Disturbance through particulate loading/ pollution surface runoff from construction	No impact (sites have hydrological links to the proposed scheme (downstream). However, standard water pollution prevention control measures and best practice measures to control dust would be in place).				Neutral all options all sites				Not significant	
	Aldermoor Fields Ecosite	Local											
	Binley Common Farm Wood Ancient Woodland (and potential LWS)	UK or National	Disturbance through particulate loading/ pollution from construction	No impact (located >2km from the proposed scheme with no hydrological links)				Neutral all options				Not significant	
	Piles Coppice Ancient Woodland (and LWS)	UK or National											
Habitat	Broad-leaved woodland – semi-natural	County	Habitat loss	Minor adverse	Minor adverse	Moderate adverse	Minor adverse	Slight	Slight	Moderate	Slight	Significant temporary effect	Significant	Significant temporary effect
	Broad-leaved – plantation woodland	Local		Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Slight	Slight	Slight	Slight	Not significant (direct loss and severance of habitats; however, not significant given the geographical scale of the impact)		
	Veteran tree	County	Potential damage	Minor adverse	No impact	No impact	No impact	Slight	Neutral	Neutral	Neutral	Not significant (subject to tree protection)	Not significant	
	Hedgerows – all types	County	Potential damage and severance	Moderate adverse	Minor adverse	Minor adverse	Minor adverse	Moderate	Slight	Slight	Slight	Significant	Not significant	
	Neutral grassland unimproved	County	Not affected west of River Sowe	No impact	No impact	No impact	No impact	Neutral	Neutral	Neutral	Neutral	Not significant		
	Neutral grassland –	Local	Habitat loss and severance	No impact	Minor adverse	Minor adverse	Minor adverse	Neutral	Slight	Slight	Slight	Not significant		

	semi-improved											
	Improved grassland	Local	Habitat loss and severance	Moderate adverse	Moderate adverse	Moderate adverse	Minor adverse	Slight	Slight	Slight	Slight	Not significant
	Scrub – dense or continuous	Local	Habitat loss	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Slight	Slight	Slight	Slight	Not significant
	Tall ruderal	Local	Disturbance through particulate loading/ pollution surface runoff from construction	No impact	No impact	No impact	No impact	Neutral	Neutral	Neutral	Neutral	Not significant
	Running water	Local	Longer culvert	Minor adverse	Minor adverse	Minor adverse	No impact	Slight	Slight	Slight	Neutral	Not significant
	Cultivated or disturbed land – amenity grassland	Local	Habitat loss	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Slight	Slight	Slight	Slight	Not significant
	Cultivated or disturbed land – arable	Local	Habitat loss and severance	Major adverse	Moderate adverse (although less than option 11)	Moderate adverse (although less than option 11)	Moderate adverse	Slight	Slight	Slight	Slight	Not significant (direct loss and severance of habitats; however, not significant given the geographical scale of the impact)
	Buildings and hard-standing	Local (only buildings used by bats or barn owl)	Demolition of buildings	No impact	No impact	No impact	Moderate adverse	Neutral	Neutral	Slight	Neutral	Not significant
	Other habitat – private gardens	Local		No impact	No impact	No impact	No impact	Neutral	Neutral	Neutral	Neutral	Not significant
Species	Bats	County (legally protected)	Direct mortality, and loss of wildlife corridor	Major adverse (most land-take in compariso n to other options with potential to impact species; farm	Moderate adverse (less land-take than the other options; farm access to remain in-situ allowing species movement over the A46)	Major adverse (demolitio n of buildings at Hungerley Hall Farm with potential loss of bat roosts and	Major adverse (significant land take with potential to impact species; raising of junction on embankmen t; farm	Moderate	Slight	Moderate	Moderate	Significant / Not significan t (potential direct impacts on species; however, not consider ed / Significant

				access over the A46 to be removed)		offline alignment resulting in land take;).	access over the A46 to be removed)					significant given the scale of the impact)	
	Badgers	Local (legally protected)	Direct mortality, habitat loss and loss of wildlife corridor	Major adverse (loss of overbridge will create severance)	Minor adverse (loss of foraging habitats)	Major adverse (potential loss of a man sett)	Major adverse (potential loss of a main sett and loss of overbridge will create severance)	Slight	Slight	Slight	Slight	Not significant (potential direct impacts on species; however, not considered significant given the scale of the impact)	
	Great crested newts	Local (legally protected)	Loss of terrestrial habitat	Minor adverse (loss of small amount of habitat over 250m from pond)	No impact	Minor adverse (loss of small amount of habitat over 250m from pond)	Minor adverse (loss of small amount of habitat over 250m from pond)	Slight	Slight	Slight	Slight	Not significant	
	Barn owl	County (legally protected)	Direct mortality, severance of habitats, habitat loss and disturbance from construction	Minor adverse (loss of foraging habitat)	Minor adverse (loss of foraging habitat)	Moderate adverse (loss of foraging habitat and potential roost sites)	Minor adverse (loss of foraging habitat)	Slight	Slight	Slight	Slight	Not significant	Not significant (potential direct impacts on species; however, not considered significant given the scale of the impact)	Not significant
	Other birds	County	Habitat loss	No impact	No impact	Moderate adverse	No impact	Neutral	Neutral	Slight	Neutral	Not significant	Not significant (loss could be compensated for although this would	Not significant

												take 10-15 years)	
	Riparian mammals	County	Disturbance from construction activities and severance of habitat	Moderate adverse (extension to culvert and potential severance of habitat)	Moderate adverse (extension to culvert)	Moderate adverse (extension to culvert)	No impact	Slight	Slight	Slight	Neutral	Not significant (potential direct impacts on species; however, not considered significant given the scale of the impact)	Not significant
	Aquatic macroinvertebrates	Local	Disturbance from construction activities (water pollution)	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Neutral	Neutral	Neutral	Neutral	Not significant	

Red, Amber, Green status indicators have been given to rate the performance of each option for biodiversity.

- Red – Worst performing option (moderate or major adverse impact on objective/ criteria, which is significant)
- Amber – Next best performing option (minor or moderate adverse impact on objective/ criteria, which may be significant or not significant depending on the ecological importance of the feature / geographical scale of the impact)
- Green – Best performing option (no or negligible impact, which is not significant)

Note: Where the performance of the option is equal the rating is the same.

Table 8.9: Summary assessment of likely significant effects on biodiversity – Operation phase

Designated site/habitat / species	Ecological feature	Importance	Impact	Level of impact				Significance of effect				Overall significance			
				Option 6	Option 7	Option 8	Option 11	Option 6	Option 7	Option 8	Option 11	Option 6	Option 7	Option 8	Option 11
Designated site	Coombe Pool SSSI	UK or National	Nitrogen deposition from changes in air quality	Negligible (change in nitrogen deposition is ≤ 0.3kgN/ha/yr refer to Chapter 5: Air Quality)	Minor adverse (change in nitrogen deposition is ≤ 0.8kgN/ha/yr refer to Chapter 5: Air Quality)	Minor adverse (change in nitrogen deposition is ≤ 1.7kgN/ha/yr refer to Chapter 5: Air Quality)	Negligible (change in nitrogen deposition is ≤ 0.3kgN/ha/yr refer to Chapter 5: Air Quality)	Neutral	Slight	Slight	Neutral	Not significant			
	Herald Way Marsh SSSI / Herald Way Marsh (Claybrook Marsh) LNR	UK or National		Negligible (change in nitrogen deposition is ≤ 0.1kgN/ha/yr refer to Chapter 5: Air Quality; and refer to Chapter 13: Road Drainage and the Water Environment)				Slight				Not significant			
	Willenhall Woods LNR	County		Negligible (change in nitrogen deposition is ≤ 0.2kgN/ha/yr)	Negligible (change in nitrogen deposition is ≤ 0.21kgN/ha/yr)	Negligible (change in nitrogen deposition is ≤ 0.2kgN/ha/yr)	Negligible (change in nitrogen deposition is ≤ 0.1kgN/ha/yr)	Neutral	Neutral	Neutral	Neutral	Not significant			

Designated site/habitat / species	Ecological feature	Importance	Impact	Level of impact				Significance of effect				Overall significance			
				Option 6	Option 7	Option 8	Option 11	Option 6	Option 7	Option 8	Option 11	Option 6	Option 7	Option 8	Option 11
	Binley Common Farm Wood Ancient Woodland (and potential LWS)	UK or National		Negligible (change in nitrogen deposition is ≤ 0.1kgN/ha/yr)	Negligible (change in nitrogen deposition is ≤ 0.1kgN/ha/yr)	Negligible (change in nitrogen deposition is ≤ 0.2kgN/ha/yr)	Negligible (change in nitrogen deposition is ≤ 0.1kgN/ha/yr)	Neutral	Neutral	Neutral	Neutral	Not significant			
	Piles Coppice Ancient Woodland (and LWS)	UK or National		Negligible (change in nitrogen deposition is ≤ 0.1kgN/ha/yr)	Negligible (change in nitrogen deposition is ≤ 0.1kgN/ha/yr)	Negligible (change in nitrogen deposition is ≤ 0.1kgN/ha/yr)	Negligible (change in nitrogen deposition is ≤ 0.1kgN/ha/yr)	Neutral	Neutral	Neutral	Neutral	Not significant			
	Stoke Floods LNR	County	Surface-water run-off pollution / sedimentation	Negligible (refer to Chapter 13: Road Drainage and the Water Environment)				Neutral				Not significant			
	Sowe Valley Dorchester Way LWS	County													
	Gainsford Rise LWS	County													
	Stoke Floods LWS	County													
	Sowe Valley Stoke Aldermoor to London Road LWS	County													
	Hungerley Hall Farm Ecosite	Local													
	River Sowe Ecosite	Local													
	Coombe Abbey Pool (part of the Coombe Pool SSSI) Ecosite	County up to UK or National													
	Smite Brook, Headwater and Tributaries. Tributary of the River Sowe Ecosite	Local													
	Sphinx Golf Course Ecosite	Local													

Designated site/habitat / species	Ecological feature	Importance	Impact	Level of impact				Significance of effect				Overall significance			
				Option 6	Option 7	Option 8	Option 11	Option 6	Option 7	Option 8	Option 11	Option 6	Option 7	Option 8	Option 11
	Aldermoor Fields Ecosite	Local													
Habitat	Broad-leaved woodland – semi-natural	County	Surface-water run-off pollution / sedimentation	Negligible (refer to Chapter 13: Road Drainage and the Water Environment)				Neutral or slight				Not significant			
	Broad-leaved – plantation woodland	Local													
	Veteran tree	County													
	Hedgerows – all types	County													
	Neutral grassland unimproved	County													
	Neutral grassland – semi-improved	Local													
	Improved grassland	Local													
	Scrub – dense or continuous	Local													
	Tall ruderal	Local													
	Running water	Local													
	Cultivated or disturbed land – amenity grassland	Local													
	Cultivated or disturbed land – arable	Local													
	Buildings and hard-standing	Local (only buildings used by bats or barn owl)													
	Other habitat – private gardens	Local													

Designated site/habitat / species	Ecological feature	Importance	Impact	Level of impact				Significance of effect				Overall significance			
				Option 6	Option 7	Option 8	Option 11	Option 6	Option 7	Option 8	Option 11	Option 6	Option 7	Option 8	Option 11
Species	Bats	County (legally protected)	Species mortality from collision with operational traffic; and disturbance from lighting	Major adverse (most extensive new off-line road alignment, impeding movement of species across the landscape, risking species collision with operational traffic)	Moderate adverse (proposed scheme aligns more closely with the existing A46; farm overpass also be retained or a new one created to allow safe passage of species over the A46)		Major adverse (new off-line road alignment, impeding movement of species across the landscape, risking species collision with operational traffic)	Moderate	Slight		Moderate	Significant	Not significant (potential for direct and indirect impacts; however not considered significant given the scale of the impact)		Significant
	Badgers	Local (legally protected)	Species mortality from collision with operational traffic.	Major adverse (most extensive new off-line road alignment, impeding movement of species across the landscape, risking species collision with operational traffic)	Moderate adverse (proposed scheme aligns more closely with the existing A46; farm overpass also be retained or a new one created to allow safe passage of species over the A46)		Major adverse (new off-line road alignment, impeding movement of species across the landscape, risking species collision with operational traffic)	Moderate	Slight		Moderate	Not significant (potential for direct and indirect impacts; however not considered significant given the scale of the impact)			
	Barn owl	County (legally protected)	Species mortality from collision with operational traffic.	Major adverse (most extensive new off-line road alignment, impeding movement of species across the landscape, risking species collision with operational traffic)	Moderate adverse (proposed scheme aligns more closely with the existing A46; farm overpass also be retained or a new one created to allow safe passage of species over the A46)		Major adverse (new off-line road alignment, impeding movement of species across the landscape, risking species collision with operational traffic)	Moderate	Slight		Moderate	Significant	Not significant (potential for direct and indirect impacts; however not considered significant given the scale of the impact)		Significant
	Riparian mammals	County	Species mortality from collision with operational traffic.	Major adverse (most extensive new off-line road alignment, impeding movement of species across the landscape, risking species collision with operational traffic)	Moderate adverse (proposed scheme aligns more closely with the existing A46; farm overpass also be retained or a new one created to allow safe passage of species over the A46)		Major adverse (new off-line road alignment, impeding movement of species across the landscape, risking species collision with operational traffic)	Moderate	Slight		Moderate	Significant	Not significant (potential for direct and indirect impacts; however not considered significant given the scale of the impact)		Significant

9 Noise and Vibration

9.1 Introduction

9.1.1 This chapter reports the findings of an assessment of the likely significant effects related to Noise and Vibration as a result of the construction and operation of four options (Option 6, 7, 8 and 11) for the proposed scheme. The assessment follows the methodology set out in DMRB LA 111 Noise and Vibration Revision 2 (Highways England, 2020k). It also summarises the regulatory and policy framework related to noise and vibration, details the methodology followed for the assessment, and describes the existing environment in the area surrounding the proposed scheme options.

9.1.2 This chapter should be read in conjunction with Figures 9-1 to 9-17.

9.2 Legislative and policy framework

9.2.1 This assessment has been undertaken taking into account relevant legislation and guidance set out in national, regional and local planning policy, summarised in the sections below. The legislation and policy requirements have informed the preparation of this chapter. Compliance (or otherwise) with statute and policy relating to noise and vibration is addressed (where applicable) within Section 9.9 of this chapter.

Legislation

Environmental Noise (England) Regulations

9.2.2 The UK Government *Environmental Noise (England) Regulations 2006* (as amended 2008, 2009, 2010) (The Stationery Office, 2006) were introduced in England to implement European Union Assessment and Management of Noise Directive 2002/49/EC (known as the Environmental Noise Directive – END). The aims of the END are to define a common approach in order to avoid, prevent or reduce the harmful effects of environmental noise. Under the END, strategic noise mapping of major roads, railways, airports and agglomerations has been completed across England. Round 3 of the noise mapping process was completed in 2017 and includes the A46. The END also contains provisions for Local Authorities to propose 'quiet areas' for formal designation. Such areas should be quiet or relatively quiet, and generate significant benefits (in terms of health, wellbeing, and quality of life) for the communities they serve because of their quietness.

Land Compensation Act 1973

9.2.3 In general, noise and vibration are recognised as both a common law nuisance (either private or public) and a statutory nuisance. However, this does not apply to noise and vibration from road traffic. As a result, the *Land Compensation Act 1973* (The Stationery Office, 1973) and *The Noise Insulation Regulations 1975* (as amended 1988) (The Stationery Office, 1975) are used in respect of road traffic noise.

9.2.4 The *Land Compensation Act 1973* Part I (The Stationery Office, 1973) provides a means by which compensation can be paid to owners of land or property which has experienced a loss in value caused by the use of public works, such as new or altered roads. Noise and vibration are two of the factors which would be considered in any claim for compensation; however, the claim should consider all changes and effects, including betterment.

The Noise Insulation Regulations 1975 (as amended 1988)

9.2.5 *The Noise Insulation Regulations 1975* (NIR) (The Stationery Office, 1975) were made under Part II of *The Land Compensation Act 1973* (The Stationery Office, 1973). Regulation 3 imposes a duty, and Regulation 4 a power, on the relevant Highway Authority to undertake or make a grant in respect of the cost of undertaking noise insulation work in eligible buildings affected by a new or altered highway. This is subject to meeting a range of criteria relating to road traffic noise levels and distance from the works as specified in the Regulations. Regulation 5 also provides discretionary powers to undertake or make a grant in respect of the cost of undertaking noise insulation work in eligible buildings with respect to construction noise.

Control of Pollution Act 1974

9.2.6 Under Section 60 of the *Control of Pollution Act 1974* (CoPA) (The Stationery Office, 1974) the local authority can serve a notice specifying how construction works should be carried out, including working hours and noise and vibration limits. Breaching the terms of the notice is an offence.

9.2.7 Section 61 of the CoPA allows the contractor undertaking demolition or construction works to apply in advance to the local authority for 'prior consent' to undertake the works.

National policy

National Policy Statement for National Networks

9.2.8 Paragraphs 5.186 to 5.200 of the NPSNN deal with noise and vibration. The NPSNN states that excessive noise can have wide ranging impacts on the quality of human life and health, use and enjoyment of areas of value (such as quiet places) and areas with high landscape quality. It also notes that similar considerations apply to vibration.

9.2.9 The NPSNN states that operational noise and vibration, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance. For the prediction, assessment and management of construction noise and vibration, reference should be made to any relevant British Standards and other guidance, which also give examples of mitigation strategies.

9.2.10 The NPSNN states that noise from a proposed development can also have adverse impacts on wildlife and biodiversity, and that noise effects of a proposed development on ecological receptors should be assessed in accordance with paragraphs 5.20 to 5.38 of the NPSNN.

9.2.11 With respect to decision making, the NPSNN states that developments must be undertaken in accordance with statutory requirements for noise and that due regard must have been given to the relevant sections of the DEFRA *Noise Policy Statement for England* (NPSE) (Department for Environment, Food and Rural Affairs, 2010), the National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2021a) and the Government's associated planning guidance on noise (Ministry of Housing, Communities and Local Government, 2019e).

9.2.12 The requirements of the NPSNN have been accounted for through a combination of desk studies and modelling to identify the existing noise climate, the likely effects associated with construction and operation of the proposed scheme options (including changes in traffic flows on the road network), and appropriate mitigation and monitoring measures.

Noise Policy Statement for England

9.2.13 The *Noise Policy Statement for England* (Department for Environment, Food and Rural Affairs, 2010) (NPSE) sets out the long-term vision of the government's noise policy, which is to "*promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development*". This long-term vision is supported by the three aims, as listed under the NPSNN, and is designed to enable decisions to be made regarding what is an acceptable noise burden to place on society.

9.2.14 The Explanatory Note within the NPSE introduces the following concepts to aid in the establishment of significant effects:

- No Observed Effect Level (NOEL): the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established.
- Lowest Observable Adverse Effect Level (LOAEL): the level above which adverse effects on health and quality of life can be detected.
- Significant Observed Adverse Effect Level (SOAEL): the level above which significant adverse effects on health and quality of life occur.

9.2.15 The NPSE recognises that "it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations". The levels are likely to be different for different noise sources, for different receptors and at different times of the day.

National Planning Policy Framework

9.2.16 Paragraph 185 of the NPPF closely aligns with the aims set out in paragraph 5.195 of the NPSNN to avoid significant adverse impacts and to mitigate and reduce other adverse impacts. It also states that planning decisions should aim to "*identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason*". In accordance with the NPSNN, the NPPF policies are the primary source of policy guidance regarding this assessment.

Planning Practice Guidance

9.2.17 In March 2014, the Department for Communities and Local Government (DCLG) released its PPG (Ministry of Housing, Communities and Local Government, 2019) web-based resource to support the NPPF. The guidance advises that local planning authorities should consider:

- Whether or not a significant adverse effect is occurring or likely to occur.
- Whether or not an adverse effect is occurring or likely to occur.
- Whether or not a good standard of amenity can be achieved.

9.2.18 Factors to be considered in determining if noise is a concern are identified, including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise and cumulative impacts. The guidance within PPG has been used to inform the setting of LOAEL and SOAEL levels as detailed in Section 9.3.

Highways England policy

9.2.19 The Roads Investment Strategy 2 (RIS2): 2020 to 2025 (Highways England, 2020l) sets out the action which Highways England will take on reducing the impact of noise pollution between 2020/21 to 2024/25 (Road Period 2). Specific actions include continuing with the Noise Important Area (NIA) improvement

programme and considering the opportunities provided by new road surfaces and design of the soft estate, especially in sensitive areas such as National Parks and areas of high population density.

9.2.20 The Highways England Delivery Plan (2020-2025) (Highways England, 2020a) sets out the target for 7,500 households to benefit from noise reduction in mitigated 'NIAs' in Road Period 2.

Local policy

Coventry City Council Plan

9.2.21 Coventry City Council adopted their local plan in December 2017 (Coventry City Council, 2017) and covers the period 2011-2031.

9.2.22 There are no specific policies addressing noise and vibration from road proposals; however, avoiding and/or mitigating impacts from noise do form part of the following policies:

- EM8: Waste Management
- H3: Provision of New Housing

Rugby District Council Plan

9.2.23 Rugby District Council adopted their local plan in June 2019 (Rugby Borough Council, 2019) and covers the period 2011 to 2031.

9.2.24 There are no specific policies addressing noise and vibration from road proposals; however, avoiding and/ or mitigating impacts from noise do form part of the following policies:

- HS5: Traffic Generation and Air Quality, Noise and Vibration
- DS2: Sites for Gypsy, Travellers and Travelling Show people
- ED2: Employment Development within Rugby Urban Area

9.3 Assessment methodology

Construction

Construction noise impacts

9.3.1 At this stage, detailed information regarding construction activities and plant requirements is not available. Therefore, a qualitative discussion of potential construction noise impacts of the different options is provided, based upon professional judgement. This assessment considers the number and proximity of residential and other noise sensitive receptors to the proposed scheme options and the scale of the proposed construction activities, including identification of activities with the potential for the highest noise emissions and best practice measures to minimise noise and vibration.

9.3.2 Noise sensitive receptors (NSRs) may be impacted due to noise generated by construction activities and construction plant for all options. The increase in noise levels will depend upon a number of variables, the most significant of which are:

- The noise generated by plant or equipment used on site, generally expressed as a sound power level.
- The periods of operation of the plant on the site, known as its 'on-time'.
- The distance between the noise source and the receptor.
- The attenuation due to ground and barrier effects.

9.3.3 DMRB LA 111 uses the 'ABC' method as described in Annex E of BS 5228-1 (British Standards Institute, 2014a) for identifying the threshold of potentially significant construction noise effects. This approach is based on setting the threshold for the onset of potentially significant adverse effects (i.e. the SOAEL) depending on the existing ambient noise level, receptors with low existing ambient noise levels (Category A) have a lower threshold than those with high existing ambient noise levels (Category C). Higher thresholds are set for normal daytime construction working hours, compared to the more sensitive evening, weekend and night-time periods.

9.3.4 As a conservative approach, DMRB LA 111 sets the threshold for the onset of adverse noise effects (i.e. the LOAEL) at a construction noise level equal to the existing ambient noise levels. Construction noise levels between the LOAEL and SOAEL have the potential to result in adverse noise effects but would not normally be classed as significant adverse effects. However, noise mitigation measures are still considered and applied in such locations to seek to keep all noise effects to a minimum. Table 9.1 which is adapted from Table 9.1 in BS 5228 sets out the construction noise SOAEL and LOAEL used for this assessment.

Table 9.1: Construction noise LOAEL and SOAEL for all receptors

Time of day	SOAEL $L_{Aeq,T}$ dB (façade)			LOAEL $L_{Aeq,T}$ dB (façade)
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75	Existing ambient
Evenings (19:00 – 23:00 weekdays) and Weekends (13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays)	55	60	65	Existing ambient
Night-time (23:00 – 07:00)	45	50	55	Existing ambient

[1] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

[2] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as the category A values.

[3] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than the category A values.

NOTE: if the ambient noise level exceeds the Category C threshold values then the SOAEL and LOAEL are defined as equal to the existing ambient.

9.3.5 However, no specific details on the construction activities, number and type of construction plant are available. Although high level construction programmes and phasing sequences have been provided by the buildability advisor, these do not contain the detailed information required to undertake a quantitative construction noise impact assessment for each option. As such, a qualitative assessment using professional judgment has been carried out at this stage for all options to determine the potential magnitude and significance of construction noise impacts.

Construction traffic and diversion routes impacts

9.3.6 As details on construction traffic movement and diversion routes are also not available at this time, these will be assessed at a later stage in the design process when more information will be available.

Construction vibration impacts

9.3.7 At this stage, detailed information regarding construction activities and plant requirements is not available. Therefore, a qualitative discussion of potential construction vibration impacts of the different options is provided, based upon professional judgement. A number of construction activities may lead to vibration impacts experienced by nearby sensitive receptors.

9.3.8 The passage of vibration through the ground is highly dependent on site-specific ground conditions. British Standard (BS) 5228-2: 2009+A1: 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Vibration (British Standards Institute, 2014a) provides a range of measured historical data for a variety of different construction works.

9.3.9 For human receptors the LOAEL is defined as a PPV of 0.3 mms^{-1} (millimetres per second), this being the point at which construction vibration is likely to become perceptible. The SOAEL is defined as a PPV of 1.0 mms^{-1}, this being the level at which construction vibration can be tolerated with prior warning. These levels are in accordance with DMRB LA 111 Table 3.31.

9.3.10 In addition to human annoyance, building structures may be damaged by high levels of vibration. The levels of vibration that may cause building damage are far in excess of those that may cause annoyance. Consequently, if vibration levels within buildings are controlled to those relating to annoyance (i.e. 1.0 mms^{-1}), then it is highly unlikely that buildings would be damaged by construction vibration.

9.3.11 BS 7385-2 Evaluation and measurement for vibration in buildings (British Standards Institute, 1993) states that for transient vibration, such as from individual impacts, the probability of building damage tends towards zero at levels less than 12.5 mms^{-1} PPV. For continuous vibration, such as from vibratory rollers, the threshold is around half this value. It is also noted that these values refer to the likelihood of cosmetic damage. Minor damage is described as occurring at a vibration level twice that of cosmetic damage and major damage at a vibration level twice that of minor damage.

9.3.12 However, as with the construction noise assessment, these methodologies rely on detailed construction phase information which is not available for this option identification stage. Therefore, a qualitative assessment of potential construction vibration effects has been undertaken, which will be based on the available information and professional judgement.

Significance of effect for construction impacts

As set out in LA 111, the key factors in identifying significant effects from construction noise and vibration annoyance are the magnitude of the impact and the duration. The magnitude of the impact is considered on a scale from negligible to major, as detailed in Table 9.2, adapted from DMRB LA 111.

Table 9.2: Construction noise and vibration magnitude of impact

Magnitude of impact	Construction noise level	Construction traffic noise level increase	Construction vibration level
Major	Above or equal to the SOAEL +5 dB	Greater than or equal to 5 dB	Above or equal to 10 mms^{-1} PPV
Moderate	Above or equal to the SOAEL and below +5 dB	Greater than or equal to 3 dB and less than 5 dB	Above or equal to the SOAEL and below 10 mms^{-1} PPV
Minor	Above or equal to the LOAEL and below the SOAEL	Greater than or equal to 1 dB and less than 3 dB	Above or equal to the LOAEL and below the SOAEL
Negligible	Below LOAEL	Less than 1 dB	Below LOAEL

9.3.13 With regards to duration, DMRB LA 111 states that construction noise or construction vibration shall constitute a significant effect where a major or moderate magnitude of impact would occur for a duration of:

- 10 or more working days (or evenings/ weekends or nights) in any 15 consecutive days.
- More than 40 days (or evenings/ weekends or nights) in any six consecutive months.

9.3.14 As detailed information on construction activities and durations is not available at this stage for any of the options, a qualitative assessment has been undertaken based on information available at the time of writing this assessment and professional judgement.

Operation

Assessment of impacts

9.3.15 In accordance with DMRB LA 111, traffic noise levels have been calculated using Calculation of Road Traffic Noise (CRTN) (Department of Transport/Welsh Office, 1988) to determine the traffic noise change due to the proposed scheme options for:

- Short-term: Do Minimum Opening Year (DM 2025) compared against the Do Something Opening Year (DS 2025).
- Long-term: Do Minimum Opening Year (DM 2025) compared against the Do Something Future Year (DS 2040).

9.3.16 Noise from a flow of road traffic is generated by both the vehicle engines and the interaction of tyres with the road surface. The traffic noise level at a receptor, such as an observer at the roadside or residents within a property, is influenced by a number of factors including traffic flow, speed, composition (percentage of heavy duty vehicles (HDV) greater than 3.5 tonnes unladen), road gradient, the type of road surface, the distance from the road and the presence of any obstructions between the road and the receptor.

9.3.17 Noise from a stream of traffic is not constant, but to assess the traffic noise impact a single figure estimate of the overall noise level is necessary. The index adopted by CRTN to assess traffic noise is $L_{A10,18h}$. This value is determined by taking the

highest 10% of noise readings in each of the 18 one-hour periods between 06:00 and 00:00, and then calculating the arithmetic mean.

9.3.18 The CRTN methodology applies a 'low flow' correction between 18-hour vehicle flows of 1,000 and 4,000. The low flow correction procedure amplifies the impact of changes in traffic flows that are already low, in particular at receptors very close to the road. The 1,000 18-hour flow cut off is the lower limit of the reliability of the CRTN prediction methodology.

9.3.19 Although the main focus of the assessment is on daytime impacts, DMRB LA 111 also requires an assessment of night-time traffic noise levels using the parameter $L_{night,outside}$, which is the traffic noise level over the period 23:00 to 07:00. However, this parameter is not calculated by the standard CRTN methodology. DMRB LA 111 refers to three methods for calculating night-time traffic noise levels developed by TRL (Transport Research Laboratory, 2002) 'Method 3', which factors the $L_{night,outside}$ from the $L_{A10,18h}$, is based on the typical diurnal pattern of traffic flows in the UK and provides reliable results for most UK roads. This method has been used to derive $L_{night,outside}$ reported in this assessment.

9.3.20 Predicted daytime and night-time traffic noise levels at noise sensitive receptors within the calculation area have been generated using noise modelling software. Predictions have been carried out for the opening year (OY) of 2025 and future year (FY) of 2040 (15 years after opening) for the Do-Minimum (DM) (Without Scheme) and Do-Something (DS) (with Scheme) scenarios. The model is based on traffic data generated by a traffic model of the proposed scheme options and the surrounding area. The traffic flow and % HDV are taken directly from the traffic model. However, the traffic speeds are subject to a process called 'speed pivoting', as required by DMRB LA 111 which adjusts the modelled speed based on measured speed data.

9.3.21 The noise level predictions have also been corrected to account for the effect of the road surface types which will be in place in the different scenarios, as set out in paragraphs 9.9.9 to 9.9.11. The model also includes the ground topography, ground type and buildings to form a 3D representation of the study area. Further details of the noise model data sources and assumptions are provided in Appendix D.2.

9.3.22 Different façades of the same property can experience different changes in traffic noise level depending on their orientation to the noise source. DMRB LA 111 requires that the assessment is based on the façade that experiences the greatest magnitude of change i.e. the largest numerical change whether this is an increase or decrease. Where this change is equal on more than one façade, the façade experiencing the highest DS traffic noise level is chosen.

9.3.23 For other road links more remote from the proposed scheme options i.e. outside the calculation area, in accordance with DMRB LA 111, a proportionate approach has been adopted based on the change in the 18 hour CRTN Basic Noise Level (BNL) i.e. the traffic noise level at 10m from the kerb, taking into account the flow, % HDV, speed and road surface. These links are defined as 'affected routes' and are defined further in paragraph 9.9.43 A count of potentially sensitive receptors within 50m of affected routes has also been completed to give an indication of the number of receptors in the vicinity of each link, and which are likely to experience the estimated change in traffic noise.

9.3.24 The SOAEL and the LOAEL for road traffic noise used in this assessment for all noise sensitive receptors for the time periods when they are in use, are detailed in Table 9 3 taken from DMRB LA 111 Table 3.49.1.

Table 9 3: Traffic noise LOAEL and SOAEL for all receptors (adapted from DMRB LA 111 Table 3.49.1)

Time period	SOAEL	LOAEL
Daytime	68 dB $L_{A10,18h}$ (façade) 63 dB $L_{Aeq,16h}$ (free-field)	55 dB $L_{A10,18h}$ (façade) 50 dB $L_{Aeq,16h}$ (free-field)
Night	55 dB $L_{night,outside}$ (free-field)	40 dB $L_{night,outside}$ (free-field)

9.3.25 For daytime, the SOAEL is set at 68 dB $L_{A10,18h}$ (façade), which is consistent with the daytime trigger level in The Noise Insulation Regulations 1975. The Noise Insulation Regulation threshold has a history of use in UK noise policy as it has previously been incorporated into planning guidance on the acceptability of sites for new residential developments. It is the external level that corresponds to an internal level with a closed single glazed window, which would meet the internal daytime criteria of 35 dB $L_{Aeq,16h}$ specified in Section 7.7 of BS 8233 (British Standards Institute, 2014c) as desirable for resting in living rooms. It also correlates with the results of Defra Study NANR316 (Department for Environment, Food and Rural Affairs, 2014) and is supported by the guidance in the Professional Practice Guidance: Planning and Noise produced by the Association of Noise Consultants, Institute of Acoustic and Chartered Institute of Environmental Health (Institute of Acoustics et al, 2017).

9.3.26 The daytime LOAEL is set at 50 dB $L_{Aeq,16h}$ (free-field), based on the guidance provided in the 1999 World Health Organisation (WHO) Guidelines for Community Noise regarding the onset of moderate community annoyance (World Health Organisation, 1999). The WHO published the Environmental Noise Guidelines for the European Region in 2018 (World Health Organisation, 2018) which provides guidelines for specific noise sources including road traffic. These guidelines in Section 3.1 suggest a recommended 53 dB L_{den} for road traffic noise (note L_{den} correlates approximately to $L_{A10,18h}$) based on a 10% risk of being Highly Annoyed. The guidelines state they are “not meant to identify effect thresholds”. Instead, they are based on the “smallest relevant risk increase” for various effects, and therefore lie slightly above the LOAEL. On this basis a LOAEL of 50 dB $L_{Aeq,16h}$ (free-field) is consistent with the latest WHO Guidelines.

9.3.27 For night-time, the SOAEL is set at 55 dB $L_{night,outside}$ (free field), which corresponds to an internal level with a closed single glazed window, which would be slightly below the night time criteria of 30 dB $L_{Aeq,8h}$ specified in Section 7.7 of BS 8233 as desirable for sleeping in bedrooms. It also correlates well with the results of Defra Study NANR316 and is supported by the Professional Practice Guidance: Planning and Noise guidance. The WHO 2009 Night Noise Guidelines for Europe (World Health Organisation, 2009) explicitly identify in Section 5.6 the night-time LOAEL as 40 dB $L_{Aeq,8h}$ (free-field). Therefore, this LOAEL has been adopted in the assessment. Levels between 40 and 55 dB are identified in the guidelines as ‘adverse’ but not significant adverse, where health effects are observed among the exposed population. 55 dB is identified in the guidelines as when the risk of cardiovascular disease increases.

9.3.28 The 2018 WHO Guidelines complement the WHO 2009 Night Noise Guidelines for Europe and in Section 3.1 suggest a recommended 45 dB L_{night} for road traffic noise based on a 3% risk of being Highly Sleep Disturbed. However, as discussed above the 2018 WHO guidelines state they are “not meant to identify effect thresholds”. Instead, they are based on the “smallest relevant risk increase” for various effects, and therefore lie slightly above the LOAEL, as explicitly defined in the WHO 2009 Night Noise Guidelines for Europe.

9.3.29 No special circumstances have been identified for the proposed scheme that suggest an alternative SOAEL or LOAEL should be adopted.

Operational traffic vibration

9.3.30 DMRB LA 111 states that "Operational vibration is scoped out of the assessment methodology as a maintained road surface will be free of irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects." As such, operational vibration impacts have not been included in this assessment.

Significance of effect for operational traffic noise impacts

9.3.31 DMRB LA 111 provides two classifications for the magnitude of the traffic noise impact of a proposed road scheme, as shown in Table 9.4. These relate to both short-term changes and long-term changes in traffic noise levels. The short-term classification detailed in Table 9.4is the main driver of the initial identification of significant effects.

Table 9.4: Magnitude of traffic noise impacts

Short-term change (DMOY to DSOY)		**Long-term change (DMOY to DSFY)**	
Noise level change (rounded to 0.1 dB) $L_{A10,18h}$ dB	**Magnitude of impact**	**Noise level change (rounded to 0.1 dB) $L_{A10,18h}$ dB**	**Magnitude of impact**
0	No change	0	No change
0.1 – 0.9	Negligible	0.1 – 2.9	Negligible
1.0 – 2.9	Minor	3.0 – 4.9	Minor
3.0 – 4.9	Moderate	5.0 – 9.9	Moderate
5.0+	Major	10.0+	Major

9.3.32 Negligible changes in the short-term would not cause changes to behaviour or responses to noise, and as such would not give rise to significant effects. For minor, moderate and major changes DMRB LA 111 outlines a range of additional factors that are considered in identifying significant effects:

- Where the magnitude of change in the short-term lies relative to the boundaries between the bands outlined in Table 9.4, in some circumstances a change within 1 dB of the top of the minor range may be appropriate to be considered a likely significant effect. Conversely a change within 1 dB of the bottom of the moderate range, may in some circumstances be more appropriate to be considered as not likely to be a significant effect.
- The magnitude of change in the long-term is different to that in the short-term - if the short-term change is minor (not significant), but the long-term change is moderate (significant) it may be more appropriate to be considered as a likely significant effect. Conversely, a smaller magnitude of change in the long-term compared to the short-term may indicate that it is more appropriate to be considered as not likely to be a significant effect.
- The absolute noise levels relative to the SOAEL - if the DS traffic noise levels are high i.e. above the SOAEL, a traffic noise change in the short-term opening year of 1.0 dB or more may be more appropriate to be considered as a likely significant effect.

- The location of noise sensitive parts of a receptor - a receptor may contain areas which are more or less sensitive than others e.g. office spaces or kitchens in a school would be considered less sensitive than classrooms. Conversely, if the sensitive parts of the receptor are exposed to the noise source, it can be more appropriate to conclude a minor change in the short-term and/ or long-term is a likely significant effect.
- The acoustic context, if a proposed scheme changes the acoustic character of an area - if a proposed scheme introduces road noise into an area where road noise is not currently a major source, it may be appropriate to conclude a minor short-term change is a likely significant effect.
- The likely perception of a traffic noise change - if a proposed scheme results in obvious changes to the landscape or setting of a receptor it is likely the traffic noise level changes would be more acutely perceived, and it may be more appropriate to conclude a minor short-term change is a likely significant effect. Conversely if a proposed scheme is not visible it can be more appropriate to conclude a moderate change is not a likely significant effect.

Noise Insulation Regulations

9.3.33 A preliminary indication of any properties likely to qualify under The Noise Insulation Regulations 1975 for each option is provided in Section 9.9. A full assessment would be completed once the detailed design of the proposed scheme is finalised and in accordance with the timescales set out in the Regulations.

Compliance with policy

9.3.34 As required by DMRB LA 111, the traffic noise SOAEL and LOAEL have been used to consider how the options comply with the policy aims detailed in the NPPF, within the context of government policy on sustainable development. The policy aims are to:

- Avoid significant adverse impacts on health and quality of life from noise as a result of the new development.
- Mitigate and minimise other adverse impacts on health and quality of life from noise from the new development.
- Contribute to improvements to health and quality of life through the effective management and control of noise, where possible.

9.3.35 At this stage, noise mitigation measures have not been fully developed for any of the options under consideration. Thus, the discussions in Section 9.9 are restricted to what extent the unmitigated options comply with the above aims and the noise mitigation measures which need to be considered further in order to meet these aims.

9.4 Assessment assumptions and limitations

9.4.1 At present, a construction contractor has not been appointed and as such the following assumptions and limitations have been made with regard to the noise and vibration impact assessment proposed at this design stage:

9.4.2 At this stage details regarding construction activities and plant requirements are not available. Therefore, a preliminary, qualitative assessment of potential construction noise and vibration has been undertaken using professional judgement.

9.5 Study area

Construction

9.5.1 The study area for the assessment of construction phase noise impacts comprises of the closest potentially sensitive receptors to the proposed scheme options and any other areas affected by construction activities, such as construction compounds, soil storage areas, and haulage routes. As detailed in DMRB LA 111, it is standard practice to consider noise impacts from construction activities up to a maximum distance of approximately 300m from the works and vibration impacts from construction works up to a maximum distance of approximately 100m from the works. No impacts would be anticipated beyond these distances. At this stage, there is limited information regarding the construction methods and location of plant, therefore it assumed that the 300m construction noise and 100m construction vibration study areas for each route option is appropriate.

9.5.2 DMRB LA 111 requires that, any other areas "where there is reasonable stakeholder expectation" that a construction phase assessment is undertaken should also be considered. However, consultation with Coventry City Council and Rugby District Council has not highlighted any such areas.

9.5.3 In addition, where the project requires full carriageway closures at night (23:00 to 07:00), an additional "diversion route study area shall be defined to include a 25m width from the kerb line of the diversion route".

9.5.4 There is also no information currently available on construction traffic flows and routes or diversion routes for any of the options. Therefore, the impacts of construction traffic and diversion routes will be assessed once the preferred option is known and suitable information is available.

Operation

9.5.5 The study area for the assessment of the operational phase road traffic noise impacts of each option has been defined as outlined below, following the guidance set out within DMRB LA 111.

9.5.6 The study area comprises of an area 600m from all proposed scheme options and existing roads physically changed or bypassed by the proposed scheme options. This area is defined as the 'calculation area' for the operational noise assessment.

9.5.7 The study area for each option also includes the area within 50m of all existing roads that are predicted to be subject to a change in traffic noise level as a result of the proposed scheme of:

- 1.0 dB or more in the short-term (DM opening year to DS opening year).
- 3.0 dB or more in the long-term (DM opening year to DS 15 years after proposed scheme opening), subject to a minimum change of 1 dB in the future year due to the proposed scheme.

9.5.8 For the purposes of the assessment these roads are defined as 'affected routes' and are identified by the analysis of the operational phase traffic data. The identification of affected routes was undertaken using spreadsheet calculation of the change in the 18 hour Calculation of Road Traffic Noise (CRTN) Basic Noise Level (BNL) i.e. the traffic noise level at 10m from the kerb, taking into account the flow, %HDV, speed and road surface (excluding gradient). This process considered all roads with 18-hour (06:00 - 00:00) weekday traffic flows above the 1000 18-hour flow lower cut off of the CRTN prediction methodology in any scenario.

9.5.9 DMRB LA 111 requires that, any other areas "where there is reasonable stakeholder expectation" that an operational phase assessment is undertaken should also be considered. No such areas have been identified at this stage.

9.5.10 The calculation area is illustrated in Figures 9-1 to 9-4. The identified affected routes are illustrated in Figures 9-5 to 9-8 for Options 6, 7, 8 and 11 respectively.

9.5.11 The estimated totals of noise sensitive receptors within the study area for each option is as follows:

- Option 6: Total of 2813 residential properties are located within the study area, of which 2724 are within the calculation area and 89 are within 50m of affected routes outside the calculation area
- Option 7: Total of 2818 residential properties are located within the study area, of which 2724 are within the calculation area and 92 are within 50m of affected routes outside the calculation area
- Option 8: Total of 2815 residential properties are located within the study area, of which 2723 are within the calculation area and 92 are within 50m of affected routes outside the calculation area. The demolition of Hungerley Hall Farmhouse in this option results in a reduction in the number of residential properties within the calculation area for this option, compared to Options 6 and 7.
- Option 11: Total of 2804 residential properties are located within the study area, of which 2724 are within the calculation area and 80 are within 50m of affected routes outside the calculation area

9.5.12 A total of 6 non-residential sensitive buildings are located within the calculation area for all options, consisting of schools, community facilities and a medical facility. These are shown on Figures 9-1 to 9-4. A further two non-residential sensitive buildings are located within 50m of affected routes for all options, both being community facilities.

9.6 Baseline conditions

9.6.1 Currently no baseline noise measurement data has been obtained for the study area. This will be undertaken at a later stage of the proposed scheme.

9.6.2 Based on aerial imagery, it is considered that road traffic is likely to be the dominant source of noise in the study area, with some localised commercial sources. In addition to the A46, there are a number of other potentially significant sources of road traffic noise, including the B4082 and Clifford Bridge Road. A reflective noise barrier, approximately 50m in length, is located along the A46 northbound carriageway as it crosses Brinklow Road towards the south of the calculation area. There are also a number of minor roads, in particular around the Star Industrial Park and University Hospital Coventry and Warwickshire, which will contribute to ambient noise levels. Other noise sources include noise associated with general urban and rural activities.

9.6.3 The area around Walsgrave Junction is a mix of residential, community and commercial use as well as areas of undeveloped semi-natural environment. This includes the following residential communities in the vicinity of the existing junction which are considered as noise sensitive receptors (NSRs):

- To the north in the vicinity of Dorchester Way
- To the west along and close to Clifford Bridge Road
- To the south-west in the vicinity of Gainford Rise

- Isolated properties to the east within the grounds of Coombe Abbey and along Brinklow Road
- Isolated properties along the A46, including Hungerley Hall Farmhouse and Walsgrave Hill Farmhouse
- All residential receptors in the study area for each option are considered to be sensitive to traffic noise levels during the day and night.

9.6.4 Other noise sensitive receptors (NSRs) in the vicinity of the junction include the following educational, medical facilities and community facilities:

- Clifford Bridge Primary School
- Pearl Hyde Primary School
- Caludon Castle Business Enterprise School
- Wyken Community Centre
- Busy Bees Nursery
- University Hospital Coventry and Warwickshire

9.6.5 All sensitive receptors described in paragraph 9.6.4 are considered to be sensitive to traffic noise level changes during the day. However, only University Hospital is considered to be sensitive to traffic noise level changes during both the day and night.

9.6.6 There are no Noise Important Areas (NIAs) located within the immediate vicinity of each option. However, there are a number of NIAs located on surrounding roads. These include three NIAs situated on the A4600 Antsy Road (IDs 324, 11796 and 14385), two to the south-west on Brandon Road (ID 330) and Binley Road (ID 11800) and one on the A46 at Binley Junction (ID 14307). All these NIAs, except ID 14307, are the responsibility of Coventry City Council. ID 14307 is the responsibility of Highways England. No Environmental Noise Directive (END) quiet areas or potential END quiet areas have been identified in the study area for any of the four options.

9.6.7 There are no Scheduled Monuments within the study area. However, Coombe Pool SSSI, located directly east of the junction is designated for its ornithology. This SSSI is located within Coombe Abbey, which is a Grade II* Park and Garden. There is also a PRoW which crosses the A46 to the north of the proposed scheme. There are three Grade II listed buildings at Hungerley Hall Farm within the proposed scheme boundary, one of which (Hungerley Hall Farmhouse) has been identified as a residential building.

9.6.8 Figures 9-1 to 9-4 illustrate the identified potentially noise sensitive receptors in the calculation area.

Existing and future surfacing

9.6.9 Information on existing road surfacing in the Highways England Pavement Management System (HAPMS) database identifies a mixture of Hot Rolled Asphalt and Low Noise Surfacing materials on Highways England's roads in the study area. Information on Highways England's future resurfacing plans in the area has not been available at this stage of the proposed scheme.

9.6.10 In order to adopt a worst case approach in terms of changes in traffic noise due to the proposed scheme, thin surfacing has been assumed to be in place along the length of the proposed scheme (including the non-strategic roads within the proposed scheme extents for each option) and strategic roads throughout the study area in the opening year and future year, both with and without the proposed scheme.

9.6.11 All other roads included in the detailed quantitative noise modelling are assumed to be surfaced with hot rolled asphalt in the opening year and future year both with and without the proposed scheme.

15 years after opening do-minimum (2040)

9.6.12 Table 9.5 summarises the long-term change in predicted traffic noise levels between the 2025 DM and 2040 DM scenarios at NSRs in the calculation area. The results are provided for the ground floor of the buildings for the daytime impacts and the top floor of each building for the night-time impacts, for example, for a two-storey house 1.5m for the day and 4.0m for the night. For properties in blocks of flats, all floors are reported for both daytime and night-time impacts. As detailed in paragraph 9.6.5, only one of the potentially sensitive non-residential buildings have been identified as being potentially sensitive at night.

9.6.13 The number of NSRs that are within 50m of affected routes outside the calculation area, where a proportionate approach based on the 18-hour CRTN BNL has been adopted, are reported in Appendix D.1.

Table 9.5: Long-term change in predicted Do-Minimum traffic noise levels (DM 2025 to DM 2040)

Change in noise level		Daytime		Night-time	
		Number of residential dwellings	**Number of other sensitive receptors**	**Number of residential dwellings**	**Number of other sensitive receptors**
Increase in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 2.9	2683	5	2680	1
	3.0 - 4.9	0	0	0	0
	5.0 - 9.9	0	0	0	0
	≥10.0	0	0	0	0
No change	0	17	0	25	0
Decrease in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 2.9	24	1	19	0
	3.0 - 4.9	0	0	0	0
	5.0 - 9.9	0	0	0	0
	≥10.0	0	0	0	0

9.6.14 The traffic noise changes from DM 2025 to DM 2040 within the calculation area are presented as a noise difference contour plot in Figure 9-9. This plot is based on free-field traffic noise levels at first floor level (4.0m above ground) using a 10m x 10m grid and is provided for illustration purposes.

9.6.15 The vast majority (98%) of NSRs within the calculation area would experience a negligible (0.1 - 2.9 dB) increase in daytime traffic noise levels from 2025 to 2040, in the absence of the proposed scheme. This is due to the general growth in traffic over time.

9.6.16 Approximately 2% of NSRs within the calculation area are predicted to experience either no change or a negligible (0.1 - 2.9 dB) decrease in daytime traffic noise levels from 2025 to 2040 in the absence of the proposed scheme. Decreases are predicted to occur at properties to the south-west of the junction in the vicinity of Gainford Rise and Royston. These properties are close to the existing B4082 which is predicted to experience a decrease in traffic flow over the long-term. This decrease in traffic flow results from traffic rerouting away from this link as both traffic volumes and delays increase at Walsgrave junction. Properties in the vicinity of the junction between Clifford Bridge Road and Belgrave Road are predicted to experience no change in traffic noise level over the long-term, resulting from a combination of changes in flows and speeds on links around this junction.

9.6.17 The vast majority of identified affected routes are predicted to experience a negligible or minor long-term increase in traffic noise levels at the roadside in the absence of the proposed scheme. This is due to the normal growth of traffic over time. Six affected routes are predicted to experience no change or a negligible long-term decreases in traffic noise levels over time in the absence of the proposed scheme with one affected route, (M42/M6 link road from Coleshill Heath Road to M6 northbound), predicted to experience a moderate decrease in traffic noise levels. Only two of these routes, (A46 Binley Junction southbound off slip and Avondale Road, Brandon between Main Street and Bretford Road) have noise sensitive receptors within 50m.

9.7 Potential impacts

Construction

9.7.1 The main construction activities that would take place for all options during the proposed scheme construction phase are site clearance, earthworks, drainage works and road construction (pavement) works. Bridge construction would also take place in the construction of Options 6 and 11. All these construction activities have the potential to result in temporary noise impacts at the receptors closest to such works.

9.7.2 The potential for temporary construction vibration impacts is dependent on the need for construction activities, which are a potentially significant source of vibration, such as earthworks and road construction (pavement) works using vibratory rollers. Piling may be required for the bridge construction in Options 6 and 11, the potential for vibration impacts from piling depends on the type of piling adopted.

9.7.3 Construction traffic and diversion routes used during overnight closures can have a temporary impact on sensitive receptors located along existing roads used by these vehicles. However, details on construction traffic and diversion routes are not yet available for any of the options and thus potential impacts of these factors on noise sensitive properties cannot be determined at this stage.

Operation

9.7.4 The magnitude of operational traffic noise impacts at a receptor is dependent on a range of factors, including the traffic flow, composition, speed, road surface, ground topography, the presence of intervening buildings and structures, and the distance to the road.

9.7.5 The operation of each option has the potential to result in both beneficial and adverse permanent traffic noise impacts. All options would alleviate traffic flow on the existing B4082 close to some receptors; however, each option would also provide a new noise source close to other receptors, as described below.

- Option 6 would result in the B4082 traffic moving away from properties located to the south-west of the junction. However, this option would also result in traffic noise moving closer to properties in the vicinity of Dorchester Way. This option would also result in traffic noise moving from the rear to the front of Hungerley Hall Farmhouse.
- Option 7 would result in free-flowing traffic moving closer to properties located to the south-west of the junction and the rear façade of Hungerley Hall Farmhouse.
- Option 8 would result in free-flowing traffic moving closer to properties located to the south-west of the junction and properties in the vicinity of Dorchester Way. This option would result in the demolition of the residential property at Hungerley Hall Farm.
- Option 11 would result in the B4082 traffic moving away from properties located to the south-west of the junction. However, this option would also result in traffic noise moving closer to properties in the vicinity of Dorchester Way. This option would also result in traffic noise moving closer to the rear façade of Hungerley Hall Farmhouse.

9.7.6 DMRB LA 111 scopes out operational vibration impacts as a maintained road surface will be free of irregularities as part of project design and general maintenance. As such, operational vibration does not have the potential to lead to significant adverse effects and is scoped out of this assessment.

9.8 Design, mitigation and enhancement measures

Construction

9.8.1 The use of best practicable means associated with mitigating potential noise and vibration impacts from construction activities would be employed and set out in an EMP which will be prepared and implemented by the construction contractor.

9.8.2 These measures would include:

- Selection of quiet and low vibration equipment.
- Defined working hours.
- Review of construction programme and methodology to consider low noise and low vibration methods (including non-vibratory compaction plant and low vibration piling methods, where required).
- Optimal location of equipment on site to minimise noise disturbance.
- The provision of acoustic enclosures to static plant, where necessary.
- Use of less intrusive alarms, such as broadband vehicle reversing warnings.

9.8.3 During the construction phase appropriate mechanisms to communicate with local residents would be set up to highlight potential periods of disruption (such as web-based, newsletters, newspapers or radio announcements), and an appropriate communication strategy will be developed.

Operation

9.8.4 At this stage of the project whilst options are still being appraised, no noise mitigation measures have been included in the noise modelling undertaken, except for low noise surfacing along the proposed scheme for all options (including the non-strategic roads within the proposed scheme extents for each option).

9.8.5 Locations at which further noise mitigation measures will need to be considered for each option are identified in Section 9.9. However, the feasibility and potential benefit of any of these further noise mitigation measures, such as noise barriers, will be considered at later stages in the assessment. Such measures could potentially reduce the identified effects to not significant at some of the noise sensitive receptors. However, adverse effects may still occur due to the large magnitude of the impact and the proximity of some of these receptors to the proposed scheme.

9.9 Assessment of likely significant effects

Construction noise and vibration impacts

9.9.1 Finalised details of the construction works required for each option are not currently available. However, there is the potential for adverse noise and vibration impacts at the closest receptors to the works, in particular if night-time works are required.

Option 6

9.9.2 The potentially worst affected receptors for this option include:

- Residential properties in Sturminster Close, Fontmell Close, Abbotsley Close, Bridport Close and Dorchester Way, the closest properties being located approximately 130m from the proposed scheme. These residential properties could be impacted by earthworks and road construction activities associated with both the realignment of the A46 to the north of the existing junction and the construction of the link road between Clifford Bridge Road and proposed dumbbell roundabouts.
- Hungerley Hall Farmhouse which is located approximately 50m from the proposed scheme. This could also be impacted by earthworks and road construction activities associated with both the realignment of the A46 to the north of the existing junction and the construction of the link road between Clifford Bridge Road and proposed dumbbell roundabouts.
- Residential properties on Gainford Rise, Faygate Close, Royston Close, Coombe Park Road (north of Clifford Bridge Primary School) and Clifford Bridge Road (close to existing junction with B4082). These residential properties, the closest being located approximately 60-160m from the proposed scheme, could be impacted by earthworks and road construction activities associated with both the realignment of the A46 to the south of the existing junction and the construction of the link road between Clifford Bridge Road and proposed dumbbell roundabouts.
- Residential properties on Valencia Road, Sevilla Close, Coombe Court, Florence Road, Skipworth Road, Hepworth Road. These residential properties, the closest properties being located approximately 60m from the proposed scheme, could be impacted by earthworks and road construction activities associated with the realignment of the A46 to the south of the existing junction.

9.9.3 Given the distance from these NSRs to the proposed scheme and the nature of the works required, professional judgement would indicate that moderate or major noise impacts during the daytime would be possible at all these locations. If works were undertaken at night, then moderate or major impacts would be very likely at all these locations.

9.9.4 Vibration impacts of a moderate or major magnitude at receptors are only likely to occur if works such as impact piling or vibratory ground or pavement compaction

activities were required in close proximity. Given the distance to the proposed scheme for Option 6, such impacts are not expected at most receptors. However, the exceptions are Hungerley Hall Farmhouse and residential properties along and in the vicinity of Valencia Road which are in close proximity to the A46. Professional judgement would indicate that moderate or major vibration impacts during the daytime would be possible at these locations.

9.9.5 Although Option 6 includes the construction of a dumbbell junction and overbridge to the north of the existing junction, no noise sensitive receptors have been identified within 300m of these particular works. Hence, no moderate or major construction noise or vibration impacts due to these works are considered likely.

Option 7

9.9.6 The potentially worst affected receptors for this option include:

- Hungerley Hall Farmhouse which is located approximately 60m from the proposed scheme. This could be impacted by earthworks and road construction activities associated with both the realignment of the A46 to the north of the existing junction and the construction of the free flow link between Clifford Bridge Road and the A46 northbound carriageway.
- Residential properties on Gainford Rise, Faygate Close, Royston Close, Coombe Park Road (north of Clifford Bridge Primary School) and Clifford Bridge Road (close to existing junction with B4082). These residential properties, the closest being located approximately 60-160m from the proposed scheme, could be impacted by earthworks and road construction activities associated with both the realignment of the A46 to the south of the existing junction and the construction of the free flow links between Clifford Bridge Road and the A46 northbound and southbound carriageways.
- Residential properties on Valencia Road, Sevilla Close, Coombe Court, Florence Road, Skipworth Road, Hepworth Road. These residential properties, the closest properties being located approximately 60m from the proposed scheme, could be impacted by earthworks and road construction activities associated with the realignment of the A46 to the south of the existing junction.

9.9.7 Professional judgement would indicate that moderate or major noise impacts during the daytime would be possible at these locations. If works were undertaken at night, then moderate or major impacts would be very likely at all these locations.

9.9.8 Vibration impacts of a moderate or major magnitude at receptors are only likely to occur if works such as impact piling or vibratory ground or pavement compaction activities were required in close proximity. Given the distance to the proposed scheme for Option 7, such impacts are not expected for most receptors. However, the exceptions are Hungerley Hall Farmhouse and residential properties along and in the vicinity of Valencia Road which are in close proximity to the A46. Professional judgement would indicate that moderate or major vibration impacts during the daytime would be possible at these locations.

Option 8

9.9.9 The worst affected receptors and potential impacts for this option are the same as those identified with respect to Option 7 above, except for those associated with Hungerley Hall Farmhouse which is proposed to be demolished in Option 8.

9.9.10 As for Option 7, professional judgement would indicate that moderate or major construction noise impacts during the daytime would be possible at the following locations. If works were undertaken at night, then moderate or major impacts would be very likely at all these locations.

- Residential properties on Gainford Rise, Faygate Close, Royston Close, Coombe Park Road (north of Clifford Bridge Primary School) and Clifford Bridge Road (close to existing junction with B4082). These residential properties, the closest being located approximately 60-160m from the proposed scheme, could be impacted by earthworks and road construction activities associated with both the realignment of the A46 to the south of the existing junction and the construction of the free flow links between Clifford Bridge Road and the A46 northbound and southbound carriageways.
- Residential properties on Valencia Road, Sevilla Close, Coombe Court, Florence Road, Skipworth Road, Hepworth Road. These residential properties, the closest properties being located approximately 60m from the proposed scheme, could be impacted by earthworks and road construction activities associated with the realignment of the A46 to the south of the existing junction.

9.9.11 Also, as for Option 7, vibration impacts of a moderate or major magnitude at receptors are only likely to occur if works such as impact piling or vibratory ground or pavement compaction activities were required in close proximity. Given the distance to the proposed scheme for Option 8, such impacts are not expected at most receptors. However, the exceptions are residential properties along and in the vicinity of Valencia Road which are in close proximity to the A46. Professional judgement would indicate that moderate or major vibration impacts during the daytime would be possible at these locations.

Option 11

9.9.12 The potentially worst affected receptors for this option include:

- Residential properties in Sturminster Close, Fontmell Close, Abbotsley Close, Bridport Close and Dorchester Way, the closest properties being located approximately 250m from the proposed scheme. These residential properties could be impacted by earthworks and road construction activities associated with the construction of the link road between Clifford Bridge Road and proposed dumbbell roundabouts.
- Hungerley Hall Farmhouse which is located approximately 25m from the proposed scheme at its closest point. This could be impacted by earthworks and road construction activities associated with both the realignment of the A46 to the north of the existing junction and the construction of the link road between Clifford Bridge Road and proposed dumbbell roundabouts.
- Residential properties on Gainford Rise, Faygate Close, Royston Close, Coombe Park Road (north of Clifford Bridge Primary School) and Clifford Bridge Road (close to existing junction with B4082). These residential properties, the closest being located approximately 90-190m from the proposed scheme, could be impacted by earthworks and road construction activities associated with both the realignment of the A46 to the south of the existing junction and the construction of the link road between Clifford Bridge Road and proposed dumbbell roundabouts.

- Residential properties on Valencia Road, Sevilla Close, Coombe Court, Florence Road, Skipworth Road, Hepworth Road. These residential properties, the closest properties being located approximately 50m from the proposed scheme, could be impacted by earthworks and road construction activities associated with the realignment of the A46 to the south of the existing junction.

9.9.13 Given the distance from these NSRs to the proposed scheme and the nature of the works required, professional judgement would indicate that minor noise impacts during the daytime are likely at residential properties in Sturminster Close, Fontmell Close, Abbotsley Close, Bridport Close and Dorchester Way. Moderate or major noise impacts during the daytime would be possible at the remaining locations identified above. If works were undertaken at night, then moderate or major impacts would be very likely at all these locations.

9.9.14 Vibration impacts of a moderate or major magnitude at receptors are only likely to occur if works such as impact piling or vibratory ground or pavement compaction activities were required in close proximity. Given the distance to the proposed scheme for Option 11, such impacts are not expected at most receptors. However, the exceptions are Hungerley Hall Farmhouse and residential properties along and in the vicinity of Valencia Road which are in close proximity to the A46. Professional judgement would indicate that moderate or major vibration impacts during the daytime would be possible at these locations.

9.9.15 Although Option 11 includes the construction of a dumbbell junction and overbridge to the north of the existing junction, no noise sensitive receptors have been identified within 300m of these particular works. Hence, no moderate or major construction noise or vibration due to these works are considered likely.

Significant effects – construction noise and vibration

9.9.16 In the absence of mitigation, and should the temporal criteria defined in 9.3.13 be met, there is the potential for temporary significant noise and/or vibration effects at the locations identified above as potentially being subject to moderate or major adverse impacts.

9.9.17 However, the exact significance, duration and frequency of any adverse noise or vibration effect resulting from the construction works will be highly dependent upon the methods, timing and duration of the works required. Further consideration of the potential effects and identification of appropriate measures to minimise effects as far as practicable will be made at the detailed design stage, or once the main works contractor is engaged.

Operation

Operational noise impacts

9.9.18 All the operational traffic noise comparisons reported in this section are based on the façade at each building which undergoes the greatest magnitude of change in traffic noise level as a result of the proposed scheme. The results are provided for the ground floor of the buildings for the daytime impacts and the top floor of each building for the night-time impacts, for example, for a two-storey house 1.5m for the day and 4.0m for the night. For properties in blocks of flats, all floors are reported for both daytime and night-time impacts. These floors have been chosen to represent where residents are likely to be during the day and night-time periods. Further details of the noise model set-up and assumptions are provided in Appendix D.2.

9.9.19 All the noise difference contour plots (refer to Figure 9.10: Do Something Short Term Option 6 to Figure 9.17: Do Something Long Term Option 11 are based on free-field traffic noise levels at first floor level (4.0m above ground) using a 10m x 10m grid and are provided for illustration purposes.

9.9.20 Table 9.6 to Table 9.9 summarise the short-term change in predicted traffic noise levels in 2025 between the DM (without Scheme) and the DS (with Scheme) scenarios at both residential buildings and other sensitive receptors for Options 6 to 11 respectively. The long-term change in predicted traffic noise levels between the 2025 DM (without Scheme) and the 2040 DS (with Scheme) scenarios at NSRs for Options 6 to 11 are summarised in Table 9.10 to Table 9.13 respectively. As detailed in Section 9.9, only one of the potentially sensitive non-residential buildings have been identified as potentially sensitive at night.

Table 9.6: Short-term change in predicted Do-something traffic noise levels (DM 2025 to DS 2025)

Change in noise level		Daytime		Night-time	
		Number of residential dwellings	**Number of other sensitive receptors**	**Number of residential dwellings**	**Number of other sensitive receptors**
Increase in noise level Daytime $L_{A10,18h}$ dB	0.1 - 0.9	1270	0	1248	0
	1.0 - 2.9	458	3	493	0
	3.0 - 4.9	91	2	111	1
Night-time $L_{night,outside}$ dB	≥5.0	68	0	55	0
No change	0	22	0	23	0
Decrease in noise level Daytime $L_{A10,18h}$ dB	0.1 - 0.9	780	1	776	0
	1.0 - 2.9	33	0	18	0
	3.0 - 4.9	2	0	0	0
Night-time $L_{night,outside}$ dB	≥5.0	0	0	0	0

Table 9.7: Option 7 - Short-term change in predicted Do-something traffic noise levels (DM 2025 to DS 2025)

Change in noise level		Daytime		Night-time	
		Number of residential dwellings	Number of other sensitive receptors	Number of residential dwellings	Number of other sensitive receptors
Increase in noise level Daytime $L_{A10,18h}$ dB	0.1 - 0.9	725	1	853	0
	1.0 - 2.9	44	0	58	0
	3.0 - 4.9	17	0	15	0
Night-time $L_{night,outside}$ dB	≥5.0	1	0	0	0
No change	0	42	0	64	0
Decrease in noise level Daytime $L_{A10,18h}$ dB	0.1 - 0.9	1799	4	1689	1
	1.0 - 2.9	96	1	45	0
	3.0 - 4.9	0	0	0	0
Night-time $L_{night,outside}$ dB	≥5.0	0	0	0	0

Table 9.8: Option 8 - Short-term change in predicted Do-something traffic noise levels (DM 2025 to DS 2025)

Change in noise level		Daytime		Night-time	
		Number of residential dwellings	Number of other sensitive receptors	Number of residential dwellings	Number of other sensitive receptors
Increase in noise level Daytime $L_{A10,18h}$ dB	0.1 - 0.9	942	2	1075	1
	1.0 - 2.9	78	1	117	0
	3.0 - 4.9	24	0	18	0
Night-time $L_{night,outside}$ dB	≥5.0	1	0	0	0
No change	0	37	0	52	0
Decrease in noise level Daytime $L_{A10,18h}$ dB	0.1 - 0.9	1603	3	1437	0
	1.0 - 2.9	38	0	24	0
	3.0 - 4.9	0	0	0	0
Night-time $L_{night,outside}$ dB	≥5.0	0	0	0	0

Table 9.9: Option 11 - Short-term change in predicted Do-something traffic noise levels (DM 2025 to DS 2025)

Change in noise level		Daytime		Night-time	
		Number of residential dwellings	Number of other sensitive receptors	Number of residential dwellings	Number of other sensitive receptors
Increase in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 0.9	1689	2	1717	0
	1.0 - 2.9	41	0	48	0
	3.0 - 4.9	1	0	1	0
	≥5.0	0	0	0	0
No change	0	24	0	32	0
Decrease in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 0.9	828	3	857	1
	1.0 - 2.9	141	1	69	0
	3.0 - 4.9	0	0	0	0
	≥5.0	0	0	0	0

Table 9.10: Option 6 - Long-term change in predicted Do-something traffic noise levels (DM 2025 to DS 2040)

Change in noise level		Daytime		Night-time	
		Number of residential dwellings	Number of other sensitive receptors	Number of residential dwellings	Number of other sensitive receptors
Increase in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 2.9	2503	4	2452	0
	3.0 - 4.9	111	1	158	1
	5.0 - 9.9	81	1	69	0
	≥10.0	1	0	0	0
No change	0	0	0	1	0
Decrease in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 2.9	26	0	44	0
	3.0 - 4.9	2	0	0	0
	5.0 - 9.9	0	0	0	0
	≥10.0	0	0	0	0

Table 9.11: Option 7 - Long-term change in predicted Do-something traffic noise levels (DM 2025 to DS 2040)

Change in noise level		Daytime		Night-time	
		Number of residential dwellings	Number of other sensitive receptors	Number of residential dwellings	Number of other sensitive receptors
Increase in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 2.9	2611	6	2636	1
	3.0 - 4.9	20	0	19	0
	5.0 - 9.9	2	0	0	0
	≥10.0	0	0	0	0
No change	0	5	0	5	0
Decrease in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 2.9	86	0	64	0
	3.0 - 4.9	0	0	0	0
	5.0 - 9.9	0	0	0	0
	≥10.0	0	0	0	0

Table 9.12: Option 8 - Long-term change in predicted Do-something traffic noise levels (DM 2025 to DS 2040)

Change in noise level		Daytime		Night-time	
		Number of residential dwellings	Number of other sensitive receptors	Number of residential dwellings	Number of other sensitive receptors
Increase in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 2.9	2632	6	2661	1
	3.0 - 4.9	39	0	37	0
	5.0 - 9.9	3	0	0	0
	≥10.0	0	0	0	0
No change	0	3	0	7	0
Decrease in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 2.9	46	0	18	0
	3.0 - 4.9	0	0	0	0
	5.0 - 9.9	0	0	0	0
	≥10.0	0	0	0	0

Table 9.13: Option 11 - Long-term change in predicted Do-something traffic noise levels (DM 2025 to DS 2040)

Change in noise level		Daytime		Night-time	
		Number of residential dwellings	Number of other sensitive receptors	Number of residential dwellings	Number of other sensitive receptors
Increase in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 2.9	2615	6	2623	1
	3.0 - 4.9	1	0	1	0
	5.0 - 9.9	0	0	0	0
	≥10.0	0	0	0	0
No change	0	0	0	0	0
Decrease in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 2.9	108	0	100	0
	3.0 - 4.9	0	0	0	0
	5.0 - 9.9	0	0	0	0
	≥10.0	0	0	0	0

Option 6

9.9.21 In the short-term, the overall trend is an increase in road traffic noise levels as a result of Option 6. Increases in traffic noise are generally predicted at residential and other noise sensitive properties close to the realigned A46 and new link road to the north of the existing junction. Such properties include those in Dorchester Way closest to the A46, properties in Sturminster Way, Fontmell Close, Abbotsbury Close and Bridport Close, as well as Hungerley Hall Farmhouse, University Hospital and Pearl Hyde Primary School. Residential properties located to the south-west of the junction are also predicted to experience increases in traffic noise in the short-term from the introduction of the free flow A46 on embankment in the vicinity of the existing junction. Decreases in traffic noise due to Option 6 are generally predicted at residential properties which are close to existing roads predicted to experience a decrease in traffic flow as a result of this option. These include properties along and close to Brinklow Road and a number of properties in Dorchester Way. At night, the same overall trend is observed as for the day, with the majority of receptors experiencing negligible and minor changes in traffic noise levels. This option is also predicted to result in an overall increase in traffic noise levels in the longer term, with the impact of traffic growth resulting in fewer properties experiencing decreases when compared to the short-term change.

Option 7

9.9.22 For Option 7, the overall trend is a decrease in road traffic noise levels in the short-term. Decreases in traffic noise are generally predicted at residential and other noise sensitive properties close to roads where traffic flows have decreased due to this option. This includes those properties located to the south-west of the junction which are close to the B4082 junction with Clifford Bridge Road, a number of properties in Dorchester Way and Pearl Hyde Primary School. However, this option also results in predicted increases in traffic noise in the short-term at properties where the proposed free flow links move traffic closer to properties.

These include properties located along Valencia Road, Florence Road, Gainford Rise and Royston Close and a number to the north of the junction in Sturminster Close. At night, the same overall trend is observed as for the day, with the majority of receptors experiencing negligible and minor changes in traffic noise levels. However, in the long-term, an overall increase in traffic noise levels due to this option is predicted, due to the impact of traffic growth reducing the beneficial impacts of this option.

Option 8

9.9.23 As with Option 7, in the short-term, the overall trend is a decrease in road traffic noise levels as a result of Option 8. In the opening year of 2025, in common with Option 7, these decreases are generally predicted at residential and other noise sensitive properties close to roads where traffic flows have decreased due to this option. This includes those properties located to the south-west of the junction which are close to the B4082 junction with Clifford Bridge Road and Dorchester Way. However, this option also results in predicted increases in traffic noise in the short-term at properties where the proposed free flow links move traffic closer to properties. These include properties located along Valencia Road, Florence Road, Gainford Rise and Royston Close. At night, the same overall trend is observed as for the day, with many receptors experiencing negligible and minor changes in traffic noise levels. However, in the long-term, an overall increase in traffic noise levels due to this option is predicted, due to the impact of traffic growth reducing the beneficial impacts of this option.

Option 11

9.9.24 As with Option 6, the overall trend as a result of Option 11 is an increase in road traffic noise levels in the short term. Increases in traffic noise are generally predicted at residential and other noise sensitive properties close to the realigned A46 and new link road to the north of the existing junction. Such properties include those in Dorchester Way closest to the A46, properties in Sturminster Close, Abbotsbury Close and Bridport Close, as well as residential properties close to Brinklow Road and Hungerley Hall Farmhouse. Residential properties located to the south-west of the junction, including properties along Gainford Rise, Valencia Road and Royston Close are also predicted to experience increases in traffic noise in the short-term from the introduction of the free flow A46 on embankment in the vicinity of the existing junction. Decreases in traffic noise due to Option 11 are generally predicted at residential properties which are close to existing roads predicted to experience a decrease in traffic flow as a result of this option. These include a number of properties fronting Dorchester Way, Clifford Bridge Road, Bridport Close and Faygate Close, as well as Pearl Hyde Primary School. At night, the same overall trend is observed as for the day, with the majority of receptors experiencing negligible and minor changes in traffic noise levels. This option is also predicted to result in an overall increase in traffic noise levels in the longer term, with the impact of traffic growth resulting in fewer properties experiencing decreases when compared to the short-term change.

Operational noise significant effects

9.9.25 In accordance with DMRB LA 111, further analysis has been undertaken on the minor, moderate and major short-term changes reported in Table 9.6 to Table 9.9 to identify the likelihood of significant effects for each of the options.

Option 6 calculation area

9.9.26 Option 6 is predicted to result in the greatest number of NSRs to experience significant adverse effects due to increases in traffic noise.

9.9.27 Significant adverse effects are likely to occur at approximately 66 NSRs located to the south-west of the junction as a result of Option 6. 45 residential properties are predicted to experience moderate and major increases in traffic noise to the south of the existing junction in Valencia Road, Royston Close and Gainford Rise. Although the proposed realigned A46 carriageway is in cutting for much of the section south of the existing junction, it is higher than its current position as it rises to cross the existing roundabout on embankment, resulting in an increase in traffic noise levels in this area. A further 21 properties in Gainford Rise and Royston Close are predicted to experience increases in noise within 1 dB of the top of the minor range. These properties would have a direct view of the realigned A46 as it crosses the existing junction on embankment and remains so for the majority of its length up to the new dumbbell roundabouts to the north. This view of the A46 is likely to result in these minor changes in noise being acutely perceived at these properties.

9.9.28 Moderate decreases in traffic noise are also predicted as a result of Option 6 at two residential properties on Florence Road and Valencia Road. However, these decreases, which range from 3.1 to 4.2 dB are on facades of the properties with no direct view of the proposed scheme. As a result, it is considered that these decreases are unlikely to be perceived at these properties and hence unlikely to result in significant beneficial effects.

9.9.29 Significant adverse effects are also likely to occur at Hungerley Hall Farmhouse which is predicted to experience a major increase in traffic noise due to both the realignment of the A46 and B4082 closer to the front of the property.

9.9.30 Significant adverse effects are also likely to occur at approximately 157 NSRs located in the vicinity of Dorchester Way as a result of Option 6. Moderate increases in traffic noise are predicted at Pearl Hyde School and University Hospital. 113 residential properties are predicted to experience moderate or major increase in traffic noise in Dorchester Way, Sturminster Close, Fontmell Close, Abbotsbury Close, Bridport Close, Bracadale Drive and Wimborne Drive. These NSRs have a direct line of sight to both the realigned A46, B4082 and new dumbbell junction, all of which move traffic noise closer to these properties. A further 42 residential properties on these roads are predicted to experience increases in noise within 1 dB of the top of the minor range. Their view of the realigned roads and new junction is likely to result in these minor changes in noise being acutely perceived at these properties.

9.9.31 The significant adverse effects of Option 6 may be avoided or minimised by the provision of further noise mitigation measures, such as noise barriers along the realigned B4082 and A46 mainline carriageway. However, the feasibility and potential benefit of these or other further noise mitigation measures would need to be considered in more detail at a later stage.

Option 7 calculation area

9.9.32 Option 7 is predicted to result in a greater number of NSRs to experience significant adverse effects due to increases in traffic noise compared to Option 11, but fewer than Option 8.

9.9.33 Significant adverse effects are likely to occur at 29 NSRs in Gainford Rise and Royston Close as a result of Option 7. Major or moderate increases in traffic noise are predicted at 18 residential properties in Gainford Rise and Royston Close. A further 8 properties in these roads, with 3 residential properties in Valencia Road are predicted to experience an increase in traffic noise within the top 1 dB of the minor band. The increases in traffic noise result from traffic on the free flow link between the A46 northbound and Clifford Bridge Road bringing traffic slightly

closer to these properties. Although this section is predominantly in shallow cutting, there are sections at grade or on embankment which result in a view of the free flow link from these properties. Their view of the realigned roads and new junction is likely to result in these minor changes in noise potentially being more acutely perceived at these properties. This aspect should be given further consideration at a later stage in order to address this perception.

9.9.34 A decrease in traffic noise of 2.4 dB is predicted on the front façade of Hungerley Hall Farmhouse as a result of the decrease in traffic accessing the A46 northbound from the B4082. However, an increase of 1.8 dB is predicted on its rear façade as a result of the A46 mainline traffic moving close to it. Therefore, it is considered that the minor decrease predicted at this property is unlikely to result in a significant beneficial effect.

9.9.35 The significant adverse effects of Option 7 may be avoided or minimised by the provision of further noise mitigation measures, such as a noise barrier along the free flow link. However, the feasibility and potential benefit of this or other further noise mitigation measures would need to be considered in more detail at a later stage.

Option 8 calculation area

9.9.36 Option 8 is predicted to result in a slightly greater number of NSRs to experience significant adverse effects due to increases in traffic noise compared to Option 7.

9.9.37 Significant adverse effects are likely to occur at 53 NSRs in Gainford Rise, Royston Close and Valencia Road as a result of Option 8. Major or moderate increases in traffic noise are predicted at 25 residential properties in Gainford Rise, Royston Close and Valencia Road. A further 13 properties in Gainford Rise and Valencia Road, with 15 residential properties in Florence Road, are predicted to experience an increase in traffic noise within the top 1 dB of the minor band. The increases in traffic noise result from traffic on the free flow link between the A46 northbound and Clifford Bridge Road bringing traffic slightly closer to these properties. The horizontal alignment of this free flow link as it diverges from the A46 northbound is slightly closer to these properties compared to Option 7. Although this section is predominantly in shallow cutting, there are sections at grade or on embankment which result in a view of the free flow link from these properties. Their view of the realigned roads and new junction is likely to result in these minor changes in noise potentially being more acutely perceived at these properties. This aspect should be given further consideration at a later stage in order to address this perception.

9.9.38 As with Option 7, the significant adverse effects of Option 8 may be avoided or minimised by the provision of further noise mitigation measures, such as a noise barrier along the free flow link. However, the feasibility and potential benefit of this or other further noise mitigation measures would need to be considered in more detail at a later stage.

Option 11 calculation area

9.9.39 Option 11 is predicted to result in just one significant adverse effect, which is the least number of NSRs likely to experience significant adverse effects of all the options.

9.9.40 Significant adverse effects are likely to occur at Hungerley Hall Farmhouse which is predicted to experience a moderate increase in traffic noise due to both the realignment of the A46 and B4082 closer to the rear of the property.

9.9.41 41 properties are predicted to experience a minor increase in traffic noise, these being located to both the south-west and north-east of the existing junction. The

increases in traffic noise result from traffic on the free flow link between the A46 northbound and Clifford Bridge Road bringing traffic slightly closer to these properties. However, these increases are within the bottom 1dB of the minor band which are unlikely to be perceived by residents and hence are unlikely to result in significant adverse effects. Similarly, minor decreases in traffic noise are also predicted to occur at 141 residential properties close to existing roads predicted to experience a decrease in traffic flow as a result of this option including properties fronting Dorchester Way, Clifford Bridge Road, Bridport Close and Faygate Close. However, there decreases are within the bottom 1 dB of the minor band which are unlikely to be perceived by residents and hence are unlikely to result in significant beneficial effects.

9.9.42 As with Option 6, the significant adverse effects of Option 11 may be avoided or minimised by the provision of further noise mitigation measures, such as a noise barrier along the top of the cutting of the realigned B4082. However, the feasibility and potential benefit of this or other further noise mitigation measures would need to be considered in more detail at a later stage.

Affected routes – all options

9.9.43 The affected routes identified for Options 6, 7, 8 and 11, and the number of receptors that are within 50m of these routes, are reported in Appendix D.1 and illustrated on Figure 9.5: Noise Affected Routes Option 6 to Figure 9.8: Noise Affected Routes Option 11 respectively.

9.9.44 The vast majority of identified affected routes are common to all options. Many of these routes are predicted to experience minor increases in traffic noise in the short-term, and a smaller number of routes predicted to experience minor and moderate increases in traffic noise in the long-term. All these increases result from predicted increases in traffic flow along these routes due to the proposed scheme options. However, only three of these affected routes have noise sensitive properties located within 50m of them:

- 56773_56872: Bubbenhall Road - Stoneleigh Road to Leamington Road (minor increase in short-term, moderate increase in long-term)
- 57668_58023: A46 Binley Junction southbound off-slip (minor increase in short-term)
- 56797_56893: Avondale Road, Brandon between Main Street and Bretford Road (minor increase in short-term)

9.9.45 Several of the affected routes common to all options are predicted to experience minor decreases in the short-term, and a smaller number of routes predicted to experience minor and moderate decreases in the long-term. All these decreases result from predicted decreases in traffic flow along these routes due to the proposed scheme options. However, only one of these affected routes has noise sensitive properties located within 50m of them:

- 54162_56897: Fosse Way between B4027 and B4112 (minor decrease in short-term)

9.9.46 However, it should be noted that flows on all routes identified in paragraphs 9.9.44 to 9.9.45 are classified as ‘low flow’ in CRTN and the low flow correction amplifies the resulting magnitude of the noise change in such small flows. On this basis, the changes in noise along these routes are unlikely to result in significant effects in any of the options under consideration.

9.9.47 In addition to the above, other affected routes have been identified specific to individual options, all of which are predicted to experience decreases in traffic

noise in the short-term, which result from decreases in traffic flow as a result of the proposed scheme options. However, only the following affected routes have noise sensitive properties within 50m of them:

- Option 6 – 57353_57999: Austin Drive, Coventry
- Option 7 and 8 – 56265_56796: Combe Fields Road between Peter Hall Lane and B4029
- Option 6, 7 and 8 - 54162_58429: Fosse Way between B4112 and Coal Pit Lane

9.9.48 The short-term change in traffic noise levels on these routes are minor and moderate respectively. Also, the flows on these routes are classified as 'low flow' in CRTN and the low flow correction amplifies the resulting magnitude of the noise change in such small flows. On this basis, the changes in noise along these routes are unlikely to result in significant effects in any of the options under consideration.

Public Rights of Way

9.9.49 There is one PRoW in the study area (refer to Figure 9.1: Noise Location Plan Option 6 and Figure 9.4: Noise Location Plan Option 11) which experiences a range of impacts for each option.

9.9.50 In Option 6, this PRoW experiences a range of impacts from negligible decreases to the east and west extents of the study area, with negligible increases in noise predicted as the footpath approaches the A46.

9.9.51 In Options 7 and 8, this PRoW experiences a negligible increase in noise along most of its length, with no change predicted as it crosses out of the western boundary of the study area to the north of University Hospital.

9.9.52 In Option 11, this PRoW experiences a minor increase to the east of the study area, and negligible increases as it crosses the A46, through the west of the study area and out of western boundary to the north of University Hospital.

9.9.53 Given the linear nature of PRoWs, the range of noise impacts along them, and the transient usage of a PRoW, a material change in the experience of using the PRoWs as a whole, which could affect people's health or quality of life is not anticipated and no significant adverse or beneficial effects on PRoWs have been identified for any of the options under consideration.

Noise insulation regulations – preliminary consideration of qualifying properties

9.9.54 A preliminary consideration of properties which may qualify for noise insulation works under The Noise Insulation Regulations 1975 (as amended) for each option has identified the following:

- Option 6: Hungerley Hall Farmhouse
- Option 7: Hungerley Hall Farmhouse, 3 Valencia Road
- Option 8: 1 Valencia Road, 9 Valencia Road, 2 Sevilla Close, 1 Florence Road
- Option 11: Hungerley Hall Farmhouse

9.9.55 A further consideration of qualifying properties will be undertaken at a later stage for the preferred option. A complete Noise Insulation Regulations assessment would also be completed at a later stage of the project when the detailed design of the proposed scheme is finalised and in accordance with the timescales set out in the Regulations.

Policy compliance

9.9.56 As required by DMRB LA 111, the traffic noise SOAEL and LOAEL have been used to consider how the options comply with the policy aims detailed in the NPSNN.

9.9.57 At this stage, noise mitigation measures have not been fully developed for any of the options under consideration. Thus, the following discussions are restricted to what extent the unmitigated options comply with the policy aims and the noise mitigation measures which need to be considered further in order to meet the noise policy aims set out in the NPSNN.

9.9.58 No quantitative assessment has been possible at this stage to derive construction noise and vibration levels attributable to each option and to compare such levels to the construction LOAELs and SOAELs set out in Section 9.3. Thus, the following discussion is focussed on operational noise only.

Operation

9.9.59 The first aim of the NPSNN is to avoid significant adverse impacts on health and quality of life from noise as a result of a new development. DMRB LA 111 defines the SOAEL as being the level at which significant adverse effects on health and quality of life occur.

9.9.60 For all the options, the residential properties exceeding SOAEL both with and without the proposed scheme in place are located adjacent to existing roads outside of the proposed scheme limits. These include properties along and close to Clifford Bridge Road to the north and south of the B4082 and also along, and close to, Brinklow Road.

9.9.61 It is unlikely that further mitigation measures would be feasible to reduce levels below SOAEL at these properties. The introduction of noise mitigation measures such as noise barriers along existing roads which already experience high noise levels, is not sustainable. Mitigation measures such as barriers are not a practical engineering option and would have other adverse impacts (including visual impacts and increased land take) whilst also causing significant access difficulties. On this basis, it is considered that the first NPSNN aim would be met for all options.

9.9.62 With regards to the second aim, low noise surfacing materials are proposed for all proposed scheme options to mitigate and minimise adverse impacts on health and quality of life resulting from them. However, all options result in increases in traffic noise levels at properties close to their alignments, which result in many of these properties predicted to experience levels between LOAEL and SOAEL. A summary of locations where further mitigation should be considered to mitigate and minimise noise levels for each option are described below:

- Option 6: Noise barriers alongside the northbound carriageway of the B4082 link road to minimise traffic noise levels at properties in Dorchester Way, Sturminster Way, Fontmell Close, Abbotsbury Close and Bridport Close. A noise barrier on the northbound carriageway of the B4082 link road to minimise traffic noise levels on the front of Hungerley Hall Farmhouse should also be considered, although this barrier is unlikely to be considered a sustainable noise mitigation measure, when considering the cost of both its installation and ongoing maintenance with the noise reduction benefits, which will be limited to a single property. Noise barriers alongside the northbound A46 to minimise traffic noise levels at properties located to the south west of the junction, including Valencia Road, Florence Road, Royston Close and Gainford Rise should also be considered.

- Option 7: Noise barriers alongside the free flow link (south side only) between the A46 northbound and junction with Clifford Bridge Road to minimise noise levels at properties located to the south west of the junction, including Valencia Road, Florence Road, Royston Close and Gainford Rise. A noise barrier alongside the A46 northbound carriageway to minimise traffic noise levels on the rear of Hungerley Hall Farmhouse should also be considered, although this barrier is unlikely to be considered a sustainable noise mitigation measure, when considering the cost of both its installation and ongoing maintenance with the noise reduction benefits, which will be limited to a single property.
- Option 8: Noise barriers alongside the free flow link (south side only) between the A46 northbound and junction with Clifford Bridge Road to minimise noise levels at properties located to the south west of the junction, including Valencia Road, Florence Road, Bracadale Close and Royston Close.
- Option 11: A noise barrier along the top of the cutting alongside the northbound carriageway of the B4082 link road to minimise traffic noise levels on the front of Hungerley Hall Farmhouse should be considered. However, such a barrier would be in close proximity to the property and, as a result, may lead to non-noise adverse impacts (such as heritage and landscape). In addition, such a barrier is unlikely to be considered a sustainable noise mitigation measure, when considering the cost of both its installation and ongoing maintenance with the noise reduction benefits, which will be limited to a single property.

9.9.63 With regard to the third NPSNN aim to ‘improve where possible’, all options result in a reduction in eastbound traffic along the B4082. This reduction is due to all options removing the delays at the existing Walsgrave junction, and hence the traffic that re-routed through Coventry to avoid these delays switches back to using the A46 southbound. This reduction in traffic flow results in a reduction in traffic noise at properties close to the B4082, including properties on Clifford Bridge Road in the vicinity of the junction. On this basis, it is considered that the third NPSNN aim would be met for all options.

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10 Geology and Soils

10.1 Introduction

10.1.1 This chapter of the environmental assessment report presents the outcome of an assessment of the potential impacts and effects associated with geology, soil resources and effects of contamination on human health, surface water and groundwater arising from the proposed scheme. This PCF Stage 2 assessment is undertaken in accordance with DMRB LA 109 – Geology and Soils Revision 0 (Highways England, 2019b).

10.2 Legislative and policy framework

10.2.1 Planning policy and legislation of relevance to this geology and soils assessment are summarised below. Further detail of the wider legislative and policy framework for the scheme is provided in Chapter 1.1.

National legislation

10.2.2 National legislation of relevance to the geology and soils assessment includes:

- Part 2A of the Environment Protection Act 1990
- DMRB LA 109
- DMRB LA 104
- DMRB LA 113 Road Drainage and the Water Environment (Highways Agency March 2020)
- Contaminated Land (England) Regulations 2006
- Water Resources Act 1991
- Environmental Damage (Prevention and Remediation) Regulations 2009
- Environmental Permitting Regulations 2016
- Water Framework Directive (Directive 2000/60/EC)
- Groundwater Directive (GWD) 2006/118/EC

National Planning Policy Framework

10.2.3 The NPPF sets out the Government's planning policies for England and how these are expected to be applied. Chapter 15 of the NPPF covers Conserving and Enhancing the Natural Environment and Chapter 17 covers Facilitating the Sustainable Use of Minerals.

National Policy Statement for National Networks

10.2.4 The NPSNN sets out the need for, as well as the Government policies to deliver, development of NSIPs on the national road and rail networks in England. The NPSNN is used by the Secretary of State as the primary basis for making decisions on DCO applications for national network NSIPs.

10.2.5 The NPSNN summarises the Government's vision and strategic objectives for national networks, with the intent to meet the country's long-term needs, supporting the economy and improving overall quality of life, as part of a wider transport system.

10.2.6 The NPSNN elaborates on the importance of the strategic road network and its role in providing critical linkages between cities and communities, as well as connecting major ports, airports and rail terminals. The NPSNN also states that a well-functioning strategic road network is critical in supporting national and regional economies.

10.2.7 Relevant paragraphs from the NPSNN are summarised in Table 10.1

Table 10.1: NPSNN Policies Relevant for the Geology and Soils Assessment

NPSNN para.	Requirement of the NPSNN	Location where information addresses policy requirements
5.117	This paragraph requires the applicants to consider land stability in respect of new development. It states that 'Specifically, proposals should be appropriate for the location, including preventing unacceptable risks from land instability. If land stability could be an issue, applicants should seek appropriate technical and environmental expert advice to assess the likely consequences of proposed developments on sites where subsidence, landslides and ground compression is known or suspected.'	No ground investigations have been undertaken at this stage. Risks associated with geotechnical hazards and land stability are assessed in DMRB CD 622 Managing Geotechnical Risk Revision 1 (Highways England, 2020u).
5.118	This paragraph requires the applicants to carry out preliminary assessment of ground instability at the earliest possible stage before a detailed application for development consent is prepared and undertake any necessary investigations to ascertain that the site will remain stable or can be made so as part of the development. It also requires the applicants to complete a land stability or slope stability risk assessment report, taking into account the surrounding areas where subsidence, landslides and land compression could threaten the development / neighbouring land or property.	No ground investigations have been undertaken at this stage. Risks associated with geotechnical hazards and land stability are assessed in DMRB CD 622.
5.168	This paragraph requires applicants to take into account the economic and other benefits of the best and most versatile (BMV) agricultural land and, where significant development of agricultural land is demonstrated to be necessary, to seek to use areas of poorer quality land in preference to that of a higher quality. Additionally, this paragraph requires the applicants to identify any effects, and seek to minimise impacts, on soil quality and, for developments on previously developed (brownfield) sites, ensure that they have considered the risk posed by land contamination and how it is proposed to address this.	The assessment reported in this chapter considers the potential effects on BMV land, soils as a resource and considered land contamination risks.

Local policy

10.2.8 Local policy of relevance to the assessment includes:

- Coventry City Council Local Plan (2016)
- Coventry Contaminated Land Inspection Strategy (2012a)
- Rugby Borough Council's Local Plan 2011-2031: Draft for consultation
- Rugby Borough Council Contaminated Land Strategy (2001)
- Warwickshire County Council's Draft Minerals Plan (2016)

Other relevant policy, standards, and guidance

- Land Contamination: Risk Management (LCRM) guidance document (Revised April 2021)
- Relevant Pollution Prevention Guidelines (Environment Agency Pollution Prevention Guidance Notes). While these guidance documents have been withdrawn the principals which they outline are still considered relevant
- British Standards 10175:2011 Investigation of Potentially Contaminated Sites – Code of Practice (2011)
- British Standards BS3882 Specification for Topsoil and Requirements for Use (2007)
- CL:AIRE Guiding Principles for Land Contamination (GPLC) (2016)
- EA The Environment Agency's approach to groundwater protection (2018) (Superseding Groundwater Protection: Principles and Practice (GP3))
- A Framework for Assessing the Sustainability of Soil and Groundwater Remediation SuRF-UK (2010)
- Construction Industry Research and Information Association (CIRIA) Guidance
    - CIRIA C552 Contaminated Land Risk Assessment: A Guide to Good Practice. (2001a)
    - CIRIA C665 Assessing risks posed by hazardous ground gases to buildings (2007)
    - Guidance C753The SUDS Manual (2015)
    - CIRIA C692 Environmental Good Practice on Site. 3rd Edition (2010)

10.3 Assessment methodology

Contaminated land assessment

10.3.1 Contaminated land, as defined in Part IIA of Environmental Protection Act 1990, is assessed through the identification and assessment of pollutant linkages (contaminant-pathway-receptor relationships). Implicit in the guidance is the application of risk assessment to assess whether potential pollutant linkages may be significant.

10.3.2 The risk-based methodology adopted in this assessment is based upon the Environment Agency's Model Procedures for the Land Contamination: Risk Management (LCRM) together with the supporting guidance referenced within this document. The methodology adopted relies on the development of a site-specific Conceptual Site Model (CSM) consisting of three components:

- A source of contamination: for example, due to historical site operations.
- A pathway: a route by which receptors can become exposed to contaminants. Examples include vapour inhalation, soil ingestion and groundwater migration.
- A receptor: a target that may be exposed to contaminants via the identified pathways. Examples include human occupiers/users of the site, surface water, groundwater, property, or ecosystems.

10.3.3 For a significant potential effect associated with either environmental and/ or human health receptors to exist, a plausible pollutant linkage involving each of these components must exist. If one of the components is absent then a pollutant linkage, and thereby potentially significant effects, are also unlikely to exist. Where all three components are or maybe present, a potentially complete pollutant linkage can be considered to exist. This does not automatically imply the presence of significant effects but that further investigation of the potential pollutant linkages may be required.

Significance assessment methodology

10.3.4 For each of the potential impacts identified, an assessment has then been made of the likely significance of resulting effects on the receptor. The definition of effect significance has been made by taking into account both the importance/ sensitivity of the receptor (refer to Table 10.2) and the magnitude of the predicted impact (refer to Table 10.3), using the matrix as presented in Table 10.4, in conjunction with professional judgement of the site-specific factors that may be of relevance.

10.3.5 Impacts to construction and maintenance workers have been scoped out of this assessment as these workers will be protected under Health and Safety provisions. Impacts to development infrastructure from potential contamination have also been scoped out as they will be addressed as part of the design.

10.3.6 The value (sensitivity) of potential receptors or soil/ geological resources and impacts (magnitude) of potential ground condition have been described qualitatively in accordance with DMRB LA 109 (Tables 3.11 and 3.12) and significance category assigned in accordance with the DMRB LA 104 Table 3.8.1.

10.3.7 The assessment defines the value (sensitivity) of identified receptors, as summarised in Table 10.2, based upon consideration for the baseline conditions including where available the following elements:

- Surrounding land uses, based on mapping and existing planning designations
- Proposed end-use, based on the nature of the proposed scheme
- Soil resource losses as associated with the proposed scheme
- Construction operations that are necessary for the proposed scheme
- Details of nature conservation importance in respect of geology and soils
- Geology, hydrogeology and hydrology of the study area and surrounding study area

10.3.8 The magnitude of potential impacts on identified receptors (magnitude), as associated with the proposed scheme, take into account the potential pathways through which an impact source/ hazard may affect the identified receptors. An example of this is summarised in Table 10.3.

Table 10.2: Defining sensitivity of receptor

Level of Sensitivity	Criteria Provided within DMRB LA 104 Table 3.2N	Summary of Criteria Provided within DMRB LA 109 Table 3.11	Examples of Definitions of Sensitivity for Different Resources	
			Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources
Very high	Very high importance and rarity, international scale and very limited potential for substitution.	Geology: very rare and of international importance with no potential for replacement (e.g. UNESCO World Heritage Sites, UNESCO Global Geoparks, SSSI's and GCR where citations indicate features of international importance). Geology meeting international designation citation criteria which is not designated as such. Soils: 1) soils directly supporting an EU designated site (e.g. SAC, SPA, Ramsar); and / or 2) ALC grade 1 & 2 or LCA grade 1 & 2 Contamination: 1) human health: very high sensitivity land use such as residential or allotments; 2&3) surface water & Ground water: use sensitivity criteria in Table 3.70 DMRB LA 113 (Road Drainage and the Water Environment (March 2020). (Table 3.70 identifies typical criteria as "Nationally significant attribute of high importance").*	Future site users – residential development Residential areas or schools within 50m of construction works Water features deemed to be of high value Ecological features deemed to be of high value Allotments, arable farmland, livestock, or market gardens on or adjacent to the site	Internationally and nationally designated sites Regionally important sites with limited potential for substitution Soils of high nature conservation or landscape importance Presence of significant mineral reserves and within a Mineral Consultation Area High quality agricultural soils (ALC Grade 1 & 2)
High	High importance	Geology: rare and of national importance with little potential for replacement (e.g. geological SSSI, ASSI, National Nature	Future site users - commercial development	Regionally important sites with potential for

	and rarity, national scale, and limited potential for substitution.	Reserves (NNR)). Geology meeting national designation citation criteria which is not designated as such. Soils: 1) soils directly supporting a UK designated site (e.g. SSSI); and / or 2) ALC grade 3a, or LCA grade 3.1. Contamination: 1) human health: high sensitivity land use such as public open space; 2&3) surface water & Ground water: use sensitivity criteria in Table 3.70 DMRB LA 113. (Table 3.70 identifies typical criteria as "Locally significant attribute of high importance").*	Residential areas or schools within 50 - 250m of construction works Commercial areas within 50m of construction works Water features deemed to be of medium value Ecological features deemed to be of medium value The built environment including buildings and infrastructure	substitution soils directly supporting a UK designated site Soils of medium conservation or landscape importance Site within a Mineral Consultation Area Good quality agricultural soils (ALC Grade 3a)
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution.	Geology: of regional importance with limited potential for replacement (e.g. RIGS). Geology meeting regional designation citation criteria which is not designated as such. Soils: 1) soils supporting non-statutory designated sites (e.g. Local Nature Reserves (LNR), LGS's, Sites of Nature Conservation Importance (SNCIs)); and / or 2) ALC grade 3b or LCA grade 3.2. Contamination: 1) human health: medium sensitivity land use such as commercial or industrial; 2&3) surface water & Ground water: use sensitivity criteria in Table 3.70 DMRB LA 113. (Table 3.70 identifies typical criteria as "Of moderate quality and rarity").*	Future site users - car park, highways, and railway related development Residential areas >250m from construction works Commercial areas within 50 - 250m of construction works Water features deemed to be of low value Ecological features deemed to be of low value	Undesignated sites of some local earth heritage interest Soils of non-statutory designated sites of nature conservation or landscape importance Limited potential for mineral reserves and site not within a Mineral Consultation Area Moderate quality agricultural soils (ALC Grade 3b)
Low	Low or medium importance	Geology: of local importance / interest with potential for replacement (e.g. non designated geological exposures, former quarry's / mining sites).	Commercial areas within >250m of construction works	Other sites with little or no local earth heritage interest

	and rarity, local scale.	Soils: 1) ALC grade 4 & 5 or LCA grade 4.1 to 7; and / or 2) soils supporting non-designated notable or priority habitats. Contamination: 1) human health: low sensitivity land use such as highways and rail; 2&3) surface water & Ground water: use sensitivity criteria in Table 3.70 DMRB LA 113. (Table 3.70 identifies typical criteria as "Nationally significant attribute of high importance").*	Water features deemed to be of low value	Poor quality agricultural soils (ALC Grade 4 & 5)
Negligible	Very low importance and rarity, local scale.	Geology: no geological exposures, little / no local interest. Soils: previously developed land formerly in 'hard uses' with little potential to return to agriculture. Contamination: 1) human health: undeveloped surplus land / no sensitive land use proposed; 2&3) surface water & Ground water: use sensitivity criteria in Table 3.70 DMRB LA 113. (Table 3.70 identifies no description for negligible criteria)*	Areas where there are no built structures, crops, or livestock Ecological features deemed to be of negligible value	Soils of negligible nature conservation or landscape importance. Negligible potential for mineral reserves to exist Very poor-quality agricultural soils (Grade 5 or ungraded)

* (Further detail is provided in DMRB LA113 Table 3.70 for surface and ground water and further discussion is provided in Chapter 13).

Table 10.3: Defining magnitude of Impact (extract of DMRB LA 104 Table 3.4N, with included examples of adverse magnitudes)

Magnitude of impact (change)	Criteria Example (Extract of DMRB LA 104 Table 3.4N)	Summary of Criteria Provided within DMRB LA 109 Table 3.12	Agriculture Soil Resources derived from DMRB LA 109 Table W/2.1	Example of Adverse Magnitudes	
				Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources
Major Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features, or elements.	Geology: loss of geological feature / designation and/or quality and integrity, severe damage to key characteristics, features, or elements. Soil: physical removal or permanent sealing of soil resource or agricultural land. Contamination: 1) human health: significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria (e.g. category 4 screening levels) SP1010 with potential for significant harm to human health. Contamination heavily restricts future use of land; 2& 3 surface water and Ground Water: “use sensitivity criteria in	Physical removal or permanent sealing of soil resource of >20ha Typically ‘best and most versatile agricultural land’ Grades 1, 2 and 3a. Damage to/or loss of all topsoil resource.	Human Health: Acute risk to human health Surface waters and/ or groundwater: Substantial acute pollution or long-term degradation of sensitive water resources (Principal Aquifer, groundwater source protection zone, surface waters of good or very good quality) Ecology: Significant change to the number of one or more species or ecosystems Landscaping/ Agriculture: Loss in	Loss of feature or attribute Earthworks resulting in high volume of surplus soil for off-site disposal Classification of surplus soil as Hazardous Waste where the intention is to discard Sterilisation of mineral resource over entire Mineral

Magnitude of impact (change)	Criteria Example (Extract of DMRB LA 104 Table 3.4N)	Summary of Criteria Provided within DMRB LA 109 Table 3.12	Agriculture Soil Resources derived from DMRB LA 109 Table W/2.1	Example of Adverse Magnitudes	
				Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources
		Road drainage and water environment DMRB LA 113". (Table 3.71 identifies typical criteria as "Results in loss of attribute and/or quality and integrity of the attribute").*		value of livestock or crops as a result of death, disease, or physical damage	Safeguarding Area
Moderate Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features, or elements.	Geology: partial loss of geological feature / designation, potentially adversely affecting the integrity; partial loss of/damage to key characteristics, features, or elements. Soils: permanent loss / reduction of one or more soil function(s) and restriction to current or approved future use (e.g. through degradation, compaction, erosion of soil resource.) Contamination: 1) human health: contaminant concentrations exceed background	Physical removal or permanent sealing of soil resource of 1 - 20ha Typically 'best and most versatile agricultural land' Grades 1, 2 and 3a. Damage to/or loss of all topsoil resource.	Human Health: Chronic risk to human health Surface water and/or groundwater: Pollution of non-sensitive water resources or small-scale pollution of sensitive water resources (Principal or Secondary Aquifers of water courses of fair quality or below) Ecology: Change to population densities	Impact on integrity of or partial loss of feature or attribute Earthworks resulting in moderate volume of surplus soil for off-site disposal Sterilisation of mineral resource over more than

Magnitude of impact (change)	Criteria Example (Extract of DMRB LA 104 Table 3.4N)	Summary of Criteria Provided within DMRB LA 109 Table 3.12	Agriculture Soil Resources derived from DMRB LA 109 Table W/2.1	Example of Adverse Magnitudes	
				Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources
		levels and are in line with limits of relevant screening criteria (e.g. category 4 screening levels) SP1010. Significant contamination can be present. Control / remediation measures are required to reduce risks to human health / make land suitable for intended use; 2& 3 surface water and Ground Water: “use sensitivity criteria in Road drainage and water environment DMRB LA 113”. (Table 3.71 identifies typical criteria as “Results in effect on integrity of attribute, or loss of part of attribute”).*		of non-sensitive species Landscaping/ Agriculture: Non-permanent health effects to vegetation/ crops from disease or physical damage, which results in a reduction in value	half of Mineral Safeguarding Area

Magnitude of impact (change)	Criteria Example (Extract of DMRB LA 104 Table 3.4N)	Summary of Criteria Provided within DMRB LA 109 Table 3.12	Agriculture Soil Resources derived from DMRB LA 109 Table W/2.1	Example of Adverse Magnitudes	
				Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources
Minor Adverse	Some measurable change in attributes, quality, or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features, or elements.	Geology: minor measurable change in geological feature / designation attributes, quality, or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features, or elements. Soils: temporary loss / reduction of one or more soil function(s) and restriction to current or approved future use (e.g. through degradation, compaction, erosion of soil resource.) Contamination: 1) human health: contaminant concentrations are below relevant screening criteria (e.g. category 4 screening levels) SP1010. Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks	Loss of any quantity of land not considered 'best and most versatile agricultural land' Grades 3b, 4 or 5. Re-use of all topsoil resource within the development.	Human Health: Slight reversible short- term effects to human health Surface waters and/or groundwater: Slight pollution of non-sensitive water resources Ecology: Some change to population densities of non-sensitive species with no negative effects on the function of the ecosystem Landscaping/ Agriculture: Slight or short-term health effects which result in slight reduction in value	Minor impact on feature or attribute Earthworks resulting in low volume of surplus soil for off-site disposal Sterilisation of mineral resource over less than half of Mineral Safeguarding Area

Magnitude of impact (change)	Criteria Example (Extract of DMRB LA 104 Table 3.4N)	Summary of Criteria Provided within DMRB LA 109 Table 3.12	Agriculture Soil Resources derived from DMRB LA 109 Table W/2.1	Example of Adverse Magnitudes	
				Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources
		to human health; 2& 3 surface water and Ground Water: “use sensitivity criteria in Road drainage and water environment DMRB LA 113”. (Table 3.71 identifies typical criteria as “Results in some measurable change in attributes, quality or vulnerability”) *.			
Negligible Adverse	Very minor loss or detrimental alteration to one or more characteristics, features, or elements.	Geology: very minor loss or detrimental alteration to one or more characteristics, features, or elements of geological feature / designation. Overall integrity of resource not affected. Soils: no discernible loss / reduction of soil function(s) that restrict current or approved future use. Contamination: 1) human health: contaminant concentrations substantially below	No loss of agricultural land. Minor disturbance to soils.	Human Health: No measurable effects on humans Surface waters and/or groundwater: Insubstantial pollution to non-sensitive water resource Ecology: No significant changes to population densities in	Impact of insufficient magnitude to affect use or integrity of feature or attribute No off-site disposal of surplus soil required No sterilization

Magnitude of impact (change)	Criteria Example (Extract of DMRB LA 104 Table 3.4N)	Summary of Criteria Provided within DMRB LA 109 Table 3.12	Agriculture Soil Resources derived from DMRB LA 109 Table W/2.1	Example of Adverse Magnitudes	
				Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources
		levels outlined in relevant screening criteria (e.g. category 4 screening levels) SP1010. No requirement for control measures to reduce risks to human health / make land suitable for intended use; 2& 3 surface water and Ground Water: “use sensitivity criteria in Road drainage and water environment DMRB LA 113”. (DMRB LA113 Table 3.71 identifies typical criteria as “Results in effect on attribute, but of insufficient magnitude to affect the use or integrity”). *		the environment or in any ecosystem Landscaping/ Agriculture: No significant reduction in landscape value	of mineral resource
No change	-	Geology: no temporary or permanent loss / disturbance of characteristics features or elements. Soils: no loss / reduction of soil function(s) that restrict current or approved future use.	-	-	-

Magnitude of impact (change)	Criteria Example (Extract of DMRB LA 104 Table 3.4N)	Summary of Criteria Provided within DMRB LA 109 Table 3.12	Agriculture Soil Resources derived from DMRB LA 109 Table W/2.1	Example of Adverse Magnitudes	
				Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources
		Contamination: human health: reported contaminant concentrations below background levels; 2& 3 surface water and Ground Water: “use sensitivity criteria in Road drainage and water environment DMRB LA 113”. (DMRB LA113 Table 3.71 identifies typical criteria as “No loss or alteration of characteristics, features or elements; no observable impact in either direction.”).*			

* (Further detail is provided in LA113 Table 3.71 for surface and ground water and further discussion is provided in Chapter 13).

Significance of effect

10.3.9 In accordance with DRMB LA 104 for each of the potential effects identified, an assessment will then be made of the likely significance of effects on the receptor. The definition of significance of effect shall be made by taking into account both the value of the receptor and the magnitude of the predicted effect, using the matrix in Table 10.4 to determine the significance category (Table 10.6) in conjunction with professional judgement of the site-specific factors that may be of relevance.

10.3.10 The approach to assigning significance of effect relies on reasoned argument, professional judgement, and the advice or views of appropriate organisations. A significant effect is that which is moderate, large or very large.

Table 10.4: Extract of Table 3.8.1 significance matrix from DMRB LA 104

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

Table 10.5: Extract of Table 3.7 significance categories and typical descriptions from DMRB LA 104

Significance category	Typical description
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.

10.4 Assessment assumptions and limitations

10.4.1 A Preliminary Sources Study Report (PSSR) shall be produced as part of the Stage 2 PCF once the preferred route has been finalised.

10.4.2 A ground investigation shall be required for the route as part of PCF Stage 3. The nature of this investigation shall be considered further based on the findings of the PSSR.

10.4.3 The updated baseline is based upon the available information as presented in Paragraph 10.6.1.

10.4.4 The Groundsure Report obtained for the assessment was procured in September 2020 based upon the proposed scheme boundary at the time. Since September 2020 the proposed scheme boundary has not changed significantly. The current proposed scheme boundary is slightly longer along the A46 to the north and south and omits the inclusion of part of Clifford Bridge Road. It should be noted because of this the distances and some inclusions within the Groundsure Report may vary to the current proposed scheme boundary and as such may differ to the distances and inclusions referenced in the baseline conditions section below, but not to such a degree that any findings are significantly changed.

10.4.5 It is assumed that the materials used to construct the proposed scheme would be designed and specified taking due account of the potential for aggressive ground conditions following characterisation of soils during future ground investigation.

10.5 Study area

Proposed scheme boundary

10.5.1 Four options for Walsgrave Junction are being considered at this option selection stage, as described in Chapter 2, which are categorised as a 'Do-Something' approach.

- Do-Something – Option 6
- Do-Something – Option 7
- Do-Something – Option 8
- Do-Something – Option 11

10.5.2 It is these four options that are reviewed within this assessment.

10.5.3 All four options share similar proposed scheme boundaries and as such, to capture the options, a combined proposed scheme boundary has determined for the proposed scheme (Refer to Figure 2.1: Location Plan).

10.5.4 The majority of the proposed works for Options 7 and 8 are focused around the existing roundabout and its surrounding area. Option 6 is more extensive, over-riding the existing roundabout with a new link road and the addition of an associated dumbbell roundabout junction within the northern end of the scheme.

10.5.5 Option 11 is not as extensive as Option 6 but includes more development than Options 7 and 8. Option 11 includes a similar development to Option 6 with the inclusion of a dumbbell roundabout in the northern end of the scheme and the overriding of the existing roundabout with a new link road. However, while the link road from the B4082 for Option 6 passes the farm on its western side, cutting through part of the farm its self; the Option 11 link road passes closer to the existing A46 to the east of the farm, with the whole redevelopment hugging closer to the original alignment than Option 6.

Scheme area

10.5.6 The area within the combined proposed scheme boundary is herein referred to in this Chapter as the proposed scheme area to define it against the variable study area defined below.

Study area

10.5.7 The study area will be confined to the following distances from the proposed scheme boundary:

Table 10.6: Summary of Geology and Soils Study Areas

Receptor / Resource	Study Area	Rationale
Agricultural Land	Within the Scheme Boundary	For the agricultural soil assessment, the study area comprises the agricultural soils which would be directly crossed or interfaced by the Scheme i.e. only land underlain by the footprint of the Scheme that would be permanently lost and the associated temporary land take that will be restored post construction.
Geology and Soils	Within the Scheme Boundary	Assessment of the geology and soils within the scheme boundary is considered appropriate to assess the impact to local soil and geological features and the location and nature of onsite and offsite potential receptors. This area is considered appropriate as intrusive works may impact upon designated geological sites during the construction phase of the Scheme.
Contaminated Land	Within 250 m of the Scheme Boundary	This study area is considered appropriate for the consideration of historical and current potentially contaminative land uses where these could migrate and affect other receptors.
Geological Sites Designated for Biodiversity Interests	Within 250 m of the Scheme boundary	This is considered an appropriate study area for the assessment of potential land contamination to affect ecological receptors.
Hydrology: Groundwater Abstractions and Discharge Consents	Within 500m of the Scheme Boundary	The study area extends far enough from the Scheme to be able to consider contamination migration risks through groundwater.
. Hydrology: Surface Water	Within 500m of the Scheme Boundary	The study area for surface water receptors may be extended further as required downstream, depending on the risk of impact. Moreover, the key surface water features in relation to geology and soils effects are usually on site or within 250 m of the Scheme Boundary.

10.6 Baseline conditions

10.6.1 A desktop review as part of PCF Stage 1 was undertaken in October 2018 using publicly available information based upon the proposed options at the time. The baseline was revisited in summary for the Environmental Scoping Report. The following sections present an updated baseline for the proposed scheme for this report which includes:

- British Geological Maps
- British Geological Survey (BGS) GeoIndex service
- Google Earth Pro
- The Defra MAGIC mapping website
- The LandIS website (Cranfield University)
- Envirocheck report
- Coal Mining Search Report sourced from Groundsure

Geological conditions

Superficial deposits

10.6.2 No superficial deposits are recorded by the BGS within low lying areas to the immediate north and south of the existing roundabout, around Coombe Pool, and at the north and south ends of the proposed scheme boundary. However, its omission does not discount the potential presence of superficial deposits in these areas.

10.6.3 The remainder of the proposed scheme area is overlain by variable superficial deposits. These include:

- Post-glacial Alluvium and River Terrace Deposits: Present in the vicinity of the River Sowe and Smite Brook. Alluvium typically comprises soft to firm compressible silty clay, with possible layers of silt, sand, peat and basal gravel. River Terrace Deposits may comprise sand and gravel locally with lenses of silt, clay, or peat.
- Baginton Sand and Gravel Formation: Present in the vicinity of Hungerley Hall Farm, across the A46 and north of and within Coombe Country Park. This formation encompasses fluvial, lacustrine and organic deposits of the Proto-Soar River. The deposits are typically sands and gravels, with lenses of silt and clay.
- Glacial Till deposits of the Wolston Glaciogenic Formation**:** Predominantly recorded further to the eastern side and western side of the study area but extending into the central northern portion of the proposed scheme area crossing the A46. These deposits comprise the Thrussington Member described as glaciolacustrine muds comprising tills, sands, gravels, and laminated clays; these are overlain by the Bosworth Clay Member, a red pebbly diamicton clay and silty clay with rock fragments.

Bedrock geology

10.6.4 The proposed scheme area is underlain entirely by the Mercia Mudstone Group, which is toward the upper, Triassic part of the Permo-Triassic sequence of strata. The deposits are described by the BGS as dominantly red, less commonly green-grey mudstones and subordinate siltstones. The Mercia Mudstone Group is underlain by a sequence of Permo-Triassic sandstones known as the Sherwood Sandstone Group.

10.6.5 Coal Measures of Carboniferous age lie at considerable depth beneath the Permo-Triassic and superficial strata and are discussed in Section 10.6.46

Historical borehole records

10.6.6 Borehole records relating to the current A46 alignment are available through the BGS website. A summary of the ground conditions from borehole records deemed relevant to the four proposed scheme options is presented below.

10.6.7 No borehole data is available in the location of the Option 6 new link road running west of the farm, or the proposed northern roundabouts for Option 6 and 11. However, BGS Boreholes are available within the vicinity of the existing roundabout.

10.6.8 Within the roundabout area the BGS boreholes identify where present, limited topsoils of c.0.3mbgl, overlying a series of silty clays commonly including pockets of sand and often noted in the logs as 'Boulder Clays'. These silty clays extend to between c.1.6mbgl and 2.7mbgl. This is within the location of the Alluvium deposits or no recorded superficials.

10.6.9 Underlying the 'Boulder Clays' is a stiff to very stiff red brown often silty clay described in the logs as the 'Keuper Marl'. This strata commonly includes laminations and extends to the base of all boreholes where encountered. The deepest available in the area is 12.35mbgl. To the north along the alignment of the A46 the boreholes tend to encounter sand or sand and gravel over the Keuper Marl.

10.6.10 BGS Boreholes SP37NE593 and SP37NE592 identify these sands or sands and gravels to 4.3mbgl and 4.2mbgl respectively and reflect a move into the location of the Baginton Sand and Gravel Formation.

Soils

10.6.11 The Cranfield University Soilscapes (LandIS) website [Accessed May 2021] shows various topsoil types across the study area. The majority of the study area comprises topsoils classified as freely draining slightly acid loamy soils.

10.6.12 There are also areas of loamy and clayey floodplain soils with naturally high groundwater adjacent to Smite Brook and the River Sowe, beginning to the west of the existing Walsgrave Junction. Areas of slowly permeable, seasonally wet slightly acid/ base-rich loamy and clayey soils are present to the north and south of Coombe Country Park and areas of slightly acid loamy and clayey soils with impeded drainage along the A46 north of Hungerley Hall Farm.

10.6.13 The Agricultural Land Classification outlined in the Groundsure report identifies that the majority of the A46 alignment and land east of the A46 within the proposed scheme area, is classified as Grade 2; moving to Grade 3 in the area east of Hungerley Hall Farm and B4082. To the south of the current roundabout the area is predominantly Grade 2 beyond the urban areas. To the east of the A46 alignment the Grade varies, predominantly Grade 3a or Grade 3b with some limited Grade 2 Areas.

10.6.14 The ALC Grades encountered are defined as follows:

10.6.15 All the soils recorded are within the upper grade range of Grades 1, 2 and 3a described by the ALC as 'the best and most versatile land'.

- Grade 2: Very good quality agricultural land. Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as

winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.

- Grade 3: good to moderate quality land with moderate limitations which affect the choice of crops, timing, and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2. Grade 3 is subdivided into:
    - Subgrade 3a - Good quality agricultural land. Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.
    - Subgrade 3b – Moderate quality agricultural land. Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

10.6.16 For areas of land that have not been surveyed but are classed as Grade 3 using the mapping noted above, a conservative assumption has been adopted for the assessment and the land has been classed as Grade 3a as a worst case, until further ALC survey can be undertaken at PCF Stage 3.

10.6.17 The Groundsure Report identifies the proposed scheme area is within a surface water related Nitrate Vulnerable Zone (NVZ) to the River Avon. NVZs are described as ‘areas at risk from agricultural nitrate pollution designated under the EC Nitrate Directive (91/676/EEC). These are areas of land that drain into waters polluted by nitrates. Farmers operating within these areas have to follow mandatory rules to tackle nitrate loss from agriculture’.

Current land use

10.6.18 The majority of the proposed scheme area is occupied by the current alignment of the A46 and B4082; and Walsgrave roundabout and associated sidings or open farmland. Deciduous woodland lies close to either side of the current alignment adjacent to, and to the south of, the Walsgrave Junction. On the east side, these woodlands are associated with Coombe Pool SSSI and Coombe Abbey Park and Garden, which form part of Coombe Country Park. On the west side the woodlands border a residential estate including a school. The only buildings within the proposed scheme area are associated with Hungerley Hall Farm located to the north of the existing roundabout.

10.6.19 Outside of the proposed scheme boundary, within the study area the majority of the land to the north-east and south-east is open farmland. To the east of the current roundabout beyond the woodland is Coombe Pool within the Coombe Country Park from which Smite Brook extends west under the current A46 alignment within a culvert and emerges on the west side of the A46 adjacent to the residential development.

10.6.20 Smite brook from the residential area in the south-west, joins the River Sowe which extends north following broadly the western proposed scheme boundary. To the west of the river the area is densely populated with a mix of residential and commercial development including a superstore to the north-east of the current roundabout and a Hospital complex approximately 270m to the north-west of the proposed scheme boundary.

Recent industrial land uses

10.6.21 The only Groundsure Report entries for recent industrial land uses is for the series of pylons which cross the proposed scheme area from the south, adjacent to the A46, heading north across the B4082 side of the current roundabout and continuing north to the River Sowe before leaving the proposed scheme area. All four options come close to but avoid the pylons. However, the powerlines cross all four options.

Historic setting

10.6.22 The Groundsure report provides historic mapping from 1886 to 2020. The following presents a summary of the key features noted within the available mapping.

10.6.23 Hungerley Farm (Later Hungerley Hall Farm) has been present within the proposed scheme area since the first available mapping from 1886. From c.1903 to c.1967 there were a number of small potential pits and ponds located to the immediate south of the farm. After this they were no longer recorded.

10.6.24 Also detailed in the Groundsure report and discussed further in this Chapter are the presence of a number of other ponds and shallow workings across the proposed scheme area over the years. Notably a small gravel pit is identified to the south of the current roundabout on the A46 alignment. By 1967 this has expanded covering a large area within the south of the study area and is noted as two distinct areas, a gravel pit, and a sand pit. These are no longer noted by c.1980 with a small allotment in the place of the original gravel pit and all are replaced by the A46 by c.1991.

10.6.25 Coombe Pool has also been present from at least 1886 onwards, then named ‘the pool’ with a ‘menagerie’ including a boat house and old sand pit. The menagerie buildings are still present at the time of this report as part of Coombe Country Park.

10.6.26 A plant nursery is noted to the immediate south of Coombe Pool adjacent to the A46 from c.1991 currently noted as Beechwood Trees and Landscapes tree surgeons.

10.6.27 The remaining area to the east of the A46 alignment within the proposed scheme and study areas has remained largely unchanged from 1886 to present, remaining open farmland.

10.6.28 As present, from 1886 the River Sowe is located on the proposed scheme area boundary to the west. Smite Brook is also present from 1886 onwards and connects to Coombe Poole via a sluice and straight section with some culverting. This section is later further culverted when the A46 is developed c.1991.

10.6.29 Walsgrave on Sowe from before 1886 was located to the north-west of the study area. The town expanded over the years extending into the study area and currently borders the proposed scheme area. The main expansions of the town were: c.1967 with the inclusion of an ‘industrial hostel’ north-west of the proposed scheme area off Clifford Bridge Road; c.1973-1974 with the development of a hospital, later the Hospitals complex, the start of the residential development to the south-west of the roundabout and a series of works and depots outside of the study area to the north-west; c.1980 saw notable residential development within the study area adjacent to the River Sowe including the current superstore to the north-west of the roundabout.

10.6.30 Beyond the current historic mapping a large industrial and commercial estate named Walsgrave and Cross Point Retail Parks has been developed to the north of the proposed scheme area including supermarkets, retail stores and commercial and industrial depots and offices.

10.6.31 The main change within the proposed scheme area and study area was the development of the A46 c.1991 including the Walsgrave roundabout and the B4082 (formerly A) link road to Clifford Bridge Road.

Geological designations and sensitive land uses

10.6.32 The Groundsure report and Defra MAGIC mapping website [accessed May 2021] identified two environmental designation within the study area:

- Green Belt land: Eastern side of the A46 onwards
- Coombe Pool SSSI: Present within the study area and extending marginally into the proposed scheme area

10.6.33 While Coombe Pool SSSI is present it is not an SSSI designated for geological or geomorphological interest.

10.6.34 The Groundsure report and Defra MAGIC shows no other environmental designations within the study area (250m) including RAMSAR, SAC, SPA, NNR and LNR sites or proposed sites, and designated ancient woodlands or forest parks.

Landfill sites

10.6.35 There are a number of historic landfill areas recorded within the Groundsure report (Identified from the Environment Agency (EA) records and *Local Authority records and mapping*) within the study area.

Historic landfill (EA) records within the proposed scheme area:

- Coombe Field: (Within the southern end of the proposed scheme across the alignment of the A46 adjacent to Coombe Pool SSSI) Coombe Fields, Binley, Coventry (R05, 3700/3049), licence holder Coventry City Council, first inputs 21/12/1926, last recorded 05/08/1981, licenced to accept industrial and commercial wastes.
- Walsgrave Hill Borrow Pit: (Within the northern end of the proposed scheme area including the current A46 alignment and land adjacent to the east). Northern Site No.4 Walsgrave Hill Borrow Pit, Walsgrave Hill Farm, Coventry, Warwickshire (WDL/318), licence holder AF Bridge Contractors Limited, first recorded 21/12/1987, last recorded 31/12/1990, licenced to accept 'inert' and 'special' wastes.

Historic landfill (EA) records within the study area:

- Coombe Estate: (To the south-west of the proposed scheme area within the residential development). Coombe Estate, Binley, Coventry (4600.309), licence holder Coventry City Council, first recorded 01/01/1950, last recorded 31/12/1960, licenced to accept 'inert' wastes. *This is most likely licenced in association with infill material for the development of the current residential estate.*

Historic landfill (Local Authority mapping) records within the proposed scheme area:

- Sharman's Yard (formerly): 223m East of 14 Dunvegan Close, Coventry, CV2 2PA
- Hawkes Tip: 77 metres East of 14 Dunvegan Close, Coventry CV2 2PA

10.6.36 Both the locations are recorded within the area designated as Coombe Field Historic landfill as above (10.6.35).

10.6.37 Three entries for Local Authority mapping recorded historic landfills are recorded, these relate to extents of the Sharman's Yard and Hawkes Tip and to Coombe Estate as described above.

10.6.38 It should be noted that the historic landfills are predominantly designated as containing inert fill and likely to be broadly associated with the A46 road construction and the residential developments in the area. As such, it is likely that either some degree of remedial works have been undertaken to permit the subsequent developments on these locations, or that these entries relate directly to inert infill material for those developments.

Historical waste sites

10.6.39 One historical waste site is recorded within the proposed scheme area with numerous entries between 1958 and 1996. These are for a Scrap Yard which appears to be located at the northern most end of the Coombe Estate historic landfill adjacent to the current A46. As for the landfills with the A46 currently at its location it is likely that at least some remedial works were undertaken to permit the A46 development.

Worked ground

10.6.40 The Groundsure Report identifies from the BGS 'Brit Pits' database one location described as 'Quarry, Sand Pit, Clay Pit or Opencast Coal Sites':

- Coombe Woods: for Sands and Gravels at the same location as the historic landfill of the same name.

10.6.41 Within the wider study area three entries are noted, one for:

- Walsgrave Hill: for Sands and Gravels at the same location as the historic landfill of the same name.
- Two entries both relating to Binley Gravel Pit for sands and gravels at the location of the Coombe Estate historic landfill.

10.6.42 Many surface ground workings are noted within the proposed scheme area and wider study area. Other than a pond noted just outside of the proposed scheme boundary at the location of the Walsgrave Hill historic landfill; the remaining entries are for gravel pits, unspecified pits, old gravel pits and unspecified ground workings. These are mainly located along the current A46 alignment, predominantly at the southern end of the proposed scheme area and within the residential development to the south-west.

10.6.43 It is likely that the majority of these surface workings have been subject to either some degree of remedial works to permit the subsequent developments at their locations or that these relate directly to those developments.

Historical land uses

10.6.44 The majority of the historic land uses relate to the pits and ground workings identified above. In addition, there is a section of 'cuttings' associated with the A46 in the centre of the alignment north of the roundabout and a refuse heap noted which is located in the south end of the Coombe Field Historic Landfill dated 1967 and 1973.

10.6.45 Five entries for Unspecified Tanks are noted for dates between 1948 and 1964 at one location, on the south-eastern edge of the Clifford Bridge Road and B4082 roundabout on the western end of the proposed scheme area. It is not clear from historic mapping what these may relate to however allotments are located nearby and this was also at the start of the main track entrance to Hungerley Hall Farm at the time.

Coal mining and natural resources

10.6.46 The BGS GeoIndex website [Accessed May 2021] shows areas of coal measures to the west of the study area. This includes Deep Coal (between 50m and 1200m) adjacent to the west side of the junction of the B4082 and Clifford Bridge Road on the proposed scheme boundary. Shallower Coal measures (seams at least 2m thick, between 600m and 1200m depth) are situated approximately 1.1 miles (1.8km) further west of this junction. The productive Coal Measures are concealed and lie at considerable depth beneath the Permo-Triassic sequence of strata along the route. The Geoindex indicates any working of the coal seams will have therefore been achieved using modern mechanised longwall mining and shallow abandoned mine workings are therefore not anticipated to be present; and that any subsidence associated with deep longwall mining will have ceased within a short time period of the working of the seams.

10.6.47 According to the Defra MAGIC mapping the study area is not within an internationally or nationally designated site for geology. However, all four options fall within Warwickshire mineral safeguarding areas for sand and gravel and have 'potential for mineral reserves'. Therefore, the study area is considered as having a sensitivity of medium to high quality.

10.6.48 The Coal Authority's Interactive Map Viewer [accessed May 2021] indicates that the study area is within the Coal Authorities Mining Reporting Area.

10.6.49 As part of this assessment a CON29M official coal mining search was obtained as part of the Groundsure report (September 2020).

10.6.50 The only notably entry in the CON29M report relates to a Coal mining subsidence claim: "We have evidence of a damage notice or subsidence claim for the property or within 50m of the property since 31st October 1994." (Details in Table 10.7).

Table 10.7: Coal mining subsidence claims

Distance	Type	Reference	Address	Claim Date	Status	Status Reason	Claim Value
0	TCA	S35956-CI	161 CLIFFORD BRIDGE ROAD BINLEY COVENTRY WEST MIDLANDS CV3 2DX		02 - Rejected	-	-

10.6.51 The CON29M report further details:

- No past or present underground coal mining works have been undertaken within the proposed scheme area, nor are future works planned.
- No past or present opencast coal mining works have been undertaken within the proposed scheme area, nor are future works planned.
- No 'coal mining geology' identified.
- No shafts or adits are noted
- No working facilities orders, emergency call outs or payments to copyhold owners are recorded.
- The location is not within a Cheshire Brine designation.
- No Mine Gas emissions are identified.

10.6.52 The 'Key Recommended Next Steps' within the report suggest a 'Subsidence Claims History report' is obtained from the Coal Authority with a view to clarifying any associated risk with regards to the coal mining subsidence claim for further details, which at present has not been obtained.

Hydrology and hydrogeology

10.6.53 The surface water, groundwater features and abstractions are discussed in Chapter 13, Road Drainage and the Water Environment of this Report.

10.6.54 Groundwater is a protected resource and its vulnerability to pollution is classified depending on the geology of the area (which determines the aquifer status) and the leaching potential of overlying soils (which determines how easily pollution from above ground sources may filter through to the aquifer).

- Bedrock: The Mercia Mudstone is designated as a Secondary 'B' aquifer. This is defined by the Environment Agency as "predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering".
- Superficial deposits: Sands and gravels; alluvium and river terrace deposits, are classified as Secondary 'A' aquifer. This is defined by the Environment Agency 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".
- Superficial deposits: The Thrussington Member and Bosworth Clay member are designated as Unproductive. This is defined by the Environment Agency as "rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow".

10.6.55 The permeability of the undifferentiated Glaciofluvial Deposits are not currently known and there are some areas with no superficial deposits, and hence no superficial aquifer designation.

10.6.56 The Sherwood Sandstone Group which underlies the Mercia Mudstone Group constitutes a Principal Aquifer. However, the aquifer is concealed and protected by virtue of the thick Mercia Mudstone strata overlying it.

10.6.57 There are no known groundwater abstractions in the study area, nor Private Water Supplies identified in the available information. However, details have been requested from the Environment Agency, Coventry City Council and Rugby Borough Council to confirm this.

10.6.58 There are no groundwater Source Protection Zones within the study area.

BGS borehole Logs

10.6.59 The BGS borehole logs publicly available from the BGS website recorded no groundwater within the boreholes located in the areas within no superficial deposits or alluvium and river terrace deposits in the vicinity of the existing roundabout where predominantly cohesive strata were encountered.

10.6.60 Within the areas to the north of the roundabout in the areas of the Baginton Sand and Gravel Formation, the boreholes did encounter some seepage and slight ingress of waters at the boundary of the Sands and Gravels with the underlying clays of low permeability at varying depth c.2-3mbgl. Within a number of the boreholes near to the roundabout ingress of water was identified where pockets of granular material were encountered within the shallow clays c. 4-5mbgl.

Soil Chemistry

10.6.61 The Groundsure report outlines the BGS likely background concentrations of potentially harmful elements estimated primarily from rural topsoil data or stream sediment data. Table 10.8 outlines the ranges of concentrations for these elements within the proposed scheme area.

Table 10.8: BGS estimated background soil chemistry

Arsenic (mg/kg)	Bioaccessible Arsenic (mg/kg)	Lead (mg/kg)	Bioaccessible Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Nickel (mg/kg)
15	No Data	100	60	1.8	20-40 to 60-40	15 to 15-30

10.6.62 In addition to the BGS background soil chemistry the BGS also provide an estimate of the urban soil chemistry of an area based upon interpolation of data from 23 urban areas in Great Britain. Table 10.9 outlines the ranges of concentrations for these elements within the proposed scheme area.

Table 10.9: BGS estimated urban soil chemistry

Arsenic (mg/kg)	Bioaccessible Arsenic(mg/kg)	Lead (mg/kg)	Bioaccessible Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Nickel (mg/kg)	Tin (mg/kg)
10 to 20	1 to 3.5	131 To 1082	86 to 614	1.3 to 7.4	47 to 93	28 to 104	19 to 33	4 to 21

Conceptual site model

10.6.63 A CSM defines the plausible contaminant source, pathway, and receptor linkages, which is integral to defining baseline conditions. The following sections detail the CSM for the currently proposed scheme Options 6, 7, 8 and 11 which have been drafted for the context of the proposed scheme based on the review of the available baseline information presented in this Chapter.

10.6.64 The CSMs present details of potential sources of contamination, potential receptors and potential contaminant migration pathways that have been identified for these sites. Table 10.10 lists the considered potential sources of contamination along the proposed scheme options.

Table 10.10: Possible sources of contamination for the proposed scheme options

Source Location	Potential Source	Option 6	Option 7	Option 8	Option 11
Onsite Sources (Within proposed scheme area inside proposed scheme boundary)	Made Ground	Potential for Made Ground associated with the construction of the existing A46, B4082 and the current roundabout. Potential for Made Ground associated with infilled features including historic Sand and gravel pits, and ponds; notably the large gravel pit and Sand pit in the south end of the proposed scheme area before its redevelopment as the A46. Potential for Made Ground associated with the historic Landfill Sites and waste sites notably within the vicinity of the current roundabout.			

Source Location	Potential Source	Option 6	Option 7	Option 8	Option 11
		Potential for Made Ground associated with Hungerley Hall Farm and historic landfilling in this area. Former Allotments in the south end of proposed scheme area.			
	Industrial and commercial uses and leaks, spills and emissions	Historic entries for unidentified tanks on western proposed scheme area boundary, south of the B4082 junction with Clifford Bridge Road. Potential for leaks spills and emissions associated with Hungerley Hall Farm, notably plant & equipment oils and fuels.			
	Agricultural use	Agricultural land used for both arable/ livestock farming. Fertilisers, pesticides and herbicides may have been applied to ground. Chemicals, e.g. sheep dip, and fuels may have been stored on farmland. Also burial pits may be present where infectious carcasses or waste materials may have been disposed of.			
	Soil Leachate	Leachates associated with potential contaminants in Made Ground and agricultural land use.			
	Groundwater	Perched/ shallow groundwater may be present along proposed scheme options most notably within areas of granular superficial deposits. Historical boreholes indicate some perched waters within Baginton Sand and Gravel Formation typically at boundary with underlying clays around 2-3mbgl and some limited ground waters within granular pockets within underlying clays c.4-5mbgl.			
Offsite Sources (Within study area Boundary outside of the proposed scheme boundary	Industrial and commercial uses and leaks, spills and emissions	Current Walsgrave and Cross Point Retail Parks to north of the proposed scheme. Current superstore to the north-west of the existing roundabout. Beechwood Trees and Landscapes tree surgeons, formerly a nursery adjacent to A46 at south end of proposed scheme boundary. Potential for equipment and vehicle oils and fuels.			
	Made Ground	Potential for Made Ground associated with the historic Landfill Sites and waste sites notably within the vicinity of the residential development to the south-west of the current roundabout. Potential for Made Ground associated with the construction of the existing A46 andB4082. Potential for Made Ground associated with infilled features including historic Sand and gravel pits, and ponds.			
	Other Potential contaminative land uses	Leachate run off from residential developments to the immediate south-west of the current roundabout.			

10.6.65 Table 10.11 provides a summary of the potential land contamination receptors for the proposed scheme options.

Table 10.11: Description of potential land contamination receptors

Potential receptors	Description
Human Health: Future site users	Workers and future users of the proposed scheme.
Human Health: Local residents and workers	Residents in the vicinity of the proposed scheme, notably the adjacent housing estate to the south-west of the current roundabout. Workers at the superstore close to the proposed scheme boundary to the north-west of the current roundabout. Farm workers of the current farmland both in the proposed scheme area and nearby
Controlled Waters: Surface waters	The main surface waters associated with proposed scheme options are: Coombe Pool c.60m east of the proposed scheme boundary adjacent to the current roundabout. Designated as an SSSI. Smite Brook which is culverted under the A46 south west and south of the current roundabout. The River Sowe on the western proposed scheme boundary, (more applicable to Option 6 due to its closer proximity)
Controlled Waters: Groundwater	Superficial deposits: Sands and gravels; alluvium and river terrace deposits, are classified as Secondary 'A' aquifer. Bedrock: The Mercia Mudstone is designated as a Secondary 'B' aquifer. Perched/ shallow groundwater may be present along the proposed scheme options most notably within the areas of granular superficial deposits. The Thrussington Member and Bosworth Clay member are designated as Unproductive.
Flora and fauna	More detailed consideration for Flora and Fauna are considered in Chapter 9 Biodiversity.
Surrounding Land Use: Residential	Nearby residential development, two story brick buildings and associated school and small shops.
Surrounding Land Use: Agricultural soils and Soil Quality	Grade 2 agricultural soils are present within the alignments of all route options. Grade 3a and grade 3b are present within the western side of the Options which will be of most relevance to Option 6.

10.6.66 Table 10.12 provides a summary of the potential pathways by which contamination sources may come into contact with receptors considered most appropriate for the proposed scheme options.

Table 10.12: Description of potential contamination pathways

Potential Pathways		Description
Soil pathways including the following sources: • Made Ground • Soil (Made Ground) derived leachate	Dermal contact	Direct contact with contaminated Made Ground soils, soil derived dust, soil leachate and perched water in the Made Ground.
	Ingestion	Direct or indirect ingestion of Made Ground soil and soil derived dust.
	Inhalation	Inhalation of Made Ground soil derived dust, organic vapours or ground generated gas.
Groundwater pathways including the following sources: • Soil leachate • Shallow and deep groundwater	Infiltration and vertical migration via permeable strata	Rainfall infiltration can generate and mobilise Made Ground soil-derived leachate impacting on surface waters and groundwater. Majority of the proposed scheme would include areas of hard standing which would limit the amount of infiltration at the site.
	Lateral Migration through Aquifer	Aquifers allow transportation of contaminants through the permeable strata.
Gas pathways including the following sources: • Ground gas	Vertical/lateral migration via permeable strata	Permeable strata and service trenches could potentially allow movement of ground gases.

10.6.67 The potential contaminant linkages and associated risks identified for the proposed scheme options are summarised in Table 10.13.

Table 10.13: Potential contaminant linkages

Potential Sources	Pathways	Receptor
Made Ground and soil derived leachate	• Inhalation/ingestion of made ground soil derived dust	• Future site users • Flora and fauna • Offsite receptors • Controlled waters • Agricultural soils
Shallow and deep groundwater	• Leaching of potential contaminants from soil pores into groundwater	• Surface watercourses

Potential Sources	Pathways	Receptor
	and migration to surface watercourses • Lateral Migration of contaminants through Aquifer • Plant uptake of leached substances	• Shallow and deep groundwater • Flora and fauna • Future Site Users
Agricultural use	• Inhalation/ingestion/dermal contact • Leaching of contaminants to groundwater in underlying aquifers • Leaching of contaminants to groundwater in underlying aquifers	• Future site users • Controlled waters
Offsite sources including Made Ground and industrial land use	• Inhalation/ingestion of soil derived dust • Leaching of potential contaminants from soil pores into groundwater and migration to surface watercourses • Lateral Migration of contaminants through Aquifer • Plant uptake of leached substances	• Future site users • Flora and fauna • Offsite receptors

10.7 Potential impacts

Construction

10.7.1 All four Options (6, 7, 8, 11) have the potential to result in physical changes on the geology and soils in the study area during construction although these changes would be relatively limited with respect to Options 7 and 8 in comparison to Option 11 and Option 6, with Option 6 being the most extensive.

10.7.2 These impacts could include:

- Effects on agricultural soils as a valuable resource: For example, loss or damage to soils of good agricultural quality (of the four options Option 6 would involve the highest permanent land take of 19.3ha).
- Impacts associated with re-use of soils and waste soils. Re-use of site-sourced materials on or off-site, disposal of site-sourced materials off-site, importation of materials to the site.
- Impacts from chemical spillages and leaks from plant and machinery used in construction.
- Impacts on ground stability through excavation and earthworks alterations.

10.7.3 Additional impacts may be present with regards to contaminated land. Notably the proposed scheme area includes two main historic landfills and landfilling is noted to be present across the current junction area. These are typically associated with the A46 and nearby residential development as well as the former historic gravel and sand pits within the current alignment of the A46. Additionally, Options 6 and 8 may pass through the existing farm to the north of the junction, while Option 11 would pass close to the farm on its eastern side. The following additional impacts may also occur:

- Disturbance of contaminated materials, resulting in the release of contaminated material to the environment, which may be inhaled, ingested, or deposited, either directly or by wind-blown dust.
- Accidental or inadvertent release of contaminated materials during the transport of contaminated spoil off-site, which may affect receptors along the route.

10.7.4 However, if the area is remediated there is the potential for beneficial effects from removal of areas of contaminated land.

10.7.5 There also may be a risk of pollution of surface and/ or groundwater during construction most notably to Smite Brook which passes beneath the A46 just south of the existing junction and Coombe Pool to the east.

10.7.6 Therefore, the assessment has considered the potential effects from contamination in relation to controlled waters and human health receptors and effects on local geology and soils, including agricultural soils.

Operation

10.7.7 During operation of the proposed scheme, all options have the potential to impact soils adjacent to the road which may be affected by spray or airborne contaminants generated during routine maintenance and operation of the road or released during road accidents/ emergency situations. This has the potential to affect human health in relation to future users of the site.

10.7.8 There is also the possibility of cut and embankment slopes being susceptible to erosion for all four options and risk of groundwater and surface water pollution from the operational phase.

10.7.9 The operational assessment has therefore considered the potential for significant effects upon future Scheme users, controlled waters and offsite receptors.

10.7.10 No further effects would be expected upon geology or loss of soil resources, including agricultural soils, therefore these resources / receptors have been scoped out of the operational assessment.

10.8 Design, mitigation and enhancement measures

Construction

10.8.1 An EMP will be prepared and implemented by the contractor which will include a range of measures associated with mitigating potential impacts as associated with land contamination as detailed below. Such measures accord with legal compliance and best practice guidance when working with or around contaminated materials.

10.8.2 These measures would typically include:

- Actions to minimise dust generation such as damping down during dry weather
- Provision of personal protective equipment (PPE), such as gloves, barrier cream, overalls etc. to minimise direct contact with soils

- Provision of adequate facilities and clean welfare facilities for all construction site workers
- Characterisation of the prevailing ground gas regime via monitoring
- Monitoring of confined spaces for potential ground gas accumulations, restricting access to confined spaces, i.e. by suitably trained personnel, and use of specialist PPE, where necessary
- Preparation and adoption of a site and task specific health and safety plan

10.8.3 It is anticipated that the construction contractor will prepare a detailed and adequate risk assessment and method statement, complying with the Environmental Good Practice on Site and other relevant Safety, Health and Environmental (SHE) guidance and legislation to mitigate any impact to construction workers. Therefore, impacts from the proposed scheme on construction workers are unlikely and therefore scoped out at this stage.

10.8.4 The prevention of pollution of controlled water would be achieved by compliance with the requirements of the relevant Environment Agency standard rules under the environmental permitting system and standard best practice.

10.8.5 The potential impacts on off-site receptors would be typically addressed through the adoption of the following measures:

- Drainage attenuation measures incorporated into the design to attenuate increased rates of runoff
- Damping of ground with water to minimise dust
- Sheeting of lorries transporting spoil off site and the use of dust suppression equipment on plant
- Groundwater level controls (as required)
- Adequate fuel/ chemical storage facilities. For example, bunded tanks, use of hard standing, associated emergency response and spillage control procedures
- Well maintained plant with associated emergency response and spillage control procedures
- Any temporary onsite storage of contaminated material would be stored on sheeting and covered to minimise the potential for leachate and run off from the stockpile being generated
- Ensuring that the surface water run-off from the proposed scheme or incidental groundwater encountered during the site preparation, earthworks and construction does not have a detrimental effect on the surface water features
- Surface water run-off to be controlled using appropriate drainage measures

10.8.6 It is assumed that the materials used to construct the proposed scheme would be designed and specified taking due account of the potential for aggressive ground conditions. The assessment methodology set out in the Building Research Establishment (BRE) Special Digest 1 (2005) would be adopted to determine the appropriate concrete classification in relation to the protection of buried concrete against sulphate attack. Therefore, the impact of aggressive ground on construction materials is scoped out at this stage.

10.8.7 Manual of Contract Documents for Highway Works (MCHW) Series 600 Earthworks (Highways England, 2016) defines Class U1B as “contaminated materials, including controlled wastes …but excluding all hazardous wastes …and radioactive wastes…” Class U2 material is defined as hazardous waste with as

per the Hazardous Waste (England and Wales) Regulations 2005. In the event of Class U1B materials being encountered treatment or remediation of the material may be required. Should Class U2 materials be present this may require removal from the location of the proposed scheme dependent on the reuse potential and the regulatory mechanism employed.

Operational phase

10.8.8 During the operation of the proposed scheme, any maintenance works should be carried out in accordance with CIRIA C692 3rd Edition Environmental Good Practice on Site (2010). Maintenance workers would be provided with appropriate PPE such as gloves and overalls to minimise direct contact with soils.

10.8.9 The proposed scheme operation would not include any activities that are likely to generate contaminants that could pose significant risk to controlled waters. However, there would be potential for environmental risks as associated with spillages due to road accidents or faulty vehicles. To mitigate the impacts on controlled waters during the proposed scheme operation, it is anticipated the highway drainage system will incorporate appropriate measures to minimise impacts associated with accidents and spillages. In addition, any spillages following road accidents would be routinely managed by Highways England who is responsible for the maintenance of the Strategic Road Network.

10.9 Assessment of likely significant effects

Value of resources (Sensitivity)

10.9.1 Based on the review of the previous and current land use in the area, there would appear to be some locations on and in the vicinity of the proposed scheme options which have the potential to be contaminated. The principal receptors which could be affected by either contamination on-site or off-site which is created or affected by construction and/ or operation of the proposed scheme comprise:

- Human health: Future road users and residents / workers close to the proposed scheme works who may be exposed to potential contaminants.
- Controlled waters: Groundwater: The Mercia Mudstone Group is defined as a “Secondary B Aquifer” by the Environment Agency; and The Superficial deposits are designated as “Secondary A” aquifers for the more granular strata and “unproductive strata” for the more cohesive strata.
- Controlled waters: Surface water: including Smite Brook and the River Sowe.
- Sensitive land Uses: the nearby Coombe Pool and country park are a designated SSSI.
- The majority of the land at and within the vicinity of the proposed scheme options is classified as Grade 2 (very good) and Grades 3a and 3b (good to moderate quality) agricultural land. There will be a loss of soils associated with the proposed scheme.

10.9.2 The value (sensitivity) of potential receptors or soil/ geological resources has been described qualitatively according to the categories in Table 10.2. The receptors are listed below in Table 10.14 including their classification of sensitivity for each of the four options.

Table 10.14: Summary of critical receptors and their sensitivity

Receptor	Phase		Sensitivity			
	Construction	Operation	Option 6	Option 7	Option 8	Option 11
Human Health – Future Site Users (scheme)	×	✓	Medium	Medium	Medium	Medium
Human Health – Local residents and workers	✓	✓	Very High	Very High	Very High	Very High
Controlled Waters – Surface Waters	✓	✓	Very High	Very High	Very High	Very High
Controlled Waters – Groundwater	✓	✓	High	High	High	High
Surrounding Land Use (Agricultural Land)	✓	✓	Very High	Very High	Very High	Very High
Soil Quality	✓	✓	Very High	Very High	Very High	Very High

Magnitude of impacts (magnitude)

Construction phase

10.9.3 The potential sources of contamination within the vicinity of the proposed scheme options have been identified. The receptors and their sensitivity have been defined in Table 2

10.9.4 This section considers the potential impacts upon identified receptors and their magnitude taking into account the impact avoidance and mitigation measures described in this Chapter. The magnitude has been described qualitatively according to the categories in Table 10.3. The receptors are discussed below with regards to the classification of magnitude. Table 10.15 below summarises these classifications of magnitude for each of the four options.

Impacts to local residents and workers

10.9.5 Residents and visitors of surrounding properties would be at risk from wind-blown dust and subsequent inhalation or direct contact with dusts or vapours generated by construction activities from contaminated soils. The residents and visitors of

properties within 50m are considered to be of a Very High sensitivity with reducing sensitivity with distance. All four options pass through/ in close proximity to Hungerley Hall Farm. As such, the receptor sensitivity for local residents and workers during the construction phase is considered to be very high for all of the proposed scheme options.

10.9.6 Taking into account the mitigation measures, the magnitude of impact upon off-site receptors is considered to be Negligible adverse for all of the proposed scheme options.

Impacts on controlled waters

10.9.7 Potential contaminants could be mobilised during the construction works which could impact upon controlled water receptors through disturbance or exposure of contaminated materials, through direct release of contaminants, or through the creation of preferential pathways. This is notably in relation to Smite Brook which runs under the current A46 alignment close to the current roundabout, which is also in the vicinity of the recorded Historic landfills and sand and gravel pits. The sensitivity for surface waters is considered to be Very high.

10.9.8 Similarly, with the potential for shallow and perched groundwaters and areas of infilled materials for which the groundwater profile is not known, the underlying Secondary A aquifer of the superficial deposits and Secondary A aquifer of the bedrock indicates the sensitivity for groundwater to be High.

10.9.9 In addition, during the construction phase it would be necessary to fuel and maintain a fleet of mobile plant. Potential impacts on soil and groundwater quality could arise from the uncontrolled release of fuel and oils, either by leakages/ spillages from storage areas or by incorrect disposal of waste or surplus material.

10.9.10 Considering the application of the embedded mitigation measures, the magnitude of potential impact upon controlled waters is considered to be Minor adverse for all of the proposed scheme options.

Impacts on agricultural soils and soil resources

10.9.11 All of the proposed scheme options will impact agricultural soils of Grades 2 and 3. Soils of Grade 2 and 3a are considered to be ‘good quality agricultural land’. Under the DMRB LA 109 as noted in Table 3, Grade 2 Soils are classified as Very High sensitivity and 3a soils have a High sensitivity classification. With all four Options crossing both soils, the overall classification is taken as Very High.

10.9.12 During the construction phase the movement of vehicles across the proposed scheme area may result in the deterioration of soil physical quality through compaction. Soil materials would also deteriorate through compaction and loss of structure if soil were to be handled in a wet condition. Compaction of the soil materials would reduce the permeability of already low permeability soils, thereby increasing the likelihood of surface run-off and flooding. Groundwater has also been recorded at shallow depths within the boundary of the proposed scheme options which could also increase the risk of soil deterioration through compaction and contribute to reduced soil permeability.

10.9.13 The proposed scheme would cover the route alignments with hard standing. The presence of the hard standing would result in the removal of soil resources, thus removing this resource from future use.

10.9.14 The four proposed scheme options would likely result in the loss of less than 20ha each of agricultural land which is considered to have a Moderate adverse magnitude. However, while all four are minor adverse, it should be noted that options 11 and 6 would take considerably more agricultural land than the other two options with Option 6 posing the most extensive, understood to be approximately 19.3ha.

Operational phase

Impacts to future site users and local residents and workers

10.9.15 While there is potential for environmental risks associated with the operation of the proposed scheme including spillages due to road accidents or faulty vehicles, the proposed scheme operation would not be anticipated to result in significant effects on human health in terms of exposure to contaminated soils. Off-site receptors include nearby residents and visitors to nearby properties within the vicinity of all of the proposed scheme options, whilst future site users include road users (of Very high and Medium sensitivity, respectively).

10.9.16 It is considered that the design for all of the proposed scheme options and included mitigation measures will be appropriate to limit the magnitude of impacts on future site users and local residents and workers. As such the magnitude is considered to be Negligible adverse**.**

Impacts on controlled waters

10.9.17 The proposed scheme operation would not include activities that could pose a significant risk to surface waters and/ or groundwaters (of high and very high sensitivity, respectively). However, there is potential for environmental risks associated with spillages due to road accidents or faulty vehicles. The proposed scheme design is anticipated to include a suitable drainage system design which would prevent accidental spillages from entering the ground or discharging directly into surface waters.

10.9.18 Given the mitigation measures, the magnitude of impact upon controlled waters is considered to be Negligible adverse during operation for all of the proposed scheme options.

Impacts on agricultural soils and soil resources

10.9.19 The proposed scheme operation is not anticipated to significantly impact upon soil resources during operation. However, soils within the proposed scheme footprint would need to be appropriately managed, whilst any chemical used (fertilisers/ herbicides) would need to be applied in accordance with the manufacturers' instructions.

10.9.20 Taking into account the mitigation measures the magnitude of impact upon soil resources (Grade 2/ 3 of Very High/ High sensitivity) is considered to be Negligible for all of the proposed scheme options during the operational phase.

10.9.21 Table 10.15 summarises the magnitudes of impact for the noted critical receptors in tabular format.

Table 10.15: Summary of critical receptors and their magnitude of impact

Receptor	**Magnitude**							
	Construction				Operation			
	Option 6	Option 7	Option 8	Option 11	Option 6	Option 7	Option 8	Option 11
Human Health – Future Site Users (scheme)	×	×	×	×	Negligible Adverse	Negligible Adverse	Negligible Adverse	Negligible Adverse
Human Health – Local residents and workers	Negligible Adverse	Negligible Adverse	Negligible Adverse	Negligible Adverse	Negligible Adverse	Negligible Adverse	Negligible Adverse	Negligible Adverse
Controlled Waters – Surface Waters	Minor Adverse	Minor Adverse	Minor Adverse	Minor Adverse	Negligible Adverse	Negligible Adverse	Negligible Adverse	Negligible Adverse
Controlled Waters – Groundwater	Minor Adverse	Minor Adverse	Minor Adverse	Minor Adverse	Negligible Adverse	Negligible Adverse	Negligible Adverse	Negligible Adverse
Surrounding Land Use (Agricultural Land) & Soil Quality	Moderate Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse	Negligible Adverse	Negligible Adverse	Negligible Adverse	Negligible Adverse

Significance of Effects

10.9.22 The determination of the significance of effects is determined through the comparison of the sensitivity of the receptor with the magnitude of the potential impact as defined in Table 10.2 and Table 4.2 in accordance with DRMB LA 104.

10.9.23 A summary of the soils and geology assessment for the proposed scheme options is presented in Table 10.16 for the construction and operational phases of the proposed scheme Options.

Table 10.16: Summary of key geology and soil effects and potential pollutant linkages for the scheme options

Source	Proposed Scheme Option	Sensitivity/ Importance of Resource/ Receptor	Magnitude of Impact	Significance of Effect
Construction				
Human Health – Future Site Users (scheme)	Options 6, 7, 8, 11	N/A	N/A	N/A
Human Health – Local residents and workers	Options 6, 7, 8, 11	Very High	Negligible adverse	Slight
Controlled Waters – Surface Waters	Options 6, 7, 8, 11	Very High	Minor adverse	Moderate or Large
Controlled Waters – Groundwater	Options 6, 7, 8, 11	High	Negligible adverse	Slight
Surrounding Land Use (Agricultural Land)	Options 6, 7, 8, 11	Very High	Moderate adverse	Large or Very Large
Soil Quality	Options 6, 7, 8, 11	Very High	Moderate adverse	Large or Very Large
Operation				
Human Health – Future Site Users (scheme)	Options 6, 7, 8, 11	Medium	Negligible adverse	Neutral or Slight
Human Health – Local residents and workers	Options 6, 7, 8, 11	Very High	Negligible adverse	Slight
Controlled Waters – Surface Waters	Options 6, 7, 8, 11	Very High	Minor adverse	Slight

Source	Proposed Scheme Option	Sensitivity/ Importance of Resource/ Receptor	Magnitude of Impact	Significance of Effect
Controlled Waters – Groundwater	Options 6, 7, 8, 11	High	Negligible adverse	Slight
Surrounding Land Use (Agricultural Land)	Options 6, 7, 8, 11	Very High	Negligible adverse	Slight
Soil Quality	Options 6, 7, 8, 11	Very High	Negligible adverse	Slight

Summary

10.9.24 Table 10.16 indicates that, given appropriate design of the proposed scheme options and adherence to appropriate construction and operational practices that accord with legal compliance and best practice guidance when working with or around contaminated materials, effects associated with soils and geology, the significance of the effects for all four options is generally predicted to be Neutral to Slight during the operational phase, and Slight to Large or Very Large during the construction phase.

10.9.25 Those of Moderate and above include the classification of Moderate / Large significance for surface waters and Large or Very Large for the soil quality and agricultural soils. The remaining effects are considered Slight.

10.9.26 The moderate to large classification for surface waters is only considered due to the proximity of the development to notable surface water bodies including Coombe Pool to the east and Smite Brook which is culverted beneath the A46 close to the development works. As such at this stage it is suggested that additional consideration is given to the potential impact of the construction works on the culverted brook specifically. Consideration should be given to Chapter 13 for further consideration for surface waters.

10.9.27 The Large or Very Large classification for soils is derived from all of the proposed scheme options being anticipated to result in the loss of less than 20ha of Grade 2 and Grade 3 agricultural land. The loss of agricultural land would be unavoidable for all proposed scheme options although Options 6 and 11 pose notably more loss of agricultural land than Options 7 and 8 which adhere closer to the original road alignment. While Option 11 poses more loss than Options 7 and 8 its development also holds close to the original alignment limiting loss compared to Option 6 which poses notably more potential land loss at approximately 19.3ha.

Proposed level and scope of assessment

10.9.28 A PSSR shall be produced as part of the Stage 2 PCF once the preferred route has been finalised.

10.9.29 A ground investigation shall be required for the route as part of Stage 3. The nature of this investigation shall be considered further based on the findings of the PSSR.

11 Material Assets and Waste

11.1 Introduction

11.1.1 This chapter reports the findings of an assessment of the likely significant effects related to Material Assets and Waste as a result of the proposed scheme.

11.1.2 The assessment has been prepared in accordance with DMRB LA 104 and DMRB LA 110 Material Assets and Waste Revision 0 (Highways England 2020b; 2019c).

11.1.3 Material assets and waste comprise:

- The consumption of materials and products (from primary, recycled or secondary, and renewable sources).
- The production and management (including recovery and disposal) of waste.

11.1.4 Material assets are defined as:

- Construction materials and products
- Assets associated with the management of waste or production of materials such as landfill capacity, safeguarded waste sites, mineral safeguard sites and peat resources.

11.1.5 Waste is defined as per the European Waste Framework Directive (Waste FD) (The European Parliament and the Council of the European Union, 2008) as *"any substance or object which the holder discards or intends or is required to discard"*.

11.2 Legislative and policy framework

11.2.1 This assessment has been undertaken taking into account relevant legislation and guidance set out in national, regional and local planning policy (summarised in the sections below). The legislation and policy requirements have informed the preparation of this chapter.

National legislation

Waste (England and Wales) Regulations 2011 (as amended)

11.2.2 The Waste (England and Wales) Regulations 2011 (as amended) (The Stationary Office, 2011) transpose the requirements of the Waste FD in England and Wales, and require the Secretary of State to establish waste prevention programmes and waste management plans that apply the waste hierarchy.

11.2.3 The waste hierarchy is defined in the Waste FD and prioritises waste prevention, followed by preparing for reuse, recycling, recovery and finally disposal as means of management of waste.

11.2.4 The Regulations require businesses to apply the waste hierarchy when managing waste, and also require that measures are taken to ensure that, by the year 2020 and beyond, at least 70% by weight of non-hazardous construction and demolition waste is subjected to material recovery. The target specifically excludes naturally occurring materials with European Waste Catalogue (EWC) Code 17 05 04.

Other waste legislation

11.2.5 The assessment has also taken account of other legislation relevant to waste including, but not limited to:

- The Environmental Permitting (England and Wales) Regulations 2016 (The Stationary Office, 2016).
- Hazardous Waste (England and Wales) Regulations 2005 (as amended) (The Stationary Office, 2005).

- Environmental Protection Act 1990 (as amended) (The Stationary Office, 1990).
- Environment Act 2021.

National planning policy and guidance

National Planning Policy Framework

11.2.6 The NPPF sets out the government's planning policies for England and how these are expected to be applied. Policies and objectives which are of particular relevance to Material Assets and Waste include:

11.2.7 The NPPF sets out the Government's planning policies for England and requires development plans to establish strategic policies to make sufficient provision for waste management and the supply of minerals: *"Strategic policies should set out an overall strategy for the pattern, scale and design quality of places, and make sufficient provision for:*

b) infrastructure for transport, telecommunications, security, waste management, water supply, wastewater, flood risk and coastal change management, and the provision of minerals and energy (including heat). (NPPF paragraph 20)".

11.2.8 The NPPF (Section 17. Facilitating the sustainable use of minerals, paragraph 210 as relevant to the proposed scheme) states that "*planning policies should*:

- As far as practicable, take account of the contribution that substitute or secondary and recycled materials and minerals waste would make to the supply of materials, before considering extraction of primary materials, whilst aiming to source minerals supplies indigenously.
- Safeguard mineral resources by defining Mineral Safeguarding Areas (MSAs) and Mineral Consultation Areas (MCAs) and adopt appropriate policies so that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development where this should be avoided (whilst not creating a presumption that the resources defined will be worked).
- Set out policies to encourage the prior extraction of minerals, where practical and environmentally feasible, if it is necessary for non-mineral development to take place.
- Safeguard existing, planned and potential sites for: the bulk transport, handling and processing of minerals; the manufacture of concrete and concrete products; and the handling, processing and distribution of substitute, recycled and secondary aggregate material."

11.2.9 The NPPF (paragraph 212) also states that local planning authorities should not normally permit other development proposals in MSAs if it might constrain potential future use for mineral working.

11.2.10 The assessment has considered the need to safeguard mineral resources and the impacts of using secondary and recycled aggregate materials.

National Policy Statement for National Networks

11.2.11 The NPSNN sets out policies in relation to waste management on transportation schemes.

11.2.12 This states that applicants should set out their arrangements for managing any waste produced and should include information on the proposed waste recovery and disposal system for all waste generated by the development. It also states that applicants should seek to minimise the volume of waste produced and the volume of waste sent for disposal, unless it can be demonstrated that the alternative is the best overall environmental outcome.

11.2.13 The requirements of paragraphs 5.42 and 5.43 of the NPSNN in relation to minimising and managing waste have been taken into account as part of the design-development of the Scheme, and in developing the planned approach to its construction, as described within Chapter 2 The project.

11.2.14 The assessment has given regard to these requirements by estimating and assessing material assets and waste associated with the Scheme, and through the identification of measures that would be implemented during construction of the Scheme to ensure both on-site and off-site waste is minimised and managed and disposed of appropriately.

National Planning Practice Guidance

11.2.15 The PPG for Minerals (MHCLG, 2014a) (published 17 October 2014) and Waste (MHCLG, 2015a) (published 15 October 2015) were published to provide more in-depth guidance to the NPPF. The PPG aims to make planning guidance more accessible, and to ensure that the guidance is kept up to date. As such, the PPG was amended in July 2017 to reflect the updated EIA Regulations, and further updated in 2019.

11.2.16 Matters of relevance to the Material Assets and Waste assessment include:

- PPG for Minerals (MHCLG, 2014a) provides context to the NPPF (MHCLG, 2019a) and advises on the safeguarding of mineral resources.
- PPG for Waste (MHCLG, 2015a) provides guidance on waste planning and implementing the waste hierarchy.
- Both documents have been considered as part of the assessment of effects associated with material assets and waste.

Waste Management Plan for England

11.2.17 The Waste Management Plan for England (Department for Environment, Food and Rural Affairs (Defra, 2021b) fulfils the requirements of the Waste (England and Wales) Regulations 2011 (The Stationary Office, 2011).

11.2.18 The Plan has been considered in the assessment as it provides an analysis of current waste management practices in England and evaluates the implementation of the objectives and provisions of the Waste (England and Wales) Regulations 2011 (The Stationary Office, 2011). In relation to demolition and construction waste, it also details how England is continuing to comfortably exceed its target of recovering at least 70%, by weight, of non-hazardous construction and demolition waste by the year 2020 and beyond.

National Planning Policy for Waste

11.2.19 The National Planning Policy for Waste (MHCLG, 2014b) states that when considering planning applications for non-waste developments, local authorities should ensure that:

11.2.20 The likely impact of proposed, non-waste related developments on existing waste management facilities, and on sites and areas allocated for waste management, is acceptable and does not prejudice the implementation of the waste hierarchy and/or the efficient operation of such facilities.

11.2.21 The handling of waste arising from the construction and operation of development maximises re-use/recovery opportunities and minimises off-site disposal.

11.2.22 These statements have informed the development of the assessment methodology. This includes the identification of the impacts of the proposed scheme on existing waste management facilities, with consideration also given to sites and areas allocated for waste management and the implementation of the waste hierarchy.

25 Year Environment Plan

11.2.23 The UK Government's Environment Plan: A Green Future: Our 25 Year Plan to Improve the Environment (Defra, 2019), "sets out goals for improving the environment within a generation and leaving it in a better state than we found it. It details how the government will work with communities and businesses to do this". The Plan includes targets for using resources from nature more sustainably and efficiently and minimising waste and it is treated as an environmental improvement plan prepared by the Secretary of State under section 8 of the Environment Act 2021. The Act makes provision for targets, plans and policies for improving the natural environment and related to waste and resource efficiency.

Our Waste, Our Resources: A Strategy for England

11.2.24 In the 25 Year Environment Plan the government pledged to leave the environment in a better condition for the next generation. The Our Waste, Our Resources: A Strategy for England (Defra, 2018a) published in 2018 will help the government to meet that commitment and "sets out how we will preserve our stock of material resources by minimising waste, promoting resource efficiency and moving towards a circular economy. At the same time we will minimise the damage caused to our natural environment by reducing and managing waste safely and carefully, and by tackling waste crime." The strategy combines actions to be taken now and commitments for the coming years.

The National and Regional Guidelines for Aggregates Provision in England 2005 to 2020

11.2.25 The National and Regional Guidelines for Aggregates Provision in England (MHCLG, 2009) set out guidelines for aggregates provision in England for the period 2005 to 2020, including assumptions on the proportional contribution of alternative sources of aggregate (secondary and recycled aggregates) to the overall provision.

11.2.26 The assessment has considered the contribution that secondary and recycled materials would have as part of the proposed scheme construction.

Local planning policy and guidance

11.2.27 The assessment has considered the following local planning policy:

- Emerging Warwickshire Minerals Plan (Warwickshire County Council, 2019). The new minerals development framework will replace the 1995 Minerals Local Plan. As of May 2021 the new plan has not yet been adopted.
- Table of Saved Polices Beyond the Three Year Period (September 2007) Warwickshire Minerals Local Plan (Warwickshire County Council, undated).
- Warwickshire Waste Core Strategy (Warwickshire County Council, 2013).
- Local Plan (Coventry City Council, 2016).

11.3 Assessment methodology

Construction

11.3.1 This material assets and waste assessment has been undertaken in accordance with the following standards:

- DMRB LA 110 Material assets and waste - This document sets out the requirements for assessing and reporting the effects on material assets and waste from the delivery of motorway and all-purpose trunk road projects.

- DMRB LA 104 Environmental assessment and monitoring - This overarching document sets out the requirements for environmental assessment of projects, including reporting and monitoring of significant adverse environmental effects.

Establishing the baseline

11.3.2 The methodology for establishing the material assets and waste baseline has considered the following:

Material assets:

- The types and quantities of material use associated with operation of the existing road / proposed scheme.
- The location of mineral safeguarding sites and peat resources in relation to the proposed scheme.
- Information on the availability of key construction materials required for the proposed scheme, specifically the production and use of aggregates, including alternative (recycled and secondary) aggregates.
- Information on the recovery of non-hazardous construction and demolition waste.

Waste:

- The types and quantities of waste arisings associated with operation of the existing road / proposed scheme.
- Regional and national presence and capacity of landfill facilities for the quantitative part of the assessment.
- Local presence of waste management facilities for the qualitative part of the assessment.

Assessment and significance criteria

11.3.3 When assessing the potential impacts of material asset use and waste the following factors have been taken into consideration:

- Waste producers have a legal duty of care to manage their waste in accordance with current regulations and to ensure that any waste leaving the site of production is transferred to a suitably licensed facility for further treatment or disposal.
- Facilities transferring, treating or disposing of waste must be either licensed or apply for an exemption from a license. Impacts arising from the operation of waste management facilities are considered elsewhere as part of the planning and permitting process for such facilities.
- As part of their planning function, Waste Planning Authorities (WPAs) are required to ensure that enough land is available to accommodate facilities for the treatment of all waste arising in the area, either within the WPA area, or through export to suitable facilities in other areas.
- Minerals Planning Authorities (MPAs) are similarly required to ensure an adequate supply of minerals, sufficient to meet the needs of national and regional supply policies, and local development needs.

11.3.4 The receptors for this assessment are:

- Waste management infrastructure in the West Midlands region and England (specifically the landfill capacity (quantitative assessment) and other waste management infrastructure (qualitative assessment)).
- Material assets used for the proposed scheme construction.

11.3.5 Landfill capacity rather than all waste management infrastructure capacity is considered in the quantitative part of the assessment for the following reasons:

- Disposal to landfill is a permanent impact and the landfill capacity is no longer available (e.g. in most cases is irreversible).
- Impacts on other types of waste management infrastructure e.g. material recovery facilities are temporary in nature. The impacts occur over a period of months or years.
- Other types of waste management infrastructure are better placed to react to waste management market demands (e.g. by provision of additional plant and equipment).

11.3.6 The effects on material assets and their significance have been assessed by:

- Identifying any direct impacts on mineral safeguarding sites or peat resources within the proposed scheme boundary.
- Estimating the likely types and quantities (where appropriate to the assessment) of the main materials that would be required during construction.
- Estimating the earthworks cut and fill balance (relevant to both material assets and waste).
- Estimating the likely proportion of non-hazardous construction and demolition waste arisings that would be recovered.
- Estimating the proportion of reused, recycled or secondary aggregate that could be imported to site for use during construction.
- Comparing the likely waste recovery rate and proportion of reused, recycled or secondary aggregate to the relevant national targets.

11.3.7 The effects on waste and waste management infrastructure, and their significance, have been assessed by:

- Identifying any direct impacts on safeguarding waste management infrastructure (i.e. land which may be identified for future waste infrastructure) within the proposed scheme boundary.
- Establishing the baseline for landfill capacity in the waste management study area in proximity to the proposed scheme.
- Estimating the earthworks cut and fill balance.
- Estimating the likely types and quantities of waste that would be generated during construction, including the potential for hazardous waste.
- Estimating the recovery rates likely to be achieved for each waste type and the quantity of waste that may require off-site management or disposal.
- Quantitatively comparing the likely waste arisings and the quantity requiring off-site disposal to the baseline landfill capacity and assessing the likely impact on that capacity.
- Qualitatively comparing the likely waste arisings from the proposed scheme to the waste management infrastructure inputs in the region and assessing the likely impact on that waste management infrastructure.

Significance of effect

11.3.8 The assessment of effects on material assets and waste has adopted the significance category descriptions and criteria contained in DMRB LA 110 (as reproduced in Table 11.1). As shown in Table 11.1, impacts which are moderate, large or very large are considered to be significant. Only adverse effects are considered.

Table 11.1: Magnitude of impacts and effects significance criteria (DMRB LA 110 Table 3.13)

Magnitude of impact	Effect significance	Material assets	Waste
Neutral	Not significant	Project achieves >99% overall material recovery / recycling (by weight) of non-hazardous Construction Demolition Waste (CDW) to substitute use of primary materials; and Aggregates required to be imported to site comprise >99% re-used / recycled content.	No reduction or alteration in the capacity of waste infrastructure at a regional scale.
Slight	Not significant	Project achieves 70-99% overall material recovery / recycling (by weight) of non-hazardous CDW to substitute use of primary materials; and Aggregates required to be imported to site comprise re-used/ recycled content in line with the relevant regional percentage target.	≤1% reduction or alteration in the regional capacity of landfill; and Waste infrastructure has sufficient capacity to accommodate waste from a project, without compromising integrity of the receiving infrastructure (design life or capacity) within the region.
Moderate	Significant	Project achieves less than 70% overall material recovery / recycling (by weight) of non-hazardous CDW to substitute use of primary materials; and Aggregates required to be imported to site comprise re-used/recycled content below the relevant regional percentage target.	>1% reduction or alteration in the regional capacity of landfill as a result of accommodating waste from a project; and 1-50% of project waste requires disposal outside of the region.
Large	Significant	Project achieves <70% overall material recovery / recycling (by weight) of non-hazardous CDW to substitute use of primary materials; and Aggregates required to be imported to site comprise <1% re-used / recycled content; and Project sterilises ≥1 mineral safeguarding site and/or peat resource.	>1% reduction in the regional capacity of landfill as a result of accommodating waste from a project; and >50% of project waste requires disposal outside of the region.

Magnitude of impact	Effect significance	Material assets	Waste
Very large	Significant	No criteria: use criteria for large categories.	>1% reduction or alteration in national capacity of landfill, as a result of accommodating waste from a project; or Project would require new (permanent) waste infrastructure to be constructed to accommodate waste.

Operation

11.3.9 The exact types and quantity of material asset use, and waste generation associated with the operation of the existing road is currently unknown. Routine maintenance would include gully emptying and litter collection. Periodically, maintenance activities such as resurfacing would be required. Waste arising from these maintenance activities is expected to be generally the same (in both type and quantity) to that generated by the existing road; and the wastes would be managed using the established procedures and facilities that are used across the network. Therefore, material asset use and waste generation during the operational phase of the proposed scheme are scoped out of the assessment. This approach is consistent with DMRB LA110 Section 3, e.g. the scoping assessment can conclude that elements of the assessment can be outside of the scope of any further assessment.

11.4 Assessment assumptions and limitations

11.4.1 Waste arising from extraction, processing and manufacture of construction components and products has been scoped out of this assessment. This assumes that these products and materials are being produced in manufacturing facilities with their own waste management plans, facilities, and supply chain, which are potentially in different regions of the UK or the world, and therefore outside of the geographical scope of this assessment.

11.4.2 Other environmental impacts associated with the management of material assets and waste for the proposed scheme e.g. on water resources, air quality, noise or traffic resulting from the generation, handling, on-site temporary storage or off-site transport of material assets and waste are addressed separately in other relevant chapters. However, the proximity principle is considered when defining study areas recognising that transporting waste has an environmental impact and in general waste should be managed as close to the place where it has been generated as possible.

11.4.3 The material assets and waste assessment has been undertaken on the basis of information available at the time of the assessment. Some of the information is not known during the assessment, such as the exact quantities and sources/ origins of material assets. Stockpiling arrangements and logistical details have not been available for the assessment. Any assumptions made for the assessment and the limitations this presents are reported.

11.5 Study area

11.5.1 The study areas for the assessment of impacts on Material Assets and Waste have been defined in line with LA 110.

11.5.2 The study area for waste generation is defined by the proposed scheme option boundaries, within which waste would be generated. The study area is deemed to include the footprint of the proposed works, together with any temporary land requirements during the construction. This may include temporary offices, compounds and storage areas.

11.5.3 The study area for non-hazardous waste management comprises the wider region within which waste management infrastructure (specifically landfill capacity) is located i.e. the West Midlands region (Herefordshire, Shropshire, Staffordshire, Warwickshire, West Midlands Metropolitan Districts (including Coventry) and Worcestershire). The study area is defined based on professional judgement and informed by consideration of the proximity principle and value for money. The principles of the proximity principle are set out in the Waste FD. Local planning authorities are required, under the Waste Regulations 2011 (Stationary Office, 2011) which transposed the Directive, to have regard to these requirements when exercising their planning functions relating to waste management.

11.5.4 The study area for hazardous waste management comprises the whole of England, as planning for hazardous waste management is undertaken at a national level. The study area is defined based on professional judgement and informed by consideration of the proximity principle and value for money. The proximity principle for hazardous waste in England as outlined in Principle 2-Infrastructure Provision in the Strategy for Hazardous Waste Management in England *"We look to the market for the development of hazardous waste infrastructure, which implements the hierarchy for the management of hazardous waste and meets the needs of the UK to ensure that the country as a whole is self sufficient in hazardous waste disposal, facilities are put in place for hazardous waste recovery in England, and the proximity principle is met" (Defra, 2010).*

11.5.5 The study area for the use of material assets in the construction of the proposed scheme and for consideration of the sterilisation of mineral safeguard sites and peat resources is defined by the proposed scheme boundary.

11.5.6 The study area for alternative materials (secondary and recycled aggregates) is the West Midlands region as defined above. Other materials may be sourced outside of the region and are considered at a national level.

11.6 Baseline conditions

11.6.1 Four options are being considered for the Walsgrave junction and the majority of baseline information is applicable to all options. Each option boundary is considered for on-site features. The following sections refer to site, features and designation relating to material assets and waste.

11.6.2 Types and quantity of material use and waste produced associated with the operation of the existing road The types and quantities of material use and waste arisings associated with the operation of the existing road network include materials required for routine maintenance and also for intermittent repairs and refurbishment, with associated limited waste arisings. The quantities of material use and waste arisings are estimated, using professional judgement, to be small when compared to regional and national data and are therefore considered within this wider geographic context.

11.6.3 For these reasons, material asset use and waste during the proposed scheme's operational phase are scoped out of the assessment.

11.6.4 Information on previously developed land including historic landfills and potential sources of contamination that could give rise to materials and waste that require

specific handling, storage and management arrangements, are set out in Chapter 10, Geology and Soils of this EAR.

Information on the availability of key construction materials required for the proposed scheme

11.6.5 At the time of writing the exact quantities of key construction materials required for the proposed scheme are unknown as the proposed scheme options designs are in early development. The preliminary design of the preferred route will be developed at PCF Stage 3.

11.6.6 Table 11.2 summarises national consumption/ sales in 2018 for steel, aggregates, cementitious materials, asphalt and concrete, which are the key construction materials expected to be used during the construction of the proposed scheme. Table 11.3 summarises construction material sales in the West Midlands.

Table 11.2: National consumption/ sales for key construction materials

Material	National consumption (million tonnes, year)	Baseline data year	Data description
Steel	17	2018	UK total consumption (Make UK, 2019)
Aggregates of which:	*251.0*	2018	**Minerals and mineral products sales in Great Britain. Cementitious includes Northern Ireland (Mineral Products Association (MPA), 2021)**
Crushed rock	117.3		
Sand and gravel - land won	48.9		
Sand and gravel - marine	13.7		
Recycled and secondary	71.0		
Cementitious of which:	15.2		
Cement	11.7		
Other cementitious materials (Fly ash, GGBS)	3.4		
Asphalt	25.4		
Ready-mixed concrete	54.2		
Concrete products	32.0		

Table 11.3: Construction material sales by region in Great Britain, West Midlands (MPA, 2021)

Construction material	Sales 2019
Crushed rock	4.7 million tonnes
Sand and gravel	6.0 million tonnes
Ready-mixed concrete	1.6 million m^3
Asphalt	2.0 million tonnes

Project targets

11.6.7 The national target for recovery of construction and demolition waste is 70% by weight, as set out in the Waste FD and the Waste Management Plan for England (Defra, 2021b). Uncontaminated excavated soil and stones (EWC code 17 05 04) are specifically excluded from this target.

11.6.8 DMRB LA 110 states that projects should aim to achieve at least 90% (by weight) material recovery of non-hazardous construction and demolition waste.

11.6.9 The baseline guidelines for alternative aggregates (which comprise both secondary aggregates, which are by-products from industrial and mining operations, and recycled aggregates, which are produced from construction waste) are set out in the National and Regional Guidelines for Aggregates Provision in England 2005 to 2020 (MHCLG, 2009) and are summarised in Table 11.4. The DMRB LA 110 derived target for the proposed scheme is the 27% for the West Midlands region as outlined in LA 110 Annex E/1 (Standards for Highway, 2019).

Table 11.4: Regional guidelines for aggregates provision in England 2005 to 2020 (MHCLG, 2009) and recycled content target (DMRB LA110 target derived from the guidelines and outlined in DMRB LA 110 Annex E/1 (Standards for Highways, 2019))

Region	Guideline for land-won production		Assumptions			Total provision (million tonnes)	DMRB LA110 alternative materials target
	Land-won sand and gravel	Land-won crushed rock	Marine sand and gravel	Alternative materials	Net imports to England		
West Midlands	165	82	0	100	23	370	27%
England (total)	1,028	1,492	259	993	136	3,908	25%

Location of safeguarded mineral sites, Minerals Safeguarding Areas and peat resources

11.6.10 The proposed scheme site option boundaries lie within a Mineral Safeguarding Area (MSA) for sand and gravel. The MSA covers the majority of the proposed scheme. As stated in the emerging Warwickshire Minerals Plan (Warwickshire County Council, 2019). *"Proposals for non-mineral development within an MSA must demonstrate that the sterilisation of mineral resources of local, regional and national importance will not occur as a result of the development, and that the development would not pose a serious hindrance to future winning or working of minerals."* The consultation process is detailed further in the emerging Warwickshire Minerals Plan and a minerals assessment may be required; this should be confirmed with the Mineral Planning Authority (Warwickshire).

11.6.11 The definition of a mineral safeguard site is not provided in DMRB LA 110 however a mineral safeguard site is deemed to be a discreet area of land which is safeguarded by a local authority e.g. quarry, wharf, rail depot, concrete plant. MSAs are not included in this definition.

11.6.12 The sterilisation of MSAs is not assessed within the Material Assets and Waste assessment or any other topic, however, MSAs are included here since MSAs are a planning consideration and further consultation and assessment in accordance with Mineral Planning Authority policies may be required at a later PCF stage.

11.6.13 Appendix 4 of the emerging Warwickshire Minerals Plan (Warwickshire County Council, 2019) provides a list of mineral infrastructure in Warwickshire including aggregate minerals and aggregate recycling sites.

11.6.14 There are no safeguarded mineral sites identified in the emerging Warwickshire Minerals Plan within the proposed scheme boundary.

11.6.15 As outlined in the Coventry City Council's Local Plan, no Mineral Consultation Areas (MCAs) are proposed for Coventry "as there are no anticipated active mineral sites that are being brought forward during the plan period".

11.6.16 There are no peat resources within the proposed scheme boundary as indicated by the British Geological Survey (BGS) Geoindex Onshore (BGS, 2021).

Waste: landfill capacity

11.6.17 Baseline information consists of the current landfill capacity the West Midlands region and England as outlined in Waste Management for England 2019 (Environment Agency, 2020) in Table 11.5.

11.6.18 For the non-hazardous waste, total landfill capacity in the West Midlands region (all types including inert, excluding non-hazardous restricted) at the end of 2019 was approximately 49.8 million m^3.

11.6.19 For hazardous waste, total hazardous merchant landfill capacity in England was approximately 18.4 million m^3. Hazardous restricted sites are not included since that capacity may not be available to the proposed scheme.

Table 11.5: Landfill capacity in the West Midlands and England

Landfill type	West Midlands landfill capacity (m^3)	England landfill capacity (m^3)
Hazardous merchant	252,000	18,443,000
Hazardous restricted	535,000	833,000
Non-hazardous with SNRHW* cell	8,349,000	69,447,000
Non-hazardous	31,027,000	134,291,000
Non-hazardous restricted	108,000	25,869,000
Inert	10,485,000	122,375,000
Total	50,756,000	371,258,000

* Some non-hazardous landfill sites can accept some Stable Non-Reactive Hazardous Wastes (SNRHW) into a dedicated cell, but this is usually a small part of the overall capacity of the site.

11.6.20 There is no available information on any potential changes to landfill capacity by the time of construction of the proposed scheme. The Warwickshire Waste Core Strategy adopted in 2013 (Warwickshire County Council, 2013) considers "that there is sufficient landfill capacity/ void within the County to manage the maximum landfill diversion amounts over the plan period."

11.6.21 The urban nature of Coventry and the lack of quarrying activity means there is no opportunity for existing or future landfill capacity, and so the City relies on the landfill capacity of surrounding authorities. The Coventry City Council Local Plan (Coventry City Council, 2016) was adopted in 2017 and includes several policies and objectives relating to waste and material management. This includes Policy EM2: Building Standards, which includes a requirement for new development to "minimise waste and maximise recycling during construction and operation".

Waste: waste management infrastructure

11.6.22 Capacity of other types of waste infrastructure e.g. material recovery/ recycling facilities are not publicly available; however, capacity can be inferred from annual waste inputs. Data is collated for the West Midlands region from the Environment Agency's Waste Data Interrogator 2020 (Environment Agency, 2020) and presented in Table 11.6.

Table 11.6: Summary of Waste Infrastructure Inputs in the Yorkshire and Humber Region 2020

Waste site type	Waste received in 2020 (tonnes)
Landfill	5,165,633
Metal Recycling Site	1,654,526
On/In Land	798,096
Transfer	3,915,904
Treatment	7,970,599
Use of Waste	41,973
Incineration	2,038,888
Mobile Plant	295,304
Storage	121,556
Processing	268,964

11.6.23 There are no permitted waste management facilities within the proposed scheme boundary.

11.6.24 According to the Warwickshire Waste Core Strategy (Warwickshire County Council, 2013) "there are a number of facilities in the county that process construction, demolition and excavation waste with the operation at Dunton of regional significance owing to its good location near the M42 and M6 just north of Coleshill in north Warwickshire as well as its overall capacity, which at its peak was 0.5 million tonnes. Whilst this operation has a time limited planning consent it has recently been extended for another 10 years from 2012 with a lower capacity of 250,000 tonnes". However, it is noted that at the time of writing "that between 103,450tpa and 496,458tpa of additional capacity may be required, equating to between approximately 2 and 10 facilities at 50,000tpa."

11.6.25 There are historic landfills within the proposed scheme boundary. Information on these historic landfills, are set out in Chapter 10, Geology and Soils of this EAR.

11.6.26 The emerging Warwickshire Minerals Plan (Warwickshire County Council, 2019) Policy MCS 4 Secondary and Recycled Aggregates – "recognises the requirement for sufficient waste management capacity in relation to construction and demolition waste. The strategy aims to promote the re-use of construction materials (in turn creating a reduction in the production of primary aggregates), to limit the amount of construction and demolition waste sent to landfill, as well as supports new waste facilities".

11.7 Potential impacts

11.7.1 Mitigation measures will be incorporated in the design and construction of the proposed scheme; these are set out in the mitigation section. Prior to implementation of mitigation a summary of the potential impacts associated with the construction of the proposed scheme is outlined below.

11.7.2 The introduction and/ or modification of road infrastructure associated with construction of the proposed scheme would potentially result in different types and durations of impact on material assets and waste.

11.7.3 There is potential for the following impacts relating to material assets and waste arising to occur during construction of the proposed scheme:

Material assets:

- Impacts on primary material resources (for example mineral safeguarding sites).
- Impacts on the availability and use of reused, recycled and secondary aggregate materials for construction.

Waste:

- Impacts from on-site generated materials (for example excavated materials and soils) and waste arisings on the capacity of existing landfill infrastructure.
- Direct, physical impacts on the operation and capacity of existing waste management infrastructure.

Table 11.7: Potential material asset use and waste arisings - construction

Project activity	Material asset use	Potential waste arisings
Site remediation/ preparation/ earthworks	Fill material for construction purposes. Primary aggregates for ground stabilisation.	Surplus excavated materials e.g. soils. Stripping of topsoil and subsoil. Waste from excavation of historic landfills
Demolition	Materials are not required for demolition works.	Waste arisings from the demolition of any structures.
Site construction	Construction materials including: • Concrete • Asphalt and bituminous material • Cement bound granular material • Well graded granular material • Precast concrete kerb • Timber • Plywood • Cementitious grout • Reinforcing steel • Reinforcing fabric • Geotextile • Geo-composite drainage system • Pipe bedding aggregate • Filter drain material	Packaging material. Excess construction materials and broken/ damaged construction materials. Existing highway infrastructure and technology as removed by excavation works. Waste oils from construction vehicles. Construction worker generated wastes.

11.8 Design, mitigation and enhancement measures

Embedded mitigation

11.8.1 Through the design development process, the proposed scheme has been designed, as far as possible, to avoid effects on material assets and waste through option identification, appraisal, selection and refinement, as described in Chapter 3, Assessment of alternatives of the EAR.

11.8.2 The design of the proposed scheme and the planned approach to its construction have been developed with an overarching principle of achieving efficiencies in materials and waste where possible, for example by designing-out and preventing waste arising where possible and diverting waste from landfill through on-site and off-site recycling and recovery.

11.8.3 Mitigation measures have been integrated (embedded) into the proposed scheme for the purpose of minimising effects on material assets and waste. These general measures comprise the following, which focus on implementing the waste hierarchy through the reuse and recycling of site-won materials on-site where possible to minimise the need to import construction materials to site, and to reduce the quantity of waste to be exported off-site:

- Designing the proposed scheme in a manner that facilitates the reuse of acceptable material arisings, for example those associated with earthworks cuttings and other excavations.
- Achieving an earthworks balance (cut and fill material) within the design of the proposed scheme, where possible, to minimise the need to import and export material.
- The inclusion of land within the proposed scheme boundary for the temporary on-site storage of soils, excavated materials and other materials.
- The appropriate sizing of construction compounds to enable the segregation and storage of waste, and to facilitate off-site recovery.
- The retention of existing highways infrastructure within the proposed scheme design where feasible, to minimise the need for the demolition of components and infrastructure and the associated generation of waste material.
- The reuse of excavated materials and the recycling of demolition and construction materials within the proposed scheme, where practicable.
- The optimisation of bridge, soil abutment and wingwall designs through the incorporation of precast concrete elements to reduce on-site waste arisings.
- Importing alternative (recycled and secondary) aggregate materials during construction, where practicable.

11.8.4 Designing out Waste Workshops were held on 6 May 2021 (Options 6, 7 and 8) and 4 August 2021 (Option 11 only) and during the workshops further designing out waste opportunities were identified by the Design Team:

Design for reuse and recovery:

- Reuse of existing carriageway in Option 6 which will be made redundant e.g. providing private means of access to farm adjacent to the proposed scheme.
- Reuse of existing carriageway in option 7. Resurfacing of existing carriageway rather than new construction. Vertical alignment adjusted to reduce vertical separation and maximise retention of existing carriageway and minimise temporary overlay material required.
- Retain hedgerows.
- Use existing overbridge in option 7. Alignment has been designed to fit under existing bridge. In option 6, 8 and 11 the bridge would be demolished.
- Retain and reuse culverts.
- Recycle concrete overbridge to be demolished in option 6, 8 and 11.
- Survey of structures and buildings to be demolished to characterise waste arisings, e.g. possible hazardous waste including asbestos and anthrax contaminated buildings. Demolition of buildings not required in Option 6, 7 and 11.
- Consider the use of borrow pits and material exchange between local projects to offset an excavated material deficit or excess.
- Recycle pavement materials to form private farm access.
- Use recycled content e.g. recycle asphalt planings back into the scheme.

- Potential to combine drainage system (e.g. classic pipe network, open attenuation ponds) with swales, linear attenuation/ carrier system requiring less material. Requirement to replace all drainage as it is end of life.
- If historic landfill materials are encountered during excavation, consider ability to reuse material in earthworks and disposal routes.
- Design for offsite construction:
- Use of precast elements including bridges, concrete barriers, headwalls, noise barriers etc.
- Design for material optimisation:
- Steepen some side slopes with ground improvements to reduce footprint of proposed scheme.
- Use of innovative design.
- Option 6 could be simplified further as more information is gathered e.g. ground investigation, stakeholder engagement.
- Use of 3D modelling to avoid any rework/ modification on site. Model standard material length rather than bespoke.
- Design for waste efficient procurement:
- Ensure assets can be maintained as efficiently as possible.
- Standardise components to aid maintenance.
- Consider waste generation in public laybys and requirement for maintenance. Laybys removed in Option 11.
- Research and use specialist waste contractors.
- Set material and waste KPIs and targets.
- Design for deconstruction and flexibility:
- Consider access requirements of other proposed developments e.g. housing developments in the area to enable further adaptation of roundabouts. High level discussions with housing developer undertaken by Highways England. Option 11 is likely to be more compatible with housing development.
- Reduce maintenance by using holistic design of fully integral bridge structure with no bearings.
- Identify components life span/ maintenance requirements.
- Use recyclable noise barriers (wood, steel etc).

11.8.5 The opportunities will be further investigated and implemented in the design as appropriate. It is suggested that opportunities are revisited periodically through the design process and through to construction.

Essential mitigation

11.8.6 The construction of the proposed scheme would be subject to measures and procedures defined within a CEMP. The CEMP would be based on an OEMP, to be prepared at PCF Stage 3 and would include the implementation of industry standard practice and control measures for environmental impacts arising during construction, such as the control of dust and the approach to waste management on site. The CEMP would be produced by the construction contractor prior to works commencing in accordance with DMRB LA 120 Environmental Management Plans Revision 1 (Highways England, 2020m) and would include a Site Waste Management Plan (SWMP).

11.8.7 The SWMP would set out a recording process for the management of waste, including the storage and transport of waste on-site and a recording mechanism for required waste documentation such as Waste Transfer or Consignment Notes (dependent on the waste stream) in order to confirm the assessment of the waste impact and to implement the embedded mitigation measures. The SWMP would include procedures for monitoring the overall construction waste recovery rate and

the proportion of secondary and recycled aggregate used in the proposed scheme, in order to confirm the assessment of material assets impacts.

11.8.8 The CEMP would require contractors to adopt good practice in construction waste management which would reduce the quantity of waste generated. The following approaches would be implemented, where practicable, in order to minimise the quantities of waste requiring disposal:

- Agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme.
- Implementation of a 'just-in-time' material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste.
- Attention to material quantity requirements to avoid over-ordering and generation of waste materials.
- Reuse of materials wherever feasible e.g. reuse of excavated soil for landscaping.
- Segregation of waste at source where practical.
- Reuse materials within the construction by carrying out remediation or soil improvement, where feasible, in order to mitigate any contamination or geotechnical risks.
- Reuse and recycling of materials off-site where reuse on-site is not practical (e.g. through use of an off-site waste segregation facility and re-sale for direct reuse or re-processing).
- The re-use of excavated soils during proposed scheme construction would be governed by a Materials Management Plan (MMP) (included within the CEMP) which would be developed in accordance with CL:AIRE Code of Practice which is a voluntary framework for excavated materials management and re-use. Following this framework would result in a level of information being generated sufficient to demonstrate that excavated material has been re-used appropriately and is suitable for its intended use. It would demonstrate that unsuitable material or waste had not been used in the development. The MMP would detail the procedures and measures that would be taken to classify, track, store, re-use and dispose of all excavated materials that would be encountered during the proposed scheme construction phase.

11.8.9 The CEMP would require that the following waste management measures are implemented in order to minimise the likelihood of any localised impacts of waste on the surrounding environment:

- Damping down of surfaces during spells of dry weather and brushing or water spraying of heavily used hard surfaces and access points across the site as required.
- Off-site prefabrication, where practical, including the use of prefabricated structural elements, cladding units, toilets, mechanical and electrical risers and packaged plant rooms.
- Burning of waste or unwanted materials would not be permitted on-site.
- All hazardous materials including fuels, chemicals, cleaning agents, solvents and solvent containing products to be kept in sealed containers at the end of each day prior to storage in appropriately protected and bunded storage areas.
- All demolition and construction workers would be required to use appropriate Personal Protective Equipment whilst performing activities on-site.
- Any waste effluent would be tested and where necessary, disposed of at an appropriately licensed facility by a licensed specialist contractor(s).

- Where there is a requirement to dispose of surplus or unsuitable soils off-site as waste, the material would be characterised to determine firstly whether it is hazardous or non-hazardous waste in accordance with the Environment Agency's Technical Guidance WM3 (Environment Agency, 2021). Once this is established, the appropriate waste management facility would be determined through Waste Acceptance Criteria analysis as required.
- Materials requiring removal from the site would be transported using licensed carriers and records would be kept detailing the types and quantities of waste moved, and the destinations of this waste, in accordance with relevant regulations.

11.8.10 The CEMP will set out the following performance targets for material assets and waste:

- At least 27% (by weight) of aggregates imported to site for use within the proposed scheme should comprise alternative (reused, recycled or secondary) aggregates, for those applications where it is technically and economically feasible to substitute these alternatives to primary aggregates. Where primary aggregate materials are mandated within DMRB they would be excluded from the target.
- Recovery of at least 70% (by weight) of non-hazardous construction and demolition waste (excluding naturally occurring materials with European Waste Catalogue Code 17 05 04), with the aim to achieve recovery of 90% (by weight).

11.8.11 Based on the effectiveness of best practice mitigation, no additional or offsetting mitigation measures would be required during construction of the proposed scheme.

Enhancements

11.8.12 No enhancement measures relating to material assets and waste have been incorporated into the design of the proposed scheme.

11.8.13 Notwithstanding this, enhancement opportunities would be further considered and implemented where applicable during design and subsequent construction work.

11.8.14 Example enhancement opportunities as outlined in DMRB LA110 (Standards for Highways 2019) for material assets and waste include:

- Use of surplus recycled or recovered materials in community projects e.g. utilising recycled mulch from tree felling on adjacent community facilities.
- Reusing suitable material for construction of noise and landscape bunding outside of the highways boundary where need has been previously identified (where land availability allows) to improve environmental outcomes for a wide range of receptors.

11.9 Assessment of likely significant effects

Construction

11.9.1 In accordance with DMRB LA 104, the prediction of impacts and the assessment of effects (and their significance) on material assets and waste associated with construction of the proposed scheme has taken account of the effectiveness of both the embedded and essential mitigation measures summarised in section 11.8.

11.9.2 Where applicable the assessment reports the temporary and permanent impacts and effects on material assets and waste that would be directly or indirectly affected by the proposed scheme by virtue of their proximity to the works, or through a shared relationship or inter-dependency.

Material assets: construction materials

11.9.3 The estimated main types and quantities of materials anticipated to be used during construction of the proposed scheme are not yet available. A review of information provided by the design team (Roadworks Estimator Order of Magnitude/ Options Estimate Project Information Form 103) and design drawings confirms that the following construction materials and items will be required for construction:

- Imported fill
- Retaining walls
- Box culvert (option 6 only)
- Road lighting
- Transverse bridge (option 6 and 8 only)
- Hard central reserve concrete barrier and steel barrier
- Resurfacing
- Advance direction signage
- Extension of link road culvert

11.9.4 Anticipated wastage rates for the main construction materials and potential recycled content for aggregate containing materials are outlined in Table 11.8.

Table 11.8: Wastage rates and potential recycled content, waste recovery rates and waste management routes

Material type	Good practice wastage rate (%)	Potential recycled content (% by weight)	Potential waste recovery rate (%)	Potential waste management route
Concrete	2.5	16	95	On site or offsite recycling
Asphalt	2.5	25	95	On site or offsite recycling
Aggregates	5	50	95	Off-site recycling
Steel reinforcement	5	Not applicable, potential recycled content for aggregates considered only	100	Off-site recycling
Structural steel	0	Not applicable, potential recycled content for aggregates considered only	Not applicable, no wastage assumed.	Not applicable, no wastage assumed.

11.9.5 The estimated wastage rates and recycled content for each material are based on the "good practice" rates from WRAP's Designing Out Waste Tool for Civil Engineering (WRAP, 2021). The actual recycled content achieved during construction will depend on the availability of material containing recycled content and technical suitability.

11.9.6 The potential recovery rates for each material are based on the WRAP "good practice" quick win recovery rates (WRAP, 2007). The potential waste management routes are based on professional judgement.

Waste: construction waste

11.9.7 Detailed information on construction material quantities, construction waste and demolition waste quantities are not yet available. A high-level estimate of construction waste (excluding demolition and excavation) has been calculated based on the works expenditure profile (most likely cost) for each option and a published benchmark based on m^3 of waste per £100,000 of construction value (Sustainable Procurement Limited and Eunomia Research & Consulting Limited, 2017). The standard practice benchmark for infrastructure is $20m^3$ of waste per £100,000. Estimated construction waste (excluding demolition and excavation) is presented in Table 11.9.

Table 11.9: Wastage rates and potential recycled content, waste recovery rates and waste management routes

Option	Construction value (£ million)	Standard practice benchmark for infrastructure	Construction waste estimate (m3)
6	110	$20m^3$ of waste per £100,000	22,000
7	30		6,000
8	56		11,200
11	67		13,400

11.9.8 The management routes and recovery rates for construction waste outlined in Table 11.8 are based on industry good practice approaches, with resulting high levels of forecast diversion from landfill.

11.9.9 Construction site operations will also generate waste streams from offices, welfare facilities, material packaging and construction plant maintenance. The quantities are anticipated to be small compared to the main demolition and construction wastes and are not included in the assessment. Procedures for the storage and management of these wastes will be set out in the contractors SWMP.

11.9.10 The overall potential construction waste recovery rate is likely to be over 90% since the potential recovery rates for the main construction material wastage e.g. concrete, aggregate and asphalt is 95% as outlined in Table 11.8.

Waste: demolition and clearance waste

11.9.11 The exact quantities of demolition waste in tonnes or m^3 is not yet determined. Potential items for demolition and clearance include (but are not limited to) those listed below:

- Vegetation
- Existing pavements - for Option 6, 21,000m^2 of land will be restored to rural land, for Option 8 14,000m^2 of land will be restored to rural land. This restoration is likely to generate waste e.g. asphalt and aggregates.
- Demolition of concrete structures
- Demolition of buildings

11.9.12 It is assumed that this demolition and clearance waste would have a high waste recovery rate and would likely be recycled offsite and would not be disposed of to landfill.

11.9.13 The quantity of waste estimated to arise from vegetation clearance is not yet known however it is assumed that this waste would have a high waste recovery rate and would likely be composted and would not be disposed of to landfill.

Waste: hazardous waste

11.9.14 The quantity of waste estimated to be hazardous waste is not yet known. The quantities of hazardous waste are anticipated to be small compared to the main construction and demolition wastes. Procedures for the storage and management of these wastes will be set out in the CEMP and will be further detailed in the contractors SWMP.

Waste: excavation

11.9.15 Excavated material is not included when calculating the overall waste recovery rate, since where possible the material would be reused on site and hence will not be categorised as a waste. The government's waste recovery target of 70% does not include excavated material (uncontaminated excavated soil and stones, EWC code 17 05 04). This approach is consistent with the waste hierarchy and the objectives of minimising waste generation and reusing materials.

11.9.16 For the majority of highways schemes, the largest quantities of materials and waste are generally those associated with earthworks, especially in those cases where a balance between excavation ("cut") and material placement ("fill") cannot be achieved.

11.9.17 The proposed scheme design is currently being progressed to optimise the requirements for cut and fill (Table 11.10) and where possible this will be minimised to reduce the import and export of materials. The project design team aim is to achieve a cut-fill balance, however predicted cut and fill for the proposed scheme is likely to be imbalanced and import and export of material will be required. It is currently estimated that the majority of excavated material will be reused, with some excavated material requiring offsite management.

Table 11.10: Cut and fill balance (highways and drainage)

Option	Cut (m^3)	Fill (m^3)	Balance	Comment
6	62,521	231,218	-168,697	Excavated material deficit
7	20,201	10,699	9,502	Excavated material excess
8	157,021	8,469	148,552	Excavated material excess
11	81,136	168,051	-86,915	Excavated material deficit

11.9.18 No major sources of potentially contaminated excavated material have been identified to date, however there are some historic landfills within the proposed scheme boundary and further ground investigation will be required to confirm the presence of contaminated material.

Material assets: mineral safeguarding sites and peat resources

11.9.19 There are no safeguarded mineral sites or peat resources identified within the site boundary. Therefore, the proposed scheme is not expected to sterilise any mineral safeguarding sites and no significant effects are predicted.

Material assets: recovery of non-hazardous construction and demolition waste

11.9.20 Table 11.8 presents the potential "good practice" recovery rates for the main construction wastes (concrete, asphalt etc.) predicted to arise during construction. A large quantity of the waste generated by the proposed scheme would likely be recoverable therefore it is anticipated that the proposed scheme could exceed the national target to recover at least 70% (by weight) of non-hazardous construction and demolition waste.

11.9.21 Accordingly, the effects of the proposed scheme in relation to the recovery of non-hazardous construction and demolition waste are assessed as being slight and not significant.

Material assets: alternative aggregates

11.9.22 Based on professional judgement and the potential recycled contents of the key construction materials outlined in Table 11.7, it is considered that application of good industry practice would enable the 27% alternative aggregate target to be delivered. The proposed scheme would be located in proximity to major urban areas, and therefore there is expected to be a good supply of alternative aggregate materials. The MPA (MPA, 2021) estimated that, in 2018, 28% of aggregate sales in Great Britain were recycled and secondary aggregates.

11.9.23 Final material specifications would be confirmed at the detailed design stage and would be used to inform the forecasting and monitoring of the use of alternative aggregates as required by the CEMP and contractor's SWMP.

11.9.24 Accordingly, the effects of the proposed scheme in relation to the use of alternative aggregates are assessed as being slight and not significant.

Waste: landfill capacity

11.9.25 The quantities of excavated materials estimated to arise during construction of the proposed scheme are set out in Table 11.9.

11.9.26 The proposed scheme has been designed so that a balance of cut and fill is achieved where possible. The use of site-sourced excavated material within the proposed scheme engineering works activities would be undertaken in accordance with an MMP. The MMP would be prepared by the Principal Contractor in accordance with the CL:AIRE DoW CoP (CL:AIRE, 2008) with the material not being classified as waste.

11.9.27 However, there are expected to be requirements for off-site management of some excavated material (option 7 and 8). Therefore, a worst case scenario where the 148,552m^3 of excavated material for option 8 (highest quantity of excess material) is disposed of landfill has been applied. This equates to 0.3% of the 49.9 million m^3 of non-hazardous and inert landfill capacity within the waste management study area. In practice, it is likely that some of the excavated material can recovered rather than disposed of to landfill.

11.9.28 Construction of option 6 (highest quantity of the four options) is expected to generate approximately 22,000m^3 of non-hazardous construction waste based on an estimated works expenditure (most likely cost) of £110 million. A worst-case scenario where all waste is disposed of to landfill has been applied. This equates to 0.04% of the 49.9 million m^3 of landfill capacity within the non-hazardous and inert waste management study area.

11.9.29 In practice a large proportion of non-hazardous and inert waste from the proposed scheme is likely to be recovered rather than disposed of to landfill, further reducing the overall quantities of waste for disposal. This is demonstrated by the potential recovery rate in excess of 90%.

11.9.30 Based on the above, the proposed scheme would likely result in less than a 1% (499,684m^3) reduction of landfill capacity within the non-hazardous waste management study area. There is considered to be adequate landfill capacity available to accommodate the non-hazardous and inert waste predicted to arise from construction of the proposed scheme.

11.9.31 The exact landfill capacity to be utilised by the proposed scheme will be determined by the construction contractor at a subsequent PCF Stage, however it is unlikely that non-hazardous waste will need to be disposed of outside of the region.

11.9.32 The quantity of waste estimated to be hazardous waste is not yet known. The quantities of hazardous waste are anticipated to be small compared to the main non-hazardous and inert construction and demolition wastes and below 1% of national hazardous landfill capacity (excludes hazardous restricted sites) which is 184,430m^3. There is considered to be adequate disposal capacity available to accommodate the hazardous waste predicted to arise from construction of the proposed scheme.

11.9.33 Hazardous waste is considered at a national scale rather than at a regional scale as outlined in section 11.5 and may need to be disposed of outside of the region, however this would not be outside of the study area for hazardous waste which is England.

11.9.34 The effects of the proposed scheme on landfill capacity are therefore assessed as being slight and not significant.

Waste: waste management infrastructure

11.9.35 The review and assessment of waste management infrastructure has concluded that there are no safeguarded waste management facilities located within the proposed scheme boundary. As no effects of the proposed scheme are predicted

on the operation of waste management infrastructure, no significant effects are predicted.

11.9.36 The proposed scheme is not expected to require the construction of new (permanent) waste management infrastructure to accommodate waste generated from its construction. As no effects of the proposed scheme are predicted on the operation of waste management infrastructure, no significant effects are predicted.

11.9.37 A qualitative review of the regional presence and inputs of waste to material recovery/ recycling facilities has been undertaken which illustrates that it is anticipated that waste infrastructure has sufficient capacity to accommodate waste from the proposed scheme (all options), without compromising the integrity of the receiving infrastructure (design life or capacity) within the region. The effects are therefore assessed as being slight and not significant.

12 Population and Human Health

12.1 Introduction

12.1.1 This chapter describes the potential population and human health impacts associated with the construction and operation of the four options which comprise the proposed A46 Walsgrave scheme. It defines the study area; the methodology used for developing the baseline and impact assessment; provides a description of the baseline environment in relation to population and human health; and presents the findings of the impact assessment.

12.1.2 The assessment follows the methodology set out in DMRB LA 112 Population and Human Health Revision 2 (Highways England, 2020n).

12.2 Legislative and policy framework

12.2.1 The following legislation and planning policy are of direct relevance to population and human health and have been considered as part of the assessment.

Legislation

Health and Social Care Act 2012

12.2.2 The Health and Social Care Act 2012 (HSMO, 2012) outlines the Secretary of State's duty to promote and improve the National Health Service (NHS), in pursuit of several key aims, which include:

- An improvement in the quality of services
- A reduction in health inequalities
- The promotion of autonomy for general practitioners and health centres
- Improvements to the treatments and services offered to patients

12.2.3 The legislation focuses on the regulation of the NHS at a national and local level. It also promotes changes such as the abolition of NHS Trusts, support for the production of Joint Strategic Needs Assessments (JSNAs) and establishment of Health and Well-being boards at a local authority level. These boards were established for the purpose of advancing the health and wellbeing of people within each local authority area and will aim to "*encourage persons who arrange for the provision of any health or social care services in that area to work in an integrated manner*."

Countryside and Rights of Way Act 2000

12.2.4 The Countryside and Rights of Way Act 2000 (HSMO, 2000) is the principal legislation governing the registration and protection of public footpaths, bridleways, and byways, and provides measures to improve public access to the open countryside and Common Land.

12.2.5 The potential effects of the proposed scheme options on walkers, cyclists, and horse riders (WCHs) travelling on these routes have been considered as part of the assessment.

National policy

National Planning Policy Framework

12.2.6 The NPPF contains policies that are applicable to both motorised travellers and WCHs, and community and private assets.

12.2.7 Section 8 of the NPPF refers to promoting healthy and safe communities, setting out the need for planning policies to promote healthy, inclusive, and safe places.

This includes provision of social, recreational, and cultural facilities which the community needs. It recognises the importance of high-quality open spaces and opportunities for sport for the health and wellbeing of communities and calls for planning policies to be based on robust assessments of such provision. Additionally, it states that planning policies should enhance public rights of way (PRoW) and access, including provision of better facilities for users.

12.2.8 Section 9 of the NPPF focuses on promoting sustainable transport. It emphasises the need to identify opportunities for walking, cycling and public transport use from the early stages of development proposals. It states planning policies should provide for walking and cycling facilities, encourage sustainable transport solutions.

12.2.9 The requirements of the NPPF have been accounted for in the assessment, with particular regard given to establishing the effects of the proposed scheme on land uses and identifying opportunities to improve facilities for WCHs and accessibility to community facilities through the design-development process, where practicable.

Planning Practice Guidance

12.2.10 The PPG was published in March 2014 to provide more in-depth guidance to the NPPF. The PPG aims to make planning guidance more accessible, and to ensure that the guidance is kept up to date. As such, the PPG was amended in July 2017 to reflect the updated EIA Regulations, and further updated in October 2019.

12.2.11 PPG for *Healthy and safe communities* (MHCLG 2019c) adds further context to the NPPF by providing guidance on health and wellbeing in planning. It covers: the role of health and wellbeing in planning; the links between health, wellbeing, and planning; and details how health infrastructure should be considered in planning decisions.

12.2.12 PPG for *Open space, sports and recreation facilities, public rights of way and local green space* (MHCLG, 2014c) also adds context to the NPPF in relation to how such facilities should be considered when planning new development, and when new development might affect existing facilities.

12.2.13 Both of these aspects of the PPG have been considered in the assessment by confirming all areas of community land and facilities, and the movements made by WCHs on the PRoW and local road network (and any associated amenity value), that would be affected or improved as a result of the proposed scheme options.

National Policy Statement for National Networks

12.2.14 The NPSNN does not provide specific guidance on the identification, assessment and mitigation of effects on population and human health as a topic area, but does include statements relating to journeys made on the national road network, effects on communities and accessibility, and the need to consider land use impacts as part of development applications for nationally significant infrastructure projects.

12.2.15 The NPSNN sets out a number of development-related expectations regarding communities and accessibility, including:

- The delivery of improvements that reduce community severance, particularly where the national road network acts a barrier to the movement of WCHs.
- Considering the accessibility needs of WCHs as part of the design-development process.
- Addressing historic problems on the road network.

- Minimising, where possible, the impacts of developments on the amenity of local communities.

12.2.16 The document identifies that existing and proposed land uses should be identified as part of the development applications, and includes statements concerning the development and/ or loss of open space, sports, recreational land, and buildings.

12.2.17 These considerations have been factored into the assessment through activities including the identification, assessment and evaluation of existing land uses, the movements of WCHs, relevant health data and statistics, and the outcomes of related assessments.

Local policy

12.2.18 The proposed scheme is located on the border of the city of Coventry and the borough of Rugby in the county of Warwickshire. This section presents all planning policy documents of relevance published by both local authorities and Warwickshire County Council.

Coventry City Council Local Plan 2011-31

12.2.19 The *Coventry City Council Local Plan 2011-31* (CCC, 2017a) was adopted by Coventry City Council (CCC) on 06 December 2017. The following policies are of particular relevance to population and human health:

- Policy JE7 'Accessibility to Employment Opportunities' states that planning applications for new employment development will be required to give consideration to the accessibility to the development by local residents, particularly those from deprived communities. The proposed scheme may therefore have a role to play in improving accessibility and therefore potentially unlocking development.
- Policy HW1 'Health Impact Assessments' states that all major development proposals are required to demonstrate that they will have an acceptable impact on health and wellbeing. Where a development has significant negative or positive impacts on health and wellbeing, applicants may be required to provide for the mitigation or provision of such impacts. A toolkit to help applicants identify health impacts is provided in the Council's *Health Impact Assessment Supplementary Planning Document* (CCC, 2017b).
- Policy GB1: 'Green Belt and Local Green Space' defines the most up to date Green Belt in Coventry upon which 'inappropriate development will not be permitted unless in very special circumstances'.
- Policy GE2: 'Green Space' states that development involving the loss of green space that is of value for amenity, recreational, and/ or community use will not be permitted unless specifically identified as part of strategic land use allocations or under exceptional circumstances.
- Policy H2: 'Housing Allocations' identifies the sites to be allocated for housing development alongside essential details that will support the principles of sustainable development. H2:3 Walsgrave Hill Farm is of particular relevance given the close proximity and overlap with the proposed scheme boundary. In total, 900 houses are included in the allocation for this site.
- Policy AC1: 'Accessible Transport Network' states that development proposals which are expected to generate additional trips on the transport network should integrate with existing transport networks, consider the transport and accessibility needs of those in the city, support the delivery of new and improved high quality local transport networks and actively support the provision and integration of energy and future intelligent mobility infrastructure.

- Policy AC4: 'Walking and Cycling' states that development proposals should incorporate appropriate safe and convenient access to walking and cycling routes.

Coventry Health and Wellbeing Strategy 2019-2023

12.2.20 The *Coventry Health and Wellbeing Strategy 2019 – 2023* (CCC, 2019b) was developed by the Coventry Health and Well Being Board which brings together leaders from Coventry City Council, West Midlands Police, West Midlands Fire Service as well as voluntary sector organisations. The strategy sets out Coventry's key health and wellbeing priorities to 2023 and highlights a high level plan for reducing health inequalities and improving health and wellbeing for the city's residents.

12.2.21 The strategy is informed by data and engagement evidence from the Joint Strategic Needs Assessment and learning from the 2016 - 19 Joint Health and Wellbeing Strategy. The Coventry Health and Wellbeing Board have agreed three long term outcomes that are hoped to be achieved as part of the strategy. Details of how each of these objectives will be achieved are presented in the strategy. The three long term objectives are as follows:

- People are healthier and independent for longer
- Children and young people fulfil their potential
- People live in connected, safe and sustainable communities

12.2.22 The Coventry Health and Wellbeing Board have also agreed three additional 'short-term' foci for the strategy period. These include:

- Loneliness and isolation
- Young people's mental health and wellbeing
- Working differently with our communities

12.2.23 This assessment includes an assessment of health, focusing on determinants central to Coventry's health and wellbeing strategy such as the proposed scheme's impact on accessibility and active travel, and accessibility to social infrastructure.

Rugby Borough Council Local Plan 2011-31

12.2.24 The Rugby Borough Council (RBC) Local Plan 2011-31 (RBC, 2019) was adopted in June 2019. The following policies are of particular relevance to the assessment:

- Policy GP2: 'Settlement Hierarchy' outlines the main focus areas for development. In the green belt and countryside, new development will be generally resisted unless national policy on the respective areas permit the development.
- Policy ED1: 'Protection of Rugby's Employment Land' states that with exception of any sites allocated for other forms of development in the Local Plan, all employment sites will be retained for employment purposes in the following use classes: B1(a), B1(b), B1(c), B2 and B8.
- Policy HS1: 'Healthy, Safe and Inclusive Communities' states that support will be provided for proposals which help to promote good health, safety and inclusivity.
- Policy HS2: 'Health Impact Assessments' states that developments above certain thresholds are required to demonstrate that they will not generate adverse impacts on health and wellbeing. The thresholds are: residential

developments over 150 units or 5ha in area; non-residential developments over 1ha in area; and developments on industrial estates over 5ha in area.

- Policy HS3: 'Protection and Provision of Local Shops, Community Facilities and Services' states that proposals that would result in a significant or total loss of a site currently or last used for a local shop, post office, public house, community or cultural facility or other service that contributes towards the sustainability of a local settlement or the urban area will not be permitted except for in exceptional circumstances.
- Policy HS4: 'Open Space, Sports Facilities and Recreation' states that these spaces should not be built upon except in exceptional circumstances.

Warwickshire County Council Neighbourhood Development Planning for Health

12.2.25 Warwickshire County Council (WCC) work with the county's district councils as well as clinical commissioning groups (CCGs) and the wider health economy to plan holistically for health. This has included the development of the Neighbourhood Development Planning for Health guidance (WCC, 2018).

12.2.26 This document presents transport as a key wider determinant of health and as playing an important role in reducing health inequalities and improving the health of the population. This can be by providing access to a range of services including health, education, and employment, helping to establish and maintain social networks and by promoting active travel. The document recommends maximising the opportunities for active travel to minimise the negative impacts which transport can have on health such those associated noise, air quality, congestion, and road traffic accidents.

12.2.27 This assessment includes an assessment of health, focusing on determinants central to Warwickshire's health priorities such as the proposed scheme's impact on accessibility and active travel and accessibility to social infrastructure.

12.3 Assessment methodology

Assessment standards and guidance

12.3.1 The following DMRB standards have been applied in the assessment to identify the value and sensitivity of land use receptors. This standard has also been used to identify and evaluate the impacts and effects that construction and operation of the proposed scheme would likely have on these receptors. This builds on the overarching guidance presented in Chapter 4, Environmental assessment methodology of this report.

- DMRB LA 104
- DMRB LA 112

Establishment of the baseline

12.3.2 In order to assess the associated potential effects of the proposed scheme, it is necessary to determine the environmental or baseline conditions, resources, and receptors in the study area. The baseline conditions are not necessarily the same as those that exist at the current time; they are the conditions that would exist at the time that the proposed scheme is expected to start. The identification of the baseline conditions therefore involves predicting changes that are likely to happen in the intervening period, for reasons unrelated to the proposed scheme.

Land use and accessibility

12.3.3 The baseline for land use and accessibility includes a description of land uses in the local area, including the presence of:

- Private property and housing
- Community land (e.g. common land, village greens, open green space, allotments, sports pitches etc)
- Community facilities (e.g. village halls, healthcare facilities, education facilities, religious facilities etc)
- The location of land allocated for employment and residential development by local authorities
- Agricultural land holdings
- WCH routes

Human health

12.3.4 The human health baseline includes all resources identified in the land use and accessibility as well as additional baseline analysis on a number of different components.

12.3.5 The human health baseline includes a description of local communities within the study area and a profile of the population which resides within these communities. This profile includes an analysis of health indicators including the presence of childhood obesity, chronic obstructive pulmonary disease (COPD), deaths from diseases of the respiratory system and long term illness or disability. The presence of any vulnerable groups which could be disproportionately affected by the impacts of the proposed scheme are also identified in the baseline.

12.3.6 The human health baseline also includes a summary of local spatial transport network characteristics. This includes details of important local roads and local public transport. This is important in determining any impacts the proposed scheme could have on the connectivity between communities and community resources.

12.3.7 Road safety data is also presented in the human health baseline in order to understand the prevalence and severity of accidents on local roads.

12.3.8 Drawing on information from other assessments detailed in this report, the human health baseline also identifies AQMAs, areas sensitive to noise, and a description of local landscape amenity.

Planning applications

12.3.9 A planning search of granted and pending planning applications within the vicinity of the proposed scheme within the last five years was also completed within the baseline. This was used to determine how the area may change between now and the time when the proposed scheme is expected to start (2027).

Effects assessment

Land use and accessibility

12.3.10 For effects on land use and accessibility, the significance of effects has been derived by combining the assigned value (sensitivity) of receptors with the magnitude of change arising from the project, in accordance with DMRB LA 104 Table 3.8.1 as reproduced in Table 4.2 of Chapter 4: Environmental assessment methodology.

12.3.11 A significance of effect was determined for each element of the land use and accessibility component of the assessment. This includes private property and housing, community land and assets, development land and businesses, agricultural land holdings and WCH. Any moderate, large or very large effects are considered significant effects.

12.3.12 The sensitivity of land use receptors was reported in accordance with the criteria outlined from DMRB LA 112 Table 3.11. Receptors were assigned a value for sensitivity based on professional judgement, taking into consideration the importance of receptors to the community and scale of use (local, regional, and national). The sensitivity of land use receptors was then assigned a sensitivity value of: 'Very high', 'High', 'Medium', 'Low' or 'Negligible'.

12.3.13 It should be noted that a higher sensitivity value could have been allocated where property or housing provision is integral to the character and function of the community with little or no provision for substitution (e.g. private property in small rural villages). Likewise, a higher sensitivity score could have been allocated where a business is the main source of employment for a community with little or no provision for substitution.

Human health

12.3.14 The impacts of the proposed scheme on human health are assessed qualitatively using professional judgement and the criteria within DMRB LA 112 Table 3.32.

12.3.15 The assessment has considered the potential consequences for human health arising from the construction and operation of the proposed scheme. It will draw upon the information and conclusions reported within Chapter 5: Air Quality, Chapter 7: Landscape and Visual, and Chapter 9: Noise and Vibration. Professional judgement has then been applied to assess the impacts on human health.

12.3.16 Due to the diverse nature of health determinants and health outcomes which are assessed, the assessment of human health effects describes the likely qualitative health outcomes and it is not possible to quantify the severity or extent of the effects. Thus, the significance of the human health effects are not determined in this chapter. The potential health effects during construction and operation are described using the criteria as outlined in Table 12.1. Where an impact is identified, actions have been recommended to mitigate any negative impact on health, or to realise opportunities to create health benefits. It should be noted that in many cases, mitigation already forms part of the proposed scheme and the implementation of this is an underlying assumption of the assessment.

12.3.17 There is no consolidated methodology or practice for the assessment of effects on human health; therefore, the impacts of the proposed scheme on human health are assessed qualitatively using professional judgement. Table 12.1 shows the four possible categories to describe the health outcomes resulting from the proposed scheme.

Table 12.1: Human health outcome categories

Health outcome category	Impact symbol	Health outcome description
Positive	+	A beneficial health impact is identified
Neutral	0	No discernible health impact is identified
Negative	-	An adverse health impact is identified
Uncertain	?	Where uncertainty exists as to the overall impact

Future Baseline

12.3.18 The ONS Population Projections Database provides an insight into how the demography of the area may change over time. According to these estimates, the population of Coventry is expected to increase by 6.7% and the population of Rugby is expected to increase by 4.7% by 2027 when the options are most likely to be operational. This outpaces national projections of 2.7% growth over this time. Consistent with national projections, the population growth in Coventry and Rugby is expected to be comprised of more older people than younger people. This additional population growth will place additional pressure on existing roads, infrastructure and local services. It will also place additional demand for access to open space and nature.

12.4 Assessment assumptions and limitations

Proposed scheme design

12.4.1 The assessment provided in this chapter presents an early assessment of the potential for impacts likely to occur. A preferred option has not yet been chosen and this assessment provides impact assessment for all four options which are currently being appraised as part of the option selection process in PCF Stage 2.

12.4.2 Given that the proposed scheme is still in an early stage of development, the options presented are subject to change. In instances where proposed scheme information is not available, assessment assumptions have been used which reflect a worst-case scenario as described in Chapter 2: The Project. There is currently limited information available related to mitigation measures and this chapter draws on the other relevant topic chapters and mitigation prescribed e.g. dust mitigation measures noted in Chapter 5: Air Quality.

12.4.3 As part of PCF Stage 3 a full environmental assessment report/ environmental statement will be prepared which will include a full assessment of the population and human health impacts. This will also consider the need for further mitigation measures.

Identification of the baseline

12.4.4 The establishment of baseline conditions has referenced, where relevant, baseline information gathered as part of related assessments reported within other chapters of the EAR. Accordingly, any limitations encountered and/ or assumptions applied in those assessments relating to the validity and accuracy of baseline data and information are relevant to the assessment of population and human health.

12.4.5 Community land and assets are referred to expressly in the baseline and included in the community assessment, only where they contribute to local context, or where they are likely to be directly or indirectly affected by the proposed scheme. All community land and assets outlined in the Baseline Conditions (section 12.6) have been considered in the context of the community assessment. However, where community land and assets are not assessed to be directly or indirectly affected by the proposed scheme, these are not necessarily detailed in the community assessment. Consequently, not all community resources within the adopted study area have been referenced within the assessment.

12.4.6 The 2011 Census (Office for National Statistics (ONS), 2012), used as a data source to identify baseline conditions in the study area, is now 10 years old. The next, the 2021 Census, is due to be published in 2022. More recent available data will be used in all instances with the exception of ward-level or smaller data in relation to health which has not been more recently collected. When it becomes available, the new Census data will be used in future assessments of the proposed scheme.

Impact assessment

12.4.7 Given that the proposed scheme is still in an early stage of development, only limited construction information is currently available as noted in Chapter 2: The Project. The construction information which informs assessment in this chapter, including information on road closures and phase durations, is based on information presented in Chapter 2.

12.4.8 Information on how the proposed scheme options change traffic flows is based on the outputs of microsimulation models which are presented in the PCF Stage 2 Walsgrave VISSIM Transport Model Package (Document reference: HE604820-ACM-GEN-WAL_SW_000_Z-RP-TR-000). This document provides an assessment of the proposed scheme's impact on the transport network during the operational phase. An assessment of the impact during the construction phase is yet to be modelled and this information is therefore not yet available at this stage.

12.4.9 The health assessment considers the assessment results presented in Chapter 5: Air Quality, Chapter 7: Landscape and Visual and Chapter 9: Noise and Vibration. The assessment therefore also considers the mitigation measures in these chapters.

12.5 Study area

12.5.1 The DMRB standard states that the study area for land use and accessibility impacts shall be based on the construction footprint/ project boundary (in this instance the Scheme Boundary) plus an area extending 500 m beyond this (the 500 m study area). The study area may be extended or reduced accordingly based on where likely effects are identified outside or unlikely to occur within the 500 m area surrounding the project boundary. During the scoping stage, no likely effects were identified that would require extension of this study area, and likewise no justification to reduce this. Therefore, resources relevant to the land use assessment which are within 500m of the current proposed scheme boundary (combined), including private property and housing, community land, community assets, development land and businesses, agricultural land holdings and WCH routes, have been identified in the baseline.

12.5.2 The human health assessment identifies impacts beyond the 500m area around the proposed scheme boundary which is used for the land use assessment. DMRB LA 112 paragraph 3.23 states that the study area for human health should be identified based on the extent and characteristics of a project and the communities/ wards directly and indirectly affected by the project. Based on this, it is determined

that human health impacts are likely to occur in CCC and RBC local authority administrative areas.

12.5.3 Therefore, for the components of the baseline related only to human health (see paragraph 12.6.55) a baseline has been described which identifies everything within CCC and RBC. The human health assessment draws upon the land uses identified as part of the land use and accessibility section. Additionally, if there are any land uses affected beyond the 500m area used for the land use assessment, these have been stated in the baseline.

12.5.4 Note, in the baseline, specific wards within these local authorities have been referenced to provide a more localised analysis of human health indicators. In these instances, the data presented represents the 2011 Census frozen ward boundaries.

12.6 Baseline conditions

Overview

12.6.1 The proposed scheme is located on the border between CCC and the Borough of Rugby administrative areas. Coventry City Centre is located approximately 5km to the west. The study area is marked by a contrast of suburban development to the west and a more rural landscape to the east. The suburban development to the west comprises the primarily residential settlements of Binley and Wyken which are suburbs of Coventry. These suburbs contain a number of important community assets, areas of open space, recreational facilities, healthcare facilities and WCH routes. The rural areas to the east primarily comprise of agricultural land with some small villages and groups of residential properties. An overview of the surrounding context for the proposed scheme is detailed in Figure 2.2: Environmental Constraints in Appendix A. Figures .

12.6.2 The main settlements located within the 500m study area are to the west of the proposed scheme boundary in the suburbs of Coventry. These suburbs include:

- Wyken - located to the west and north-west of the proposed scheme boundary
- Walsgrave on Sowe - located to the north-west of the proposed scheme boundary
- Stoke - located to the west of the proposed scheme boundary
- Binley - located to the south and south-west of the proposed scheme boundary

The local population

12.6.3 ONS mid-year population estimates (ONS, 2019) show that the proportion of the population under the age of 16 is 19.5% in Coventry and 20.2% in Rugby. This is marginally higher than in England (19.2%). Approximately 13.5% of Coventry's population is over 65, compared to 19% in Rugby and 18.4% in England. Coventry therefore has on average a considerably younger population than both Rugby and England.

12.6.4 The two census wards adjacent to the proposed scheme, Wyken and Fosse, have contrasting population mixes. Wyken, a suburban ward of Coventry, has a fairly young population with 20.2% of the population aged between 0 and 16. Fosse, located in Rugby Borough to the east of the proposed scheme, has a much lower 17.5% of the population aged 0 to 16. The proportion of the population who are aged over 65 in Fosse (23.6%) is seven percentage points higher than Wyken (16.6%).

12.6.5 Census data from the ONS (ONS, 2012) shows the population proportion by ethnicity for each local authority and compares these to the West Midlands and England. This is presented in Table 12.2.

Table 12.2: Ethnicity breakdown by local authority in the study area

Local Authority/ Area	White	Mixed/ Multiple Ethnic Group	Asian/ Asian British	Black/ African/ Caribbean/ Black British
Coventry	73.8	2.6	16.3	5.6
Rugby	90.5	2.0	5.2	2.0
West Midlands	82.7	2.4	10.8	3.3
England	85.4	2.3	7.8	3.5

Source: ONS, (2011); Census 2011

12.6.6 The population within the health baseline study area is shown to be mostly White, with the Asian/ Asian British population being the second largest ethnic group by population proportion. As also reflected in the population age mix, differences in the urban – rural demography statistics observed when comparing Coventry and Rugby are also reflected in these ethnicity statistics. In Coventry, 73.8% of the population are white, compared with 90.5% in Rugby.

Land use and accessibility

Private property and housing

12.6.7 There are many residential properties in the study area which are located in the settlements described in section 12.6.2. The majority of residential properties are within the suburbs of Coventry to the west of the proposed scheme. There are also isolated residential properties and small settlements comprising residential properties in the rural part of the study area in the east.

12.6.8 Hungerley Hall Farmhouse is a Grade II listed building and falls within the proposed scheme boundary, the only residential property to do so. The farmhouse comprises one residential property and several agricultural buildings.

12.6.9 There is one planning allocation comprising private property and housing identified within the study area. This is referred to in Policy H2:3, Walsgrave Hill Farm in the CCC Local Plan 2011 (CCC, 2017). The Local Plan states that up to 900 dwellings can be built on the site and states the following site specific requirements: '*Retention and enhanced setting of listed buildings at Hungerley Hall Farm. Site to incorporate blue light access linking the A46 to the University Hospital. Facilitate and work with Highways England on highways proposals linked to a new Grade Separated junction at Clifford Bridge. Provision of essential drainage and flood risk infrastructure.'*

Community land

12.6.10 There are five publicly accessible open spaces within the 500m study area. These open spaces are identified in Table 12.3 along with their respective type, on-site facilities, and descriptions of existing access points.

Table 12.3: Community land within the 500m study area

Name	Type	Distance from Proposed scheme boundary (m)	On-site facilities	Access
Coombe Country Park	Public park	0m (adjacent to the scheme boundary)	Coombe Country Park Visitor Centre, Coombe Abbey, Go Ape Coventry, Coombe Pool, car parks, picnic benches	B4027, Centenary Way
Dorchester Way Open Space	Public park/ play space	0m (adjacent to the scheme boundary)	Children's play areas, Car parking	Valencia Road, Bracadale Close, Coombe Park Road, Royston Close, Clifford Bridge Road
Land East of Hapworth Road	Play space	0m (adjacent to the scheme boundary)	Children's play area, basketball hoop, football goals	Hapworth Road
Land North of Stoke Floods Nature Reserve	Playing fields	50m	Allotments, football goals, rugby posts	Stoke Floods Nature Reserve, Attoxhall Road, Belgrave Road, Clifford Bridge Road
The Ivor Preece Field	Playing fields	250m	Broadstreet Rugby Football Club, Football goals, rugby posts, floodlights, sprinting track	A428 Rugby Road

Source: OS MasterMap, (2020); OS Open Greenspace, (2020); Google Maps, (2020)

12.6.11 Immediately to the east of the proposed scheme boundary is Coombe Country Park which is designated as a SSSI and a Grade II* Registered Park and Garden. The major attractions in the park include a visitor centre, a lake (Coombe Pool), a Go Ape facility (Go Ape Coventry) and an abbey (Coombe Abbey). Coombe Pool is the only one of these attractions which is located within the 500m study area of the proposed scheme. It attracts anglers and bird watchers. Anglers are only permissible in the eastern part of the pool.

Community assets

12.6.12 Within the 500m study area, there are 10 community assets identified with none of these lying within the proposed scheme boundary or directly accessed by the scheme area. These comprise two nurseries, four schools, an extended learning centre, a hospital, a hospice, a community centre, and a sports centre. These resources are identified in Table 12.4 along with their location and descriptions of access points.

Table 12.4: Community assets within the 500m study area

Name	Type	Location	Access
Hinkley Road Nursery	Nursery	Wyken	Dorchester Way
Imagine… Creative Early Years	Nursery	Wyken	Clifford Bridge Road
Pearl Hyde Community Primary School	Primary School	Wyken	Dorchester Way
Clifford Bridge Primary School	Primary School	Binley	Coombe Park Road
Caludon Castle School	Secondary School	Wyken	Axholme Road
Wyken Extended Learning Centre	Secondary School	Wyken	Axholme Road
University Hospital Coventry and Warwickshire	Hospital	Wyken	Clifford Bridge Road, Hall Lane
Coventry Myton Hospice	Hospice	Wyken	Clifford Bridge Road, Hall Lane
Wyken Community Centre	Community Association	Wyken	Clifford Bridge Road
Caludon Castle Sports Centre	Sports facility	Wyken	Axholme Road

Source: OS MasterMap, (2020); OS Open Greenspace, (2020); OpenStreetMap, (2020); Google Maps, (2020)

12.6.13 University Hospital Coventry and Warwickshire provides both emergency and elective care and specialises in cardiology, neurology, stroke, joint replacements, and in vitro fertilisation. The hospital works in partnership with the University of Warwick's Warwick Medical School and has a large accident and emergency department that serves Coventry and many areas in Warwickshire.

12.6.14 Wyken Community Centre provides a range of classes, activities, sports, and other functions for the local community. These classes include martial arts, dance, fitness, and yoga.

12.6.15 There are no existing accessibility restrictions or severance issues for the existing community land and assets.

Development land and businesses

12.6.16 There are a number of businesses which are within the 500m study area. These businesses, along with their main class uses and existing access points, are outlined in Table 12.5. Where there are a number of businesses in close proximity to each other, they have been grouped by their general location.

Table 12.5: Businesses within the 500m study area

Business area location	Main types of business	Access
Tesco Superstore and Petrol Station	Supermarket	B4082 Clifford Bridge Road
Binley Business Park	Professional services, finance, real estate	Harry Weston Road
Beechwood Trees and Landscapes Ltd.	Tree surgery	Brinklow Road
Clipper Logistics*	Logistics and Distribution	A4600 Hinkley Road; Parkway

Source: Google Maps 2021, Costar 2021

**Located on Cross Point Business Park and formerly a Toys R Us distribution centre. Centre Clipper Logistics tenancy expiries in July 2021 and is currently being used to service a dedicated NHS contract providing PPE equipment to hospitals around the UK. The premises is currently to let and so its future occupier is unknown, although likely to be involved with logistics and distribution (Costar, 2021).*

12.6.17 There is no development land related to employment uses in the study area.

Agricultural land holdings

12.6.18 There are two farms within the study area. These are detailed in Table 12.6. Both of these farms comprise primarily of arable land. Hungerley Hall Farm is owner occupied and split across both the east and west sides of the A46, north of the B4082. An agricultural bridge connects the eastern field to Hungerley Hall Farmhouse and the access track. There is also a small parcel of mostly improved grassland to the south of the eastern field but separated by the B4082. Details of land ownership are provided in Appendix G.

12.6.19 Walsgrave Hill Farm is located directly to the north of Hungerley Hall Farm and is accessed from the north via Bridleway 156 R75x/1. This farm also comprises fields which span both sides of the A46.

Table 12.6: Agricultural holdings

Holding name	Tenure	Activities	Sensitivity to change
Hungerley Hall Farm	Owner occupied	Arable land	Medium
Walsgrave Hill Farm	Jointly owned by four individuals	Arable land	Medium

Source: AECOM Stakeholder Engagement (2021)

WCH routes

12.6.20 WCH routes are important assets for local areas, as they can connect smaller villages and centres to community facilities. They also provide routes upon which the local population can exercise, which are often safe from vehicular traffic.

12.6.21 The Centenary Way Long Distance walking trail is a 159km footpath originating in the Tame Valley and ending in the Ilmington Downs. The route passes close to several major local settlements, including Coventry, Warwick, and Leamington Spa. In the study area, the route connects with Bridleway 156 R75x/1 which passes over the A46 approximately 1.5km north of the Walsgrave Junction.

12.6.22 Two public footpaths run adjacent to each other and circumvent Coombe Pool around the perimeter of Coombe Country Park. These paths include bridges over small streams that lead into Coombe Pool such as Smite Brooke.

12.6.23 The Sowe Valley Walk is a promoted walking route which runs parallel to the River Sowe from Longford through to Willenhall. In the study area, the route connects the Stoke Floods Nature Reserve with the Dorchester Way Open Space and Coventry University Hospital. The footpath is situated approximately 280m west of the proposed scheme options.

12.6.24 To the south-west of the proposed scheme, a public footbath connects the children's play space off Valencia Road to Royston Close. This provides an alternative pedestrian route from residents of Eastern Binley to Clifford Bridge Primary School.

12.6.25 There are no National Cycle Network routes within 500m of the proposed scheme.

Air quality management areas

12.6.26 The Walsgrave junction is adjacent to the Coventry City Council AQMA, which is an area encompassing the land within the administrative boundaries of the City of Coventry and is located to the west of the A46 (Defra, 2021a). This has been declared due to exceedances of the annual mean NO_2 objective. The Coventry City AQMA includes or is adjacent to part of the ARN, namely the A46, A45 London Road, A45 Stonebridge Highway, and certain urban roads in Binley and Walsgrave, west of the Walsgrave junction.

12.6.27 The District of Rugby and the District of Warwick have also declared AQMAs in some urban areas (Defra, 2021a) but these do not include any roads in the ARN. The Borough of Hinckley and Bosworth has not declared any AQMAs.

12.6.28 Further information on the Air Quality baseline assessment and impacts can be found in Chapter 5: Air Quality.

Areas sensitive to noise

12.6.29 Currently no noise baseline measurement data has been obtained for the study area. This will be undertaken as part of the noise assessment in PCF Stage 3.

12.6.30 As stated in Chapter 9, based on aerial imagery, it is considered that road traffic is likely to be the dominant source of noise in the study area, with some localised commercial sources. In addition to the A46, there are a number of other potentially significant sources of road traffic noise, including the B4082 and Clifford Bridge Road. A reflective noise barrier, approximately 50m in length, is located along the A46 northbound carriageway as it crosses Brinklow Road towards the south of the calculation area. There are also a number of minor roads, in particular around the University Hospital Coventry and Warwickshire, which will contribute to ambient noise levels. Other noise sources include noise associated with general urban and rural activities.

12.6.31 Further information on the Noise baseline assessment and impacts can be found in Chapter 9: Noise and Vibration.

Landscape amenity

12.6.32 The proposed scheme lies within Natural England's National Character Area (NCA) 97: Arden. Arden comprises farmland and former wood-pasture lying to the south and east of Birmingham between the River Tame and the River Avon in Warwickshire and North Worcestershire. The landscape of the lower-lying central area is gently rolling with small fragmented, semi-natural and ancient woodlands. Mature oaks are characteristic features of hedgerows forming distinctive field boundaries. Historic parklands and narrow river corridors are frequent features in the vicinity of the urbanised area.

12.6.33 The study area encompasses Dunsmore Parklands Landscape Character Type (LCT). The landform of Dunsmore Parklands LCT is gently rolling with frequent parklands and tree belts. Hedgerows and wooded streamlines combine with copses to create a local enclosure. Field pattern is generally of large scale and poorly defined in some places allowing middle distant views to wooded skylines.

12.6.34 The landscape elements within the study area predominantly comprise agricultural land, the designated parkland of Coombe Abbey and dense residential areas of Binley/ Walsgrave, which form the urban edge of Coventry. In the north of the study area, large scale industrial and commercial buildings and the University Hospital of Coventry and Warwickshire are prominent elements which emphasise the urban fringe influence from within the wider rural landscape.

12.6.35 Further details are described in Chapter 7: Landscape and Visual.

Spatial transport network characteristics

12.6.36 The A46 forms a key element of the north-south travel to work area. The route provides an alternative route for journeys between the East Midlands and the south west and forms part of the national Strategic Road Network, linking the M6 and M69 with the M40 and the M5.

12.6.37 Walsgrave junction is located approximately 3.1 miles (5km) to the east of Coventry city centre and connects the B4082 and the A46. Binley junction is approximately 1.1 miles (1.7km) to the south and the M6 and M69 are to the north. The Walsgrave junction is therefore important to a number of major employment sites to the Strategic Road Network, as well as the hospital and other local amenities.

12.6.38 The A46 is connected to the Clifford Bridge Road by a 400m stretch of the B4082. Clifford Bridge Road is an important local road which runs north-south between Walsgrave on Sowe and Binley. This route provides access to Coventry University Hospital as well as a number of local schools and employment sites.

12.6.39 The B4027 Brinkley Road and the A428 Rugby Road connect the small settlements in the rural eastern part of the study area with the suburbs of Coventry in the west of the study area. The B4027 Brinkley Road passes under the A46. The A428 Rugby Road connects with the A46 near to the Binley Industrial Estate to the south of the proposed scheme.

12.6.40 Bus services within the study area range from local routes to inter-city networks. There are a number of bus stops along Clifford Bridge Road and B4027 Brinkley Road. Those within 500m of the proposed scheme have been identified in Table 12.7. There are no railway stations within 500m of the proposed scheme.

Table 12.7: Key bus routes within the study area

Bus Route Number	Key Bus Stop Locations
3	Arena Shopping Park – Warwickshire Shopping Park
60	Arena Retail Park – Warwick University
85	Coventry - Rugby
85A	Coventry - Rugby
85B	Coventry - Rugby
85S	Coventry - Rugby
858	Coventry - Rugby
858S	Coventry – Rugby Schools
86	Coventry – West Haddon
218	Binley Woods – Walsgrave Tesco
X30	Ansty Park – Coventry City Centre

Source: Bus Times (nxbus.co.uk)

Road safety information

12.6.41 Incidents and collisions between vehicles and people using the UK's road network can cause serious injuries and death.

12.6.42 Table 12.8 identifies the number of people either killed or seriously injured (KSI) per 100,000 on England's roads between 2016 and 2018. The national average is 42.6 per 100,000. The rate in Rugby is considerably higher than this (67.7) and the rate in Coventry is lower (34.9).

Table 12.8: KSI statistics for local authorities within the study area

Area	Coventry	Rugby	England
Killed and seriously injured (KSI) casualties on England's roads 2016-18 per 100,000 population	34.9	67.7	42.6*

**Aggregated from all known lower geography values*

Source: Public Health England, (2020); Local Authority Health Profiles

12.6.43 Data showing all road traffic incidents attended by the police service and whether these accidents are considered 'slight', 'serious' or 'fatal' is published by the DfT (Department for Transport, 2021). The latest data is for 2019. It shows that there were 10 road traffic incidents within the study area during 2019, of which four were considered 'slight' and six were considered 'serious'. There were no traffic accidents within the study area which resulted in a fatality. Table 12 9 presents the road traffic incidents within the health baseline study area during 2019. Six of the 10 accidents took place on the A46 and four took place on the Walsgrave Junction.

Table 12 9: Road safety data within the study area

Road Name	Area	Total Road Traffic Accidents	Vehicles	Casualties
A46 (within proposed scheme boundary)	Wyken/ Binley	6	15	12
Brinklow Road	Binley	1	3	1
Clifford Bridge Road	Binley	1	2	1
Dorchester Way	Wyken	1	2	1
University Hospital Coventry and Warwickshire	Wyken	1	2	2
Total		10	24	17

Source: Department for Transport (2021) Road Safety Data

Human Health

General health classification

12.6.44 Data from the 2011 Census (ONS, 2012), which is the latest dataset available for self-assessment of health, shows a lower proportion of individuals in Coventry reported their general health as 'good' or 'very good' than the national average (80.6 and 81.4% respectively). The figure in Rugby (83%) is higher than both Coventry and the national average. The percentage of the population that reported to be in 'bad' or 'very bad' health in Coventry (6.1%) was higher than both in Rugby (4.5%) and the national rate (5.4%).

12.6.45 The percentage of the population which reported their general health as 'good' or 'very good' was similar in Wyken and Fosse (82.2% and 82.3% respectively). However, the percentage of the population which reported their general health as 'bad' or 'very bad' was higher in Wyken than in Fosse (5.4% compared with 4.8% respectively).

Life expectancy

12.6.46 Male life expectancy in Coventry (78.7 years) in 2016-2018 was approximately one year lower than the national average for England (79.6 years) (PHE, 2020fa). At 80.5 years, male life expectancy in Rugby was approximately one year higher than the national average.

12.6.47 Similarly, female life expectancy in Coventry (82.2 years) was one year lower than the national average (83.2), while female life expectancy in Rugby was slightly higher than the national average (83.5) (PHE, 2020).

Deprivation

12.6.48 Out of the 317 local authorities in England, Coventry is ranked the 75th most deprived local authority and Rugby is ranked the 222nd on MHCLG's Index of Multiple Deprivation (IMD) 2019 (MHCLG, 2019d), where 1st is the most deprived. This means that Coventry ranks among the top 30% most deprived local authorities while Rugby ranks within the top 30% least deprived local authorities. In Coventry, 14.2% of the Lower Super Output Areas[1] (LSOAs) rank in the most deprived 10% of LSOAs national. In comparison, none of the LSOAs in Rugby are ranked within the top 10%.

12.6.49 When assessing only the income deprivation domain indicator, no LSOAs in Rugby rank in the most deprived 10% of all LSOAs nationally. Approximately 15.4% of LSOAs in Coventry rank in the most deprived 10%. When assessing only the health deprivation and disability domain indicator, 6.9% of LSOAs in Rugby and 10.5% of LSOAs in Coventry rank in the most deprived 10%.

12.6.50 There are three Middle Super Output Areas (MSOAs) which border the combined Site boundary. Namely, these include Bindley and Willenhall and Wyken in Coventry, and Revel and Binley Woods in Rugby. The IMD data suggests that these surrounding MSOAs generally benefit from low levels of deprivation, with 80% of the LSOAs within these MSOAs being ranked within the 50% least deprived LSOAs in England. However, pockets of deprivation exist within close proximity to the Site. In particular, one LSOA in Wyken ranks within the top 10% more deprived in England.

Childhood obesity

12.6.51 Data from Public Health England (PHE) (PHE, 2020) for the year 2019/ 20 shows that the prevalence of obesity in children (age 10 - 11 years) in England is 21%. The prevalence of obesity in children (age 10 - 11 years) in Coventry (25.3%) is significantly above the national average. The data for Rugby (19.7%) suggests that prevalence of obesity in children (age 10 - 11 years) is slightly lower than the national rate.

Emergency hospital admissions for chronic obstructive pulmonary disease (COPD)

12.6.52 COPD is a common respiratory disease in the UK, usually affecting people over the age of 35.

12.6.53 Over the 5-year period between 2013/ 14 and 2017/ 18 (PHE, 2020), hospital admissions for COPD in all four local authorities within the health baseline study area were lower than the national average. The standardised admissions ratio in Coventry is substantially higher than the national average (114, with 100 representing the national average), while in Rugby the admissions ratio is considerably lower (76.2).

Deaths from diseases of the respiratory system

12.6.54 In 2018 the proportion of yearly deaths caused by diseases of the respiratory system in each local authority within the health baseline study area was broadly in line with England's national average (13.6%) (ONS, 2019). In Coventry, 13.9% of deaths were caused by respiratory diseases compared to 13.2% in Rugby.

[1] A Lower Super Output Area (LSOA) is a geographic area. LSOAs are a geographic hierarchy designed to improve the reporting of small area statistics in England and Wales.

Long-term illness or disability

12.6.55 Data from the 2011 Census (ONS, 2012) shows that the proportion of the population living with a long-term health problem (illness) or disability across England was 17.6%. By way of comparison, this figure for Rugby (16.1%) was much lower than the national percentage. Coventry had a similar proportion of the population living with long-term health problems or disabilities as the national percentage (17.7%).

12.6.56 As to be expected given a younger population, the percentage of the population who reported in the Census to have a long-term health problem or disability was lower in Wyken than in Fosse (16.5% compared to 16.9% respectively). Perhaps surprisingly however, the percentage of the population reported to have 'day to day activities limited a lot' by illnesses or disabilities in Wyken was considerably higher than in Fosse (7.9% and 6.9% respectively). This shows that those with health problems or disabilities in Wyken tend to have more severe conditions than in Fosse.

Health profiling summary

12.6.57 Table 12.10 provides an overall summary of the Local Authority Health Profiles produced by Public Health England for Coventry and Rugby and how they compare to national figures.

Table 12.10: Local authority health profiles

Health Indicator	Coventry	Rugby	England
Population (2019)	371,500	108,900	56,286,900
Population aged under 16 (2019)	19.5%	20.2%	19.2%
Population aged over 65 (2019)	13.5%	19%	18.4%
Prevalence of childhood obesity (age 10 - 11 years) (2018/ 19)	25.3%	19.7%	21%
Emergency Hospital Admissions for Chronic Obstructive Pulmonary Disease (COPD)	114	76.2	100
Proportion of deaths caused by respiratory diseases (2018)	13.9%	13.2%	13.6%
Population with a long-term health problem or disability (2011)	17.7%	16.1%	17.6%
General health classification - bad or very bad (2011)	6.1%	4.5%	5.4%

Health Indicator	Coventry	Rugby	England
General health classification - good or very good (2011)	80.6%	83%	81.4%
Male life expectancy at birth (2016 - 2018) (yrs)	78.7	80.5	79.6
Female life expectancy at birth (2016 - 2018) (yrs)	82.2	83.5	83.2
IMD - Rank of average rank (2019) (1 being most deprived)	75	222	-
IMD - Proportion of LSOAs in most deprived 10% nationally (2019)	14.2%	0%	-
Income deprivation - Proportion of LSOAs in most deprived 10% nationally (2019)	15.4%	0%	-
Health deprivation - Proportion of LSOAs in most deprived 10% nationally (2019)	10.5%	6.9%	-
Population (2019)	371,521	108,935	56,286,961

Source: Public Health England, (2020); Local Authority Health Profiles

12.7 Potential impacts

12.7.1 A scoping exercise was undertaken in November 2020 which identified the potential effects likely to occur due to the proposed scheme options. The scoping exercise was informed by the technical and reporting requirements contained in DMRB LA 103. The outcomes of the scoping exercise were documented in a scoping report and detail on the potential effects is provided in this section.

12.7.2 The proposed scheme options have potential to lead to population and human health impacts during both the construction and operation phases of the proposed scheme.

During construction

12.7.3 The potential impacts arising during construction of the proposed scheme are as follows:

Land use and accessibility

12.7.4 Direct land take impacts on, or impacts on the accessibility to, private property and housing, community land and assets, development land and businesses, agricultural land holdings and walking, cycling and horse-riding facilities as a result of construction of the proposed scheme either temporarily or permanently.

Human health

12.7.5 Potential impacts on human health determinants during construction considers the following health and well-being determinants of relevance as identified from those set out in the London Healthy Urban Development Unit (HUDU) Rapid Health Impact Assessment Tool Fourth Edition 2019 (NHS HUDU, 2019):

- Access to healthcare services and other social infrastructure
- Access to open space and nature (including provision of)
- Air quality, noise, and neighbourhood amenity
- Accessibility and active travel (including to and use of active travel)
- Driver safety

During operation

12.7.6 Potential impacts arising from the proposed scheme once it is complete and operational are as follows:

Land use and accessibility

12.7.7 There are not expected to be any land use and accessibility impacts on any existing community land and assets, development land and businesses, agricultural land holdings or WCH routes in the study area due to the operation of any proposed scheme options.

Human health

12.7.8 Potential impacts on human health determinants during operation considers the following health and well-being determinants from HUDU guidance:

- Access to healthcare services and other social infrastructure
- Access to open space and nature (including provision of)
- Air quality, noise, and neighbourhood amenity
- Accessibility and active travel (including to and use of active travel)
- Driver safety

12.8 Design, mitigation and enhancement measures

Construction

12.8.1 Where possible, proportionate measures to avoid or minimise impacts on people and community facilities should be embedded within each proposed scheme design and mitigation should be put in place to offset significant negative effects on population and health. During construction, these should include:

- The development of an EMP for the proposed scheme. The EMP would set out the environmental mitigation requirements during proposed scheme construction, including good practice in respect of air quality and best practicable means in relation to noise associated with construction activity, and also the project level expectations on how the proposed scheme would be constructed.
- A Traffic Management Plan (TMP) would be implemented which defines measures to be used by the construction contractor to reduce the impacts from construction traffic, including measures to ,reduce worker vehicle movements and to reduce HGV movements, particularly at peak periods.

- Minimising land take from agricultural land and maximising the extent of restoration post-construction, hence reducing the impact upon agricultural enterprises and activity.
- Liaison with agricultural land holding owners, occupiers and agents, as appropriate, to establish measures to protect livestock, agricultural land and water supplies, and make arrangements regarding access to land holding and required maintenance.
- Bus routes should be taken into consideration when defining temporary diversions and temporary traffic management - the construction contractor should discuss and agree temporary diversion routes in advance with CCC and RBC as applicable in order to limit impacts on passengers.
- During the proposed scheme construction phase, appropriate mechanisms to communicate with local residents should be set up to highlight potential periods of disruption (e.g. web-based, newsletters, newspapers, radio announcements etc.).
- Landowners that would be directly affected by demolition and land-take should be eligible for appropriate compensation in accordance with established compensation procedures.
- Sites used temporarily during the proposed scheme construction phases should be appropriately restored and returned to the applicable landowner.
- Areas of open space used temporarily during construction should be appropriately landscaped once the construction phase is complete.
- Providing an alternative access route to severed resources and/ or reducing the time taken for access routes to be closed.

Operation

12.8.2 The proposed scheme designs should include embedded mitigation measures that aim to avoid and minimise effects upon people and communities during operation. Examples of these type of design measure/ mitigation are included below:

- Using noise mitigation measures such as noise barriers to reduce any significant noise effects which occur. Further information on noise mitigation measures can be found in Chapter 9: Noise and Vibration
- Where applicable, the proposed scheme could seek to encourage walking and cycling such as through a controlled crossing, footpaths and cycleways

12.9 Construction effects - Land use and accessibility

Private property and housing

12.9.1 As detailed in the baseline, Policy H2:3 of the Coventry Local Plan allocates Walsgrave Hill Farm to the north-west of the proposed scheme for the development of up to 900 residential properties. Options 6, 7, 8 and 11 all have potential to require land which is indicated within the allocation. However, there are currently no planning applications for development on this land, and the local plan states that any potential developer will be required to 'facilitate and work with Highways England on highways proposals linked to a new Grade Separated junction at Clifford Bridge'. It is therefore unlikely that the proposed scheme will result in this allocation not being able to come forward for development. In conclusion, the proposed scheme is expected to have no temporary or permanent effects on the land use and accessibility of the Walsgrave Hill Farm allocation.

Temporary effects

12.9.2 Hungerley Hall Farmhouse is located to the north-west of the existing A46/ B4082 junction. Given this residential land contains fewer than 30 properties, the sensitivity of the land is assessed to be medium. Construction of Option 7 has the potential to require the temporary loss of approximately 50% of the property's garden for approximately one year and five months. The potential magnitude of impact is assessed as moderate and the potential significance of effect is assessed as slight adverse.

Permanent effects

12.9.3 Construction of Option 6 has the potential to result in a permanent severance of access to the residential property at Hungerley Hall Farmhouse. The property will not be able to access the road network unless an alternative route is put in place. Hungerley Hall Farmhouse is assessed to be of medium sensitivity. This has potential to result in residents permanently not being able to access these properties and therefore the potential magnitude of impact is assessed to be major. The potential significance of effect on this residential property is assessed to be moderate adverse, which is significant. It is anticipated that an alternative private means of access would be provided from the eastern dumbbell of Option 6.

12.9.4 Construction of Option 7 has the potential to require the permanent loss of approximately 20% of the garden at Hungerley Hall Farmhouse. The sensitivity of this residential property is assessed to be medium. The potential magnitude of this partial land take is assessed to be moderate and the potential significance of this effect is slight adverse, which is not significant.

12.9.5 Construction of Option 8 will result in the permanent demolition of Hungerley Hall Farmhouse and the permanent loss of the entirety of its garden. The sensitivity of this resource is assessed to be medium. Since the demolition would be of the entire property, the potential magnitude of impact is assessed to be major. The potential significance of effect on this residential property is assessed to be moderate adverse and significant.

12.9.6 Construction of Option 11 has the potential to require the permanent loss of approximately 50% of the garden at Hungerley Hall Farmhouse. The sensitivity of this residential property is assessed to be medium. The potential magnitude of this partial land take is assessed to be moderate and the potential significance of this effect is slight adverse (not significant).

Community land and assets

Temporary effects

12.9.7 The construction of Options 6, 7 and 11 will not result in any temporary impacts on community land or assets. All impacts of these options on the resource are expected to occur permanently, as described in 12.9.9.

12.9.8 The construction of Option 8 has potential to temporarily require approximately 0.5ha of land within Coombe Country Park for up to one year and four months to provide sufficient space for construction works. Coombe Country Park is an important asset for the community and is likely frequently used by local residents. The sensitivity of the receptor is therefore assessed to be medium. The area of land which has the potential to be temporarily lost represents less than 1% of the total area of the park. The land with potential to be impacted is located on the western edge of the park, to the west of Coombe Pool, and is primarily used for informal recreation. The construction land take would also not impede on people's ability to access the primary attractions in the country park including the footpath

which enables access around Coombe Pool. The potential magnitude of impact is therefore assessed as negligible and the potential significance of effect is assessed as slight adverse (not significant).

Permanent effects

12.9.9 The construction of Options 6, 7 and 11 have the potential to permanently require approximately 0.05ha of land within Coombe Country Park. The sensitivity of the Coombe Country Park is assessed to be medium. The land with potential to be impacted is located on the western edge of the park, to the west of Coombe Pool, and is primarily used for informal recreation. Given the area of land take is less than 0.1% of the total area of the park, the magnitude of the effect is assessed to be negligible. The potential significance of effect is therefore assessed to be neutral (not significant).

12.9.10 The construction of Option 8 has potential to permanently require approximately 0.2ha of land within Coombe Country Park. The sensitivity of the Coombe County Park is assessed to be medium. The area of land with potential to be temporarily lost represents less than 1% of the total area of the park. The land with potential to be impacted is located on the western edge of the park, to the west of Coombe Pool, and is primarily used for informal recreation. The construction land take would also not impede on people's ability to access the primary attractions in the country park including the footpath which enables access around Coombe Pool. The potential magnitude of impact is therefore assessed as negligible and the potential significance of effect is assessed as slight adverse (not significant).

Agricultural land holdings

12.9.11 The baseline identifies two agricultural land holdings in the study area: Hungerley Hall Farm and Walsgrave Hill Farm.

12.9.12 Hungerley Hall Farm comprises agricultural buildings and arable farmland. The agricultural buildings are located to the north-west of the A46/ B4082 junction. The arable farmland is located in two fields to the east and west of the existing alignment of the A46. The eastern field is accessed by a bridge which passes over the A46. Walsgrave Hill Farm is located to the north of Hungerley Hill Farm and comprises land used for arable farming. The below describes the potential temporary and permanent impacts of the proposed scheme options on these agricultural land holdings.

Temporary effects

12.9.13 Construction of Option 6 will likely not require any temporary land take from within Hungerley Hall Farm.

12.9.14 Construction of Option 7 will require the temporary loss of approximately 0.7ha of land in the part of the Hungerley Hall Farm to the west of the existing A46. The farmland is not reliant on a spatial relationship with key agricultural infrastructure though there is evidence that the crop produced on the farmland involves intensive production methods and is therefore required to be accessed frequently. The sensitivity is therefore assessed to be medium. The land impacted is equivalent to approximately 2% of the total land within the agricultural land holding. No farm buildings are expected to be affected. The potential magnitude of impact is therefore assessed to be negligible and the potential significance of this temporary effect is assessed to be neutral (not significant).

12.9.15 Construction of Option 8 has the potential to require the temporary closure of agricultural buildings attached to Hungerley Hall Farmhouse as well as approximately 6ha of agricultural land as these will no longer be accessible. It will also temporarily require the closure of the agricultural bridge which passes over

the existing A46 for approximately one year and four months. The sensitivity of Hungerley Hall Farm is assessed to be medium. The temporary closure of the agricultural bridge would sever access between the field to the east of the A46 and the rest of the agricultural land holding. The buildings impacted comprise the majority of farm buildings within Hungerley Hall Farm. The combination of land take and severance will mean that approximately 32ha of Hungerley Hall Farm would no longer be able to be farmed, equivalent to approximately 66% of the total area. The potential magnitude of impact is therefore assessed to be major and the potential significance of this permanent effect is assessed to be large adverse (significant).

12.9.16 Construction of Option 11 will require the temporary land take of approximately 8ha in Hungerley Hall Farm's western field. The length of time this land will be required for is still to be determined. The new route alignment will remove the existing agricultural connection road between Hungerley Hall Farm's eastern and western fields. However, this severance is avoided as an access route onto the B4082 from the Eastern Field will be included. The sensitivity of Hungerley Hall Farm is assessed to be medium. The direct land take will require a total of approximately 17% of the total land area of Hungerley Hall Farm. The potential magnitude of impact is therefore assessed to be minor and the potential significance of this temporary effect is assessed to be slight adverse (not significant).

12.9.17 Construction of Option 6 will require the temporary loss of approximately 16ha of land in Walsgrave Hill Farm's southern fields for approximately one year and ten months. The agricultural land holding comprises approximately 145ha of farmland used for arable farming. The farmland is not reliant on a spatial relationship with key agricultural infrastructure though there is evidence that the crop produced on the farmland involves intensive production methods and is therefore required to be accessed frequently. The sensitivity of this resource is therefore assessed to be medium. Construction of the option has potential to lead to the temporary loss of less than 11% of the land within the agricultural land holding in Option 6 and no farm buildings will be affected. The potential magnitude of impact is therefore assessed to be minor and the potential significance of this temporary effect is assessed to be slight adverse (not significant).

12.9.18 Construction of Option 7 will likely not require any temporary land take from within Walsgrave Hill Farm.

12.9.19 Construction of Option 8 will require the temporary loss of approximately 0.5ha of land in the Walsgrave Hill Farm's southern fields for approximately one year and four months. The agricultural land holding is assessed to be of medium sensitivity. Construction of the option has potential to lead to impacts on approximately less than 1% of the land within the agricultural land holding and no farm buildings will be affected. The potential magnitude of impact is assessed to be negligible and the potential significance of this temporary effect is assessed to be neutral (not significant).

12.9.20 Construction of Option 11 will require the temporary loss of approximately 3.7ha of land in the Walsgrave Hill Farm's southern fields. The length of time this land will be required for is still to be determined. The agricultural land holding is assessed to be of medium sensitivity. Construction of the option has potential to lead to impacts on approximately 2% of the land within the agricultural land holding and no farm buildings will be affected. The potential magnitude of this temporary effect is assessed to be minor and slight adverse (not significant).

Permanent effects

12.9.21 Construction of Option 6 has the potential to permanently sever access between Hungerley Hall Farm and the road network. The sensitivity of Hungerley Hall Farm is assessed to be medium. The agricultural land holding will not be able to access the road network unless an alternative route is put in place. The permanent severance of the agricultural land holding from the road network means that the farm owners will not be able to access land which is essential for the enterprise to function. Since the entirety of the agricultural land holding has potential to be impacted, the potential magnitude is assessed to be major. The potential significance of this permanent effect is therefore assessed to be large adverse (significant).

12.9.22 Construction of Option 7 has the potential to require the permanent loss of approximately 0.7ha of land in the part of Hungerley Hall Farm, mostly to the west of the existing A46. The sensitivity of the agricultural land holding is assessed to be medium. The land impacted is equivalent to approximately 1% of the total land within the agricultural land holding and no farm buildings will be affected. The potential magnitude of the impact is therefore assessed to be negligible and the potential significance of this permanent effect is assessed to be neutral (not significant).

12.9.23 Construction of Option 8 has the potential to require the permanent loss of approximately 5ha of land of Hungerley Hall Farm to the west of the existing A46. The sensitivity of Hungerley Hall Farm is assessed to be medium. Once operational, a replacement agricultural bridge over the A46 will re-provide access to the eastern field. The land impacted is equivalent to approximately 11% of the total land area. This land take will require some of the farm buildings but this is not expected to prevent the remaining land from being used for agricultural purposes. The potential magnitude of impact is therefore assessed to be minor and the potential significance of this permanent effect is assessed to be slight adverse (not significant).

12.9.24 Construction of Option 11 will permanently require the land take of approximately 5.1ha of Hungerley Hall Farm's western field. The sensitivity of Hungerley Hall Farm is assessed to be medium. The 5.1ha direct land take from Hungerley Hall Farm compromises approximately 10% of the total land area. The potential magnitude of impact is therefore assessed to be minor and the potential significance of this permanent effect is assessed to be slight adverse (not significant).

12.9.25 Construction of Option 6 will require the permanent loss of approximately 15ha of land in Walsgrave Hill Farm's southern fields. Walsgrave Hill Farm is assessed to be of medium sensitivity. The land impacted is equivalent to approximately 10% of the total land within the agricultural land holding and no farm buildings will be affected. The potential magnitude of impact is therefore assessed to be minor and the potential significance of this permanent effect is assessed to be slight adverse (not significant).

12.9.26 Construction of Option 7 will likely not require any permanent land take from within Walsgrave Hill Farm.

12.9.27 Construction of Option 8 will require the permanent loss of approximately 0.2ha of land in Walsgrave Hill Farm's southern fields. The sensitivity of the agricultural land holding is assessed to be medium. The land impacted is equivalent to less than 1% of the total land within the agricultural land holding and no farm buildings will be affected. The potential magnitude of impact is therefore assessed to be

negligible and the potential significance of this permanent effect is assessed to be neutral (not significant).

12.9.28 Construction of Option 11 will require the permanent loss of approximately 3.6ha of land in Walsgrave Hill Farm's southern fields. The sensitivity of Walsgrave Hill Farm is assessed to be medium. The land impacted is equivalent to less than 2% of the total land within the agricultural land holding and no farm buildings will be affected. The potential magnitude of impact is therefore assessed to be minor and the potential significance of this permanent effect is assessed to be slight adverse (not significant).

Walkers, cyclists and horse riders (WCH)

12.9.29 There are not expected to be any temporary or permanent land use and accessibility impacts on any walking, cycling or horse riding resources in the study area due to the construction of any proposed scheme options.

Construction effects - health

Access to healthcare services and other social infrastructure

12.9.30 The University Hospital Coventry and Warwickshire, located on the A4600 Hinckley Road in the study area, is the primary local hospital for all communities within the study area. There are also a number of community facilities located on and adjacent to the A4600 and Clifford Bridge Road, including two primary schools, two secondary schools, a community centre, a church, and a pub. As well as serving residents of the local suburbs of Coventry, these community facilities also serve residents of small settlements to the west of the A46 including Brandon, Brinklow and Bretford (particularly the schools, as there are no schools located in these settlements).

12.9.31 Construction of the proposed scheme may impact accessibility to these resources via road closures or increased congestion on the local road network due to construction traffic and diversions.

12.9.32 In all options, connectivity between the B4082 and the A46 is affected. Residents of Brandon, Brinklow and Bretford to the west of the A46 (particularly Brandon and Bretford) are likely to use this connection to travel to and from the University Hospital and other community facilities in Walsgrave-on-Sowe. During construction of Option 6, there will be no access between the B4082 and the southbound carriageway of the A46 for approximately 1 month. Southbound access will be re-provided once the construction work is completed in Option 6. Option 7 and Option 8 will permanently remove southbound access between the B4082 and both A46 carriageways. No road closures are expected during the construction of Option 11. Residents of the small settlements will still be able to access all resources identified in the Baseline via other roads such as the B4027 Brinklow Road and the A428 Rugby Road. These alternative routes are not expected to lead to a considerable increase in journey times to and from these resources.

12.9.33 No transport modelling has been conducted for the construction phase yet. It is therefore not yet clear how the local transport network will be impacted by the addition of construction vehicles, and re-routing of other vehicles due to closures during the construction phase. Although at this stage it is not expected that there will be a considerable impact on the transport network which will lead to impacts on accessibility, pending a complete understanding of these impacts the impact on health at this stage is assessed to be uncertain in all four options. However, this assessment should be updated when this information is available in PCF Stage 3.

Access to open space and nature

12.9.34 Open spaces at Dorchester Way, east of Hapworth Road, Stoke Floods Nature Reserve, and Ivor Preece Field are either adjacent or lie in close proximity to the proposed scheme boundary. There would be no land required from these for the construction of the proposed scheme in any of the options and no disruption to access is expected.

12.9.35 Coombe Country Park comprises a number of attractions including a lake (Coombe Pool) which is circumnavigated by a footpath. Options 6, 7 and 11 will each require the permanent land take of approximately 0.05ha of Coombe Country Park. In addition, Option 8 has the potential to temporarily require approximately 0.3ha of land within Coombe Country Park for up to one year and four months, 0.2ha of which would be permanently required. However, this land take would not impact on any of the attractions within the Country Park as it comprises a relatively very small area of space within a peripheral area at the edge of the park that does not facilitate access to other areas and as such it would not deter potential users from visiting the park. Therefore, the potential construction impact on access to open space and nature is assessed to be neutral. It is recommended that at PCF Stage 3 the permanent land take be refined to avoid land take from the park boundary as much as possible.

Air quality, noise, and neighbourhood amenity

12.9.36 There are residential properties located close to the proposed scheme which have potential to be affected during the construction phase. There is potential for negative health effects due to changes in air quality and noise/ vibration, and landscape amenity impacts at these locations.

12.9.37 There are not likely to be any air quality impacts. During construction of all four options, any change in local NO_2 concentrations are expected to meet local air quality objectives and be within national limit values set within the Ambient Air Quality and Clearer Air for Europe Directive and transcribed into UK legislation by the Air Quality Standards Regulations 2010. For more details see Chapter 5: Air Quality.

12.9.38 As reported in Chapter 7: Landscape and Visual, there are not expected to be any significant effects on landscape amenity from any option.

12.9.39 All four options have the potential for significant noise and vibration effects at residential properties during construction as a result of the proposed scheme. Road construction activities and earthworks are most likely to be the source of these significant impacts. The noise assessment (Chapter 9) states that these effects are likely to be moderate or major. No vibration impacts of a moderate or major magnitude are predicted at any residential receptors for any of the options due to the distance of works likely to require impact piling or vibratory ground or pavement compaction activities from these receptors. Additional assessment of noise and vibration impacts will occur at PCF Stage 3.

12.9.40 Overall, the potential health impact during construction on air quality, noise and neighbourhood amenity is assessed to be negative for all options. This is based on no adverse air quality or landscape amenity impacts for all options but significant adverse impacts on noise for all options.

Accessibility and active travel

12.9.41 Construction of the proposed scheme will not result in any impacts on any WCH facilities. Therefore, the potential health impact during construction on accessibility and active travel is assessed to be neutral.

Driver safety

12.9.42 As stated in the Baseline Conditions section, there were six accidents that took place on the A46 of which four took place on Walsgrave junction. Improving safety is a key objective of the proposed scheme and driver, passenger and road worker safety has been considered during the proposed scheme's shortlisting process during PCF Phase 1. It is expected that in a 'do nothing' alternative additional delays along the A46 would exacerbate safety issues with the A46 junction.

12.9.43 There has been no formal modelling around the impact of the proposed scheme on traffic during the construction phases as part of PCF Stage 2. There will be an uncertain impact of driver safety on human health during construction.

Operational effects - land use and accessibility

12.9.44 There are not expected to be any land use and accessibility impacts on any existing community land and assets, development land and businesses, agricultural land holdings or WCH routes in the study area due to the operation of any proposed scheme options. The existing scheme fragments the eastern and western sides of the road. As, there are limited opportunities to cross the road via WCH routes, with the closest being 1.6km north of Walsgrave Junction, it will remain a barrier during operation and as such an additional WCH facility could be something that is considered at PCF Stage 3 as an opportunity for enhancement.

Operational effects - health

Access to healthcare services and other social infrastructure

12.9.45 During the operational phase, the proposed scheme has the potential to impact accessibility between local communities and the healthcare facilities and other social infrastructure they use by changing traffic flows and levels of congestion on the road network. A description of the resources of particular relevance to this assessment is provided in section 12.6.

12.9.46 All proposed scheme options will lead to a reduction in congestion on both directions of the A46 during peak times. This will benefit road users from the wider area using the A46 to travel to and from the M69/ M6 to the north. However, the proposed scheme options all lead to some re-routing and some instances of additional congestion on the local road network. The extent of this differs by option. Option 6 would result in a slight increase in journey time between the A46 southbound carriageway and Clifford Bridge Road/ Ansty Road due to the 'dumb-bell' layout of the option meaning that vehicles attempting this journey are required to travel a further distance. Option 7 and Option 8 would both lead to small increases in the number of vehicles travelling through Binley on Clifford Bridge Road and the A428 Brandon Road. This is because the amendments to the A46/ B4082 junction will mean that vehicles can no longer travel between the B4082 and the A46 southbound carriageway. Option 11 will lead to a noticeable reduction in journey times through Binley and Walsgrave during the PM peak however there is likely to be slightly increased congestion at other locations, including at Tollbar.

12.9.47 Residents of the small settlements to the west of the A46 are required to use these roads to travel to the University Hospital and the other community resources listed above. However, none of these options would lead to congestion which is likely to be enough to affect accessibility between these communities and the resources identified. There are no other residents in the study area likely to have their accessibility impacted. Therefore, for all options, the potential health impact during construction on access to healthcare services and other social infrastructure is assessed to be neutral.

Access to open space and nature

12.9.48 Open spaces at Dorchester Way, east of Hapworth Road, Stoke Floods Nature Reserve, and Ivor Preece Field are either adjacent or lie in close proximity to the proposed scheme boundary. There would be expected to be no impacts arising from the proposed scheme on these in respect of accessibility in any of the options.

12.9.49 The Coombe Country Park is the only open space with potential to be affected during the operational phase. It comprises a number of attractions including a lake (Coombe Pool) which is circumnavigated by a footpath. This resource will not be impacted as part of the operation of Option 6 and Option 7. However, Option 8 has potential to permanently require approximately 0.2ha of land within Coombe Country Park. However, this would not impact on any of the attractions within the Country Park and it would not deter potential users from visiting the park. Therefore, the potential impact on access to open space and nature during operation is assessed to be neutral.

Air quality, noise, and neighbourhood amenity

12.9.50 There are residential properties located close to the proposed scheme which have potential to be affected during the operational phase. There is potential for negative health effects due to changes in air quality, landscape amenity and noise/ vibration impacts at these locations.

12.9.51 As reported in Chapter 5: Air Quality, there are not likely to be any significant air quality impacts. During operation of all four options, any change in local NO_2 concentrations are expected to meet local air quality objectives and be within national limit values set within the Ambient Air Quality and Clearer Air for Europe Directive and transcribed into UK legislation by the Air Quality Standards Regulations 2010. For more details see Chapter 5: Air Quality.

12.9.52 As reported in Chapter 7: Landscape and Visual, there are not expected to be any significant effects on landscape amenity from any option.

12.9.53 However, all options have the potential for significant noise and vibration effects. Option 6 is predicted to result in 45 residential properties experiencing moderate or major increases in traffic noise. These are to the south of the existing junction and primarily located on Valencia Road, Royston Close and Gainford Rise. A further 21 residential properties in Gainford Rise and Rouston Close are predicted to experience increases of road traffic noise in the minor range. Option 7 is predicted to result in 18 residential properties (located on Gainford Rise and Rouston Close) experiencing moderate or major increases in noise. A further 8 properties are predicted to experience minor increases in traffic noise. Option 8 is predicted to result in 25 properties (on Gainford Rise, Royston Close and Valencia Road) experiencing moderate or major increases in noise. Option 11 is predicted to result in 41 properties experiencing a minor increase in traffic noise as a result of increased traffic noise on the free flow link between the A46 northbound and Clifford Bridge Road. However, as reported in Chapter 9: Noise and Vibration, significant adverse effects are not expected. In addition, Option 11 is predicted to result in 141 residential properties fronting Dorchester Way, Clifford Bridge Road, Bridport Close and Faygate Close to experience minor decreases in traffic noise and one property to experience significant noise effects (Hungerley Hall Farm).

12.9.54 The significant adverse effects caused by all options may be avoided or minimised through mitigation measures, however the feasibility and potential benefit of this would need to be considered at a later stage.

12.9.55 Therefore, the potential health impact during operation on air quality, noise and neighbourhood amenity is assessed to be negative for all options. This is based on there being no adverse air quality or landscape amenity impacts, but adverse noise impacts.

Accessibility and active travel

12.9.56 Operation of the proposed scheme will not result in any impacts on any WCH facilities. The proposed scheme will also not lead to any changes to the local WCH network. Therefore, the potential health impact during operation on accessibility and active travel is assessed to be neutral.

12.9.57 As an opportunity for enhancement, additional measures could be incorporated at PCF stage 3 in order to improve the existing barriers caused by the A46 due to a lack of WCH crossings.

Driver safety

12.9.58 As demonstrated in the baseline, there were six accidents that took place on the A46 of which four that took place on Walsgrave Junction. Improving safety is a key objective of the proposed scheme and driver, passenger and road worker safety has been considered during the proposed scheme's shortlisting process during PCF Stage 1. It is expected that in a 'do nothing' alternative additional delays along the A46 would exacerbate safety concerns at the Walsgrave Junction.

12.9.59 All four schemes have been designed to improve driver safety and reduce the number of accidents through the use of slip lines. This will help to alleviate congestion and allow traffic to flow at a less variable speed. It will also mean that road users will not need to turn across the A46 traffic on any of the route options. Therefore, the potential health impact during operation on driver safety is assessed to be positive.

13 Road Drainage and the Water Environment

13.1 Introduction

13.1.1 This section presents an assessment of the proposed scheme's potential impact on the water environment. The water environment includes water quality, hydromorphology, groundwater, flood risk and drainage. Baseline information has been reviewed in the context of the proposed scheme in order to identify potentially significant effects. Where significant effects are identified a method of assessment to determine the significance of those effects have been described.

13.1.2 This chapter should be read in conjunction with Figure 13.1: Water Resources to Figure 13.13: Flood Depth Difference 100 Year + 32% CC Option 11.

13.2 Legislative and policy framework

13.2.1 A summary of the legislation, policy, and guidance documents relevant to the assessment of effects of the proposed scheme options on road drainage and the water environment is presented in the sections below, whilst the main EU Directives relevant to the proposed scheme, with the related UK regulations, are within in Table 13.1.

Table 13.1: Legislative framework

European Directives	Description	Implemented in the UK by:
Water Framework Directive 2000/60/EC	The directive makes provision for the maintenance and improvement of the *ecological and chemical status* of the water environment, which includes rivers, lakes, wetlands, groundwater, estuaries and coastal waters. Chemical status is determined from compliance with environmental standards for chemicals that are classed as *priority hazardous substances*. The ecological status of a surface waterbody is measured through a range of biological quality elements, supported by measurements of physicochemistry, hydromorphology and compliance with environmental standards for chemicals that are classed as *specific pollutants*. For groundwater the overall status has a quantitative and a chemical component. The aim is for designated waterbodies to achieve *good overall status*. Certain surface waterbodies may be designated as artificial or heavily modified and will have less stringent targets to meet; however, these will still need to demonstrate *good overall potential*.	The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (superseding the 2003 Regulations)
Priority Substances Directive 2008/105/EC	This directive sets out the Environmental Quality Standards (EQS) for substances in surface waters (river, lake, transitional and coastal). It confirmed their designation as priority or priority hazardous substances, the latter being a subset of particular concern. Annex I of the directive tabulates limits on concentrations of priority substances in surface waters. This includes 33 priority substances and 8 other pollutants.	
Groundwater Directives	This directive introduces procedures for assessing the *Chemical Status* of groundwater as per the Water	The Groundwater

European Directives	Description	Implemented in the UK by:
2008/105/EC and 2006/118/EC	Framework Directive and protects groundwater by preventing direct discharge of *hazardous pollutants* and limiting the direct discharge of non-hazardous pollutants.	(England and Wales) Regulations 2009
Floods Directive 2007/60/EC	This directive makes provision for the assessment of flood risk, mapping its potential impact and planning measures to reduce potential and significant flood risk.	The Floods and Water Management Act 2010
The Environmental Liability 2004/35/EC	This directive aims to ensure those causing damage to the environment (including the water environment) are legally and financially responsible for that damage. It covers environmental damage caused by or resulting from occupational activities to: • Species and natural habitats protected under the 1992 Habitats Directive and the 1979 Wild Birds Directive • Designated Water Framework Directive water bodies other than effects justified under Article 4.7 of the Water Framework Directive • Land contamination that creates a significant risk of harming human health	The Environmental Damage (Prevention and Remediation) Regulations 2015
The Freshwater Fish Directive 2006/44/EC	This directive was subsumed by the Water Framework Directive in December 2013. However, it is considered that the previous classification of a watercourse as a Salmonid or Cyprinid fishery under the Directive still provides useful information on the characteristics and quality of a water feature and thus we have sought to review previous classifications and to take them into account when determining the importance of a water body.	Original implementing national legislation has since been superseded by the Water Framework Directive Regulations 2017

National legislation

13.2.2 Additionally, the objectives of the EU Directives listed in Table 13.1. are achieved through the following UK legislation:

- Water Act 2014
- Land Drainage Act 1991
- Water Resources Act 1991
- Salmon and Freshwater Fisheries Act 1975 (as amended)
- The Environmental Permitting (England and Wales) Regulations 2016
- The Eels (England and Wales) Regulation 2009
- The Control of Pollution (Oil Storage) (England) Regulations 2001

13.2.3 Under the Environmental Permitting (England and Wales) Regulations (2016) an Environmental Permit (flood risk activity) is required from the Environment Agency if a regulated activity is to be undertaken on or near a Main River, on or near a flood defence structure, or in a flood plain, and exemptions do not apply. This includes any activity within 8m of the bank of a main river, flood defence structure or culvert on a main river, or activities carried out on the floodplain of a main river, more than 8m from the riverbank, culvert or flood defence structure if you do not have planning permission.

13.2.4 An Environmental Permit may also be required for the discharge to surface waters or ground of any 'unclean' (i.e. poisonous, noxious or polluting matter, waste matter, or trade or sewage effluent) construction site runoff, again where exemptions do not apply. However, highways authorities do not require permission from the Environment Agency to discharge surface water runoff from highways to Controlled Waters (i.e. all watercourses, canals, lakes, groundwater etc.) under the Highways Act 1980 providing they do not cause water pollution.

13.2.5 If water is required for construction works, then depending on the source of water and volumes required, this may require an abstraction licence from the Environment Agency. This also applies where groundwater abstraction is required for dewatering of excavations, unless exemptions apply, such as for emergency situations or where the quantities are very small apply or do not meet the relevant criteria. A temporary abstraction licence is required to abstract more than 20 metres cubed (m^3) of water per day lasting less than 28 days, and a full abstraction licence is required to abstract more than $20m^3$ of water per day for a period of more than 28 days. Any licence issued could contain conditions requiring abstraction to cease at times of lower flows.

13.2.6 Land drainage consent will be required from Coventry City Council (CCC) as the Lead Local Flood Authority (LLFA) for certain works that may affect the flow in Ordinary Watercourses (i.e. all other watercourses that are not Main Rivers) under the Flood and Water Management Act 2010 and the Land Drainage Act 1991 (as amended). Land drainage consent is usually only required when the flow in an Ordinary Watercourse may be affected, although this and any bylaws that may apply will need to be confirmed with the Council at a later stage.

National policy guidance

National Planning Policy Framework (NPPF)

13.2.7 The NPPF has three overarching objectives to contribute to the achievement of sustainable development, one of which is the 'environmental objective'. This objective includes the requirement of "helping to improve biodiversity, using natural resources prudently, and minimising waste and pollution" (Paragraph 8c). In addition, the NPPF contains a number of statements which are relevant to water quality. These include:

- Strategic policies should set out an overall strategy for the pattern, scale and quality of development, and make sufficient provision for …(d) conservation and enhancement of the natural, built and historic environment. This includes landscapes and green infrastructure, and planning measures to address climate change mitigation and adaptation (paragraph 20d).
- Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and

infrastructure to climate change impacts. Development should not cause unacceptable levels of water pollution and should help improve water quality wherever possible (paragraph 149).

- Planning policies and decisions should contribute to and enhance the natural and local environment by preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as water quality, taking into account relevant information such as river basin management plans (paragraph 170e).

13.2.8 The requirements of the NPPF have been taken into account in the assessment, with particular regard given to potential impacts in relation to flood risk and water quality.

National Planning Policy Guidance (NPPG)

13.2.9 NPPG provides guidance for local planning authorities on assessing the significance of water environment effects of proposed developments. The guidance highlights that adequate water and wastewater infrastructure is needed to support sustainable development.

13.2.10 The NPPF and the Flood Risk and Coastal Change NPPG recommends that Local Plans should be supported by a Strategic Flood Risk Assessment and should develop policies to manage flood risk from all sources taking account of advice from the Environment Agency and other relevant flood risk management bodies, such as LLFAs and Internal Drainage Boards. Local Plans should apply a sequential, risk-based approach to the location of development to avoid, where possible, flood risk to public and property and manage any residual risk, taking account of the impacts of climate change.

National Policy Statement for National Networks (NPSNN)

13.2.11 The NPSNN statements 5.90 - 5.115 and 5.219 - 5.231 specifically apply to flood risk and water quality respectively, and how impacts on the water environment affect the decision making process.

13.2.12 The NPSNN paragraph 5.99 states that when determining an application, the Secretary of State should be satisfied that flood risk will not be increased elsewhere, and only consider development appropriate in areas at risk of flooding where it can be demonstrated that the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location; and development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning. Priority is given to the use of Sustainable Drainage Systems (SuDS).

13.2.13 With regard to water quality, NPSNN paragraph 5.226 states that the Secretary of State should be satisfied that a proposal has had regard to the River Basin Management Plans (RBMPs) and the requirements of the Water Framework Directive (including Article 4.7 which describes various tests that need to be met to justify new physical modification to a water body when that modification could lead to deterioration or prevent improvement) and its daughter directives, including those on priority substances and groundwater.

A Green Future: Our 25 Year Plan to Improve the Environment

13.2.14 In 2018 Defra published ‘A Green Future: Our 25 Year Plan to Improve the Environment setting out the UK Government’s goals for improving the environment

within a generation and leaving it in a better state than we found it. The plan covers the provision of clean air and water; protection and enhancement of habitats, wildlife and biosecurity; reducing the risk from environmental hazards and mitigating and adapting to climate change; using resources more sustainably and efficiently, minimizing waste and managing exposure to chemicals; and enhancing beauty, heritage and engagement with the natural environment. With regards to the water environment, the Plan includes specific goals to reduce the environmental impact of water abstraction, meet the objectives of River Basin Management Plans under the Water Framework Directive, reduce leakage from water mains, improve the quality of bathing waters, restore protected freshwater sites to a favourable condition, and do more to protect communities and businesses from the impact of flooding, coastal erosion and drought. At the heart of the Plan's delivery is the natural capital approach with the aspiring goal that there should always be a net gain in biodiversity from new development.

Future Water

13.2.15 The Government's Future Water strategy (Defra, 2011b) published in June 2011 sets out the Government's long-term vision for water and the framework for water management in England. It aims to permit the supply of secured water supplies whilst ensuring an improved and protected water environment. Future Water brings together the issues of water demand, water supply, water quality in the natural environment, surface water drainage, and river/ coastal flooding into a single coherent long-term strategy, in the context of the need to reduce greenhouse gas emissions. The strategy also considers the issue of charging for water. The water environment and water quality have great economic, biodiversity, amenity and recreational value, playing an important role in many aspects of modern day society, and thus the functions provided must be sustainably managed to ensure they remain available to future generations without compromising environmental quality.

Sustainable Drainage Systems Guidance

13.2.16 Planning policy encourages developers to include SuDS in their proposals where practicable. SuDS provide a way to attenuate runoff from a site to the rate agreed with the Environment Agency or LLFA to avoid increasing flood risk, but they are also important in reducing the quantities and concentration of diffuse urban pollutants found in the runoff.

13.2.17 Defra have published guidance on the use, design and construction of SuDS (Non-statutory technical standards for SuDS, Defra (2015)). Current best practice guidance on the planning for and design of SuDS treatment is provided in C753 The SuDS Manual (Part D Ch. 23)(CIRIA, 2015a), Design Manual for Roads and Bridges (DMRB) CD 532 Vegetated Drainage Systems for Highway Runoff Revision 0 (Highways England, 2020p), and DMRB CG501 Surface and Subsurface Drainage Systems for Highways Revision 2 (Part C Ch. 9) (Highways England, 2019d).

Local Policy

13.2.18 The boundary between administrative areas is located just west of the A46. To the east is Rugby Borough Council and Warwickshire County Council (WCC), to the west is Coventry City Council (CCC). The LLFA with interest in the scheme is CCC, as it is responsible for the areas downstream of the A46 Junction.

13.2.19 The proposed scheme to the west of the roundabout is within CCC administrative area. The Coventry Local Plan (2011-2031) includes policy EM1: Planning for Climate Change, whereby developments should seek opportunities to make space

for water and for the development of new blue infrastructure to accommodate climate change.

13.2.20 The local plan also includes policy EM4 Flood Risk Management, which recommends that a Flood Risk Assessment (FRA) accompanies major developments, and all opportunities to reduce flood risk in the surrounding area must be taken. This includes pursuing opportunities to undertake river restoration and enhancements, including de-culverting, removing unnecessary structures and reinstating a natural, sinuous watercourse. No development should be within 8m of a Main River, and 5m from an ordinary watercourse. Policy EM5 encourages the use of SuDS.

13.2.21 The Rugby Borough Council Local Plan (2011-2031) (Rugby Borough Council, 2019) Policy SDC5 relates to Flood Risk Management and sets out the requirements for new development within the Borough. This includes that the development should not increase flood risk elsewhere, that the development is appropriately flood resilient and resistant, and that opportunities to reduce the causes and impacts of flooding should be taken where possible. Policy SDC7 refers to the 'Protection of the Water Environment and Water Supply', which requires that development is in accordance with the WFD objectives. Policy SDC6: Sustainable Drainage encourages the use of SuDS techniques for drainage.

13.2.22 The Coventry Strategic Flood Risk Assessment (SFRA) (JBA, 2015), outlines the flood risks within the area. Findings from the CCC SFRA have been used to outline the baseline flood risk to the proposed scheme boundary.

13.2.23 Coventry Local Flood Risk Management Strategy (LFRMS) (Coventry City Council, 2015) was issued in 2014 and updated in 2015. It is a document setting out how CCC intends to manage local flood risk. The strategy has the aim ''*To produce a plan to reduce and manage local flood risk in a way that will benefit people, property and the environment*.' Findings from the CCC LFRMS have been used to outline the baseline flood risk to the proposed scheme boundary.

13.2.24 The Coventry Preliminary Flood Risk Assessment (PFRA) (Coventry City Council, 2011) provides a high level overview of flood risk from all sources within Coventry, using information on past and future floods. Sources of past flood events are identified to be mainly due to surface water and fluvial sources. The PFRA defines Flood Risk Areas within the County, which are areas that are deemed to be most susceptible to surface water flooding, none of which are in the vicinity of the A46 roundabout.

13.2.25 The Coventry Surface Water Management Plan (SWMP) (Coventry City Council, 2016) was originally issued in 2015 with a revised version published in 2016. The document sets out the long-term plan for reducing the risk of surface water flooding throughout the city. The SWMP provides guidance on how rainwater runoff should be discharged from a new development as below:

- "An appropriate soakaway or some other surface infiltration system, or where not reasonably practicable
- Reduced peak and total discharge to a watercourse, or where not reasonably practicable
- Reduced peak and total discharge to the public sewer network."

13.2.26 The Warwickshire Strategic Flood Risk Assessment (SFRA) (URS, 2013) outlines the flood risks within the area. Findings from the WCC SFRA have been used to outline the baseline flood risk to the proposed scheme boundary.

13.3 Assessment methodology

Establishing baseline conditions

13.3.1 To inform the assessment, data has been gathered from the following sources:

- Ordnance Survey (OS) and aerial maps (TomTom, 2021)
- Met Office website (Meteorological Office, 2021)
- British Geological Survey (BGS) Geoindex Website (BGS, 2021)
- Environment Agency Catchment Data Explorer website (EA, 2020)
- GOV.UK Flood map for planning website (EA, 2019a)
- Environment Agency Areas Susceptible to Groundwater Flooding website (BGS, 2019)
- Environment Agency Water Quality Archive website.
- Magic Map website (Defra, 2021c)
- Coventry City Council policy/ guidance documents
- Site-specific hydraulic model outputs
- Highways England Drainage Data Management System (HADDMS) (Highways England, 2021c)
- Severn River Basin District (RBMP) (EA, 2015)
- Environment Agency data request, reply received on 23 November 2020 (Ref 189116)
- Detailed hydraulic modelling undertaken by AECOM in April 2021

Construction and operation

13.3.2 The importance of receptors, and evaluation of the magnitude on an attribute has been established on the basis of the method described in DMRB LA 113 Road drainage and the water environment, Revision 1 (Highways England, 2020q).

13.3.3 The assessment of effect significance has been undertaken in accordance with DMRB LA 104.

Evaluation of receptor importance

13.3.4 The importance of potentially affected water environment features has been established using a four-point scale (low, medium, high, very high) developed on the basis of Table 3.70 within DMRB LA 113. This four point scale is presented in Table 13 2.

13.3.5 For the purpose of this assessment, receptor ‘importance’ has been identified rather than receptor ‘value’. This is because when considering the water environment, the availability of dilution means that there can be a difference in the sensitivity and importance of a water body. For example, a small drainage ditch of low conservation value and biodiversity with limited other socio-economic attributes, is very sensitive to impacts, whereas an important regional scale watercourse, that could have conservation interest of international and national significance and support a wider range of important socio-economic uses, is less sensitive by virtue of its ability to assimilate discharges and physical effects. Irrespective of importance, all controlled waters in England are protected by law from being polluted.

Table 13 2: Estimating the importance of water environment attributes

Importance[1]	Groundwater	Surface water	Morphology[2]	Flood risk[3]
Very High	Principal aquifer providing a regionally important resource and/ or supporting a site protected under the relevant UK legislation Ecology and Nature Conservation Groundwater locally supports GWDTE* Source Protection Zone (SPZ) 1	Watercourse having a WFD classification shown in a RBMP and Q95 ≥1.0 m^3/s. Site protected/ designated the relevant UK legislation Ecology and Nature Conservation.	Unmodified, near to or pristine conditions, with well-developed and diverse geomorphic forms and processes characteristic of river type	Essential infrastructure or highly vulnerable development.
High	Principal aquifer providing locally important resource or supporting river ecosystem. Groundwater supports a GWDTE SPZ 2	Watercourse having a WFD classification shown in a RBMP and Q95 m^3/s <1.0 m^3/s. Species protected under the relevant UK legislation Ecology and Nature Conservation.	Conforms closely to natural, unaltered state and would often exhibit well-developed and diverse geomorphic forms and processes characteristic of river type, with abundant bank side vegetation. Deviates from natural conditions due to direct and/or indirect channel, floodplain, and/or catchment development pressures	More vulnerable development
Medium	Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ 3	WFD not having a WFD classification shown in a RBMP and Q95 >0.001 m^3/s.	Shows signs of previous alteration and/ or minor flow regulation but still retains some natural features or may be recovering towards conditions indicative of the higher category	Less vulnerable development

Low	Unproductive Strata	Watercourses not having a WFD classification shown in a RBMP and Q95 ≤0.001 m^3/s.	Substantially modified by past land use, previous engineering works or flow regulation and likely to possess an artificial cross-section (for example trapezoidal) and would probably be deficient in bedforms and bankside vegetation. Could be realigned or channelised with hard bank protection, or culverted and enclosed. May be significantly impounded or abstracted for water resources use. Could be impacted by navigation, with associated high degree of flow regulation and bank protection, and probable strategic need for maintenance dredging. Artificial and minor drains and ditches would fall into this category.	Water compatible development

1 Professional judgement is applied when assigning an importance category to all water features. All controlled waters are protected from pollution under the Environmental Permitting (England and Wales) Regulations 2016 and the Water Resources Act 1991 (as amended), and future WFD targets also need to be considered.

2 Based on the water body 'Reach Conservation Status' presently being adopted for HS2 (and developed originally by Atkins) and developed from the EA conservation status guidance (EA, 1998a; EA, 1998b). DMRB LA 113 provides advice on hydromorphological assessment but does not provide criteria for determining hydromorphological receptor importance.

3 Vulnerable development, less vulnerable development and water compatible development are defined in the NPPF.

* GWDTE: Groundwater Dependent Terrestrial Ecosystems.

^A negligible level of environmental importance is included in Table 13.4 as this is as shown in DMRB LA 104. However, in accordance with DMRB LA 113 there is no category for a 'negligible' importance water body. The lowest importance grade for a water body is low.

Magnitude of Impact

13.3.6 The magnitude of impact on the water environment has been established using the criteria outlined in Table 3.71 of DMRB LA 113 as detailed in Table 13 3. These impacts take into consideration the extent that the proposed scheme would directly or indirectly affect the identified water receptors. The identification of impacts takes account of all embedded and essential mitigation measures described in Section 13.8 of this chapter and Chapter 2: The Project.

Table 13 3: Estimating the magnitude of an impact on an attribute

Magnitude of Impact	Criteria	Description
Major Adverse	Results in a loss of attribute and/ or quality and integrity of the attribute	Surface water: • Failure of both acute-soluble and chronic sediment related pollutants in Highways England Water Risk Assessment Tool and spillage risk assessment (HEWRAT) and compliance failure with Environment Quality Standard (EQS) values. • Calculated risk of pollution from a spillage >2% annually (spillage assessment). • Loss or extensive change to a fishery. • Loss of regionally important public water supply. • Loss or extensive change to a designated nature conservation site. • Reduction in water body WFD classification.
		Groundwater: • Loss of, or extensive change to, an aquifer. • Loss of regionally important water supply. • Potential high risk of pollution to groundwater from routine runoff – risk score >250 (Groundwater quality and runoff assessment). • Calculated risk of pollution from spillages >2% annually (Spillage assessment). • Loss of, or extensive change to GWDTE or baseflow contribution to protected surface water bodies. • Reduction in water body WFD classification.

Magnitude of Impact	Criteria	Description
		• Loss or significant damage to major structures through subsidence or similar effects.
		Flood Risk: • Increase in peak flood level >100 mm.
Moderate Adverse	Results in effect on integrity of attribute, or loss of part of attribute	Surface Water: • Failure of both acute-soluble and chronic sediment-bound pollutants in HEWRAT but compliance with EQS values. • Calculated risk of pollution from spillages >1% annually and <2% annually. • Partial loss in productivity of a fishery. • Degradation of regionally important public water supply or loss of major commercial/ industrial/ agricultural supplies. • Contribution to reduction in water body WFD classification.
		Groundwater: • Partial loss or change to an aquifer. • Degradation or regionally important public water supply or loss of significant commercial/ industrial/ agricultural supplies. • Potential medium risk of pollution to groundwater from routine runoff – risk score 150-250. • Calculated risk of pollution from spillages >1% annually and <2% annually. • Partial loss of the integrity of GWDTE. • Contribution to reduction in water body WFD classification. • Damage to major structures through subsidence or similar effects or loss of minor structures.
		Flood Risk: • Increase in peak flood level > 50mm.
Minor Adverse	Results in some measurable change in attribute's quality or vulnerability.	Surface Water: • Failure of either acute soluble or chronic sediment related pollutants in HEWRAT.

Magnitude of Impact	Criteria	Description
		• Calculated risk of pollution from spillages >0.5% annually and <1% annually. • Minor effects on water supplies.
		Groundwater: • Potential low risk of pollution to groundwater from routine runoff – risk score <150. • Calculated risk of pollution from spillages >0.5% annually and <1% annually. • Minor effects on an aquifer, GWDTEs, abstractions and structures.
		Flood Risk: • Increase in peak flood level >10mm.
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity.	Surface Water: • No risk identified by HEWRAT (pass both acute-soluble and chronic-sediment related pollutants). • Risk of pollution from spillages <0.5%.
		Groundwater: • No measurable impact upon an aquifer and/or groundwater receptors and risk of pollution from spillages <0.5%.
		Flood Risk: • Negligible change in peak flood level <+/- 10mm.
Minor Beneficial	Results in some beneficial effect on attribute or a reduced risk of negative impact occurring.	Surface Water: • HEWRAT assessment of either acute soluble or chronic-sediment related pollutants becomes pass from an existing site where the baseline was a Fail condition. • Calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is <1% annually).
		Groundwater: • Calculated reduction in existing spillage risk by 50% or more to an aquifer (when existing spillage risk <1% annually). • Reduction or groundwater hazards to existing structures.

Magnitude of Impact	Criteria	Description
		• Reductions in waterlogging and groundwater flooding.
		Flood Risk: • Creation of flood storage and decrease in peak flood level (>10mm).
Moderate Beneficial	Results in moderate improvement of attribute quality	Surface Water: • HEWRAT assessment of both acute-soluble and chronic-sediment related pollutants becomes pass from an existing site where the baseline was a fail condition. • Calculated reduction in existing spillage by 50% or more (when existing spillage risk >1% annually). • Contribution to improvement in water body WFD classification.
		Groundwater: • Calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is >1% annually). • Contribution in improvement in water body WFD classification. • Improvement in water body catchment abstraction management strategy (CAMS) (or equivalent) classification. • Support to significant improvements in damaged GWDTE.
		Flood Risk: • Creation of flood storage and decrease in peak flood level (>50mm).
Major Beneficial	Results in major improvement of attribute quality	Surface Water: • Removal of existing polluting discharge or removing the likelihood of polluting discharges occurring to a watercourse. • Improvement in water body WFD classification.
		Groundwater: • Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring. • Increased recharge to an aquifer. • Improvement in water body WFD classification.
		Flood Risk:

Magnitude of Impact	Criteria	Description
		• Creation of flood storage and decrease in peak flood level (>100mm).
No Change		No loss or alteration of characteristics, features, or elements; no observable impact in either direction.

Significance of effect

13.3.7 The identification of the likely significant effects on water resources has relied upon the professional judgement of competent experts. It has also been informed by knowledge and experience gained from assessments of similar highway schemes.

13.3.8 The assignment of effects has involved combining the value of an asset with the predicted magnitude of impact, guided by the significance matrix set out in DMRB LA 104 (reproduced in Table 13.4).

13.3.9 The matrix has been used to guide the identification and assessment of effects on water resources; however, where professional judgement has resulted in a deviation from the thresholds contained in the matrix, or where two categories are noted in the table, for example 'slight or moderate', professional judgement has been used to report a single significance category. These are explained within the relevant sections of the chapter and are supported by appropriate evidence and explanation. A significant effect is considered to be moderate, large or very large.

Table 13.4: Significance of effect matrix

		Magnitude of Impact (change)				
		No change	Negligible	Minor	Moderate	Major
Environmental importance (i.e. value/ sensitivity)	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Large 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
*A negligible level of environmental importance is included as this is as shown in DMRB LA 104. However, in accordance with DMRB LA 113 there is no category for a 'negligible' importance water body. The lowest importance grade for a water body is low (see Table 13 2).						

Flood risk assessment

13.3.10 A preliminary flood risk assessment has been prepared to support the option selection stage (refer to Appendix F). In accordance with NPSNN and NPPF requirements, a full FRA will be undertaken at PCF Stage 3 and will accompany the Environmental Assessment Report/ Environmental Statement. The assessment related to flood risk of the options is included within this chapter. An initial assessment of the impact of the proposed options on fluvial flooding has been undertaken using the updated baseline hydraulic model and the current proposed scheme options. The proposed scheme hydraulic models were initially run with a 70% climate change allowance. Following publication of the latest EA guidance (July 2021), the models were re-run with a 32% climate change allowance, which represents the new higher central allowance for the year 2080.

Water Framework Directive assessment

13.3.11 At this stage no Water Framework Directive Assessment (WFDa) has been undertaken. A preliminary WFDa will need to be completed during PCF Stage 3.

13.4 Assessment assumptions and limitations

13.4.1 The following assumptions and limitations have been made at this stage:

- The assessment has been undertaken using available data at the time of writing in May 2021.
- No water quality or flow monitoring has been undertaken. The best available Environment Agency data has been obtained from the gov.uk website (Environment Agency Water Quality Archive website).
- No ground investigations have taken place to determine groundwater levels, flow direction or quality.
- The assessment assumes that all road runoff is to be discharged to surface watercourses as indicated by the drainage strategy, with no discharges to ground.
- No construction method statements are available at the time of writing, so assumptions have been made that all works would take place using best practice.
- Drainage attenuation would be provided within the system to ensure no increase in runoff rates due to increased impermeable areas.
- Drainage design for the new catchment areas and attenuation ponds would include sufficient water quality mitigation measures for the outfalls to pass the HEWRAT assessment at the next assessment stage.
- No ponds or nature conservation sites identified within the study area are hydraulically connected to the proposed scheme site and are therefore at risk of water pollution.
- The assessment of flood risk has been undertaken with the latest available mapping/ data provided by the Environment Agency and CCC. This has been complemented by detailed hydraulic modelling undertaken by AECOM to enhance the understanding of the impact of the different options being assessed.
- The hydraulic modelling undertaken to update the baseline fluvial flood risk at the site includes a range of assumptions/ limitations, further detailed in the Hydraulic Model Technical Note prepared to accompany the Flood Risk Assessment. The baseline model has been reviewed by the Environment Agency resulting in minor amendments to the model which had no tangible impact on results.

- No site-specific ground investigations have been undertaken at this stage so the assessment of groundwater flood risk is based upon existing British Geological Survey (BGS), Council, and Environment Agency mapping.
- The need to discharge to ground and the attenuation of changes in surface water runoff will be determined as the drainage design develops. It is anticipated that a site visit will be undertaken to assess the connectivity between water bodies in the study area at later stages in the design process.
- It is noted that the walkover took place in February 2021 following rainfall the previous day and water levels were relatively high. This did limit some observations in that the river bed was not always visible.

13.5 Study area

13.5.1 For the purposes of the water resource (flow and quality) assessment, a study area of approximately 1km around the boundary of the proposed scheme options (Options 6, 7, 8, and 11) has been considered, in order to identify surface and groundwater bodies that could reasonably be affected by the direct impacts associated with the proposed scheme (i.e. there is a pathway between the proposed scheme and the waterbody). The study area and baseline information are shown on Figure 13.1: Water Resources.

13.5.2 Consideration has also been given to any attributes of surface water or groundwater or water dependent ecological sites outside this study area, as pollutants can propagate downstream. Professional judgement has been applied to identify the extent to which such features are included. For surface water bodies defined within the WFD, consideration of the whole waterbody extent is included. This approach is consistent with DMRB LA 113.

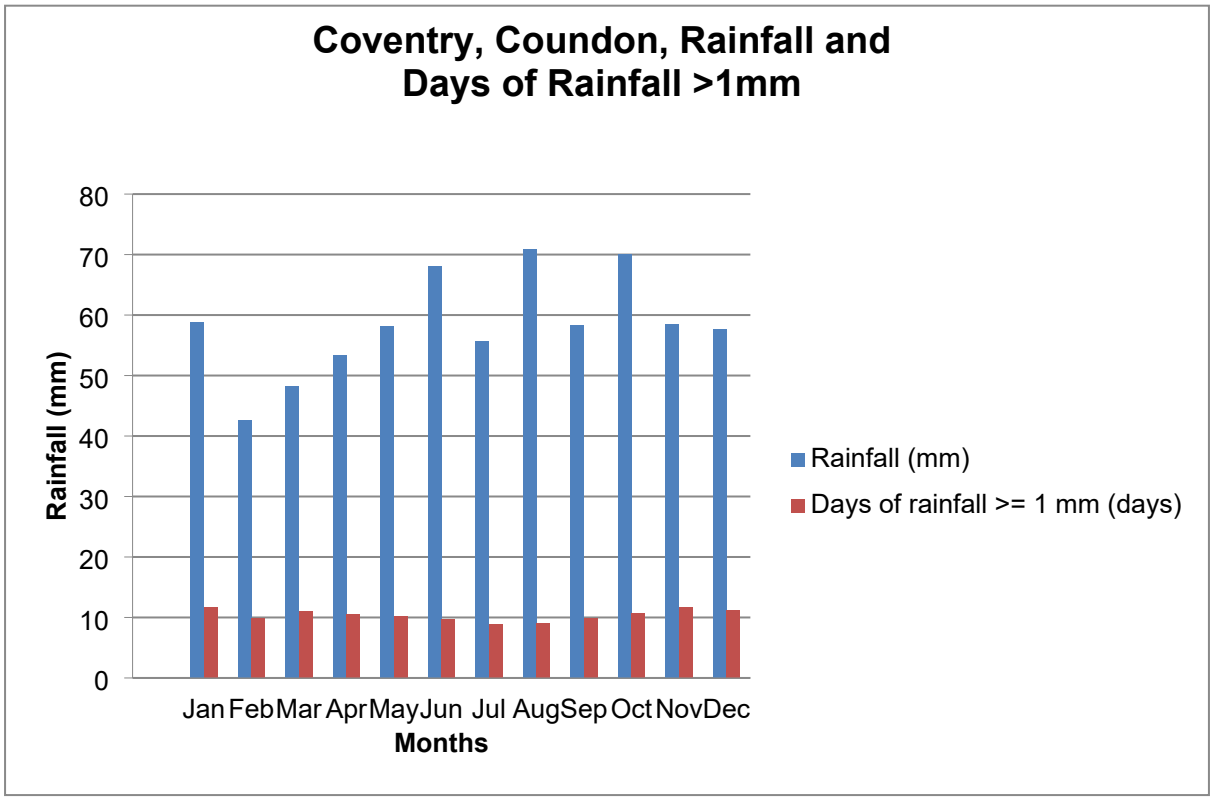
13.6 Baseline conditions

Topography, land use and climate

13.6.1 The site is characterised by gentle undulating topography with elevations shown on Ordnance Survey mapping of around 85m to 70m above ordnance datum (AOD). There are shallow valleys around the watercourses in the area.

13.6.2 Based on the Meteorological Office website (2020), the nearest weather station is located at Coundon, Coventry, approximately 5 miles (8km) to the west of the proposed scheme. Using the data from this weather station (refer to Plate 13.1), it is estimated that the study area experiences an average of 700mm per year, with it raining more than 1mm on 124 days per year, which are both lower than a UK average.

Plate 13.1: Coventry (West Midlands Conurbation) UK climate averages – Met Office



13.6.3 The land to the east of the A46 corridor and the proposed scheme has a predominantly rural character, including of a mix of agricultural land, Coombe Abbey Country Park and patches of woodland whereas the land to the west is a mix of man-made urban areas of Coventry, including recreational grounds and residences, and arable land (also allocated for development).

Surface water features

13.6.4 The study area for the four options contains three river catchments classified under the WFD: Withy Brook, Smite Brook and the River Sowe. The proposed scheme options are contained within the Smite Brook and River Sowe catchments. The Withy Brook catchment is upstream of the works and will not be affected and is thus not considered any further. These watercourses are shown on Figure 13.1: Water Resources.

13.6.5 The catchment of the River Sowe in this area is designated under the WFD ('*Sowe – conf Withy Bk to conf R Avon*' GB109054044540) and drains land to the east and south of Coventry. It is designated as a Main River where flood risk management is the responsibility of the Environment Agency. According to the Environment Agency's Catchment Data Explorer website (2021) it is currently at Moderate Ecological Status (with a target status of moderate by 2015). Reasons for not achieving good status are stated as livestock agriculture and farming, poor pesticide usage, water industry sewage discharges and urban transport. This has led to failures for mercury and its compounds, benzo (g-h-i) perylene, PDBE and PFOS. Poor phosphate status, moderate classification for macrophytes and phytobenthos combined. Approximately 1.6km downstream on the western bank of the river is the Stoke Floods Local Nature Reserve. The reserve's main feature is a large pool created as a result of mining subsidence, which contains an array of wetland plants and birdlife.

13.6.6 Upstream of the above catchment, incorporating a drainage of the southern area of Coventry, the River '*Sowe -conf Breach Bk to conf Withy Bk*', is designated under the WFD (GB109054044660). This is classified as Poor Ecological Status 2019, with a target as moderate status by 2027. Reasons for not achieving good status are stated as urban catchment, sewage industry discharges, groundwater abstractions and agriculture. This has led to a fail for chemical classification, with failures for mercury and its compounds, PDBE and PFOS. Macrophytes and phytobenthos combined is classified as Poor.

13.6.7 Smite Brook rises to the west of Lutterworth and flows westwards beneath the M6 and into Coombe Pool. From Coombe Pool, Smite Brook is culverted beneath the existing A46 and then continues to flow westwards and into the River Sowe.

13.6.8 Smite Brook is an Ordinary Watercourse where CCC is the LLFA under the Floods and Water Management Act 2010 and the Land Drainage Act 1991 (as amended).

13.6.9 Smite Brook is also designated under the WFD ('*Smite Bk – source to conf R Sowe*' GB109054044630) as a non-heavily modified watercourse that is 8.2 miles (13.2km) in length and with a catchment area of 45.9km^2. Based on the 2019 classification data on the Environment Agency Catchment Data Explorer website it is currently at Poor Ecological Status, (with a target status as 'moderate by 2015'). This was moderate in 2016 and has now been downgraded. Reasons for not achieving good status and reasons for deterioration are stated as phosphate (classified as Moderate), and macrophytes/ phytobenthos combined (classified as Poor), as a result of discharges from agriculture (i.e. livestock grazing) and sewage discharges. Additionally, the following priority hazardous substances are classified as failures: PBDE and PFOS. These are chemicals associated with fire retardants and fire-fighting foams. Mercury and compounds also fails within the water quality chemical status.

13.6.10 Coombe Pool forms part of Coombe Pool SSSI and Coombe Country Park and allows for active coarse fishing for cyprinid species such as pike, zander, carp, tench and bream. It is fed by Smite Brook and also designated under the WFD as a heavily modified lake (water body GB30937926 of the Severn RBMP). It has a surface area of 0.306km^2 and is shallow with a mean depth of just 1.05m. According to the Environment Agency's Catchment Data Explorer website it is currently at Moderate Ecological Potential and failing to meet Good Chemical Status (2019 classification). The reasons for not being at Good Ecological Potential are total nitrogen (Poor) and Total Phosphate (Bad). It is failing to meet Good Chemical Status due to PBDE, PFOS and mercury and its compounds. Pressures on this water body are listed as including continuous sewage discharges (water industry), poor livestock management in the catchment), and urbanisation and transportation.

13.6.11 Birchley Wood Brook is a tributary of Smite Brook and an Ordinary Watercourse. Whilst the watercourse is not designated under the WFD, it would be incorporated in the Smite Brook designation as a tributary. This watercourse appears to form from the coalescence of numerous drainage ditches around Birchley Wood, and then flows in a westerly direction and around the southern perimeter of Coombe Pool before its confluence with Smite Brook immediately east of the A46 and the existing Walsgrave Junction.

13.6.12 The surface water features and their attributes are shown in Figure 13.1: Water Resources. Surface waterbodies were visited during a site visit to the study area in February 2021 following rainfall the previous day.

Surface water quality

13.6.13 The Environment Agency provided water quality information in response to an information request (Ref 189116, received 23 November 2020) for both River Sowe at Hungerley Hall Farm 400m north-west of Walsgrave roundabout and Smite Brook at Coombe Abbey 2.5km upstream of Walsgrave roundabout. This is summarised below in Table 13.5. However, these two sites do not include parameters needed for the HEWRAT assessment to be carried out at PCF3 Environmental Assessment.

13.6.14 Data on these parameters has been obtained from Environment Agency monitoring carried out approximately 13km downstream on the River Sowe at Stoneleigh. On the River Sowe at Stoneleigh 252 samples have been taken between 2000 and 2020. The data from 2015 - 2021 is summarised in the table below. Dissolved copper has not been monitored for since 2013, so the dissolved copper is data from 2012 - 2013.

Table 13.5: Water quality data from the Environment Agency

	Units	Minimum	Maximum	Average
River Sowe at Hungerly Hall Farm				
pH	n/a	7.72	8.78	8.10
Ammonia as N	mg/l	0.031	0.362	0.115
Dissolved Oxygen	mg/l	3.9	15	10.4
Smite Brook at Coombe Abbey				
pH	n/a	7.8	8.5	8.01
Ammonia as N	mg/l	0.037	0.221	0.09
Dissolved Oxygen	mg/l	5.81	14.9	10.0
River Sowe at Stoneleigh				
pH	n/a	7.13	8	7.53
Ca	mg/l	33.1	90.1	76.02
DOC	mg/l	5.33	8.95	6.63
Dissolved Oxygen	mg/l	5.69	10.9	8.76
Dissolved copper	µg/l	1.84	3.89	2.85

Surface water flow

13.6.15 Approximately 10km downstream, the River Sowe at Stoneleigh has a monitored river flow Q95 of 1.189m^3/s. (National River Flow Archive website; Station 54004). The catchment has a Standard Annual Average Rainfall (SAAR) from 1961 - 1990 of 667mm per year. However, this gauge will also be including flow from two significant tributary sub-catchments, the River Sherbourne and Finham Brook. Using the Flood Estimation Handbook webservice website (2020) the catchment area north of the confluence with the Smite Brook is approximately 82km^2. However, at the Stoneleigh gauging station the catchment area is 262km^2. A simple analysis of this would suggest that the flow upstream of the Smite Brook

would be expected to be around 30% of that recorded at the gauging station. This would mean that the Q95 flow at upstream of Smite Brook would most likely be lower than 1m^3/s.

13.6.16 No flow data for Smite Brook is currently known or available. LowFlows software will be used at PCF Stage 3 to determine the Q95 of the watercourse, taking into account the likely effects on flow from the Coombe Pool. The current A46 south of Walsgrave roundabout crosses Smite Brook 50m south of the circulatory of the roundabout.

Surface water ponds

13.6.17 There are some ponds located within the study area. These include Coombe Pool, which is 4.4 hectares in area with a mean depth of 1.05m and falls wholly within the Coombe Pool SSSI. The pool lies at 73m AOD. The pool is also designated under the WFD (GB30937926). It is a heavily modified waterbody that is at Moderate Ecological Potential and Failure for Chemical Status under the 2019 classification. The concentrations of PDBE and PFOS and mercury and its compounds are failing for chemical water quality.

13.6.18 Other ponds within the study area include:

- Field pond hydraulically unconnected to watercourses located approximately 100m north of the eastern dumbbell roundabout of proposed Option 6, and 300m north of the eastern dumbbell roundabout of proposed Option 11
- Two field ponds located approximately 450m and 480m north-east from the eastern dumbbell roundabout of proposed Option 6, and 630 and 660m north-east from proposed Option 11 roundabout, hydraulically unconnected to watercourses
- Field pond 670m south-east of the southern extent of proposed Option 8, and Option 11, hydraulically unconnected to watercourses
- Pond located on eastern bank of the River Sowe, 850m west of the southern extent of proposed Option 8 and Option 11
- Stoke Floods Nature Reserve, a Local Nature Reserve located approximately 950m west of the southern extent of proposed Option 8 and Option 11

13.6.19 There are a number of field drains in the study area associated with agricultural land to the east and west of the northern A46.

Abstractions

13.6.20 The Environment Agency has provided details on the location of licensed surface and groundwater abstractions in the study area. There are two within 1km of the proposed scheme boundary. These are located approximately 930m to the north-west and north-east for an industrial-commercial process from groundwater (abstraction 1) and one for agricultural spraying from surface water (abstraction 2) respectively. These are shown on Figure 13.1: Water Resources.

13.6.21 The entire study area is within a surface water Nitrate Vulnerable Zone 590 (River Avon to confluence with River Severn). The proposed scheme is not within a surface water drinking water safeguard zone, or drinking water protected area (surface water). See Figure 13.1: Water Resources.

13.6.22 Coventry City Council have confirmed there are no private water supplies within the study area.

Pollution incidents

13.6.23 Data from the National Incident Response Service reporting contains all reported pollution incidents within the study area. Category 1 incidents are major, and category 2 incidents are significant. Category 3 (minor) and Category 4 (insignificant) are scoped out.

13.6.24 In the last five years there have been 4 pollution incidents with a Category 1 or 2 classification within the Coventry District area. None of these are within the study area.

Existing road drainage

13.6.25 The existing road drainage for the A46 is shown on the Highways England Drainage Data Management System (HADDMS) (Highways England, 2021c). The priority outfall locations within the proposed scheme area are tabulated in Table 13.6.

13.6.26 HADDMS indicates that these are based on mainly baseline assessment, with desk study which has been carried out for some outfalls – the very high priority outfalls.

13.6.27 No quantitative assessment has been carried out. Outfalls classed as 'very high' are where the spillage risk or long term EQS are estimated or assessed to be failing. A 'moderate' risk outfall is where it has been estimated or assessed that either the short-term soluble metals assessment of the sediment-bound pollutant risk assessment is likely to be failing to meet standards.

Table 13.6: Priority outfall location

Discharge Asset Reference	Watercourse	Location	Risk status
SP3878_8273d	Birchley Wood Brook south of Coombe Pool	Outfalls into watercourse south of B4428 road crossing	A: Very High: desk study complete, field study required
SP3878_8375h		Outfalls into watercourse north of B4428 road crossing	A: Very High, field study required
SP3878_8375d			A: Very High, field study required
SP3878_8375g			A: Very High, field study required
SP3878_8847b	Birchley Wood Brook south of Coombe Pool	Outfalls into watercourse south of B4428 road crossing	C: Moderate. Baseline Assessment Carried out
SP3878_7860a		Outfalls into watercourse upstream of, and south of, B4428 road crossing	C: Moderate. Baseline Assessment Carried out
SP3878_8063a		Outfalls into watercourse upstream of, and south of, B4428 road crossing	C: Moderate. Baseline Assessment Carried out
SP3878_7964a		Outfalls into watercourse upstream of, and south of, B4428 road crossing	C: Moderate. Baseline Assessment Carried out

Discharge Asset Reference	Watercourse	Location	Risk status
SP3878_8066a		Outfalls into watercourse upstream of, and south of, B4428 road crossing	C: Moderate. Baseline Assessment Carried out
SP3879_3320d	Smite Brook	Outfalls from A46 to west side of Smite Brook	Undetermined: No assessment carried out
SP3879_0439a		Outfalls north side of B4082 into smite Brook	C: Moderate. Baseline Assessment Carried out
SP3879_0338c		Outfalls south side of B4082 into Smite Brook	C: Moderate. Baseline Assessment Carried out
SP3879_0537a		Outfalls south side of B4082 into Smite Brook	C: Moderate. Baseline Assessment Carried out
SP3879_9044a	River Sowe	Outfalls into the River Sowe from west of B4082	C: Moderate. Baseline Assessment Carried out
SP3879_7690a	River Sowe	Outfalls into the River Sowe north of the current roundabout	C: Moderate. Baseline Assessment Carried out
SP3880_7316a			C: Moderate. Baseline Assessment Carried out
SP3880_4708a			C: Moderate. Baseline Assessment Carried out
SP3980_0666b			C: Moderate. Baseline Assessment Carried out

13.6.28 A drainage strategy report has been produced (Ref HE604820-ACM-HDG-WAL_SW_000_Z-RP-CD-0001) which includes information on the current road drainage design. The existing drainage system within the Highways England boundary for the study area were obtained from reviewing HADDMS.

13.6.29 Based on the available drainage information along the A46 mainline south of the Farm overbridge, the existing highway drainage is predominantly piped, with the surface water runoff from the carriageway collected via gullies located around the roundabout and on the approaching roads. This discharges to Smite Brook via a culvert and outfall south of the roundabout.

13.6.30 North of the Farm overbridge, the existing highway drainage along the A46 mainline is predominantly piped, with the surface water runoff from the carriageway collected via catchpits located on both sides of the A46 mainline. This discharges to the River Sowe via a secondary pipe network and outfall north-west of the Farm overbridge.

13.6.31 Based on the available drainage information along the B4082, the existing drainage is predominantly piped, with the surface water runoff from the carriageway collected via gullies either side of the carriageway. This discharges to Smite Brook outlets located before and after it passes under the B4082 via the three culverts just east of Clifford Bridge roundabout.

13.6.32 The maintenance responsibility of the A46 mainline lies with Highways England. CCC are responsible for the B4082 up to where it joins the existing A46 Walsgrave roundabout.

Water dependent ecological sites and protected sites

13.6.33 There are several water dependent ecological sites and protected sites of interest, which are either within the study area or are hydrologically connected to the study area. The following are statutory designated sites:

- Coombe Pool SSSI was last surveyed by Natural England in 2016 and is designated for its ornithological interest and is supported by open water, marginal aquatic and woodland habitat. It is located adjacent to the east of the A46.
- Stoke Floods LNR is located approximately 900m south-west of the existing Walsgrave Junction. It is located on the western edge of the River Sowe. The reserve has a large lake, reedbeds and scrub next to the River Sowe. The lake is the result of mining subsidence and supports many wetland plants.

13.6.34 There are also a number of non-statutory designated sites for nature conservation within the study area. These are listed below.

13.6.35 Sowe Valley Dorchester Way LWS: Designated as part of the Sowe Valley Dorchester Way LWS. The river includes a considerable area of flood plain, supports a good variety of bird species, a strong colony of water vole (*Arvicola amphibius*) and aquatic and emergent bankside vegetation.

13.6.36 River Sowe Ecosite: River with aquatic, emergent and bankside vegetation.

13.6.37 Coombe Abbey Pool (part of the Coombe Pool SSSI) Ecosite: This ecosite includes areas designated as SSSI. Designated for its ornithological interest, particularly a large heronry. Water vole and otter (*Lutra lutra*) are known to be using the site. The site is good for invertebrates (butterflies and moths).

13.6.38 Smite Brook, headwater and tributaries. Tributary of the River Sowe ecosite: Includes a small area of Smite Brook. A linear site which runs through Coombe Pool SSSI. A tributary of the River Sowe with historical records of White Clawed Crayfish (*Austropotamobius pallipes*), otter and water vole (Reference Chapter 8 Biodiversity).

Hydromorphology

13.6.39 A brief walkover of the watercourses potentially impacted by the proposed scheme has been carried out to support the establishment of the hydromorphological baseline. This has been supported by a targeted desk-based study. In accordance with DMRB LA 113, assessments have been undertaken to identify the potential for any likely significant effects from the proposals. Where conclusive assessments cannot be made at this stage, the need for further assessments will be recommended during the WFD scoping assessment at PCF Stage 3. Watercourses considered within this assessment are the River Sowe (Sowe – confluence Withy Brook to confluence River Avon WFD Waterbody), Smite Brook (Smite Brook – source to confluence River Sowe WFD Waterbody) and Birchley

Wood Brook (considered within the Smite Brook – source to confluence River Sowe WFD Waterbody).

13.6.40 It is noted that the walkover took place in February 2021 following rainfall the previous day, and water levels were relatively high. This did limit some observations in that the river bed was not always visible.

13.6.41 Birchley Wood Brook upstream (east) of Coombe Pool lies within a wide, gently sloping floodplain where the predominant land use was observed to be pastoral farming. The planform of Birchley Wood Brook is straight and considered to be unnatural; it is likely that the watercourse was straightened and modified historically to support land drainage for agriculture, though these modifications pre-date the earliest OS mapping. The flow conditions and channel profile were typically very uniform; local diversity was created at the location of an isolated woody feature within the channel. The watercourse was typically silty and the channel bed not visible. The riparian zone was limited to semi-continuous trees, that were uniform in nature and likely planted at the time the watercourse was straightened.

13.6.42 Further downstream where Birchley Wood Brook runs through woodland adjacent to Coombe Pool, the watercourse presented increased flow diversity; flow types ranged from pooled flow to gravelly run features. Gravel sediment deposits were also observed downstream of woody features. Birchley Wood Brook confluences with Smite Brook immediately upstream (east) of the A46.

13.6.43 Smite Brook downstream of the A46 has also been historically modified. Early OS maps indicate that the watercourse was previously more sinuous, and was realigned and straightened, which was likely to facilitate the construction of the B4082. It also appears that the watercourse was straightened in the vicinity of the A46; the channel is also over-wide at this location given the establishment of in-channel vegetation acting to narrow the channel. The lateral connectivity of the watercourse to the floodplain is relatively good; a flow route over the right bank floodplain was observed during the site visit, which is possibly indicative of a previous channel course of the river. Some woody features were observed within the channel producing a locally diverse range of flow conditions. The river bed was not visible during the site survey but it is likely that the watercourse would naturally have a gravel bed and a more sinuous planform within the corridor of alluvium at this location. The riparian vegetation was limited to a grassy field across the right bank but a woodland corridor over the left bank provides a supply of wood to the channel.

13.6.44 The River Sowe in the vicinity of the study area flows through a wide unconfined valley. Historic mapping indicates that the watercourse was previously more sinuous and has been subject to a range of modifications such as mills or channelisation and straightening for farming. This is supported by geological mapping of the area which shows the corridor of alluvium which the watercourse would have meandered within, bordered in places by river terrace deposits indicative of the extent of the river's influence historically.

13.6.45 At the time of the walkover, water levels were high and the watercourse was very turbid, so the river bed and bedforms were not visible. The channel was very over-deep and disconnected from the floodplain, which is a result of previous human modification. Localised bank erosion was observed in places, which is likely to be a factor of increased local gradient due to straightening, and the over-deep nature of the channel meaning that relatively high flows, in hydromorphological terms, are contained within the watercourse. The riparian zone of the watercourse was limited to semi-continuous trees, some of which may have been planted to assist in

confining the river to its modified alignment, bushes and shrubs and in places the watercourse was bordered directly by agricultural fields.

Groundwater features

13.6.46 From geological information available within the HADDMS site, the bedrock consists of Mercia Mudstone Group (MMG) – Mudstone. The superficial geology consists of a mix of Alluvium (clay, silt, sand and gravel), superficial and Undifferentiated Glaciofluvial Deposits, River Terrace Deposits (Sand and Gravel) and areas of Thrussington Member – Diamicton which are capped by the Bosworth Clay member. There are also areas underlain by Baginton Sand and Gravel Formation to the, east, south and north-east of the roundabout.

13.6.47 The River Terrace and Alluvial Deposits are associated with the River Sowe and Smite Brook and are shown on Figure 13.1: Water Resources.

13.6.48 Groundwater is a protected resource and its vulnerability to pollution is classified depending on the geology of the area (which determines the aquifer status) and the leaching potential of overlying soils (which determines how easily pollution from above ground sources may filter through to the aquifer).

13.6.49 The area to the south, west and north-east of the existing roundabout, which is underlain by River Terrace Deposits, with remaining areas showing no superficial deposits. The path of the River Sowe/ Smite Brook are also underlain by alluvial deposits with pockets of River Terrace Deposits. An area of Baginton Sand and Gravel Formation extending southwards is located, at its closest, 80m north of the existing roundabout.

13.6.50 Pockets of Baginton Sand and Gravel Formation is also present in the northern and to the east of the roundabout across the Coombe Country Park.

13.6.51 Across the wider area, pockets of Bosworth Clay and the Thrussington Member are mapped.

13.6.52 The permeable superficial deposits, where present, have a Secondary A aquifer classification. These are described as permeable layers that can support local water supplies and may form an importance source of base flow to rivers.

13.6.53 The Thrussington Member is classified as Secondary Undifferentiated aquifer. These are strata where it is not possible to attribute either category A or B.

13.6.54 The bedrock beneath the study area, Mercia Mudstone Group is classified as Secondary B aquifer. Secondary B aquifers are mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like cracks, openings and eroded layers.

13.6.55 Groundwater is classified under the WFD. The study area lies within the Avon Warwickshire – Secondary Mudrocks WFD groundwater body (ID GB40902G990900). This groundwater body has a Good overall status under the 2019 Cycle 2 WFD, with a Good quantitative status and a Good chemical status. The overall objective is Good by 2015 which it has met.

13.6.56 There are areas within the proposed scheme boundary which are classified as being susceptible to groundwater flooding, with potential for groundwater flooding to occur at the surface. These areas are spatially associated with the superficial deposits.

13.6.57 There are no groundwater Source Protection Zones in the study area. The area is not within a Drinking Water Safeguard Zone (groundwater). There are no borehole groundwater level or pumping test data for the study area within the information provided by the Environment Agency.

13.6.58 From the British Geological Survey (BGS) Geoindex site, there are records of ground investigation boreholes in the area. A review of selected boreholes from the BGS records indicates that borehole reference SP37NE437 (NGR 438515 479444) for the Coventry Eastern Bypass was drilled to the east of Hungerley Hall Farm in September 1981 on the southern edge of the finger of Baginton Sand and Gravel Formation. This borehole proved 3m of a medium dense pale brown silty sand and gravel overlying Keuper Marl (MMG) to the base of the borehole at 7m below ground level (bgl). The borehole struck water within the Mudstone formation at 6.5m below ground level (70.35m AOD), which rose to 4.6m bgl (73.25m AOD) following completion of drilling.

13.6.59 A borehole drilled 100m to the south (borehole reference SP37NE590, NGR 438448, 279390) formed in September 1983) proved 1.1m of brown sand and gravel, overlying Keuper Marl (MMG) to the base. This borehole did not encounter groundwater to the base at 7m bgl.

13.6.60 To the south of the roundabout, BGS borehole reference SP37NE584, (NGR 438374,279207) in the vicinity of the Smite Brook proved approximately 1.0m layer of the sand and gravel underlain by 0.9m of clay which overlies the Keuper Marl Formation (MMG). A slow seepage of groundwater was struck within the sand and gravel at 1.7m (approximately 69.1m AOD).

13.6.61 BGS Borehole reference SP37NE587 (NGR 438184,279333) also recorded up to 1.9m of clay underlain by the Keuper Marl Formation (MMG) to 3m bgl. No groundwater was encountered in the borehole.

13.6.62 Made ground is also present in the southern extent of the proposed scheme boundary (BGS borehole reference SP37NE434 (NGR 438416 278946) and SP37NE429 (NGR 438603 278793))

13.6.63 Based on the publicly available BGS records reviewed information, shallow/ perched groundwater is likely to be present within the permeable superficial deposits within the proposed scheme boundary. This is supported by the lower permeability clays and the Mudstone bedrock. Perched groundwater is also likely to be present within any made ground present in the southern part of the proposed scheme boundary.

13.6.64 There are three historic landfill sites in the study area. These are listed below:

- Coombe Estate, licenced to take inert waste, 260m south-west of the existing roundabout in the current area of residential housing
- Coombe Fields, was licenced to take industrial and commercial waste, located 240m south-east of the existing roundabout. This site straddles the A46 road, and up to 9m of made ground is noted from boreholes in this area (see paragraph 13.6.62)
- Site No 4 Walsgrave Hill Borrow pit, licenced to take inert and special waste. Located 1.3km north of the existing roundabout, east of the A46

Discharge consents

13.6.65 From the information received from the Environment Agency, there are two discharge consents in the area, these are both located at a farm 935m to the south-east of the proposed scheme. The purpose of the discharges is not noted, and the receiving waters is noted as ‘not defined’. The location of the discharges are approximately 500m from the nearest surface watercourse, so the discharges may be to groundwater.

Baseline flood risk

Tidal

13.6.66 The site is located a considerable distance from the sea (approximately 90km) and at an elevation between 70m and 85m AOD. The risk of tidal flooding is therefore considered negligible and is scoped out of the assessment.

Fluvial

13.6.67 The Environment Agency's Flood Map for Planning (Figure 13.2: Fluvial Flood Zones) shows the existing alignment of the A46 within the study area to be in Flood Zone 1, defined as areas that have a less than 0.1% Annual Exceedance Probability (AEP) of fluvial flooding. There are embankments either side of the A46 separating the road from the flood zones associated with the surrounding watercourses.

13.6.68 The areas around Coombe Pool to the east of the A46 are within Flood Zone 2 (between 1% and 0.1% AEP) and Flood Zone 3 (greater than 1% AEP) associated with the Smite Brook (a tributary of the River Sowe) and an un-named watercourse discharging into the Smite Brook just upstream of the A46 roundabout.

13.6.69 The Smite Brook flows from Coombe Pool via a sluice under the A46. The Brook then passes under the B4082 before its confluence with the River Stowe. Where Smite Brook passes under the B4082, the Flood Zone 3 extents encroach within the road.

13.6.70 The EA mapping is based upon a 2011 model, which has been reviewed and found to not accurately represent fluvial flood risk in the area. As part of the scope of this project, site-specific hydraulic modelling has been undertaken to provide a more accurate representation of the baseline fluvial flood risk around the A46 Walsgrave Junction. The changes to the model included updating the hydrology, extending the model, updating watercourse structures, and better representing the confluences between watercourses and Coombe Pool. The 1% AEP and 0.1% AEP flood extents in the updated baseline model differ from the legacy 2011 EA model, see Figure 13.4: 1000 Year Comparison and Figure 13.5: 100 Year Comparison. The updated baseline model has been reviewed by the EA, resulting in a number of minor amendments to the model which had no tangible impact on model results.

13.6.71 The updated baseline (do-nothing/do-minimum) model results in a significant impact (increase) on peak flood levels and localised increases in flood extent. The most notable increases in flood extent occur upstream of the A46 on Smite Brook where the culvert and embankment provide significant flow restrictions. The increase in flood risk in the baseline scenario is due to the more detailed modelling approach that was taken to better represent the existing flood risk in the area. The updated baseline model does not take into account any of the proposed options, which are further discussed later in this report.

13.6.72 The updated baseline model still shows the A46 to be located within Flood Zone 1, i.e. it remains outside of the updated 0.1% AEP flood extents.

13.6.73 These results are conservative with respect to the legacy 2011 model and are considered to provide a better representation of flood mechanisms in the vicinity of Walsgrave Junction. Nonetheless, the baseline risk of fluvial flooding to the existing A46 Walsgrave Junction is still considered to be low as per the updated baseline model.

Pluvial (overland surface water)

13.6.74 Pluvial flooding occurs when natural and/or engineered systems lack the capacity to manage the volume of rainfall. Pluvial flooding can occur in urban areas during an extreme, high intensity, low duration summer rainfall event which overwhelms the local surface water drainage systems, or in rural areas during medium intensity, long duration events where saturated ground conditions prevent infiltration into the subsoil. This flood water would then be conveyed via overland flow routes based on the local topography.

13.6.75 The EA's Flood Risk from Surface Water mapping (Figure 13.3: Surface Water Flood Risk) shows the existing alignment of the A46 to the north of the junction to be at a high risk of surface water flooding (greater than 3.3% AEP), with a flow path from north to south along the road, onto the existing roundabout and onto the B4082.

13.6.76 In the design 'medium risk' scenario (between 1% and 3.3% AEP), the flood flow route stops on the existing B4082 approximately 230m to the west of the existing A46 roundabout. The flood flow route is predicted to overtop to the north and south of the existing B4082 only in the extreme 'low risk' scenario (between 0.1% and 1% AEP). The flood depths in the design 'medium risk' scenario are shown to be below 300mm on the existing B4082, with some areas predicted to flood to up to 900mm depth on the existing A46 to the north of the junction.

13.6.77 There are areas of surface water ponding on the existing A46 to the south of the junction in the 'medium risk' scenario with flood depths limited to 300mm. In the extreme 'low risk' scenario there is a flood flow route along the existing A46 from south to north towards the roundabout.

13.6.78 The overland surface water flood flow routes are shown to originate on the highway itself. The EA's Flood Risk from Surface Water mapping is based on coarse modelling which is unlikely to include the existing highway drainage infrastructure nor local nuances in topography. The mapping therefore provides a conservative estimate. The EA mapping shows that the flood flow routes would remain within the carriageway, which suggests that flood depths are unlikely to reach significant depths and would instead be conveyed along the carriageway as dictated by topography.

13.6.79 The baseline risk of overland surface water flooding on the road is therefore considered to be medium.

Pluvial (sewer)

13.6.80 Sewer flooding is typically caused by heavy rainfall or blockages in the existing sewer network.

13.6.81 The existing highway drainage of the A46 and B4082 is predominantly piped with surface water runoff collected via gullies and discharged into the Smite Brook and River Sowe via a number of culverts and outfalls. The drainage strategy report (Ref HE604820-ACM-HDG-WAL_SW_000_Z-RP-CD_0001) provides further detail on the existing drainage infrastructure.

13.6.82 The WCC SFRA shows no instances of sewer flooding in the area, however, the CCC SFRA shows two instances of sewer flooding within the CV3 2 postcode area.

13.6.83 The maintenance responsibility of the A46 and B4082 lies with Highways England and CCC, respectively. The drainage infrastructure is assumed to be maintained regularly to minimise the potential for blockages. In the event that heavy rainfall or a blockage leads to an exceedance in the capacity of the drainage infrastructure, the resulting sewer flooding would follow the same flood mechanism as the

overland surface water flows, which would be directed along the A46 toward the roundabout and remain predominantly within the carriageways.

13.6.84 The baseline risk of sewer flooding is therefore considered to be low.

Groundwater

13.6.85 As outlined in the 'Groundwater Features' section of this chapter, the site is underlain by Secondary A, B and Undifferentiated aquifers. The CCC SFRA and the WCC SFRA show the study area to have between 25% and 75% susceptibility to groundwater flooding. There are areas where groundwater flooding occurs at surface, which are spatially associated with permeable superficial deposits.

13.6.86 As outlined in the 'Groundwater Features' section of this chapter, there are a number of historic BGS boreholes in the vicinity of the proposed scheme. Groundwater was encountered between 6.5m and 1.7m bgl. Shallow/ perched groundwater is likely to be present within the permeable superficial deposits and Made Ground where present beneath the proposed scheme area. The exact groundwater levels beneath the proposed scheme would be confirmed with a site-specific intrusive ground investigation.

13.6.87 The BGS borehole records suggest that the groundwater beneath the proposed scheme is likely present within smaller pockets of perched groundwater above the impermeable underlying mudstones, rather than forming part of wider/ strategic aquifers. In addition, there are no existing underground structures. The baseline risk of groundwater flooding is therefore considered to be low.

Artificial Sources

13.6.88 The EA Flood Risk from Reservoirs online mapping shows that in the unlikely event of the Coombe Pool reservoir failing, the area to the west of the A46 roundabout including the B4082 could be affected. The CCC SFRA shows a large flood extent covering both areas of the proposed scheme and Coventry if there were to be a breach at Coombe Pool.

13.6.89 The EA Reservoir map indicates the largest area that may be affected by flooding if a reservoir were to fail. The EA note that this is a worst-case prediction, and although the consequences of a sudden embankment failure would be severe, the probability of this occurring is extremely low. All large reservoirs must be inspected and supervised by reservoir panel engineers. Coombe Pool falls within the responsibility of CCC and part of their remit is to ensure that this asset is maintained to a high standard thus reducing the associated flood risk.

13.6.90 There are no other significant artificial bodies of water within proximity of the proposed scheme, and the baseline risk of flooding from artificial sources is therefore considered to be low.

Importance of receptors

13.6.91 Based on the information within the baseline section, and the criteria tabulated in Table 13 2, the receptor importance at this stage of the assessment is shown below in Table 13.7.

Table 13.7: Estimating the importance of water environment attributes

Receptor Name	Receptor Type	Importance (provisional)	Justification
Smite Brook	Water quality	High	Smite Brook is a relatively minor watercourse whose lower course has been significantly interrupted by the Coombe Pool lake. Smite Brook is designated under the WFD and it is assumed has a Q95 of <1m^3/s, although this will be controlled by the nature of the overflow from Coombe Pool and the hydrology of the lake. At this stage, it is not known what potential there is for relevant protected species to be present and thus importance could be higher.
	Morphology	Medium	The Smite Brook is not officially designated as a heavily modified water body under the WFD. However, the reach affected by the proposed scheme that lies between the Coombe Pool and the River Sowe appears to have been significantly modified in the past, likely associated with road building activities. The watercourse does still present some valuable morphological characteristics such as woody features and relatively good floodplain connectivity, as well as self-recovery. Therefore it is considered to be of medium importance.
	Flood risk	High	The updated baseline model Flood Zone 3 extends either side of the brook, which comprises predominantly fields. However, it encroaches within residential properties either side of Clifford Bridge Road. The updated baseline model Flood Zone 2 further encroaches within residential properties either side of Clifford Bridge Road, as well as properties on Faygate Close and Royston Close. Construction workers will be considered a very high importance receptor for construction phase impacts.
River Sowe	Water quality	High	The watercourse is of regional importance and is designated under the WFD with a Q95 estimated to be less than 1 m^3/s (based on a catchment apportionment approach compared to the gauging station record 10 km downstream). Stoke Floods LNR is located approximately 900 m downstream. At this stage, it is not known what potential there is for relevant protected species to be present and thus the importance could be higher.

Receptor Name	Receptor Type	Importance (provisional)	Justification
	Morphology	Medium	The River Sowe is not designated as a heavily modified water body under the WFD. However, a review of online aerial, historic and Ordnance Survey maps suggests the channel has historically been straightened and channelised through the study area. The channel retains some natural processes and has the potential for recovery therefore it has been assigned an importance of medium.
	Flood risk	High	Much of the Flood Zone 2 and 3 is undeveloped fields, however, a commercial property to the north of the river is affected by the updated baseline Flood Zone 2 extents and residential properties located approximately 800m to the south-west of the River Sowe crossing beneath Clifford Bridge Road encroach within Flood Zone 2 and 3. Construction workers will be considered a very high importance receptor for construction phase impacts.
Birchley Wood Brook	Water quality	Medium	A small second order minor watercourse that does not have a specific WFD designation but drains into the WFD designated Smite Brook. Although it flows close to the Coombe Pool SSSI, a walkover survey suggested that this watercourse does not have any hydrological connection to the lake. Assumed to have low flow >0.001 m^3/s. Unknown if the Birchley Wood Brook has any potential for relevant protected species to be present, and this will need to be investigated at a later stage.
	Morphology	Medium	The Birchley Wood Brook has been subject to a range of historic pressures such as straightening, realignment, potentially over-deepening, culverting for access etc. However in locations, the watercourse exhibits a range of morphological features and flow types indicative of a high importance watercourse, therefore it has been designated Medium importance.
	Flood risk	Low	The updated baseline Flood Zone 2 and 3 do not extend significantly beyond the alignment of the brook as it meanders adjacent to Coombe Pool. The flood extents widen eastward to the north of Brinklow Road, which comprises fields and a wooded area.

Receptor Name	Receptor Type	Importance (provisional)	Justification
Coombe Pool	Water quality	Very high	Coombe Pool is designated as a SSSI and as a lake WFD water body. It also has specific interest for recreation and aesthetic value.
Warwickshire Avon – Secondary Mudrocks WFD groundwater body	Groundwater	Medium	Secondary A superficial aquifer overlying Secondary B bedrock aquifer

Future Baseline

13.6.92 The assigned importance categories above are expected to stay the same for future baseline as for the time of writing, with the improvement in water quality and morphology being promoted under the WFD.

13.6.93 The importance of flood risk is also expected to stay the same in the future. Within the assessment within this EAR the effects of future climate change will be taken into account within the hydraulic modelling, and also within the sizing of attenuation ponds.

13.6.94 Consented planning applications within the area have been considered within Chapter 15 to assess the potential for cumulative impacts with the proposed scheme on local receptors. An area of land to the west of the A46, north from the Walsgrave Junction, has been allocated for development in the Local Plan for approximately 900 dwellings, however as this is not a committed development at this stage it has not been assessed within this EAR.

13.7 Potential impacts

Construction

13.7.1 The potential impacts from construction effects of the options for the proposed scheme on water receptors could include:

- Impacts on water quality due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals, or through mobilisation of contamination following disturbance of contaminated ground or groundwater, or through uncontrolled site run-off.
- Potential increase in volume and rate of surface water runoff from new impervious areas leading to an impact on flood risk.
- Temporary impacts on water levels and sediment dynamics within watercourses may result in impacts to hydromorphology of the watercourses.
- Temporary impacts on the groundwater level within the permeable deposits of the superficial deposits due to excavation of cuttings, attenuation ponds, and foundations below the groundwater table.
- Impacts on any water abstractions (if any confirmed present).
- Temporary works within a watercourse channel and/or within a floodplain could displace floodwater, increasing flood risk elsewhere.
- Temporary works could result in reduced conveyance at watercourse crossings, which could lead to water backing up and flooding the site or off-site areas.

- Construction works, including foundations and ground re-profiling could result in changes in overland surface water conveyance paths particularly during and immediately following periods of heavy rainfall. This could increase the risk of flooding to the site or off-site areas.
- Shallow excavations to facilitate construction/ foundations could lead to ponding of surface water and/or emergence of groundwater.

13.7.2 Construction activities such as earthworks, excavations, site preparation and levelling and grading operations result in the disturbance of soils. Exposed soil is more vulnerable to erosion during rainfall events due to loosening and removal of vegetation to bind it, compaction and increased runoff rates. Surface runoff from such areas can contain excessive quantities of fine sediment, which may eventually be transported to watercourses where it can result in adverse impacts on water quality, flora and fauna.

Operation

13.7.3 During operation and maintenance, the following potential effects may occur as a result of the proposed scheme:

- Impacts on the surface water or groundwater quality from changes in highway run-off (including the use of de-icants) or as a result of accidental spillages.
- Impact on surface water quality from the introduction of new outfalls. Surface water runoff from roads can contain pollutants such as hydrocarbons, heavy metals, inert particulates, litter and organic matter which can cause chronic pollution of the water environment if allowed to enter watercourses without the appropriate treatment or dilution.
- Changes in the routine of traffic and the characteristics of traffic flows may result in subtle changes to the concentration of contaminants in runoff and spillage risk.
- Changes in the topography that may have a subsequent impact on surface water drainage patterns and river flows.
- The construction of new structures, such as outfalls, may cause impact to the hydromorphological character of the watercourse.
- Potential increase in volume and rate of surface water runoff from new impervious areas (all options) leading to an impact on flood risk and scour risk in receiving watercourses upstream and downstream of the proposed scheme.
- Potential for siltation and blockages within the drainage systems causing failure or improper function, which could impact hydrology through flooding.
- Hydromorphological impacts including changes to physical form (for example scour or culverting), hydraulic processes and sediment dynamics (for example constriction of flows, flood plain disconnection) underpinning habitats in watercourses and their floodplains.
- During the operational phase, the permanent excavation of cuttings or ponds below the groundwater table may result in permanent dewatering of some areas and altered groundwater flow paths. This can result in reduced groundwater resources locally.
- The proposed scheme could lead to the displacement of flood water where it encroaches within the fluvial floodplain of the Smite Brook and River Sowe, which could increase flood risk to the road itself or to offsite areas.
- The proposed scheme could lead to the displacement of pluvial flood flow routes, which could increase flood risk to the road itself or to offsite areas.
- The proposed scheme foundations for structures which are located within the groundwater table may affect groundwater flow resulting in

groundwater mounding and emergence (groundwater flooding). Additionally, increased impermeable areas would reduce rainfall infiltration into the ground and subsequent groundwater recharge.

13.7.4 At this stage, it is not known whether the current road runoff is compliant with standards and records on HADDMS do not show any treatment or spillage containment assets on the existing road. The proposed scheme may therefore provide an opportunity to introduce treatment where there currently is none

13.8 Design, mitigation and enhancement measures

Construction phase

13.8.1 This section describes how potential environmental impacts have been, or will be avoided, prevented, reduced, or offset through design or management during the construction phase processes and operational designs. These measures are embedded within the design and are thus taken into account by the impact assessment in the initial prediction of effects.

13.8.2 The risk of pollution to watercourse and surface water and groundwater environment is greatest during the construction stages of the project. Pollution may arise directly from spillages of oil or other polluting substances, indirectly from runoff from hard standing and other sealed surfaces or from construction machinery that may contain high levels of suspended solids. However, during construction potential impacts to the water environment would tend to be temporary and short term.

13.8.3 In order to avoid, minimise, and reduce adverse effects where possible, both direct and indirect, on the local surface water and groundwater receiving environment, an EMP containing measures to minimise and manage impacts in relation to the water environment would be developed by the appointed contractor. The EMP would be reviewed, revised, and updated once the project progresses towards construction to ensure all potential impacts and effects as recommended by this and future assessments are summarised and minimised as far as practicable in keeping with best practice at that point in time. The principles of mitigation and the measures set out below are the minimum standards that the contractor would implement.

13.8.4 The following documents provide useful guidance on best practice measures to minimise the risks of pollution as far as practicable. The UK Government Guidance for Pollution Preventions (GPP), which are still under development, cover a variety of scenarios. The ones released so far are:

- GPP1: Understanding your environmental responsibilities – good environmental practice (October 2020)
- GPP 2: Above ground oil storage (2018)
- GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer
- GPP 5: Works and maintenance in or near water for construction or maintenance works near, in, or over water (2018)
- GPP 8: Safe storage and disposal of used oils (2018)
- GPP 13: Vehicle washing and cleaning
- GPP 19: Vehicles: Service and Repair
- GPP 20: Dewatering underground ducts and chambers
- GPP 21: Pollution Incident Response Plans (2018)
- GPP22: Dealing with spills
- GPP26: Safe storage – drums and intermediate bulk containers

13.8.5 As of the 17 December 2015, all Pollution Prevention Guidance (PnPG) Documents published by the UK environment agencies were withdrawn. Although they provide useful advice on the management of construction to avoid, minimise and reduce environmental impacts, they should not be relied upon to provide accurate details of the current legal and regulatory requirements and processes. They are referred to in this document alongside other current guidance and in the context of the proposed scheme and site-specific mitigation measures. Construction phase operations would be carried out in accordance with guidance contained within the Environment Agency PnPG, including:

- Use and Design of Oil Separators in Surface Water Drainage Systems: PnPG3
- Working at Construction and Demolition Sites: PnPG6
- Control of Spillages and Fire Fighting Runoff: PnPG18

13.8.6 Further mitigation measures would be those in accordance with current good practice for highway drainage design as set out in DMRB, and references therein and the following key Construction Industry Research and Information Association (CIRIA) documents:

- C741 (2015, 4th Edition) Environmental good practice on site guide
- C609 (2004a) Sustainable Drainage Systems, hydraulic, structural and water quality advice
- C624 (2004b) Development and flood risk – Guidance for the construction industry
- C522 (2001b) Sustainable Urban Drainage Systems – Design manual for England and Wales
- C523 (2001c) Sustainable Urban Drainage Systems – Best practice manual for England, Scotland, Wales and Northern Ireland
- C532 (2001d) Control of water pollution from construction sites – Guidance for consultants and contractors

13.8.7 CIRIA document C741, 4th Edition Environmental good practice on site contains examples of best practice measures which can be used in specific situations. For example there is a case study on use of non-potable water and reducing sediments within silty site runoff water. SuDS will be utilised wherever possible for drainage solutions.

13.8.8 The following broad mitigation measures would be adopted within the EMP and implemented on site:

- Site clearance and areas of bare earth will be kept to a minimum, and re-seeded or covered by a geotextile as soon as practically possible.
- There will be no pumping or discharges (such as displaced ground or surface water) to controlled waters without a Water Activity Permit obtained from the Environment Agency (unless the water is confirmed with the Environment Agency as clean or an exception applies). The Principal Contractor shall comply with any conditions imposed by any permits.
- Highways England or their Principal Contractor will obtain a bespoke Water Activity Permit from the Environment Agency before commencing any relevant works for any temporary works within 8m of the top of the bank of a Main River. The top of bank can be variable in interpretation, so within 10m of the edge of the channel of the watercourse is good rule of thumb.
- The Principal Contractor shall comply with any conditions imposed by any permits. Similarly, temporary and permanent consents from the LLFA for works affecting Ordinary Watercourses shall be obtained by the design

team or the Principal Contractor as appropriate and in advance of any such works.

- There will be no pumping into surface water drains or combined sewer without the permission of the statutory undertaker (Severn Trent Water).
- During the construction process any surface water land drains or existing road gullies present on the site would be identified and covered up to ensure construction site runoff or any accidental spillages cannot enter the drainage system without appropriate treatment.
- Where water needs to be removed from excavations, it will be suitably treated (for example, settlement to remove suspended solids) and transported the minimum practical distance before discharge to a suitable water body or sewer under the appropriate consents or otherwise pumped to a tanker for off-site disposal at an appropriate licenced waste facility.
- In order to prevent water pollution resulting from spillages of foul waste water generated by on site welfare facilities, these will be managed either by connection to the local mains or stored in a suitable system and regularly emptied for off-site disposal by a specialist contractor.
- Spill kits will be available on the site, regularly checked and topped up, and appropriate training given to employees in their use.
- Storage of fuel and chemicals will be in accordance with The Control of Pollution (Oil Storage) (England) Regulations 2001 and PnPG26 and particular care will be taken with the delivery and use of concrete and cement as it is highly corrosive and alkaline. No washing out of delivery vehicles is to take place on site without suitable provision for the washing out water and provision of a suitable location that is lined with a geotextile to prevent infiltration to ground. Such washing will not be allowed to flow into any drain and a wheel wash will be implemented.

13.8.9 The potential flood risk impacts during the construction phase will be avoided or mitigated as follows:

- The scheme design will incorporate an appropriate amount of flood mitigation (further discussed in the ‘assessment of likely significant effects’ section), to minimise fluvial floodwater displaced off site both during construction and operation.
- Floodplain working will be kept to a minimum, with temporary land-take required for construction to be located out of the floodplain as far as reasonably practicable or allowances made for floodplain control measures. Where construction works do encroach into the floodplain, floodplain compensation will be considered to ensure there is no net loss of floodplain storage, water flows are unobstructed, and that flood risk does not increase elsewhere. Where works include lowering ground levels which could increase flood risk to the road itself posing a risk to construction workers, bunds will be considered to prevent water from overtopping into the road.
- Works to culverts, including headwall works, would be planned in such a way as to minimise interruptions of flows, with further detail provided in the construction methodology at a later stage. This would apply to three options 6, 7, and 8. No works are required to culvert or headwall for Option 11. These works would be: Option 6 (extension to north and south of the B4082 Smite Brook culvert), Option 7 (extension to the west side of the A46 Smite Brook culvert), and Option 8 (extension to both sides of the A46 Smite Brook culvert).
- Following confirmation of groundwater levels beneath the site with an intrusive ground investigation, the requirement for groundwater control measures during construction will be confirmed. If required, dewatering

and disposal using standard techniques such as sumps and pumps may be used to manage the potential for groundwater seepages into excavations/ earthworks.

- Temporary drainage measures would be put in place during construction to control surface water runoff from the site, to reduce the risk of uncontrolled discharge into the adjacent watercourses. Where appropriate, cut-off drainage would be provided around the site whilst the permanent drainage infrastructure is being constructed. This would ensure that surface water flow routes originating from the highway are managed within the site and not displaced off site.

13.8.10 SuDS are methods of controlling surface water in a more sustainable way than the traditional method of pipes to direct the water from the site as quickly as possible. Using SuDS is a way to minimise the risk and impact of flooding, however, their design and use depends on the development type. Ponds and swales are preferred sustainable solutions as this mimics natural drainage and can provide a number of other benefits. However, where SuDS are not possible or there is a high risk of runoff water having an adverse effect on a receiving waterbody as shown in a HEWRAT assessment, proprietary treatment systems may be considered to provide some additional treatment of highway runoff.

13.8.11 Replacement of culverts will be designed in such a way as to minimise the potential adverse hydromorphological, water quality, and biological impacts of the structure where practicable. For example, these will aim to minimise changes in river alignment and length, interruptions of flows, sediment transport or riverbank or bed continuum, allow for a naturalised bed to minimise scour effects, maximise light penetration, and maintain access for mammals (for example, otter). For this project there are currently no plans to replace culverts, but Option 6 requires extension to north and south of the B4082 Smite Brook culvert, Option 7 requires headwall extension to the west side of the A46 Smite Brook culvert (the culvert is not being altered), and Option 8 requires extension to both sides of the A46 Smite Brook culvert. No works are required to the culvert or headwall for Option 11.

13.8.12 Appropriate drainage treatment is generally decided as part of the detailed design using DMRB CG501 Volume 4, Section 2, Part 3(Highways England, 2020). Selection criteria include cost, performance, maintenance requirements, land availability and nature of the receiving waters. Systems include:

- Active systems (with operators) such as penstocks and notched weirs
- Passive systems such as swales, wetlands, ponds, silt traps and filter drains
- Relevant guidelines for consultation when designing a drainage system with low pollution risk include:
- GPP 5 Works in, near or over watercourses (NRW, NIEA, SEPA, 2018)
- GPP 21 Incident Response Planning (NRW, NIEA, SEPA, 2017)
- GPP 22 Dealing with Spills (NRW, NIEA, SEPA, 2018)
- CG501 (DMRB Volume 4, Section 2, Part 3) Design of Highway Drainage Systems – guidance on conventional drainage systems to reduce pollution (Highways England, 2019c)
- CD532 (DMRB Volume 4, Section 2, Part 1) Vegetative Treatment Systems for Highway Runoff – guidance on vegetated drainage systems (Highways England, 2020o)
- CD 530 (DMRB Volume 4, Section 2, Part 8) Design of Soakaways (Highways England, 2020r)
- CD521 Hydraulic design of road edge surface water channels and outlets (Highways England, 2020s)

13.8.13 For drainage into the various watercourses, mitigation measures will be implemented where a HEWRAT assessment suggests these are required.

13.8.14 Mitigation has the potential to enhance the current water environment where the current road drainage system does not include treatment or spillage containment, which will be considered by the proposed scheme.

13.8.15 The drainage strategy report has been produced (Ref HE604820-ACM-HDG-WAL_S_000_Z-RP-CD-0001). This includes the proposed outline drainage strategy for Option 6. There would be three drainage catchments which do not include any impermeable areas within the catchment. There is a net increase of 9.24ha of impermeable area for this option as this option is a new offline mainline and grade separated junction. The existing impermeable area of the A46 is discounted and taken to be zero as it will be returned to nature. Three attenuation ponds would be constructed to attenuate the increase in impermeable area and limited to Qbar flow rate before discharging to the River Sowe to the west of the pond via new outfalls. The pond volumes will take into account 40% climate change. A new culvert would not be required to carry flow under the proposed mainline and connector road. An extension to the culvert carrying Smite Brook under the B4082 would be required on both sides to support the proposed new verge. This would involve an in-situ reinforced concrete extension of approximately 7m on the north side and approximately 3m on the south side of the culvert. The existing wingwalls and headwalls will also need to be removed and replaced with in-situ reinforced concrete wingwalls and headwalls.

13.8.16 Flood compensation will be provided on a level for level, volume for volume basis wherever possible. The need for compensatory storage is a particular requirement for Option 6 where large volumes of floodplain will be lost.

13.8.17 For Option 6 the A46 south of Walsgrave roundabout requires some earthworks cut to the slope to the east and west of the road. This cut would be within a false embankment to the east and west of the road. North of the existing roundabout the route goes offline and passes north of Hungerley Hall Farm. There is a cutting over a distance of 130m, with a maximum 2.75m depth of cutting at Ch 970. Just north of the farm, the proposed option is mainly located on embankment with some minor depth of cutting (approximately 1.5m for the eastern dumbbell roundabout area). There would be an overbridge over the new mainline of the A46. The link road to the B4082 has shallow cutting to its eastern edge.

13.8.18 Option 7 includes two catchments, the A46 mainline catchment and the A46 slip-roads catchment. This option results in a net decrease in impermeable area of 0.1ha, therefore, no additional attenuation is proposed within this drainage design. It has been proposed that the existing drainage system on the A46 Mainline and B4082 would be retained. The potential for changing the drainage system would be investigated in the next design stage once an option has been chosen. This may potentially include additional attenuation to provide enhancement. Culvert extension on the west side of the A46 for the Smite Brook under the mainline A46 would be required. This would involve the introduction of a new precast concrete retaining wall approximately 1.2m high and 6.2m long, to be installed in front of the existing headwall to retain fill. No extension is required for the existing link road culvert.

13.8.19 For Option 7, south of the existing roundabout, the proposed option is slightly higher than existing (approximately 1m), with widening of the existing cuttings to the east and west of the road proposed. North of the roundabout, there is approximately a maximum of 0.5m increase in the proposed road level. The existing cuttings would be widened to the west near Hungerley Hall Farm. The area of the junction is mainly at grade with small variations.

13.8.20 Option 8 includes two catchments, the A46 mainline catchment and the A46 slip-roads catchment. This option includes an increase in impermeable area of 0.24ha resulting from the realignment of the A46 mainline and the accompanying slip roads. An attenuation pond would be introduced just north-west of the existing junction to provide attenuation for the surface water runoff. This attenuation pond would be constructed to attenuate the increase in impermeable area and limited to Qbar flow rate before discharging to the River Sowe to the north-west of the pond via a new outfall. The pond volumes will take into account 40% climate change for rainfall intensity. A culvert extension to the east and west of the A46 would be required for the Smite Brook. This would involve an in-situ reinforced concrete extension of approximately 3m on the west side and approximately 4.5m on the east side of the culvert. The existing wingwalls and headwalls will also need to be removed and replaced with in-situ reinforced concrete wingwalls and headwalls. No extension is required for the existing link road culvert. A cutting is located near Hungerley Hall Farm up to 7m deep.

13.8.21 For Option 8, south of the junction there is minor cutting widening, and the addition of embankment widening to the east and west in the area of the Smite Brook crossing to accommodate the design. The long profile of the road in this area is higher than the existing road, with approximately a maximum uplift of 0.5m. There is minor widening of the existing cutting to the north side and south side of the B4082. North of the roundabout, the alignment moves to the west of the existing with the widening of the existing cutting area. The route of the road would cross the area of Hungerley Hall Farm buildings. In this area, there would be cutting for a distance of approximately 480m in length. The maximum depth of this cutting would be in the region of 7.6m in depth. This is a minimum of 72.0m AOD. North of the cutting, the proposed alignment would match the current alignment and profile. The location of the cutting is located within the area of the Baginton Sand and Gravel Formation, a Secondary A aquifer.

13.8.22 Option 11 includes 4 catchments and results in a net increase in impermeable area of 0.35ha as the mainline alignment is as close to the existing A46 as possible. The net increase is the result of the introduction of a grade separated junction and the removal of the existing roundabout:

- The first catchment is the A46 mainline results in a decrease in impermeable area due to the removal of the existing roundabout. No works to the headwall or culvert are required.
- The second catchment is the B4082 connector road, which results in the need for additional attenuation in the form of an attenuation pond just adjacent to Clifford Bridge roundabout as it connects to the B4082.
- The third is the grade separated junction south, which consists of the northbound diverge, southbound merge slip roads and grade separated overbridge & roundabouts. This results in the need for additional attenuation in the form of an attenuation pond to the southwest of the junction just adjacent to the proposed connector road.
- The fourth catchment is the grade separated junction south, which consists of the northbound merge and southbound diverge slip roads. This results in the need for additional attenuation in the form of an attenuation pond to the northwest of the junction.

13.8.23 This option has a cutting near Hungerley Hall Farm, similar to Option 8 in layout, but the maximum depth of the cutting is 74m AOD. The location of the cutting is located within the area of the Baginton Sand and Gravel Formation, a Secondary A aquifer.

13.8.24 The drainage network would be designed to DMRB standards which would ensure best practice design.

Operational phase

13.8.25 The following are mitigation and enhancement measures to be included for the operation of the proposed scheme:

- The design of new permanent works affecting watercourses (e.g. culverts extensions) will be informed by appropriate hydromorphological and ecological surveys and assessments. Where possible, clear span structures will be proposed. Where these are not possible, suitably sized culverts with sunken bases to allow a natural bed to form with mammal ledges as required, will be provided as a minimum. The design of such structures will be agreed with the Environment Agency and LLFA.
- Where extensions to existing culverts are required consideration of measures to ameliorate any existing adverse impacts of the structure will be considered.
- Each of the options would require mitigation in line with the scale of impact through the WFDa process. Option 6 in particular is anticipated to require detailed consideration through the WFDa process and would likely require a notable level of mitigation and additional enhancement.
- Drainage network sizing, for example pipes and SuDS storage basins, will be designed with an additional allowance for climate change in accordance with LLFA requirements.
- Mitigation measures, for example oversized pipe networks and SuDS, will be incorporated into the design of the proposed scheme.
- Any new road drainage would be designed to DMRB standards and will ensure that surface water drainage catchments are not bisected by any new provision.
- The drainage study will be undertaken and would allow for an agreed increase in rainfall intensity to account for climate change and would ensure sufficient capacity within the highway drainage network to attenuate any increase in impermeable area during the operation of the junction.
- A quantitative HEWRAT will be carried out on all new and existing outfalls in order to provide information at PCF Stage 3 once further information is available, on the requirement for any additional attenuation measures to be included within the drainage design in order to reduce risks to the surface water environment.
- SuDS provide a way to attenuate runoff from a site to a rate agreed with the Environment Agency and/ or the LLFAs to avoid increasing flood risk, but they are also important in reducing the quantities and concentration of diffuse urban pollutants found in runoff. Their design and use will depend on factors, such as site specific constraints. Ponds, wetlands and swales will be the preferred sustainable solutions, as these options mimic natural drainage and can be used to deliver other environmental benefits.
- The development of SuDS will take account of Defra guidance on the use, design and construction of SuDS, and current best practice guidance on the planning for and design of SuDS treatment contained in CIRIA's SuDS Manual (C753, 2015), DMRB CD532 Vegetated Drainage Systems for Highway Runoff, and DMRB CG501 Design of Highway Drainage Systems for Highways.
- The potential for increased risk of scour at outfalls (where outfalls cannot be provided by new ditchcourses) and around the potential watercourse crossings, will be assessed. If increased discharge velocities occur then

appropriate scour protection measures should be developed, or the velocities reduced through modified attenuation measures. This will require hydromorphological assessment to inform the design of the outfall and watercourse crossings.

- The scheme design will incorporate an appropriate amount of flood mitigation (further discussed in the 'assessment of likely significant effects' section – see below), to minimise fluvial floodwater displaced off site.
- Where the proposed scheme does displace fluvial floodwater, flood compensation will be provided on a level for level, volume for volume basis. Detailed hydraulic modelling is being undertaken to confirm the compensatory volume required and to demonstrate that the proposed mitigation options can adequately compensate the otherwise displaced floodwater.
- The proposed drainage strategy would pick up any rainfall falling onto the road and attenuate it within SuDS prior to discharging into adjacent watercourses. This would ensure that surface water flow routes are managed within the site and not displaced off site.
- The exact groundwater regime beneath the site will be confirmed with intrusive ground investigations which will inform the most appropriate method of constructing foundations to minimise the displacement of perched groundwater beneath the site. If deemed necessary, preferential flow paths for groundwater using granular trenches may be implemented to direct groundwater displaced by cuttings and/or scheme foundations away from the road and adjacent areas to discharge into the watercourses.

13.9 Assessment of likely significant effects

13.9.1 This section considers the results of the preliminary impact assessment of effects, taking into account design, mitigation and enhancement measures as noted within Section 13.8 of this report. This assessment is based on the information currently available for the proposed scheme for the four options.

Potential construction impacts and likely significant effects – surface water quality

13.9.2 Where construction works are undertaken in proximity to Smite Brook and the River Sowe, or close to existing land drains connected to surface watercourses, there is the potential for adverse direct impacts on water quality due to deposition or spillage of soils, sediments, oils, fuels or other construction chemicals. Coombe Pool SSSI is located adjacent to the eastern edge of the A46 in the area of the Walsgrave roundabout. These are presented for the different options below.

Option 6

13.9.3 The design of Option 6 includes the construction of a link road and dumbbell roundabout within the area to the west of the current A46 (drawing HE551486-ACM-HGN-WAL-SW-OP6-ZDR-CG-0118-P01) and to the north of the existing Walsgrave roundabout. This has the potential to result in direct impact to water quality within the River Sowe and Smite Brook through the construction of the road and the extension to the Smite Brook culvert.

13.9.4 Option 6 would also result in the largest area of new impermeable surfaces being constructed (estimated to be 9.24ha), and thus the largest volume of runoff to be managed. This runoff may also contain highway derived pollutants that will need to be treated, with the treatment train determined from a suitable water quality risk assessment (also taking into account the spillage risk from the new junction). The proposed attenuation ponds would have new outfalls constructed to discharge to the River Sowe which have the potential to result in direct impact to the river.

13.9.5 Option 6 would require earthworks close to, and extension to the north and south of the culvert at the B4082 (for the new junction access road) which have the potential to result in direct impacts on Smite Brook.

13.9.6 Flood risk mitigation requirements for Option 6 could include re-engineering the river locally to enhance storage whilst maintaining conveyance. The flood risk impacts are discussed later in this section.

13.9.7 However, it is noted that a section of the existing A46 will be returned to nature and this will offset some of the increase in hardstanding. In addition, where no treatment or spillage containment measures exist on the current road network, this project represents an opportunity to provide improvement. Finally, this option is also unlikely to significantly affect Coombe Pool.

13.9.8 In summary, this option has the following potential impacts:

- potential re-engineering of the river channel for enhancement of storage
- removal of the existing road area to return to nature
- potential to add treatment / spillage containment to a new road
- no significant effects to Coombe Pool.

Option 7

13.9.9 Option 7 utilises the existing footprint as much as possible and removes the roundabout with a left in – left out link road arrangement (drawing HE551486-ACM-HGN-WAL-SW-OP6-ZDR-CG-0103-P01). Option 7 results in a decrease of impermeable area of 0.1ha. The design includes the headwall extension to the west of the Smite Brook A46 culvert and has the potential to result in direct impacts to the water quality within Smite Brook from spills and fine sediment during any works to the outfalls/ culvert extension. There is an undetermined priority outfall (Asset Ref: SP3879_3320d) to the west of the A46 which may be impacted by the works.

13.9.10 Construction is close to the existing location, without permanent construction within the floodplain of the River Sowe.

Option 8

13.9.11 Option 8 results in a small increase in impermeable area of 0.24ha, together with extension of the Smite Brook culvert to the east and west of the A46. The design includes widened embankments encroaching onto the Coombe Pool SSSI, with a culvert extension to the east of the A46 also potentially resulting in impact on the Coombe Pool SSSI area. A new attenuation pond would be constructed to the north-west of the junction.

13.9.12 The culvert extension for the Smite Brook culvert has the potential to result in direct impacts to Smite Brook. Works in this area would also necessitate impact to the existing priority outfall. This is an undetermined priority outfall (Asset Ref: SP3879_3320d).

13.9.13 The works for Option 8 therefore have the potential to impact Coombe Pool SSSI and Smite Brook directly, with indirect impacts to the River Sowe downstream through hydrological connectivity.

Option 11

13.9.14 Option 11 utilises the existing footprint as much as possible at the southern end of the Scheme, with land take from the dumb-bell roundabout at the northern end of the Scheme. The drainage implications for Option 11 result in a small increase in

impermeable area of 0.35ha, with the addition of attenuation ponds on 3 of the 4 new catchments.

13.9.15 The design has no modifications to the existing culvert or headwall for Smite Brook under the A46 or B4082.

13.9.16 Construction is close to the existing location, without permanent construction within the floodplain of the River Sowe.

Surface water quality significance of effects

13.9.17 Adoption of the mitigation measures described in Section 13.8 would minimise potential adverse surface water quality impacts during construction. Therefore, taking this into account alongside the risk presented by the nature of the works and its duration, it is considered that the construction works for Option 6, with the construction works close to the River Sowe, the construction of new outfalls, and the extension of the B4082 culvert, has the potential for minor adverse impact to the River Sowe and Smite Brook. Both are high importance receptors, therefore, using Table 13.4, this potentially results in a slight effect (not significant).

13.9.18 The widening of the River Sowe through this area, as suggested by early flood risk work is considered to potentially result in temporary moderate adverse impacts, as excavation would be required within the channel of the watercourse to widen the flow pathway. A temporary moderate adverse impact would result in a temporary moderate adverse effect (significant) on the water quality within the River Sowe.

13.9.19 Option 7 and Option 11 are similar in terms of their potential for impact on waterbodies. However, Option 7 would include headwall extension of the Smite Brook A46 culvert, with no alteration of the culvert itself, and less construction works which may impact on the River Sowe. Option 11 does not include works to the headwall. Works are still required in the area surrounding the culvert as is passes under the A46. Therefore, it is considered the construction of Option 7 and Option 11 could potentially result in minor adverse impact on Smite Brook resulting in a slight effect (not significant). It is considered the construction works would have a negligible impact to the River Sowe, resulting in a slight effect (not significant).

13.9.20 For Option 8 the works include the extension at both ends of the Smite Brook A46 culvert, together with embankment widening. These works impinge on the woodland at the edge of Coombe Pool SSSI. The extension of the A46 Smite Brook culvert has the potential for temporary minor adverse impact to the water quality within Smite Brook. Using Table 13.4 this would result in a slight effect (not significant).

13.9.21 The culvert extension works temporarily impact on the Coombe Pool SSSI. The potential for impact on Coombe Poole SSSI is included in Chapter 8: Biodiversity. At this stage in the assessment it is unclear how much of an impact these works would have on the pool itself. The works appear to only affect the woodland along the edge of the SSSI, rather than the water feature itself, therefore, it is considered works in this area have the potential for a minor adverse impact, on a very high importance receptor. Using Table 13.4 this results in the potential for a moderate adverse effect on the SSSI (which is significant).

Potential construction impacts and likely significant effects – hydromorphology

13.9.22 Option 6 would involve a culvert extension on Smite Brook passing under the B4082, and the construction of a new carriageway adjacent to the River Sowe, within the floodplain. Early flood risk work indicates that widening of the River Sowe may be required to facilitate this option. It is possible that temporary access

works such as temporary watercourse crossings may interact with nearby watercourses, otherwise impacts may arise from the culvert extension on Smite Brook. In addition, the excavation and stockpile of material associated to the construction of the attenuation pond over the left bank floodplain of the River Sowe may also provide a pathway for silt to enter the watercourse.

13.9.23 Each of these activities could cause impacts such as damage to the riparian zone or river banks, or release of fine sediments into the watercourse, which may lead to siltation of the bed. Construction of the new carriageway alongside the River Sowe would likely involve stockpiling materials or excavations adjacent to the watercourse which may also lead to the delivery of fine sediments to the watercourse and possible siltation of the bed. The construction of three attenuation ponds would require the construction of outfalls into the River Sowe. These should be ditchcourses rather than pipes/ engineered outfalls to minimise impact on the hydromorphology of the receiving watercourse.

13.9.24 Option 7 involves a headwall extension to the downstream face of the A46 culvert on Smite Brook. Risks of impacts from this activity include potential damage to river banks and the riparian zone, and release of silt into the watercourse and possible associated siltation of the bed. Option 7 has no proposed ponds, and Option 11 has three proposed ponds. As for Option 6 above, these should outfall via ditchcourses to the receiving watercourse. For Option 11, the excavation and stockpile of material associated to the construction of the attenuation pond over the left bank floodplain of the River Sowe may also provide a pathway for silt to enter the watercourse.

13.9.25 Option 8 involves a culvert extension of the A46 culvert on Smite Brook at both the upstream and downstream side. Risks of impacts from this activity include potential damage to river banks and the riparian zone, and release of silt into the watercourse and possible associated siltation of the bed. In addition, the excavation and stockpile of material associated with the construction of the attenuation pond over the left bank floodplain of the River Sowe may also provide a pathway for silt to enter the watercourse. As for Option 6 above, these should outfall via ditchcourses to the receiving watercourse.

13.9.26 Each of the above potential impacts would be mitigated during the construction phase by measures set out in the Construction EMP (CEMP). This will include measures for activities near to watercourses such as storage of materials and excavations that should minimise the risk of runoff and therefore silt delivery to watercourses. Provided the CEMP is followed, construction impacts for each of the options would result in a negligible impact to hydromorphology.

13.9.27 Using Table 13.4 a negligible effect on a receptor of medium importance (Smite Brook/ River Sowe for morphology) results in a neutral effect (not significant).

Potential construction impacts and likely significant effects – groundwater flow and quality

13.9.28 Potential impacts to groundwater during construction include the potential for spills of oil/ fuel infiltrating into the groundwater environment, and the construction of any intrusive structures (e.g. cuttings) and other excavations (e.g. ponds) below the water table which would require dewatering.

13.9.29 Where soil stripping and/ or excavations are proposed, the aquifer overburden would be reduced and could temporarily lead to increased groundwater vulnerability during the construction phase.

13.9.30 For Option 6 there is a cutting up to 2.75m deep. At this stage the depth of groundwater in this area is not known. Therefore, taking the precautionary

principle, it is assumed that there may be interception of groundwater in this area. It is considered this would result in a minor impact on groundwater flow and using Table 13-4 a slight effect (not significant) on groundwater flow from Option 6.

13.9.31 It is considered that, taking into account the mitigation measures described in Section 13.8, during construction there would be no change to the groundwater quality and flow in the area. Using Table 13.4 this results in a neutral effect (not significant) to groundwater in this area.

13.9.32 Option 7 has some minor widening of existing cuttings, and the vertical profile of the road will be raised. It is considered that, taking into account the mitigation measures described in section 13.8, during construction there would be no change to the groundwater quality and flow in the area. Using Table 13.4 this results in a neutral effect (not significant) to groundwater flow in this area.

13.9.33 Option 8 includes a cutting in the area of Hungerley Hall Farm. There is potential for impact to groundwater with the formation of the 7m deep cutting in the area of Hungerley Hall Farm. The base of the cutting is 72.0m AOD on the outline design plans. From the baseline information, paragraph 13.6.58, a borehole formed in 1981 encountered groundwater at 70.35m AOD, which then rose to 73.25m AOD on completion of drilling. It is considered that there is a potential for temporary minor adverse impact on groundwater flow in the area, resulting in a slight effect (not significant).

13.9.34 Option 11 includes a cutting in the area of Hungerley Hall Farm. There is potential for impact to groundwater with the formation of the 4.43m deep cutting in the area of Hungerley Hall Farm. The base of the cutting is approximately 74m AOD on the outline design plans. Referencing paragraph 13.6.58, groundwater is below the level of the base of the cutting. Additionally, the existing mainline A46 is in the range 73.8m AOD to 74m AOD near Hungerley Hall Farm, so the proposed cutting for the new B4082 link from the grade separated junction to the existing B4082 would be no deeper than the existing road. Therefore, it is considered that there is a potential for negligible impact on groundwater flow in the area, resulting in a neutral effect (not significant).

13.9.35 It is considered that, taking into account the mitigation measures described in Section 13.8, during construction there would be no change to the groundwater quality in the area. Using Table 13.4 this results in a neutral effect (not significant) to groundwater quality in this area.

13.9.36 There is the potential for excavation within the southern area of the proposed scheme for Options 6, 7, 8 and 11 to encounter perched groundwater in the area of the historic landfill. However, excavations for cuttings within this area for all options show a widening of existing cutting. Therefore, it is considered there would be a negligible risk of interception of perched contaminated groundwater, therefore a neutral effect (not significant).

Potential construction impacts and likely significant effects – flood risk

Fluvial Flood Risk

13.9.37 Temporary works within or near a watercourse channel and/or within the floodplain associated with the Smite Brook and River Sowe could displace floodwater with the potential to increase flood risk both to the construction workers on site and to off-site areas.

13.9.38 An initial assessment of the impact of the proposed options on fluvial flooding has been undertaken using the updated baseline hydraulic model and the current proposed scheme options. In line with updated EA guidance (July 2021), the

proposed scheme hydraulic models were run with a 32% climate change allowance, which represents the new higher central allowance for the year 2080.

13.9.39 The environmental importance is 'low' for the site and 'high' for off-site areas due to the more vulnerable development within the River Sowe floodplain.

Option 6

13.9.40 The construction of option 6 would involve working within the River Sowe floodplain and immediately adjacent to the riverbank.

13.9.41 To construct the western ramp would involve lowering the ground level to below the existing level of the riverbank, which the model results show would be susceptible to flooding in the 1 in 2 year event (50% AEP). Constructing the northern end of the western ramp would involve ground raising within the floodplain, which would cause impacts at the confluence of Withy Brook and the River Sowe and displace floodwater off-site. There is also the potential for loss of conveyance at the two Smite Brook crossings, under the A46 and under the B4082.

13.9.42 The adverse fluvial flood risk impacts associated with Option 6 are significant. The results of the modelled option 6 scenario show an increase in peak flood level of up to 150mm on site and up to 100mm off site. This would result in a major adverse impact on site and a moderate impact off site. Using Table 13.4, the effect of unmitigated Option 6 would therefore be 'very large' for the site and 'large or very large' for off-site areas.

13.9.43 As per the mitigation measures described in Section 13.8, there are number of potential mitigation measures which could be explored to reduce the impact of option 6 on fluvial flood risk. However, due to the position of the western ramp, it is considered unlikely that the increased flood levels and extents could be mitigated without extensive and costly interventions. Possible mitigation measures include:

- Raising the western ramp above the flood level and running it partially on a viaduct to reduce the amount of floodwater displaced
- Significant ground level reductions north of the scheme to offset the loss of storage and changes to conveyance
- Re-engineering the river locally to enhance storage whilst maintaining conveyance. This is considered a complex option which would have impacts on other environmental disciplines.

13.9.44 A hydraulic model incorporating the proposed mitigation measures has not been developed at this stage, however, mitigation is likely to be possible albeit with significant cost and potential impact on other environmental disciplines which is likely to be prohibitive. With mitigation measures implemented it is likely that the impacts of option 6 on fluvial flood risk during construction could be reduced to negligible (+/- 10mm flood level).

13.9.45 Using Table 13.4, the effect would therefore be 'slight' both for the site and off-site areas, which is not significant.

Option 7

13.9.46 The construction of Option 7 would involve widening of the road to the north and south of the roundabout and re-profiling road levels.

13.9.47 Option 7 was then re-modelled with the updated climate change allowance of 32% (published by the EA in July 2021). The updated model results show that there would be no fluvial flood risk impacts both on and off-site as a result of the scheme,

such that no further mitigation measures are required to achieve a negligible impact of these options.

13.9.48 Using Table 13.4, the effect would therefore be 'neutral' for on- and off-site areas, which is not significant.

Option 8

13.9.49 The construction of Option 8 would involve a new arm of carriageway to the west of the existing A46 alignment, with the potential for reduced conveyance on the Smite Brook during construction at both the A46 and B4082 crossings.

13.9.50 Using the latest Environment Agency climate change allowance of 32%, the model results show that without mitigation, water would be stored on the road. The results show that the depth of flooding on the road (that was previously dry) would be up to 1.8m. If floodwaters were to reach the road, the model predicts a decrease in peak flood levels upstream (east) of the A46. The model predicts no impacts downstream. This would result in a major adverse impact on site and a negligible impact off site. Using Table 13.4, the effect of unmitigated option 8 would therefore be 'very high' for the site and 'neutral' for off-site areas.

13.9.51 As described in Section 13.8, a number of potential mitigation measures could be included, which could comprise:

- Introducing a bund along the east edge of the scheme up to a level of 74.2mAOD (+ freeboard) preventing water from entering the carriageway and storing it to the east as per the existing situation; and/or
- Increasing the road levels at the junction to 74.2mAOD (+freeboard); and/or
- Reduction in levels adjacent to the road to offset the storage loss due to the corridor widening.

13.9.52 It is considered likely that with mitigation measures implemented the impacts of option 8 on fluvial flood risk during construction could be reduced to negligible (+/- 10mm flood level).

13.9.53 Using Table 13.4, the effect would therefore be 'neutral' for on- and off-site areas, which is not significant.

Option 11

13.9.54 The construction of Option 11 would comprise a grade separated junction approximately 800m to the north of the existing roundabout location, together with associated earthworks and attenuation ponds. The existing A46/B4082 roundabout would be removed as part of the proposal.

13.9.55 In response to the flood mitigation required by the previous options, the proposed highway alignment for option 11 already includes a raised ridgeline on the east of the existing A46 alignment to a level of 74.6mAOD. This prevents water from entering the carriageway and stores it to the east as per the existing situation. The model results for option 11 show that there would be no flood impacts caused by the proposal for the 32% climate change scenarios. The B4082 access is shown to not flood and the B4082 ramp rises away from the flood extent thus preventing the ingress of water. The proposed attenuation ponds are shown to be located outside the flood extent. No further mitigation measures are therefore required to achieve a negligible impact of option 11 on fluvial flood risk.

13.9.56 Using Table 13.4, the effect would therefore be 'neutral' for on- and off-site areas, which is not significant.

Surface water flood risk

13.9.57 As discussed earlier in this chapter, there are existing surface water flood flow routes along the A46 being conveyed towards the A46 roundabout and onto the B4082. Construction works, including foundations and ground re-profiling could result in changes in overland surface water conveyance paths, which could increase the risk of flooding on or off site.

13.9.58 For all options, the mitigation measures described in Section 13.8 would be implemented to manage surface water flow routes during construction.

13.9.59 The impact is therefore considered to be negligible and would be limited to the site itself and the areas between the site and outfalls to watercourses used for temporary drainage.

13.9.60 The environmental importance is 'low' for the site and 'low' for areas immediately adjacent to the proposed scheme, as verges and fields are classified as water compatible. Using Table 13.4, the effect would therefore be 'slight' for the site and 'neutral/ slight' for offsite areas, both of which are not significant.

Groundwater flood risk

13.9.61 As detailed earlier within this chapter, there is potential for elevated perched groundwater beneath the proposed scheme and consequent risk of groundwater flooding. During the construction phase there would be some excavation and earthworks to facilitate the development, which could lead to groundwater seepages into excavations/ earthworks.

13.9.62 For all four options the mitigation measures described in Section 13.8 would be implemented to manage the potential for groundwater flooding during construction. The impact is therefore considered to be negligible and would be limited to the proposed scheme boundary itself and areas between the proposed scheme boundary and outfalls to the watercourses if pumping out of groundwater is deemed necessary. The requirement for mitigation measures would be confirmed following completion of intrusive ground investigations.

13.9.63 The environmental importance is 'low' for the site and 'low' for areas immediately adjacent to the site. Using Table 13.4, the effect would therefore be 'slight' for the site and 'neutral/ slight' for offsite areas, both of which are not significant.

Flood Risk from Artificial Sources

13.9.64 As detailed earlier in this chapter, the risk of flooding from artificial sources is considered to be low. This would remain the same during the construction phase. The effect would therefore be 'neutral', which is not significant.

Potential operational impacts and likely significant effects – pollution of surface water from routine road runoff

13.9.65 The existing road in this area discharges to the surface watercourses Smite Brook and River Sowe with no current water quality mitigation or attenuation of runoff rates. Options 6, 8 and 11 include attenuation ponds to ensure no increase in runoff rates from the new impermeable areas. The attenuation ponds also provide water quality mitigation with improvements in suspended sediment, and dissolved pollutants.

13.9.66 During Stage 3 of the assessment process a DMRB HEWRAT assessment would be carried out. This assessment would assess the levels of mitigation provided for routine runoff to ensure minimal detrimental impact to the receiving watercourses.

13.9.67 It is assumed that the drainage design would include sufficient water quality mitigation to ensure the HEWRAT assessments for the new outfalls would pass

the assessment. Within the Scheme, the introduction of mitigation measures would provide an opportunity for improvement of road runoff in comparison to the existing runoff quality.

13.9.68 Where no treatment or spillage containment measures exist on the current road network, this project represents an opportunity to provide improvement.

13.9.69 It is considered all scheme options would result in a negligible impact, and slight effect (not significant) on water quality.

Potential operational impacts and likely significant effects – pollution of surface water from accidental spillages

13.9.70 DMRB LA 113 provides a method for the assessment of pollution impacts from accidental spillages. This method gives an indication of the risk of an accidental spillage causing a pollution impact on receiving water bodies.

13.9.71 Watercourses should be protected so that the risk of a serious pollution incident has an annual probability of less than 1% (equivalent to a return period of 1 in 100 years), unless they are considered to be sensitive (for example, covered by a SSSI designation) in which case a more stringent annual probability of 1 in 200 years is applied.

13.9.72 Calculation of spillage risk is carried out at PCF3 assessment stage once traffic data and detailed design data is available.

13.9.73 However, based on the existing road containing no spillage containment, and Options 6, 8, and 11 including attenuation ponds which would allow the addition of spillage containment, this represents an opportunity to provide improvement over the current situation.

13.9.74 It is considered this is a minor beneficial impact, resulting in a slight positive effect (which is not significant).

Potential operational impacts and likely significant effects – pollution of surface water from de-icing agents

13.9.75 De-icing salt is a potential pollution source from routine highway maintenance. No practical form of treatment can remove salt from the carriageway runoff after road salting. De-icing salt would potentially have an impact on the receiving aquatic ecosystem, which would result in a greater effect where the receiving watercourse is small, with limited dilution, such as is the case in this proposed scheme.

13.9.76 It is not known at this stage what the Q95 flows are for Smite Brook and the River Sowe. However, it is likely that the flows in winter when de-icing is required would often be greater than this. The fauna and flora present is also likely to be less sensitive to the impacts of de-icer salts in runoff during the winter when many plant species have died back and fauna dormant.

13.9.77 The effect from de-icing would be localised, occasional and generally of short duration when temperatures fall below 4°C. Therefore, the impact has been assessed as negligible for all options. Using Table 13.4 this would result in a slight effect, which is not significant.

Potential operational impacts and likely significant effects – hydromorphology

13.9.78 Option 6 would involve a culvert extension on Smite Brook towards the confluence with the River Sowe; construction of a new carriageway through the River Sowe floodplain; and early flood risk modelling suggests widening of the River Sowe would be required to mitigate adverse flood risk impacts. The culvert extension would result in a localised increase in shading and loss of riparian zone. There would also be decreased lateral connectivity locally and some loss of natural

banks which may reduce the sediment supply to the river. In addition, there may be a localised loss or interruption to the riverbed substrate. It is assumed that mitigation could be built into the culvert design extension design, in terms of sizing and maintaining a natural bed. Therefore, impacts from the culvert extension would be very localised to the extent of the works and would likely constitute a minor adverse impact and a slight effect. It is likely that additional mitigation in line with the scale of impact would be required during the WFDa process.

13.9.79 Option 6 also includes a new carriageway through the floodplain of the River Sowe. It is assumed the carriageway will be embanked to a level that it does not frequently flood. This would result in a loss in floodplain connectivity of the River Sowe. Additional impacts associated with this would require further study but may include impacts such as increased risk of scour within the River Sowe channel from constriction of flood flows. It is possible this would result in a moderate adverse impact and moderate effect which is significant. This aspect of Option 6 would require detailed consideration through the WFDa process and would likely require a notable level of mitigation and additional enhancement.

13.9.80 Option 6 would require widening of the River Sowe to offset the flood risk impacts associated with the Option. It is not yet known the location or extent to which widening would be required, but it is anticipated there would be impacts to the flow conditions and sediment transport regime, that may result in siltation and change in the bed substrate with potential additional impacts to the fauna and flora within the watercourse. Widening would also cause a loss of the riparian zone, which may not be permanent and a reduction in floodplain connectivity. It is possible that the channel widening could result in a major adverse impact and a moderate or large effect which is significant. This element of Option 6 would require substantial consideration during the WFDa process and would likely require a substantial level of mitigation and additional enhancement. It is noted that it may be possible to carry out the widening in a manner that may be beneficial, rather than adverse to the watercourse; for example creating an area of lowered floodplain rather than widening the deepest part of the channel. However, this would require further assessment and may not provide the level of flood risk mitigation that is required.

13.9.81 Using Table 13.4 it is considered there would be a major adverse impact to hydromorphology for Option 6, resulting in a moderate or large effect (significant).

13.9.82 Option 7 would involve an extension to the headwall of the Smite Brook culvert on the downstream face of the A46. The headwall extension may result in a localised increase in shading and loss of riparian zone. There may also be decreased lateral connectivity locally and some loss of natural banks which may reduce the sediment supply to the river. The impacts from the headwall extension would be very localised to the extent of the works. It is likely that mitigation in line with the scale of impact would be required during the WFDa process. Works for Option 11 would include construction in the area where Smite Brook is culverted under the A46.

13.9.83 Using Table 13.4 it is considered there would be a negligible impact to hydromorphology for Option 7 and Option 11, resulting in a slight effect (not significant).

13.9.84 Option 8 would involve an extension to the A46 Smite Brook culvert on the upstream and downstream face. The culvert extension would result in a localised increase in shading and loss of riparian zone. There would also be decreased lateral connectivity locally and some loss of natural banks which may reduce the sediment supply to the river. In addition, there may be a localised loss or interruption to the river bed substrate. It is assumed that mitigation could be built into the culvert extension design, in terms of sizing and maintaining a natural bed.

Therefore, impacts from the culvert extension would be very localised to the extent of the works. It is likely that additional mitigation in line with the scale of impact would be required during the WFDa process.

13.9.85 Using Table 13.4 it is considered there would be a minor adverse impact to hydromorphology for Option 8, resulting in a slight effect (not significant).

Potential operational impacts and likely significant effects – pollution of groundwater

13.9.86 The road drainage design for all options discharges routine road runoff to surface watercourses and not to ground. Therefore, there is no pathway by which routine operational runoff, or spillages, could directly impact groundwater quality within the area.

13.9.87 Using Table 13.4 it is considered there would be a no change impact to groundwater quality for all options, resulting in a neutral effect (not significant).

Potential operational impacts and likely significant effects – groundwater flow

13.9.88 Option 8 includes a cutting of up to 7m in the area of Hungerley Hall Farm with the base of the cutting being 2m deeper than the existing A46 mainline. Option 6 includes cutting of up to 2.75m north of Hungerley Hall Farm. There are no significant cuttings for Option 7. Option 11 includes a cutting of approximately 4.43m deep in the area of Hungerley Hall Farm, with the base of the cutting at a similar level to the existing A46 road.

13.9.89 At this stage, there is no up-to-date site specific information on groundwater levels, and potential flows in the area of Hungerley Hall Farm, which is located on a finger of the superficial deposits Secondary A aquifer. The design for Option 8 results in the new A46 being 50m to the west of the existing road layout, and a decrease in 2m of the road surface. Option 11 results in the new cutting being much closer to the existing mainline, with the base of the cutting being at a similar level to the existing A46 mainline road.

13.9.90 Using the precautionary principle, it is assumed that groundwater may be encountered in this area, and that the required road drainage design would lead to lowering of groundwater within this area. However, as shown in Figure 13.1: Water Resources, the spatial extent of this area of superficial deposits Secondary A aquifer is not extensive, and its width is decreasing to the south, before disappearing all together.

13.9.91 The magnitude of impact on groundwater flow is therefore considered to be minor, resulting in a slight effect (which is not significant).

Potential operational impacts and likely significant effects – flood risk

Fluvial flood risk

13.9.92 As well as an update to the baseline model, modelled scenarios for the four proposed scheme options has been developed. The proposed options were initially tested for the 1 in 100-year event plus 70% climate change allowance to determine the impact on the flood levels and extents both on and offsite and to determine the scale of the compensatory floodplain storage needed, if required. In line with latest EA guidance, the model was then re-run with a 32% climate change allowance, which relates to the new higher central allowance for the year 2080.

13.9.93 The environmental importance is ‘very high’ for the proposed road as it provides an important transit route and connection to a hospital and would therefore be classified as ‘essential infrastructure’. The environmental importance is ‘high’ for offsite areas due to the more vulnerable development in the River Sowe floodplain.

Option 6

13.9.94 Whilst the extent of the on and off-site flood risk impacts has reduced due to the updated climate change allowance, the adverse impacts remain significant. Without mitigation, the operational option 6 scheme would result in an increased flood risk to the proposed western ramp, an increase in flood levels of up to 150mm on site and up to 100mm off-site, and changes to the flow regime at the confluence of Withy Brook and the River Sowe. This would result in a major adverse impact on site and a moderate impact off site. Using Table 13.4, the effect of unmitigated Option 6 would therefore be 'very large' for the road and 'large or very large' for off-site areas.

13.9.95 There are a number of potential mitigation measures which could be explored to reduce the impact of option 6 on fluvial flood risk, as outlined in the 'construction impacts' section. However, due to the proposed location of the western ramp, it is considered unlikely that the increased flood levels and extents could be mitigated without extensive and costly interventions.

13.9.96 A hydraulic model incorporating the proposed mitigation measures has not been undertaken at this stage. However, mitigation is likely to be possible albeit with significant cost and potential impact on other environmental disciplines which is likely to be prohibitive. With mitigation measures implemented it is likely that the impacts of option 6 on fluvial flood risk during operation could be reduced to negligible (+/- 10mm flood level).

13.9.97 Using Table 13.4, the effect would therefore be 'slight' for both the road and offsite areas, which is not significant.

Option 7

13.9.98 The hydraulic model for option 7 incorporates was run with the climate change allowance of 32% in line with latest EA guidance. The model results show that there would be no flood risk impacts both on and off-site as a result of the scheme. No further mitigation measures would therefore be required to achieve a negligible impact of these options.

13.9.99 Using Table 13.4, the effect would therefore be 'neutral' for both the road and off-site areas, which is not significant.

Option 8

13.9.100 Using the latest Environment Agency climate change allowance of 32%, the model results show that the road would flood in the operational option 8 scheme, resulting in a decrease in flood levels upstream (east) of the A46. The model predicts no impacts off-site. The results show that the depth of flooding on the road (that was previously dry) would be up to 1.8m. This would result in a major adverse impact on site and a negligible impact off site. Using Table 13.4, the effect of unmitigated option 8 would therefore be 'very high' for the road and 'neutral' for off-site areas.

13.9.101 A number of potential mitigation measures could be included to mitigate the increase in flood risk, as outlined in the 'Potential Construction Impacts' section above.

13.9.102 With mitigation measures implemented, it is likely that the impacts of option 8 on fluvial flood risk during operation could be reduced to negligible (+/- 10mm flood level).

Option 11

13.9.103 The proposed Option 11 alignment includes an elevated highway profile to the east of the scheme (to 74.6m AOD), which prevents water encroaching onto the road from the east. With this mitigation incorporated, the hydraulic model shows

that the scheme would result in no flood impacts both on and off-site for the 32% climate change allowances. No additional mitigation measures are therefore required.

13.9.104 Using Table 13.4, the effect would therefore be 'neutral' for both the road and offsite areas, which is not significant.

Surface water flood risk

13.9.105 As discussed earlier in this chapter, there are existing surface water flood flow routes along the A46 being conveyed towards the A46 roundabout and onto the B4082. The level changes proposed as part of the proposed scheme could result in altering existing pluvial flood paths, which could lead to the displacement of floodwater. The operational scheme therefore has the potential to increase the pluvial flood risk to the proposed scheme itself or to offsite areas.

13.9.106 All four options include re-profiling the road levels, which would impact upon the overland surface water flow routes, which currently originate within the highway itself. As per the mitigation measures described in Section 13.8, the proposed drainage strategy would pick up any rainfall falling onto the road and attenuate and treat it within SuDS prior to discharge into the adjacent watercourses. This would ensure that surface water flow routes are managed within the proposed scheme boundary and would not pose an increased risk to offsite areas. The impact is therefore considered to be negligible.

13.9.107 The environmental importance is 'very high' for the proposed road and 'low' for areas immediately adjacent to the proposed scheme boundary, as verges and fields are classified as water compatible. Using Table 13.4, the effect would therefore be 'slight' for the road and 'neutral/ slight' for offsite areas, both of which are not significant.

Groundwater flood risk

13.9.108 As detailed earlier within this chapter, there is the potential for elevated perched groundwater beneath the site and consequent risk of groundwater flooding. The cuttings to facilitate the scheme and the operational scheme foundations for structures which encroach within the groundwater table may affect groundwater which could lead to emergence of groundwater at surface, i.e. groundwater flooding.

13.9.109 The impact of the proposed scheme on the wider groundwater flow was assessed in more detail in the 'groundwater flow' section of this chapter. The publicly available BGS records demonstrate that the shallow groundwater beneath the site is likely to be present within the permeable superficial deposits or in isolated perched pockets within the lower permeability layers. In the operational phase, groundwater within the superficial deposits would continue to flow within the aquifer around the scheme. Groundwater displaced from perched pockets of groundwater within the lower permeability strata could lead to localised increases in the water table.

13.9.110 The exact risk of groundwater flooding to the site would be confirmed following completion of intrusive ground investigations. However, when taking into account the mitigation measures described in Section 13.8, the impact of all four options is likely to be negligible and, if present, would be limited to the proposed scheme boundary itself and areas between the site and outfalls to the watercourses if preferential groundwater flow paths are deemed necessary.

13.9.111 The environmental importance is 'very high' for the proposed road and 'low' for areas immediately adjacent to the site. Using Table 13.4, the effect would

therefore be 'slight' for the road and 'neutral/ slight' for offsite areas, both of which are not significant.

Flood Risk from Artificial Sources

13.9.112 As detailed earlier in this chapter, the risk of flooding from artificial sources is considered to be low. This would remain the same during the operational phase. The effect would therefore be 'neutral', which is not significant.

13.10 Summary and conclusions

13.10.1 Section 13.9 Assessment of Likely Significant Effects presents the potential impacts and significance of effects from the four options, Options 6, 7, 8 and 11 on the water environment. The water environment includes water quality, hydromorphology, groundwater, flood risk and drainage.

13.10.2 This section summarises the outcomes of that assessment process based on the information available at the time of writing, with embedded mitigation measures in place.

Option 6: Construction

13.10.3 This option presents the largest new impermeable area. Excavation within the River Sowe channel would be required to widen the flow pathway resulting in a temporary potentially moderate adverse effect (significant) on the water quality within the River Sowe. It is considered that with the embedded mitigation in place there would be a neutral effect (not significant) to hydromorphology.

13.10.4 There is potentially a minor impact on groundwater flow during excavation of the cutting near Hungerley Farm, resulting in a slight effect (not significant). There would be a neutral effect to groundwater quality (not significant).

13.10.5 An assessment of Option 6 using the updated hydraulic model for the area and considering the latest climate change allowances (32%) shows that there would be increases in flood risk both on and off-site. Mitigating the increases in fluvial flood risk as a result of Option 6 are likely to be possible albeit with significant cost and potential impact on other environmental disciplines. With mitigation measures implemented it is likely that the impacts could be reduced to negligible (not significant); however, the monetary and environment cost of the mitigation is likely to be prohibitive. Impact on surface water and groundwater flood risk would be mitigated against resulting in slight impacts (not significant).

Option 7: Construction

13.10.6 The construction of the headwall, and less construction within the area close to the River Sowe and Smite Brook results in a slight effect (not significant) to water quality. This option represents a small decrease in impermeable area. It is considered that with the embedded mitigation in place there would be a neutral effect (not significant) to hydromorphology. Minor widening of the cuttings for this option result in a neutral effect (not significant) to groundwater. The deep cutting close to Hungerley Hall Farm has the potential to result in a slight effect (not significant). There would be a neutral effect to groundwater quality (not significant).

13.10.7 An assessment of Option 7 using the updated hydraulic model for the area and considering the latest climate change allowances (32%) shows that there would be no flood risk impacts both on and off-site as a result of the scheme, such that no further mitigation measures would be required. The impacts of Option 7 on fluvial flood risk are therefore neutral (not significant). Impacts on surface water and groundwater flood risk would be mitigated against resulting in slight impacts (not significant).

Option 8: Construction

13.10.8 The extension of the headwall on Smite Brook results in a potentially slight effect (not significant) to Smite Brook. This option represents a small increase in impermeable area 0.24ha). However, the works appear to impact on the edge of the Coombe Pool SSSI. At this stage is it considered there is the potential for moderate adverse effect on the SSSI (which is significant). It is considered that with the embedded mitigation in place there would be a neutral effect (not significant) to hydromorphology. There would be a neutral effect to groundwater quality (not significant).

13.10.9 An assessment of Option 8 using the updated hydraulic model for the area and considering the latest climate change allowances (32%) shows that the road would flood in this option, resulting in a decrease in flood level upstream (east) of the A46. The model predicts no impacts off-site. Appropriate mitigation measures would need to be incorporated, which could include a bund along the eastern road alignment. With mitigation measures implemented, it is likely that the impacts of Option 8 on fluvial flood risk could be reduced to negligible (not significant). Impacts on surface water and groundwater flood risk would be mitigated against resulting in slight impacts (not significant).

Option 11: Construction

13.10.10 Whilst there are no headwall / culvert alterations, the construction within the area close to the River Sowe and Smite Brook results in a slight effect (not significant) to water quality. This option represents a small increase in impermeable area of 0.35ha. It is considered that with the embedded mitigation in place there would be a neutral effect (not significant) to hydromorphology. Minor widening of the cuttings for this option result in a neutral effect (not significant) to groundwater. The cutting close to Hungerley Hall Farm has the potential to result in a negligible effect (not significant). There would be a neutral effect to groundwater quality (not significant).

13.10.11 Option 11 includes a raised highway elevation to the east of the scheme to prevent floodwater encroaching within the site as per the existing situation. An assessment of option 11 using the updated hydraulic model for the area shows that there are no impacts both on and off-site for the 32% climate change scenario. No further mitigation measures would therefore be required. The impacts of Option 11 on fluvial flood risk are therefore neutral (not significant). Impact on surface water and groundwater flood risk would be mitigated against resulting in slight impacts (not significant).

Various options: Operation

13.10.12 For the operational scheme, it is considered there would be no significant effects on water quality. For Option 6, the potential widening of the River Sowe channel is considered to have a moderate or large effect (significant). Options 7, 8 and 11 would be a slight effect (not significant) on hydromorphology. For all options it is considered there would be a neutral effect on groundwater quality, with the potential for a slight effect on flow from the cuttings in Option 8. The potential for impact on Coombe Poole SSSI is included in Chapter 8: Biodiversity as it is a loss of woodland area.

13.10.13 For the flood risk aspects of the operational scheme, it is considered likely that the flood risk impacts of option 6 could technically be reduced to negligible (not significant); however, the monetary and environmental costs of the extensive mitigation measures are likely to be prohibitive. The mitigation measures required for Option 8 are less intrusive and would likely comprise bunding on the eastern edge of the scheme. Operational Options 7 and 11 are shown to have neutral impacts on fluvial flood risk when using the latest climate change allowances. The

surface water and groundwater flood risk impacts would be reduced to negligible (not significant) through appropriate mitigation.

14 Climate

14.1 Introduction

14.1.1 This chapter addresses the potential impacts on climate of the proposed scheme and the impacts of future climate change on the resilience of the proposed scheme. To align with the requirements of the EIA Regulations 2017 and DMRB LA 114 Climate Revision 0.0.1 (Highways England, 2021d), consideration of climate effects is divided into two aspects:

- **Greenhouse gas (GHG) impact assessment** – considers the impact on the climate of GHG emissions arising from the proposed scheme during its lifetime, including how the project will affect the ability of Government to meet its carbon reduction plan targets.
- **Climate change resilience (CCR) assessment** – considers the resilience of the proposed scheme to climate change impacts, including how the proposed scheme design will take account of the projected impacts of climate change.

14.2 Legislative and policy framework

National legislation

Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended)

14.2.1 The EIA Directive 2011/52/EU sets out the requirement to undertake an Environmental Impact Assessment (EIA). Directive 2011/52/EU was amended by Directive 2014/92/EU (Official Journal of the European Union, 2014). The amendments included the introduction of an express requirement to describe the likely significant effects resulting from the impact of the project on climate change. The amendment requires the vulnerability of the proposed scheme to climate change to be considered.

Climate Change Act 2008 (2050 Target Amendment) Order 2019

14.2.2 The Climate Change Act 2008 (hereafter referred to as the 'Act') provides a framework to meet the UK's greenhouse gas (GHG) emission reduction goals through legally binding national carbon emission caps within five-year periods. The Act was amended in 2019 to revise the existing 80% reduction target and legislate for net zero emissions by 2050 (2050 Target Amendment, Order 2019). A trajectory for the UK to achieve its carbon reduction targets is set out through a series of 5-year carbon budgets which provide maximum emissions limits for greenhouse gases. The six carbon budgets currently legislated by parliament cover to the period ending 2037, however only the sixth carbon budget (laid before Parliament, April 2021 and enshrined into law in June 2021) takes into account the UK's Net Zero target.

14.2.3 The current budgets include:

- a) 3rd carbon budget (2018 to 2022) 2,544 MtCO2e.
- b) 4th carbon budget (2023 to 2027) 1,950 MtCO2e.
- c) 5th carbon budget (2028 to 2032) 1,725 MtCO2e.
- d) 6th carbon budget (2033 to 2037) 965 MtCO2e.

14.2.4 The Climate Change Committee has indicated that the steep trajectory will continue through later carbon budgets (BEIS, 2016).

Paris Agreement

14.2.5 The Paris Agreement (enforced since 2016) is a legally binding agreement within the United Nations Framework Convention on Climate Change (UNFCCC) dealing with GHG emissions mitigation, adaptation and finance starting in the year 2020. It requires all signatories to strengthen their climate change mitigation efforts to keep global warming to well below 2°C this century and to pursue efforts to limit global warming to 1.5°C (UNFCCC, 2016). This requirement is addressed in section 14.8.

UK Nationally Determined Contribution

14.2.6 In 2020, the UK communicated its new Nationally Determined Contribution to the UNFCCC. Within this, the UK has committed to reducing GHG emissions by at least 68% by 2030 compared to 1990 levels (UK Government, 2020a).

National planning policy and guidance

National Planning Policy Framework

14.2.7 At a national level, the UK Government published an update to the NPPF in 2021. The NPPF supersedes previous national PPGs and planning policy statements (PPSs). The NPPF summarises in a single document the Government planning policies for England, and how these are expected to be applied. Policies of relevance to climate change and sustainability assessment as presented herein include those achieving sustainable development and meeting the challenge of climate change. The NPPF (para 1453) states that:

"*Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure*."

National Policy Statement for National Networks

14.2.8 NPSNN sets out policies to guide how DCO applications will be decided and how the impacts of national networks infrastructure should be considered.

14.2.9 Policies relevant to the climate assessment:

- 4.40 - Applicants must consider the impacts of climate change when planning location, design, build and operation. Any accompanying environment statement should set out how the proposal will take account of the projected impacts of climate change.
- 4.41 - Where transport infrastructure has safety-critical elements and the design life of the asset is 60 years or greater, the applicant should apply the UK Climate Projections high emissions scenario (high impact, low likelihood) against the 2080 projections at the 50% probability level.
- 4.42 - The applicant should take into account the potential impacts of climate change using the latest UK Climate Projections available at the time and ensure any environment statement that is prepared identifies appropriate mitigation or adaptation measures. This should cover the estimated lifetime of the new infrastructure.
- 4.43 - The applicant should demonstrate that there are no critical features of the design of new national networks infrastructure which may be seriously affected by more radical changes to the climate beyond that projected in the latest set of UK climate projections. Any potential critical

features should be assessed taking account of the latest credible scientific evidence on, for example, sea level rise and on the basis that necessary action can be taken to ensure the operation of the infrastructure over its estimated lifetime through potential further mitigation or adaptation.

- 4.44 - Any adaptation measures should be based on the latest set of UK Climate Projections, the Government's national Climate Change Risk Assessment and consultation with statutory consultation bodies. Any adaptation measures must themselves also be assessed as part of any environmental impact assessment and included in the environment statement, which should set out how and where such measures are proposed to be secured.
- 5.17 - Carbon impacts will be considered as part of the appraisal of scheme options (in the business case), prior to the submission of an application for DCO. Where the development is subject to EIA, any Environmental Statement will need to describe an assessment of any likely significant climate factors in accordance with the requirements in the EIA Directive., for road projects applicants should provide evidence of the carbon impact of the project and an assessment against the Government's carbon budgets.
- 5.18 - Any increase in carbon emissions is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the proposed scheme are so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets.

National Planning Policy Guidance

14.2.10 The PPG was published in March 2014 to provide more in-depth guidance to the NPPF. The PPG aims to make planning guidance more accessible, and to ensure that the guidance is kept up to date. As such, the PPG was amended in July 2017 to reflect the updated EIA Regulations, and further updated in 2019.

14.2.11 National Planning Practice Guidance (NPPG) – Climate Change (Ministry of Housing, Communities and Local Government, 2019) advises how to identify suitable mitigation and adaptation measures in the planning process to address the impacts of climate change. Paragraph 001 states that:

"*effective spatial planning is an important part of a successful response to climate change as it can influence the emission of greenhouse gases… Planning can also help increase resilience to climate change impact through the location, mix and design of development."*

The Decarbonising Transport Plan

14.2.12 The DfT Decarbonising Transport Plan (DfT, 2021) sets out the government's commitments and actions needed to decarbonise the transport system in the UK before 2050. The plan expands the government commitments to reduce and remove the use of fossil fuels from road transport, and to set phase out dates for every type of new fossil fuelled road vehicle.

Net Zero Highways: Our 2030/ 2040/ 2050

14.2.13 Highways England have recently published the Net Zero Highways plan (Highways England, 2021a). The plan sets out how Highways England will take action across their own operations and lead decarbonisation of England's highways construction and support implementation of the Decarbonising Transport Plan. The plan includes the following targets:

- By 2030 Highways England aim to achieve net zero for their own operations.

- By 2040 the set target is to achieve net zero from maintenance and construction activities. Highways England aims to use a carbon management system to embed approaches that minimise emissions, including lean construction practices and principles of circular economy. There is a focus on working with suppliers in the construction industry to develop roadmaps to net zero, trailing new materials and working with manufacturers and government on carbon capture and storage solutions, and working with supply chains to trial zero emissions plant and zero emissions Heavy Goods Vehicles (HGV).
- By 2050, there is a target to achieve net zero carbon travel on Britain's roads

14.2.14 The Highways England licence (Department for Transport (2015) includes the following commitments towards the Environment and management of GHG emissions:

- *Ensure that protecting and enhancing the environment is embedded into its business decision-making processes and is considered at all levels of operations;*
- *Ensure the best practicable environmental outcomes across its activities, while working in the context of sustainable development and delivering value for money;*
- *Consider the cumulative environmental impact of its activities across its network and identify holistic approaches to mitigate such impacts and improve environmental performance;*
- *Where appropriate, work with others to develop solutions that can provide increased environmental benefits over those that the Licence holder can achieve alone, where this delivers value for money;*
- *Calculate and consider the carbon impact of road projects and factor carbon into design decisions, and seek to minimise carbon emissions and other greenhouse gases from its operations;*
- *Adapt its network to operate in a changing climate, including assessing, managing and mitigating the potential risks posed by climate change to the operation, maintenance and improvement of the network;*
- *Develop approaches to the construction, maintenance and operation of the Licence holder's network that are consistent with the government's plans for a low carbon future;*
- *Take opportunities to influence road users to reduce the greenhouse gas emissions from their journey choices.*

Local planning policy and guidance

Coventry Climate Change Strategy, 2012-2020

14.2.15 The current Climate Change Strategy looks to "ensure that by 2020 Coventry is a world leading low carbon, and sustainable city, resilient to extreme weather events and to long term climate change".

14.2.16 A revised Climate Change Strategy is currently under development with the aims of further embedding sustainability into planning, and also setting a target for Coventry to become net carbon zero.

Coventry Local Plan 2011-2031 (adopted 2017)

14.2.17 Objectives of the Local Plan relevant to the climate assessment include:

- Creating an attractive, cleaner and greener city
- Maintaining and enhancing an accessible transport network

14.2.18 Key policies derived the Local Plan include:

- DS3: Sustainable Development Policy
- EM1: Planning for Climate Change Adaptation
- DE1: Ensuring High Quality Design

The West Midlands Strategic Transport Plan

14.2.19 The transport plan (West Midlands Combined Authority 2016), highlights the important connection between reducing carbon emissions, the health and well-being agenda and projected creation of new jobs and economic prosperity within the transport sector.

14.2.20 It considers asset management and the use of lower carbon intensive materials within their strategic approach.

West Midland's Local Transport Plan (2011-2026)

14.2.21 The local transport plan (Centro, 2011) highlights the importance of the transport sector in supporting a low carbon future.

14.2.22 Amongst other measures, the approach to low carbon transportation includes effective asset management and enhanced maintenance and use of Smart Routes to target carbon reductions.

14.2.23 It also includes a long-term vision for 'improved environment and reduce carbon through new technologies'.

14.3 Assessment methodology

14.3.1 As reported within the Scoping Report, the scope of the GHG assessment includes construction and operational activities, including road user emissions and maintenance.

14.3.2 The climate change vulnerability assessment considers the influence of current and future extreme weather events, temperatures and precipitation. Sea level rise and changes to wind were scoped out of the assessment due to lack of influence on the proposed scheme.

Methodology, standards and guidance

14.3.3 This climate assessment has been undertaken in accordance with the following standards and guidance:

- Section 3 of DMRB LA 114 for assessing the vulnerability of projects to climate change and the effect on climate of GHG from construction, operation and maintenance projects.
- Road user emissions have been calculated following TAG Unit A3, section 4.
- The British Standards Institution (BSI) PAS 2080 (2016): Carbon Management in Infrastructure
- European Commission Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment
- European Commission Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report
- European Commission Guidance for the Calculation of Land Carbon Stocks provides a methodology for calculating carbon stocks from land use
- IEMA (2017) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance
- The Department for Business, Energy and Industrial Strategy (BEIS) provides GHG emission factors for UK-based organisations

- The British Standards Institution (BSI) BS EN ISO 14064-1:2019 and 14064-2:2019 specifications for organisational-level and project-level guidance for the quantification and reporting of GHG emissions and removals
- The World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD) GHG Protocol provides overarching guidance on developing GHG inventories and reporting standards.
- The Inventory of Carbon & Energy (ICE) database has been used to source appropriate carbon factors to estimate the embodied carbon of materials used for construction of the proposed scheme. The ICE database uses some material property data from the Chartered Institution of Building Services Engineers (CIBSE).

Establishment of the Baseline

GHG Impact Assessment

14.3.4 The baseline conditions for the GHG impact assessment (the Do-Minimum scenario) were determined using modelled volumes of traffic currently on the existing ARN, and its predicted future use (accounting for increases in traffic and associated congestion) through to year 2087 (assuming a proposed scheme lifetime of 60 years).

Climate Change Vulnerability Assessment

14.3.5 Data was gathered from the following sources to determine the baseline conditions for the climate change vulnerability assessment:

- The latest UK Climate Projections (UKCP18) from the Met Offices' Hadley Centre Climate Programmes – to identify the relevant climate projections for the appropriate geographic area of the proposed scheme.
- Met Office historic climate data (Met Office, accessed 2021) – to identify the historic trends of relevant climate parameters for the appropriate geographic areas of the proposed scheme.

Greenhouse gas assessment

Construction

14.3.6 A lifecycle approach to calculating the GHGs has been used. This approach considers specific timescales and emissions from different lifecycle stages of the proposed scheme:

- Product stage
- Construction process stage
- Operational stage
- Decommissioning

14.3.7 Decommissioning was 'scoped out' of the GHG assessment; it is anticipated the proposed scheme will be in use beyond the design life of the road infrastructure. Any future decommissioning would require a separate planning submission.

14.3.8 Where specific activity data has been made available, expected GHGs arising from the construction and operational activities, and embodied carbon in materials of the proposed scheme, have been quantified using a calculation-based methodology as per the following equation below as stated in the Defra emissions factors guidance (Defra, 2020):

Activity data x GHG emissions factor = GHG emissions value.

14.3.9 Emission factors have been sourced from Defra (2020) emissions factors and embodied carbon data from the Inventory of Carbon and Energy (ICE) (University of Bath, 2019).

14.3.10 At PCF Stage 2 limited information is available on construction activity, materials and plant requirements. Therefore, the assessment is limited at this time and will be updated at PCF Stage 3 once more information becomes available.

14.3.11 In line with applicable guidelines from the World Business Council for Sustainable Development (WBCSD)/ World Resources Institute (WRI) Greenhouse Gas Protocol initiative, the GHG emissions study will be reported as tonnes of carbon dioxide equivalent (tCO2e) and consider the seven Kyoto Protocol gases:

- Carbon-dioxide (CO2)
- Methane (CH4)
- Nitrous oxide (N2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF6)
- Nitrogen Trifluoride (NF3)

Operation

14.3.12 Road user emissions have been calculated using Highway England/ National Highway's DMRB air quality spreadsheet model (version V8_EFT10). This version of the EFT only provides emissions factors to 2030. Beyond this date emissions per vehicle type are assumed to remain at 2030 levels. This approach does not therefore allow for recent UK Government policy presented in the Transport Decarbonisation Plan, including the end of the sale of petrol and diesel cars by 2030 and associated uptake of electric vehicles. The future road user emissions presented are therefore a worst-case scenario for GHG emissions. Future versions of the Emissions Factor Toolkit are anticipated to better reflect the influence of government policy.

14.3.13 The GHG emissions operational assessment adopts a scenario-based assessment, with the quantification of four different scenarios (Do-Something scenarios) to provide a range for the potential additional GHG emissions associated with Scheme operation. These are compared against a baseline, Do-Minimum Scenario.

Significance of effect

14.3.14 In line with the NPSNN, significance of effect will be assessed by comparing estimated GHG emissions arising from the proposed scheme with UK carbon budgets, and associated reduction targets.

14.3.15 Table 14.1 shows the current and future UK carbon budgets, which at present have only been calculated up to 2037 (Committee on Climate Change, 2017).

Table 14.1: UK carbon budgets

Carbon Budget	Total Budget ($MtCO_2e$)
3rd (2018-2022)	2,544
4th (2023-2027)	1,950
5th (2028-2032)	1,725
6th (2033-2037)	968

14.3.16 The assessment of project-related emissions will be compared to relevant UK Carbon Budgets. The assessment of projects on climate shall only report significant effects where increases in GHG emissions will have a material impact on the ability of Government to meet its carbon reduction targets.

Climate change resilience assessment

Construction

14.3.17 The vulnerability assessment followed the method detailed in DMRB LA 114 Climate Section 3 (paragraphs 3.24 to 3.35). This was completed in liaison with the project design team and the other EIA technical disciplines by considering the 2018 UK Climate Projections (UKCP18) (UK Met Office, 2018) for the geographical location and timeframe of the proposed scheme (from construction through to operation).

14.3.18 The assessment has considered the strategic aims and objectives encompassed within the national and local policies and strategies summarised in Section 14.2, which collectively seek to minimise the adverse impacts of climate change whilst requiring new development to take climate change considerations into account.

14.3.19 An assessment of climate change vulnerability has been undertaken for the proposed scheme to identify potential climate change hazards and benefits, and to consider their potential consequence and likelihood of occurrence, taking account of the measures incorporated into the design of the proposed scheme (as described by paragraph 3.42 of DMRB LA 114).

14.3.20 The proposed scheme does not include any 'safety critical features' and therefore has not been assessed against H++ climate scenarios, as described in paragraph 3.30 of DMRB LA 114.

Operation

14.3.21 The methodology for operation will utilise the same as construction outlined above.

Significance of effect

14.3.22 The DMRB LA 114 standards detail how to assess the relevance of potential impacts during operations, significance criteria, evaluation of significance and when further design and mitigation measures are required. During the construction phase, impacts will be assessed qualitatively. Once climate hazards have been identified the likelihood (as illustrated in Table 3.39a of DMRB LA 114) and consequences (sourced from Table 3.39b of DMRB LA 114) will be assessed according to Table 14.2 and Table 14.3.

Table 14.2: Likelihood categories (DMRB LA 114 Table 3.39a).

Likelihood	Description (probability and frequency of occurrence)
Very high	The event occurs multiple times during the lifetime of the project (e.g. 120 years) e.g. approximately annually, typically 120 events
High	The event occurs several times during the lifetime of the project (e.g. 120 years) e.g. approximately once every five years, typically 24 events.
Medium	The event occurs limited times during the lifetime of the project (e.g. 120 years) e.g. approximately once every 15 years, typically 8 events.
Low	The event occurs during the lifetime of the project (e.g. 120 years) e.g. once in 120 years.

Likelihood	Description (probability and frequency of occurrence)
Very low	The event can occur once during the lifetime of the project (e.g. 120 years).

Table 14.3: Description of consequences (DMRB LA 114 Table 3.39b)

Consequence of impact	Description
Very large adverse	Operation - national level (or greater) disruption to strategic route(s) lasting more than 1 week.
Large adverse	Operation - national level disruption to strategic route(s) lasting more than 1 day but less than 1 week or regional level disruption to strategic route(s) lasting more than 1 week.
Moderate adverse	Operation - regional level disruption to strategic route(s) lasting more than 1 day but less than 1 week.
Minor adverse	Operation - regional level disruption to strategic route(s) lasting less than 1 day.
Negligible	Operation - disruption to an isolated section of a strategic route lasting less than 1 day.

14.3.23 As described by DMRB LA 114 paragraph 3.20, significance is determined where increases in GHG emissions will have a material impact on the ability of the Government to meets its carbon reduction targets. As stated by DMRB LA 114 paragraph 2.19 Note 2, “it is considered unlikely that projects will in isolation conclude significant effects on climate.”.

14.3.24 The significance of each impact will then be evaluated through a matrix as detailed in Table 14.4. Any significant conclusions will be based on and incorporate confirmed design and mitigation measures, as described by Table 3.41 of DMRB LA 114.

14.3.25 Construction of the proposed scheme is anticipated to occur within the 4th budgets. Emissions from the operation of the proposed scheme would fall into the 5th, 6th and subsequent future budgets once set.

Table 14.4: Significance matrix (DMRB LA 114 Table 3.41)

		Measure of Likelihood				
Measure of Consequence *NS=Not significant; S=Significant		Very Low	Low	Medium	High	Very High
	Very Large	NS	S	S	S	S
	Large	NS	NS	S	S	S
	Moderate	NS	NS	S	S	S
	Minor	NS	NS	NS	NS	NS
	Negligible	NS	NS	NS	NS	NS

14.4 Assessment assumptions and limitations

14.4.1 The information presented in this assessment reflects that obtained and evaluated at the time of reporting and is based on an emerging design of the proposed scheme.

14.4.2 Information available at the early design stage of each option which enabled quantification of GHG emissions include:

- Bulk earthwork 'cut and fill' quantities – it has been assumed that excavated material will be reused on site and excess material landfilled (as a worst-case scenario).

14.4.3 Materials have been assumed to be transported to site by HGV from within a 50km radius. This is presented as a worst-case scenario in the absence of data. In accordance with the proximity principle it is expected that materials will be sourced more locally where possible.

14.4.4 Due to limited data at this stage, GHG emissions from the following sources have not been quantified, and therefore a qualitative assessment has been provided:

- Demolition – number of structures requiring demolition have been considered.
- Pavement volumes – assumed to vary proportionality depending on land take and earthworks.

14.4.5 Worker transportation would also contribute to the construction GHG footprint. At this stage, worker numbers and the distance travelled is unknown. Professional judgement and conservative estimates have been used to calculate GHG emissions associated with worker transportation to site. In this case 120 workers per day has been assumed and a 6-day working week. A distance of 10 km from the site has been assumed and a return trip has been included. It is assumed all commuting is undertaken by car, with an occupancy rate of 1 per vehicle.

14.4.6 Fuel use onsite has been estimate using the construction value of each Option as a proxy (Glenigan, 2018).

14.4.7 The future road user emissions are likely to be a conservative worst-case scenario as the Defra Emission Factor Toolkit used to calculate emissions have not yet been updated to include the forecasted uptake of electric and low carbon vehicles, nor recent UK Government decarbonisation policy.

14.4.8 At this stage the assessment has been undertaken in line with DMRB standards and the limitations mentioned above are typical for this stage of the project. The assessment is therefore considered robust and the level of investigation and detail is appropriate for the purposes of a PCF Stage 2 assessment.

14.5 Study area

Greenhouse gas assessment

14.5.1 The study area for the GHG assessment includes:

- All direct GHG emissions arising as a result of construction, maintenance and operational activity within the proposed scheme boundary.
- Embodied carbon in materials used for construction and maintenance as a result of raw material extraction, processing and manufacture.
- Road user emissions arising from the ARN.

Climate change resilience assessment

14.5.2 The study area for the resilience assessment will be the area of temporary and completed works within the proposed scheme boundary.

14.6 Baseline conditions

Greenhouse gas assessment

14.6.1 The current and future baseline for the lifecycle GHG impact assessment is a 'business as usual' scenario where the proposed scheme is not constructed, and the existing road remains (do minimum scenario).

14.6.2 Table 14.5 provides the emissions baseline. This includes the road traffic emissions from the existing ARN and the current land use (carbon sequestration value) of proposed land take for each option. Land take emissions have been calculated in accordance with the 'European Commission Guidance for the Calculation of Land Carbon Stocks provides a methodology for calculating carbon stocks from land use'.

14.6.3 Permanent land take for each option:

- Option 6: 192,825m^2
- Option 7: 7,177m^2
- Option 8: 52,890m^2
- Option 11: 131,573m^2

Table 14.5: Emissions baseline (annual tonnes CO^2)

	Option 6	Option 7	Option 8	Option 11
Road Traffic Baseline (2018) (tonnes)	2,733,680	2,733,680	2,733,680	2,733,680
Without proposed scheme opening year (future baseline) (2025) (tonnes)	2,848,233	2,848,233	2,848,233	2,848,233
Land Use (tonnes)[2]	-201	-8	-55	-167

Climate change resilience assessment

14.6.4 The current baseline for the vulnerability assessment is based on historic climate data obtained from the Met Office (2020) recorded by the closest meteorological station to the proposed scheme (Coventry) for the period 1981-2010. This data is listed in Table 14.6

Table 14.6: Historic climate data summary

Climatic Variable	Month	Value
Average annual maximum daily temperature (°C)	-	13.8
Warmest month on average (°C)	July	21.6
Coldest month on average (°C)	February	1.3
Mean annual rainfall levels (mm)	-	58.3
Wettest month on average (mm)	August	70.8
Driest month on average (mm)	February	42.6

[2] Assumes 50% grassland, 50% forested. The carbon value presented is the total amount sequestered by the area of land. It is not an annual value.

14.6.5 The Met Office historic 10-year averages for the 'Midlands' district identify gradual warming between 1969 and 2018, with increased rainfall also. Information on mean maximum annual temperatures (°C) and mean annual rainfall (mm) is summarised in Table 14.7.

Table 14.7: Midlands 10-year average historic climate data

Climatic Period	Mean maximum annual temperatures (°C)	Mean annual rainfall (mm)
1969-1978	12.817	728.04
1979-1988	12.606	797.32
1989-1998	13.512	744.48
1999-2008	13.97	843.01
2009-2018	13.846	783.2

14.6.6 The future baseline for the vulnerability assessment is based on future UKCP18 data detailed in Table 14.8 and Table 14.9.

14.6.7 The review of vulnerability to climate change has considered a scenario that reflects a high level of greenhouse gas emissions at the 10%, 50% and 90% probability levels to assess the impact of climate change over the lifecycle of the proposed scheme. A 10% probability result indicates that 10% of model results were below this figure. A 50% probability results indicates that 50% of model results were above and below this figure. A 90% result indicated that 90% of model results were below this figure.

14.6.8 For the purpose of the assessment, UKCP18 probabilistic projections for pre-defined 20-year periods for the following average climate variables have been obtained and analysed:

- Mean annual temperature
- Mean summer temperature
- Mean winter temperature
- Maximum summer temperature
- Minimum winter temperature
- Mean annual precipitation
- Mean summer precipitation
- Mean winter precipitation

14.6.9 Table 14.9, respectively. UKCP18 probabilistic projections have been analysed for the 25km grid square in which the proposed scheme is located. These figures are expressed as temperature/ precipitation anomalies in relation to the 1981-2000 baseline.

14.6.10 UKCP18 uses a range of possible scenarios, classified as Representative Concentration Pathways (RCPs), to inform differing future emission trends. These RCPs "… *specify the concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to preindustrial levels*." RCP8.5 has been used for the purposes of this assessment as a worst-case scenario.

The proposed scheme has varying design life elements, with the pavement surface at 15 years, the pavement at 40 years and the structures at 120 years. The projected climate variables presented in Table 14.8 and

14.6.11 Table 14.9 show time periods that intersect these stages. The 2020-2039 time period intersects the construction stage, earliest operations and the end of the design life for pavement surfacing. The 2060-2079 time period intersects the end of design life of the pavement surface and approximately halfway life of the proposed scheme. The 2080-2099 time period is the furthest available projection and intersects the latter part of the proposed scheme.

Table 14.8: Projected changes in temperature variables (˚C), 50% probability (10% and 90% probability in parenthesis)

Climate Variable	2020-2039	2050-2069	2080-2099
Mean annual air temperature anomaly at 1.5 m (°C)	+0.9 (-0.0 to +1.9)	+2.0 (+0.6 to +3.6)	+3.5 (+1.3 to +5.7)
Mean summer air temperature anomaly at 1.5 m (°C)	+1.4 (+0.3 to+2.7)	+3.3 (+1.0 to +5.8)	+6.1 (+2.3 to +6.1)
Mean winter air temperature anomaly at 1.5 m (°C)	+0.8 (-0.1 to +1.9)	+2.0 (+0.5 to +3.7)	+3.4 (+1.1 to +6.1)
Maximum summer air temperature anomaly at 1.5 m (°C)	+0.9 (-0.0 to +1.9)	+2.0 (+0.6 to +3.6)	+3.5 (+1.3 to +5.7)
Minimum winter air temperature anomaly at 1.5 m (°C)	+1.4 (+0.3 to +2.7)	+3.3 (+1.0 to +5.8)	+6.1 (+2.3 to +6.1)
Mean winter air temperature anomaly at 1.5 m (°C)	+0.8 (-0.1 to +1.9)	+2.0 (+0.5 to +3.7)	+3.4 (+1.1 to +6.1)

Table 14.9: Projected change in precipitation (%), 50% probability (10% and 90% probability in parenthesis)

Climate Variable	2020-2039	2050-2069	2080-2099
Annual precipitation rate anomaly (%)	+1.0 (-4.0 to +6.4)	-1.0 (-7.6 to +5.5)	-0.4 (-6.5 to +5.9)
Summer precipitation rate anomaly (%)	-8.4 (-30.1 to +14.5)	-24.2 (-52.5 to +4.8)	-36.0 (-65.9 to -1.8)
Winter precipitation rate anomaly (%)	+6.9 (-4 .0 to +18.6)	+12.1 (-5.8 to +31.2)	+22.1 (1.1 to +47.5)

14.7 Potential impacts

Greenhouse gas assessment

14.7.1 To assess the GHG emissions arising from the construction and operation of the proposed scheme, a lifecycle assessment approach has been applied using available design, construction and transportation data. The key GHG emission sources considered in the assessment are described in the following section for both the construction and operation phases of the proposed scheme.

Construction

14.7.2 The potential impacts of the GHG emissions are determined through identifying activity sources and calculating their magnitude Table 14.10 presents the sources of GHG emissions from the proposed scheme during construction.

Table 14.10: Sources of GHG emissions - construction

Lifecycle stage	Activity	Primary emission sources
Pre-construction stage	• Enabling works	• Vehicles and fuel use for generators on site. • Workers travelling to/from the site
	• Land clearance	• Loss of carbon sink
Product stage	• Raw material extraction and manufacturing of products required for the proposed scheme	• Embodied GHG emissions
Construction process stage	• On-site construction activity • Transport of construction materials (where not included in embodied GHG emissions) • Transport of construction workers • Disposal of any waste/ water generated by the construction processes	• GHG emissions from vehicle/ plant use • GHG emissions from disposal of waste/water

Operation

14.7.3 Table 14.11 presents the sources of GHG emissions from the proposed scheme during operation. The operation of the proposed scheme has been considered at 60 years.

Table 14.11: UK sources of GHG emissions - operation

Lifecycle stage	Activity	Primary emission sources
Operation stage	• Operation of associated road and signalling • Maintenance including re-surfacing	• GHG emissions from energy and fuel use • Embodied emissions associated with re-surfacing materials
Use stage	• Vehicle journeys	• GHG emissions per vehicle mile/ km • Energy consumption

Climate change resilience assessment

Construction

14.7.4 During construction, the proposed scheme may be vulnerable to a range of short-term climate risks.

14.7.5 Potential impacts on the proposed scheme likely to occur during the construction phase include:

- Inaccessible construction site due to severe weather event (flooding, snow and ice, storms) restricting working hours and delaying construction.
- Health and safety risks to the workforce during severe weather events.
- Unsuitable conditions (due to very hot weather or very wet weather, for example) for certain construction activities, such as laying pavement materials or delivery of construction plant and increasing the need to repeat certain works.
- Damage to construction materials, plant and equipment, including damage to temporary buildings/ facilities within the site boundary such as offices, compounds, material storage areas and worksites.
- Extreme weather causing supply chain issues for construction materials, potentially impacting the construction programme or costs.

14.7.6 The potential climate resilience impacts and effects on the proposed scheme during the construction phase are not expected to be significant, due to the duration and nature of the construction activities associated with the proposed scheme. Accordingly, these impacts have not been considered further in the assessment.

Operation

14.7.7 Once operational, the proposed scheme has the potential to be impacted by a changing climate and in particular, more frequent severe weather events in the medium to long term.

14.7.8 Potential impacts on the proposed scheme likely to occur during the operational phase include:

- Material and asset deterioration due to high temperatures.
- Overheating of electrical equipment, for example information and communication systems.
- Health and safety risks to road users.
- Changes in travel patterns of network users.
- Longer vegetation growing seasons resulting in increased periods of leaf fall and increased maintenance and management requirements.
- Damage to roads from periods of heavy rainfall.
- Flood risk (surface, groundwater, fluvial and snow/ice melt) on the network and damage to drainage systems with the potential for increased runoff from adjacent land contributing to surface water flooding.
- Increased slope instability due to prolonged or heavy precipitation leading to subsidence.
- Storm damage to structures.
- Inaccessibility of the network during severe weather events.

14.8 Design, mitigation and enhancement measures

Greenhouse gas assessment

14.8.1 Mitigation measures would be implemented to reduce emissions across the lifecycle of the proposed scheme, including the design phase. Consideration of

carbon early within the design phase maximises the opportunities for low carbon solutions to be embedded into the scheme. Key sources of GHG emissions during construction would be from construction activities and carbon embedded in construction materials.

14.8.2 Highways England is committed to reducing carbon emissions from activity on its network by implementing the following mitigation hierarchy:

- **Avoidance and prevention** – to maximise potential for reusing and/ or refurbishing existing assets and/or materials.
- **Reduction** – through the application of low carbon solutions including technologies, materials and products to minimise resource consumption.
- **Remediation** – applied to further reduce carbon through on or off-site offsetting or sequestrations.

14.8.3 The current assessment is only able to quantify the GHG emissions associated with earthworks. The majority of construction emissions are expected to be associated with the embodied carbon within construction materials. Further design of the selected option based on qualitative assessment will provide the opportunity for consideration of low carbon material choices.

Climate change resilience assessment

14.8.4 A number of general mitigation and adaptation measures to address the potential impacts associated with climate change events have been considered, many of which have been identified within other discipline chapters within this EAR and will continue through the development of the proposed scheme design at Stage 3. The assessment identifies and takes into account existing resilience measures for each climate variable and associated impacts either already in place, or in development for infrastructure and assets.

14.8.5 Potential mitigation measures across all PCF Stage 2 options could include, but are not limited to:

- Taking into account the dangers associated with working in more extreme weather conditions during construction.
- Alternative pavement materials with superior properties (such as increased tolerance to fluctuating temperatures).
- Taking into account climate change projections within maintenance plans and drainage systems.
- Appropriate emergency systems being in place (including user communications systems such as variable messaging systems).
- Maintenance intervention cycles of assets.

14.9 Assessment of likely significant effects

Greenhouse gas assessment

Construction

14.9.1 Table 14.12 shows the breakdown of emissions associated with earthworks construction activities. Where Option 6 and 11 require a large volume of 'fill' beyond the 'cut' quantities in these enabling works, they have a much greater carbon impact than Options 7 and 8.

Table 14.12: Construction GHG emissions (earthworks only)

Category	Option 6 Emissions (tCO2e)	Option 7 Emissions (tCO2e)	Option 8 Emissions (tCO2e)	Option 11 Emissions (tCO2e)
Embodied carbon in materials (aggregate fill for earthworks) including transportation to site	2,858.68	n/a	n/a	1,936.27
Energy consumption	407.66	111.18	207.54	248.30
Business/ employee travel	307.18	242.30	223.76	237.66
Waste* (LANDFILL)	4.92	28.90	202.09	7.73
Total	3,578.44	382.38	633.39	2,422.23

**Includes transportation to landfill and emissions arising from landfill.*

14.9.2 Table 14.13 provides some commentary for each emission source against the stage 2 appraisal options.

Table 14.13: Construction GHG emissions (construction activities)

Category	Stage 2 Options Appraisal
Embodied carbon in materials including transportation to site	All options will require a mix of aggregate and asphalt for pavements. Option 6 is likely to be the least favourable – having the largest area to pavement (based on total land take and earthworks quantities). Option 7 is expected to be the most favourable – having the smallest land take and therefore the least amount of materials.
Fuel, electricity and water consumption	Resource requirements have been estimated based on each options construction value (£), with Option 6 having the greatest impact and Option 7 having the lowest impact.
Business/ employee travel	Working days have been estimated based on the scale of the project (Option 6: 464; Option 7: 366; Option 8: 338; and Option 11: 359) as presented in Chapter 2. Travel emissions are expected to increase proportionately depending on the number of days.
Waste and waste transport	Wastage across all schemes varies depending on earthworks cut and fill quantities. For the majority of options disposal emissions are likely to be minimal (see Chapter 11 for more details)

14.9.3 Based on current data available, from a GHG emissions perspective, the Stage 2 options have been ranked in order of magnitude; Option 7, Option 8, Option 11, Option 6.

14.9.4 A more detailed GHG assessment will be carried out for the preferred option, during PCF Stage 3, when more information is available. In line with the requirement of the NPSNN, the GHG emissions impact will then be measured against the UK Government's five-year carbon budgets.

Operation

14.9.5 A comparison of operational road user GHG emissions between the 'do-minimum' and 'do-something' scenarios for the year of opening (2025) and the design year (2040) are presented in Table 14.14.

Table 14.14: Road user GHG emissions

	Option 6		Option 7		Option 8		Option 11	
Category	Year Opening (tCO2e)	Design Year (tCO2e)	Year Opening (tCO2e)	Design Year (tCO2e)	Year Opening (tCO2e)	Design Year (tCO2e)	Year Opening (tCO2e)	Design Year (tCO2e)
Do Minimum	2,848,233	3,178,757	2,848,233	3,178,757	2,848,233	3,178,757	2,848,233	3,178,757
Do Something	2,852,999	3,187,424	2,853,584	3,186,667	2,853,757	3,187,345	2,852,659	3,188,116
Variation	4,766	8,667	5,351	7,909	5,524	8,588	4,426	9,359

14.9.6 In line with the requirement of the NPSNN, Table 14.15 provides an assessment of the proposed scheme's GHG emissions impact against the UK Government's five year carbon budgets. This includes road user emissions only.

14.9.7 Albeit the opening year for the proposed scheme is anticipated to be 2027, air Quality, noise and climate assessments have used traffic modelling data from the earliest possible opening year of 2025 and design year of 2040 so that the results presented are consistent with the traffic model and conservative.

Table 14.15: Operational emissions in comparison to national carbon budgets

Carbon Budget	Category	Option 6	Option 7	Option 8	Option 11
4th (2023-2027)	Estimated total carbon over carbon budget (tCO2e) ('Do something' Scenario)	8,759,652	8,760,602	8,761,424	8,761,424
	Net CO2 project GHG emissions (tCO2e) (Do something- Do minimum)	16,639	17,588	18,410	18,410
	Proportion of Carbon Budget (Net Emissions)	0.0009%	0.0009%	0.0009%	0.0009%
5th (2028-2032)	Estimated total carbon over carbon budget (tCO2e) ('Do something' Scenario)	15,736,465	15,733,485	15,736,572	15,738,885
	Net CO2 project GHG emissions (tCO2e) (Do something- Do minimum)	40,994	38,012	41,102	41,102
	Proportion of Carbon Budget (Net Emissions)	0.0024%	0.0022%	0.0024%	0.0024%

Carbon Budget	Category	Option 6	Option 7	Option 8	Option 11
6th (2033-2037)	Estimated total carbon over carbon budget (tCO2e) ('Do something' Scenario)	15,937,120	15,933,335	15,936,725	15,940,580
	Net CO2 project GHG emissions (tCO2e) (Do something- Do minimum)	43,335	39,545	42,940	42,940
	Proportion of Carbon Budget (Net Emissions)	0.0045%	0.0041%	0.0044%	0.0044%

Monitoring

14.9.8 The CEMP will set out details of the monitoring to be undertaken during the proposed scheme construction stage to determine whether the mitigation measures embedded in the proposed scheme design are being appropriately implemented. Highways England is committed to reducing carbon emissions and working closely with suppliers to reduce emissions from network related activity. Energy consumption and materials use will be recorded and reported on an ongoing basis during the proposed scheme construction phase using the Highways England Carbon Reporting Tool.

14.9.9 It is not considered practical to monitor GHG emissions from road users during the proposed scheme's operational phase, due to the difficulties monitoring and measuring actual data.

Climate change resilience assessment

Construction

14.9.10 A high-level resilience assessment has been undertaken to assess the vulnerability of the PCF Stage 2 options to climate change during construction. The potential impacts of projected climate change and extreme weather impacts upon the resilience of the proposed scheme are likely to be similar for all options and are detailed in Table 14.16 below.

Table 14.16: CCR assessment – construction (all options)

Climate Variable	Impacts	Options Appraisal	Likely Significance
Increased frequency of extreme weather events	Damage, delay, health and safety impacts, increased costs.	Increased frequency of extreme weather (for example flooding, storms, heatwaves, etc) could impact all Stage 2 options for example due to the construction site becoming inaccessible, damage to machinery and equipment, and delaying the process. However, resilience to this impact is not likely to be significantly different between the Stage 2 options proposed.	Not Significant (NS)

Climate Variable	Impacts	Options Appraisal	Likely Significance
Increased temperatures, prolonged periods of hot weather	Warm and dry conditions exacerbate dust generation and dispersion, health risks to construction workers.	Increased temperatures and prolonged periods of hot weather can create health risks to the workforce and unsuitable working conditions. However, resilience to this impact is not likely to be significantly different between the Stage 2 options proposed.	NS
Increased precipitation, and intense periods of rainfall	Flooding of works and soil erosion; Disruption to supply of materials and goods.	Increased precipitation, and intense periods of rainfall may result in flooding events (fluvial and surface water) and disrupt the supply of goods and services. However, resilience to this impact is not likely to be significantly different between the Stage 2 options proposed.	NS

Operation

14.9.11 A high-level resilience assessment has been undertaken to assess the vulnerability of the PCF Stage 2 options to climate change during operation. The potential impacts of projected climate change and extreme weather impacts upon the resilience of the proposed scheme are likely to be similar for all options and are detailed in Table 14.17 below.

Table 14.17: CCR assessment – operation (all options)

Climate Variable	Impacts	Options Appraisal	Likely Significance
Increased frequency of extreme weather events	Increased requirement for maintenance and repair, danger to road users; Increased costs.	Increased frequency of extreme weather events weather (for example flooding, storms, heatwaves, etc) could impact on the infrastructure for all Stage 2 options, such as signage and lighting. Resilience to these impacts is unlikely to be significantly different between the Stage 2 options proposed due to the similarities in utilities and structure and future operation.	NS
Increased temperatures, prolonged periods of hot weather	Stress on structures and technology; Stress on surfaces e.g. difficulties with maintaining required texture depth operation; Challenges for maintenance regimes.	Temperature extremes, including dry periods could result in altered properties of road and pavements, for example, the resistance of road coverings. Resilience to this impact is not likely to be significantly different between the Stage 2 options proposed.	NS

Climate Variable	Impacts	Options Appraisal	Likely Significance
Increased precipitation, and intense periods of rainfall	Flooding; Water scour causing structural damage; Weakening or wash-out of structural soils; Change in ground water level and soil moisture.	Relatively small increases in usage of impermeable hard surfacing and surface gradients can increase the risk of flooding, especially under projected climate scenarios of increasing winter rainfall. For the flood risk aspects of the operational scheme, it is considered likely that the flood risk impacts of Option 6 could technically be reduced to negligible (not significant); however, the monetary and environmental costs of the extensive mitigation measures are likely to be prohibitive. The mitigation measures required for Option 8 are less intrusive and would likely comprise bunding on the eastern edge of the scheme. Operational Options 7 and 11 are shown to have neutral impacts on fluvial flood risk when using the latest climate change allowances. The surface water and groundwater flood risk impacts would be reduced to negligible (not significant) through appropriate mitigation.	NS

Monitoring

14.9.12 At this stage, based on the detail of information available, it is assumed that climate change will not have a significant impact on any of the Stage 2 options. However, this will be reviewed during subsequent assessments.

14.9.13 Further measures to reduce the vulnerability of the proposed scheme to climate change risks will be identified and considered as the preferred option is selected and the preliminary design is carried out at PCF Stage 3.

15 Assessment of cumulative effects

15.1 Introduction

15.1.1 This chapter presents the results of an assessment of the likely significant cumulative effects associated with the proposed scheme.

15.1.2 Potential effects from the proposed scheme may not be significant in isolation; however, several effects from the proposed scheme could combine resulting in an effect which could become significant; or effects from other committed developments in the area surrounding the proposed scheme could occur at the same time as the proposed scheme. The potential effects can be negative or positive in nature.

15.1.3 This chapter is supported by Appendix E long list of developments.

15.2 Legislative and policy framework

National Legislation

The Town and Country Planning (Environmental Impact Assessment) Regulation 2017

15.2.1 In accordance with Schedule 4 (5) of the EIA regulations, EIA should include consideration for the likely significant effects of the development resulting from the cumulation of effects with other existing or approved projects.

National Policy Statement for National Networks

15.2.2 Paragraph 4.16 of the NPSNN states that: “when considering significant cumulative effects, any environmental statement should provide information on how the effects of the applicant’s proposal would combine and interact with the effects of other development (including projects for which consent has been granted, as well as those already in existence)”.

National Planning Policy Framework

15.2.3 The NPPF paragraph 185 requires that cumulative effects are considered in decision-making:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development”.

DMRB and PINS Advice Note 17

15.2.4 The assessment of the combined and cumulative effects of the proposed scheme draws primarily upon the methodology provided by DMRB LA 104.

15.2.5 The Planning Inspectorate (PINS) gives guidance for cumulative assessment (Advice Note 17: Cumulative effects assessment relevant to nationally significant infrastructure projects) (PINS, 2019). Whilst the consenting route for the proposed scheme is yet to be confirmed, the PINS guidance has been used to supplement the methodology within DMRB, as it is one of the few more comprehensive pieces of guidance available. It states that:

“…applicants should, amongst other matters, consider mitigation for cumulative effects in consultation with other developers; assess cumulative effects on health; (…) consider positive and negative effects; and consider environmental limits (e.g. the potential for water quality effects to arise due to incremental changes in water quality)”.

15.2.6 This advice note has been used in the identification of the cumulative Zones of Influence (ZoI) for the cumulative assessment.

15.3 Cumulative assessment methodology

Scope of assessment

15.3.1 In line with DMRB LA 104 paragraph 3.21, the cumulative effects assessment considers two types of cumulative impact:

- **Combined effects:** combinations of effects that have been identified in Chapters 5 to 14, which, when acting together, are considered likely to result in a new or different likely significant effect, or an effect of greater significance, than any one of the impacts on their own.
- **Cumulative effects:** Scheme effects which, when considered together with the effects associated with other planned developments, could result in a new or different likely significant effect or an effect of greater significance than the scheme in isolation.

Combined effects methodology

15.3.2 The assessment methodology involves the identification of environmental resources and receptors where there is potential for more than one impact to be experienced and therefore potential for interactions between these. This enables the identification of the overall combined environmental effects of the proposed scheme.

15.3.3 The following receptor groups have been identified in the individual assessment chapters and considered in relation to the combined effects:

- Human receptors (residential and community facilities)
- Ecological receptors
- Built heritage features
- Waterbodies
- Travellers (walkers, cyclists, horse riders, and motorised users)

15.3.4 Potential interactions were identified by reviewing the effects identified within Chapters 5 to 14. The following chapters are considered to have combined effects relating to the above receptor groups:

- Chapter 6: Cultural Heritage and Chapter 8: Biodiversity consider the potential interactions of effects relating to construction and operational noise and air quality, and construction dust on receptors. Chapter 6: Cultural Heritage also takes into account visibility and landscape effects to inform the assessment of setting impacts and historic landscape as noted therein.
- Chapter 8: Biodiversity includes consideration of effects on the water environment and how this could affect ecological receptors.
- With the exception of dust generation during construction, the effects reported in Chapter 10: Geology and Soils would not be expected to affect the receptors noted in paragraph 15.3.3. As construction dust (including dust from storage areas) is already considered within the assessment in Chapter 5: Air Quality, a separate section relating to Geology and Soils has not been included.
- Effects relating to materials and waste as noted in Chapter 11: Material Assets and Waste would be unlikely to affect the receptors noted in paragraph 15.3.3 above.
- Chapter 12: Population and Human Health, considers the combined residual effects from other assessment topics (noise, air quality, traffic,

landscape, and visual) which could affect people's health and enjoyment of a PRoW, community facility or public open space.

- Chapter 13: Road Drainage and the Water Environment considers the effects of traffic in combination with changes that would be made to the water environment.
- Chapter 14: Climate includes specific consideration of combined climate impacts.

15.3.5 This assessment has considered the combined effects on all receptors and are summarised in Section 15.4.

Identifying Significance

15.3.6 In order to consider effects that are not significant, but could become significant in combination with other effects, the following effects have been considered for each topic:

- Air quality – receptors identified as sensitive locations with respect to construction dust and receptors experiencing a small magnitude or larger change in NO_2 or particulate matter in the Opening Year (as the worst case scenario (Vehicles are assumed to be more efficient and more electric cars in later years)).
- Visual effects – receptors experiencing a slight adverse or worse impact during construction or in the Opening Year (as the worst-case scenario).
- Noise and vibration – receptors experiencing a slight adverse or worse impact during construction or in the Design Year (as the worst-case scenario).

15.3.7 For definitions of these assessment criteria please refer to Chapter 5: Air Quality, Chapter 6: Cultural Heritage, Chapter 7: Landscape and Visual Effects, Chapter 8: Biodiversity, Chapter 9: Noise and Vibration, Chapter 10: Geology and Soils, Chapter 1: Population and Human Heath and Chapter 13: Road Drainage and the Water Environment.

15.3.8 The significance of combined effects upon environmental resources and receptors was determined using professional judgement (with input provided by the competent experts responsible for the production of the individual assessments) and judgements in relation to the combination of the individual effects with reference to Table 4.2: Matrix for determination of significance of effect (DMRB LA 104 Table 3.8.1) within Chapter 4: Environmental Assessment Methodology. Typical descriptions for effects are noted in Table 15.1. Generally, combined effects which are moderate, large, or very large (adverse or beneficial) are deemed to be significant and are expected to be material in the decision-making process.

Table 15.1: Typical descriptions of combined and cumulative effects

Significance Category	Typical descriptions of effect
Very Large (adverse or beneficial)	Where the combined impacts of the proposed scheme or cumulative impacts of the proposed scheme in association with other development upon an individual or collection of environmental receptors would be very highly significant (positive or negative). Effects would be permanent for receptors of very high value*. Effects at this level are material in the decision-making process.
Large (adverse or beneficial)	Where the combined impacts of the proposed scheme or cumulative impacts of the proposed scheme in association with other development upon an individual or collection of environmental receptors would be highly significant (positive or negative). Effects would be: • widespread/ large scale for a receptor of high value • permanent for a receptor or receptors of high value • localised for a receptor or receptors of very high value • temporary for a receptor or receptors of very high value. Effects at this level are likely to be material in the decision-making process.
Moderate (adverse or beneficial)	Where the combined impacts of the proposed scheme or cumulative impacts of the proposed scheme in association with other development upon an individual or collection of environmental receptors would be significant (positive or negative). Effects would be: • permanent for a receptor or receptors of medium value • localised for a receptor or receptors of high value • temporary for a receptor or receptors of high value Effects at this level can be considered to be material decision-making factors.
Slight (adverse or beneficial)	Where the combined impacts of the proposed scheme or cumulative impacts of the proposed scheme in association with other development upon an individual or collection of environmental receptors would be noteworthy but not significant (positive or negative). Effects would be: • permanent for a receptor or receptors of low value • localised for a receptor or receptors of medium or high value • temporary for a receptor or receptors of medium or high value Effects at this level are not considered to be material decision-making factors.
Neutral	Where the combined impacts of the proposed scheme or cumulative impacts of the proposed scheme in association with other development upon an individual or collection of environmental receptors would be negligible and not significant (positive or negative). No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.
* Note that the term 'value' refers here to both intrinsic value and sensitivity.	

Cumulative effects methodology

Stage 1: Establish the maximum ZoI and identify the long list of 'other developments'

Maximum Zone of Influence

15.3.9 PINS Advice Note 17 states that a "*Zone of Influence for each environmental aspect considered within the ES* [EAR]" should be determined. The maximum study area or cumulative ZoI has been developed based on an assumption that sensitive receptors at the furthest extent of the study areas used in Chapters 5 to 14 of this report would also be at the furthest extent of a theoretical study area for other development. The cumulative ZoI is the combined area over which the proposed scheme and other developments could have impacts on the same receptors.

15.3.10 The 4km maximum search area to prepare the long list reflected the study areas used in the biodiversity assessment of statutory nature conservation designations (see Chapter 8: Biodiversity).

Table 15.2: Cumulative effects assessment zone of influence

Environmental Topic	Scheme Study Area	Cumulative ZoI
Air Quality	Construction: 200m from the edge of the proposed scheme boundary for construction dust. The effects from construction phase traffic have not been considered at this time as noted in Chapter 5: Air Quality. Operation: The ARN within the traffic model defines study area, as described in Chapter 5: Air Quality. As the operational phase traffic data includes traffic associated with other developments, the air quality impact assessment reported within Chapter 5 is inherently cumulative.	400m from the proposed scheme boundary (for construction dust only)
Cultural Heritage	Construction and operation: 1km from the proposed scheme boundary for designated heritage assets and their settings.	Up to 2km from the proposed scheme boundary
Landscape and Visual	Construction and operation: 1km from the proposed scheme boundary based on the ZTV and on-site verification of up to 2 km.	Up to 4km from the proposed scheme boundary
Biodiversity	Construction and operation: 2km from the proposed scheme boundary for statutory and non-statutory designated sites. Within this, the study area for assessment purposes varies according to specific biodiversity receptors, is informed by SSSI Risk Zones and for species by Natural England and best practice guidance from the CIEEM and other sources.	Up to 4km from the proposed scheme boundary
Noise and Vibration	Construction: The vibration study area is a maximum of 100m from the works. The construction noise study area is a maximum of 300m from the proposed scheme boundary.	Up to 600m from the proposed scheme boundary

Environmental Topic	Scheme Study Area	Cumulative ZoI
Geology and Soils	Construction and operation: The proposed scheme boundary and an additional area of 250m for geology, soils and land contamination. An extended study area of 500m from the proposed scheme boundary has been considered appropriate for groundwater, surface water and potable water abstractions.	Up to 1km from the proposed scheme boundary
Material Assets and Waste	Construction: The estimated materials availability and waste capacity data used in the proposed scheme assessment (Chapter 12: Material Assets and Waste) are based on future regional demand, including other significant projects within the West Midlands region. Operation: operational phase material and waste management issues are scoped out of the assessment as unlikely to result in significant effects (See Chapter 12: Material Assets and Waste).	Not Applicable
Population and Human Health	Construction and operation: The study area for the assessment of impacts on land use and accessibility includes residential properties, community land and assets, businesses, development land, WCH facilities (PRoW, cycle routes and footways) and agricultural holdings within and up to 500m from the proposed scheme boundary. The human health assessment presented in Chapter 12: Population and Human Health draws on information and conclusions contained within the air quality, landscape and visual, noise and vibration, road drainage and the water environment, and climate assessments. The cumulative ZoI will be as per these topics.	Up to 1km form the proposed scheme boundary for land use and access
Road and Drainage and the Water Environment	Construction and operation: The study area is 1km beyond the proposed scheme boundary for water quality; extended up to 2km for water dependent ecological sites and rivers. The study area for flood risk is 1km upstream and 1km downstream of watercourse crossings.	2km beyond the proposed scheme boundary for water quality and flood risk, extended up to 4km water dependent ecological sites.
Climate	Construction and operation: The study area for GHGs is the area within the proposed scheme boundary and the ARN. As the construction and operational phase traffic data includes traffic associated with other developments, the climate assessment reported within Chapter 14: Climate is inherently cumulative.	Not Applicable

Environmental Topic	Scheme Study Area	Cumulative ZoI
	The study area for climate resilience is land within the proposed scheme boundary the surrounding environment as informed by other environmental topic assessments study areas. Therefore, no additional cumulative ZoI is identified beyond the other topic ZoIs within this table.	

Long list of other development

15.3.11 The long list of 'other development' presented in Appendix E was compiled based on information and records at the time of undertaking the assessment for those developments within the cumulative ZoI. A review of the developments for which planning permission had been granted between 1 January 2017 and 1 September 2021 was undertaken using the planning application search functions of the Rugby Borough Council (RBC), Coventry City Council (CCC) and Warwickshire District Council (WDC) websites.

15.3.12 DMRB LA 104 recommends that professional judgement is used to define the list of projects to be included (DMRB LA 104 Paragraph 3.22 Note 2) and provides a set of criteria upon which the assessment of cumulative effects should report on as below:

- Roads projects which have been confirmed for delivery over a similar timeframe.
- Development projects where planning consent has been granted, and for which an EIA was undertaken, excluding those where the consent has expired.
- Proposals in adopted development plans with a clear identified programme for delivery.

15.3.13 PINS Advice Note 17 notes that it is appropriate to consider the cumulative effects of the proposed scheme with existing developments and existing plans and projects that are 'reasonably foreseeable'. As the proposed scheme is unlikely to commence construction until 2025 at the earliest, and be open to traffic in 2027, 'reasonably foreseeable' has been interpreted to include other development projects that are in planning. Therefore, in addition to the criteria prescribed by DMRB LA 104, development projects were included in the long list where they are considered to be 'major developments' as defined by the Town and Country Planning (Development Management Procedure) Order (MHCLG, 2015b) Part 1(2). The criteria for a 'major development' are:

- Employment proposals of 1,000 m^2 or more.
- Residential proposals with 10 or more houses or, where the number of houses is not known, a site area of 0.5ha or more.
- Minerals or waste sites with an area of 1ha or more.
- Transport infrastructure proposals with an area of 1ha or more.

15.3.14 A search was conducted using the PINS website and the Highways England improvements and major road projects website. This search indicated that there are two major road projects and no NSIPs within 4km of the proposed scheme.

15.3.15 A total of 48 developments were included on the initial long-list and can be found in Appendix E.

15.3.16 Each identified development was placed on the long list and then reviewed to determine the current status of each development, to identify whether the

development had been implemented (completed), was under construction, or if the consent had expired.

15.3.17 Where developments were determined to have been completed and in operation, they are considered within the current baseline against which the effects of the proposed scheme have been assessed in Chapters 5 to 14. Therefore, these were excluded from the cumulative effects assessment.

15.3.18 Development projects where EIA is required, but consent has not yet been determined have been left within the short list due to the relatively long period between the time of the assessment and the start of construction and Opening Year.

Stage 2: Identify the shortlist of 'other development' for Cumulative effects assessment

15.3.19 The developments on the long-list were reviewed to identify the potential for these developments to result in cumulative effects with the proposed scheme. This included consideration for the nature and scale of the development, and potential temporal and/ or spatial interactions with receptors affected by the proposed scheme in the relevant ZoIs. No cumulative impacts were identified and no developments have been included in the short list.

15.3.20 The process of preparing the short-list has been documented and the justification for excluding developments in the short-list is provided in Appendix E.

Stage 3: Information gathering

15.3.21 Information gathering involved sourcing further information relating to the shortlisted developments, in order to establish the details of their likely environmental effects and potential for cumulative effects with the proposed scheme. This information has been primarily obtained from documentation submitted as part of planning applications or used in the appraisals for site allocations. Information gathered for each development included (where available) the design of the development, its location, the expected timelines and likely environmental effects.

Stage 4: Assessment

15.3.22 The value of receptor and significance of construction and operational phase environmental effects has been brought forward from the individual topic assessments. The information collated for the list of other developments provides the anticipated impacts (either provided in an accompanying EIA or assumed) on the same receptors as the proposed scheme. The magnitude of the combined impact of the proposed scheme and other developments upon these environmental resources and receptors has been determined using professional judgement based on the typical descriptions provided in Table 15.1.

Identifying significance

15.3.23 The significance of cumulative effects has been determined using professional judgement (with input provided by the competent experts responsible for the production of the individual assessments) with reference to the typical descriptions for effects . Generally, cumulative effects which are moderate, large or very large (adverse or beneficial) are deemed to be significant.

Assumptions and Limitations

15.3.24 Whilst the proposed scheme may be considered to be a NSIP, this has not been confirmed and therefore it is considered disproportionate to apply the full methodology within PINS Advice Note 17 at this stage of the assessment - the Environmental Appraisal Report. If the proposed scheme is later considered to be an NSIP, the assessment methodology for the Environmental Statement will be

required to follow PINS Advice Note 17. This could bring other developments into the scope of the cumulative assessment at PCF Stage 3. This would require the inclusion of additional developments within the long list of other developments including Nationally Significant Infrastructure Projects that are yet to be determined and development that is identified in other development plans, emerging development plans and other plans and programmes which set a framework for future development consents or approvals.

15.3.25 The assessment requires application of professional judgement to come to a conclusion of significant combined or cumulative effects in line with the criteria in Table 15.1.

15.3.26 The assessment has been undertaken based upon the information related to other developments that is publicly available. Further information about the other developments is likely to become available as they progress through their own programme for delivery. There may also be future planning applications submitted within the ZoI for further developments than those identified that could result in cumulative effects with the proposed scheme, which at this time cannot be assessed. If further developments warrant an EIA it is assumed that a cumulative assessment would be required which would take into account the proposed scheme.

15.3.27 Due to the limited information available on many developments regarding the delivery programmes, worst-case approaches have been adopted. For in-combination effects this assumes that effects arising from two different topics on one receptor will occur concurrently unless timing is explicitly mentioned in the assessment. For cumulative effects, a worst-case assumption of overlapping construction programmes (with the proposed scheme) and the development being fully operational by Opening Year has been applied. The assumptions and limitations noted within Chapter 4 and the topic Chapters 5 to 14. of this report also apply to this assessment.

15.4 Assessment of combined effects

15.4.1 This section provides a summary of the potential combinations of effects which have been identified as part of the assessments reported within Chapter 5: Air Quality, Chapter 6: Cultural Heritage, Chapter 7: Landscape and Visual Effects, Chapter 8: Biodiversity, Chapter 9: Noise and Vibration, Chapter 10: Geology and Soils, Chapter 1: Population and Human Heath and Chapter 13: Road Drainage and the Water Environment, which are considered likely to affect a single receptor as described in these chapters. This therefore presents the potential for combined effects on these receptors.

Table 15.3 to

15.4.2 Table 15.10 include details of the receptors which may be subject to combined effects due to the proposed scheme; in some cases, the combined effect is equivalent to the 'worst case' effect already identified for a single environmental topic. Where it is considered that the combination of effects may change the effect upon the receptor, the resulting effect has been assigned in accordance with the significance categories set out within Table 4.2.

15.4.3 Based on this assessment, there is potential for cumulative significant effects during construction as a result of all options, due to combinations of construction noise, vibration, and visual effects. During operation there is also the potential for cumulative significant effects most notably for Option 6.

Construction

Table 15.3: Combined effects during construction – Option 6

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	High sensitivity to dust, no significant effects with mitigation	Moderate adverse impacts likely	Neutral	Very large (winter) Large (summer) Adverse	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Moderate adverse
Residential receptors at Valencia Road	High sensitivity to dust, no significant effects with mitigation	Large adverse impacts likely	Large adverse impacts likely	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential Receptors at Florence Road, Sevilla Close, Hepworth Road	High sensitivity to dust, no significant effects with mitigation	Moderate adverse impacts likely	Neutral	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	High sensitivity to dust, no significant effects with mitigation	Moderate adverse impacts likely	Neutral	Large adverse	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Moderate adverse
Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave.	High sensitivity to dust, no significant effects with mitigation	Moderate adverse impacts likely	Neutral	Slight adverse	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Hungerley Hall Farm Grade II Listed Building	High sensitivity to dust, no significant effects with mitigation	Large adverse impacts likely	Large adverse impacts likely	Very large adverse	Slight adverse	Slight adverse	Slight adverse	Moderate adverse	Neutral	Neutral	Large adverse
Coombe Abbey Grade II*	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Slight adverse	Moderate adverse	Neutral	Neutral	Neutral	Neutral	Slight adverse
Walsgrave Farm Grade II	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Slight adverse	Neutral	Neutral	Slight adverse	Neutral	Neutral	Slight adverse
Coombe Pool SSSI	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Moderate adverse	Neutral	Neutral	Neutral	Neutral	Neutral
River Sowe	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Neutral	Large adverse	Neutral	Slight adverse	Neutral	Slight adverse
Smite Brook	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Slight adverse	Large adverse	Neutral	Slight adverse	Neutral	Slight adverse

Table 15.4: Combined effects during construction – Option 7

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Moderate adverse	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential receptors at Valencia Road	High sensitivity to dust, no significant effects with mitigation	Large adverse impacts likely	Large adverse impacts likely	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential Receptors at Florence Road, Sevilla Close, Hepworth Road	High sensitivity to dust, no significant effects with mitigation	Moderate adverse impacts likely	Neutral	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave.	High sensitivity to dust, no significant effects with mitigation	Moderate adverse impacts likely	Neutral	Slight adverse	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Hungerley Hall Farm Grade II Listed Building	High sensitivity to dust, no significant effects with mitigation	Large adverse impacts likely	Large adverse impacts likely	Large adverse	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Large adverse
Coombe Abbey Grade II*	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Walsgrave Farm Grade II	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Coombe Pool SSSI	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Moderate adverse	Neutral	Neutral	Neutral	Neutral	Neutral
River Sowe	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Neutral	Large adverse	Neutral	Slight adverse	Neutral	Slight adverse
Smite Brook	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Slight adverse	Large adverse	Neutral	Slight adverse	Neutral	Slight adverse

Table 15.5: Combined effects during construction – Option 8

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Moderate adverse	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential receptors at Valencia Road	High sensitivity to dust, no significant effects with mitigation	Large adverse impacts likely	Large adverse impacts likely	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential Receptors at Florence Road, Sevilla Close, Hepworth Road	High sensitivity to dust, no significant effects with mitigation	Moderate adverse impacts likely	Neutral	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave.	High sensitivity to dust, no significant effects with mitigation	Moderate adverse impacts likely	Neutral	Slight adverse	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Hungerley Hall Farm Grade II Listed Building	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Large adverse	Neutral	Slight effect	Slight adverse	Moderate adverse	Neutral	Neutral	Moderate adverse
Coombe Abbey Grade II*	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Walsgrave Farm Grade II	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Coombe Pool SSSI	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Moderate adverse	Neutral	Slight Adverse	Moderate adverse	Neutral	Slight adverse

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
River Sowe	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Neutral	Large adverse	Neutral	Neutral	Neutral	Neutral
Smite Brook	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Slight adverse	Large adverse	Neutral	Slight adverse	Neutral	Slight adverse

Table 15.6: Combined effects during construction – Option 11

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	High sensitivity to dust, no significant effects with mitigation	Moderate adverse impacts likely	Neutral	Large (winter) Moderate (summer) adverse	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Moderate adverse
Residential receptors at Valencia Road	High sensitivity to dust, no significant effects with mitigation	Large adverse impacts likely	Large adverse effects	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential Receptors at Florence Road, Sevilla Close, Hepworth Road	High sensitivity to dust, no significant effects with mitigation	Moderate adverse impacts likely	Neutral	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	High sensitivity to dust, no significant effects with mitigation	Moderate adverse impacts likely	Neutral	Moderate (winter) Slight (summer) adverse	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave.	High sensitivity to dust, no significant effects with mitigation	Moderate adverse impacts likely	Neutral	Slight adverse	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Hungerley Hall Farm Grade II Listed Building	High sensitivity to dust, no significant effects with mitigation	Large adverse effects	Large adverse effects	Very large adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Neutral	Neutral	Large adverse
Coombe Abbey Grade II*	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Slight adverse	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Walsgrave Farm Grade II	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Slight adverse	Neutral	Neutral	Slight adverse	Neutral	Neutral	Slight adverse
Coombe Pool SSSI	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Moderate adverse	Neutral	Neutral	Neutral	Neutral	Neutral

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
River Sowe	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Neutral	Large adverse	Neutral	Slight adverse	Neutral	Slight adverse
Smite Brook	High sensitivity to dust, no significant effects with mitigation	Neutral	Neutral	Neutral	Neutral	Neutral	Large adverse	Neutral	Slight adverse	Neutral	Slight adverse

Operation

Table 15.7: Combined effects during operation – Option 6

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Moderate adverse	Operational vibration not in scope of assessment	Very large (winter) And large (summer) in the opening year reducing to slight in year 15	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Moderate adverse
Residential receptors at Valencia Road	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Moderate adverse	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential Receptors at Florence Road, Sevilla Close, Hepworth Road	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Moderate adverse	Operational vibration not in scope of assessment	Large in opening year and reducing to slight in year 15	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave.	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Moderate adverse	Operational vibration not in scope of assessment	Neutral in opening year and increasing to slight in year 15	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Hungerley Hall Farm Grade II Listed Building	Large increases in NO_2 predicted	Large adverse effects	Operational vibration not in scope of assessment	Large in opening year reducing to moderate in year 15	Slight adverse	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Moderate adverse
Coombe Abbey Grade II*	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Moderate adverse	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Walsgrave Farm Grade II	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Coombe Pool SSSI	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Slight adverse
River Sowe	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Neutral	Slight adverse	Slight adverse	Slight adverse
Smite Brook	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Neutral	Slight adverse	Slight adverse	Slight adverse

Table 15.8: Combined effects during operation – Option 7

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Slight in the opening year and in year 15	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential receptors at Valencia Road	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Slight adverse	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential Receptors at Florence Road, Sevilla Close, Hepworth Road	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Slight adverse	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave.	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Moderate adverse	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Hungerley Hall Farm Grade II Listed Building	Small increases in NO_2 predicted	Neutral	Operational vibration not in scope of assessment	Large in opening year reducing to moderate in year 15	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Coombe Abbey Grade II*	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Walsgrave Farm Grade II	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Coombe Pool SSSI	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Slight adverse	Neutral	Neutral	Slight adverse	Slight adverse	Slight adverse
River Sowe	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse
Smite Brook	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse

Table 15.9: Combined effects during operation – Option 8

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Moderate in the opening year reducing to slight in year 15	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential receptors at Valencia Road	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Large adverse	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential Receptors at Florence Road, Sevilla Close, Hepworth Road	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Slight adverse	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave.	Small increases in NO_2 predicted	Large adverse	Operational vibration not in scope of assessment	Slight in opening year and reducing to neutral in year 15	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Hungerley Hall Farm Grade II Listed Building	Medium increases NO_2 predicted	Neutral	Operational vibration not in scope of assessment	Not applicable	Very large adverse	Neutral	Neutral	Neutral	Neutral	Neutral	Receptor removed as part of proposed scheme
Coombe Abbey Grade II*	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Walsgrave Farm Grade II	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	Noise	Vibration	Visual effects	Cultural Heritage	Biodiversity	Geology & Soils	Population & Human Health	Water Environment	Climate	
Coombe Pool SSSI	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Slight adverse	Neutral	Neutral	Slight adverse	Slight adverse	Slight adverse
River Sowe	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Neutral	Slight adverse	Slight adverse	Slight adverse
Smite Brook	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Neutral	Slight adverse	Slight adverse	Slight adverse

Table 15.10: Combined effects during operation – Option 11

Receptor	Potential combined effects										Residual (cumulative) effect
	Air quality (Construction dust)	**Noise**	**Vibration**	**Visual effects**	**Cultural Heritage**	**Biodiversity**	**Geology & Soils**	**Population & Human Health**	**Water Environment**	**Climate**	
Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Large (winter) and moderate (summer) in opening year and reducing to slight in year 15	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential receptors at Valencia Road	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential Receptors at Florence Road, Sevilla Close, Hepworth Road	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Residential receptors at northern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Slight in opening year and reducing to neutral in year 15	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse

Residential receptors at Royston Close and Gainford Rise, Binley/ Walsgrave.	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Hungerley Hall Farm Grade II Listed Building	Small increase in NO_2 predicted	Moderate adverse	Operational vibration not in scope of assessment	Large in opening year and reducing to slight in year 15	Moderate adverse	Neutral	Slight adverse	Slight adverse	Neutral	Neutral	Slight adverse
Coombe Abbey Grade II*	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Moderate adverse	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Walsgrave Farm Grade II	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Coombe Pool SSSI	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Neutral	Neutral	Slight adverse	Slight adverse	Slight adverse
River Sowe	Imperceptible	Neutral	Operational	Neutral	Neutral	Neutral	Slight	Neutral	Slight adverse	Slight	Slight adverse

	mean NO_2 concentration changes at all receptors (neutral)		vibration not in scope of assessment				adverse			adverse	
Smite Brook	Imperceptible mean NO_2 concentration changes at all receptors (neutral)	Neutral	Operational vibration not in scope of assessment	Neutral	Neutral	Neutral	Slight adverse	Neutral	Slight adverse	Slight adverse	Slight adverse

15.5 Assessment of cumulative effect

15.5.1 No developments have been shortlisted for inclusion in the assessment of cumulative effects. Other developments identified within the ZoI either do not have a temporal overlap with the proposed scheme or do not meet the criteria outlined in DMRB LA 104 (Paragraph 3.22 Note 2). These developments are considered to have a very low potential for cumulative effects in conjunction with the proposed scheme.

15.5.2 Therefore, there are not likely to be any significant cumulative effects as a result of the proposed scheme in association with other developments. This conclusion should be reviewed at PCF Stage 3 with a revision to the long list of other developments.

16 Summary

16.1.1 The previous topic chapters 5 to 15 present the assessments for the individual environment impact assessment topics. Each assessment provides an assessment of the likely significant effects (with the implementation of mitigation measures i.e. residual effects). Table 16.1 provides a summary of the significant residual effects of the proposed scheme with mitigation, as described, in place.

Table 16.1: Summary of the significant residual effects of the proposed scheme with mitigation, as described, in place.

Chapter	Construction				Operation			
	Option 6	**Option 7**	**Option 8**	**Option 11**	**Option 6**	**Option 7**	**Option 8**	**Option 11**
Chapter 5: Air Quality	No significant effects.				No significant effects.			
Chapter 6: Cultural Heritage	Large permanent adverse effect on: Grade II listed barn at Hungerley Hall Farm (setting impact as closer to the new road alignment. Grade II listed Granary, cowshed and stable at Hungerley Hall Farm. Moderate temporary adverse effect on: Grade II Listed Granary, cowshed and stable at Hungerley Hall Farm.	No significant effects.	Very large permanent adverse effects on: Demolition of the listed Hungerley Hall Farm-house Large permanent adverse effect on: Grade II listed barn at Hungerley Hall Farm (setting impact as closer to the new road alignment. Grade II listed Granary, cowshed and stable at Hungerley Hall Farm.	Moderate permanent adverse effect on: Hungerley Hall Farm-house due to loss of field adjacent to gardens.	Moderate adverse effect on Coombe Abbey Grade II* RPG due to lighting of 'dumbbell junction'.	No significant effects.	No significant effects.	Moderate adverse effect on Coombe Abbey Grade II RPG due to lighting of 'dumbbell junction'.

Chapter	Construction				Operation			
	Option 6	Option 7	Option 8	Option 11	Option 6	Option 7	Option 8	Option 11
Chapter 7: Landscape and Visual Effects	No significant landscape effects. Very large visual effects during construction on: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close (very large in winter and large in summer) Residential receptors at Hungerley Hall Farm Grade II Listed Building Large visual effects during construction on: Residential receptors at northern end of Fontmell Close/ Abbotsbury Close Moderate visual effects during construction on:	No significant landscape effects. Large visual effects during construction on: Residential receptors at Hungerley Hall Farm Grade II Listed Building Moderate visual effects during construction on: Recreational receptors at Gainford Rise Open Space, Binley Residential receptors at southern end of Fontmell Close/ Abbotsbury Close	No significant landscape effects. Large visual effects during construction on: Residential receptors at Hungerley Hall Farm Grade II Listed Building Moderate visual effects during construction on: Recreational receptors at Gainford Rise Open Space, Binley Residential receptors at southern end of Fontmell Close/ Abbotsbury Close	No significant landscape effects. Very large visual effects during construction on: Residential receptors at Hungerley Hall Farm Grade II Listed Building Large visual effects during construction on: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close (winter) Moderate visual effects during construction on: Residential receptors at	No significant landscape effects. Moderate permanent adverse visual effects on residential receptors at Hungerley Hall Farm Grade II Listed Building	No significant landscape effects. There are no permanent residual effects at year 15 (winter).	No significant landscape effects. There are no permanent residual effects at year 15 (winter).	No significant landscape effects. There are no permanent residual effects at year 15 (winter).

Chapter	Construction				Operation			
	Option 6	**Option 7**	**Option 8**	**Option 11**	**Option 6**	**Option 7**	**Option 8**	**Option 11**
	Recreational receptors in the River Sowe open space			southern end of Fontmell Close/ Abbotsbury Close (summer) Residential receptors at northern end of Fontmell Close/ Abbotsbury Close (winter)				
Chapter 8: Biodiversity	Significant effects arising from: Slight adverse temporary effect on broad-leaved semi-natural woodland (County value) and potential for moderate adverse effect on Coombe Pool SSSI in the short term and reducing to not	Significant effects arising from: Slight adverse temporary effect on broad-leaved semi-natural woodland (County value) and potential for moderate adverse effect on Coombe Pool SSSI in the short term and reducing to not significant in the long term.	Significant effects arising from: Moderate adverse permanent effect on Coombe Pool SSSI and broad-leaved semi-natural woodland (County value) Major adverse effects on bats (County value) due to habitat loss and severance.	Significant effects arising from: Slight adverse temporary effect on broad-leaved semi-natural woodland (County value) and potential for moderate adverse effect on Coombe Pool SSSI in the short term and reducing	Significant effects arising from: Major adverse effect on bats, barn owl and riparian mammals (County value) due to risk of species mortality from collision with operational traffic; and disturbance from lighting.	No significant effects.	No significant effects.	Significant effects arising from: Major adverse effect on bats, barn owl and riparian mammals (County value) due to risk of species mortality from collision with operational traffic; and disturbance from lighting.

Chapter	Construction				Operation			
	Option 6	Option 7	Option 8	Option 11	Option 6	Option 7	Option 8	Option 11
	significant in the long term. Moderate adverse permanent effect on hedgerows (County value) due to loss and severance; Major adverse effects on bats (County value) due to habitat loss and severance.			to not significant in the long term. Major adverse effects on bats (County value) due to habitat loss and severance.				
Chapter 9: Noise and Vibration	Potential for significant construction noise and vibration effects on nearby residential properties and Hungerley Hall Farmhouse. Construction traffic noise was not assessed.	Potential for significant construction noise and vibration effects on nearby residential properties and Hungerley Hall Farmhouse. Construction traffic noise was not assessed.	Potential for significant construction noise and vibration effects on nearby residential properties. Construction traffic noise was not assessed.	Potential for significant construction noise and vibration effects on nearby residential properties and Hungerley Hall Farmhouse. Construction traffic noise was not assessed.	Large adverse effects on Hungerley Hall Farm. Moderate adverse effects at 66 NSRs in vicinity of Valencia Road. Moderate adverse effects at 157 NSRs in vicinity of Dorchester Way.	Moderate adverse effects at 29 NSRs in vicinity of Gainford Rise and Royston Close.	Large adverse effects at 53 NSRs in vicinity of Gainford Rise, Royston Close and Valencia Road.	Moderate adverse effects on Hungerley Hall Farm.

Chapter	Construction				Operation			
	Option 6	Option 7	Option 8	Option 11	Option 6	Option 7	Option 8	Option 11
Chapter 10: Geology and Soils	Large or very large adverse effect on soil quality and surrounding agricultural land. Moderate or large adverse effects on controlled surface waters.				No significant effects.			
Chapter 11: Material Assets and Waste	No significant effects.				No significant effects.			
Chapter 12: Population and Health	Large adverse permanent effects on: Hungerley Hall Farmhouse (severance to road network) Moderate adverse permanent effects on: Hungerley Hall Farmhouse (residential access) Potential for significant construction noise and vibration effects.	Potential for significant construction noise and vibration effects.	Large adverse permanent effects on: Hungerley Hall Farmhouse (severance of access to eastern field) Moderate adverse permanent effects on: Hungerley Hall Farmhouse (demolition) Potential for significant construction noise and vibration effects.	Potential for significant construction noise and vibration effects.	No significant effects.			

Chapter	Construction				Operation			
	Option 6	**Option 7**	**Option 8**	**Option 11**	**Option 6**	**Option 7**	**Option 8**	**Option 11**
Chapter 13: Road Drainage and the Water Environment	Moderate adverse temporary effects on water quality within the River Sowe.	No significant effects.	Moderate adverse temporary effect on Coombe Pool SSSI.	No significant effects.	Moderate or large adverse effect on hydromorphol-ogy.	No significant effects.		
Chapter 14: Climate	No significant effects				No significant effects. In comparison to the Do-Minimum scenario, some options provide a net increase in carbon budget periods, however this net difference is never more than 0.001% of the budget.			
Chapter 15: Assessment of Cumulative Effects	Large adverse temporary residual combined effects on: Hungerley Hall Farm Grade II Listed Building Moderate adverse temporary residual combined effects on: Residential receptors at southern end of	Large adverse temporary residual combined effects on: Hungerley Hall Farm Grade II Listed Building No significant cumulative effects with other projects.	Moderate adverse temporary residual combined effects on: Hungerley Hall Farm Grade II Listed Building No significant cumulative effects with other projects.	Large adverse temporary residual combined effects on: Hungerley Hall Farm Grade II Listed Building Moderate adverse temporary residual combined effects on: Residential receptors at southern end of Fontmell Close/	Moderate adverse residual combined effects on: Residential receptors at southern end of Fontmell Close/ Abbotsbury Close, Hungerley Hall Farm Grade II Listed Building. No significant cumulative effects with other projects.	No significant residual combined effects. No significant cumulative effects with other projects.	No significant residual combined effects. No significant cumulative effects with other projects.	No significant residual combined effects. No significant cumulative effects with other projects.

Chapter	Construction				Operation			
	Option 6	Option 7	Option 8	Option 11	Option 6	Option 7	Option 8	Option 11
	Fontmell Close/ Abbotsbury Close Residential receptors at northern end of Fontmell Close/ Abbotsbury Close No significant cumulative effects with other projects.			Abbotsbury Close No significant cumulative effects with other projects.				

17 References

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APPENDIX C
REPORT ON PUBLIC CONSULTATION

A46 Coventry Junctions Upgrade (Walsgrave Junction)

Stage 2 Consultation Report
PCF Stage 2
National Highways

Status: P01

Document Ref: HE604820-ACM-GEN-WAL_SW_000_Z-RP-ZH-3345

March 2022

A46 Coventry Junctions Upgrade (Walsgrave)

Stage 2 Consultation Report

Report No: HE604820-ACM-GEN-WAL_SW_000_Z-RP-ZH-3345

March 2022

Revision	Current Status	Date	Prepared By	Reviewed By	Approved By
P01	S3	16/03/22	PB	JH	KJ/JW

National Highways
2 Colmore Square
38 Colmore Circus
Birmingham
B4 6BN

AECOM
Sunley House
4 Bedford Park
Croydon
CR0 2AP

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1 Introduction

1.1 Scheme Background

1.1.1 National Highways are investigating and developing proposals to improve Walsgrave junction as part of the A46 Coventry Junctions Upgrade scheme. The scheme was announced in the Autumn Statement 2014 (AS14) and listed in the Government's Roads Investment Strategy (RIS) as a commitment in the 2015/16 - 2019/20 period, subject to further contributions from National Highways.

1.1.2 The route section, as shown in **Error! Reference source not found.**-1, is 8.2km in length and consists of an all-purpose two-lane dual carriageway (D2AP) with two at grade junctions (Binley junction and Walsgrave junction) located between A45 / A46 Tollbar End junction to the south and M6 Junction 2 to the north.

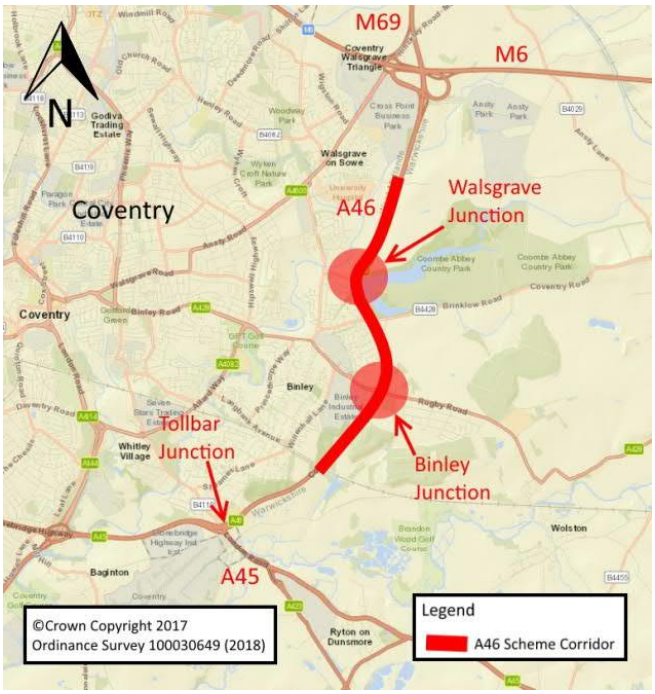


Figure 1-1: Location of A46 Walsgrave junction

1.1.3 The A46 Walsgrave junction is an at-grade non-signalised roundabout, which connects the A46 to the local network through the B4082. It consists of a three-arm roundabout with the A46 running north/south and the B4082 on the western arm. The junction upgrade is currently at Stage 2 of the PCF process, which involves the selection of options.

1.2 Scheme Objectives

1.2.1 Support economic growth

1.2.1.1 The A46 is a nationally significant trade and export route. There are ports at either end of the corridor and both East Midlands and Birmingham airports are close by. The scheme will provide additional junction capacity in an area that's already busy and which is forecast to become even busier in the coming years due to planned developments across the region.

1.2.2 Support the smooth flow of traffic

1.2.2.1 Congestion at the Walsgrave junction means journeys are unreliable and take longer than they should. This will only get worse as more people are expected to use the road in the future. The scheme will improve the flow of traffic, meaning road users will have quicker and more reliable journeys.

1.2.3 Improve safety

1.2.3.1 Accidents not only have a direct impact on those involved, but they often lead to lane closures which impact journey time reliability for other road users. Improving the Walsgrave junction will improve safety by separating local and long-distance traffic and reducing congestion.

1.3 Purpose of this report

1.3.1 The purpose of this report is to provide a summary of the responses received during the non-statutory consultation period.

1.3.2 A non-statutory consultation is an initial consultation held by National Highways, seeking stakeholder views on potential options for a scheme.

1.3.3 The report details how stakeholders and the public were informed of the consultation, how the proposal was presented, the responses received and how these responses have been analysed and considered.

1.4 Options

1.4.1 Options assessment

1.4.1.1 An options assessment took place prior to the non-statutory public consultation. This process is outlined in Figure 1-2 below.

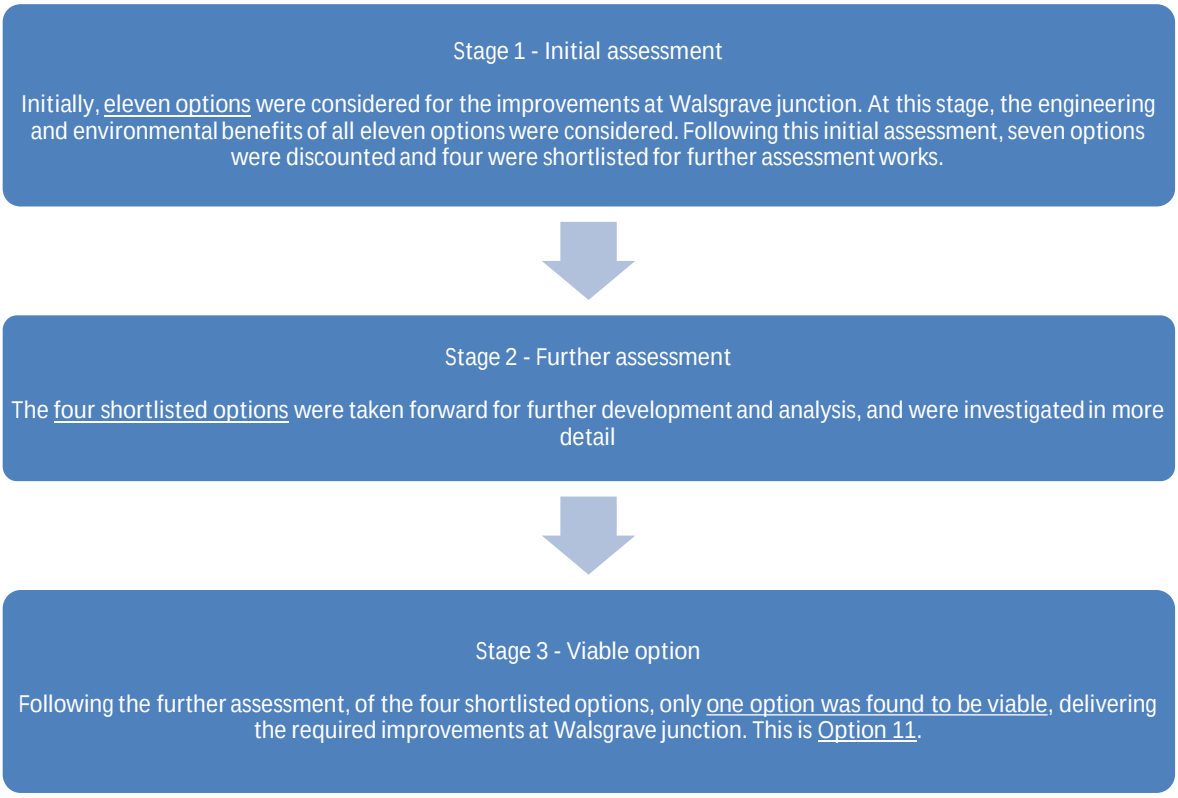


Figure 1-2: Options selection process

1.4.2 As Option 11 was the only viable option, this was the option carried forward to non-statutory consultation.

1.4.3 As the design of this option is still at an outline stage, this consultation provided an opportunity for stakeholders to meaningfully influence its further development before the scheme is taken forward into the next design stage.

1.4.4 Alongside Option 11, the three options developed and analysed at Stage 2 were also outlined. The consultation materials focused on the reasons these options were not viable and explained why they could not be consulted upon during non-statutory consultation.

1.5 Viable option – Option 11

1.5.1 Option 11 would provide a fully grade separated junction approximately 800m north of the existing A46 Walsgrave junction. A grade separated junction is a junction where the conflicting traffic flows are kept apart, usually by means of a bridge of tunnel. This allows for two lanes of free-flowing traffic in each direction. Exit and entry slip roads would be provided on both the north and southbound carriageway allowing full connection to the local road network.

1.5.2 The junction would be in a dumbbell layout with the slip roads connecting to a roundabout on each side of the carriageway with the roundabouts connected via an overbridge. For safety reasons the existing northbound and southbound laybys, north of the current A46 Walsgrave roundabout, would need to be removed.

1.5.3 A new B4082 link road, approximately 1km in length, would be provided between the western roundabout of the proposed dumbbell junction and an existing section of the B4082 that leads to the roundabout on Clifford Bridge Road. This would be a two-lane single carriageway, situated between the A46 and Hungerley Hall Farm.

Figure 1-3 (page 10) shows the proposed design of Option 11.

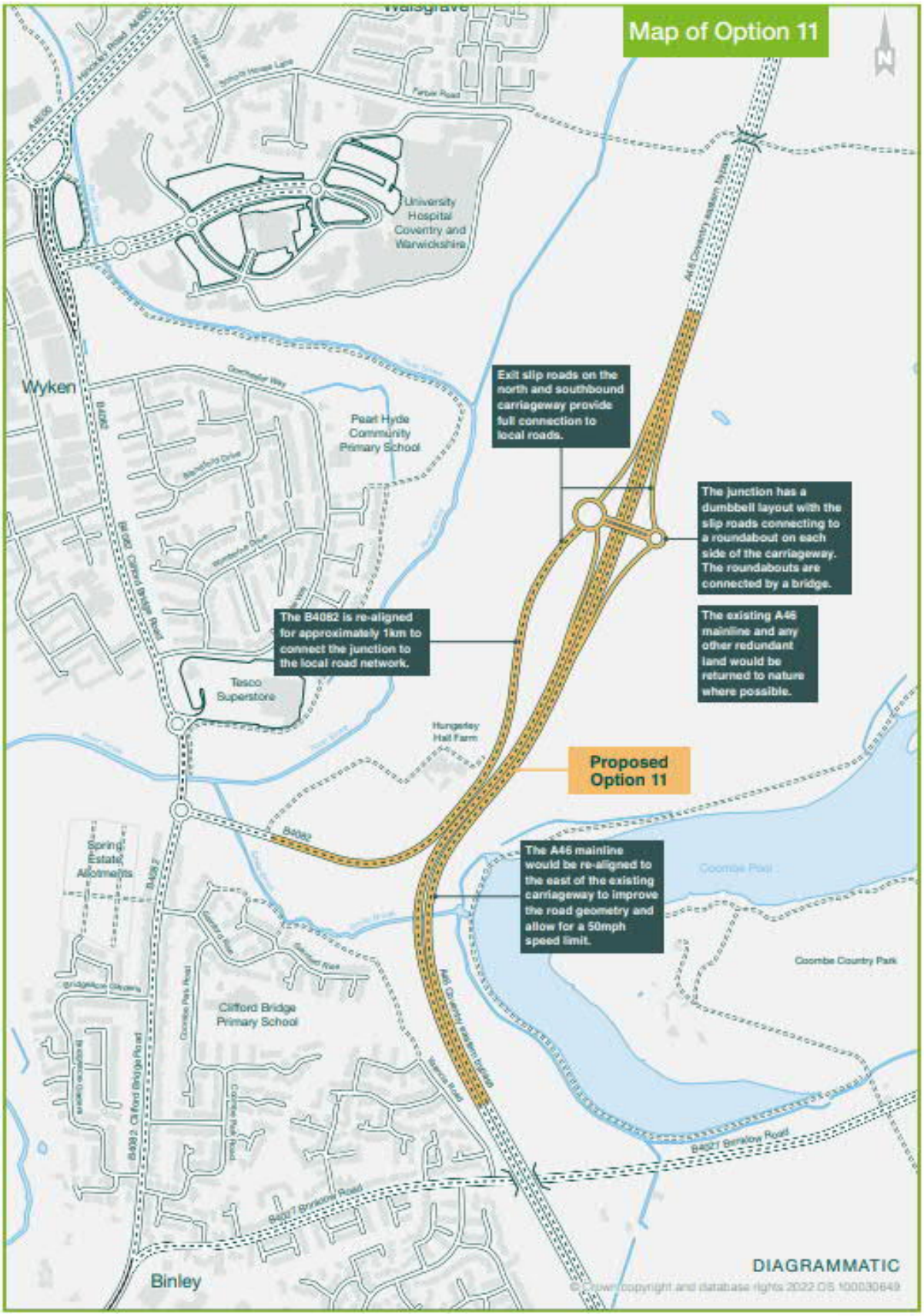


Figure 1-3: Proposed design for Option 11

1.5.4 Due to the existing local constraints, including the River Sowe flood plain and Hungerley Hall Farm, the main carriageway will have a 50mph limit so road users can travel safely through the junction. The existing sections of the B4082 and A46 roundabout that are no longer required would be removed, with planting and landscape designs for any unused land to be decided in later stages of the scheme. The existing overpass (farm access)

over the A46 close to Hungerley Hall Farm would be demolished, with new access provided subject to consultation with the landowner.

1.6 Discounted options

1.6.1 Option 6

1.6.1.1 Option 6 would have provided a new fully grade separated junction approximately 1km north of the existing junction. It allowed for two lanes of free-flowing traffic in each direction. Exit and entry slip roads would have been provided on both the north and southbound carriageway allowing full connection to the local road network. The junction would have been in a dumbbell layout with the slip roads connecting to a roundabout on each side of the carriageway with the roundabouts connected via an overbridge.

1.6.1.2 The B4082 would have been re-aligned for approximately 1.2km to connect the junction to the local road network. The A46 would have been straightened to the west of the existing carriageway to allow for a national speed limit.

1.6.1.3 Figure 1-4 (page 12) shows the proposed design of Option 6.

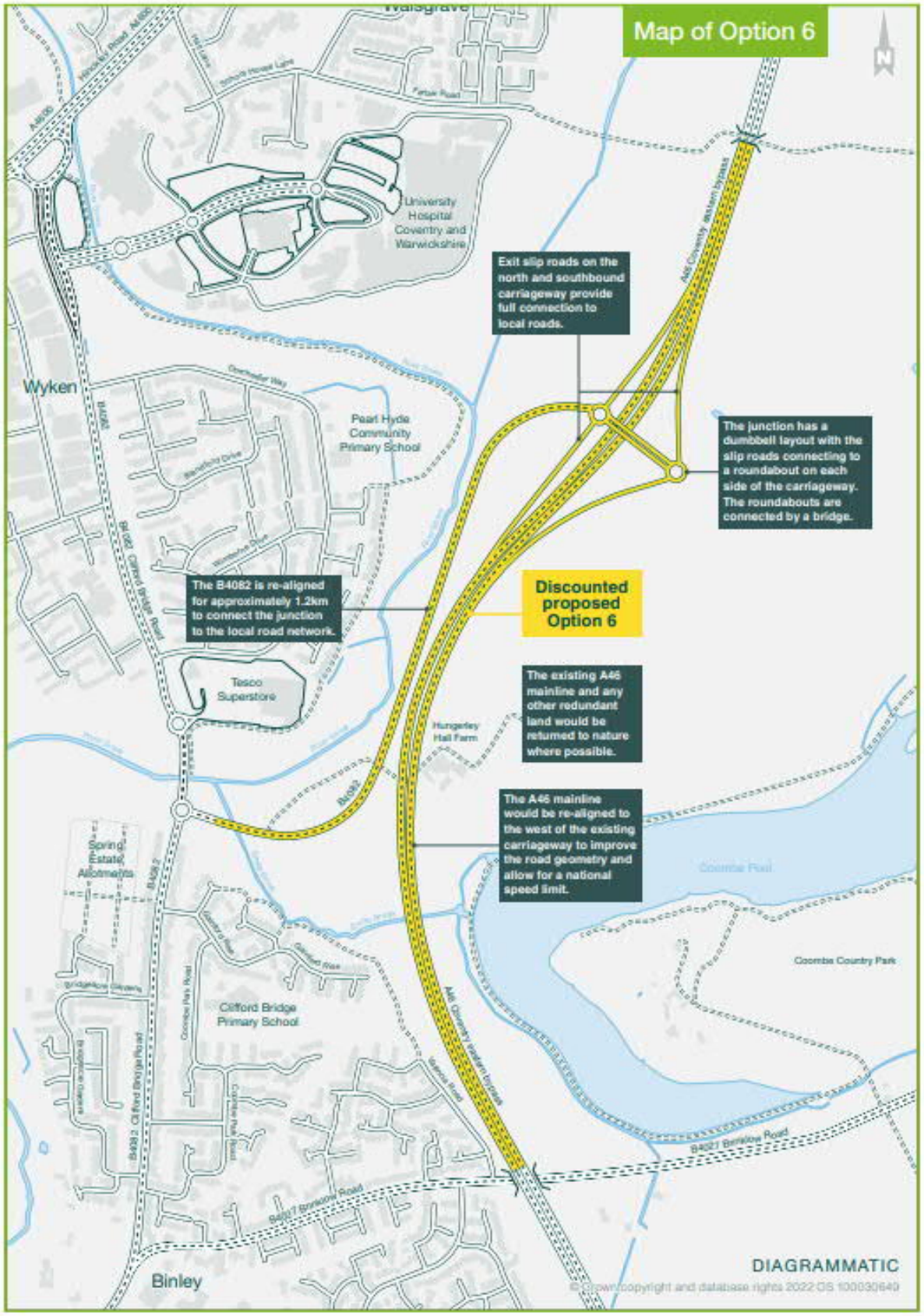


Figure 1-4: Proposed design for Option 6

1.6.1.4 Further analysis of this design indicated that there would have been significantly increased risk of flooding associated with this option. The new B4082 would have led to a significant reduction in the River Sowe's floodplain storage and would have resulted in regular flooding of the road and the local area. In order to overcome these impacts, a large number of mitigation measures would have been required, which would have

resulted in other significant environmental impacts, meaning that this option was not viable.

1.6.2 Option 7 and Option 8

1.6.2.1 The junction designs of Option 7 and 8 were very similar, with the difference between the two being in the alignment of the A46 carriageway. This meant that Option 7 would have allowed for a 50mph speed limit, whereas Option 8 would have allowed for a national speed limit of 70mph.

1.6.2.2 The designs would have removed the existing roundabout at Walsgrave junction to provide two lanes of free-flowing traffic in each direction on the A46.

1.6.2.3 Exit slip roads would have provided access from the A46 northbound carriageway to the local road network via the B4082 and an entry slip road would have provided access to the A46 northbound carriageway from the B4082. However, no access would have been provided from the A46 southbound carriageway to the B4082 and there would have been no access to the A46 southbound carriageway from the B4082.

1.6.2.4 Figure 1-5 (page 14) and Figure 1-6 (page 15) show the design of Option 7 and Option 8 respectively.

1.6.2.5 Further traffic modelling showed that these junction designs would have led to worsening congestion on the local road network, including the A428 and Clifford Bridge Road. These traffic impacts would have then tailed-back onto the A46, meaning there would still have been some queuing on the A46 between the Binley and Walsgrave junctions

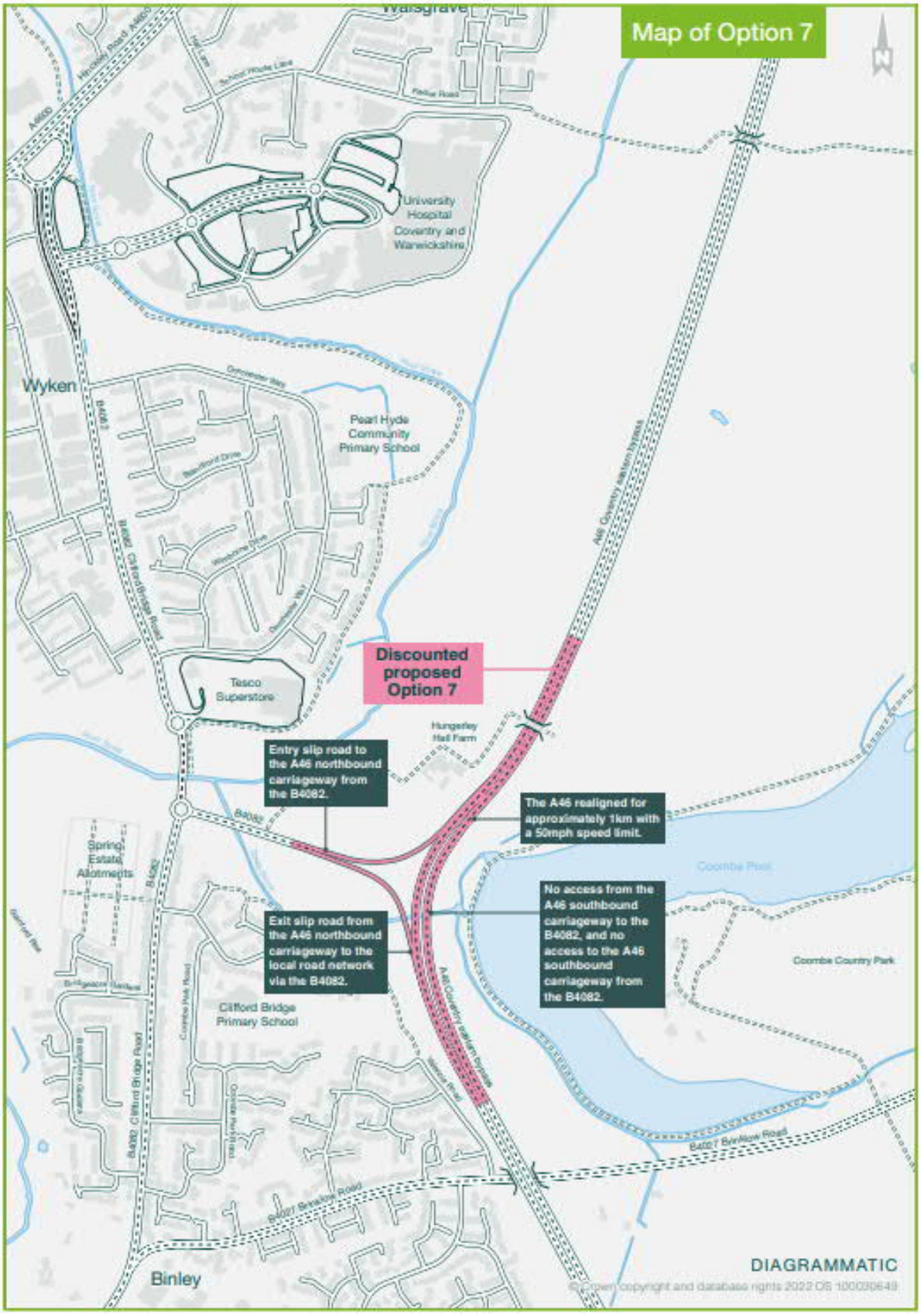


Figure 1-5: Proposed design for Option 7

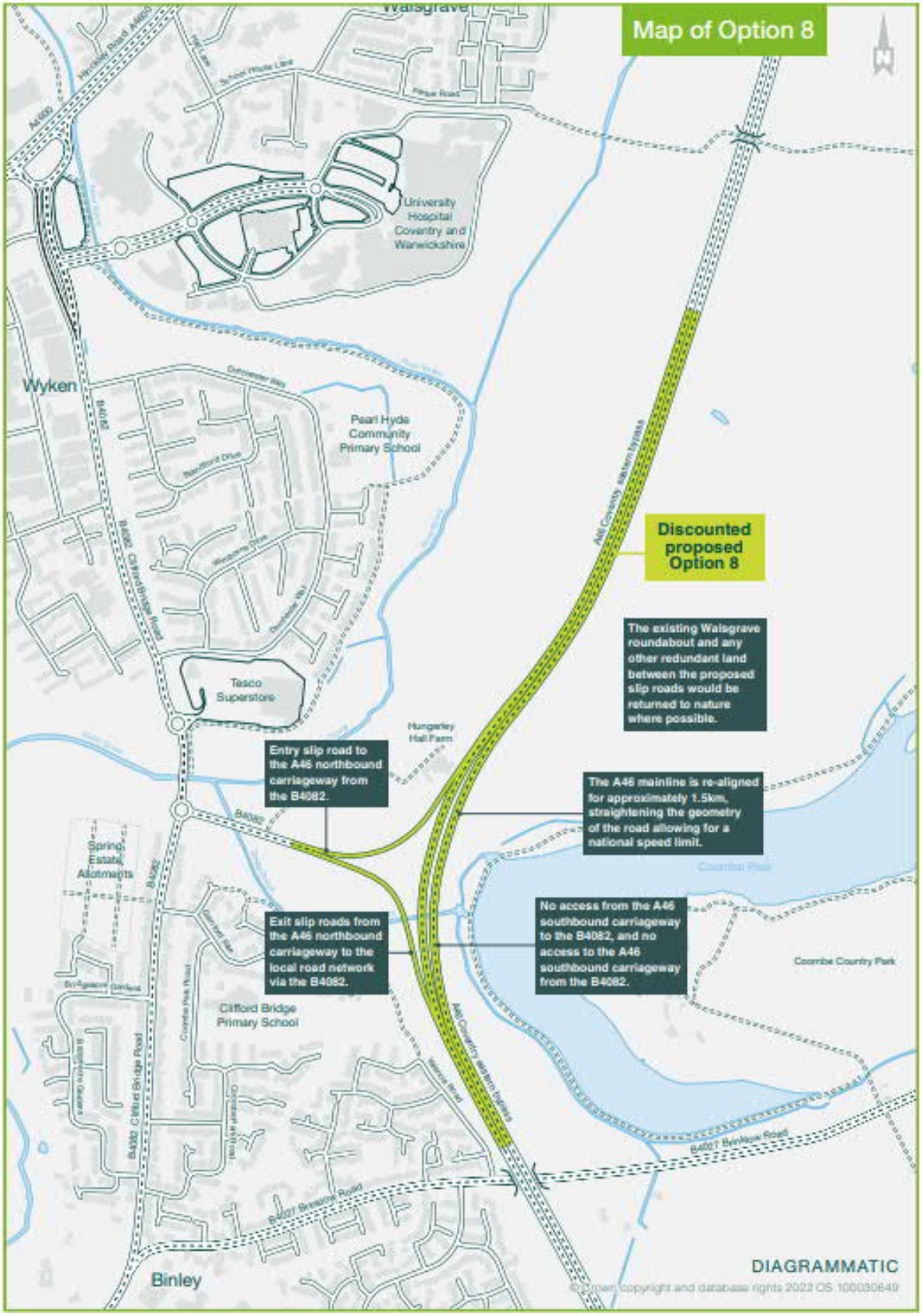


Figure 1-6: Proposed design for Option 8

2 Approach to Public Consultation

2.1 Introduction

2.1.1 The non-statutory public consultation took place from 11 January 2022 until midnight on 14 February 2022; giving National Highways an opportunity to gain a better understanding of the views and expectations of local stakeholders, including local communities, landowners, businesses, local authorities, and road-users.

2.1.2 Responses to the consultation have been considered and analysed in this Report on Public Consultation. The findings of this consultation will inform National Highways' Preferred Route Announcement for this scheme and, where possible, feedback received will be taken into consideration during the next design phase.

2.2 Approach to public consultation during COVID-19 pandemic.

2.2.1 The coronavirus (COVID-19) pandemic presented a number of potential challenges to National Highways ability to deliver an inclusive and accessible consultation. From Monday 13 December 2021 to Thursday 27 January 2022, the British Government implemented 'Plan B' coronavirus restrictions, due to the large spike in COVID-19 cases associated with the Omicron variant.

2.2.2 Due to additional measures, and the high number of COVID-19 cases throughout this period, National Highways took the decision proceed with the consultation without offering face-to-face public information events throughout the consultation period. National Highways felt it would not be possible, nor would it be safe, to hold face-to-face public information events during the consultation period. National Highways also felt it would not be responsible or fair to ask members of the public to attend face-to-face events, given the timing of this consultation period.

2.2.3 After assessment and careful consideration, National Highways identified a number of ways to engage with communities and stakeholders which allowed alternative methods for people to access scheme information, ask questions and ultimately submit an informed response during the public consultation period.

2.2.4 These ideas were combined into the Approach to Public Consultation document, which was shared with Warwickshire County Council, Coventry City Council and Rugby Borough Council for their review and input ahead of launch. This document was used to deliver an inclusive and accessible consultation. This document can be found in Appendix A at the end of this document.

2.2.5 Throughout this section of the consultation report, the methods National Highways used to publicise the consultation, the consultation materials available and the methods of response will be outlined. Where suitable, references will be made to how these methods have helped to overcome the challenges faced as a result of the coronavirus pandemic.

2.3 Publicising the consultation

2.3.1 In preparation for the consultation, National Highways targeted communications at stakeholders including residents, statutory bodies, local campaign groups and the general public. These activities are detailed below.

2.3.2 **Press Releases**

2.3.2.1 National Highways issued two press releases to promote the public consultation.

2.3.2.2 The press releases provided readers with information regarding the consultation. It advised where materials were available and explained how they could engage and respond during the consultation process.

2.3.2.3 The first press release was issued on Tuesday 10 January 2022. This is shown in Appendix B of this consultation report.

2.3.2.4 The second press release was issued on Tuesday 1 February 2022. This is shown in Appendix C of this consultation report

2.3.3 Postcard to local residents

2.3.3.1 A mailing zone surrounding the A46 Walsgrave junction was identified, this defined where information would be posted to promote the consultation. The zone was devised to include residential and business areas in close proximity to the scheme, using existing boundaries (such as main A roads) as natural borders for the area. The likely use of the junction north and south was also considered.

2.3.3.2 The area contained approximately 10,000 homes and businesses, and captured those who were most likely to be interested in, or affected by, the proposals.

2.3.3.3 Figure 2-1 below outlines the mailing zone.

Figure 2-1: Consultation Zone

2.3.3.4 An initial postcard was sent to residents and businesses in the mailing zone on Tuesday 11 January 2022. This postcard was sent to notify residents and businesses about the launch of the consultation, to direct them to our website and consultation materials, and to ask them to provide feedback on our proposals.

2.3.3.5 This postcard can be found in Appendix D1 of this document.

2.3.3.6 A second postcard was also sent to those in the mailing zone on Tuesday 2 February 2022. This reminder postcard was sent to prompt local residents and businesses to read about, and provide feedback on, the scheme before the end of the consultation period.

2.3.3.7 This postcard can also be found in Appendix D2 of this document.

2.3.4 Scheme posters

2.3.4.1 Where possible, posters promoting the public consultation were distributed digitally and via post to display at local amenities close to Walsgrave junction.

2.3.4.2 Table 2-1 below shows the list of locations who agreed to display a poster when contacted.

Location Displaying Poster	Address
Potters Green URC Church	363 Woodway Ln, Coventry CV2 1QL
Walsgrave Baptist Church	Hinckley Rd, Coventry CV2 2EX
St Bartholomew's Church	St. Bartholomew's Church, Brinklow Road, Binley, CV3 2DT
The Coombe Social Club	Brinklow Rd, Binley, Coventry CV3 2HY
Wyken Community Centre	Westmorland Rd, Coventry CV2 5PY
Walsgrave Church of England Primary School	School House Ln, Coventry CV2 2BA
Clifford Bridge Primary School	Coombe Park Rd, Coventry CV3 2PD
Ernesford Grange Primary School	Foxton Rd, Binley, Coventry CV3 2HN
Seva School	Eden Rd, Walsgrave on Sowe, Triangle, Coventry CV2 2TB
Caludon Castle Sports Centre	Axholme Rd, Coventry CV2 5BD
Caludon Library	Axholme Rd, Coventry CV2 5BD
Living Well Health Club	Paradise Way, Coventry CV2 2ST
Coombe Country Park	Brinklow Rd, Coventry CV3 2AB

Table 2-1: Locations who agreed to display a poster when contacted

2.3.4.3 In addition to the above, posters were also distributed to appropriate stakeholders identified by the engagement team on the Binley phase of the A46 Coventry Junctions Upgrade.

2.3.4.4 A copy of the A46 Walsgrave scheme poster used to promote the public consultation can be found in Appendix E of this consultation report.

2.3.5 Deposit point

2.3.5.1 Copies of the consultation brochure and response form were made available to collect from Caludon Library from Saturday 29 January 2022 until the consultation closed on Tuesday 14 February 2022. Caludon library was selected as the deposit point location as it is well located in relation to the scheme.

2.3.6 Mobile Exhibition Van

2.3.6.1 National Highways' Mobile Exhibition Van was used to promote and advertise the consultation during the consultation period. Figure 2-2 below shows an image of the van stationed in the car park of Warwickshire Shopping Park.

Figure 2-2: Image of National Highways' Mobile Exhibition Van

2.3.6.2 The mobile exhibition van was parked at various well-visited local locations on 6 days throughout the consultation period.

2.3.6.3 These locations were selected due to their high footfall and close proximity to the Walsgrave junction. Table 2-2 below details both the location and timings of where National Highways' Mobile Exhibition Van was stationed.

Location	Date	Time
Tesco, Clifford Bridge, Coventry, CV2 2TS	Thursday 20 January 2022	09:00 – 15:00
B&Q, Brandon Way, Binley Woods, Coventry, CV3 2JD	Friday 21 January 2022	09:00 – 15:00
Warwickshire Shopping Park, Kynner Way, Binley, Coventry CV3 2SB	Saturday 22 January 2022	10:00 – 16:00
Warwickshire Shopping Park, Kynner Way, Binley, Coventry CV3 2SB	Sunday 23 January 2022	10:00 – 16:00
Tesco, Clifford Bridge, Coventry, CV2 2TS	Monday 24 January 2022	10:00 – 16:00
Tesco, Clifford Bridge, Coventry, CV2 2TS	Tuesday 25 January 2022	10:00 – 16:00

Table 2-2: Locations and timings of National Highways' Mobile Exhibition Van

2.3.7 Scheme webpage

2.3.7.1 The Walsgrave section of the National Highways A46 Coventry Junctions Upgrade webpage was updated to provide information on the consultation.

2.3.7.2 Key information regarding the A46 Coventry junctions upgrade was uploaded to the webpage under a 'Latest updates' heading.

2.3.7.3 When updates were uploaded, notifications were sent out via email to stakeholders who had signed up to receive updates on the scheme. Consultees were invited to sign up to receive updates this across the consultation materials and on the scheme webpage.

2.3.7.4 The scheme webpage provided:

- the latest updates on the Walsgrave junction.
- background information and context for the A46 Walsgrave junction upgrade.
- key information regarding the public consultation including how to respond to the consultation, the deadline for responses to be submitted, when the online public information events were taking place and the links required to join them.
- links to PDF versions of the public consultation materials including the consultation brochure, the consultation response form, the approach to public consultation and a recording of one of the online public information events (Tuesday 1 February 2022).
- a link to the online response form
- contact details for queries about the consultation

2.3.7.5 The Scheme webpage included updates for both phases of the Coventry junctions upgrade (Walsgrave junction and Binley junction). In the early stages of the consultation, several comments from consultees indicated it was difficult to locate the Walsgrave consultation documents on the A46 Coventry junctions upgrade scheme webpage.

2.3.7.6 In response to these comments, a prominent grey box was added to the top of the scheme webpage, which clarified the website contained updated for both phases of the Coventry junctions upgrade scheme.

2.3.7.7 Under a bold 'Walsgrave junction' heading, key details were provided about the Walsgrave junction upgrade, including clear links to the consultation brochure, response form and links to the three online public information events.

2.3.7.8 A screenshot of the website before and after its update can be found in Appendix F of this report.

2.3.8 Promotion via social media

2.3.8.1 National Highways used its West Midlands region Facebook and Twitter accounts to promote the consultation.

2.3.8.2 The channels were used to promote consultation launch, provide key updates such as reminders for consultees to attend the online public information events and reminders to respond to the consultation feedback.

2.3.9 Additional communication channels

2.3.9.1 In addition to the above, National Highways asked key consultees, such as Local Authorities and Parish Councils to promote and share the scheme via their own channels.

2.3.9.2 National Highways also engaged with Local Authorities to identify and engage with hard-to-reach groups who may be impacted by the scheme. Although they were unable to identify any specific groups likely to be impacted, the relevant teams at Coventry City Council and Warwickshire County Council agreed to promote the consultation via relevant channels.

2.4 Consultation Materials

2.4.1 Consultation brochure

2.4.1.1 A 32-page brochure was produced with information about the consultation.

2.4.1.2 This included:

- information regarding the scheme context and background
- a summary of the key local constraints
- a detailed description of the proposal

- a summary of discounted options
- information on the impacts and the benefits of the proposed option
- the next stages of the scheme.

2.4.1.3 The consultation brochure was available to download from the scheme webpage.

2.4.1.4 In addition to this, as hard copies of the consultation brochure would usually be available at events, National Highways made arrangements to ensure they were available throughout the consultation period:

- Consultees could request that a printed copy of the brochure was posted to them for free.
- Printed versions were also made available for collection from Caludon Library from 29 January 2022.

2.4.1.5 A copy of this brochure can be found in Appendix G of this consultation report.

2.4.2 Response form

2.4.2.1 A response form was produced which sought respondents' views on three key sections:

- Section A: asked respondents about their travel habits around the A46 Walsgrave junction including; when they travel, what routes they use and how close they live to the scheme
- Section B: asked respondents to give their views on Option 11
- Section C: asked respondents to provide feedback on the delivery of the consultation, the materials used and ways to improve engagement in the future

2.4.2.2 If able to, respondents were encouraged to complete the online version of the response form, hosted by Citizenspace (an online consultation platform used by National Highways). The form could be found at: https://highwaysengland.citizenspace.com/he/a46-walsgrave/

2.4.2.3 As there were no face-to-face events, the hard copy version of the response form was also available to download from the scheme webpage for the duration of the consultation period.

2.4.2.4 In addition to this, as hard copies of the response form would usually be available at events, National Highways made arrangements to ensure they were available throughout the consultation period:

- Consultees could request a printed copy of the response form was posted to them for free. Printed versions were also available to collect from Caludon Library from 29 January 2022.

2.4.2.5 A copy of this response form can be found in Appendix H of this consultation report.

2.4.3 Recording of online Public Information Event

2.4.3.1 As it was not possible to hold face-to-face public information events, on Tuesday 1 February 2022 National Highways posted a recording of the presentation from one of the online public information events to the scheme webpage.

2.4.3.2 This meant that consultees who were unable to attend the online public information events (or wanted to re-visit the information shared) could watch the presentation back at a time that suited them.

2.4.3.3 The recording showed a presentation delivered by Joseph Mulqueen (Project Manager) and John Waterman (AECOM Project Manager) who discussed the scheme background, the constraints in the local area, the viable option, discounted options and next steps following non-statutory public consultation.

2.4.3.4 To ensure that the video was accessible, subtitles were provided on the recorded live event.

2.5 Consultation Response Channels

2.5.1.1 National Highways encouraged respondents to submit responses to the consultation using two main channels:

- **Online** – the National Highways website directed consultees to the Citizenspace online consultation platform where they could complete and submit a response form (LINK)
- **Post** – respondents could also respond by post using the consultation response form, received by post, or by printing the response form available on the scheme webpage.

2.5.1.2 Consultees were then able to return hard-copy response forms to National Highways via a dedicated freepost address, set up for the scheme: **FREEPOST A46 WALSGRAVE JUNCTION**

2.5.2 Email

2.5.2.1 As consultees could not ask questions at face-to-face consultation events, consultees were able to email the scheme inbox (a46coventryjcns@highwaysengland.co.uk) with any questions they had about the scheme. A member of the project team would then respond to their query.

2.5.2.2 Consultation responses sent to this email address were also accepted as formal feedback.

2.5.2.3 Consultees were also able to use the call back service (0300 123 5000) to contact members of the project team. This is explained further in section 2.5.3 (below).

2.5.3 Call back service

2.5.3.1 As National Highways were unable to host face-to-face Public Information Events during the consultation period, a call back service was provided (0300 123 5000).

2.5.3.2 This service, advertised on the posters, postcards and in the brochure, was offered to provide stakeholders with the opportunity to speak to a member of the project team at a mutually convenient time, using Microsoft Teams or an alternative platform (Zoom, telephone call).

2.5.3.3 The call back service allowed consultees to ask questions they may have otherwise asked at a face-to-face consultation event.

2.6 Engagement Activities

2.6.1 Pre-consultation briefing – Members of Parliament

2.6.1.1 Individual pre-consultation briefings were offered to the three Members of Parliament with constituencies in closest proximity to the scheme.

2.6.1.2 Of these, the Member of Parliament for Rugby, Mark Pawsey, requested a meeting. This meeting took place on Monday 10 January 2022, starting at 16:00.

2.6.2 Pre-consultation briefing – Affected Landowners

2.6.2.1 Individual online pre-consultation briefings were offered to all private landowners directly affected by the scheme.

2.6.2.2 One landowner requested a briefing and members of the project team delivered a presentation on the scheme. Time was allowed in the meeting to give the landowner the flexibility to ask questions and discuss the plans outlined.

2.6.2.3 This provided the landowner the opportunity to open dialogue with the project team prior to the consultation launch, as opposed to finding out about the scheme at the same time as members of the general public.

2.6.3 Pre-consultation briefing – Key stakeholders

2.6.3.1 Key local stakeholders were invited to join an online pre-consultation briefing on Monday 10 January 2022, this took place between 17:30 and 19:30 to enable those who work during the day to participate. The event was held as a Microsoft Teams meeting, this allowed stakeholders to interact and ask questions verbally during the meeting.

2.6.3.2 This gave key local stakeholders (local councillors, parish councillors and hospital representatives) the opportunity to view and comment on the consultation material before the consultation was launched to members of the public.

2.6.3.3 It also meant that if local and parish councillors were approached by members of the public with regard to the scheme, they were appropriately informed and would be able to direct people to where they could find further information and respond to the consultation.

2.7 Online Public Information Events

2.7.1 National Highways held three online Public Information Events throughout the consultation period.

2.7.2 The details of these events are listed in Table 2-4 below

Event	Date	Time
Online Public Information Event 1	Thursday 20 January 2022	18:00 – 20:00
Online Public Information Event 2	Wednesday 26 January 2022	12:00 – 14:00
Online Public Information Event 3	Saturday 29 January 2022	11:00 – 13:00

Table 2-3: Details of online consultation events

3 Engagement with Public Consultation

3.1 Introduction

3.1.1 This chapter summarises the engagement received during the public consultation in terms of reach, the number of attendees to events, visits to the scheme webpage and number of responses.

3.1.2 The feedback received on the consultation process is discussed in more detail in Chapter 8 using response form feedback and any comments from consultees.

3.2 Attendance - Pre-consultation briefing and Online Public Information Event

3.2.1 National Highways were able to monitor attendance levels during the online consultation events. The number of attendees is detailed in Table 3-1 below.

Event	Date	Attendance
Pre-consultation briefing	Monday 10 January 2022, 18:00 – 20:00	17
Online Public Information Event 1	Thursday 20 January 2022, 18:00 – 20:00	14
Online Public Information Event 2	Wednesday 26 January 2022, 12:00 – 14:00	30
Online Public Information Event 3	Saturday 29 January 2022, 11:00 – 13:00	12

Table 3-1: Attendance levels at online engagement events

3.3 Calls to CCC

3.3.1 Four calls were made to the National Highways Customer Contact Centre during the consultation period. Each consultee received a call back from a relevant member of the Project Team, who was allocated based on an understanding of the specific caller's enquiry. The calls and their topics are summarised in table 3-2 below.

Call	Theme	Summary
1	Contaminated land	Consultee called to notify the Project Team that they had information on waste underneath parts of the A46.
2	Request additional information	Consultee called to request additional information about the scheme.
3	Noise and Visual impacts on property	Consultee called to discuss potential noise and visual impacts on their property.
4	Traffic Management	Consultee called to discuss potential traffic management impacts in their local area.

Table 3-2: Table summarising calls received during the consultation

3.4 Emails to the scheme inbox

3.4.1 Fifteen emails were sent to the scheme inbox during the consultation. Table 3-3 below summarises the recurring themes that were found across many of the emails received.

Theme	Summary
Support for the scheme	Several respondents offered support for the scheme, alongside raising other issues.
Hospital Link	Respondents highlighted that they believed the scheme should include a new link to University Hospital Coventry & Warwickshire. These respondents requested that a link to the hospital is considered in the plans going forward, as this would reduce local congestion and allow for more efficient emergency service access.
Traffic Management	Several respondents asked how traffic would be managed during the construction period, including the effects this may have on public transport and the methods that will be used to ensure that traffic levels are kept to minimum during the construction phase of the scheme.
Scheme plans	Two respondents emailed to request additional plans associated with the scheme. These were provided where possible.

Table 3-3: Recurring themes in emails to the A46 Coventry Junctions scheme inbox

3.5 Recording of Public Information Event

3.5.1 The recording of the Public Information Event posted by National Highways was viewed 283 times (accurate as of: 16/02/2022).

3.6 Visits - National Highways websites

3.6.1 Analytical data to show the number of visitors to the National Highways A46 Walsgrave junction scheme webpage were collected throughout the public consultation period. Table 3-4 below provides details of this analysis.

Webpage	Total clicks	Total unique visitors	Average time on page (seconds)
A46 Coventry junctions upgrade scheme webpage	2,225	1,953	298
A46 Walsgrave Junction upgrade consultation page (Citizenspace)	851	672	177

Table 3-4: Summary of consultee website interaction

4 Consultation responses and analysis methodology

4.1 Response forms

4.1.1 The majority of consultation responses were received in the form of completed consultation response forms.

4.1.2 In total, 102 response forms were received during the consultation period. 95 of these were completed and submitted online and the remaining seven response forms were submitted in hard copy.

4.2 Open freeform responses

4.2.1 In addition to the response forms, 19 consultation responses were received during the consultation period via email/post and National Highway's Every Customer Has an Opinion system (ECHO)- these were freeform in nature.

4.2.2 Responses have been analysed in Chapters 5, to 8 of this report.

4.2.3 All consultation responses are summarised in Figure 4-1 below.

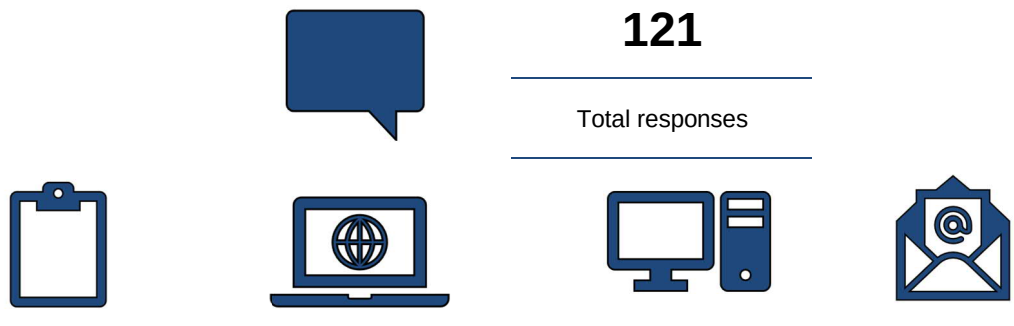


Figure 4-1: Summary of consultation responses

4.3 Responses received by type of respondent

4.3.1 In total, 107 responses were from members of the public, one response identified themselves as an affected land interest and 13 responses were received from organisations. These organisations are listed below and their responses are summarised in Table 7-1, in Chapter 7 of this report.

Stakeholder type	Organisations who responded to consultation
Local Authorities, Parish Councils, Political	Coventry City Council Warwickshire County Council Rugby Borough Council Brinklow Parish Council A46 Member Partnership
Statutory bodies	Health and Safety Executive NATS (formerly National Air Traffic Services) Royal Mail Warwickshire Police

Stakeholder type	Organisations who responded to consultation
	Ministry of Defence*
Local business and facilities	Coventry and Warwickshire Local Enterprise Partnership University Hospital Coventry and Warwickshire Jaguar Land Rover

**Response received after the close of consultation.*

Table 4-1: List of organisations who responded to consultation

4.4 Responses received by location

4.4.1 92 of the respondents who responded to the consultation using the response form provided a postcode; 10% (10) of respondents did not provide a postcode on their response form.

4.4.2 Figure 4-2 below breaks down the responses received by postcode.

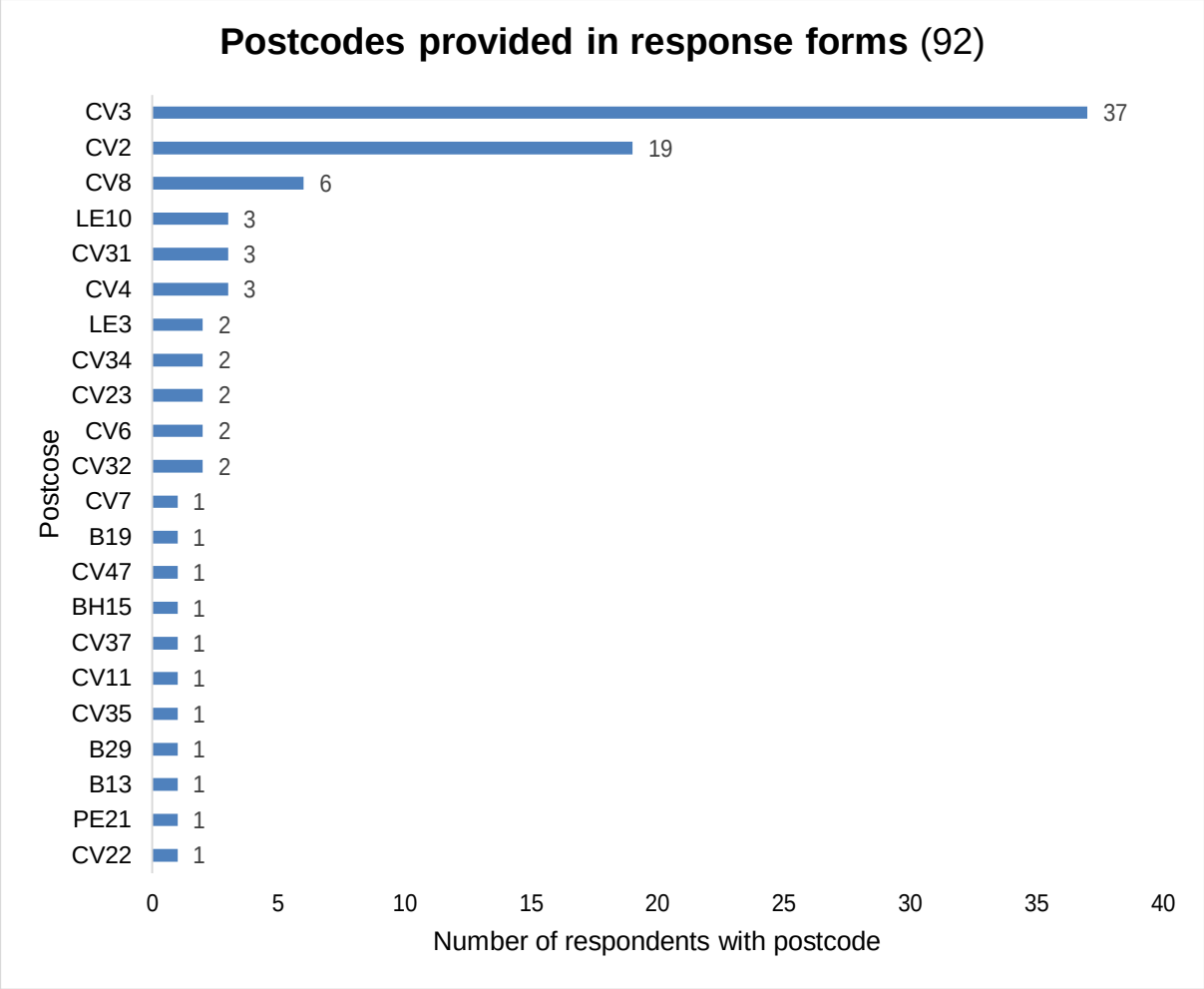


Figure 4-2: Postcodes provided by respondents who used the response form

4.4.3 The figure above shows that the majority of responses received to this consultation were from postcodes in or near to the A46 Walsgrave junction.

4.4.4 Figure 4-3 below demonstrates the spread of responses to the consultation on a map, using postcode data received in the consultation response form.

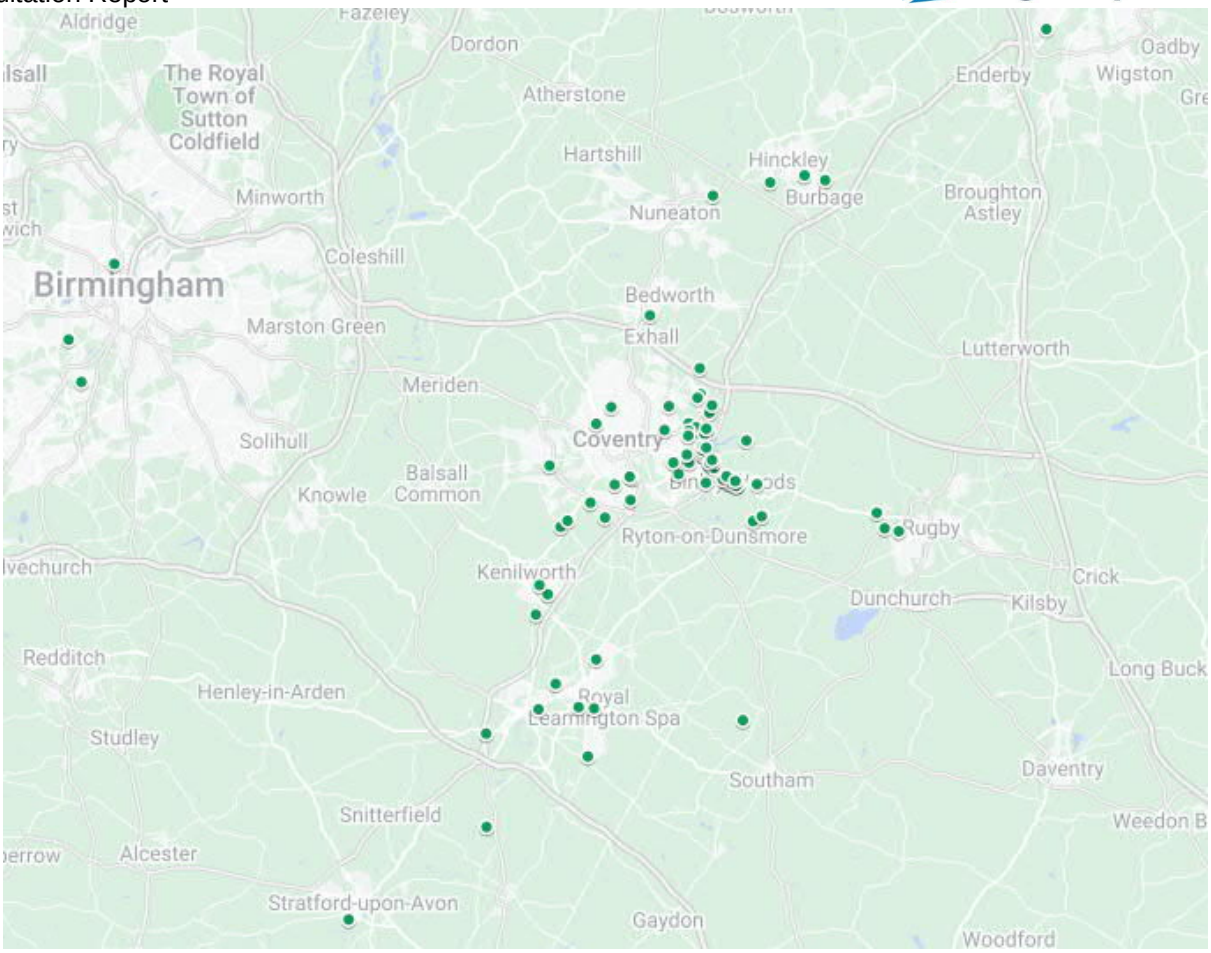


Figure 4-3: Postcode data displayed on map

4.4.5 Please note figure 4-3 focuses on the A46 Walsgrave junction itself. Therefore, one of the responses from Leicester postcode area, and the responses from Bournemouth and Peterborough postcode areas are not shown in the figure.

4.5 Analysis Methodology

4.5.1 Response forms

4.5.1.1 Structured responses received via response forms have been analysed on a question-by question basis, in the relevant chapter of this report (please see section 4.5.3 below for the structure of the findings of this consultation).

4.5.1.2 A database containing online response forms was downloaded from Citizenspace, National Highways' online consultation platform. Any additional response forms submitted to National Highways (either via email or post) were added to this database manually to form one complete dataset.

4.5.1.3 Closed questions have been presented in graphs to display the findings of each question clearly. All findings are rounded to the nearest whole number, so some charts may not sum to exactly 100%. The number of respondents who responded to each question is shown in brackets in the title of the chart.

4.5.1.4 Open questions, where respondents were able to elaborate on their answers using their own words, have been coded using a coding framework. This framework was created based on frequently recurring themes and comments in open responses received during the consultation.

4.5.1.5 The responses to these questions have been presented in bar graphs, under each question title. Only codes which have been applied more than once in a question are shown. The exact number of times a code has been applied is shown at the end of the

relevant bar. The number of responses to the question is shown in brackets in the title of the chart.

4.5.2 Free-form responses

4.5.2.1 Free form responses, where respondents have chosen to write their own response rather than respond using the scheme response form, were collated into a single spreadsheet.

4.5.2.2 These responses have been summarised in Chapter 7 of this document. Open responses from key consultees have been summarised in Table 7-3. The four comments in the ECHO system have been summarised in Table 7-2. The two outstanding open responses from other consultees have been summarised in Table 7-1.

4.5.2.3 These tables summarise responses and highlight the key topics and prevailing themes that have emerged from the consultation feedback.

4.5.3 Structure of Findings

4.5.3.1 The findings of this report are assessed in the following four chapters:

- Chapter 5 – Travel behaviour and existing issues at the A46 Walsgrave junction
- Chapter 6 – Proposed improvements to the A46 Walsgrave junction
- Chapter 7 – Free-hand responses received.
- Chapter 8 – Feedback on the consultation process

4.5.3.2 Conclusions are drawn in Chapter 9.

5 Travel behaviour and existing issues at Walsgrave junction

5.1 Introduction

5.1.1 Respondents were asked a number of questions in the response form regarding their current use of the A46 Walsgrave junction and their thoughts on the junction as it currently exists. This section summarises the responses to these questions.

5.2 Q1 response analysis - *Which of the following best describes you? (tick all that apply):*

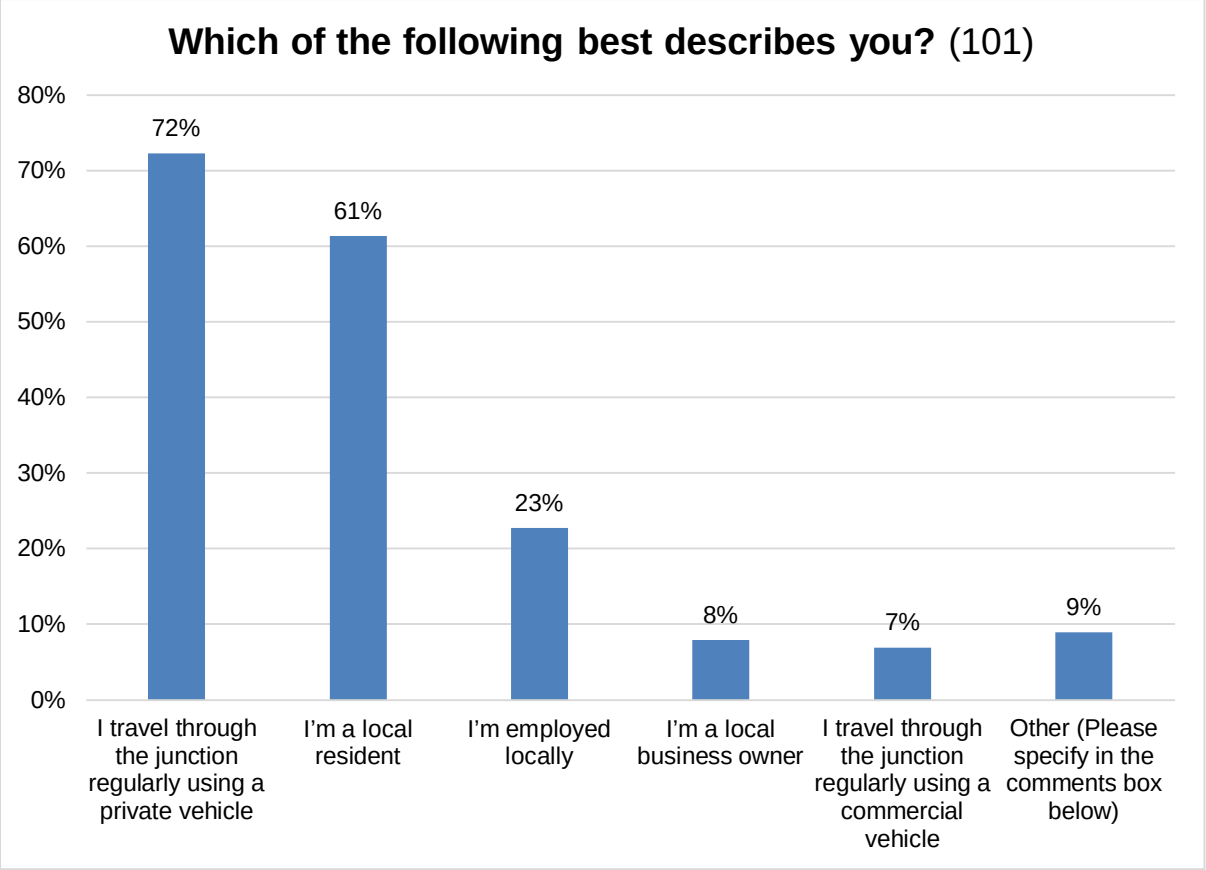


Figure 5-1: Question 1 - Which of the following best describes you?

5.2.1 73 (72%) of the respondents who answered this question, said they travelled through the junction regularly using a private vehicle. 62 (61%) identified themselves as a local resident, and 23 (23%) said they were employed locally. Please note that respondents could chose as many options as applicable to them. One respondent did not answer this question.

5.2.2 Nine (9%) respondents selected 'other' in response to this question. Three respondents stated they use the junction to travel to the hospital. Two respondents stated they live several miles from the junction. One identified themselves as a property owner, and another stated they travel through the junction irregularly in a private vehicle.

5.3 Q3 response analysis - *Why do you use the A46 Walsgrave junction? (tick all that apply):*

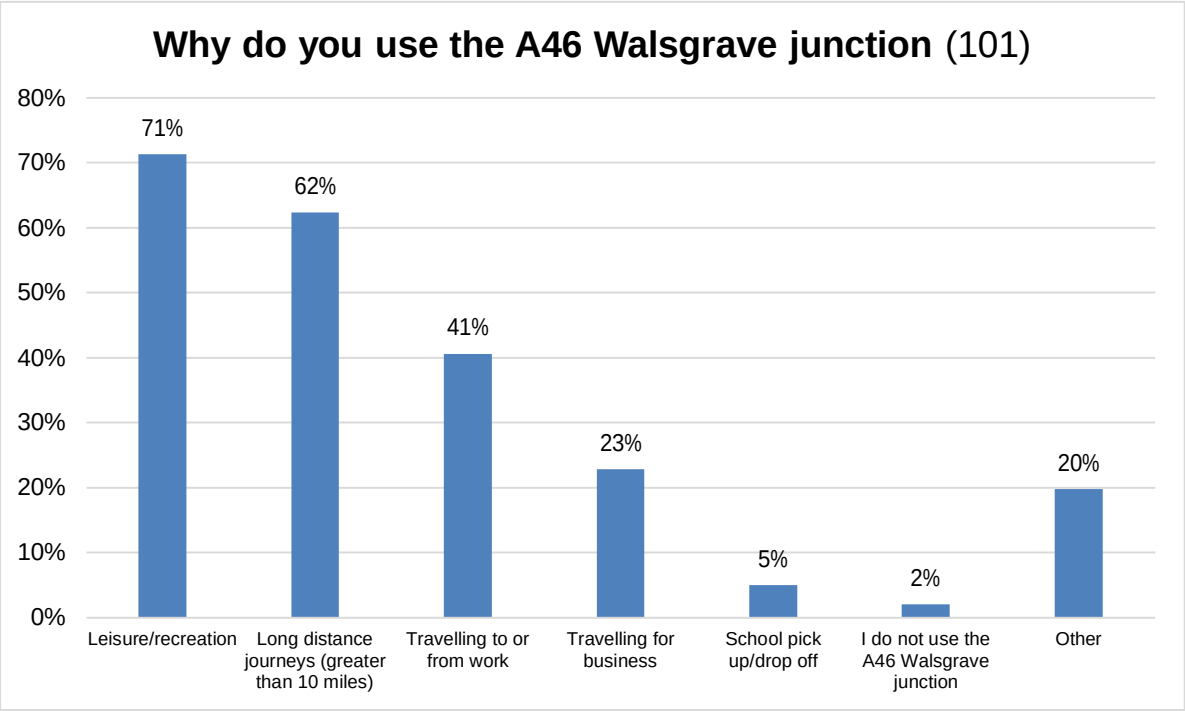


Figure 5-2: Question 3 - Why do you use the A46 Walsgrave junction?

5.3.1 The most common use of the A46 Walsgrave junction was for leisure/recreation, with 72 (71%) respondents selecting this. Meanwhile, 63 (62%) respondents used the junction for long distance journeys, whilst 41 (41%) and 23 (23%) respondents stated they used the junction for travelling to or from work, or travelling for business, respectively. Please note that respondents could chose as many options as applicable to them. One respondent did not answer this question.

5.3.2 20 (20%) respondents indicated that they had another reason for using the junction. Notably, 50% (10) of respondents who chose 'other' stated that they use the junction to visit the hospital. In addition to this, three users stated they use the junction for shopping. Other than this, reasons included general use, local and long-distance travelling, visiting family friends and access to property.

5.4 Q4 response analysis - *Which modes of transport do you normally use to travel through the A46 Walsgrave junction? (tick all that apply):*

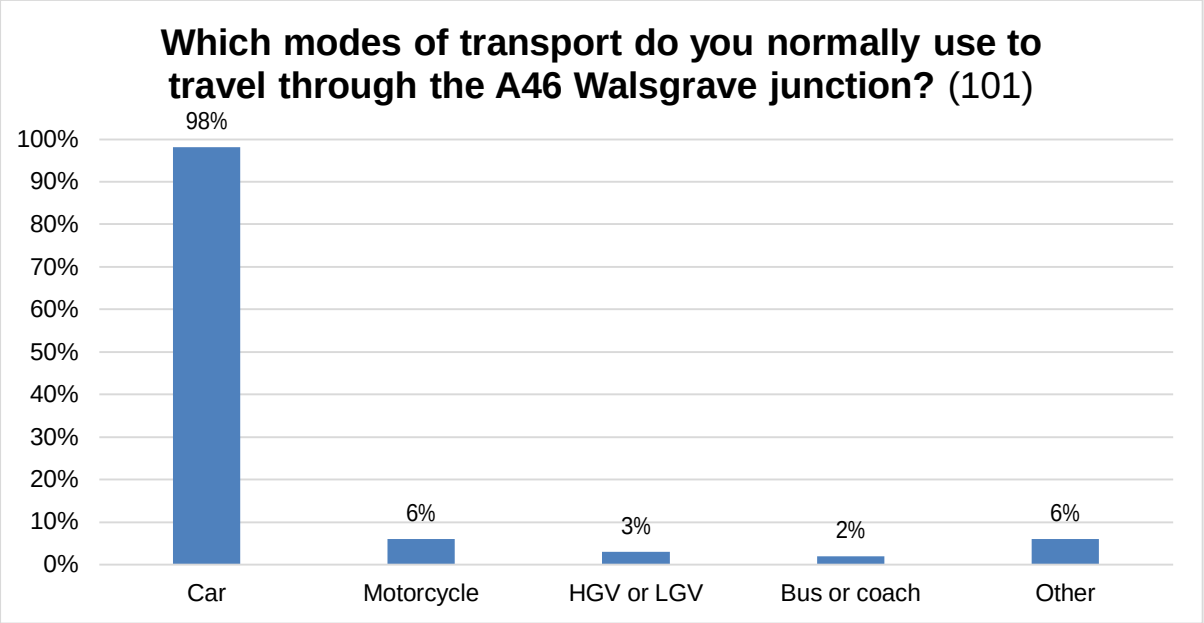


Figure 5-3: Question 4 - Which modes of transport do you normally use to travel through the A46 Walsgrave junction?

5.4.1 The most cited mode of transport used to travel through the A46 junction was car, with 99 (98%) respondents selecting this option. Six (6%) respondents indicated they travelled through the junction on a motorcycle, three (3%) respondents said they travelled through the junction in an HGV/LGV and two (2%) respondents said they travelled through the junction on a bus/coach. Please note that respondents could chose as many options as were applicable to them. One respondent did not answer this question.

5.4.2 Six (6%) respondents indicated that they used an alternative form of transport to travel through the junction. 50% (three) of these respondents stated they use a campervan/motorhome to travel through the junction. Two respondents indicated they use a van to travel through the junction. Finally, one user indicated they use all motor vehicles to travel through the junction.

5.5 **Q5 response analysis -** *How often do you travel through the A46 Walsgrave junction?*

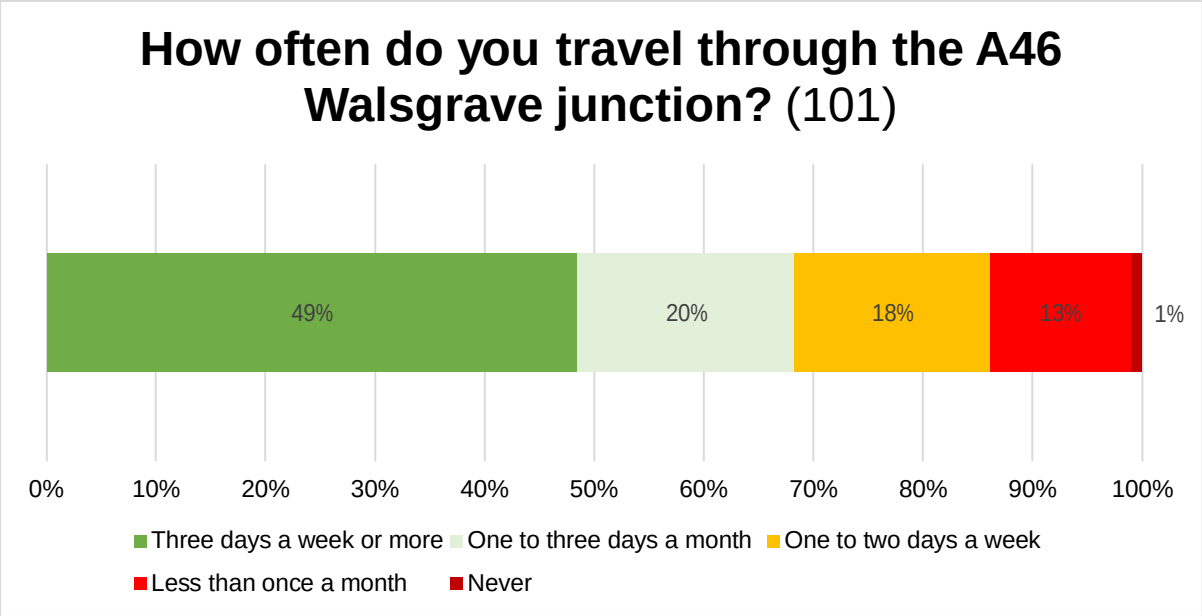


Figure 5-4: Question 5 - How often do you travel through the A46 Walsgrave junction?

5.5.1 49 (49%) respondents indicated they travel through the junction three days a week or more. 20 (20%) users travel around one to three days a month and 18 (18%) travel one to two days a week. 13 (13%) users travel less than once a month. Please note that one respondent did not answer this question.

5.6 **Q6 response analysis -** *When do you travel through the A46 Walsgrave junction? (tick all that apply):*

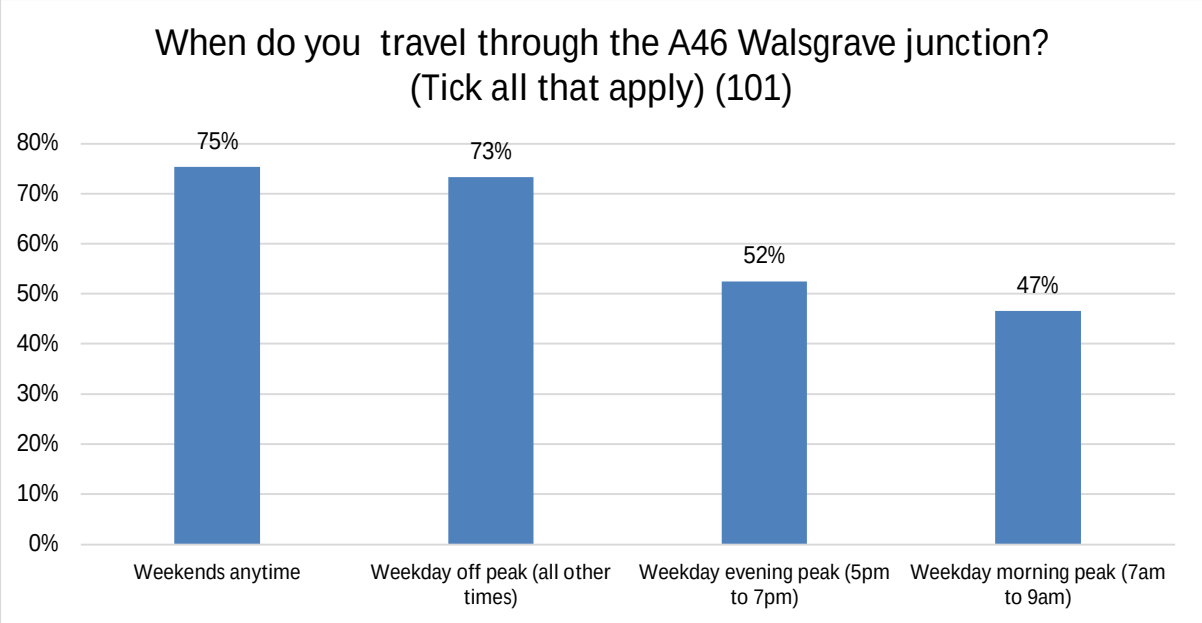


Figure 5-5: Question 6 - When do you travel through the A46 Walsgrave junction?

5.6.1 76 (75%) respondents indicated they used the junction at weekends, and 74 (74%) respondents indicated they use the junction at weekday off peak times. 53 respondents (52%) and 47 (47%) of users indicated that they used the junction at weekday evening peak times and weekday morning peak times respectively. Please note that

respondents could chose as many options as applicable to them. One respondent did not answer this question.

5.7 Q7 response analysis

5.7.1 A - *How satisfied are you with your journey through the A46 Walsgrave junction as it is now? (please tick one answer in each row)*

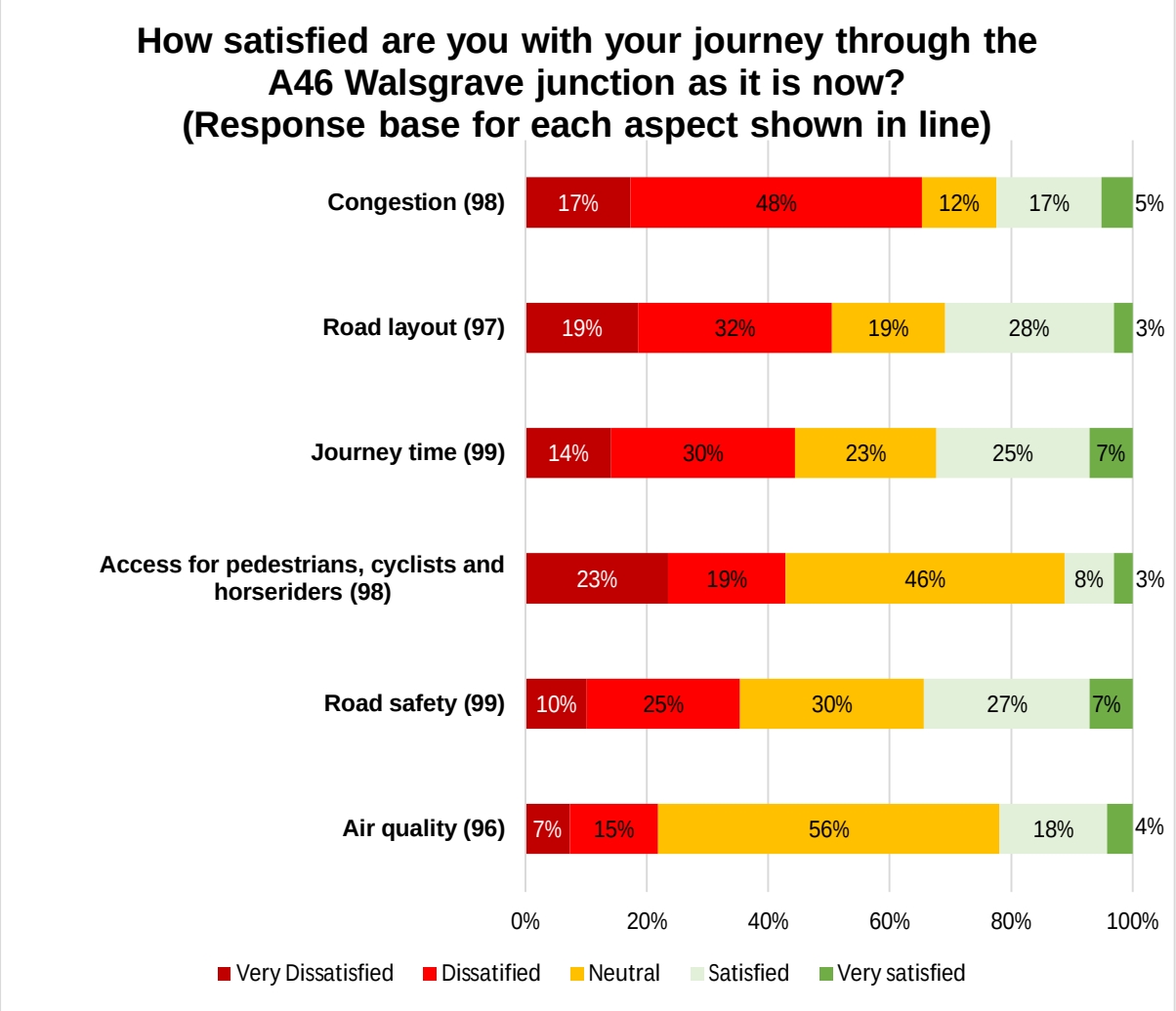


Figure 5-6: Question 7A - How satisfied are you with you journey through the A46 Walsgrave as it is now?

5.7.2 The graph above shows how satisfied respondents are with differing aspects of their journey through A46 Walsgrave junction as it is now.

5.7.3 As is shown in Figure 5-6, levels of dissatisfaction at the different aspects of junction generally outweighed levels of satisfaction from users, other than in air quality where the majority of people expressed a neutral view on the matter, and levels of satisfaction and dissatisfaction were equal. This trend is particularly evident in congestion (65% of users were either very dissatisfied or dissatisfied with the current congestion levels with only 22% either satisfied or very satisfied), road layout (51% of respondents were either very dissatisfied or dissatisfied with only 31% of respondents satisfied or very satisfied) and journey time (45% of respondents were very dissatisfied or dissatisfied compared to 31% who are satisfied or very satisfied). The number of people who responded in each category is shown in brackets after each category in the chart.

5.7.4 B – *Please provide any further comments about your current journey through the A46 Walsgrave junction, in the space below:*

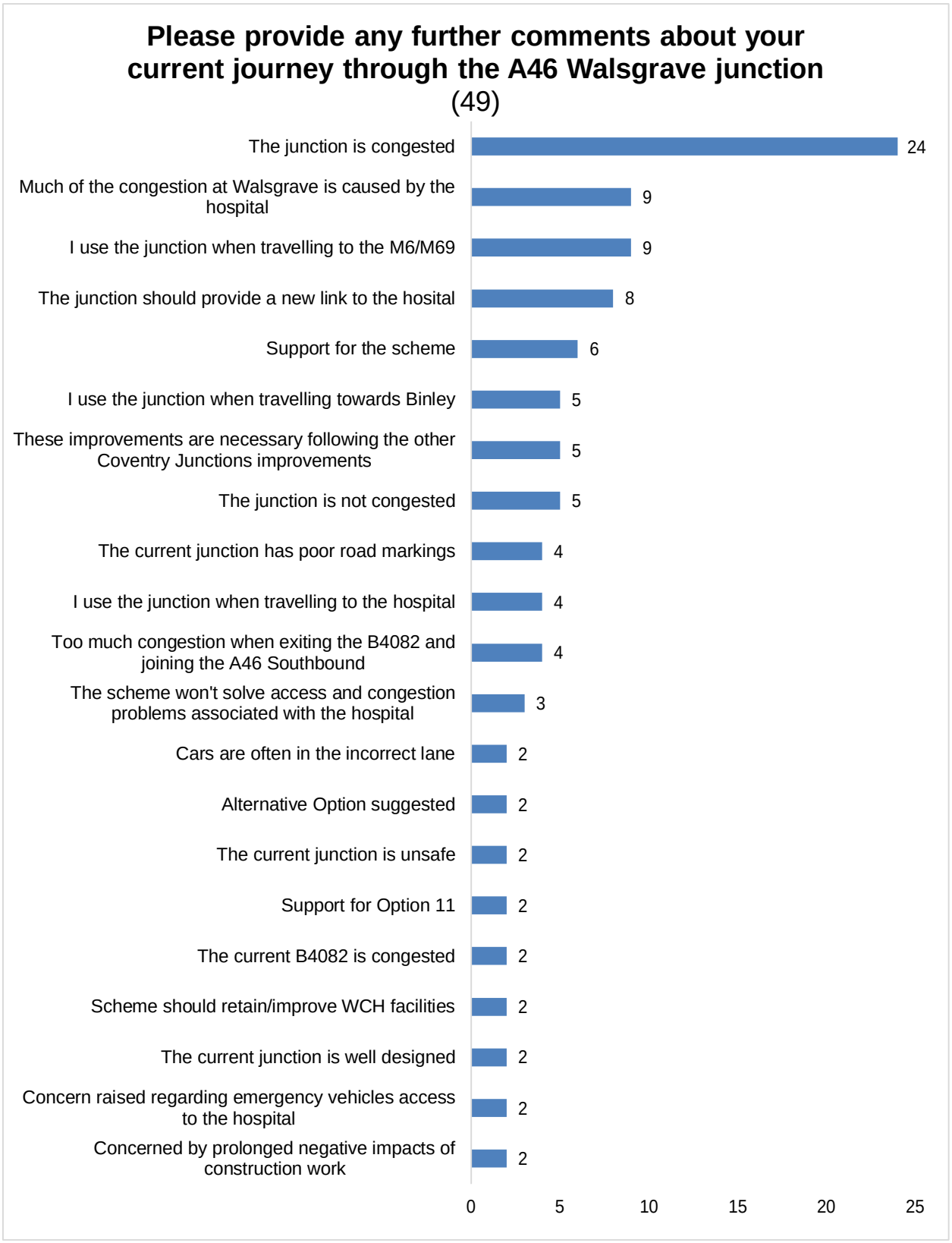


Figure 5-7: Question 7B - Please provide any further comments about your current journey through the A46 Walsgrave junction

5.7.5 The graph above shows the recurring comments left by respondents to question 7B. 50 comments were received in response to this question, and 24 (48%) of these comments indicated that they believe the junction is congested as it currently is. Nine (18%)

respondents indicated that they thought the congestion currently experienced at Walsgrave junction is caused by the hospital, and a further eight (16%) respondents expressed that they believed the new junction should provide direct access to the hospital. The other most popular code applied in this response related to users use of the junction, with nine (18%) respondents writing that they mostly use the junction to travel to M6/M69 junction.

5.7.6 Two alternative options were suggested in this question. These were:

- To use a flyover in the junction's existing location (as is being constructed at Binley junction, south of Walsgrave)
- Construct/retain a slip road on northbound carriageway in the existing location of the junction.

6 Proposed improvements at Walsgrave junction

6.1 Introduction

6.1.1 Respondents were asked to share their thoughts on the proposed improvement works at Walsgrave junction as presented in the consultation. This section summarises the responses to these questions.

6.2 Q8 response analysis - *To what extent do you agree that improvements to the A46 Walsgrave junction are needed?*

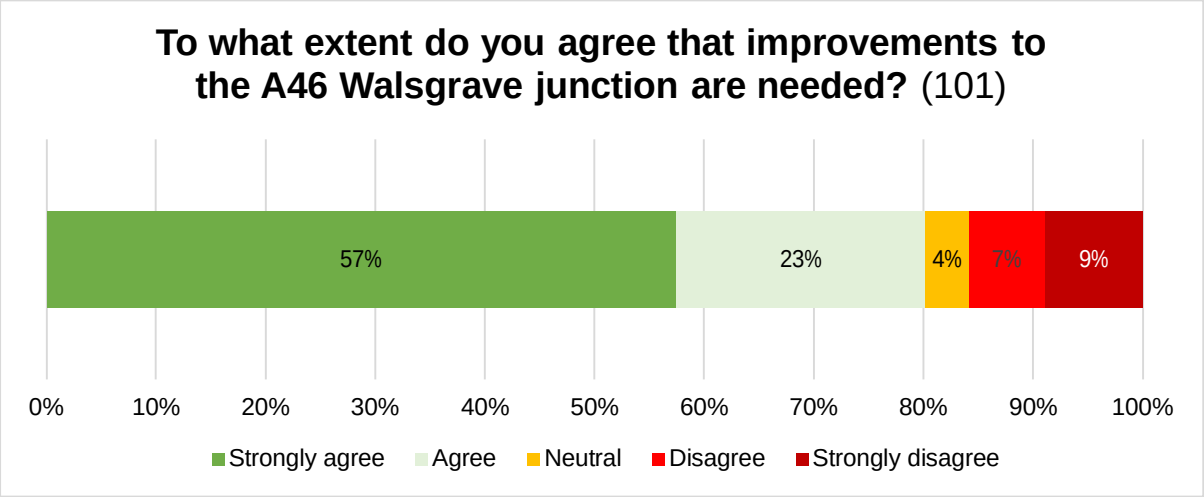


Figure 6-1: Question 8 - To what extent do you agree that improvements to the A46 Walsgrave junction are needed?

6.2.1 Over half (57%) of the 101 respondents who answered this question strongly agreed that junction improvements were required, and a further 23 respondents (23%) agreed with the need for improvements. Comparatively, seven (7%) respondents disagreed, and nine (9%) respondents strongly disagreed that junction improvements were required. Four (4%) of respondents remained neutral on this matter. Please note that one respondent did not answer this question.

6.3 Q9 response analysis -

6.3.1 A - *To what extent do you support or oppose Option 11?*

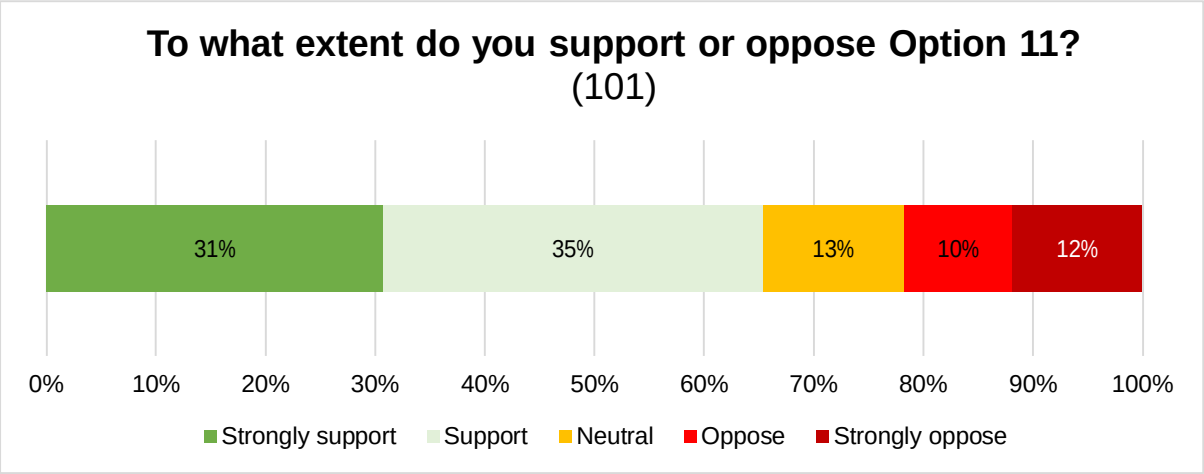


Figure 6-2: Question 9A - To what extent do you support or oppose Option 11?

6.3.2 Around two thirds of all respondents expressed support for option 11 – with 31 (31%) of the 101 respondents who answered this question expressing strong support, and a further 35 (35%) respondents stating that they support Option 11. Comparatively, 10 (10%) respondents opposed, and 12 (12%) strongly opposed Option 11.13 (13%) respondents remained neutral on this matter. Please note that one respondent did not answer this question.

6.3.3 B - *Please provide any further comments to explain your answer, in the space below:*

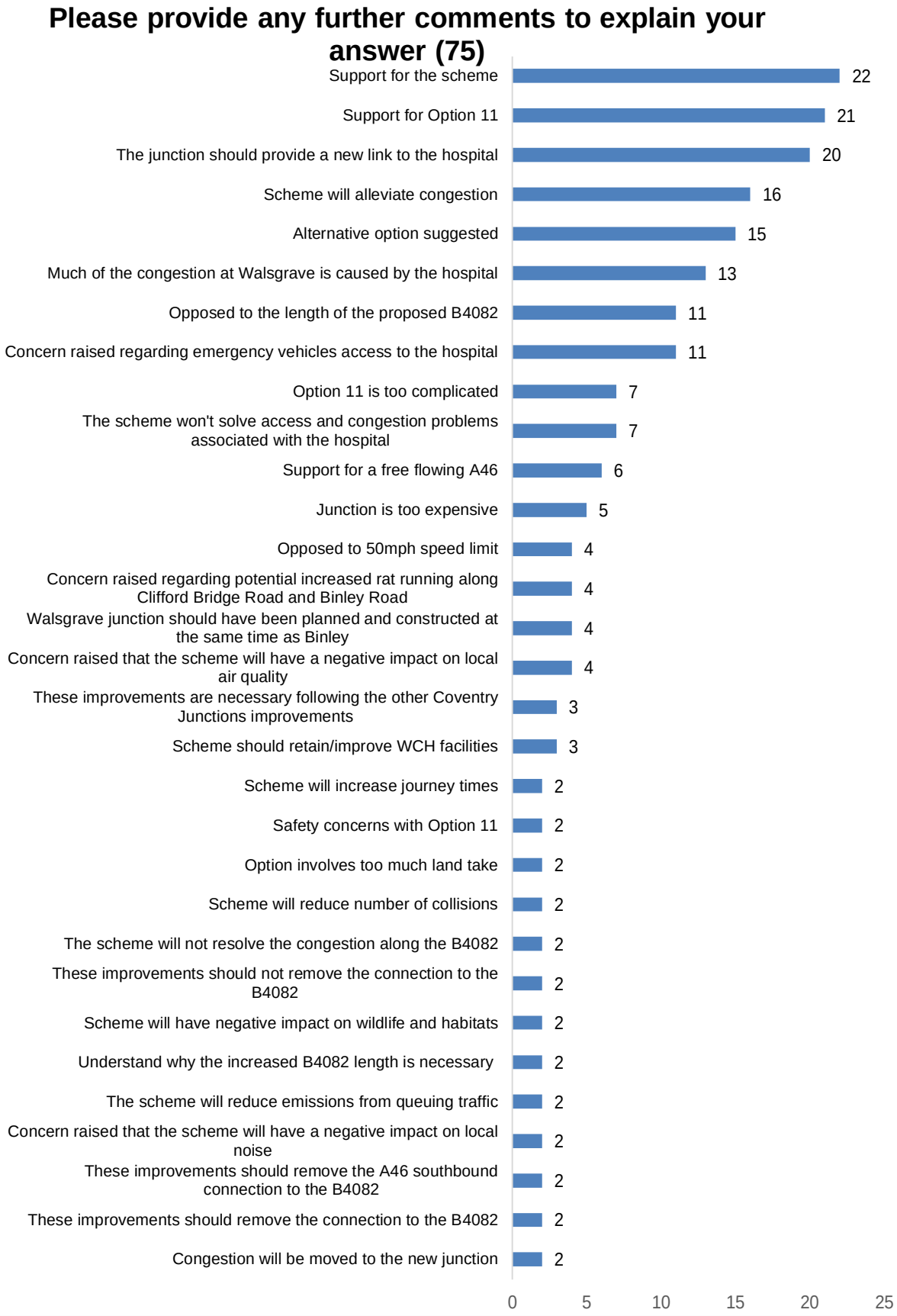


Figure 6-3: Question 9B - Please provide any further comments to explain your answer

6.3.4 In total, 75 respondents left a comment to this question. Where appropriate, more than one code was applied to respondents' comments, so there are more than 75 codes shown in the graph above. Please note, the same code could not be applied to the same comment twice.

6.3.5 As is shown in figure 6-3 above, 22 (29%) respondents suggested that they supported the scheme in general, and a further 21 (28%) responses suggested that they supported Option 11 specifically. Adding to this, a further 16 (21%) comments stated that Option 11 would alleviate congestion at the junction.

6.3.6 However, a clear prevailing theme arising from the responses to this question was the suggestion that the scheme should provide a new link to the hospital, with 20 (27%) comments suggesting this. Similarly, 13 (17%) comments suggested that much of the congestion at the junction is caused by the hospital and 11 (15%) raised concerns around emergency vehicles access to the hospital; vehicles struggle to access the hospital now, and will continue to do so with the proposed junction.

6.3.7 A final key theme that emerged in the responses to this question concerned the increased length of the B4082, with 11 (15%) respondents leaving comments about this. This is strongly linked to the concern that the scheme will increase rat running in the local area, along Clifford Bridge Road and Binley Road, which four people raised in response to this question.

6.3.8 Fifteen comments indicated that an alternative option should be considered. Several options were mentioned more than once, these were (the number of times follows the comments in brackets):

- Construct a fly over (as is being constructed at Binley junction, south of Walsgrave) (3)
- Construct/retain a slip road on northbound carriage in the junctions existing location (3)
- Complete removal of access to the B4082 (2)
- Removal of southbound access to the B4082 (2)

6.4 Q10 response analysis - Do you have any concerns in relation to this scheme? If you do, please list them in the space below, together with your reasons why.

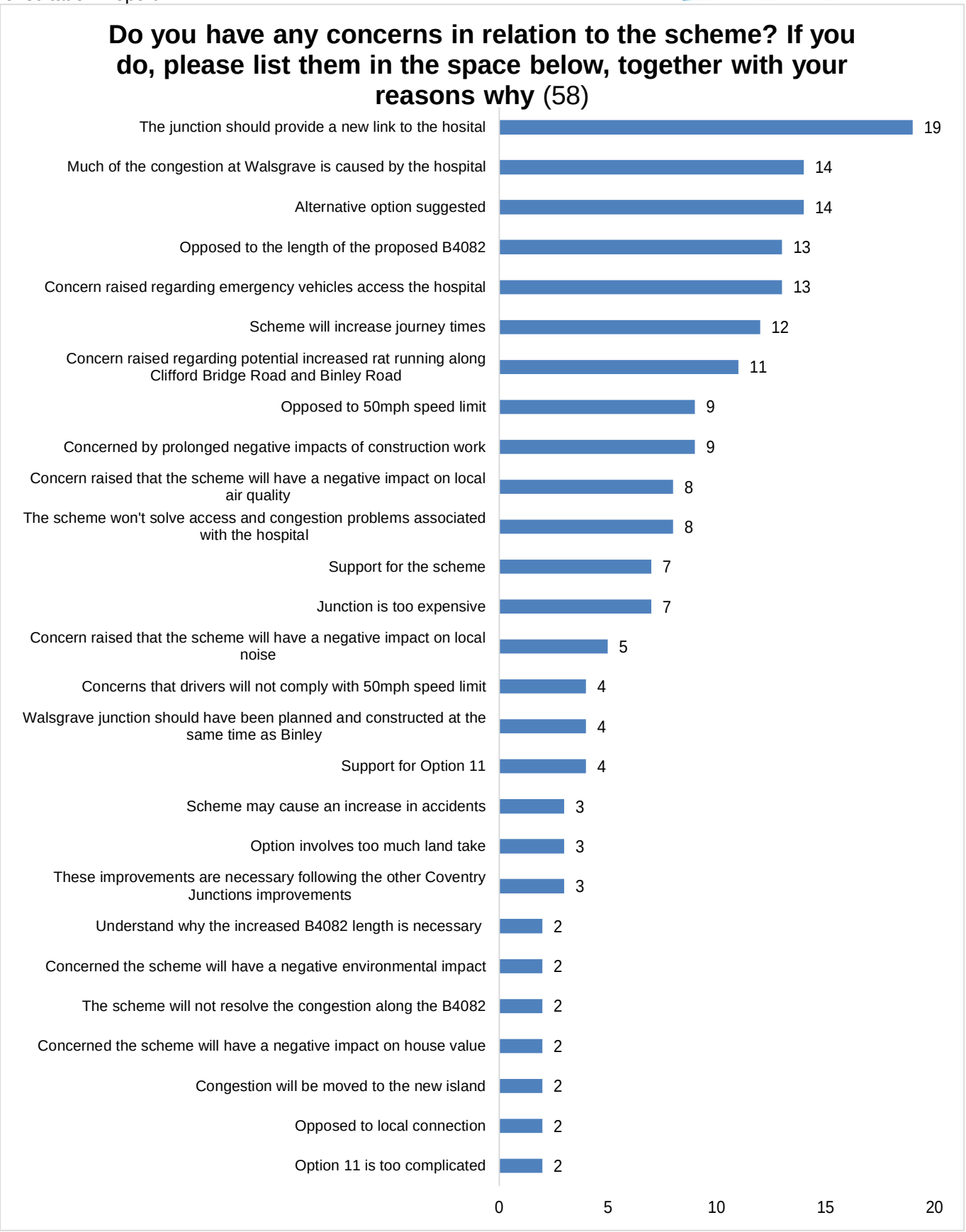


Figure 6-4: Question 10 - Do you have any concerns in relation to the scheme? If you do, please list them in the space below, together with your reasons why

6.4.1 In total, 58 respondents left a comment to this question. Where appropriate, more than one code was applied to respondents' comments, so there are more than 58 codes shown in the graph above. Please note, the same code could not be applied to the same comment twice.

6.4.2 The most common concern raised was the belief that the junction should provide a new link to the hospital, with 19 (38%) respondents suggesting the scheme should consider this. In addition to this, 14 (28%) people indicated that they believe much of the congestion at Walsgrave junction is caused by the Hospital and 13 (22%) comments raised concerns around emergency vehicles access to the hospital; vehicles struggle to access the hospital now, and will continue to do so with the proposed junction.

6.4.3 Another key prevailing theme found in responses to this question concerned the increased length of the B4082, with 13 (22%) comments raising this in their response. Similarly, 12 (21%) comments from respondents indicated that they were concerned that the junction improvements would actually increase their journey time. Finally, a further 11 (19%) comments raised concerns that the increased length of the B4082 might encourage rat running in the local area, with people using Clifford Bridge Road and Binley Road, (from Binley junction) to avoid having to travel increased distances if using the proposed junction.

6.4.4 In addition to the above, 14 comments indicated that alternative options should be considered instead of Option11. Several options were mentioned more than once, these were:

- Construct a fly over (as has been done at Binley junction, south of Walsgrave) (2)
- Construct/retain a slip road on northbound carriage in the junctions existing location (3)
- Remove A46 southbound access to the B4082

6.5 Free form responses

6.5.1 In addition to the response forms received, six free form consultation responses were received from members of the public.

6.5.2 Two free form consultation responses were received via email, these are outlined in table 7-1 below.

Topic	View on Option 11	Comment summary
Alternative Option	Not stated	Suggested the construction of an overpass in Walsgrave junction's existing location
Improved walking, cycling and horse-riding facilities	Not stated	Suggests the inclusion of a cycleway parallel to the A46 Cycleway links to existing bridge over the A46 which forms an east to west Public Right of Way (near Farber Road). Would provide access to Coombe Abbey Park, Ansty Business Park, Rolls Royce and open countryside.

Table 6-1: Summary of free hand consultation responses from the general public

6.5.3 In addition to the above comments, four anonymous comments were added to ECHO. This is an interactive consultation tool, which is being used by the Binley section of the Coventry Junctions Upgrade scheme. However, as Binley and Walsgrave share a website, four comments were added to this tool that were clearly relating to the Walsgrave consultation. These comments have been coded and are detailed in the table 6.2 below.

Comment	Topic	Comment summary
ECHO1	Hospital Link	Scheme should include new link to directly access the hospital. Suggested this is the main cause of congestion on Clifford Bridge Road
ECHO2	Walking, cycling and horse-riding facilities	Suggests new cycling and horse-rising routes need to be considered. Should be considered as heath and climate change demand motor traffic reductions
ECHO3	Congestion – Clifford Bridge Road	Suggests the A46 is busy when Clifford Bridge Road is busy and traffic queues between the islands. Believes that Option 11 will have the same problem
ECHO4	Negative noise impacts	Local residents concerned that they are heavily impacted by noise Suggest any scheme should use modern mitigation strategies on road surfaces to reduce noise impacts.
ECHO4	Hospital link	Scheme should include a new link to directly access the hospital This would ease congestion on Clifford Bridge Road junction Reduce air quality impact for residents near Clifford Bridge Road.

Table 6-2: Summary of consultation responses added to ECHO

7 Responses from organisations

7.1 Introduction

7.1.1 As outlined earlier in this report, 13 free form consultation responses were received from organisations. Please note that one of these consultation responses is a late consultation response, received from the Ministry of Defence after the close of consultation.

7.1.2 This section summarises responses from these stakeholders, their position on Option 11 and a summary of the key issues/opportunities/concerns raised in their response.

7.1.3 Responses received from organisations are outlined in table 7-1 below. The table notes the overall sentiment of the response and summarises the key points raised in the response.

Row	Stakeholder	View on Option 11	Summary of response
1	Brinklow Parish Council	Not given	Scheme should provide access to the hospital and car park to alleviate local congestion Suggested alternative option to move the junction north to link to the existing light duty bridge Concerned by the potential speed of traffic approaching from Ansty junction
2	NATS	Not given	Stated they have no infrastructure within 10km of the site Anticipates no impacts from the proposal No comments to make on consultation
3	Health & Safety Executive	Not given	No comments to make at this stage Wishes to be reconsulted when the application proceeds to NSIP
4	Warwickshire County Council	Support	Grateful for engagement over last 12 months, allowing them to help shape the scheme Noted the importance of the A46 with regards to key local businesses, major employers, housing development and the ongoing growth and development of Warwickshire and the sub-regional economy Support for Option 11 Seeks further engagement regarding how disruption will be managed during the construction process, particularly how emergency services will continue to access the Hospital. Seeks further engagement regarding the extent to which a second access to the hospital could be facilitated. Requested information regarding the consideration of vulnerable road users Asked if pedestrians and cyclists could be assisted by the proposals
5	Coventry City Council	Support	Support for Option 11 - Allows access to the Strategic Road Network, without putting undue pressure on local road networks Essential that the scheme allows for the potential facilitation of access to the proposed Walsgrave Hill Development and UHC&W Supports the removal of the existing roundabout and notes the enhancement opportunities this could provide. Notes that all other opportunities to enhance habitat should be maximised Noted a number of points in relation to the new B4082 Link Road: Speed limit - B4082 should be graduated down from 40mph to 30mph at an appropriate point Heading to A46 south or from the A46 north – increased distance to travel. Notes this is manageable in comparison to route changes if other options were adopted Hungerley Hall Farm will require suitable noise and landscaping mitigation. Design must respect the historic importance of the building Route should minimise need for agricultural traffic to use the road. Walking and cycling facilities should be incorporated to connect to the planned Binley Cycle Route at Clifford Bridge Road Buses - Should be designed to accommodate bus services, given the potential development at Walsgrave Hill. Suggested two potential options to improve walking and cycling routes as part of the scheme.

Row	Stakeholder	View on Option 11	Summary of response
			Need for further detailed discussions regarding drainage and flooding impacts as the design progresses Scheme should accommodate buses and the potential Very Light Rail scheme
6	Rugby Borough Council	Not given	Comments regarding consultation process and level of detail for discounted options Concern that extra distance for people travelling to or from the A46 South will encourage rat running on the local roads Essential scheme does not worsen traffic in the Borough of Rugby with their improvements Stressed it is essential for National Highways to effectively communicate the time saving measures associated with this scheme. Wish to be consulted around the development of this junction going forward
7	Royal Mail	Not given	Notes the importance of the A46 to Royal Mail's distribution routes Notes four operational properties in the vicinity that could be impacted Wish to receive additional information when available, particularly around construction phasing and Traffic Management Plan.
8	Coventry & Warwickshire Local Enterprise Partnership	Support	Appreciated the scheme briefing to the Transport and Infrastructure Business Group on 14/01/2022 Noted the importance of the A46 with regards to key local businesses, major employers, housing development and the ongoing growth and development of the sub-regional economy Support for Option 11 Seeks further engagement regarding how disruption will be managed during the construction process, particularly how emergency services will continue to access the Hospital. Seeks further engagement regarding the extent to which a second access to the hospital could be facilitated
9	Jaguar Land Rover	Support	Support the aims of the overall Coventry Junctions Upgrade scheme Support for the Option 11 Believe Option 11 will provide capacity to the local highway network around Coventry, improving traffic flow and reducing delays along the A46 Concern regarding the highway operation during the construction and delivery phase Wish to be further consulted on the proposed Traffic Management plans for the scheme Would like to see consideration given in the Traffic Management to their employee shift patterns
10	University Hospitals Coventry and Warwickshire Trust	Support	Strongly agree improvements are necessary at the A46 Walsgrave junction Strongly support Option 11 – believe it will provide numerous direct and indirect benefits Believe Option 11 is the best option Believe Options 7 and 8 would have exacerbated existing traffic problems 'Blue light access' to the hospital is required as part of the scheme - should be shown on emerging plans and agreed in detailed design Support that Option 11 allows for Coventry City Council's emerging Very Light Rail proposals

Row	Stakeholder	View on Option 11	Summary of response
			Wish to be consulted on as the scheme continues to develop
11	Warwickshire Police – Traffic Management	Opposed	Concerned about the 50mph speed limit – speed limit would be unenforceable Concern that if compliance is poor then there may be an increase in collisions and casualties Wish to be consulted throughout the detailed design stage, to look to ensure maximum compliance with any speed restriction through scheme design, without requirement for police enforcement
12	A46 Partnership	Support	Appreciated the scheme briefing on 26/01/2022 Junction needs to be replaced, as the final at grade junction on the A46 between Ansty junction and the M40 at Warwick Seeks confirmation of measures to be put in place during construction to minimise impact of works on the road network Would like to see an access to the hospital The A46 Partnership supports Option 11 Requested further updates and consultation as the scheme progresses
13	Ministry of Defence*	Not given	Confirmed scheme area is outside of Ministry of Defence safeguarding areas.

**Response received after close of consultation*

Table 7-1: Responses from key organisations

8 Feedback on the consultation process

8.1 Introduction

8.1.1 As part of the feedback form respondents were asked to provide their views on certain aspects of the consultation process. This section of the report summarises responses to these questions.

8.2 Q11 response analysis - *How did you hear about the consultation? (tick all that apply):*

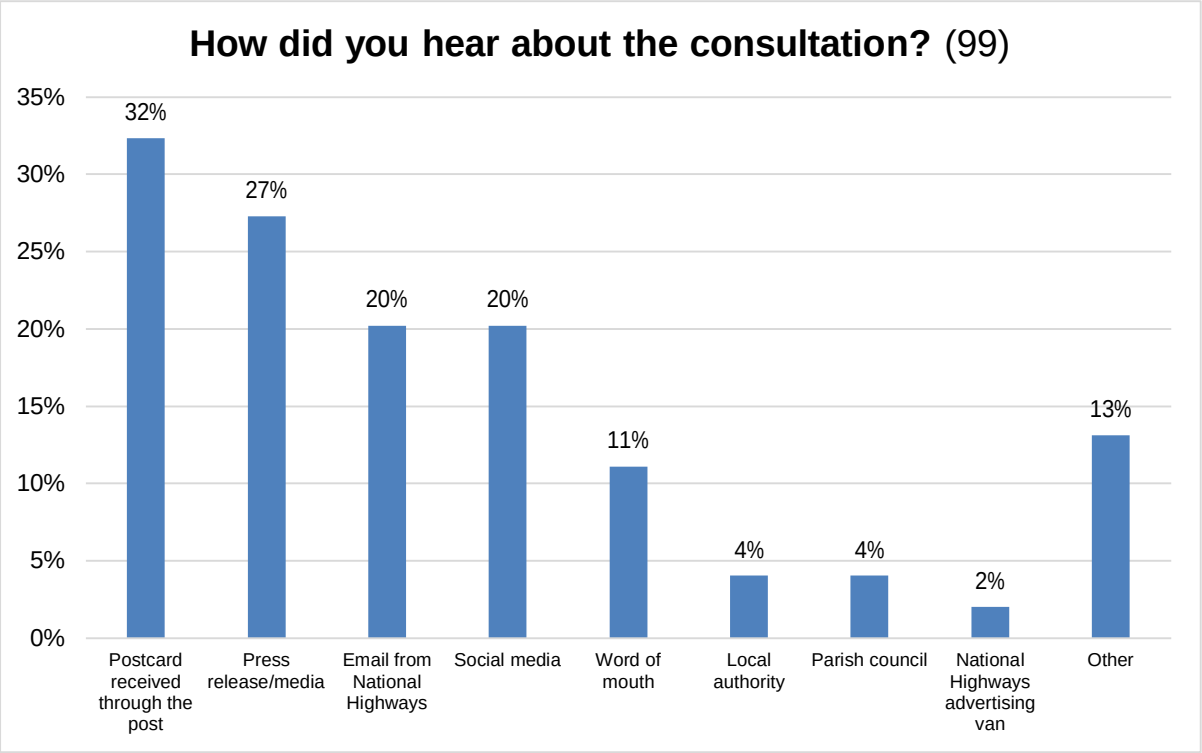


Figure 8-1: Question 11 - How did you hear about the consultation?

8.2.1 Around a third (32%) of the 99 respondents who answered the question, said they heard about the scheme when they received a postcard through the post. The second most common method through which people heard about the scheme was via a press releases or the media, with a total of 47 (47%) respondents heard about the consultation through either a press release/media (27) or social media (20). 20 (20%) respondents indicated they received an email from National Highways, and 11 (11%) respondents heard about the consultation through word of mouth.

8.2.2 Thirteen respondents indicated that they heard about the consultation through other methods. Seven of these respondents indicated they heard about it online; two respondents heard about the consultation through National Highways website, two respondents found the consultation through a web search, two respondents on BBC Midlands news site, and one person via social media. Other responses included references to a neighbourhood watch email, an email from a local councillor, National Highways advertising van, a local newspaper. Please note that respondents could chose as many options as applicable to them. Three respondent did not answer this question.

8.3 **Q12 response analysis -** *Do you have any further comments about the information we've shared, the materials we've used or the consultation process? Open question*

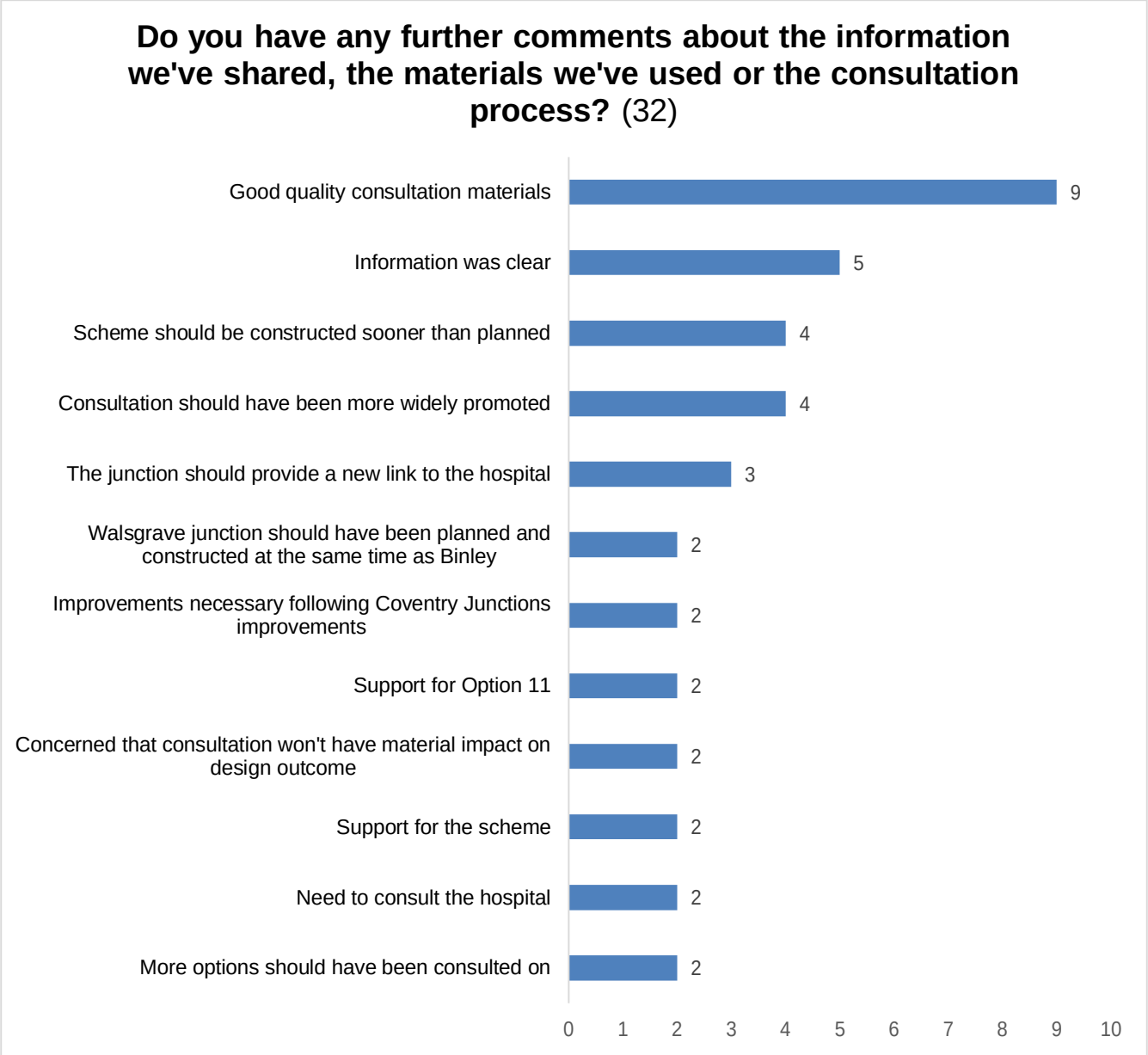


Figure 8-2: Question 12 -Do you have any further comments about the information we've shared, the materials we've used or the consultation process?

8.3.1 As is shown in the figure above, 32 respondents left comments in response to question 12. Nine of these comments indicated that they felt the consultation materials were of good quality. Five respondents also indicated that they thought the information was clear. Four consultees commented that they felt the scheme could have been promoted more widely.

9 Conclusions and Next Steps

9.1 Conclusions

9.1.1 The analysis of the consultation responses received shows that there is support for the proposed improvements at Walsgrave junction, to address issues of congestion, road layout and journey times. The analysis of the responses received has also shown that there is a broad support from members of the public for Option 11, presented by National Highways at non-statutory public consultation.

9.1.2 Similarly, key local stakeholders such as Coventry City Council, Warwickshire County Council and University hospitals Coventry and Warwickshire were supportive of Option 11.

9.1.3 There was no feedback received during the consultation exercise which would prevent Option 11 being taken forward to the next stage of design.

9.1.4 Despite the support for Option 11, a number of points have been raised across responses from both key stakeholders and the public, which must be considered alongside support for this option. These include:

- the potential inclusion of a new link to the hospital
- the new length of the B4082 and the potential increase in rat running as a result
- the 50mph speed limit on the A46 and;
- the cost of the junction upgrade.

9.1.5 Each of these points can be examined further at the next stage of design, alongside ongoing engagement with key stakeholders.

9.2 Next Steps

9.2.1 This consultation has captured a range of views from local communities and organisations. These views are essential to highlighting potential constraints and factors that may not have previously been considered. The purpose of this report is to present a factual summary of the consultation process and the responses received.

9.2.2 National highways will use this report, and the findings of further investigation and assessment works, to shape and develop the preliminary design and make a Preferred Route Announcement for the scheme later in 2022.

Appendices

Appendix A – Approach to consultation

A46 Coventry Junctions Upgrade
Walsgrave Junction

Approach to Public Consultation

Introduction

At National Highways we believe in a connected country and our network makes these connections happen. We strive to improve our major roads and motorways – engineering the future to keep people moving today and moving better tomorrow. We want to make sure all our major roads are more dependable, durable and, most importantly, safe.

In the Midlands, we are investing in ways to increase capacity, improve connections and make sure journeys are as reliable as possible.

The A46 Coventry Junctions Upgrade is a critical part of this investment, upgrading a key link between the East and West Midlands, which is great news for the local and regional economy.

We will be asking for your views on our proposed option to upgrade the A46 Walsgrave junction and want to share with you how we will do this. We have produced this document which outlines our approach to consultation, including the different ways we'll collect feedback. It also provides details about how you can take part and how your feedback will be used to influence our options.

We will develop our approach in partnership with Coventry City Council, Warwickshire County Council and Rugby Borough Council to ensure our consultation is as effective and inclusive as possible.

The scheme

As part of the Government's Road Investment Strategy, National Highways is improving the A46 Binley and Walsgrave junctions, known as the A46 Coventry Junctions Upgrade. The A46 is a strategic link between the East and West Midlands, connecting Coventry and Warwickshire to the motorway network.

The Binley and Walsgrave upgrades are being delivered in a phased approach, with permission granted for the Binley scheme in June 2020 and construction on site since March 2020.

We've been working to develop a viable option for the Walsgrave junction, which meets the needs of road users and the community whilst providing value for money. This included reviewing and discounting a number of potential shortlisted options.

We are now looking to present this option while we are still at an early stage of design to get feedback from the local community, interested parties and road users. Information about the scheme, including what we are consulting on, will be included in our public consultation brochure.

Environmental information

We are preparing an Environmental Assessment Report. This will assess the potential environmental impacts of our proposed scheme. The following range of environmental topics are being assessed:

- Air Quality
- Cultural Heritage
- Landscape and Visual
- Biodiversity
- Geology and Soils
- Materials Assets and Waste
- Noise and Vibration
- Population and Health
- Road Drainage and the Water Environment
- Climate
- Assessment of Cumulative Effects

We will identify measures to reduce negative environmental impacts, where possible, and will include these in our consultations as the scheme is developed. We will undertake further surveys and assessments at future detailed design stages to understand the potential impacts at the appropriate level of detail, based on statutory requirements and national guidance. A decision on whether a statutory Environmental Impact Assessment is required will be taken once we have completed more work on the design for our preferred option.

Approach to public consultation

This document outlines the details of our upcoming consultation process, including where you can find information and how to respond. This document will be available to view and download via the scheme webpage after the launch of the consultation and paper copies will be available on request. Contact details to request information or documents from us can be found at the end of this document.

Why and when will we consult?

Public consultation is an important part of the delivery of this scheme and provides people with a real opportunity to influence our proposals. It also allows us the opportunity to help people fully understand the scheme and resolve concerns.

This isn't the only time we'll be consulting about this scheme. We'll undertake further consultation once we have more detail about our proposals.

Your comments will help us better understand the local area and any potential impacts our scheme may have on road users and the local community. We will listen to everyone's views and consider your opinions as we develop our preferred option for the scheme.

We plan to hold our consultation on a proposed option for the scheme across a five-week period starting on Tuesday 11 January 2022. The consultation will close at

11:59pm on Monday 14 February 2022.

Who will we consult?

We have developed a consultation target area for the distribution of our consultation materials. This is based on who we think will be interested in or affected by our proposals and includes approximately 10,000 homes and businesses. We'll let people living and working in this area know about our consultation by sending out a postcard at the launch of the consultation.

We are also working with Coventry City Council, Warwickshire County Council and Rugby Borough Council to identify groups who are traditionally hard to reach, to ensure that we reach all those who could be affected by our proposals.

Anyone who is interested in this scheme is welcome to take part. We welcome all views and will take them into account to help shape and improve our scheme design.

Consultation target area

How will we consult?

From Tuesday 11 January 2022, all consultation materials and a link to the online feedback form will be posted on our scheme webpage at: https://nationalhighways.co.uk/our-work/west-midlands/a46-coventry-junctions-upgrade/

Due to the recent changes in Government coronavirus guidance, public information events will be held online through Microsoft Teams, instead of holding in person events. The dates and times for these events are listed below:

- Thursday 20 January from 6pm to 8pm
- Wednesday 26 January from 12pm to 2pm
- Saturday 29 January from 11am to 1pm

The meeting invitation links will be posted on our scheme webpage before each event.

For those who are unable to access the online consultation we'll be offering a call back service to speak to one of the project team members who will answer questions about the scheme. To do this, please call our contact centre on 0300 123 5000 and let them know when you're available to receive a call back from one of the team. Printed and alternative copies of the consultation materials will also be made available on request.

We'll use the following methods to promote our public consultation:

Method	Detail
Scheme webpage	A full summary of the scheme and electronic versions of all consultation materials will be available at: *https://highwaysengland.co.uk/our-work/west-midlands/a46-coventry-junctions-upgrade/*
Information postcard	We'll send postcards to around 10,000 addresses within the consultation target area to provide details of the scheme webpage and consultation events. The postcards will also include our contact details for people to ask questions or request printed copies of materials.
Social media	National Highways' social media channels (including Twitter and Facebook) will be used to advertise the consultation.
Media	A written communication directed at members of the news media will be distributed by our Press Office to local news and media outlets on key dates throughout the consultation.
Partner communication channels	We will work with partners, such as local authorities, to promote the consultation through existing, established communication channels.
Information posters	Posters with details of the consultation will be displayed in public locations that are open and accessible. They will include a QR code to help people quickly access the webpage and consultation response form via their smartphone.
Mobile Exhibition Centre	Our mobile exhibition centre will be used to advertise the consultation in public locations near to the scheme during the consultation.

VIP briefing events	We'll invite VIP stakeholders to attend a presentation ahead of the launch of the consultation period to brief them on the scheme and upcoming events. This is likely to be held remotely.

How can people respond to the consultation?

Responses to the consultation can be submitted in the following ways:

- Online - Complete the online consultation response online at: https://highwaysengland.co.uk/our-work/west-midlands/a46-coventry-junctions-upgrade/ (this link can also be accessed by scanning the QR code on our posters using a smartphone)
- Post - Complete a paper copy of the consultation response form and return it to: FREEPOST A46 WALSGRAVE

The deadline for responding to the consultation is 11:59pm on Monday 14 February 2022.

What will happen to the consultation responses?

All responses received during the consultation will be recorded and analysed. The detailed analysis will allow us to understand the issues and concerns raised by all our stakeholders and how these can be addressed. Where it is possible to do so, we will use your feedback to help influence the scheme design or to help identify ways to address concerns about the impacts of the scheme.

We'll summarise our findings in a public consultation report which will explain our analysis and how it influenced our proposals. We'll make the consultation report available to download from the scheme webpage.

The consultation report and detailed area research such as environmental surveys and traffic assessments will help us develop our preferred option, also known as our preferred route.

Next steps

The steps leading to our Preferred Route Announcement (PRA) are shown below:

Step	Description
1	Public consultation on our viable option for the junction. Following the close of the consultation, we will collate and analyse responses.
2	The consultation report will be published digitally after the consultation has closed and made available on our webpage. Printed copies will be available upon request. We'll consider the feedback raised during the consultation and, where possible, make amends to the scheme design.
3	The preferred option to be taken forward to the next stage of design development will be announced.
4	Public consultation on our preferred option. We'll share more detail about our proposals at this stage to collect your views.

For more information visit our scheme webpage to sign up for email alerts whenever the webpage is updated:https://highwaysengland.co.uk/our-work/west-midlands/a46-coventry-junctions-upgrade/

If you have any queries about this scheme, please contact our Customer Contact Centre by calling 0300 123 5000 or email the project team on A46CoventryJcns@highwaysengland.co.uk

Appendix B -Press Release 1

Cookies on GOV.UK

We use some essential cookies to make this website work.

We'd like to set additional cookies to understand how you use GOV.UK, remember your settings and improve government services.

We also use cookies set by other sites to help us deliver content from their services.

Accept additional cookies

Reject additional cookies

View cookies (/help/cookies)

GOV.UK

Coronavirus (COVID-19) (/coronavirus)
Latest updates and guidance

1. Home (https://www.gov.uk/)
2. Transport (https://www.gov.uk/transport)
3. Road infrastructure (https://www.gov.uk/transport/road-infrastructure)
4. Road improvement and investment (https://www.gov.uk/transport/road-improvement-and-investment)

Press release

National Highways launches consultation on A46 Walsgrave upgrade

Motorists, businesses and residents are being invited by National Highways to have their say on a major upgrade at the A46 Walsgrave junction in Coventry.

From:
National Highways (/government/organisations/national-highways)
Published
10 January 2022

The existing Walsgrave junction as seen from above.

The consultation period on the scheme starts on Tuesday 11 January with details about the project being uploaded onto the scheme website for people to look at.

Members of the public are invited to look at the design options with opportinuties to speak to the National Highways project team about the work in a series of online events taking place later this month.

Following detailed analysis of four design options by National Highways at Walsgrave junction, one of these options has been found to deliver the required improvements at Walsgrave.

The vital upgrade work to the junction is set to cost between £75m and £125m with a final cost set to be determined later in the process following detailed design work.

National Highways Project Manager, Joe Mulqueen said:

> The viable design option for the Walsgrave junction is incredibly exciting and it's an important scheme on the A46 in Coventry.
>
> We know that this junction is incredibly busy and once the scheme is complete, it will alleviate congestion at a well-known bottleneck on the A46.
>
> We're looking forward to speaking to people to find out what comments they have and to hear their feedback.

Due to the ongoing coronavirus situation, events will be held online through Microsoft Teams.

These events will take place on:

- Thursday 20 January from 6pm to 8pm
- Wednesday 26 January from 12pm to 2pm
- Saturday 29 January from 11am to 1pm

Meeting invitations will be posted on the National Highways webpage ahead of each session. Those unable to attend the online events can also speak to the project team with a special telephone call back service.

The A46 is a strategic link between the East and West Midlands and connects Coventry and Warwickshire to the motorway network.

The Government's Road Investment Strategy (RIS2) 2020 - 2025 included a commitment to the A46 Coventry Junctions scheme, which includes upgrading both the Binley and the Walsgrave junctions.

Work is currently taking place at Binley to create a new £61m flyover set for completion in early 2022.

Current levels of congestion at Walsgrave and the impacts this has on journey time reliability, are having a serious effect on communities and businesses and would constrain future development in the area.

Once the consultation has closed on Monday 14 February 2022, responses will be analysed and a consultation report will be produced summarising the feedback received.

National Highways will then consider the feedback, incorporating the comments received where possible, whilst completing further assessment and design work.

The preferred route announcement for the scheme is set to take place in summer this year and will be taken through to the next stage of design development.

To request a call back from the team, people should call 0300 123 5000 to discuss a suitable time to receive a call back from one of the team.

To find out more about the A46 Coventry Junctions project, head online to the scheme page. (https://nationalhighways.co.uk/our-work/west-midlands/a46-coventry-junctions-upgrade/)

General enquiries

Members of the public should contact the National Highways customer contact centre on 0300 123 5000.

Media enquiries

Journalists should contact the National Highways press office on 0844 693 1448 and use the menu to speak to the most appropriate press officer.

Published 10 January 2022

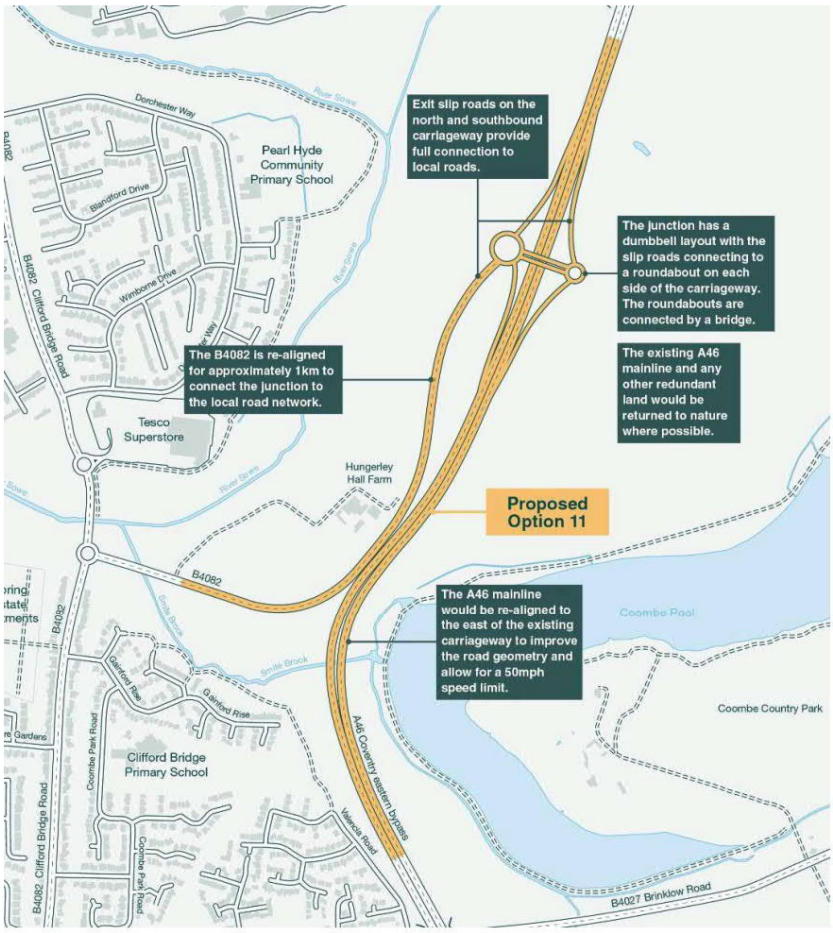
Explore the topic

- Road improvement and investment (/transport/road-improvement-and-investment)

Appendix C – Press Release 2

News release
nationalhighways.co.uk

National Highways reminding people to have their say on A46 Walsgrave upgrade



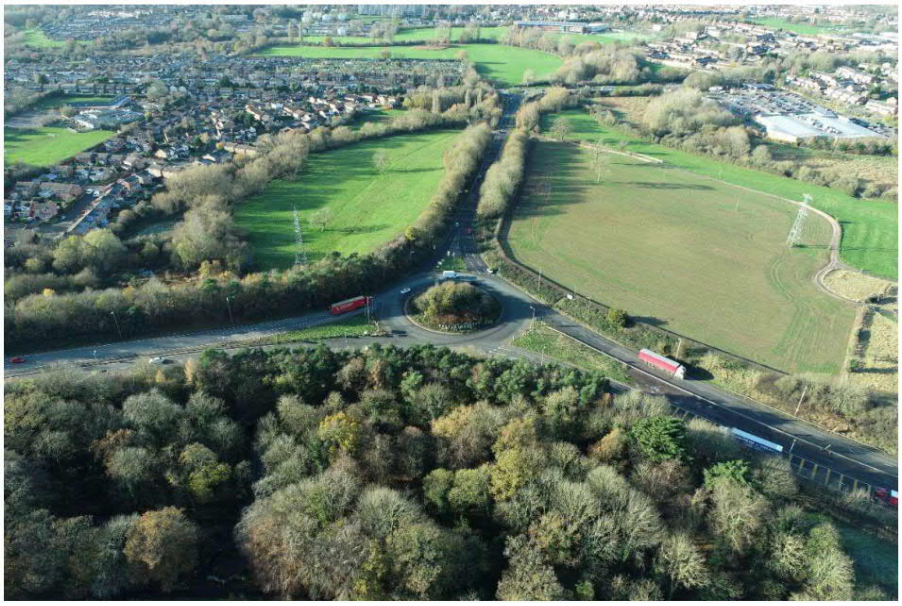
Caption: The viable design option - known as a grade separated junction - allows for a free flowing A46 carriageway while also providing road users with the option to enter and exit the local road network when travelling from either a north or southbound direction.

1

National Highways Project Manager, Joe Mulqueen said: "We're delighted to see so many people taking part in our consultation for the Walsgrave junction including those that took part in our recent online events.

"The viable design option for the Walsgrave junction is incredibly exciting and it's an important scheme on the A46 in Coventry.

"We're reminding people to have their say before the consultation finishes later this month so that we can hear what people think and to analyse feedback."



Caption: The existing Walsgrave junction as seen from above.

The A46 is a strategic link between the East and West Midlands and connects Coventry and Warwickshire to the motorway network.

The Government's Road Investment Strategy (RIS2) 2020 - 2025 included a commitment to the A46 Coventry Junctions scheme, which includes upgrading both the Binley and the Walsgrave junctions.

Work is currently taking place at Binley to create a new £61m flyover set for completion in early 2022.

Current levels of congestion at Walsgrave and the impacts this has on journey time reliability, are having a serious effect on communities and businesses and would constrain future development in the area.

Once the consultation has closed on Monday 14 February 2022, responses will be analysed and a consultation report will be produced summarising the feedback received.

National Highways will then consider the feedback, incorporating the comments received where possible, whilst completing further assessment and design work.

The preferred route announcement for the scheme is set to take place in summer this year and will be taken through to the next stage of design development.

To find out more about the A46 Coventry Junctions project, head online to https://nationalhighways.co.uk/our-work/west-midlands/a46-coventry-junctions-upgrade/

Ends

NOTES TO EDITORS

National Highways is the wholly government-owned company responsible for modernising, maintaining and operating England's motorways and major A roads.

Real-time traffic information for England's motorways and major A roads is available via its website (https://trafficengland.com), local and national radio travel bulletins, electronic road signs and mobile apps. Local Twitter services are also available at https://nationalhighways.co.uk/about-us/social-media-use/.

For further information please contact National Highways' press office (24hrs) on 0844 693 1448 and select the most appropriate option below:

Option 1: **National enquiries** (9am to 5.30pm) & **out of hours for urgent enquiries**
Option 2: **North West** (between 9am & 5.30pm)
Option 3: **Yorkshire, Humber and North East** (between 9am & 5.30pm)
Option 4: **West Midlands** (between 9am & 5.30pm)
Option 5: **East Midlands** (between 9am & 5.30pm)
Option 6: **East** (between 9am & 5.30pm)
Option 7: **South East** (between 9am & 5.30pm)
Option 8: **South West** (between 9am & 5.30pm)

Appendix D – Promotional Postcards

D.1 Postcard 1

TO BE SUPPLIED BY NH

D.2 Postcard 2

national highways

A46 Coventry junctions upgrade - Walsgrave junction
Public consultation

There's still time to have your say on our plans to improve the A46 Walsgrave junction.

Your views are important to help us better understand the local area and any potential impacts our scheme may have on you and the community.

Have your say before Monday 14 February 2022.

To find out more about our plans

Visit our webpage **https://nationalhighways.co.uk/our-work/west-midlands/a46-coventry-junctions-upgrade/** where you can:

- View the consultation materials
- Watch a recording of one of our online information events
- Give your views

Got any questions?

We're offering a call back service where you can ask a member of our project team any questions about the scheme. To do this, please call our contact centre on **0300 123 5000** and let them know when you're available to receive a call back from one of the team.

Please recycle me

Printed copies of our consultation materials are available on request, contact us on:

Telephone: 0300 123 5000 **Email:** A46CoventryJcns@highwaysengland.co.uk

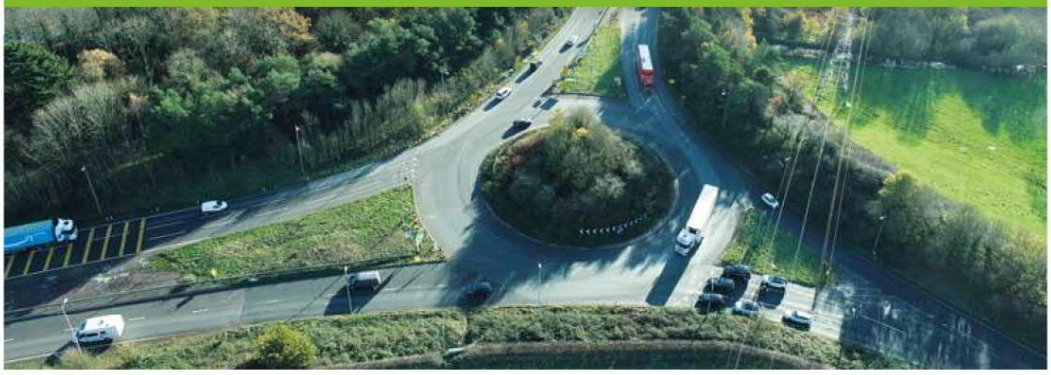
Scan me for more information about the improvements

BHM22_0007

Appendix E – Promotional Poster

national highways

A46 Coventry junctions upgrade - Walsgrave junction
Public consultation



Have your say

We're holding a public consultation on our plans to improve the A46 Walsgrave junction. Your views are important to help us better understand the local area and any potential impacts our scheme may have on you and the community. The consultation will run between **Tuesday 11 January and Monday 14 February 2022.**

You can get involved by: Visiting our webpage to find out more information about the improvements and give your views **https://nationalhighways.co.uk/our-work/west-midlands/a46-coventry-junctions-upgrade/**

Coming to one of our online information events:

Thursday 20 January	Wednesday 26 January	Saturday 29 January
6pm to 7pm	12pm to 2pm	11am to 1pm

These events will be held via Microsoft Teams. We'll share the meeting invitation on our webpage.

If you're unable to attend one of these events we're also offering a call back service where you can ask a member of our project team any questions about the scheme. To do this please call our contact centre on **0300 123 5000** and let them know when you're available to receive a call back from one of the team.

All consultation materials will be available on our webpage and printed copies will be available on request.

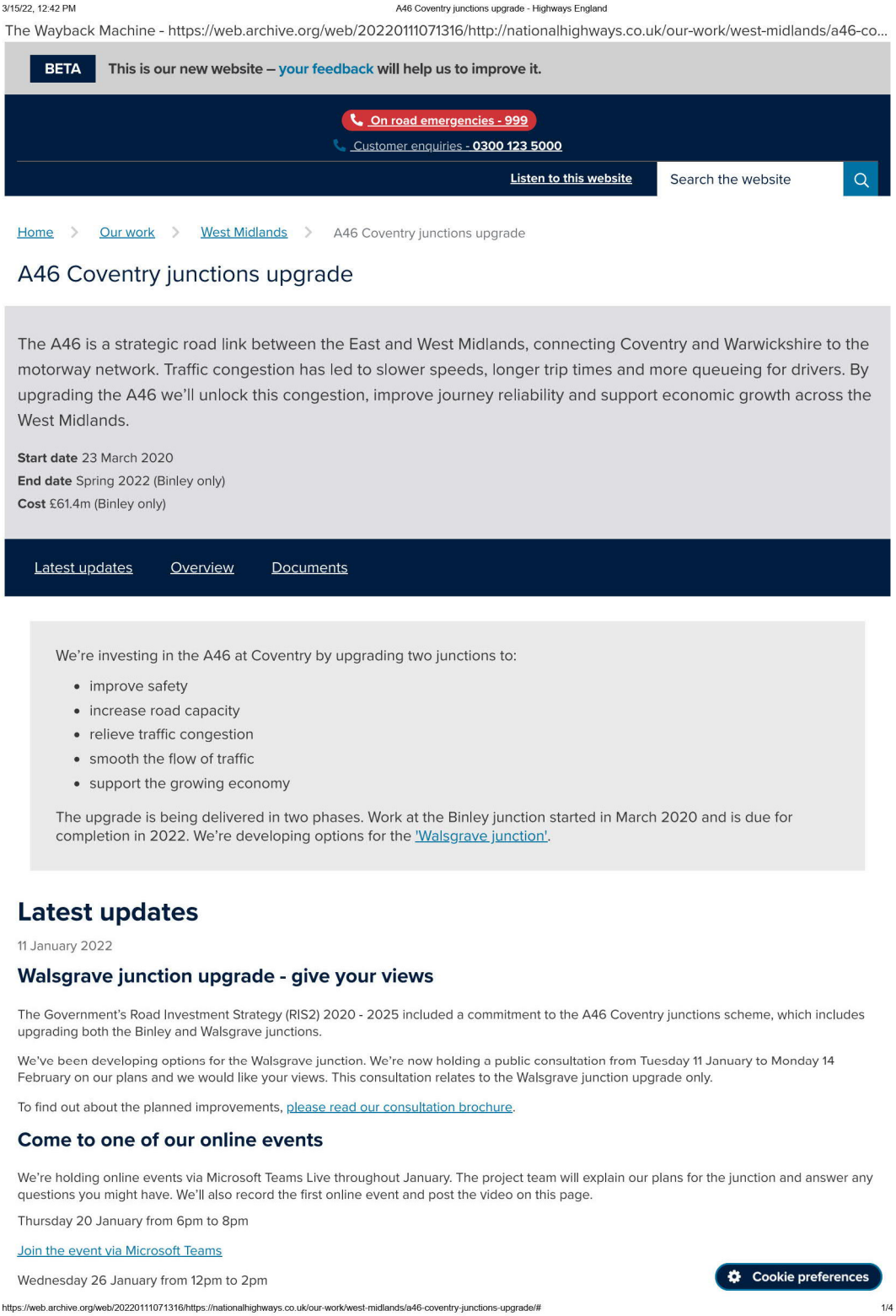
Telephone: 0300 123 5000 Email: A46CoventryJcns@highwaysengland.co.uk

Scan me for more information about the improvements

BHM21_0143

Appendix F – Scheme webpage

F.1 Screenshot of A46 Coventry Junctions website homepage prior to update



3/15/22, 12:42 PM A46 Coventry junctions upgrade - Highways England

The Wayback Machine - https://web.archive.org/web/20220111071316/http://nationalhighways.co.uk/our-work/west-midlands/a46-co...

BETA This is our new website – your feedback will help us to improve it.

On road emergencies - 999

Customer enquiries - 0300 123 5000

Listen to this website Search the website

Home > Our work > West Midlands > A46 Coventry junctions upgrade

A46 Coventry junctions upgrade

The A46 is a strategic road link between the East and West Midlands, connecting Coventry and Warwickshire to the motorway network. Traffic congestion has led to slower speeds, longer trip times and more queueing for drivers. By upgrading the A46 we'll unlock this congestion, improve journey reliability and support economic growth across the West Midlands.

Start date 23 March 2020
End date Spring 2022 (Binley only)
Cost £61.4m (Binley only)

Latest updates Overview Documents

We're investing in the A46 at Coventry by upgrading two junctions to:

- improve safety
- increase road capacity
- relieve traffic congestion
- smooth the flow of traffic
- support the growing economy

The upgrade is being delivered in two phases. Work at the Binley junction started in March 2020 and is due for completion in 2022. We're developing options for the 'Walsgrave junction'.

Latest updates

11 January 2022

Walsgrave junction upgrade - give your views

The Government's Road Investment Strategy (RIS2) 2020 - 2025 included a commitment to the A46 Coventry junctions scheme, which includes upgrading both the Binley and Walsgrave junctions.

We've been developing options for the Walsgrave junction. We're now holding a public consultation from Tuesday 11 January to Monday 14 February on our plans and we would like your views. This consultation relates to the Walsgrave junction upgrade only.

To find out about the planned improvements, please read our consultation brochure.

Come to one of our online events

We're holding online events via Microsoft Teams Live throughout January. The project team will explain our plans for the junction and answer any questions you might have. We'll also record the first online event and post the video on this page.

Thursday 20 January from 6pm to 8pm

Join the event via Microsoft Teams

Wednesday 26 January from 12pm to 2pm

Cookie preferences

https://web.archive.org/web/20220111071316/https://nationalhighways.co.uk/our-work/west-midlands/a46-coventry-junctions-upgrade/# 1/4

Join the event via Microsoft Teams

Saturday 29 January from 11am to 1pm

Join the event via Microsoft Teams

You may need to create a Microsoft Teams account before joining the online event.

We're also offering a call back service where you can request a call from one of the project team members to answer your questions about the scheme. To do this please call our contact centre on 0300 123 5000 and let them know when you're available to receive a call back from one of the team. You can also email us at: A46CoventryJcns@highwaysengland.co.uk

Why the junction improvements are needed

Current levels of congestion, and the impacts this has on journey time reliability, are having a serious effect on communities and businesses in the local area and would constrain future development.

Our plans to improve the Walsgrave junction will:

- support economic growth
- support the smooth flow of traffic
- improve safety

Give your views

Your feedback is important to us, so please share your ideas, concerns and local knowledge with us.

Give your views on our citizen space consultation webpage.

You can also respond by printing out, or requesting a printed copy, of our consultation response form.

The consultation will run from Tuesday 11 January 2022 to Monday 14 February 2022. Responses posted on the closing date will still be accepted.

What happens next

Once the consultation has closed on Monday 14 February 2022, the feedback and responses will be analysed. We'll incorporate the comments received where possible, whilst completing further assessment and design work. A consultation report will then be produced summarising the feedback received.

The preferred route announcement for the scheme is set to take place in summer this year (2022) and will be taken through to the next stage of design development.

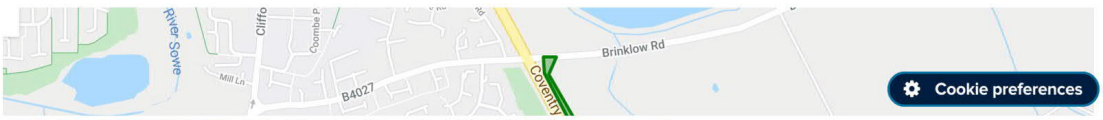
+ See more updates

Project information

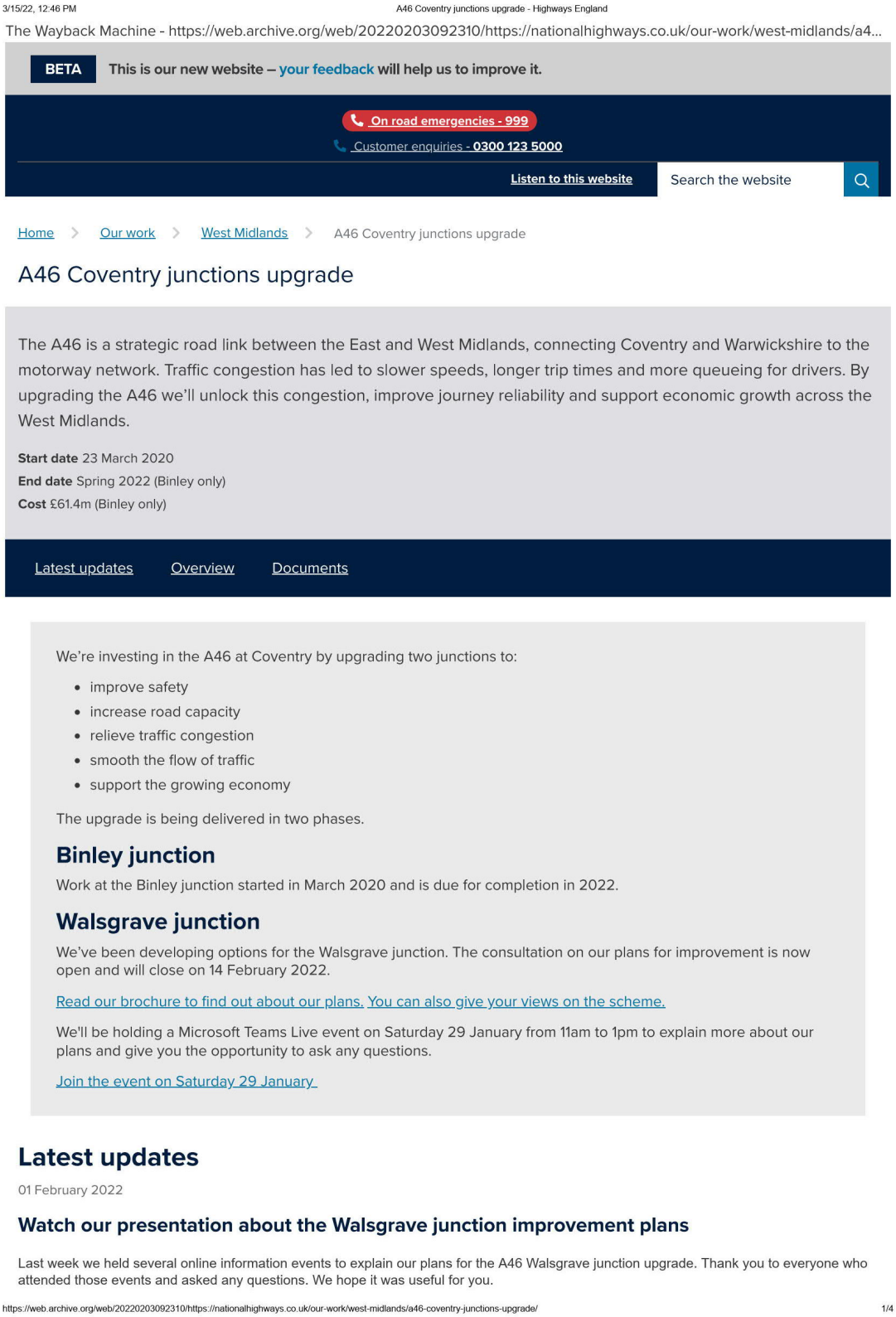
— Give us your feedback

Visit our A46 Coventry junctions upgrade feedback tool to have your say. The tool includes an interactive map. You can click on a location to make a specific comment, or give us your general feedback.

ECHO is a one-way feedback tool, so if you'd like a response to your feedback you can email the project team at: A46CoventryJcns@highwaysengland.co.uk



F.2 Screenshot taken of A46 Coventry Junctions website homepage following update



3/15/22, 12:46 PM A46 Coventry junctions upgrade - Highways England

The Wayback Machine - https://web.archive.org/web/20220203092310/https://nationalhighways.co.uk/our-work/west-midlands/a4...

BETA This is our new website – your feedback will help us to improve it.

On road emergencies - 999

Customer enquiries - 0300 123 5000

Listen to this website Search the website

Home > Our work > West Midlands > A46 Coventry junctions upgrade

A46 Coventry junctions upgrade

The A46 is a strategic road link between the East and West Midlands, connecting Coventry and Warwickshire to the motorway network. Traffic congestion has led to slower speeds, longer trip times and more queueing for drivers. By upgrading the A46 we'll unlock this congestion, improve journey reliability and support economic growth across the West Midlands.

Start date 23 March 2020
End date Spring 2022 (Binley only)
Cost £61.4m (Binley only)

Latest updates Overview Documents

We're investing in the A46 at Coventry by upgrading two junctions to:

- improve safety
- increase road capacity
- relieve traffic congestion
- smooth the flow of traffic
- support the growing economy

The upgrade is being delivered in two phases.

Binley junction

Work at the Binley junction started in March 2020 and is due for completion in 2022.

Walsgrave junction

We've been developing options for the Walsgrave junction. The consultation on our plans for improvement is now open and will close on 14 February 2022.

Read our brochure to find out about our plans. You can also give your views on the scheme.

We'll be holding a Microsoft Teams Live event on Saturday 29 January from 11am to 1pm to explain more about our plans and give you the opportunity to ask any questions.

Join the event on Saturday 29 January

Latest updates

01 February 2022

Watch our presentation about the Walsgrave junction improvement plans

Last week we held several online information events to explain our plans for the A46 Walsgrave junction upgrade. Thank you to everyone who attended those events and asked any questions. We hope it was useful for you.

https://web.archive.org/web/20220203092310/https://nationalhighways.co.uk/our-work/west-midlands/a46-coventry-junctions-upgrade/ 1/4

If you weren't able to come along to one of the live online events, we have recorded the presentation section of the event. The project manager for National Highways and Aecom explain what our viable option is, why we discounted other options and what constraints we had to work around in the area.

Please give your views on the improvements by filling in our response form.

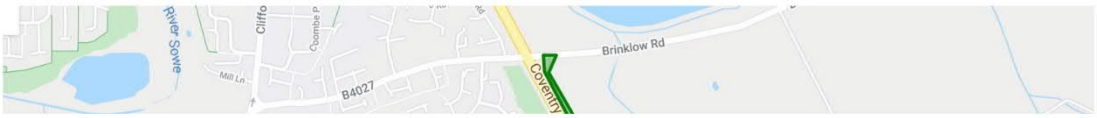
+ See more updates

Project information

− Give us your feedback

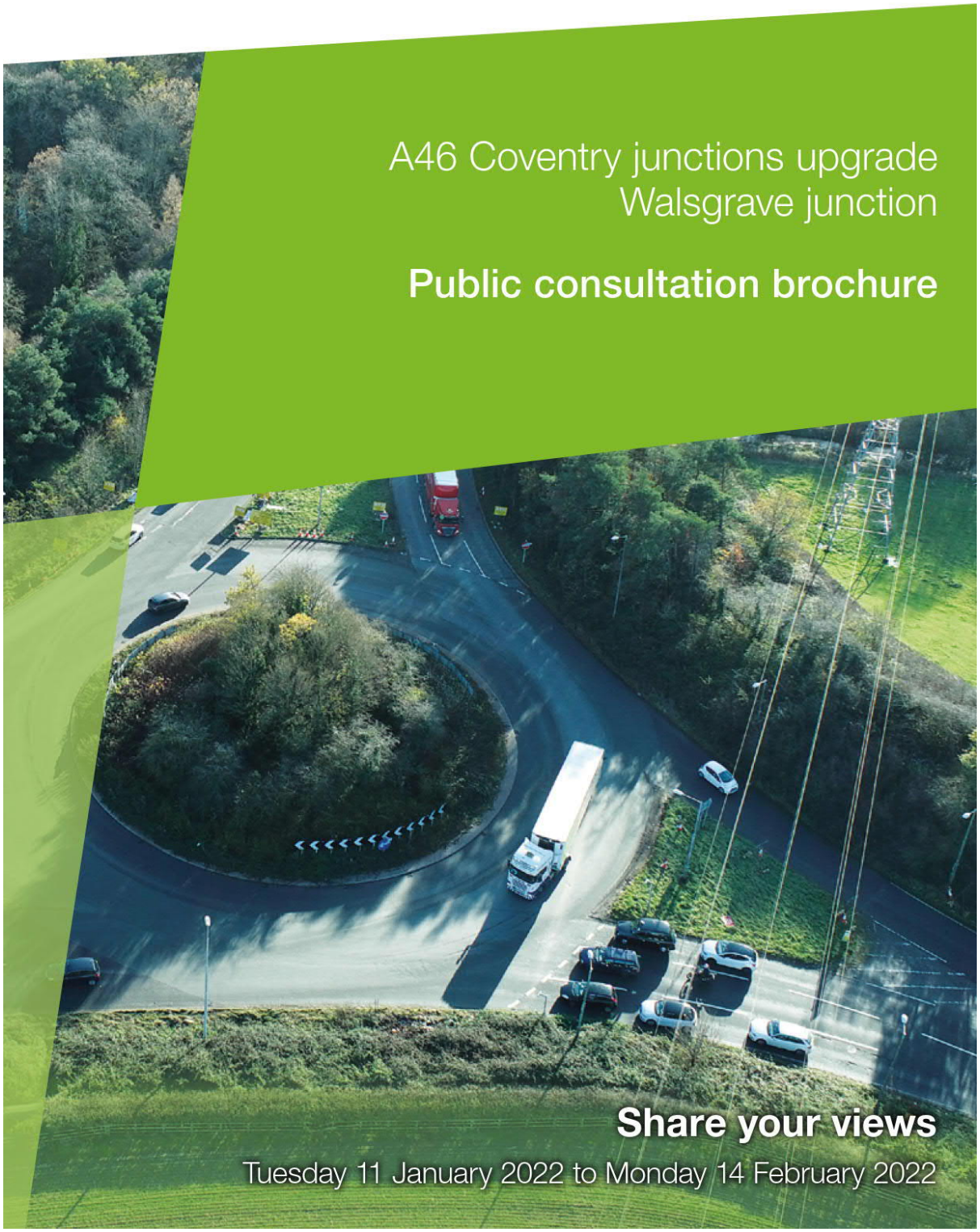
Visit our A46 Coventry junctions upgrade feedback tool to have your say. The tool includes an interactive map. You can click on a location to make a specific comment, or give us your general feedback.

ECHO is a one-way feedback tool, so if you'd like a response to your feedback you can email the project team at: A46CoventryJcns@highwaysengland.co.uk



Appendix G – Consultation Brochure

national highways



Contents

Investing in your roads

At National Highways, we believe in a connected country and our network makes these connections happen. We strive to improve our major roads and motorways - engineering the future to keep people moving today and moving better tomorrow. We want to make sure all our major roads are more dependable, durable and, most importantly, safe.

In the Midlands, we're investing in ways to increase capacity, improve connections and make sure journeys are as reliable as possible.

The A46 Coventry junctions upgrade is a critical part of this investment, upgrading the key link between the East and West Midlands and will help support the economic growth locally and across the West Midlands.

In this brochure we explain our proposed improvements for the A46 Walsgrave junction and the options that have been considered. We also give details of how you can give us your feedback during our public consultation.

Our consultation

We're holding a public consultation on our plans to improve the A46 Walsgrave junction. We'd like to hear what you think, so please share your ideas, concerns and local knowledge with us. The consultation will run from **Tuesday 11 January 2022 to Monday 14 February 2022.**

We are aware that the coronavirus situation is constantly developing and changing, and it's essential that we observe and comply with the UK government's restrictions.

Due to the recent changes in government guidance we will be holding our public information events online through Microsoft Teams. During these events we will present information about the scheme and answer any questions you might have.

All of our consultation materials are available on our webpage, and printed copies of these materials will be made available via post on request. Your views are important to help us better understand the local area and any potential impacts our scheme may have on you and the community.

Where to get more information

We want to make sure you have access to all the information you need about the scheme.

Join one of our online information events:

- Thursday 20 January from 6pm to 8pm
- Wednesday 26 January from midday to 2pm
- Saturday 29 January from 11am to 1pm

You may need to download Microsoft Teams to access these events. We will share the meeting invitation link on our webpage before the event.

Visit our scheme webpage: https://nationalhighways.co.uk/our-work/west-midlands/a46-coventry-junctionsupgrade/

Contact us with any questions

We're offering a call back service where you can request a call back from one of the project team members to answer your questions about the scheme. To do this please call our contact centre on **0300 123 5000** and let them know when you're available to receive a call back from one of the team. You can also email us at: **A46CoventryJcns@highwaysengland.co.uk**

If you'd like more information about accessing the consultation materials, or you'd like to receive printed copies of the materials, please contact us using the details above.

How to respond

- You can respond to our consultation by completing the response form online, by visiting our scheme webpage: **https://nationalhighways.co.uk/our-work/west-midlands/a46-coventry-junctions-upgrade/**

If you are unable to access the online response form, you can respond using the following methods:

- **posting** a printed response form to us using our freepost address. There's no need for a stamp, just put your form in an envelope and send it to**: FREEPOST A46 WALSGRAVE JUNCTION**
- **email** your response to us at: **A46CoventryJcns@highwaysengland.co.uk**

All responses must be received by National Highways before 11:59pm on Monday 14 February 2022. Responses posted on or before the closing date will be accepted.

Why the scheme is needed

The A46 is a strategic link between the East and West Midlands, and connects Coventry and Warwickshire to the motorway network.

The Government's Road Investment Strategy (RIS2) 2020 - 2025 included a commitment to the A46 Coventry junctions scheme, which includes upgrading both the Binley and Walsgrave junctions. This consultation relates to the Walsgrave junction upgrade. Current levels of congestion and the impacts this has on journey time reliability, are having a serious effect on communities and businesses and will constrain future development in the area.

Upgrading the A46 Walsgrave junction will:

Support economic growth

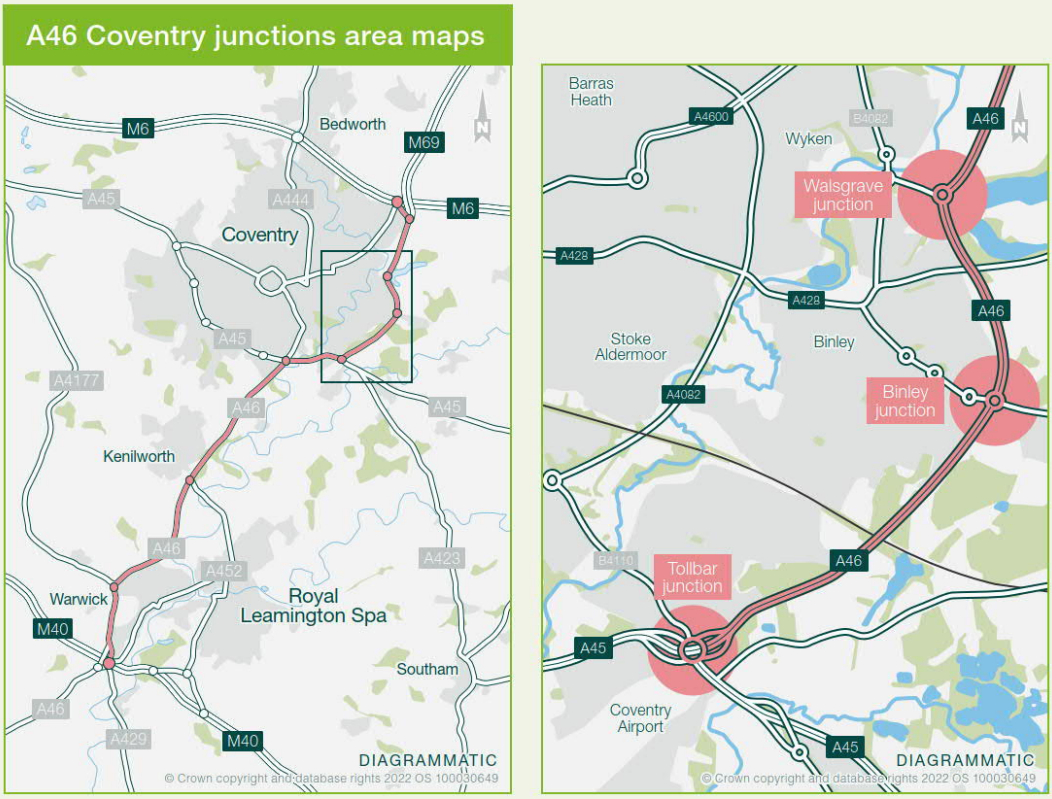
The A46 is a nationally significant trade and export route. There are ports at either end of the corridor and both East Midlands and Birmingham airports are close by. The scheme will provide additional junction capacity in an area that's already busy and which is forecast to become even busier in the coming years due to planned developments across the region.

Support the smooth flow of traffic

Congestion at the Walsgrave junction means journeys are unreliable and take longer than they should. This will only get worse as more people are expected to use the road in the future. Our scheme will improve the flow of traffic, meaning road users will have quicker and more reliable journeys.

Improve safety

Accidents not only have a direct impact on those involved, but they often lead to lane closures which impact journey time reliability for other road users. Improving the Walsgrave junction will improve safety by separating local and long-distance traffic and reducing congestion.


A46 Coventry junctions area maps
M6
Bedworth
M69
A45
A444
M6
Coventry
A45
A4177
A46
A45
Kenilworth
A46
A452
A423
Warwick
Royal
Leamington Spa
M40
Southam
A46
A429
M40
DIAGRAMMATIC
© Crown copyright and database rights 2022 OS 100030649
Barras
Heath
A4600
Wyken
A46
Walsgrave
junction
A428
A428
A46
Stoke
Aldermoor
Binley
A4082
Binley
junction
B4110
Tollbar
junction
A46
A45
Coventry
Airport
A45
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Constraints

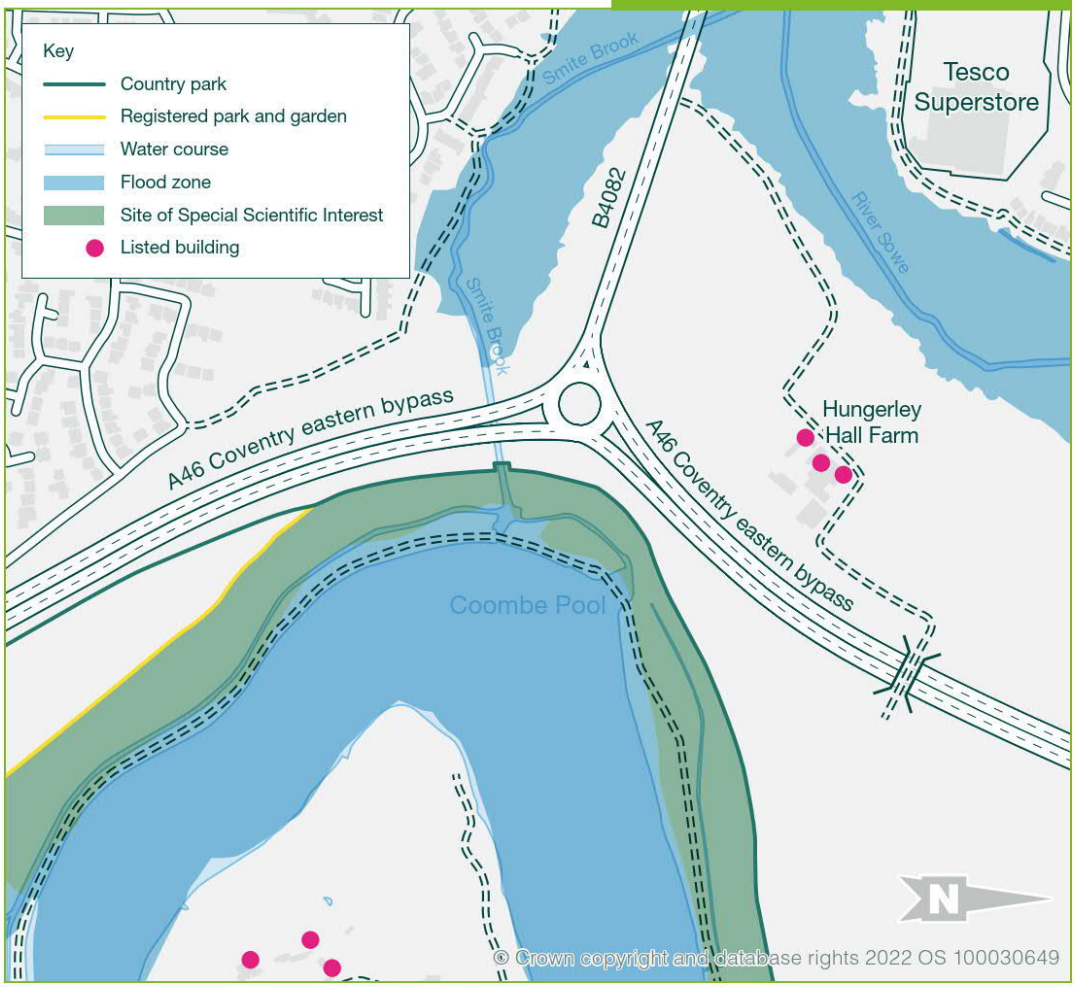
The location and setting of the A46 Walsgrave junction presents a number of engineering and environmental constraints. We have carefully considered these constraints when developing and shortlisting options as they have presented significant engineering challenges.

The constraints in the area of Walsgrave junction include:

- the River Sowe and Smite Brook flood plains
- Coombe Pool Site of Special Scientific Interest
- Smite Brook crossing the carriageway
- historic and listed buildings at Hungerley Hall Farm
- a historic landfill site
- high voltage overhead power-lines

The environment is really important and we will work to minimise our impact and enhance environmental features wherever possible. Where these constraints cannot be avoided or mitigated, this has resulted in options being discounted. The key reasons for discounting specific options have been outlined throughout this consultation brochure.

Environmental constraints map



Our plan for A46 Walsgrave junction

Up until now, we have been assessing options. We have outlined below how we arrived at our proposed option which we are presenting at this consultation.

Initial assessment - eleven options

Initially, eleven options were considered for the improvements at Walsgrave junction. At this stage, we looked at the engineering and environmental benefits of all eleven options. Following this initial assessment, seven options were discounted and four were shortlisted for further assessment works. The reasons for discounting the seven options are outlined on page 22-25 of this brochure.

Further assessment - four options

The four shortlisted options were taken forward for further development and analysis, and were investigated in more detail.

Viable option - one option

Following the further assessment, only one of our four shortlisted options was found to deliver the required improvements at Walsgrave junction. This is **Option 11.**
We have also described the three shortlisted options that have been discounted, focusing on the reasons why they were not viable.

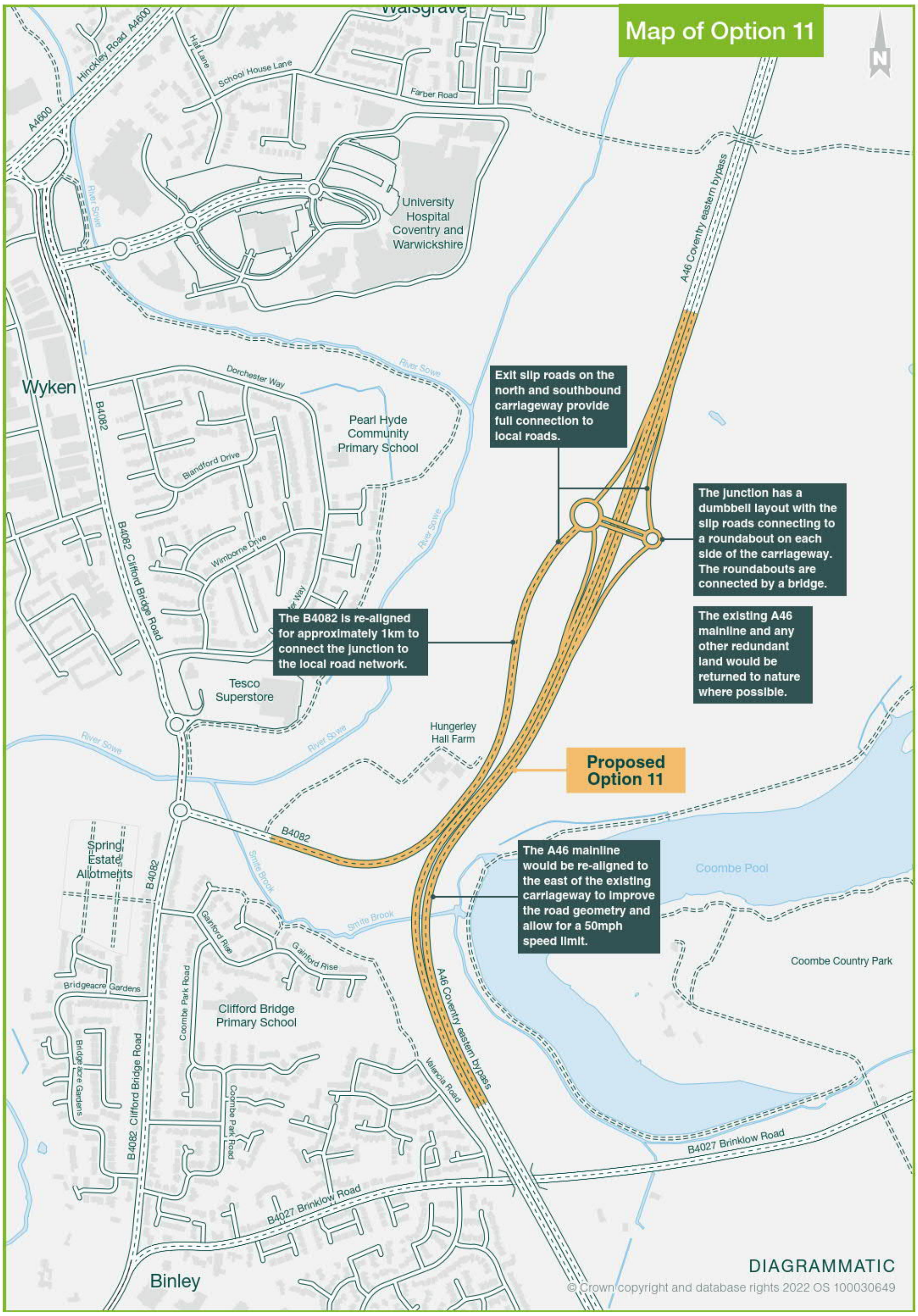
Option 11

A grade separated junction is a junction where the conflicting traffic flows are kept apart, usually by means of a bridge or tunnel.

Option 11 provides a fully grade separated junction approximately 800m north of the existing A46 Walsgrave junction. This allows for two lanes of free-flowing traffic in each direction. Exit and entry slip roads would be provided on both the north and southbound carriageway allowing full connection to the local road network. The junction would be in a dumbbell layout with the slip roads connecting to a roundabout on each side of the carriageway with the roundabouts connected via an overbridge. For safety reasons, the existing northbound and southbound laybys, north of the current A46 Walsgrave roundabout, would need to be removed.

A new B4082 link road, approximately 1km in length, would be provided between the western roundabout of the proposed dumbbell junction and an existing section of the B4082 that leads to the roundabout on Clifford Bridge Road. This would be a two-lane single carriageway, situated between the A46 and Hungerley Hall Farm as shown in the **map on page 7.**

Due to the existing local constraints, including the River Sowe flood plain and Hungerley Hall Farm, the main carriageway will have a 50mph limit so road users can travel safely through the junction. The existing sections of the B4082 and A46 roundabout that are no longer required would be removed, with planting and landscape designs for any unused land to be decided in later stages of the scheme. The existing overpass (farm access) over the A46 close to Hungerley Hall Farm will be demolished, with new access provided subject to consultation with the landowner.


Map of Option 11
Exit slip roads on the north and southbound carriageway provide full connection to local roads.
The junction has a dumbbell layout with the slip roads connecting to a roundabout on each side of the carriageway. The roundabouts are connected by a bridge.
The existing A46 mainline and any other redundant land would be returned to nature where possible.
The B4082 is re-aligned for approximately 1km to connect the junction to the local road network.
Proposed Option 11
The A46 mainline would be re-aligned to the east of the existing carriageway to improve the road geometry and allow for a 50mph speed limit.
Walsgrave
Wyken
Binley
University Hospital Coventry and Warwickshire
Pearl Hyde Community Primary School
Tesco Superstore
Hungerley Hall Farm
Spring Estate Allotments
Clifford Bridge Primary School
Coombe Pool
Coombe Country Park
A46 Coventry eastern bypass
B4082 Clifford Bridge Road
B4027 Brinklow Road
DIAGRAMMATIC
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Shortlisted options that were discounted

Option 6

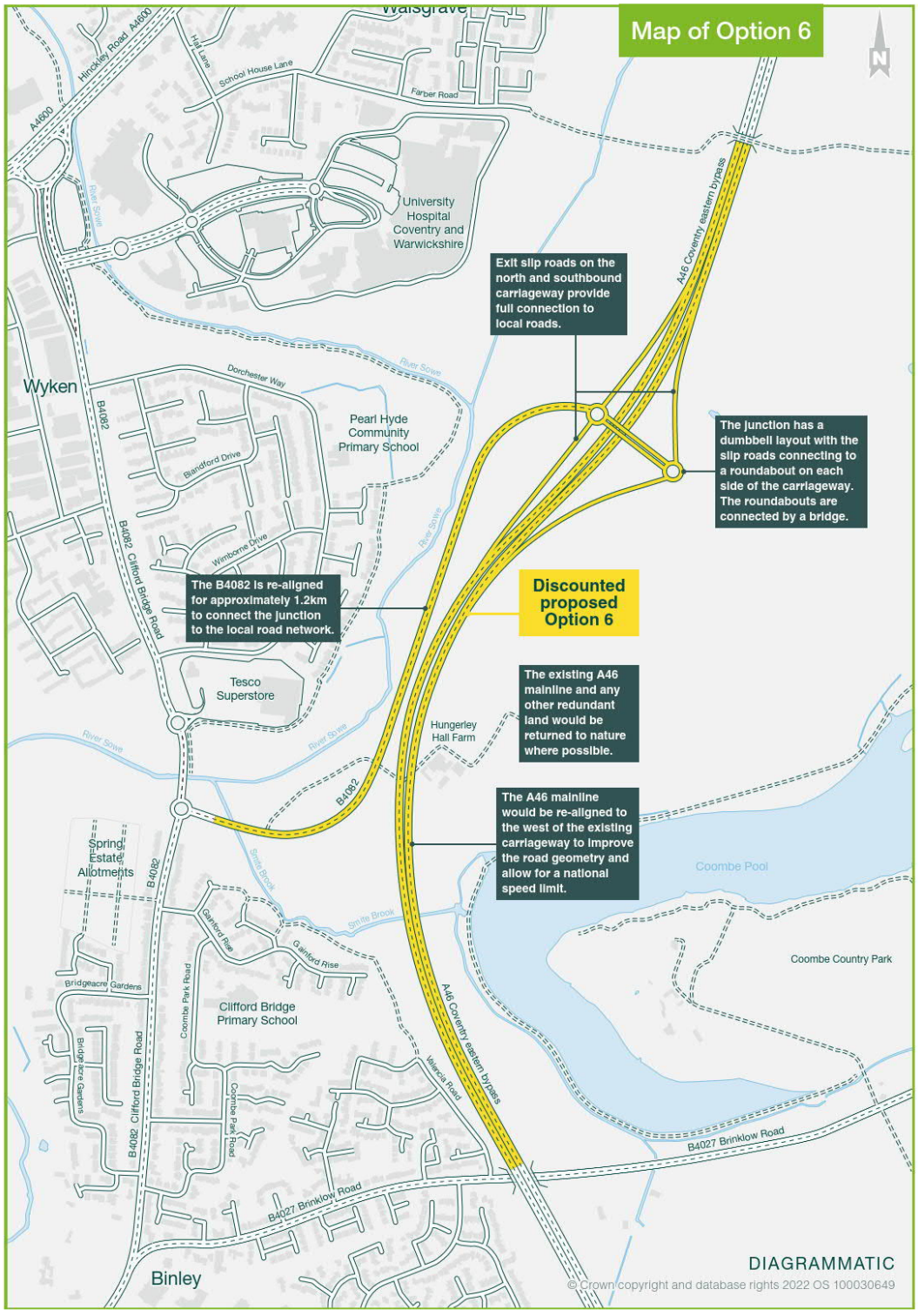
Option 6 would have provided a new fully grade separated junction approximately 1km north of the existing junction. It allowed for two lanes of free-flowing traffic in each direction. Exit and entry slip roads would have been provided on both the north and southbound carriageway allowing full connection to the local road network. The junction would have been in a dumbbell layout with the slip roads connecting to a roundabout on each side of the carriageway with the roundabouts connected via an overbridge.

The B4082 would have been re-aligned for approximately 1.2km to connect the junction to the local road network. The A46 would have been straightened to the west of the existing carriageway to allow for a national speed limit.

Why was this option discounted?

Further analysis of this design indicated that there would be significantly increased risk of flooding associated with this option. The new B4082 would have led to a significant reduction in the River Sowe's floodplain storage and would have resulted in regular flooding of the road and the local area.

In order to overcome these impacts, a large number of mitigation measures would have been required, which would have resulted in significant environmental impacts, meaning that this option was not viable.


Map of Option 6
Exit slip roads on the north and southbound carriageway provide full connection to local roads.
The junction has a dumbbell layout with the slip roads connecting to a roundabout on each side of the carriageway. The roundabouts are connected by a bridge.
Discounted proposed Option 6
The B4082 is re-aligned for approximately 1.2km to connect the junction to the local road network.
The existing A46 mainline and any other redundant land would be returned to nature where possible.
The A46 mainline would be re-aligned to the west of the existing carriageway to improve the road geometry and allow for a national speed limit.
Walsgrave
Hinckley Road A4600
Mill Lane
School House Lane
Farber Road
A4600
River Sowe
University Hospital Coventry and Warwickshire
A46 Coventry eastern bypass
Wyken
Dorchester Way
B4082
Pearl Hyde Community Primary School
Blandford Drive
Wimborne Drive
B4082 Clifford Bridge Road
Tesco Superstore
Hungerley Hall Farm
Spring Estate Allotments
Shiits Brook
Gainford Rise
Bridgeacre Gardens
Coombe Park Road
Clifford Bridge Primary School
Warwick Road
Coombe Pool
Coombe Country Park
B4027 Brinklow Road
Binley
DIAGRAMMATIC
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Option 7 and Option 8

The junction design of Option 7 and 8 were very similar, with the difference between the two options being in the alignment of the A46 carriageway. This meant that Option 7 would have allowed for a 50mph speed limit, whereas Option 8 allowed for a national speed limit of 70mph.

The designs would have removed the existing roundabout at Walsgrave junction to provide two lanes of free-flowing traffic in each direction on the A46.

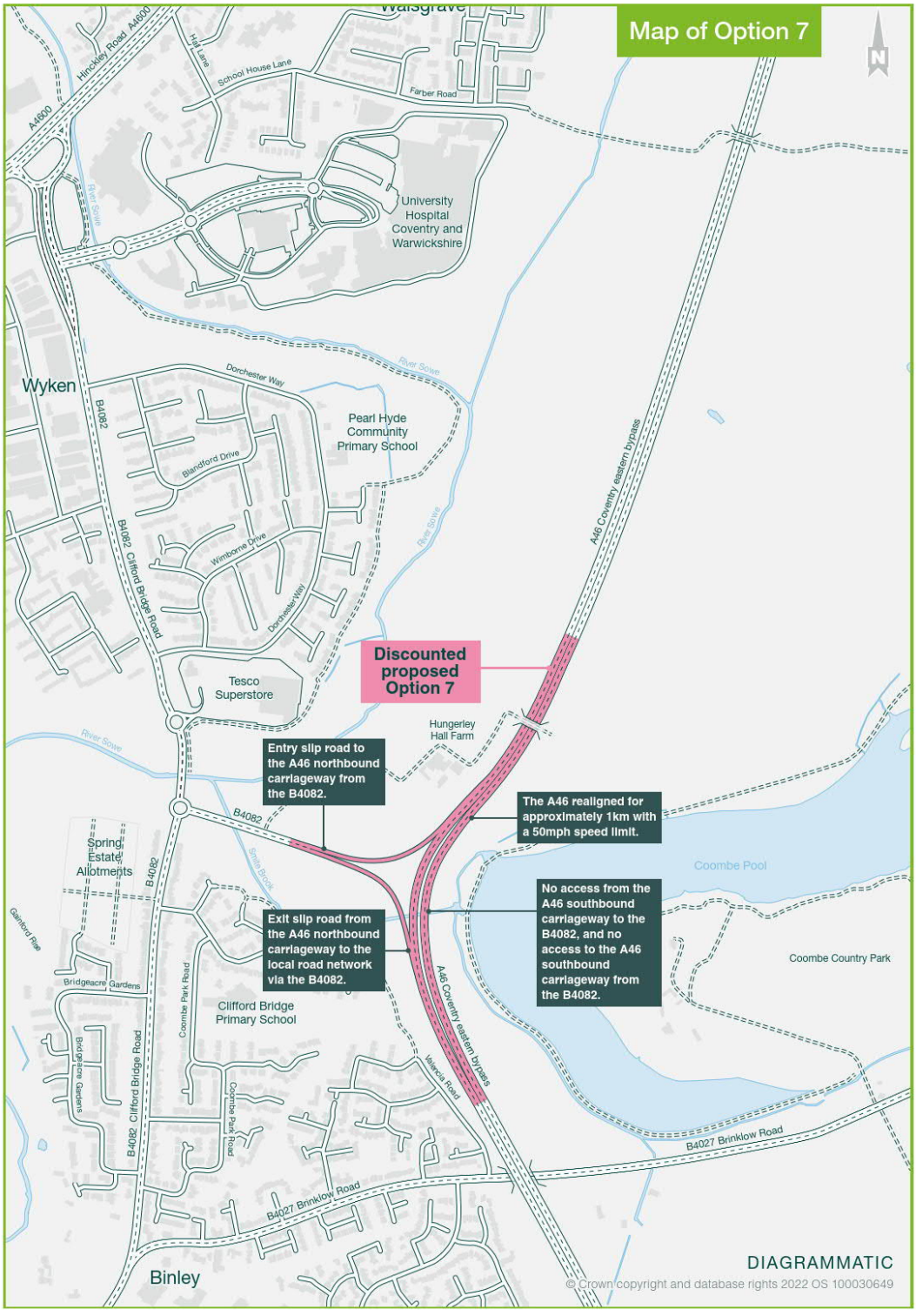
Exit slip roads would have provided access from the A46 northbound carriageway to the local road network via the B4082 and an entry slip road would have provided access to the A46 northbound carriageway from the B4082.

However, no access would have been provided from the A46 southbound carriageway to the B4082 and there would be no access to the A46 southbound carriageway from the B4082.

Why were these options discounted?

Further traffic modelling showed that these junction designs would have led to worsening congestion on the local road network, including the A428 and Clifford Bridge Road.

These traffic impacts would then tailback onto the A46, meaning there would still be some queuing on the A46 between the Binley and Walsgrave junctions.


Map of Option 7
N
Walsgrave
Hinckley Road
A4600
Mill Lane
School House Lane
Farber Road
University Hospital Coventry and Warwickshire
River Sowe
Wyken
Dorchester Way
B4082
Pearl Hyde Community Primary School
Blandford Drive
Wimborne Drive
B4082 Clifford Bridge Road
A46 Coventry eastern bypass
Discounted proposed Option 7
Tesco Superstore
Hungerley Hall Farm
Entry slip road to the A46 northbound carriageway from the B4082.
The A46 realigned for approximately 1km with a 50mph speed limit.
Spring Estate Allotments
Shilo Brook
Coombe Pool
No access from the A46 southbound carriageway to the B4082, and no access to the A46 southbound carriageway from the B4082.
Exit slip road from the A46 northbound carriageway to the local road network via the B4082.
Gaisford Rise
Bridgeacre Gardens
Coombe Park Road
Clifford Bridge Primary School
Coombe Country Park
Valencia Road
B4027 Brinklow Road
Binley
DIAGRAMMATIC
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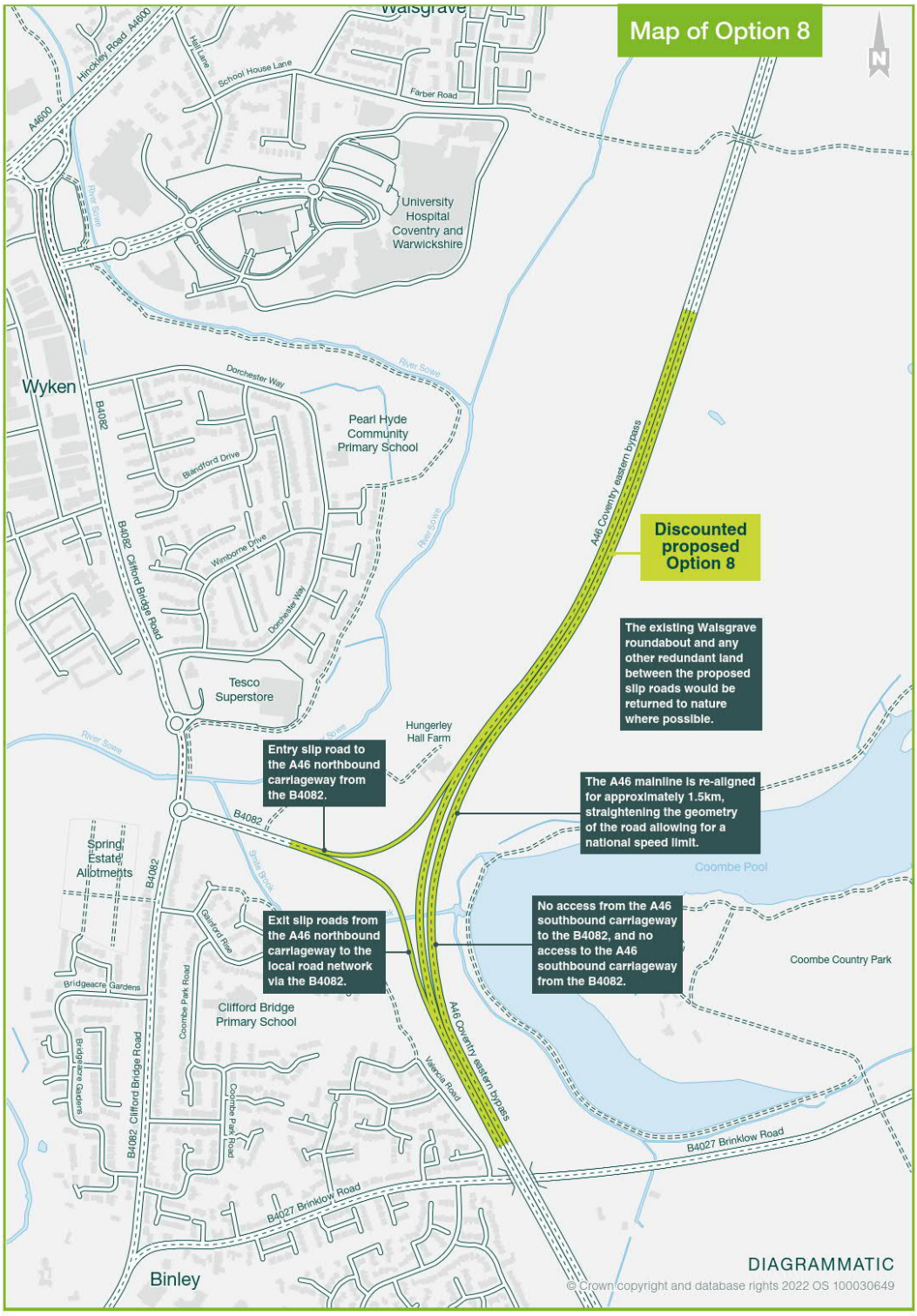
11

A46 Coventry junctions upgrade - Walsgrave junction



12

Benefits and impacts of the shortlisted options

In assessing the benefits and impacts of the four shortlisted options, we looked at a variety of features as summarised in the table below. As this consultation is taking place at an early stage in the overall scheme, this information is still being developed for our final option, option 11, as we carry out detailed surveys and assessments. Environmental impacts are assessed based on national guidance.

Journey times and traffic congestion

We have built a traffic model that has been validated using observed traffic flows and journey times. This has allowed us to understand the current issues and forecast how they will change in the future if we do not build the scheme. We have used this model to test the impact of building the options we've developed.

Option 11

Option 11 performs well in traffic modelling, with the grade separated junction allowing the A46 Walsgrave junction to operate efficiently.

This junction design allows for a free flowing A46 carriageway, while also providing road users with the option to enter and exit the local road network when travelling from either a north or southbound direction.

Shortlisted options that were discounted:

Option 6	Option 7	Option 8
Option 6 performed well in traffic modelling, with the grade separated junction allowing the A46 to operate efficiently.	Option 7 allowed for a 50mph speed limit. However, Option 7 was shown to result in worsening congestion on the local road network. This would lead to tailbacks on the A46 between the Walsgrave and Binley junctions. It is for this reason that Option 7 has been discounted.	Option 8 allowed for a 70mph speed limit. However, Option 8 was shown to result in worsening congestion on the local road network. This would lead to tailbacks on the A46 between the Walsgrave and Binley junctions. It is for this reason that Option 8 has been discounted.

Noise

An assessment of noise and vibration has been carried out to understand the likely noise effects both while we're building the scheme and once it's open to traffic. Our noise model is able to forecast where changes in noise would occur and as the scheme is developed in later stages, it'll help us to identify where mitigation, such as noise barriers, might be needed.

Option 11

Option 11 performs well in terms of noise modelling, and it is predicted to result in only one significant adverse effect, which is less than our discounted options.

The significant adverse effect as a result of Option 11 will be at Hungerley Hall Farm, due to both the realignment of the A46 and the introduction of the new free flow junction slip road close to the rear of this property.

During construction, noise impacts are likely at Hungerley Hall Farm, properties located close to the north-west of the scheme, and properties in the area of the Clifford Bridge Road junction. This is due to earthworks and road construction activities required to build the B4082 link and realign the A46 to the north of the junction. Construction noise is also likely to impact properties south of the new junction due to earthworks and road construction activities needed to realign the A46 carriageway. Vibration impacts are also likely at properties close to the A46, including Hungerley Hall Farm and in the vicinity of Valencia Road to the south of the scheme.

However, as the scheme develops, we will consider potential construction impacts carefully. Wherever possible, mitigation measures will be put in place to reduce the impact of our construction work on the local area.

Shortlisted options that were discounted:

Option 6	**Options 7 and 8**
Option 6 was predicted to result in the greatest number of significant adverse noise effects from traffic on sensitive locations (such as residential properties and schools). This included Hungerley Hall Farm and properties to the north-west of the scheme. There would have also been considerable noise impacts during the construction period, including impacts on: ■ Hungerley Hall farm and properties nearby ■ Clifford Bridge Road junction and Valencia Road ■ properties to the south of the junction and those in close proximity to the A46	Options 7 and 8 would have resulted in significant negative noise impacts from traffic at properties located to the south-west of the scheme, due to the introduction of a new free flow junction slip road that would have brought traffic closer to these properties. There would have been considerable noise impacts during the construction period, including impacts on: ■ Hungerley Hall farm and properties nearby ■ Clifford Bridge Road junction and Valencia Road ■ properties to the south of the junction and those in close proximity to the A46

Cultural heritage

We've looked at the potential effects on cultural heritage within the area of the scheme, considering possible physical impacts on historic buildings and gardens, such as Hungerley Hall Farm and Coombe Abbey Park. We've also examined the potential for effects on archaeological remains.

Option 11

Although this option brings the realigned B4082 closer to the east side of Hungerley Hall Farm, by keeping the connector road on the east side of Hungerley Hall Farm, between the farm itself and the existing A46, this option avoids isolating the farm's buildings. Due to the road's proximity to Hungerley Hall Farm, this option does involve the removal of part of the field immediately adjacent to the south of the listed farmhouse. However, the new connector road will be in-cutting at this location. This means the road will be set at a lower level to the original ground level. This will minimise the impact of the road from key viewpoints at the farmhouse building, and minimise impacts on the other listed buildings at Hungerley Hall Farm.

The new junction may be visible from parts of Coombe Abbey Park, but due to the height of woodland surrounding the park, it's not expected to be visible from listed assets within the park, such as the Menagerie. However, there may be potential for the night-time lighting of the junction to be visible from Coombe Abbey Park.

Shortlisted options that were discounted:

Option 6	Option 7	Option 8
The straightened road in Option 6 would have run very close to the Grade II listed barn to the front of the farmhouse at Hungerley Hall Farm. The new junction may also have been visible from the front of the property. The raised junction may also have been visible from certain areas in Coombe Abbey Park, including the potential for night-time lighting of the dumbbell junction to be visible.	This option would have resulted in minimal change to the setting of the listed buildings at Hungerley Hall Farm and Coombe Abbey Park.	This option would have required the demolition of at least one of the Grade II listed buildings at Hungerley Hall Farm, impacting on the setting of the remaining buildings. The straightened road would also have run closer to the remaining buildings. This option would have had minimal change to the setting of Coombe Abbey Park.

Landscape

Using our landscape and visual field surveys, which were completed during the summer and winter months of 2020, we've produced a detailed assessment of the landscape and visual impacts of each of the options.

Option 11

As Option 11 involves the construction of a grade separated junction, it will result in a large change in character, compared to the current landscape buffer to the urban edge of Coventry.

In addition to the impact of the junction, the landscape character will be impacted by the loss of vegetation, which will make the new junction more visible during the construction and operation of the scheme.

Despite these impacts, it's predicted there will be minimal visual impacts on Coombe Abbey Park due to the height of woodland vegetation surrounding the park. Although Option 11 will have an impact on the landscape, its similarity with the existing road layout means it is much less intrusive than our discounted Option 6.

As we enter the next stages of development, we will look to reduce these impacts as much as possible through careful design of the proposed scheme and the development of mitigation strategies.

Shortlisted options that were discounted:

Option 6	Option 7	Option 8
Option 6 is significantly larger in size than the other three options, and this was reflected in the assessments on landscape and visual impacts. Option 6 also resulted in the largest change of the current landscape buffer, to the urban edge of Coventry. The landscape would have been altered by the new junction, and loss of vegetation. The new junction would be more visible during construction and operation of the scheme.	Option 7 performed well in our assessments on landscape and visual impacts. Option 7 had only a minor change to the existing junction with minimal loss of vegetation.	Option 8 would have resulted in the loss of Hungerley Hall Farmhouse, which would have altered the local landscape. The junction would have also been visible from key locations, including from within the fringes of Coombe Abbey Park where vegetation removal from the edge of the park is required.

Nature conservation

We've carried out ecological surveys in order to inform our decisions on what steps we can take to reduce the impact of the scheme on biodiversity.

Further surveys will be carried out in the next stage of the scheme's development, to assess the impact the chosen option may have on both species and habitats in more detail, and to design any mitigation that may be required.

Option 11

As Option 11 involves the construction of a grade separated junction, it requires a substantial amount of land take and has the potential to impact on some wildlife and habitats. The land take required for the scheme and the demolition of the bridge over the A46 may have the potential for impacts on protected and notable species including bats and badgers.

There is also the potential for some temporary impacts on the Coombe Pool Site of Special Scientific Interest (SSSI) associated with clearance of screening vegetation. However, to compensate for this loss of screening vegetation, a potential area for replanting of woodland has been identified.

As we progress to the next stage of development, we will aim to reduce environmental and ecological effects. Where our impacts can't be avoided, we will mitigate against this where possible, through careful design.

Shortlisted options that were discounted:

Option 6	Option 7	Option 8
Option 6 required the greatest area of land, taking the road infrastructure much closer to the River Sowe corridor and separating the farmland between the existing A46 and the River Sowe. This had the potential for impacts on protected and notable species including bats and badgers.	Option 7 was largely within the existing highway boundary but would encroach into adjacent farmland and the edge of the woodland of Coombe Pool SSSI.	Option 8 would have had the greatest impact on woodland at the edge of Coombe Pool SSSI and on Smite Brook. Option 8 would also have required the demolition of Hungerley Hall Farmhouse which may have disrupted roosting bats.

Road drainage and the water environment

We've assessed the potential impacts on the water environment within the area of the scheme, which includes potential impacts on surface and groundwater quality, groundwater levels and flows and flood risk. We've also assessed compliance with the Water Framework Directive.

At present the A46 carriageway and roundabout drain directly into local water courses without treatment. The River Sowe and associated Smite Brook floodplains are adjacent to the current route.

Option 11

No flood mitigation is required with this option, as it does not increase flood risk within the area.

Shortlisted options that were discounted:

Option 6	**Option 7**	**Option 8**
This option would have involved construction within the river floodplains, which would have resulted in land being needed to provide floodplain compensation. Detailed flood modelling showed that this option would have resulted in regular flooding of the A46 and the surrounding area. Overcoming the predicted increased flood risk for this option would require complex mitigation strategies, which would have significant impacts. **It is for this reason that Option 6 has been discounted.**	No flood mitigation would have been required with this option.	Option 8 would have required some construction within the floodplain, making flood mitigation necessary.

Construction duration and impacts

We currently expect to start building the scheme in early 2025. We're committed to delivering the scheme safely while minimising disruption to road users and residents. As the scheme progresses, we will continue to involve and engage road users and residents.

Option 11

Throughout the construction period for Option 11, it is anticipated that we will be able to keep traffic moving on the A46, keeping the A46 open and minimising impacts on road users.
We expect construction of this option to last approximately 18 months.

Shortlisted options that were discounted:

Option 6	Option 7	Option 8
Our initial work suggests that construction of this option would take approximately 2 years.	Our initial work suggests that construction of this option would take approximately 18 months.	Our initial work suggests that construction of this option would take approximately 18 months.

Land take

Option 11

Option 11 will require a significant amount of land take. Despite this, Option 11 does not require the removal of any buildings. We strive to work positively with landowners that may be affected by our proposals. As we progress into the next stage of design, we will be engaging closely with affected landowners as we continue to develop our scheme.

Shortlisted options that were discounted:

Option 6	Option 7	Option 8
Option 6 would have required the greatest amount of land take.	Option 7 would have required the least amount of land take as the works would have been within the existing highway boundary.	Option 8 would have required greater land take than Option 7 due to the increased radius of the A46 carriageway and placement of the new slip roads. In addition to this, it would have also required the demolition of Hungerley Hall Farmhouse.

Air quality

Air quality monitoring data and our scheme specific traffic model have been used to develop an air quality model. This captures current air quality data and forecasts potential changes resulting from our scheme at key locations known as 'sensitive receptors' (such as houses and schools).

Any sensitive receptors within 200m of the new junction and associated new roads, or near existing roads that would have a change in traffic flows due to the scheme are assessed in the model. Whilst there may be small changes in concentrations of nitrogen dioxide (NO2) and fine particles (PM10) as a result of changes in traffic flows, the models suggest that any changes to air quality would not be significant and would not result in any significant adverse effects on sensitive receptors once the scheme is open to traffic.

As the scheme progresses to the next stage of development, further surveys will be carried out to assess the likely effects arising from our chosen option. We will publish more details about how we'll manage air quality effects during construction before we start work.

Contaminated land

The existing A46 was built over a historic landfill site. Along with other potential sources of contamination, this may have resulted in contamination of soils and groundwater and generated ground gas.

Further surveys will be carried out in the next stage of the scheme's development, to assess the impact and design the appropriate mitigation.

Climate

The construction of all options would give rise to emissions from the manufacture of the materials used in construction, their transportation to site, and from activities during construction, such as emissions from construction plant. We'll work proactively with our contractor to identify opportunities to reduce emissions during construction and once the road is open to traffic.

Once the road is open to traffic, it's likely there would be an increase in greenhouse gas emissions from additional journeys made by vehicles. Government policy is to change the mix of traffic on UK roads in favour of lower emission vehicles (e.g. uptake of electric vehicles). If this is successful, then the operational impact of the scheme would reduce over time.

Road safety

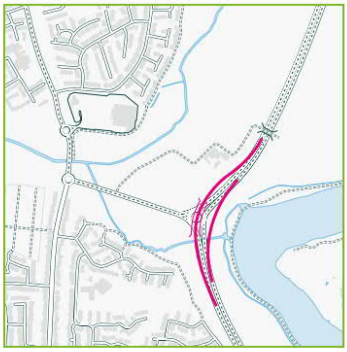
The options would be expected to have a positive impact on road safety by introducing a high-quality dual carriageway, improving the flow of traffic and removing queuing at the junction.

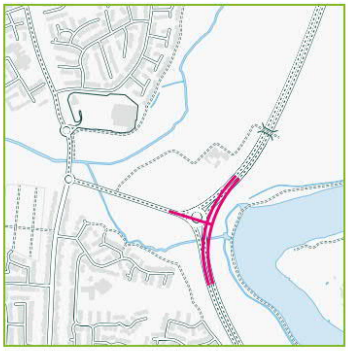
This improvement is forecasted over the wider network, including local routes, as the junction improvements will relieve congestion.

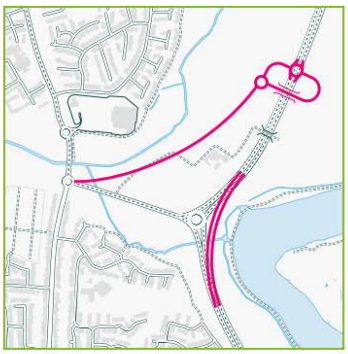
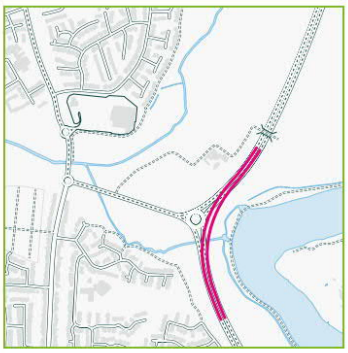
Options discounted during initial assessment

In developing our proposals for A46 Walsgrave junction, we considered eleven options, before shortlisting these to the four which were taken forward for further assessment.

The table below summarises the options that were discounted during our initial assessment of the eleven options.

Option	Description	Reasons for discounting option
	Option 1 consisted of a local road improvement option which only allowed one-way traffic on Clifford Bridge Road and proposed no changes to the existing A46. This option sought to reduce the volume of traffic using the A46 Walsgrave junction.	Traffic modelling showed that this option did not offer any significant improvement to congestion on the A46.
	Option 2 would have allowed through-traffic to bypass the roundabout, while retaining the existing roundabout to provide access to the local road network. Northbound traffic would have passed over the roundabout on a dual lane flyover, with merge and diverge slip roads leading to the roundabout. A new single lane bypass would have been built for southbound through-traffic. The existing roundabout would have been used for access to and from the local roads.	The proposed junction layout had the potential to confuse road users, which presented safety concerns. The flyover would have had a significant visual impact on Coombe Abbey Park, Coombe Pool and the associated Site of Special Scientific Interest and would create an increased sense of urbanisation to this heritage site. Furthermore, the southbound link would have been a single carriageway which would not have provided enough capacity to accommodate forecasted traffic volumes.

Option	Description	Reasons for discounting option
	Option 3 would have replaced the roundabout with a signal-controlled T-junction.	In order to accommodate the volume of traffic, two turning lanes would have been needed. This would have resulted in five lanes of traffic at the junction which would be required to merge into two. This, alongside potential driver confusion, presented safety concerns. This option would not have allowed traffic to flow freely and would have significantly impacted journey times. The introduction of traffic lights would have been inconsistent with the rest of the route presenting further safety concerns as drivers may not expect traffic lights.
	Option 4 would have provided entry and exit slip roads on the northbound carriageway only. There would have been no access to or from the local road network from the southbound carriageway. The A46 would have had a 50mph speed limit.	Due to the alignment of the diverge slip road, the existing pylon in the area would need to be relocated. The desire to avoid this led to the development of Option 7 which was a similar design, except with a tighter diverge slip road that avoids the pylon relocation and reduces land take. Option 7 also had a tighter merge slip road which reduces land take further.

Option	Description	Reasons for discounting option
	Option 5, a compact grade separated junction, would have provided entry and exit slip roads in a loop arrangement. An overbridge and roundabout would have provided connection to the local road network via a realigned B4082.	Due to the length and tight radius of the slip roads the A46 would have had a 50mph speed limit. Additionally, this option would isolate Hungerley Hall Farm as the A46 carriageway would be in front of the farmhouse buildings and the B4082 connector road behind. Compact grade separated junctions are used where a fully grade separated junction is unable to be provided due to available space or environmental constraints. For the A46 Walsgrave junction a fully grade separated junction can be provided and is included in our viable Option 11.
	Option 9 would have removed the junction to allow free flowing traffic along the A46. The A46 would have had a 50mph speed limit.	This option would not provide any connection to the local road network.

Option	Description	Reasons for discounting option
	Option 10 is similar to Option 9 but would have allowed for a 70mph speed limit, by realigning the A46 to increase the radius of the curve.	This option would not provide any connection to the local road network.

Next steps

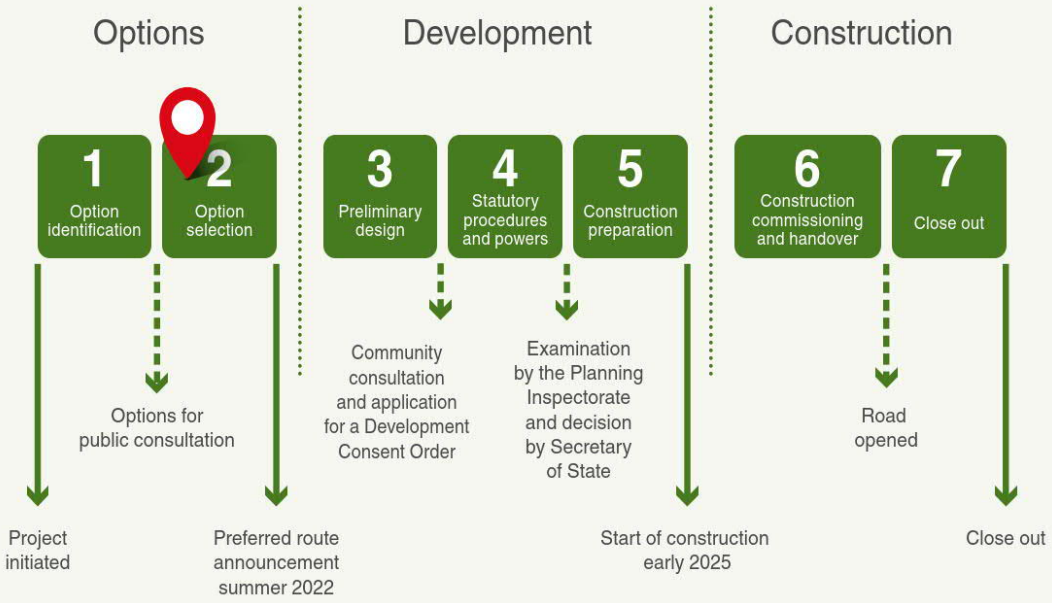
Once the consultation has closed on Monday 14 February 2022, we'll analyse all responses and produce a consultation report summarising the feedback we've received. We'll then consider the feedback, incorporating the comments received where possible whilst completing further assessment and design work.

We'll make our preferred route announcement for the scheme in summer 2022.

Our preferred route will be taken through to the next stage of design development. This is when we'll develop more detail on the highway structures and overall design. It's also when the next stages of environmental assessments are completed, and we look at the steps we can take to reduce any environmental effects. During this stage of the scheme we'll hold another public consultation, giving you the opportunity to comment on a more developed proposal.

It's likely we'll be required to submit an application for a Development Consent Order (DCO) to the Planning Inspectorate to gain permission to build the scheme. The process for this is explained in the table below.

A DCO is a special type of planning permission which is needed for a Nationally Significant Infrastructure Project. Further information on the DCO process can be found on the Planning Inspectorate's website: **https://infrastructure.planninginspectorate.gov.uk/application-process/the-process/**
It will be possible to participate in the Planning Inspectorate's examination of our application, when our final proposal will be considered in detail.




Public consultation
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For more information, please visit our scheme webpage:
https://nationalhighways.co.uk/our-work/west-midlands/a46-coventry-junctions-upgrade/

You can also sign up to receive email alerts whenever our scheme webpage is updated.

If you have any queries about this scheme please contact us on **0300 123 5000** or email us at:
A46CoventryJcns@highwaysengland.co.uk


Public consultation
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Appendix H – Public consultation response form

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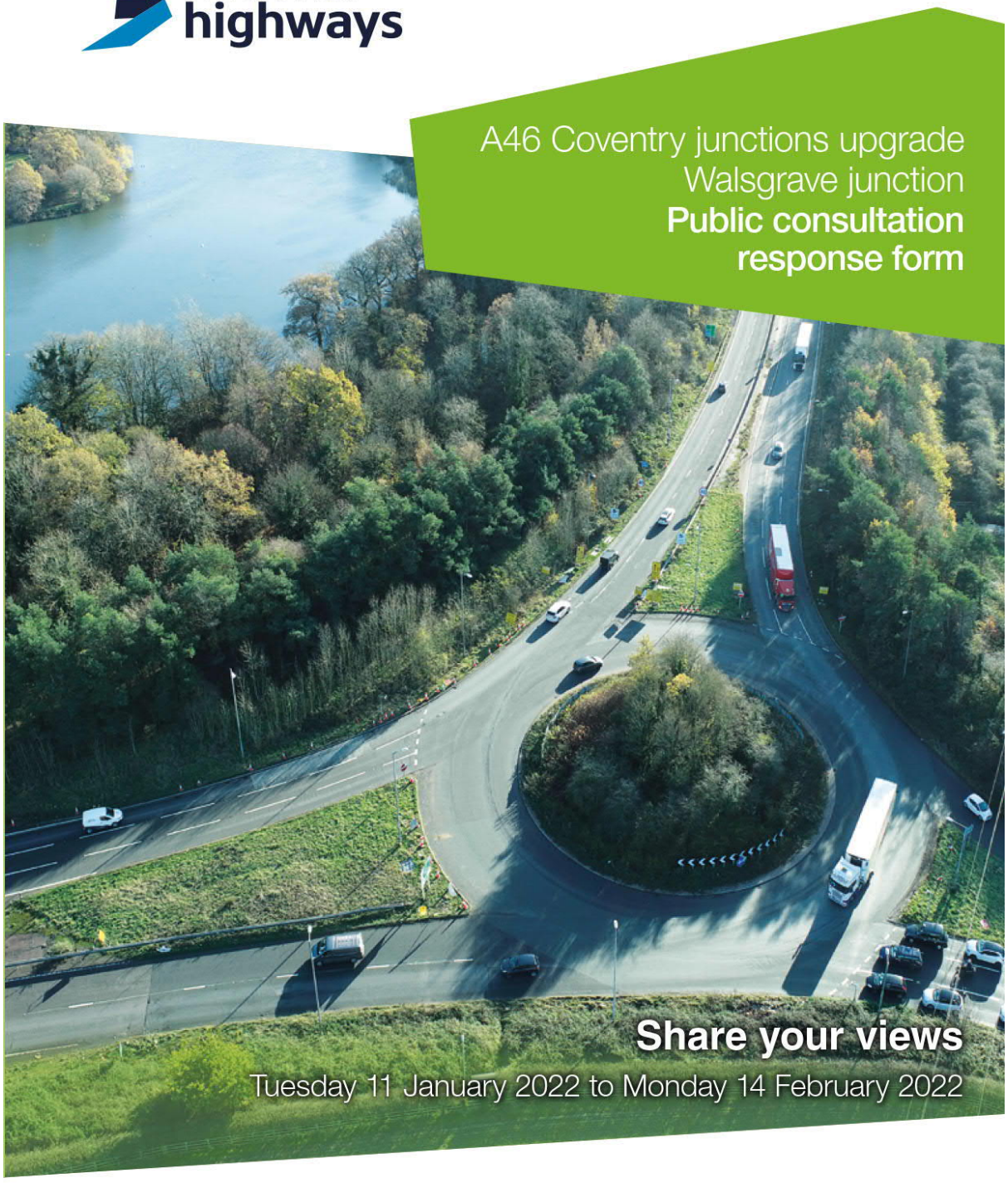

www.nationalhighways.co.uk

Before completing this response form, we recommend you read the consultation brochure. This can be found on our webpage at: **https://nationalhighways.co.uk/our-work/west-midlands/a46-coventry-junctions-upgrade/**

If you have any questions about the consultation, please call our Customer Contact Centre on **0300 123 5000** or email our team at **A46CoventryJcns@highwaysengland.co.uk**

Send your completed response form back to us by post. There's no need for a stamp just put your form in an envelope and send it to **FREEPOST A46 WALSGRAVE JUNCTION.** Responses posted on the closing date will still be accepted.

It would be helpful for us if you could provide your name, postal address and email address. This is so we can understand where you live in relation to the scheme and contact you about your response if needed. This information won't be used for any other purpose.

If you'd prefer to give your comments anonymously, you don't need to provide your name and email address but we'd appreciate it if you could still provide us with your postcode.

Name: .....

Address: .....

.....

Postcode: .....

Email address: .....

Are you responding on behalf of an organisation?

☐ Yes

☐ No

If 'Yes' please provide the name of your organisation and your role within it:

Organisation name: .....

Role within organisation: .....

The following questions relate to you and your current use of the A46 Walsgrave junction.

1. **Which of the following best describes you?** *(tick all that apply):*

- ☐ I'm a local resident
- ☐ I'm a local business owner
- ☐ I'm employed locally
- ☐ I travel through the junction regularly using a private vehicle
- ☐ I travel through the junction regularly using a commercial vehicle
- ☐ Other (please specify): .....

2. **Do you own land or hold any interests such as private rights of way or sporting rights, covered by our proposed option for the scheme?** *(If yes please specify below):*

- ☐ Yes
- ☐ No

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3. **Why do you use the A46 Walsgrave junction?** *(tick all that apply):*

- ☐ Travelling to or from work
- ☐ Travelling for business
- ☐ Leisure/recreation
- ☐ School pick up/drop off
- ☐ Long distance journeys (greater than 10 miles)
- ☐ I do not use the A46 Walsgrave junction
- ☐ Other (please specify): .....

If you do not use the A46 Walsgrave junction, please skip to question 8

4. **Which modes of transport do you normally use to travel through the A46 Walsgrave junction?** *(tick all that apply):*

- ☐ Car
- ☐ HGV or LGV
- ☐ Bus or coach
- ☐ Motorcycle
- ☐ Other (please specify): .....

5. **How often do you travel through the A46 Walsgrave junction?**

- ☐ Three days a week or more
- ☐ One to two days a week
- ☐ One to three days a month
- ☐ Less than once a month

6. **When do you travel through the A46 Walsgrave junction?** *(tick all that apply):*

- ☐ Weekday morning peak (7am to 9am)
- ☐ Weekday evening peak (5pm to 7pm)
- ☐ Weekday off peak (all other times)
- ☐ Weekends (anytime)

7a. **How satisfied are you with your journey through the A46 Walsgrave junction as it is now?** *(please tick one answer in each row)*

	Very satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied	Don't know
Road safety	☐	☐	☐	☐	☐	☐
Congestion	☐	☐	☐	☐	☐	☐
Road layout	☐	☐	☐	☐	☐	☐
Journey time	☐	☐	☐	☐	☐	☐
Noise	☐	☐	☐	☐	☐	☐
Air quality	☐	☐	☐	☐	☐	☐
Access for pedestrians, cyclists and horseriders	☐	☐	☐	☐	☐	☐

7b. **Please provide any further comments about your current journey through the A46 Walsgrave junction, in the space below:**

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8. To what extent do you agree that improvements to the A46 Walsgrave junction are needed?

Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
☐	☐	☐	☐	☐	☐

The following questions relate to Option 11 which, as explained in the consultation brochure, has been found to be the only viable option to upgrade the A46 Walgrave junction.

9a. To what extent do you support or oppose Option 11?

Strongly support	Support	Neutral	Oppose	Strongly oppose	Don't know
☐	☐	☐	☐	☐	☐

9b. Please provide any further comments to explain your answer, in the space below:

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10. Do you have any concerns in relation to this scheme? If you do, please list them in the space below, together with your reasons why. You may include issues such as road safety, journey time, congestion, our discounted options, construction, landscape and scenery, impact on residential properties, air quality, and noise.

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The following questions relate to our consultation.

11. **How did you hear about the consultation?** *(tick all that apply):*

- ☐ Postcard received through the post
- ☐ Engagement van
- ☐ Local authority
- ☐ Parish council
- ☐ Poster
- ☐ Press release/media
- ☐ Email from National Highways
- ☐ Social media
- ☐ Word of mouth
- ☐ Other (please specify): .....

12. **Do you have any further comments about the information we've shared, the materials we've used or the consultation process?**

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Next steps

Thank you for taking the time to complete our response form. Your views will help shape the scheme and we value your feedback. Once the consultation has closed on Monday 14 February 2022, we'll analyse all responses and produce a consultation report summarising the feedback we've received. We'll then consider the feedback, incorporating the comments received where possible whilst completing further assessment and design work. We'll make our preferred route announcement for the scheme in summer 2022.

If you'd like further information about the scheme, you can sign up to receive future updates about the A46 Walsgrave junction at: **https://nationalhighways.co.uk/our-work/west-midlands/a46-coventry-junctions-upgrade/**

Data protection and you

On 25 May 2018, the UK General Data Protection Regulations (UKGDPR) became law. The law requires National Highways to explain to you – consultees, stakeholders and customers – how your personal data will be used and stored.

National Highways adheres to the government's consultation principles, the Planning Act 2008 and the Highways Act 1980 as required, and may collect personal data to help shape development of highways schemes.

Personal data collected by the project team will be processed and retained by National Highways and its appointed contractors until the scheme is complete. In some instances consultation responses may also be sent to the Planning Inspectorate.

Under the UKGDPR regulations you have the following rights:

- Right of access to the data (Subject Access Request)
- Right for the rectification of errors
- Right to erasure of personal data – this is not an absolute right under the legislation
- Right to restrict processing or to object to processing
- Right to data portability

If, at any point, National Highways plans to process the personal data we hold for a purpose other than that for which it was originally collected, we will tell you what that other purpose is. We will do this prior to any further processing taking place and we will include any relevant additional information, including your right to object to that further processing.

You have the right to lodge a complaint with the supervisory authority, the Information Commissioners Office.

If you'd like more information about how we manage data, or a copy of our privacy notice, please contact: **DataProtectionAdvice@highwaysengland.co.uk**

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APPENDIX D
STATUS BOX SUMMARY TABLE

Section	Status
3. Foot Summary of the Current Conditions	
3.5	Topography, land use, property, and industry A topographical survey is required ahead of preliminary design in PCF Stage 3.
3.7	Geology & Soils A Ground Investigation (GI) is required in Stage 3 to reduce uncertainty over the variable ground conditions and to determine the groundwater level, with testing of the composition and properties of the strata, noting the need for magnetometer surveys to mitigate the identified UXO risk. The GI should also establish the chemical composition of the ground and groundwater, with assessment of the risk from contaminants.
3.9	Public Utilities C3 estimates have been undertaken in PCF Stage 2. C4 notices are required to be issued to affected statutory undertakers at PCF Stage 3 to cost protection and diversions more precisely.
3.12	Environment Further survey work is required to develop the baseline environment assessment during PCF Stage 3.
3.13	Option Values Detailed assessment of Option values to be undertaken at PCF Stage 3.
3.16	Coventry City Council Discussions and consultation with local authorities to be undertaken throughout subsequent PCF Stages and the project progresses.
	Rugby Borough Council Local plans and implications of its adoption alongside the Walsgrave junction upgrade (particularly in rural settlement areas) to be evaluated further in PCF Stage 3 Case for the Scheme.
	Coventry and Warwickshire Gateway Scheme The cumulative impact of these developments has been assessed in the PCF Stage 2 Environmental Appraisal Report (EAR). Refer to Appendix B for further detail.
	University Hospital Coventry and Warwickshire Consider the timescale for the construction of this scheme and the potential impacts with the A46 Walsgrave project in PCF Stage 3 and beyond.
	Ansty Park, High Profile Prestige Business Park Site for Coventry And Warwickshire Consider potential impacts of the proposal to the A46 Walsgrave project in PCF Stage 3 and beyond.
	Walsgrave Hill Farm scheme - Roxhill Developments plans In PCF Stage 3 discussions with the developer of site H2:3 should continue to agree land use, and access arrangement and the timing for both schemes.
	National Highways Road Improvement schemes A Planning History search is to be undertaken during PCF Stage 3 to understand the development proposals in the area, interactions with scheme and any cumulative impacts.

5. Geographic, Demographic, Planning and Policy Context	
5.4	National Local Planning Policy The mineral safeguard policies adopted by WCC will also be a consideration for assessment and inclusion in the PCF Stage 3 Case for the Scheme. Considerations for relating to flood risk, heritage and biodiversity will be further explored in PCF Stage 3 in the Case for the Scheme document.
7. Summary of Design & Analysis	
7.4	Drainage It is recommended that a drainage survey, including use of CCTV, is carried out in PCF Stage 3 to confirm both the layout and condition of the drainage infrastructure including any culverts and, if present, any pollution control features.
7.7	Technology Technology equipment and systems considered for inclusion in PCF Stage 3 is a single CCTV surveillance camera located at the Walsgrave Junction for network surveillance, incident management and response and as an extension of the nearby M69 Motorway CCTV surveillance system. Gantry No.35 (MS3 97/9A) is affected by Option 11 and may require removal / relocation, this will require investigation in PCF Stage 3. Refer to the ITS Technology Report (HE604820-ACM-HEL-WAL_SW_000_Z-RP-EC-0001) for further details.

APPENDIX E
REFERENCE LIST

Document Name	Document ID
Bat, Badger, Barn owl and Aquatic Invertebrate Surveys undertaken in 2021	Refer to EAR
Buildability Report	HE604820-ACM-GEN-WAL_SW_000_Z-RP-XX-0001
CoSTM traffic Forecasting Report	HE604820-ACM-GEN-WAL_SW_000_Z-RP-TR-0005
Environmental Assessment Report	HE604820-ACM-EGN-WAL_SW_000_Z-RP-LE-0003
Equality Impact Assessment	HE604820-ACM-GEN-WAL_SW_000_Z-RP-ZH-3337
Groundsure Report	Refer to PSSR
ITS Technology Report	HE604820-ACM-HEL-WAL_SW_000_Z-RP-EC-0001
Lighting Design Report	HE604820-ACM-HLG-WAL_SW_000_Z-RP-EO-0001
Preliminary Sources Study Report	HE604820-ACM-SGT-WAL_SW_000_Z-RP-CE-0001
Report on Public Consultation	HE604820-ACM-GEN-WAL_SW_000_Z-RP-ZH-3345
Scoping Report	HE604820-ACM-EGN-WAL_SW_000_Z-RP-LE-0001
Statutory Undertakes Diversions Report	HE604820-ACM-VUT-WAL_SW_000_Z-RP-CU-0001
The Drainage Strategy Report	HE604820-ACM-HDG-WAL_S_000_Z-RP-CD-0001
Value for Money Assessment	Confidential NH Product