A46 Coventry Junctions Upgrade (Walsgrave Junction)

Staged Overview of Assessment Report
PCF Stage 2

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Glossary of Terms and Abbreviations

Abbreviation	Definition
AADT	Average Annual Daily Traffic flows
ALC	Agricultural Land Classification
AMBC	Analysis of Monetised Costs and Benefits
AoDM	Area of Detailed Modelling
AoI	Area of Influence
AQMA	Air Quality Management Area
BCR	Benefit to Cost Ratio
CCC	Coventry City Council
CLP	Coventry Local Plan
CSR	Client Scheme Requirements
DCO	Development Consent Order
DfT	Department for Transport
DM(#)	Option (#) Do Minimum
DMRB	Design Manual for Roads and Bridges
DN(#)	Option (#) Do Nothing
DNO	Distribution Network Operator
DS(#)	Option (#) Do Something
EA	Environment Agency
END	Environmental Noise Directive
EqIA	Equality Impact Assessment
GI	Ground Investigation
HADDMS	Highways Agency Drainage Data Management System
HHF	Hungerley Hall Farm
HV	High Voltage
IDC	Investment Decision Committee
JLR	Jaguar Land Rover
LILO	Left-in / Left-out
LV	Low Voltage
LWS	Local Wildlife Site
MAGIC	Multi-Agency Geographic Information for the Countryside
NIAs	Noise Important Areas
NPV	Net present Value (NPV)
OME	Order of Magnitude Estimate
PCF	Project Control Framework
PRoW	Public Right of Way
RAG	Red, Amber, Green (Rating System)
SAC	Special Areas of Conservation
SMRSER	South Midlands Route Strategy Evidence Report
SMS	Safety Management System
SOAR	Staged Overview of Assessment Report

Abbreviation	Definition
SOBC	Strategic Outline Business Case
SPAs	Special Protection Areas
SRN	Strategic Road Network
SSD	Stopping Site Distance
SSSI	Site of Special Scientific Interest
STW	Severn Trent Water
SU	Statutory Undertaker
TUBA	(Transport Users Benefit Appraisal)
UKBIC	UK Battery industrialisation Centre (UKBIC)
VOC	Vehicle Operating Cost (VOC)
WBRC	Warwickshire Biological Records Centre (WBRC)
WCC	Warwickshire County Council (WCC)
WCH	Walking, Cycling & Horse-Riding
WCHAR	Walking, Cycling & Horse-Riding Assessment and Review
WFD	Water Framework Directive (WFD).
WPD	Western Power Distribution
UXO	Unexploded Ordnance
ZoI	Zones of Influence

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1 Executive Summary

1.1 Purpose of Report

1.1.1 This report is the Staged Overview of Assessment Report (SOAR) for the Walsgrave junction upgrade project, which forms part the A46 Coventry junctions upgrade scheme. This report provides an overview of the development of Walsgrave junction and a summary of the technical work completed at PCF Stage 2 (Option Selection).

1.2 Project Study Area and Current Arrangement

1.2.1 Walsgrave junction is an at-grade three arm roundabout on the A46 Coventry Eastern bypass, situated between the Binley and M6/M69 junctions. Walsgrave junction provides a connection between the Strategic Road Network (SRN) and the Local Road Network via the A46 and B4082 respectively.

1.2.2 Overall, the A46 Coventry junctions upgrade scheme involves the upgrade of two at-grade junctions (Binley and Walsgrave) which have been identified as a cause of congestion on this section of the A46. The A46 is strategic road link between the East and West Midlands, connecting Coventry and Warwickshire to the motorway network.

1.2.3 Objectives for the overall scheme that this upgrade of Walsgrave junction will contribute towards are:

- A strategic road network that supports and facilitates economic growth, supporting employment and residential development opportunities;
- A strategic road network that is maintained to safe and serviceable condition;
- Improve the operation and efficiency of the existing transport network, delivering capacity enhancements to the SRN;
- A strategic road network that minimises its negative impacts on users, local communities, and the environment;
- A strategic road network that balances the need of individuals and businesses that use and reply upon it;
- Reducing/minimising the impact on the wider environment, whilst seeking to bring enhancement;
- Operational maintenance to be considered holistically during the design stage and at a balance of cost versus disruption.

1.2.4 Binley junction is currently in construction (PCF Stage 6) with completion expected in 2022. This SOAR document is for Walsgrave junction only. For further information on Binley junction refer to the Binley junction Stage 3 SOAR (HE551486-ACM-HGN-A46_SW_000_Z-RP-CH-0016).

1.3 Option Identification

1.3.1 Thirty four junction arrangements were originally identified in the PCF Stage 1 Option Identification process. Through rationalisation and option sifting activities these were shortlisted down to 10, which were developed and assessed during PCF Stage 1. Rationalising to 10 options was achieved through the application of a red-amber-green (RAG) assessment considering eight key characteristics, being; safety, traffic throughput, impact on the local network, environment, geotechnical, economic benefit, cost, and stakeholders.

1.3.2 Of the 10 options, 3 design solutions for Walsgrave junction were originally carried forward into PCF Stage 2. These were:

- Option 6 - Full Grade Separated Junction. 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. A 60mph B4082 connector road also forms part of this proposal.
- Option 7 - Left-In, Left-Out Junction. Option 7 is a left-in / left-out arrangement, allowing merging and diverging from the proposed A46 northbound carriageway. Access / egress to the local road network from the southbound carriageway is removed. The speed limit on the mainline through the junction for this Option is 50mph.
- Option 8 - Left-in, Left-out Junction. Option 8 is also a left-in / left-out arrangement, allowing merging and 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 to allow for a 70mph speed limit on the mainline.

1.3.3 Following a National Highways Solution Review and Validation Event on 20th May 2021 and work undertaken to that date including traffic and flood modelling alongside environmental assessments, the three options were deemed unviable and Option 11 was subsequently developed.

- Option 11 - Full Grade Separated Junction. Option 11 is a grade separated junction approximately 0.8km to the north of the existing roundabout location. The geometry of this Option allows a 50mph speed limit on the mainline dual carriageway. A 60mph B4082 connector road also forms part of this proposal.

1.3.4 The principal reasons for the discounting of the original three options in PCF Stage 2 are summarised as follows:

- Option 6 - predicted to cause significant environmental impact including noise impacts to a local housing estate west of the project as well as substantial impact on the existing flood plain.
- Option 7 - left in / left out solution would cause detrimental effects to the local road network due to re-routing of traffic.
- Option 8 – as with Option 7, left in / left out solution would also cause detrimental effects to the local road network arising from traffic re-routing.

1.4 Planning

1.4.1 The proposed project corridor is located within a wider context of established and evolving national, regional, and local policies relating to transportation, environmental and land-based development commitments. The relevant Local Authorities are Coventry City Council and Rugby District Council.

1.4.2 Coventry City Council's Local Plan (Local Plan 2011 – 2031) adopted on 6th December 2017, sets out Coventry's blueprint and vision to help re-establish itself as one of the country's top 10 cities, enhance its position at the centre of the Coventry and Warwickshire Sub-region and contribute towards the West Midlands engine for growth.

1.4.3 Rugby Borough Council's Local Plan (2011-2031 vision) was adopted in June 2019, replacing the June 2011 Core Strategy and 2006 Local Plan.

1.4.4 Development proposals planned within the vicinity of Walsgrave junction include:

- Land allocated under the Coventry Local Plan for future development
- Rugby Borough Council Binley Woods Site Allocations Development Pack 2016
- Jaguar Land Rover (JLR) – Whitley South development
- University Hospital (Coventry & Warwickshire) application
- Coventry and Warwickshire Gateway
- Other committed road developments in the East Midlands

1.4.5 Options 6, 7, 8 and 11 are considered to be either a construction or an alteration scheme as they involve new sections of carriageway that are outside the existing highway boundary and the realignment of an existing junction. The options are located wholly within England and the Secretary of State is the Highway Authority.

1.4.6 The areas of development for Options 6, 8, and 11 exceed the 12.5ha threshold and so it is likely that these options would be classed as a NSIP requiring a DCO.

1.4.7 The area of development for Option 7 is less than 12.5ha and so does not fulfil all of the criteria in Section 22 of the Planning Act.

1.5 Engineering Assessment

Geotechnical

1.5.1 In preparing the Preliminary Sources Study Report (HE604820-ACM-SGT-WAL_SW_000_Z-RP-CE-0001), a desk study sourced existing data from within National Highways databases as well as third parties such as BGS, Coal Authority and Environment Agency. This was supplemented with a site walkover in September 2021.

1.5.2 Key geotechnical hazards considered during Stage 2 design decisions for earthworks and structures are unexploded ordnance, historic landfill and artificial ground deposits, low strength, highly compressible material, and high flood risk adjacent to the water courses. Details are recorded in the Geotechnical Risk Register and have guided the scoping of the Ground Investigation to be undertaken in the next stage, which will be utilised in preliminary design. Refer to Appendix A for further details on the Preliminary Sources Study Report.

Highways

1.5.3 The junction Option alignments were severely constrained by the following existing significant features:

- Coombe Pool Site of Special Scientific Interest and the Grade II* Coombe Abbey Park and Garden located east of the existing junction.
- Grade II listed buildings at Hungerley Hall Farm, located north west of the existing junction.
- Overhead 132kV power line and associated pylons located west of the existing junction.
- Flood Plain associated with the River Sowe and Smite Brook.

1.5.4 In Option 11, standard cross sections in accordance with the Design Manual for Roads and Bridges (DMRB) have been used in the design and the following design speeds have been applied:

- A46 Mainline – 85kph
- A46 Merges and Diverges – 60kph
- A46 Overbridge – 100kph
- B4082 Connector Road – 100kph

1.5.5 The geometry constraints and design speeds led to 10 departures being identified in Option 11, the most notable are A46 mainline weaving length and B4082 connector road horizontal geometry. Verge widening for the improvement of Stopping Sight Distance (SSD) and advance direction signage placement has been designed.

1.5.6 Drainage design in PCF Stage 2 has been limited to catchment analysis in order to locate and size the three attenuation ponds for Option 11. Pipe network design has not been conducted at this stage. High level lighting design has also been undertaken alongside a technology assessment which confirm no technology is required in order to adhere to standards at Walsgrave junction, although the existing northbound MS3 may require removal or relocation.

1.5.7 Section 5 of this SOAR provides further details on Option 11 and summarises the engineering assessment of the unviable Options 6, 7 and 8.

1.6 Safety Assessment

1.6.1 The existing Walsgrave junction does not have a particularly poor road user safety record. Verified National Highways collision data for the 2012-2019 period show that 26 accidents were recorded in total: 19 slight, 6 serious, 1 fatal. There is a significant challenge to achieving a definitive safety improvement at Walsgrave junction during operation from this low baseline of accident collisions, together with forecast traffic growth arising from developments.

1.6.2 It was agreed with National Highways SES Health & Safety Risk Senior Advisor that the corresponding safety objectives for the three-year period after becoming fully operational will be as follows:

- PICs would be no worse than existing baseline within the project limits.
- FWI would be no worse than existing baseline within the project limits.

1.6.3 Option 11 achieves these safety objectives for an equal volume of Average Annual Daily Traffic (AADT) in the baseline and assessment years, for the three-year period after becoming operational.

1.7 Environmental Assessment

1.7.1 The scope of the environmental assessments in the EAR is set out in the Scoping Report. Refer to Appendix B for further detail. 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 road drainage and water environment.

1.7.2 The identification of study areas and assessments of environmental effects have been undertaken in accordance with DMRB LA 104, other relevant DMRB standards and published guidance.

1.7.3 All 'Do Something' scenarios (Options) were found to have potential for likely significant environmental effects The key impacts, direct and/or indirect being to:

- Coombe Pool Site of Special Scientific Interest (SSSI)
- Grade II* Coombe Abbey Park and Garden
- Grade II listed buildings located at Hungerley Hall Farm

1.7.4 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. Based on the available information to date, it was determined that due to the potential for significant environmental effects on key receptors, a Development Consent Order (DCO) under the Planning Act would be required for the project.

1.8 Stakeholders Impact Assessment

1.8.1 A non-statutory consultation was held by National Highways, seeking stakeholder views on the proposed scheme.

1.8.2 The non-statutory public consultation took place from 11th January 2022 until midnight on 14th 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. Refer to the Report on Public Consultation in Appendix C for further detail.

1.8.3 Responses to the consultation were considered and analysed in the Report on Public Consultation. The findings of the 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.

1.8.4 In preparation for the consultation, National Highways targeted communications at stakeholders including residents, statutory bodies, local campaign groups and the general public on where materials were available and explained how they could engage and respond during the consultation process

1.8.5 These activities included:

- **Press Releases** – Issued by NH on 10th January and 1st February 2022
- **Postcard to Local Residents** – To approximately 10,000 residential and business areas in close proximity to the scheme.
- **Scheme Poster** - Distributed digitally and via post to display at local amenities close to Walsgrave junction and for appropriate stakeholders.
- **Deposit Points** - Copies of the consultation brochure and response form were made available to collect at Caludon Library close to the scheme.
- **Mobile Exhibition Van** - The mobile exhibition van was parked at various well-visited local locations on 6 days throughout the consultation period.
- **Scheme Webpage** - Key information regarding the A46 Coventry junctions upgrade was uploaded to the webpage
- **Social Media** - Promoted via NH West Midlands region Facebook and Twitter accounts
- **Additional Communication Channels** - Local Authorities and Parish Councils were requested share information via their own channels.

Conclusion of Public Consultation

1.8.6 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 as well as broad support from members of the public for Option 11.

1.8.7 Similarly, key local stakeholders such as Coventry City Council, Warwickshire County Council and University hospitals Coventry and Warwickshire were supportive of Option 11.

1.8.8 There was no feedback received during the consultation exercise which would prevent Option 11 being taken forward to the next stage of design.

1.8.9 The Report on Public Consultation alongside the other findings of Stage 2 will feed into the Preferred Route Announcement for the scheme later in 2022.

1.9 Traffic and Economics Assessment

Model Summary

1.9.1 Replacing those developed and used in Stage 1, two new traffic models were developed for Stage 2. The first was a strategic model using SATURN, developed from the National Highways Midlands Regional Traffic Model used to generate traffic forecasts and undertaken economic assessment; the second, a microsimulation model using Vissim was focussed on the A46 and local roads in the immediate vicinity of Walsgrave junction for the purposes of operational assessment. Both were validated against existing data.

1.9.2 Six forecast scenarios were run: a Do Nothing (neither Walsgrave nor Binley junction upgraded), a Do Minimum (Binley junction upgraded, but not Walsgrave), and four Do Something scenarios (one each for Walsgrave Options 6, 7, 8 and 11).

1.9.3 Traffic forecasts showed that all four Do Something scenario result in significant overall congestion relief compared with both the Do Minimum and the Do Nothing. The comparisons with the Do Nothing show greater congestion relief; this is due to the Binley upgrade providing some congestion relief in its own right prior to the Walsgrave upgrade.

1.9.4 The impacts of each of the options are similar. Against both the Do Minimum and Do Nothing, Option 6 performs better in terms of congestion relief across the wider network (AoDM) than Options 7, 8 and 11. Against both the Do Minimum and Do Nothing, Option 7 performs slightly worse than Options 6, 8 and 11.

1.9.5 All four options reduce delays at Walsgrave relative to the Do Minimum and at both Binley and Walsgrave relative to the Do Nothing.

1.9.6 The re-routeing effects and changes in demand in all options are a mixture of local and long distance. In particular there is evidence of additional long-distance trips along the A46, which are a result of the demand responses from the implementation of the Walsgrave upgrade on top of the existing implementation of the Binley upgrade.

1.9.7 Modelling the effects of removing of right-turn movements from Walsgrave junction in Options 7 & 8 showed higher levels of congestion and journey times on the adjacent local road network as a result of traffic re-routing via Ansty or Binley junctions. This led to traffic queuing back onto the A46. Options 7 and 8 were deemed unviable principally for this reason.

1.10 Cost Estimate and Benefit-Cost Ratios

1.10.1 The economic appraisal comprised an assessment of the net benefits to users and the wider community as a result of the junction upgrade scheme, set against the capital construction costs, all as incurred over a ‘whole life’ period.

1.10.2 For each of the four options, a full cost benefit analysis was required for assessment in ‘value for money’ terms. The appraisal included an assessment of economic benefits to road users, including time savings and vehicle operating costs; and assessment of accident savings and associated economic benefits and the monetised benefits from changes to greenhouse gas emissions. The BCRs for Options 6, 7, 8 and 11 are shown in Table 1-1.

1.10.3 As a sensitivity test, this process was repeated comparing the options against the Do Nothing Option and assessed against wider economic benefits resulting from the scheme. For all four options the benefits are positive under all three different growth scenarios.

1.10.4 The Low Growth scenario resulted in similar or slightly greater BCRs for each Option, largely resulting from reduced Greenhouse Gas and Air Quality disbenefits which mitigated the reduction in transport user benefits.

1.10.5 The reduction in the BCR for the High Growth scenario relative to the Core scenario is due to practical network capacity limits being reached in the DS models (all four options) for the High Growth scenario in 2051 resulting in subdued benefits.

	Option 6	**Option 7**	**Option 8**	**Option 11**
Initial BCR	1.1	4.0	2.3	2.1
Initial BCR Measured Against Do Nothing Option	1.0	2.0	1.6	1.6
BCR with Inclusion of Wider Benefits and Journey Time Reliability Benefits	1.4	5.2	3.0	2.8
BCR with Inclusion of Wider Benefits and Journey Time Reliability Benefits Against Do Nothing Option	1.3	2.5	2.0	1.9

Table 1-1 - Benefits-Cost Ratio of Options 6, 7 ,8 and 11

1.11 Recommendations

1.11.1 Option 11 complies with the RIS2 scope requirements and was recommended to be carried forward to Public Consultation. It received positive feedback from Public Consultation and is recommended to be carried forward to PCF Stage 3 via the Preferred Route Announcement. Despite the support for Option 11, a number of points were raised across responses from both key stakeholders and the public, which must be at the next stage. These include:

- potential inclusion of a new link to the hospital
- length of the new B4082 and potential increase in rat running as a result
- 50mph speed limit on the A46 and;
- cost of the junction upgrade.

1.11.2 In addition to the continued refinement of design aspects the following recommended activities for PCF Stage 3 should be undertaken:

- A Ground Investigation is required to reduce uncertainty over variable ground conditions, groundwater levels, contaminants and unexploded ordnance (UXO).
- Undertake drainage surveys including CCTV to confirm layout and condition of existing pipe network, culverts and pollution control features
- Maintain continued ecology surveys to develop the baseline environmental assessment
- Work closely with Coventry City Council to develop the B4082 design to ensure it can be adopted

1.11.3 Any changes to legislation, policy, or plans as a result of Brexit, The Environment Act or proposed planning Bill will need to be fully considered and implemented if necessary, during PCF Stage 3 delivery.

1.11.4 Changes to the Biodiversity Net Gain targets as a result of the Environment Act will need to be implemented in Stage 3, alongside additional or updated ecological surveys.

1.11.5 The WFD scoping assessment, a quantitative HEWRAT, a Ground Investigation and a full Flood Risk Assessment need to be completed in Stage 3. Air Quality Strategy and the Biodiversity Plan should be superseded prior to PCF Stage 3. Land take will need to be reconsidered in Stage 3.

1.12 Conclusion

1.12.1 As the single remaining viable option, the PCF Stage 2 assessment of Option 11, alongside feedback from the Public Consultation, demonstrates that all of the scheme objectives for the Walsgrave junction upgrade can be met.

1.12.2 Despite challenging constraints, the alignment of Option 11 largely complies with Standards, with identified Departures having been discussed through early engagement with SES specialist(s) and agreed as reasonable at this stage. The arrangement performs well by reducing congestion and journey times without adversely affecting the local road network and is assessed as being high value for money economically according to the Department for Transport Value for Money Framework.

1.12.3 Risks associated with the Option are acceptable, and it can be built and operated safely. Whilst there is potential for significant environmental impact, there is also opportunity to mitigate the impacts and to achieve a positive biodiversity net gain. Feedback from Public Consultation was largely positive and areas for further development in PCF Stage 3 with key stakeholders have been identified.

1.12.4 It is recommended that Option 11 is taken forward to the Preferred Route Announcement and developed further at PCF Stage 3.

1.12.5 Refer to Appendix D for further detail on the status of design elements and tasks to be completed in the following PCF stage. Refer to Appendix E for the List of References of documents used in this report.

2 Introduction

2.1 Project Background

2.1.1 Walsgrave junction is an at-grade three arm roundabout on the A46 Coventry Eastern bypass, situated between Binley and the M6/M69 junctions. Walsgrave junction provides a connection between the Strategic Road Network (SRN) via the A46 and the Local Road Network via the B4082.

2.1.2 The works area comprises a 2.7km section of the A46 Coventry Eastern Bypass, including the existing Walsgrave junction, and a section of the B4082.

2.1.3 The A46 Coventry junctions upgrade scheme involves the upgrade of two at-grade junctions (Binley and Walsgrave) which have been identified as a cause of congestion on this section of the A46. Binley junction is approximately 1.7km to the south of Walsgrave, as shown in Figure 2-1 below.

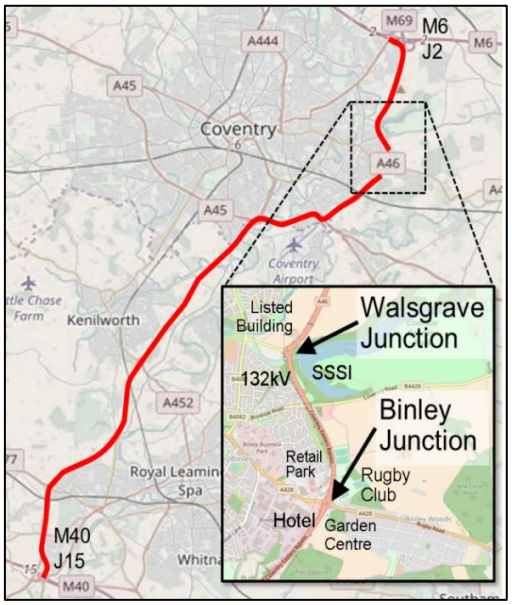


Figure 2-1 - A46 Coventry Junctions Upgrade (Binley and Walsgrave)

2.1.4 The existing Walsgrave junction is located approximately 5km to the east of Coventry city centre and 2km south of the M6/M69 junction. The A46 runs north/south through the junction at-grade, and the B4082 connects to the western arm of the roundabout. The current junction is shown in Figure 2-2.

Figure 2-2 - Walsgrave junction Layout

2.1.5 The scheme is one of several set out under the Department for Transport (DfT) Road Investment Strategy (RIS) to be developed and delivered by National Highways during the RIS1 and RIS2 periods. The A46 is strategic road link between the East and West Midlands, connecting Coventry and Warwickshire to the motorway network and the high level outcomes that the scheme is intended to contribute to are as follows:

- A strategic road network that supports and facilitates economic growth, supporting employment and residential development opportunities;
- A strategic road network that is maintained to safe and serviceable condition;
- Improve the operation and efficiency of the existing transport network, delivering capacity enhancements to the SRN;
- A strategic road network that minimises its negative impacts on users, local communities and the environment;
- A strategic road network that balances the need of individuals and businesses that use and reply upon it;
- Reducing/minimising the impact on the wider environment, whilst seeking to bring enhancement;
- Operational maintenance to be considered holistically during the design stage and at a balance of cost versus disruption.

2.1.6 The scheme will contribute to the National Highways Key Performance Indicators set out in Table 2-1 below:

Strategic Outcome	Key Performance Indicator (KPI)
Improving Safety For All	Ongoing reduction in the number of people killed or seriously injured on the SRN to support a decrease of at least 50% by the end of 2025 against the 2005-09 average baseline.
Providing Fast and Reliable Journeys	**Average Delay** Difference between the observed travel time and the speed limit travel time (seconds per vehicle per mile). Ambition: Performance to be no worse at the end of RP2 than it is at the end of RP1. Highways England will be required to demonstrate how it has acted to reduce delays in support of this ambition.
Providing Fast and Reliable Journeys	**Network Availability** Percentage of the network free from traffic restrictions owing to roadworks. Target: Achieve 97.5% lane availability in 2020-21. Existing metric to be replaced by a new expanded metric with target based on baselining work undertaken during 2020-21.
Providing Fast and Reliable Journeys	**Incident Clearance Rate** Percentage of incidents cleared within one hour, based on 24 hour coverage. Target: 86% of motorway incidents cleared within one hour.
A Well Maintained and Resilient Network	**Pavement Condition** Target: Achieve 95% of road surface that does not require further investigation for possible maintenance for years 1 and 2 of RP2, based on the continuation of the current pavement metric. Target for years 3 onwards will be based on the concept of road surface in good condition and determined through parallel running using the new metric trialled in RP1.
Being Environmentally Responsible	**Noise** Target: 7,500 households in Noise Important Areas mitigated using funding from the Environment and Wellbeing designated fund during RP2.
Being Environmentally Responsible	**Biodiversity** Target: Following update to the Environment Act, 10% Biodiversity Net Gain will be required for schemes constructed in RP3.
Being Environmentally Responsible	**Air Quality** Target: Bring links agreed with Defra and based on the Pollution Control Mapping model into compliance with legal NO2 limits in the shortest possible time.

Strategic Outcome	Key Performance Indicator (KPI)
	Highways England carbon emissions Target: Reduce Highways England's carbon emissions as a result of electricity consumption, fuel use and other day-to-day operational activities during RP2, to levels defined by baselining and target setting activities in 2020-21. (1) Ensuring that the Contractor provides frequent (quarterly) reports summarising the carbon emissions relating to activities undertaken for the works and submits this data using the Highways England Carbon Tool. (2) Ensuring that the Supplier identifies and prioritises carbon saving opportunities to for the scheme in line with Highways England's requirements (DMRB LA 114).
Meeting the Needs Of All Users	**Road User Satisfaction** Target: Achieve an 82% road user satisfaction score in 2020-21 and 2021-22, with year on year increases in following years. Roadworks information timeliness and accuracy.
Meeting the Needs Of All Users	**Roadworks Information Timeliness and Accuracy** Target: Achieve 90% accuracy of roadworks information seven days in advance of works by 2024-25, with an increasing trajectory of improvement through RP2 from the level of performance achieved by the end of RP1.
Achieving Efficient Delivery	**Total Efficiency** Target: Evidence the efficiency target of £2.304bn capital and operational expenditure is demonstrated by the end of RP2.

Table 2-1 - Key Performance Indicator

2.1.7 Refer to Section 4.2 for further detail.

2.1.8 Upgrade of Binley junction to a grade separated junction is currently in the construction phase. The Binley junction upgrade involves a flyover carrying the mainline A46, constructed over the roundabout, and four new slip roads.

2.1.9 AECOM was awarded the contract PC1 0092 (on the 1st of September 2020) and undertook PCF Stage 1 (Option Identification) of Walsgrave junction.

2.1.10 Thirty four junction arrangements were originally identified in the PCF Stage 1 Option Identification. Through rationalisation and Option sifting activities the 34 options were shortlisted down to 10, which were developed and assessed during PCF Stage 1. Rationalising to 10 options was achieved through the application of a red-amber-green (RAG) assessment considering eight key characteristics:

- Safety
- Traffic throughput
- Impact on the local network
- Environment
- Geotechnical
- Economic
- Cost
- Stakeholders

2.1.11 Of the 10 options, 3 design solutions for Walsgrave junction were originally carried forward into PCF Stage 2. These included:

- Option 6 - Full Grade Separated Junction. 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. A 60mph B4082 connector road also forms part of this proposal.
- Option 7 – Left-In, Left-Out Junction. Option 7 is a left-in / left-out arrangement, allowing merging and diverging from the proposed A46 northbound carriageway. Access / egress to the local road network from the southbound carriageway is removed. The speed limit on the mainline through the junction for this Option is 50mph.
- Option 8 – Left-in, Left-out Junction. Option 8 is also a left-in / left-out arrangement, allowing merging and 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 to allow for a 70mph speed limit on the mainline.

2.1.12 Following the National Highways Solution Review and Validation Event on the 20th of May 2021 and work undertaken to that date including traffic and flood modelling alongside environmental assessments, the previous options were deemed unviable and Option 11 was subsequently developed based on previously discounted options re-examined in the light of additional data, modelling and assessments from Options 6, 7 and 8.

- Option 11 - Full Grade Separated Junction. Option 11 is a grade separated junction approximately 0.8km to the north of the existing roundabout location. The geometry of this Option allows a 50mph speed limit on the mainline dual carriageway. The B4082 connector road also forms part of this proposal would enable a 60mph speed limit.

2.1.13 A second National Highways Solution Review and Validation Event was held on 8th September 2021, confirming the viability of Option 11. Refer to Appendix C for further details.

2.1.14 Refer to Section 7 of this report for full details of the options.

2.1.15 This document considers upgrade options for the A46 Walsgrave junction which is currently in Project Control Framework (PCF) Stage 2 – Option Selection. For clarity, any references to “the Scheme” is inclusive of both Binley and Walsgrave junction upgrades. Reference to “the Project” only refers to the proposed upgrade of Walsgrave junction.

2.2 Purpose

2.2.1 The purpose of the Staged Overview of Assessment Report (SOAR) is to bring together the traffic, economic, safety, operational, technical, maintenance, environmental and affordability assessments plus Public Consultation feedback which form the basis for taking Option 11 forward to Preferred Route Announcement and thereafter PCF Stage 3 Preliminary Design.

2.2.2 Status boxes have been introduced for sections where further work is required, and they explain what remains to be completed in the subsequent PCF Stages, see example below.

Status: Example status box.

3 Summary of the Current Conditions

3.1 Description of Locality

3.1.1 The A46 is a non-continuous route between Bath in Somerset to Grimsby in Lincolnshire. It is a strategic link between the East and West Midlands, and beyond, linking the M1 Junction 21 and M40 Junction 15, connecting Coventry and Warwickshire to the strategic road network and the rest of the country. A plan showing the route between Bath and Grimsby is shown below in Figure 3-1.

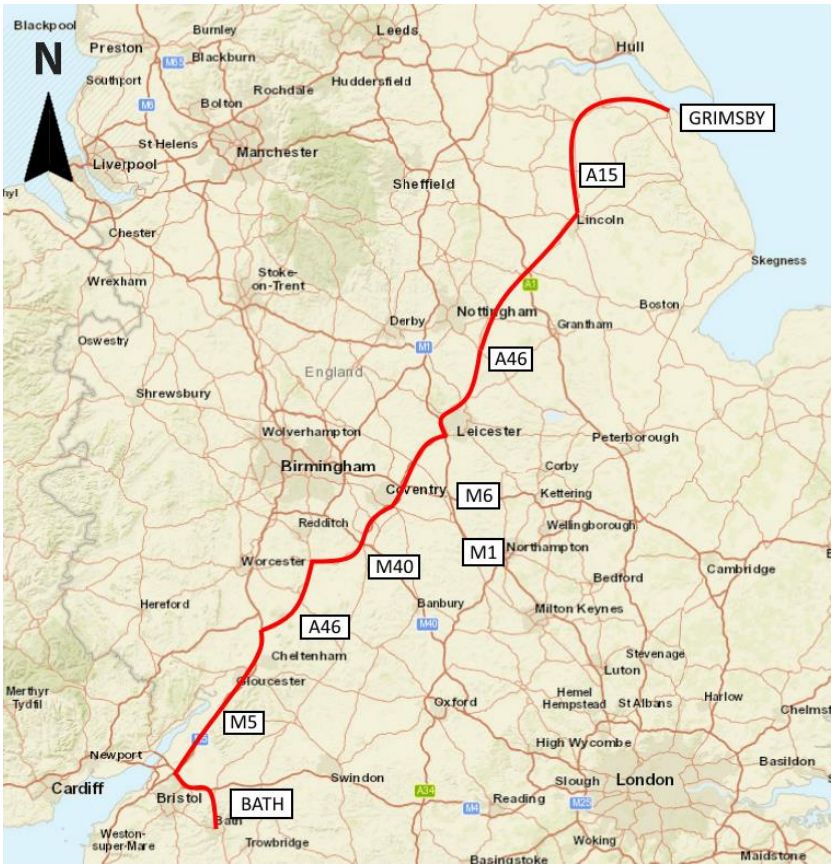


Figure 3-1 - A46 Route from Bath to Grimsby

3.1.2 The route connects several major employment sites to the wider motorway network and forms a key element of the north/south travel to work area. It is also an important strategic route between ports in the north of England with those on the south coast via the M69, M40, A34 and M3.

3.1.3 Approximately 2km to the north of Walsgrave junction, the A46 transitions into the M69. This section of the M69 is a two-lane motorway (D2M). The start of the M69 forms part of M6 Junction 2. The M69 runs north/south between Coventry and Leicester.

3.1.4 M6 Junction 2 links the M6, M69, A46, A4600, B4065. Upgrading of the M6 between Junctions 2 and 4 to a smart motorway was completed in 2020. The M6 runs from the north-west of England to M1 Junction 19.

3.1.5 Travelling south from Walsgrave junction the A46 firstly meets Binley junction which connects to the local road network via the A428. As mentioned previously Binley junction is currently being grade separated and in the construction phase. South of Binley, the A46 meets Tollbar End junction. To the east of the Tollbar End junction, the A45 is a D2AP road; to the west, the A45 is a D3AP road. Access to Coventry Airport is also provided from the Tollbar End junction.

3.2 Existing Highway Network and Constraints

3.2.1 The PCF stage 2 study area for the A46 Coventry Junctions Upgrade (Walsgrave junction) is located between the northern extents of the Binley junction works to the south and the A46/R75 Walsgrave Hill Farm accommodation overbridge to the north. It also includes the B4082 link road between the A46 and B4082 Clifford Bridge Road. Refer to Figure 3-2 for the key features and constraints within the study area.

3.2.2 This section of the A46 is D2AP and falls within National Highways maintenance Area 9 as defined by the asset support contract which covers the West Midlands.

3.2.3 The A46 is owned and maintained by National Highways. The B4082 and Clifford Bridge Road is part of Coventry City Council's highway network. The B4082 link road is a two-lane single carriageway road that provides a link between the A46 and Clifford Bridge Road.

3.2.4 Walsgrave junction, the A46 mainline and B4082 link road are located in a rural setting on the edge of the Coventry urban area. The junction is constrained by:

- Coventry CC Air Quality Management Area (AQMA)
- Coombe Pool SSSI
- River Sowe & Smite Brook flood zones
- Overhead 132kV Tower & Lines
- Grade II listed buildings at Hungerley Hall Farm (HHF)
- Coombe Abbey Park Registered Park and Garden (Grade II* listed)

3.2.5 The B4027 Brinklow Road passes under the A46 mainline approximately 600m south of the existing Walsgrave junction.

3.2.6 The route crosses a tributary of the River Sowe, in a culvert, approximately 200m south of the M6/M69 junction southbound diverge, north of Walsgrave junction, outside of the proposed works area. The Smite Brook carries water out falling from Coombe Pool and crosses the A46 mainline in a culvert less than 100m to the south of the existing Walsgrave junction. The structure, Smite Main Culvert (STR_19208) comprises a single span insitu reinforced concrete box culvert measuring 5.20m by 1.95m internally. The overall length (based on as-built information) is 81.73m. Splayed wingwalls are provided on each side of the headwalls.

3.2.7 Smite Brook also crosses the B4082 in a culvert approximately 300m to the west of the Walsgrave roundabout. The structure, Smite Link Culvert (STR_19208) comprises a single span insitu reinforced concrete box measuring 5.00m by 2.96m internally. The structure has a square length of 20.32m and a skew length of 17.7m (from as-built information). Wingwalls are provided on each side of the headwalls. The Smite Brook carries water out falling from Coombe Poole. Refer to Appendix G for further detail.

3.2.8 Two farm accommodation overbridges are located between the Walsgrave junction and the M6/M69 junction. The Hungerley Hall Farm (HHF) accommodation bridge is located approximately 400m north of the Walsgrave roundabout. The structure comprises a two-span 63m, continuous insitu post-tensioned voided spine beam. This is supported on bank seats with a single concrete column at mid span. The abutments are supported on spread footings.

3.2.9 The Walsgrave Hill Farm accommodation bridge is located approximately 1.6km north of the Walsgrave junction, this also carries the R75 bridleway. The structure comprises a two span insitu post-tensioned concrete deck, simply supported on reinforced concrete abutments with through-walls at either end and an integral reinforced concrete pier as the intermediate support. The supports are founded on reinforced concrete spread footings.

3.2.10 Two gantries are present within the project vicinity, gantry no.35 (MS3 97/9A) and gantry no.36 (Signal Portal Gantry 98/9A). VMS Gantry No.35 is situated approximately 1.2km to the north of the existing Walsgrave junction. The structure is a steel cantilever gantry, which spans over the verge of the northbound carriageway of the A46. VMS Gantry No.36 is situated approximately 1.5km to the north of the existing junction. This gantry is also a steel cantilever spanning over the verge of the northbound carriageway.

3.2.11 Parking laybys are located on the north and southbound carriageways of the A46 mainline between the Walsgrave junction and the M6/M69 junction. Emergency telephones are located at these laybys. The usage levels of the laybys are currently unknown, the layby on the northbound carriageway is approximately 250m long, whilst the southbound layby is approximately 320m long. See Section 7.8 for further information on these laybys and provision of similar facilities within the wider area.

3.2.12 Coombe Country Park and Coombe Pool are located to the east of the A46 mainline near Walsgrave junction. This is designated as a SSSI and a Grade II* Registered Park and Garden. The Park and Garden also contains a number of listed heritage assets ranging from Grade 1, Grade II and Grade II*.

3.2.13 Hungerley Hall Farm is located to the west of the A46 mainline near the Walsgrave junction, which contains three Grade II listed buildings. Access to the property is via an entrance on the north side of the B4082.

3.2.14 The River Sowe is located west of the A46, with the areas adjacent to the river designated as a floodplain. See Section 7.4 for further details on this floodplain.

3.2.15 C2 Utilities searches have taken place and identified that there is statutory undertaker's equipment located in the vicinity of the project belonging to various utility companies. Most notably, this includes 132kV overhead transmission lines operated by Western Power Distribution and a high pressure sewer main operated by Severn Trent. See Section 8 for full further details on the Statutory Undertakers.

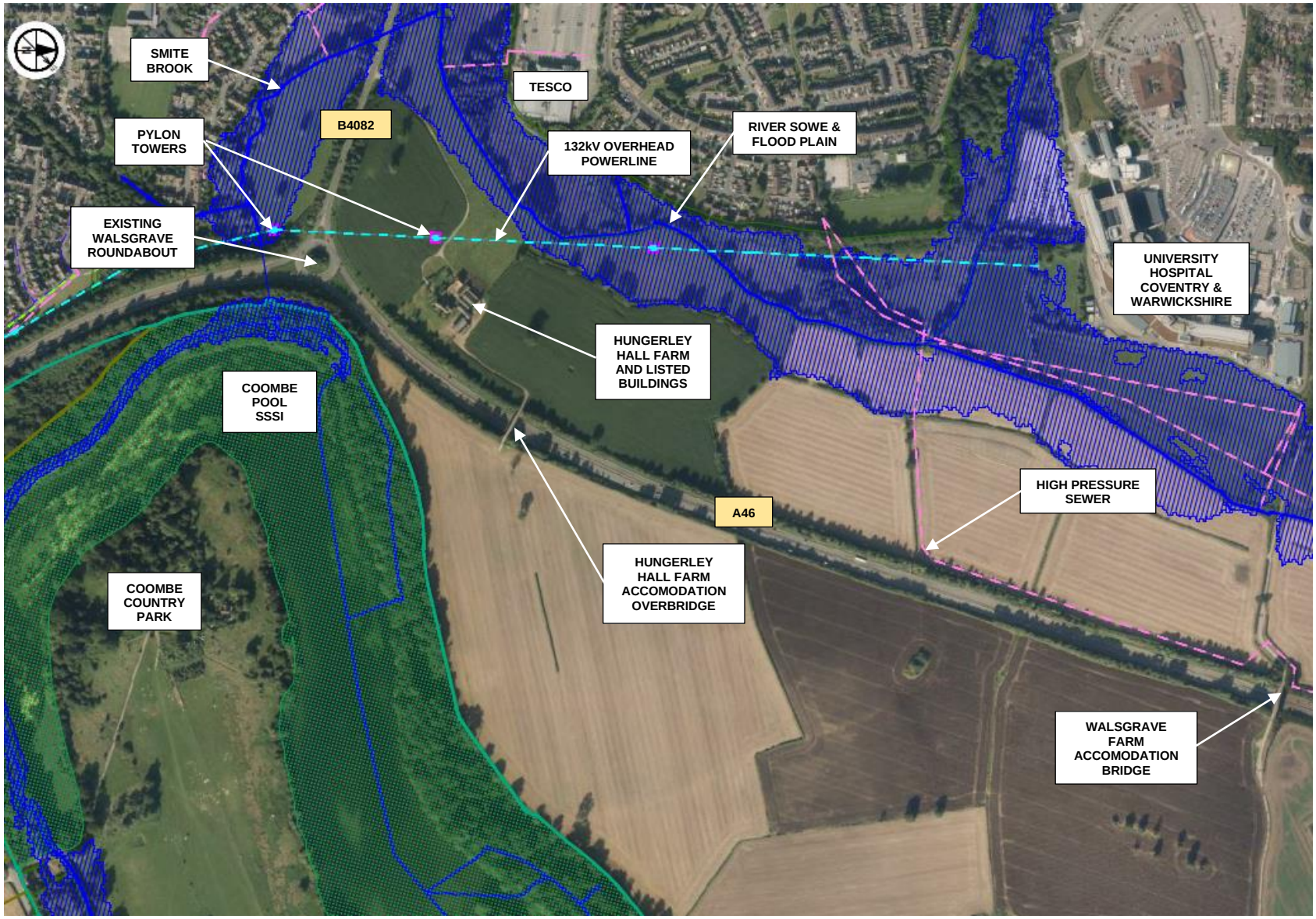


Figure 3-2 - Project constraints within the study area

3.3 Existing Junction Layout

3.3.1 The central island of the roundabout has a diameter of approximately 40m, and with the 12.5m wide circulatory carriageway, the outside diameter of the roundabout is approximately 65m.

3.3.2 On approach to the roundabout the A46 northbound and southbound entry arms flare from two to three lanes, to allow two lanes for traffic continuing on the A46 and one lane to the B4082. The B4082 entry arm flares from one lane to three lanes on approach to the roundabout.

3.4 Accidents Analysis

3.4.1 At the time of drafting the RIS1 scope, the A46 experienced some safety performance issues in comparison to the rest of the Strategic Road Network (SRN). These performance issues were focused on Tollbar End junction. The A46 south of Coventry is 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) link are complete and the commitment to convert part of the M6 between junctions 2 and 4 into a Smart Motorway was also completed in March 2020. These projects aimed to begin addressing these safety performance issues.

3.4.2 In isolation the existing Walsgrave junction does not have a particularly poor road user safety record and the primary objective of this upgrade is capacity improvement. A review of the accidents from 2017 to 2019 at Walsgrave junction revealed a cluster of accidents occurring on and near the junction. This data was provided by National Highways Midlands Data Analysis Team in October 2021. No data beyond 31st December 2019 was available at the time of assessment as was yet to be published by the Department for Transport.

3.4.3 In summary, 11 accidents were recorded in total over the three years: 7 slight, 4 serious, 0 fatal. Refer to Section 7.14 for further details including the safety assessment extents and collision location plans.

3.5 Topography, land use, property, and industry

3.5.1 The topography of the site excluding earthworks is generally flat. The roads occupying the site include the A46, the B4082, and two access roads: a 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 is covered by vegetation: mainly grass with hedgerows, trees and bushes present around the perimeter. At the north of the site, there are embankment earthworks passing through the site for the farm track and Public Right of Way off Farber Road that passes over the A46.

3.5.2 Smite Brook is present in the south of the site, culverted under the A46 and flowing from Coombe Pool in the east, to the River Sowe in the west. The River Sowe, runs approximately north to south, parallel to the western site boundary.

3.5.3 Between Binley and the Walsgrave junctions, land use on the western side of the A46 predominantly comprises residential and retail properties set back from the highway boundary. A narrow band of open space and scrub land separates the A46 from the residential properties. To the east of this section of the A46, the highway is bordered by playing fields used by Broadstreet Rugby Football Club, scrub land, agricultural land and woodland associated with the Coombe Park and Pool.

3.5.4 Between Walsgrave and the M6/M69 junction the land-use is predominantly agricultural. There is an agricultural vehicle crossing access approximately 400m north of the roundabout (approximately 125m north of Hungerley Hall Farm) and another bridleway overbridge (the Walsgrave Hill Farm accommodation overbridge) approximately 1.2km from this agricultural vehicle crossing.

3.5.5 The University Hospital Coventry and Warwickshire is located approximately 450m to the west of the A46 near the point where the Walsgrave Farm accommodation overbridge crosses the A46. A large supermarket is also present northwest of the existing junction accessed via Clifford Bridge Road.

3.5.6 Landfill sites are known to exist beneath the A46 carriageway. These sites (pockets) are located immediately to the north of the Brinklow Road overbridge.

3.5.7 North of the existing Walsgrave junction, the agricultural land predominantly slopes from east to west towards the River Sowe. The A46 mainline is in cut as it leaves Walsgrave junction heading north.

3.5.8 The land immediately south of the B4082 slopes steeply from north to south away from the road to a relatively flat plain.

3.5.9 South of the existing junction, bunding is present on each side of the A46. On the eastern side, after the bunding, the land falls northeast and on the western side the land falls northwest.

3.5.10 See Sections 3.7 and 3.8 for more details on the topography of the land and landfill sites present in the vicinity.

3.5.11 In PCF Stage 2, LiDAR data of the site was sourced from the Environment Agency National LIDAR Programme and no scheme-wide topographical surveys were undertaken. Figure 3-3 below shows the areas where LiDAR was obtained for the site, showing the extents of 10m and 1m grids.

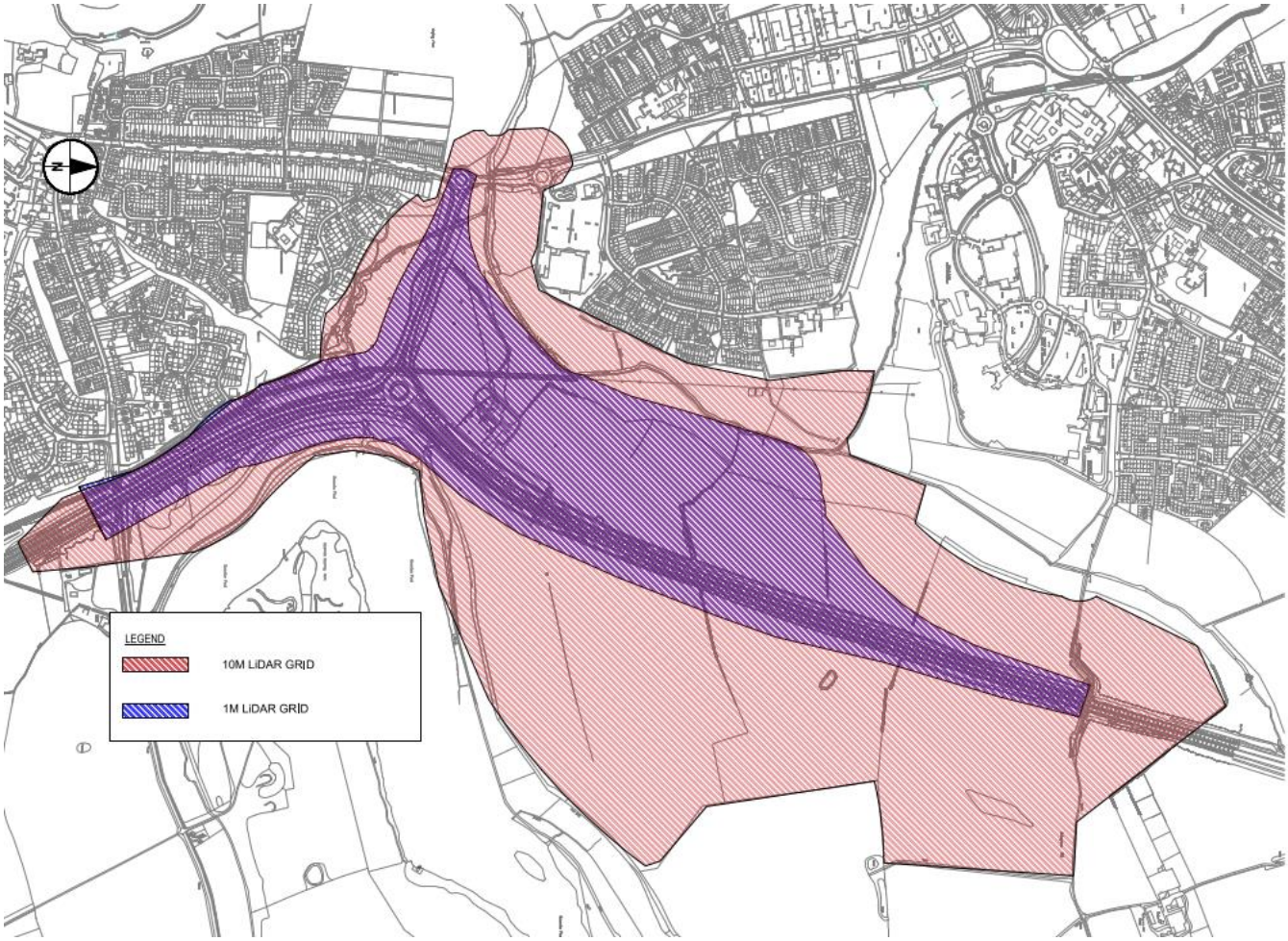


Figure 3-3 - Extents of LiDAR survey

Status: A topographical survey is required ahead of preliminary design in PCF Stage 3.

3.6 Road Drainage

3.6.1 Existing drainage information within the National Highways boundary has been sourced from the Highways Agency Drainage Data Management System (HADDMS). Based on this information, along the A46 mainline south of the Hungerley Hall 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.

3.6.2 North of the 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 northwest of the Hungerley Hall Farm overbridge.

3.6.3 Based on the available drainage information along the B4082, the existing drainage is also predominantly piped, with the surface water runoff from the carriageway collected via gullies each side of the carriageway. This discharges to Smite Brook outlets located before and after it passes under the B4082 via the culvert east of Clifford Bridge roundabout.

3.6.4 The maintenance responsibility of the A46 mainline lies with National Highways. Coventry City Council are responsible for the B4082 drainage.

3.7 Geology & Soils

3.7.1 There are areas indicated with deposits of Made Ground south of Walsgrave junction immediately north of Brinklow Road and a smaller deposit at the northern perimeter of site, east of the A46. An area of 'Infilled Ground' is also shown to be at the northern perimeter of site, west of the A46. It is possible that other artificial ground exists within the site footprint at a thickness that has not been mapped. These deposits can be variable in composition, strength and compressibility as well as having potential for aggressive chemicals.

3.7.2 Superficial deposits are recorded throughout the majority of the site and comprise Alluvium, River Terrace Deposits, Baginton Sand and Gravel and the Wolston Formation: Bosworth Clay Member and Thrussington Member. A full description and layout of the superficial deposits can be found in the PSSR (HE604820-ACM-SGT-WAL_SW_000_Z-RP-CE-0001) within Appendix A. There is a potential for low strength, high compressibility clays within the Alluvium, Baginton Sand & Gravel, and River Terrace deposits.

3.7.3 The bedrock found underlying the site is the Mercia Mudstone Group. Considerations should be made for chemically aggressive conditions due to the present of sulphate deriving minerals such as gypsum, halite, and anhydrite.

Status: 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.

3.8 Mining

3.8.1 There are areas of coal measures to the west of the site adjacent to the B4082 and 1.8km away. 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.

3.9 Public Utilities

3.9.1 This section summarises utility information of note and is not an extensive list of all assets. Refer to Section 8 for further statutory undertaker information and proposed diversionary works.

3.9.2 C2 enquiries were issued to all utility companies in PCF Stage 2 to establish the location of existing apparatus in the vicinity of Walsgrave junction and as a refresh of the C2 enquires undertaken in PCF Stage 1. This was undertaken predominantly between October and November 2020 via several sources, including LineSearch, online SU databases, and formal e-mail requests to identified SUs.

3.9.3 26 utility companies were identified as potentially having assets within the vicinity of Walsgrave junction. In summary, 5 out of the 26 utility companies have existing apparatus that was likely be affected by the proposals to upgrade Walsgrave junction (varying by Option). These SU are:

- Western Power Distribution (WPD) - high and low voltage power assets
- Severn Trent Water (STW) - both clean and wastewater assets
- BT Openreach - underground Telecoms cables
- Vodafone - underground Telecoms cables
- Coventry City Council (CCC) Street Lighting and Drainage assets.

Electricity

3.9.4 132kV Western Power Distribution (WPD) high voltage (HV) overhead transmission lines run adjacent the A46 corridor on pylons on the west side of the A46. Overground low voltage (LV) lines, which supply Hungerley Hall Farm, are present north of the B4082.

3.9.5 At the northern extents of the project an underground LV cable runs along the western verge of the A46 towards the Walsgrave Hill Farm accommodation bridge.

Water and Sewer Mains

3.9.6 South of the existing Walsgrave junction, a clean water main runs adjacent to the western verge of the A46 northbound carriageway and then diverts west, continuing adjacent to the southern verge of the B4082 from Walsgrave junction. This water main then crosses the B4082 until the Hungerley Hall Farm access where it splits into two sections. One section runs further west towards Clifford Bridge Road on the north side of the B4082. The other section runs north along the eastern bank of the River Sowe.

3.9.7 In the northwest of the site a high-pressure sewer main from the west runs north and follows along the western verge of the A46 towards the Walsgrave Farm accommodation bridge.

Telecommunications

3.9.8 BT have underground services near Walsgrave junction, the Walsgrave Farm accommodation overbridge, and the Clifford Bridge Road/B4082 roundabout. An overhead BT service cable is present between the Hungerley Hall Farm access road and the River Sowe.

3.9.9 Vodafone and Surf Telecoms cables run along the western side of the A46 between Brinklow Bridge and Walsgrave junction.

Coventry City Council (CCC)

3.9.10 Coventry City Council drainage and lighting assets running along the northern and southern edges of the B4082 from Clifford Bridge road to Walsgrave junction.

Status: 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.

3.10 Technology

3.10.1 Desk studies indicated that there is currently no existing deployed technology equipment, systems, and infrastructure at, or in the immediate vicinity of the A46 Coventry Eastern Bypass approaches to Walsgrave junction, although there is an MS3 (97/9A) located adjacent to the northbound carriageway 1.2km north of the existing junction affected by some options. The presence of functioning street lighting columns indicates the presence of Distribution Network Operator (DNO) power supply exit points and hence likely ducted network infrastructure.

3.10.2 A review of the link-road from the B4082 Clifford Bridge Road to Walsgrave junction has also not highlighted the presence of existing technology equipment, systems, or infrastructure during the desktop study. It is observed that there is existing third-party communications equipment and infrastructure equipment at the furthest end of the link-road where it intersects with Clifford Bridge Road. This equipment and infrastructure can be found on the C2 Statutory Undertakers responses collated during PCF Stage 2.

3.10.3 The section of the A46 Coventry Eastern Bypass between Binley and Walsgrave junction does not contain any existing technology equipment, systems, or infrastructure. Although the presence of traffic signals, control cabinets and induction loops on the A46 approach to Binley are observed. These traffic signals are subject to modification during the present Binley junction grade separation works. The C2 Statutory Undertakers' responses indicate BT network infrastructure and DNO power supply exit points on approach to Binley.

3.10.4 Technology equipment, systems and infrastructure is located upon the northern section of the A46 Coventry Western Bypass between Walsgrave and the M6/M69 junction as detailed in Table 3-1 below:

No.	Equipment Type	MP	Quantity
1	ERT	98/0A	1
2	ERT	97/8B	1
3	MS3	97/9A	1
4	600EMS cabinet	97/9A	1
5	609P cabinet	97/9A	1
6	MS3	98/5A	1
7	600VMS cabinet	98/5A	1
8	609P cabinet	98/5A	1
9	Signal Portal Gantry	98/9A	1
10	600LD cabinet	98/9A	1
11	609P cabinet	98/9A	2
12	600R cabinet	98/9A	1
13	609M-S-TR-C cabinet	98/8A	1
14	Signal/VMS Portal Gantry	99/6A	1
15	609P cabinet	99/6A	1
16	600EMS cabinet	99/7J	1

Table 3-1 - Existing Technology Equipment, System and Infrastructure

3.11 Lighting

3.11.1 The current A46 dual carriageway south of the existing junction runs adjacent to the Coombe Pool SSSI boundary. Currently there is no lighting provision further south than 100m from the existing roundabout, which limits light spill into the SSSI. There is also lighting present approximately 100m to the north on the immediate approach to the existing junction.

3.11.2 The B4082 local authority road is currently lit along its length from Walsgrave junction to Clifford Bridge Road.

3.12 Environment

3.12.1 The following sections provide a summary of the baseline environmental appraisal and assessment.

3.12.2 For a detailed description refer to the submitted PCF Stage 2 Environmental Assessment Report in Appendix B for further detail.

Status: Further ecology survey work (including badgers, bats, reptiles, riparian mammals and woodland trees) is required to develop the baseline environment assessment during PCF Stage 3.

3.12.3 Key environmental receptors and constraints in the surrounding area have been identified from a combination of desk study data sources and preliminary site surveys. The following data sources have been used: Multi-Agency Geographic Information for the Countryside (MAGIC) website1; Historic England website, Coventry City Council, Rugby Borough Council and Warwickshire County Council websites, Warwickshire Biological Records Centre, and the UK Flood Map for Planning Service website.

3.12.4 Details on the environmental constraints in the area surrounding the junction can be found in the Environmental Constraints Map in Appendix H.

Noise Important Areas

3.12.5 The baseline noise environment is dominated by road traffic, 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 alongside the A46 northbound carriageway as it crosses Brinklow Road towards the south of the 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.

3.12.6 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 National Highways. 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.

[1] https://magic.defra.gov.uk/

Noise Sensitive Receptors

3.12.7 The study area is based on a maximum distance of approximately 300m from the construction works for noise impacts and up to a maximum distance of approximately 100m from construction works for vibration impacts. No impacts would be anticipated beyond these distances during construction. For operation, 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. The study area comprises a mix of residential, community, and commercial use properties as well as areas of undeveloped semi-natural environment. This includes residential communities to the north, west, and south-west of the existing junction, including the following residential communities;

- 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

3.12.8 All residential receptors in the study area for each Option are considered to be sensitive to traffic noise levels during the day and night.

3.12.9 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

3.12.10 The above educational, medical facilities and community facilities 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.

3.12.11 The University Hospital is located approximately 1.2km to the north of the existing junction. Coombe Pool SSSI, designated for its ornithology, is located less than 50m from the existing Walsgrave junction. The Sowe Valley walk is a locally promoted footpath following the River Sowe close to the west of the A46.

Local Air Quality Management (LAQM)

3.12.12 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 NO2 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.

3.12.13 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.

Relevant Sensitive Receptors to Air Quality

3.12.14 Receptors sensitive to changes in air quality including residential properties, schools and hospitals are located within the study area.

3.12.15 Within the 200m study area there are a number of residential properties, which include:

- Hungerley Hall Farm.
- Properties along Clifford Bridge Road.
- Properties along Dorchester Way, Bridport Close, Abbotsbury Close, Fontmell Close, Sturminster Close.
- Properties along Gainford Rise, Royston Close, Valencia Road and Florence Road.

3.12.16 Schools just beyond 200m from the edge of the study area include Clifford Bridge Academy and Pearl Hyde Primary School.

3.12.17 The University Hospital Coventry and Warwickshire is located to the north-east of the proposed scheme, approximately 1.2km to the north of the existing junction.

Greenhouse Gases

3.12.18 Under Part 4.2g of The National Highways Licence and in accordance with the Infrastructure Act 2015, National Highways as the licence holder are bound to "minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment." This includes the requirement to 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.

3.12.19 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.

3.12.20 Key sources of GHG emissions during construction would be from construction activities and carbon embedded in construction materials. GHG is not a significant effect or differentiator between options.

Landscape and Visual Character

3.12.21 The proposed scheme lies between Natural England's National Character Area (NCA) 97: Arden and NCA 96: Dunsmore and Feldon. Arden comprises farmland and former wood-pasture. The landscape of the lower-lying central area has small fragmented semi-natural and ancient woodlands amongst fields bounded by hedgerows featuring Mature oaks. Dunsmore and Feldon are predominantly rural, agricultural landscapes, containing small rivers and tributaries. Feldon has a more open character, while Dunsmore is wooded. The area comprises predominantly agricultural land, parkland of Coombe Abbey and dense residential and industrial areas of Binley/ Walsgrave. Prominent elements are the large scale industrial and commercial buildings and the University Hospital of Coventry and Warwickshire

3.12.22 The existing corridor of the A46 cuts through the 1km study area and landscape, offset from the residential areas. The study area whilst not designated at national or county level, 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 and Visual Context

3.12.23 Sensitive visual receptors in the study area include residents of individual properties:

- Hungerley Hall Farm.
- Gainford Rise, Royston Close, Valencia Road and Florence Road.
- Clifford Bridge Road.
- Dorchester Way, Bridport Close, Abbotsbury Close, Fontmell Close and Sturminster Close.

3.12.24 The proposed scheme adjoins Coombe Abbey Grade II* Registered Park and Garden located within Coombe Abbey Park. There is a range of listed buildings within the study area, including several within Coombe Abbey Park and three at Hungerley Hall Farm.

Heritage and Historic Resources

3.12.25 Two historic environmental records cover the search area; the Coventry historic environmental record and the Warwickshire historic environmental records.

3.12.26 There are no World Heritage Sites or Registered Battlefields within the Study Area.

3.12.27 The study area for designated assets contains 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. There are two archaeological constraint areas within the Coventry planning records that are within 300m of the edge of the study area. These comprise an area of ridge and furrow to the north of Clifford Bridge allotments and Binley Windmill. There is also an area of ridge and furrow as well as sites of two gravel pits within the Study Area.

3.12.28 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. Three Grade II listed buildings at Hungerley Hall Farm are located within the combined proposed scheme boundary and one Grade II listed building at Walsgrave Hill Farm is located to the north of the combined proposed scheme boundary.

Biodiversity

3.12.29 Biodiversity data sources, including MAGIC, Warwickshire Biological Records Centre (WBRC) and reports from bat, badger, barn owl and aquatic invertebrate surveys undertaken in 2021, were used in the assessment to establish the baseline environment. Refer to the EAR in Appendix B for further detail.

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

3.12.31 Coombe Pool SSSI is less than 50m from Walsgrave junction. 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). This SSSI is sensitive to nitrogen / acid deposition and ambient levels of oxides of nitrogen (NOx).

3.12.32 Three other SSSIs are within 5km of the junction: Herald Way Marsh, Ryton and Brandon Gravel Pitts, and Brandon Marsh.

3.12.33 Stoke Floods Local Nature Reserve (LNR) is located approximately 900m south-west of the junction. Two other LNRs are located within 5km of the junction: Willenhall Wood and Wyken Slough. Seven local wildlife sites (LWS) are located within 2km of the junction.

3.12.34 The proposed scheme boundary of the combined options includes the existing A46 road, with associated road verges; hedgerows, woodland, amenity grassland and arable farmland. One veteran tree record was provided from Warwickshire Biological Records Centre west of the River Sowe. A potential veteran oak tree was identified at Hungerley Hall Farm. The habitats within the proposed scheme boundary have the potential to support a range of species including a number of bat species, badgers, great crested newts, reptiles, a range of bird species including barn owl, riparian mammals, and aquatic macroinvertebrates.

Road Drainage and The Water Environment

3.12.35 The following water features exist in the 1km study area, three watercourses (one main river and two ordinary water courses) and various standing water bodies (one named and several others unnamed. In more detail, these are as follows:

- The Smite Brook (a tributary to the River Sowe) is culverted beneath the A46 50m south of Walsgrave junction. Smite Brook is an Ordinary Watercourse and designated under the Water Framework Directive (WFD). The extent to the section 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.
- Smite Brook flows into the River Sowe approximately 500m downstream of where it emerges from the A46 embankment. The River Sowe, at its closest is 280m north-west of the existing Walsgrave junction. The River Sowe is of regional importance and is a designated Main River and designated under the WFD. Historical mapping suggests the channel has historically been straightened and channelised through the study area.
- The 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.
- There are a number of standing water bodies within 2km of the junction, including Coombe Pool. The River Sowe feeds into a lake located within the Stoke Floods Local Nature Reserve.
- There are also a number of unnamed ponds and field drains. A number of drainage ditches are located in the fields to the east of the A46 main alignment.

3.12.36 The existing alignment of the A46 is in Flood Zone 1 (denoting a low risk of fluvial flooding) as per Environment Agency mapping. There are areas of Flood Zone 3 (high risk of fluvial flooding) in the west of the site boundary associated with the Smite Brook and River Sowe. An area of Flood Zone 3 is shown to cross the B4082; no works are proposed around this area. The areas around Coombe Pool to the east of the A46 are within Flood Zone 2 (medium risk of fluvial flooding) and Flood Zone 3 associated with the Smite Brook and the Birchley Brook discharging into the Smite Brook just upstream of the A46 roundabout.

3.12.37 Site specific hydraulic modelling was undertaken to provide a more accurate representation of the baseline fluvial flood risk around the A46 Walsgrave junction. The updated baseline model has been reviewed by the Environment Agency in June 2021. The updated baseline model results in a significant increase on peak flood levels and localised increases in flood extent. 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 still shows the A46 to be located within Flood Zone 1.

Geology and soils

3.12.38 No SSSIs designated for geological or geomorphological interest have been identified within 2 km of the junction.

3.12.39 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 250m study area for contaminated land. Coombe Field and Walsgrave Hill Borrow Pit lie within the scheme area, whilst Coombe Estate, Sharman's Yard and Hawkes Tip lie within the wider study area.

3.12.40 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 has been undertaken to permit the subsequent developments on these locations, or that these entries relate directly to inert infill material for those developments.

3.13 Accessibility to Transport Systems

Rail Services

3.13.1 No railway facilities such as stations, rail tracks or depots exist in the vicinity to Walsgrave junction. As such, it is not expected that the project will add any additional benefit to the access of rail services for railway users.

Bus Services

3.13.2 The existing bus services using the Walsgrave junction and Clifford Bridge Road are shown in Table 3-2 and

3.13.3 Table 3-3; however, Options 6, 7, 8 and 11 do not directly affect these existing bus routes.

Table 3-2 – Existing Bus Services using A46 Walsgrave junction

Bus Service, Route and Operator	Service Frequency (per day)			Travel Time (Approx.)
	Monday- Friday	Saturday	Sunday	
X30 – Diamond Buses (Ansty Park Circular via Coventry City Centre)	Every 30 mins (06:25 to 19:30)	-	-	25 mins
X31 – Same as X30 (additional services)	Every 30 mins (09:30 to 16:30)	-	-	25 mins

Table 3-3 – Existing Bus Services along Clifford Bridge Road

Bus Service, Route and Operator	Service Frequency (per day)			Travel Time (Approx.)
	Monday-Friday	Saturday	Sunday	
585, 585A, 585B, 585S Travel De Courcey (Coventry – Rugby - Coventry)	Every 30 mins (06:10 to 21:05)	Every 40-60 mins (from 06:10 to 21:05)	Every 120 mins (09:00 to 21:00)	50-70 mins
16, 16A - iGo Buses Stoke Aldermoor – University Hospital)	Every 50-60 mins (06:30 to 18:00)	Every 50-60 mins (06:30 to 18:00)		25 mins
60, 61 - Travel De Courcey (University of Warwick – Arena Retail Park)	Every 30-40 mins (06:20 to 22:00)	Every 30-60 mins (06:50 to 22:00)	Every 60 mins (10:00 to 22:00)	70 mins

Option Values:

3.13.4 Option values refer to the willingness to pay for a transport service with the possibility of future use but currently anticipated or undertaken by other modes. Non-use values are values placed on a transport service regardless of any possibility of future use (WebTAG Unit A4.1, S7).

Status: Detailed assessment of Option values to be undertaken at PCF Stage 3.

Severance

3.13.5 On this project, severance mainly concerns those using non-motorised modes, particularly pedestrians (WebTAG Unit A4.1, S5).

3.13.6 No pedestrian crossing currently exists at Walsgrave junction. The only crossings are available north of Walsgrave junction and cross the A46 via two overbridges. One overbridge is used by Hungerley Hall Farm as a private access.

3.14 Integration

Transport Interchange

3.14.1 The existing study area provides a north-south link via the A46 and east-west via the B4082. The junction provides connection to/from:

- Farm properties north of the junction
- Coventry Airport near Tollbar End junction
- Coombe Pool
- Coventry Hospital precinct north west of the Junction

3.14.2 In addition, the junction provides an important link as part of the SRN to connect the M6, M69, M40 and other key roads as outlined in Section 2.1.

Land-Use Policy

3.14.3 The proposed project corridor is located within a wider context of established and evolving national, regional, and local policies relating to transportation, environmental and land-based development commitments. The relevant Local Authorities are Coventry City Council and Rugby District Council.

3.14.4 A range of land uses, and policy designated sites of interest lie adjacent and close to, the proposed project corridor. Those with a direct relationship to the project have been identified and included in the PCF Stage 2 Assessment.

3.14.5 The National Planning Policy Framework [14] Paragraph 75 states that planning policies should protect and enhance public rights of way (PRoW) and accesses. Local authorities should seek opportunities to provide better facilities for users, for example adding links to existing PRoW networks including National Trails.

3.14.6 NPS [13] Paragraph 3.22 states that severance can be a problem in some locations. Where appropriate, applicants should seek to deliver improvements that reduce community severance and improve accessibility.

3.14.7 In addition, NPS Paragraph 5.184 states that PRoW, National Trails, and other rights of access to land (e.g., open access land) are important recreational facilities for walkers, cyclists, and equestrians. Applicants are expected to take appropriate mitigation measures to address adverse effects on National Trails, other PRoW, and open access land and, where appropriate, to consider what opportunities there may be to improve access.

3.15 Other relevant factors

Third Party Development Proposals

3.15.1 Several development proposals are planned within the vicinity of the A46 Coventry junctions' scheme and have been identified. The following developments are explored in further detail in Section 3.16:

- Land allocated under the Coventry Local Plan for future development
- Rugby Borough Council Binley Woods Site Allocations Development Pack 2016
- Jaguar Land Rover (JLR) – Whitley South development (OUT/2016/0405)
- University Hospital (Coventry & Warwickshire) application (FUL/2018/2063)
- Coventry and Warwickshire Gateway
- Other committed road developments in the East Midlands including Binley junction, M6 J2-4 smart motorway, A5 Dodwells to Longshoot Widening, M40/M42 Interchange smart motorway and M42 J6 improvements

3.16 Option Constraints – Planning Factors

Coventry City Council

3.16.1 Coventry City Council's Local Plan (Local Plan 2011 – 2031) adopted on 6th December 2017, sets out Coventry's blueprint and vision to help re-establish itself as one of the country's top 10 cities, enhance its position at the centre of the Coventry and Warwickshire Sub-region and contribute towards the West Midlands engine for growth.

3.16.2 The Local Plan sets out strategic planning policies and detailed development management policies that are material considerations in determining planning applications. The Local Plan also allocates sites for specific types of development for particular requirements.

3.16.3 The Local Plan has committed to providing 24,600 homes between 2011 and 2031. This includes an area of land, Walsgrave Hill Farm, allocated for housing adjacent to the A46 north-east of Walsgrave junction and south of the M6 / M69 junction (see Figure 3-4). This area of land is approximately 58 hectares located to the west of the A46 and extends from the existing Walsgrave junction for approximately 1.8km to where the A46 crosses the River Sowe; the area is bordered by the A46 to the east and the River Sowe to the west.

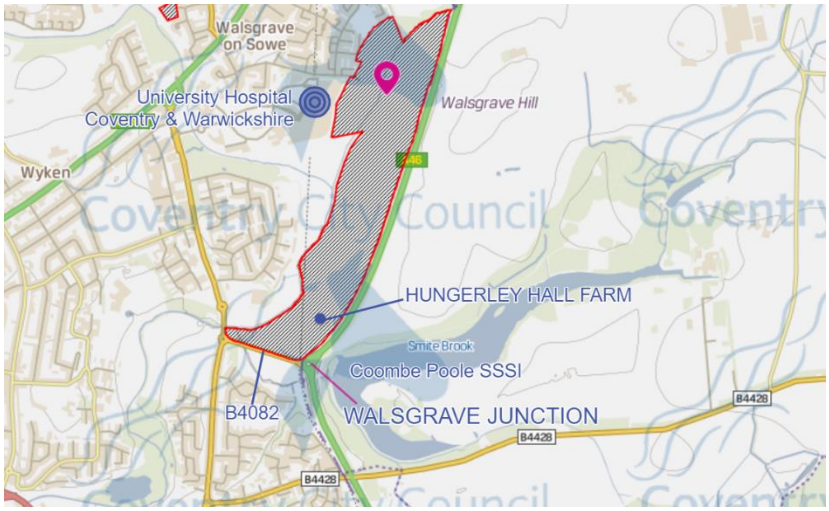


Figure 3-4 Plot H2:3 (within red line boundary). From CCC Local Plan Online Map.

3.16.4 A total of 900 dwellings are proposed within boundary plot H2:3[3]. The Local Plan states that it is an essential site-specific requirement to retain and enhance the setting of listed buildings at Hungerley Hall Farm and to incorporate a new access linking the A46 to University Hospital. The specific requirements state that potential developers should facilitate work with National Highways on proposals to link a new grade separated junction at Clifford Bridge Road and provide essential drainage and flood risk infrastructure.

3.16.5 The Coventry City Council Local Plan has also committed to planning for the wider Cycle Coventry cycle network made up of 17 strategic cycle routes and orbital route, as shown in Figure 3-5.

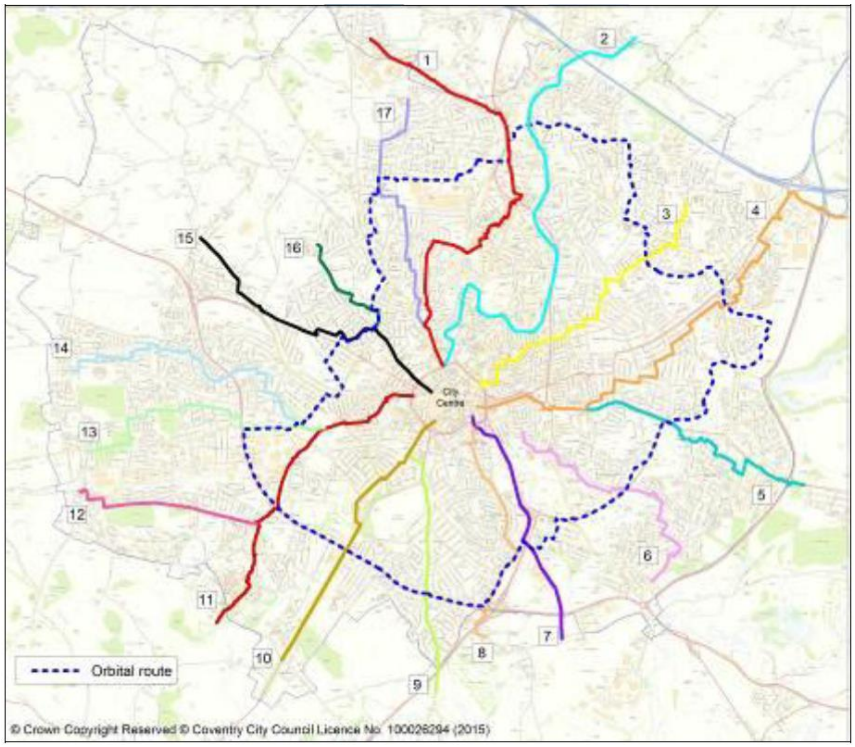


Figure 3-5 - Proposed 'Cycle Coventry' Cycle Route Network

3.16.6 Strategic route 4 runs along Central Boulevard which crosses under the M69 at M6 Junction 2. This then runs along the A4600 into the city centre.

3.16.7 Strategic route 5 crosses the A46 at the Binley junction via a toucan crossing. This route follows the A428 Brandon road into the city centre.

3.16.8 There is also an orbital route of the city which serves the Clifford Park residential area west of the River Sowe and connects to the University Hospital area. This should be considered and co-ordinated with the existing WCH route at High Bridge and the existing A46 overbridge to maintain the connectivity between the residents east of the A46 and west to the University Hospital area. This is discussed further in the WCH Section 9 of the report.

3.16.9 In discussions with National Highways AREA 9 MAC, it has been noted that Coventry City Council is looking into plans to alleviate traffic congestion and queuing issues due to the short distance between roundabouts near Tesco and the B4082 on Clifford Bridge road (approximately 120m). Further discussions and consultation with local authorities should be undertaken throughout subsequent stages.

Status: Discussions and consultation with local authorities to be undertaken throughout subsequent PCF Stages and the project progresses.

Rugby Borough Council

3.16.10 Rugby Borough Council's Local Plan (2011-2031 vision) was adopted in June 2019, replacing the June 2011 Core Strategy and 2006 Local Plan.

3.16.11 The overall strategy for managing development in the Borough during the plan period is illustrated in Figure 3-6. With reference to the local plan report available on the Council's website, the following levels of housing and employment development have been planned for and provided within the Rugby Borough between 2011 and 2031:

- 12,400 additional homes, including 2,800 dwellings to contribute to Coventry's unmet needs, located in the main rural settlement areas (Binley Woods, Brinklow, Clifton on Dunsmore) shown in triangular markings in the Local Plan and approximately 2.5km from Walsgrave junction.
- 208ha of employment land, including 98ha to contribute to Coventry's unmet needs, located in the main urban areas shown in square markings in the Local Plan and approximately 14km from Walsgrave junction.

3.16.12 The local plan and the various implications of its adoption alongside the Walsgrave junction upgrade, particularly in rural settlement areas, have been evaluated in PCF Stage 2.

Status: 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.

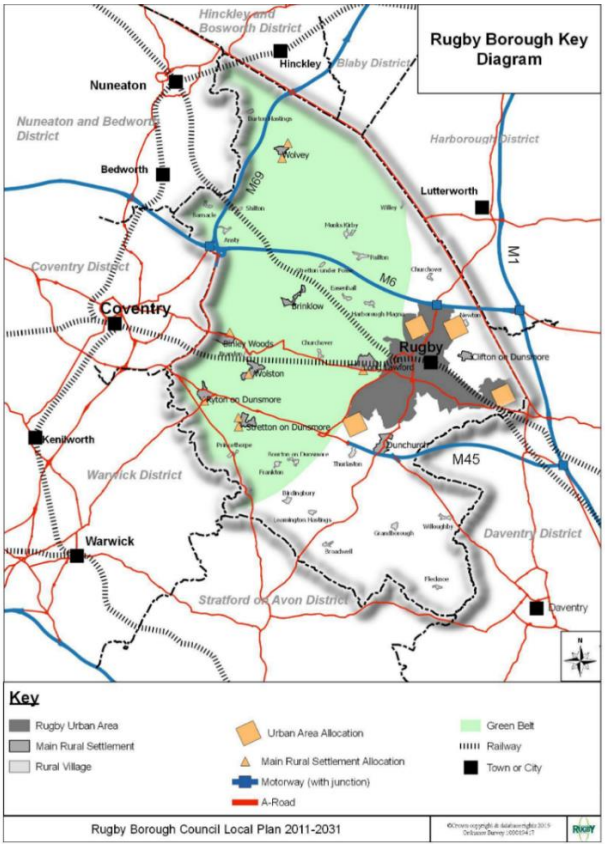


Figure 3-6 - Rugby Borough Key Diagram

Cumulative Developments

3.16.13 There are a number of future developments planned that are directly relevant to the A46 Walsgrave junction upgrade project including major developments with planning permission and committed road schemes in the East Midlands. The information below has been obtained from Warwickshire, Rugby, and Coventry Council websites during PCF Stage 2.

Coventry and Warwickshire Gateway Scheme

3.16.14 Coventry and Warwickshire Gateway is a two phase development located to the South East of Coventry and straddling the A45 and the City border with Warwickshire. The development is seeking to create a 60-acre mixed use business park (known as Whitley South Development) located on land north of Coventry Airport, of which 30 acres will become an extension to the Jaguar Land Rover global headquarters. This will be followed by the development of a 200-acre manufacturing/logistics hub on land located south-east of the airport. The scheme includes major road improvements, including a new junction on the A45 between Tollbar End and Stivichall Interchange to ease congestion and improve access around Jaguar Land Rover's premises at Whitley Business Park. If the schemes progresses, the development proposal has potential to impact the capacity and future flows of the proposed A46 Coventry Junctions scheme.

Status. 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

3.16.15 A planning application for a new 1,600 capacity surface car park to serve University Hospital Coventry and Warwickshire staff whilst easing pressure on the current parking facility to free up spaces for visitors, was submitted to CCC in July 2018 (FUL/2018/2063). The application sought to develop the agricultural farmland area located immediately to the east of the hospital. The car park's entrance and exit will be via the hospital's main Clifford Bridge Road entrance, utilising an existing service road that runs through and around the southern edge of the site.

3.16.16 Planning permission for these proposals was granted in June 2020. And conditions discharged in August 2020.

Status 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 & Warwickshire

3.16.17 An outline planning application (R19/1540) for a new employment area (160,000m²) named Prospero Ansty, located immediately to the east of the M69 junction was submitted to Rugby Borough Council in December 2019 and subsequently granted planning permission in June 2021. The development includes plans to develop the redundant/surplus parts of the Rolls-Royce Ansty manufacturing and testing site. This scheme has the potential to generate new traffic and vehicle movements on the local and wider highway network.

Status Consider potential impacts of the proposal to the A46 Walsgrave project in PCF Stage 3 and beyond.

Walsgrave Hill Farm scheme – Housing Site H2:3

3.16.18 The land west of the A46 is allocated in the Coventry Local Plan as housing site H2:3 to provide 900 dwellings. A planning application to develop the site has not yet been submitted. The A46 scheme will make use of land within the housing allocation and National Highways have been in discussion with the developer of the H2:3 site throughout PCF Stage 2 regarding the use of the land and access arrangements to the housing site.

Status 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 sets out the proposed list of National Highways Road Improvement schemes to be considered throughout subsequent PCF Stages for both Walsgrave and Binley junctions. These schemes will be considered within the Proposed Development cumulative effects assessment and future baseline traffic flows (referred to as 'cumulative road schemes') in future design stages

Table 3-4 – Schemes nearby Walsgrave junction, A46 Coventry Junctions Upgrade

Scheme	Opening year	Description
Dodwells to Longshoot Widening	Not being taken forward as standalone scheme – NH update 26Jul21	Widening of current section of single carriageway between Dodwells roundabout and Long Shoot junction to dual carriageway
M42 Junction 6 improvements	Works commenced in 2020 Open for traffic 2023/24	Increasing capacity of M42 at Junction 6
A46 Strategic Link Road	Planning application 2023/24 Works to commence in 2024/25	Capacity upgrades to the A46 between Stoneleigh and Kenilworth being led by Warwickshire County Council

NN NPS Accordance

3.16.19 Table 3-5 summarises conflicts and compliances in accordance with National Policy Statement for National Networks

Table 3-5 - Summary of National Networks National Policy Statement Accordance by Exception

Topic	Option 6	Option 7	Option 8	Option 11
Safety		Slip road config. concerns & A46 tailback risk. Major departures		
Internationally designated sites, SSSI and NNR	Alignment is further from SSSI than existing roads	Indirect impacts on SSSI due to proximity. Loss of screening vegetation unlikely to impact on qualifying feature	Some permanent landtake from SSSI. Loss of screening vegetation unlikely to impact on qualifying feature	Indirect impacts on SSSI due to proximity. Loss of screening vegetation unlikely to impact on qualifying feature
Irreplaceable habitats (ancient woodland & veteran trees)	Alignment largely through arable farm land. Some loss of trees around HHF. Risk of veteran tree loss adjacent to R.Sowe	Limited veg. loss near SSSI with limited footprint for mitigation measures. Potential temporary effect on SSSI woodland.	Mature tree loss adjacent to and in SSSI, with limited footprint for mitigation measures	Limited vegetation loss adjacent to SSSI with limited footprint for mitigation measures. Potential temp. effect on SSSI woodland.
Protection of other habitats and species (Biodiversity)	Vegetation loss and severance of habitats affecting protected species	Vegetation loss along existing highway boundaries.	Vegetation loss on existing highway boundaries & SSSI. Loss of main badger sett & bat roosts in trees & HHF	Vegetation loss along existing highway boundary. Direct impact on badgers likely requiring new main sett
Flood risk	Significant increase in flood risk. Costly mitigation measures with secondary env. impacts.	Flood modelling shows no flood risk impact on or off site as a result of this option.	Risk of A46 flooding mitigated if bunding east of A46 maintained at 75.0m AOD	Site not located in flood zone 2 or 3. No flood impact.
The historic environment	Change in Coombe Abbey Park & Garden & HHF setting due to elevated jct. No direct impact.		Demolition of Grade II listed Hungerley Hall Farm	Closer B4082 impacts setting of Hungerley Hall Farmhouse
Land use:Green Belt	Scheme extents are within Green Belt, but unlikely to be classed as inappropriate development			
Land use: open space / sports etc				
Noise and vibration	B4082 150m from houses. 11dB inc at HHF. Many residential properties significantly affected. Disproportionate mitigation.	3dB inc @ HHF. Morrisons estate closer to B4082. Mitigatable. Significant impacts on HHF difficult to mitigate.	North end of Morrisons estate closer to B4082 and A46. Mitigatable	~3dB inc.@ HHF.Risk of qualifying for noise insulation. Would need mitigation solution agreeing with Historic England & Local Authority
Water quality and resources	Minor changes to culverts crossing Smite Brook. R.Sowe widening would need mitigation.		Scheme requires works to Smite Brook and edge of Coombe Pool SSSI	

Status: 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.

3.17 Engineering constraints

3.17.1 There are a number of planning factors that constrain potential layouts. These include Hungerley Hall Farm and surrounding buildings, historic landfill, poor soils, the 132kV overhead transmission lines, and the River Sowe flood plains.

3.17.2 The following high-level constraints that have significant potential to affect the delivery of the project options are as follows:

- Existing land use and presence of landfill sites
- Existing 132kV Overhead Transmission Line
- Hungerley Hall Farm and surrounding buildings are a key physical constraint to the junction upgrade options particularly as three of the buildings (Farmhouse and two outbuildings) are Grade II listed.
- Coombe Poole SSSI is a key physical constraint to the geometry of the junction options
- A primary engineering constraint is the presence of landfill sites beneath the existing carriageway. Sharman's Tip is considered the most problematic, having contributed to long term settlement since this section of the A46 was constructed in 1988.
- Effects on agricultural soils as a valuable resource: for example, loss or damage to 'best and most versatile' soils classified in Natural England's Agricultural Land Classification (ALC) system, grades 1, 2 and 3a (varying from 'excellent, very good, and moderate quality agricultural land.
- Leachate at the site is currently identified as metastable by the Environment Agency. However, of significant concern is the mobilisation of contaminants which may result from any disturbance of the landfill during construction.

Coombe Abbey Registered Park and Garden & Coombe Pool SSSI

3.17.3 Existing and proposed junction layouts are constrained by the location of the Coombe Park and Pool, and the SSSI associated with it. This is discussed in further detail later in Section 7.12 (Environmental Assessment) within this report.

WPD 132kV Overhead Transmission Line

3.17.4 WPD's 132kV high voltage overhead powerline on the western side of the A46 and Walsgrave junction that crosses above the B4082 and runs further north between the River Sowe and Hungerley Hall Farm. This constraint and impact on each Option is described further in Section 7.

Flood Plain Associated with the River Sowe and Smite Brook

3.17.5 The areas of flood zone 2 and 3 in and around the study area especially near the River Sowe and its confluences, Smite and Withy brook, form a physical constraint to potential and proposed layouts. A number of drainage ditches are located in the fields to the east of the A46. These areas have been detailed in Sections 3.12 and 7.4.

GD 300 - Requirements for new and upgraded all-purpose trunk roads

3.17.6 The RIS 1 sets the vision for GD 300 (expressways) as “A-roads that can be relied upon to be as well-designed as motorways and which are able to offer the same standard of journey to users”.

3.17.7 The A46 has been identified within the RIS 1 as one of a number of strategic routes to be considered for GD 300 compliance within the 2040 vision.

3.17.8 In April 2020, National Highways (then Highways England) released GD 300 (Version 2) guidance documentation which provides design requirements and advice for new and upgraded all-purpose trunk roads.

3.17.9 During PCF Stage 2, GD300 was initially treated as a constraint due to the possibility of required future proofing to allow for expressway upgrade. As part of the expressway standard, this would have meant the aim would have been for this section of the A46 to operate at National Speed Limit (70mph) and be fully grade-separated, restricting alignment options. However, as the project progressed the 70mph speed limit (120kph design speed) alignment was deemed detrimental to other factors such as environment. The requirement for grade separation to allow free flowing traffic remained.

3.17.10 This section of the A46 will not be compliant with GD300 on opening and would need further upgrade. It should be noted that in accordance with GD300 when an existing dual carriageway is being converted to an expressway, design speed relaxations can be applied. Therefore, if the project opens with a 50mph speed limit, future expressway upgrade is still possible with these relaxations.

4 Scheme Objectives

4.1 Problem identification

4.1.1 The Walsgrave junction is one of two at-grade roundabouts on this section of the A46 and has been identified as a cause of congestion. In addition, the A46 corridor suffers from low peak hour speeds, high vehicle delay, poor journey time reliability and has a number of collision clusters at the existing at-grade junctions. Thus, an upgrade to the Walsgrave junction is being proposed to reduce congestion, improve safety and support development in the region.

4.1.2 The South Midlands Route Strategy Evidence Report (SMRSER) published by the Highways Agency (now National Highways) in April 2014, identified the following traffic problems relevant to the A46 corridor:

- It experiences peak hour speeds of 21mph to 30mph on this 70mph route at the approaches to Tollbar junction and 41mph to 50mph at Walsgrave junction.
- It is in the top 10% for vehicle-hour delay
- It is one of the locations with least reliable journey time
- It is one of the links with the highest proportion of freight.

4.1.3 The SMRSER was written prior to the completion of the improvements at the Tollbar End junction.

4.1.4 The existing Walsgrave junction is the final capacity constraint on this section of the A46. This causes the earlier improvements made to Binley junction and Tollbar End to perform at reduced efficiency. Without improvements to Walsgrave junction, the A46 as a corridor does not meet its full potential.

4.2 Objectives

4.2.1 The objectives for the overall scheme that Walsgrave will contribute towards are as follows:

- A strategic road network that supports and facilitates economic growth, supporting employment and residential development opportunities;
- A strategic road network that is maintained to safe and serviceable condition;
- Improve the operation and efficiency of the existing transport network, delivering capacity enhancements to the SRN;
- A strategic road network that minimises its negative impacts on users, local communities and the environment;
- A strategic road network that balances the need of individuals and businesses that use and reply upon it;
- Reducing / minimising the impact on the wider environment, whilst seeking to bring enhancement; and
- Operational maintenance to be considered holistically during the design stage and at a balance of cost versus disruption.

4.2.2 Assessment of the objectives is provided in the following sections:

- **Community** - The scheme supports and facilitates employment and residential development opportunities, minimising its negative impacts on users, local communities and the environment. The scheme also balances the need of individuals and businesses. Refer to Section 7.27.1 and the Benefits Register in Appendix I for further details.
- **Safe** - To enable the strategic road network to be maintained to a safe and serviceable condition, considerations were made to allow for maintenance activities to be conducted safely. For safe access to scheme structures and attenuation ponds, maintenance lay-bys had been proposed for maintenance vehicle access. For further details, refer to Section 7.8 and Appendix J.
- **Efficiency** - To ensure the scheme options improved the operation and efficiency of the existing transport network, Vissim microsimulation and CoSTM modelling was employed to investigate the effectiveness of each scheme Option. Refer to Section 7.13 for further details.
- **Environment** – The Stage 2 options were designed to avoid the major constraints and sought to minimise environmental impacts as far as possible with the information then available. Environmental assessment has been undertaken for each scheme Option. Refer to Section 7.12 for further detail.
- **Maintenance** - Operational maintenance to be considered holistically during the design stage and at a balance of cost versus disruption. The alignment design of the proximity between the B4082 and A46 pinch point allowed for safe maintenance of the anti-dazzle screening/noise bund/safety barrier without disrupting road operation. Refer to Section 7.14 for further maintenance safety assessment considerations.

5 Geographic, Demographic, Planning and Policy Contexts

5.1 Introduction

5.1.1 The administrative boundary between the councils of Coventry City and Warwickshire County is along the western highway boundary of the A46 corridor. The area within the county of Warwickshire also falls within the Rugby District Council administrative area and Coombe Fields Civil Parish, as Figure 5-1.

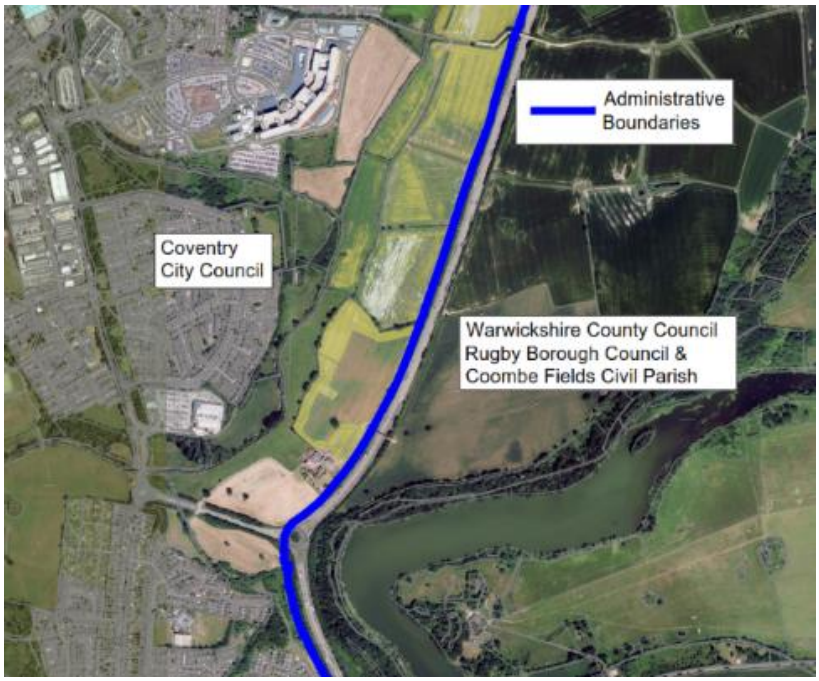


Figure 5-1 - Administrative Boundaries

5.1.2 The strategic need for the project is set out in the RIS for the 2015/16 to 2019/20 Road Period and the CSR as a committed scheme.

5.1.3 Planning consent for the project will be required and the regime to be followed is dependent on the option taken forward. The appropriate consenting regimes available are the Planning Act 2008 or the Highways Act 1980.

5.1.4 Under the Planning Act 2008, schemes and projects that are considered to be a Nationally Significant Infrastructure Project (NSIPs) will be consented by applying for a Development Consent Order (DCO as a means of obtaining permission for developments.

5.1.5 Not all the options for consideration will be permitted by DCO. Some options for consideration may need to follow the Highways Act 1980 consenting regime, where the scheme is of size below the thresholds in the Planning Act 2008 and so does not constitute a Construction or Alteration scheme, or where the scheme is within the existing highway boundary and does not result in significant adverse effects on the environment.

5.2 National Significant Infrastructure Projects (NSIPs) and DCO process

5.2.1 NSIPs are major infrastructure developments in England and Wales. These include projects such as power plants, large renewable energy projects, new airports, airport extensions and major road projects. A DCO application for consent to construct and operate a NSIP is made to the Planning Inspectorate who will consider the application and make a recommendation to the relevant Secretary of State, who in turn will decide on whether a DCO should be granted.

5.2.2 The types of Highways projects that constitute a NSIP and consented by means of a DCO are defined in Section 22 of the Planning Act 2008. Section 22 of the Planning Act 2008 outlines that Highway related development will be considered a NSIP if it is classed as 'construction', 'alteration' or improvement of a highway and exceeds the relevant thresholds and criteria.

5.2.3 Options 6, 7, 8 and 11 are considered to be either construction or alteration scheme as they involve new sections of carriageway that are outside the existing highway boundary and the realignment of an existing junction. The options are located wholly within England and the Secretary of State is the Highway Authority. The area of development for Options 6, 8, and 11 exceed the 12.5ha threshold and so it is likely that these options would be classed as a NSIP requiring a DCO. The area of development for Option 7 is less than 12.5ha and so does not fulfil all of the criteria in Section 22 of the Planning Act. It is possible that this Option may be consented under the Highways Act 1980. The consenting route for each Option will be determined in the Planning Route Proforma published by National Highways.

5.2.4 Given that the Walsgrave junction project is in PCF Stage 2, the scheme design may change altering the layout, speed limit and area of development. This may affect and change the consenting route for each Option. The scheme design and criteria in Section 22 of the Planning Act 2008 should be kept under review as the scheme design progresses.

5.2.5 The NSIP process comprises six key stages, which include:

- Pre-application,
- Acceptance,
- Pre-examination,
- Examination,
- Decision and
- Post-decision.

5.2.6 During the pre-application stage, there is a statutory requirement to undertake consultation with landowners, stakeholders and the local community during the pre-application stage, and the Planning Act sets out that applicants have a duty to take account of consultation responses prior to submission of the DCO.

5.2.7 Under the DCO process, there is no public inquiry; however, a mechanism exists for stakeholders and the public to provide comments during the examination period. The Examination is mainly a written process, although hearings may be held, at the discretion of the Planning Inspectorate. Once a DCO is granted, it provides development consent for the applicant to construct the project, and compulsory purchase powers over third party land if these are required.

5.3 National Networks National Policy Statement

5.3.1 The National Networks National Policy Statement (NNNPS) (December 2014) sets out the need for and Government policies to deliver NSIP projects on the national road and rail networks in England. The Secretary of State (SoS) uses the NNNPS as the primary basis for making decisions on development consent applications. The proposed project needs to demonstrate compliance with the guidance set out in the NNNPS.

5.3.2 The NNNPS provides policy in respect of a schemes interaction with the environment and sets out how this should be considered in the determination of applications for development consent. These impacts include air quality, carbon emissions, biodiversity, dust and odour, flood risk, land instability, the historic environment, landscape and visual impacts, land use (including the green belt), noise and vibration, impact on transport networks and water quality. Most of these will be relevant to the project given its location and will need to be taken into consideration as the project progresses and in an application for development consent. Table 5.1 below provides a summary of the anticipated NNNPS compliance for each scheme Option from PCF Stage 2. Refer to Appendix K for further detail.

Table 5.1 – Summary of NNNPS for each scheme Option

Topic	Description
Safety	There is concern for Option 7 & 8 regarding slip road configurations and A46 tailbacks resulting in significant departures. Option 6 and 11 do not raise significant safety concerns.
Internationally Designated Sites, SSSI and NNR.	All options impact the SSSI; however, these can be mitigated with the exception of Option 8 with no opportunity for mitigation measures.
Irreplaceable Habitats (Ancient Woodland & Veteran Trees)	All options result in minimal vegetation loss with the exception of Option 8 where mature trees adjacent and within the SSSI are lost with limited footprint for mitigation measures.
Protection Of Other Habitats & Species (Biodiversity)	All options result in vegetation loss along the existing highways boundary affecting habitats with opportunity for mitigation.
Flood Risk	Options 7 and 11 avoid floodplains and pose no significant flood risk concerns. Although Options 6 and 8 potentially result in potential risk of flooding, with costly mitigation measures.
The Historic Environment	Options 6, 8 and 11 affect Hungerley Hall Farm with Option 8 would resulting in demolition of Hungerley Hall Farm. There are opportunities for mitigation for Options 6 and 11.
Land Use: Green Belt	For all options, scheme extents are within Green Belt, but unlikely to be classed as inappropriate development.
Noise & Vibration	All options result in moderate disruption with room for mitigation.
Water Quality and Resources	Options 6 and 8 would require works to Smite Brook, alongside other flood mitigation measures.

5.4 National and Local Planning Policy

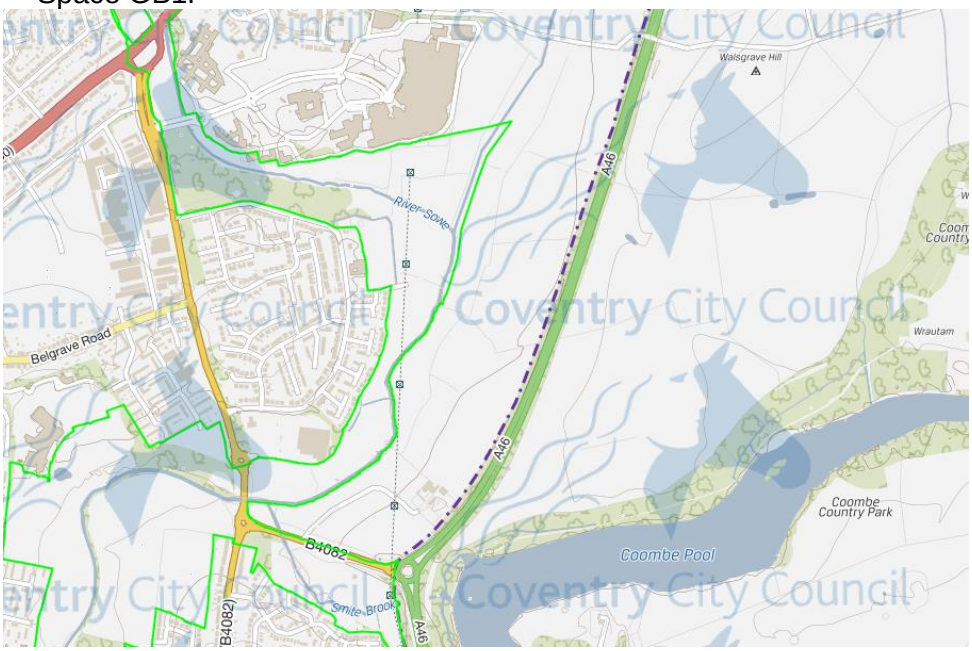
5.4.1 The NNNPS is the principal planning policy document to be used when considering applications for NSIP schemes. The NNNPS sets out that applicants for development consent are expected to design to avoid environmental and social impacts and where necessary ingrate mitigation to reduce the significance of the effect.

5.4.2 This is in keeping with the principles set out in the National Planning Policy Framework (NPPF) [1] document which is of material consideration when determining applications for development consent. While paragraph 5 of the NPPF outlines that the framework does not contain specific policies for NSIPs and that such applications are to be determined in accordance with the Planning Act 2008 some aspects of the NPPF are referred to within the NNNPS and should be accounted for where appropriate.

5.4.3 Local planning policy is also of material consideration. In terms of local planning policy, policies contained within the Coventry Local Plan (CLP) 2016 are relevant and should be considered. The Coventry Local Plan recognises that effective management of the SRN is crucial to Coventry's national connectivity needs and references planned improvements to the A46, including at Walsgrave.

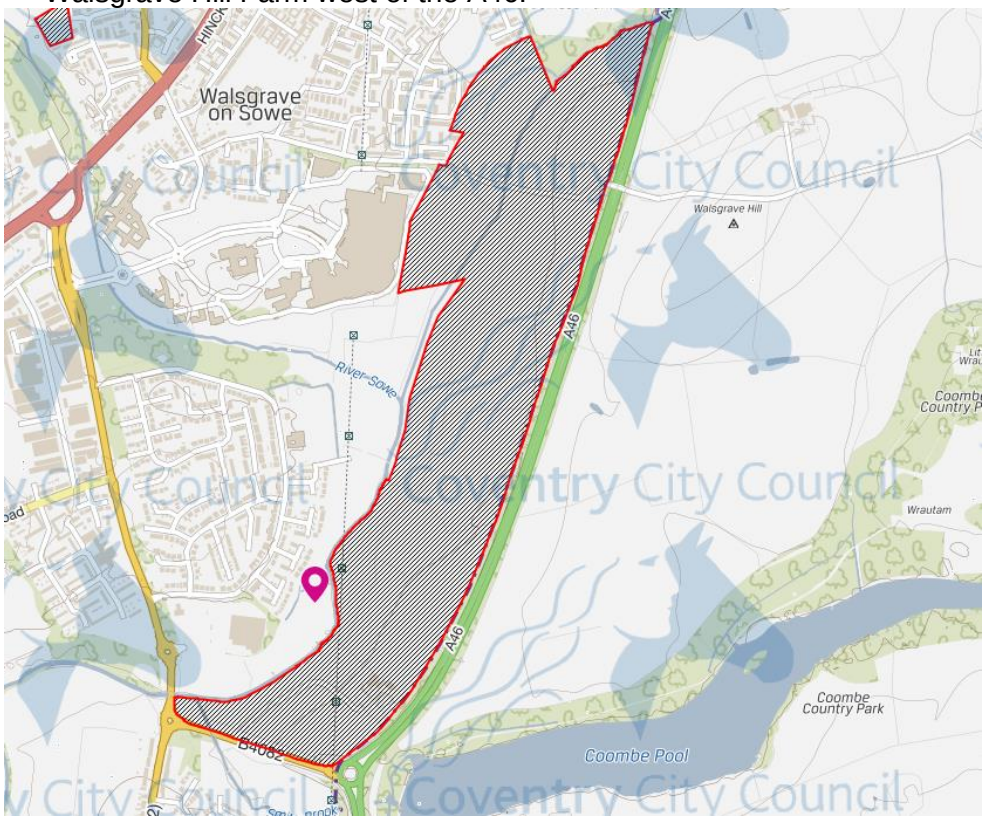
5.4.4 The CLP shows that the scheme is located within the Coventry Green Belt and designated local green space. These land use designations restrict various types of development unless very special circumstances are demonstrated. The NPPF requires that policies managing development within areas of local green space be consistent with those for green belts. Areas of local green space are local in character and hold significance for local communities.

Figure 5.1 – Extract from the Coventry City Local Plan. Designated Local Green Space GB1.



5.4.5 The land situated between the River Sowe, A46 carriageway and B4082 is designated for the construction of 900 new homes. The site is referred to in the CLP as site H2:3 Walsgrave Hill Farm (see extract below).

Figure 5.2 – Extract from the Coventry City Local Plan. Housing Site H2:3 Walsgrave Hill Farm west of the A46.



5.4.6 The CLP has identified Walsgrave Hill Farm for 900 dwellings, along with the retention and enhanced setting of listed buildings at Hungerley Hall Farm. The site is proposed to incorporate blue light access linking the A46 to the University Hospital. The CLP states that Coventry City Council will facilitate and work with National Highways on highways proposals linked to a new Grade Separated junction at Clifford Bridge. The proposal will also include the provision of essential drainage and flood risk infrastructure.

5.4.7 The CLP also shows that The Sowe Valley Dorchester Way Local Wildlife Site is located west of the Scheme. the scheme is also located within a sand and gravel safeguarding area (CLP policy EM9).

5.4.8 The boundary between Coventry City Council and Warwickshire County Council (WCC) including Rugby Borough Council (RBC) is located along the western side of the A46 carriageway. Elements of the scheme will be located along and east of the existing A46 carriageway and within the administrative area of WCC and RBC. The Local Development Plan for RBC is the RBC Local Plan 2011-2013 which was adopted in 2019. Land use designations show that the scheme is located within the Green Belt in RBC under policy GP2. Policies in the area of the scheme include for the protection, restoration, and enhancement to blue and green infrastructure assets.

5.4.9 The RBC Rural Policies map also identifies parts of the Scheme are within or adjacent to the Coombe Pool Site of Special Scientific Interest (SSSI) and Coombe Abbey Grade II* Park and Garden, designated as a Conservation Area.

Status: 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.

6 Summary of Options

6.1 History of the scheme and project

6.1.1 This section discusses the history of the scheme and project. This includes work undertaken previously by others and AECOM from PCF Stage 1.

6.1.2 As noted previously in this document, any reference to “the Scheme” is inclusive of both the Binley and Walsgrave junctions upgrades unless stated otherwise. Reference to “the Project” only refers to the proposed upgrade of Walsgrave junction.

6.1.3 Atkins and Mouchel (now part of WSP) previously undertook an initial Optioneering exercise which covered both the Binley and Walsgrave junctions. AECOM was then commissioned to review the earlier options and undertake PCF Stage 1. A summary of previous PCF Stage 0 and Stage 1 work is listed below in Sections 6.2 to 6.4.

6.2 2014 Route Strategic Options Report

6.2.1 The 2014 Route Strategic Options Report – A46 Coventry to M6 J2 identified four potential options. The four lettered options that were identified are shown in Table 6-1.

Table 6-1 - List of Options detailed within Route Strategic Options Report (2014)

Option	Summary
Option A	Improvements to Binley junction by grade separation
Option B	Improvements to Walsgrave junction through relocation and grade separation
Option C	Feasibility study to look at connections between Coventry and the M6/M69 and whether the links can be improved and if there is sufficient capacity to cope with the planned growth.
Option D	Improvements to both the Binley and Walsgrave junctions as stated in Options A and B above.

6.2.2 A recommendation was made to take forward Option D and its associated sub-options as the improvement works to the two junctions would facilitate economic growth and alleviate delay and congestion along this section of the A46.

6.2.3 It was concluded in the 2014 Route Strategic Options Report that the improvements of both the Binley and Walsgrave junctions would potentially help reduce congestion and reliability issues along the A46 Coventry Eastern Bypass and would ensure the overall benefits of upgrading both junctions would be greater than the two individual projects being delivered independently.

6.2.4 Due to the more urgent need to upgrade Binley junction, plans to upgrade it were progressed ahead of the proposals to upgrade the Walsgrave junction. Binley junction is currently being grade separated and in the construction phase (PCF Stage 6). Binley junction is expected to be open to traffic in 2022.

6.3 PCF Stage 0: Binley + Walsgrave junctions (2015)

6.3.1 In PCF Stage 0 the options for grade separation were developed by Atkins without the benefit of traffic flow data and traffic modelling to inform the proposed layout configurations.

6.3.2 The PCF Stage 0 proposed removing the existing Walsgrave roundabout and providing a grade separated junction 1000m north of the existing junction. The A46 would be realigned through the existing location of the roundabout. There was some flexibility in the location of this junction along the route of the A46. There was also potential for a link into Coventry immediately to the south of the Coventry and Warwickshire University Hospital.

6.4 PCF Stage 1: Binley + Walsgrave junctions (2015 - 2016)

6.4.1 During 2015-2016 Mouchel undertook PCF Stage 1 (Option Identification) for the Walsgrave and Binley junctions. During this process 3 options were identified:

- Option A – Grade separation at the A46 Binley junction + Do Nothing at the Walsgrave junction
- Option B – Grade separation at the A46 Binley junction + Do Minimum at Walsgrave junction (enhanced at-grade roundabout or signal solution)
- Option C – Grade separation at the A46 Binley junction + Do Something at the Walsgrave junction (Dumbbell Layout - A46 grade separated northwest of the roundabout)

6.4.2 No traffic data was available at the time to verify the suitability or otherwise of the layouts developed.

6.4.3 Option C was identified as unlikely to be delivered within the budget of the project, however it met stakeholder expectations by opening up land for development opportunities. There was significant potential identified to secure developer contributions from ‘sites’ that would be unlocked by the relocation of the Walsgrave junction. Refer to Appendix L for further detail of the Mouchel PCF Stage 1 options assessment.

Why the Walsgrave component of Option C was not progressed

6.4.4 Since mid-March 2016 the scheme had been directed to continue with the evaluation of a single solution (Option C) which aligned with the RIS1 strategy. Option C included the grade separation of Binley junction and relocation and grade separation of Walsgrave junction. Whilst this was considered the most appropriate long-term solution for the A46, the PCF stage 0 and PCF stage 1 Order of Magnitude Estimate for Option C exceeded the RIS1 funding allowance.

6.4.5 The initial BCR analysis for Option C also indicated that the scheme would return a BCR greater than 1.5 and would therefore be deemed as at least Medium VfM. It was also noted that unless the funding could be allocated within RIS2 or by developer contributions, the assessed scheme would not be delivered.

6.4.6 With reference to the Client Scheme Requirements (CSR) Version 0.2, a National Highways Investment Decision Committee (IDC) review decided that Walsgrave junction would be considered for funding under proposed RIS2 submissions and would be put on hold until local authorities were in the position to unlock the surrounding development land within the project vicinity. A DfT Change Control form was submitted accordingly.

6.4.7 A change in project scope outlining the delivery of a grade separated junction at Binley only was approved on 6th April 2017 (V0.2) by National Highways.

6.4.8 Following a February 2018 IDC decision by National Highways to progress both elements of the scheme at the same time, a revisit of the Walsgrave PCF Stage 1 works began in March 2018 by AECOM.

6.5 PCF Stage 1: Walsgrave junction – AECOM

6.5.1 During the development of Binley Preliminary Design (PCF Stage 3) by AECOM, concerns were raised regarding the traffic model and the economic appraisal conclusions derived therefrom.

6.5.2 On 7th March 2018, AECOM was instructed by National Highways to revisit and carry out further analysis of the Walsgrave junction study area at a PCF Stage 1 level of detail.

6.5.3 The National Highways brief identified six junction layouts for Walsgrave junction to be assessed. These layouts were provided as schematics without reference to constraints. These layouts are defined as the six family layouts. They range in a degree of change from Do Nothing, Minor, Modest, and Moderate to Substantial Change i.e. bypass lanes, left in left out, signalised or fully grade separated junctions.

6.5.4 Using the six families, 30 Walsgrave junction layout options were developed and/or considered for PCF Stage 1, including the previous work undertaken by Mouchel. Through rationalisation and Option sifting activities the options were shortlisted down to 10 for further development and assessment.

6.5.5 The following options were selected for further assessment in PCF Stage 1:

Table 6-2 - Options Assessed in PCF Stage 1

Option	Brief Description
1	One-way traffic system on Clifford Bridge Road (70mph)
2	Dedicated bypass southbound (free-flow link) with fly-over northbound (50mph)
3	Signalised T-junction (50mph)
4	Left-in / Left-out (LILO) connection to B4082 (50mph)
5	Compact Grade-separated Junction (fully compact junction) (50mph)
6	Fully Grade-separated Junction (70mph)
7	Left-in / Left-out (LILO) connection to B4082 (tight radii) (50mph)
8	Realignment of A46 Mainline with Left-in / Left-out (LILO) connection to B4082 (70mph)
9	Removal of A46 connection to B4082 (50mph)
10	Removal of A46 connection to B4082, with realignment of A46 Mainline (70mph)

6.5.6 Based on the assessment undertaken, it was concluded that of the 10 options developed, the following should be discounted at PCF Stage 1:

- Option 1 is highly unlikely to be considered favourably by local road users and residents and provides no meaningful benefit to the A46.
- Option 2 has insufficient capacity on the southbound free flow link. The Option also does not fit within the budget.
- Option 3 is not considered practical given the need to have five lanes for A46 traffic at the stop line and the likely safety disbenefits of this traffic merging into two lanes exiting from the junction. It would also not meet the overall scheme objectives of having free flowing traffic on the A46, would severely penalise off-peak journey times and does not fit within the budget.
- Option 4 impacts the existing Western Power Distribution (WPD) electricity assets which would require relocation. This relocation cost is substantial and cannot be afforded within the available project budget.
- Option 5 technically complies with the RIS requirement for “grade-separation”; however, compact arrangement is not suitable for traffic flows on A46 and alignments would encircle Hungerley Hall Farm. It is not affordable within the project budget.
- Options 9 and 10 do not provide any connectivity with the B4082, plus would likely result in significant negative stakeholder reaction due the combination of the removal of the connection to the local network. National Highways want to meet the RIS requirements as far as possible and Options 7 and 8 are superior in this respect.

6.5.7 Thus, Options 7 and 8 were recommended to be carried forward to Stage 2 because they would maintain or better safety by reducing conflicting traffic movements on the A46. Option 6 was carried forward as the only Option complying with the then current RIS scope requirement.

6.6 PCF Stage 2: Walsgrave junction – AECOM

6.6.1 Option 6, 7 and 8 design solutions for Walsgrave junction were originally carried forward into PCF Stage 2.

6.6.2 Following the National Highways Solution Review and Validation Event on 20th May 2021 and work undertaken to that date including traffic and flood modelling alongside environmental assessments, the three options were deemed unviable. Options 7 and 8 were found to have detrimental effects on the local road network. Option 6 was predicted to have significant noise and flooding impacts.

6.6.3 Option 11 was subsequently developed based on previously discounted options re-examined in the light of additional data, modelling and assessments from Options 6, 7 and 8. Option 11 is a grade separated junction approximately 0.8km to the north of the existing roundabout location, with a realigned B4082 connector road connecting back to Clifford Bridge Road. The geometry of which allows a 50mph speed limit on the mainline dual carriageway.

6.6.4 A second National Highways Solution Review and Validation Event was held on 8th September 2021, confirming the viability of Option 11.

6.6.5 Refer to Section 7 of this report for the full summary of the options.

7 Summary of Design & Analysis

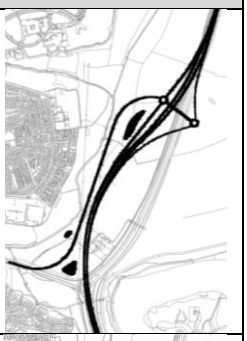
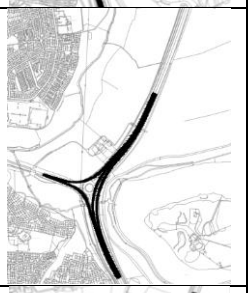
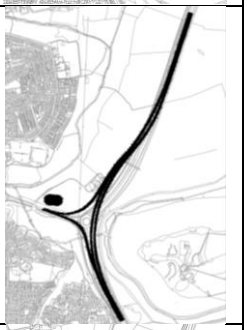
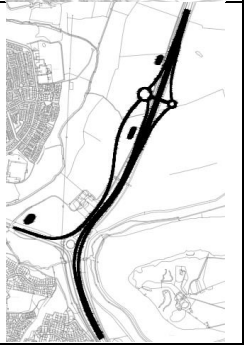
7.1 Engineering Assessment

7.1.1 The following section assesses the engineering aspects and compared the key elements of the four options considered for the Walsgrave Junction Upgrade during PCF Stage 2.

7.2 Options Summary

7.2.1 A summary of the four options identified is provided in Table 7-1 below.

Table 7-1 - Alignment Schematics

Option	Mainline Speed	Short Description	Schematic
6	70mph	Full Grade Separated Junction. 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. A 60mph B4082 connector road also forms part of this proposal.	
7	50mph	Left-In, Left-Out Junction. Option 7 is a left-in / left-out arrangement, allowing merging and diverging from the proposed A46 northbound carriageway. Access / egress to the local road network from the southbound carriageway is removed. The speed limit on the mainline through the junction for this Option is 50mph.	
8	70mph	Left-in, Left-out Junction. Option 8 is also a left-in / left-out arrangement, allowing merging and 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 to allow for a 70mph speed limit on the mainline.	
11	50mph	Full Grade Separated Junction. Option 11 is a grade separated junction approximately 0.8km to the north of the existing roundabout location. The geometry of this Option allows a 50mph speed limit on the mainline dual carriageway. A 60mph B4082 connector road also forms part of this proposal.	

7.2.2 Refer to the A46 Walsgrave Junction (General Arrangements) Drawings in Appendix M for further detail.

7.3 Design Drivers

All Options

7.3.1 All Option designs sought to minimise land take while being safe to construct and maintain.

7.3.2 The constraints that drove the horizontal geometric designs of the A46 and B4082 and junction locations of the options were principally the Coombe Pool SSSI, Hungerley Hall Farm listed buildings, WPD pylons and the flood plain associated with the River Sowe.

7.3.3 In addition to this, the vertical alignments were driven by tie-in requirements, clearance to the WPD overhead power lines, phasing of construction, minimising visual impact and respecting flood levels associated with River Sowe and Coombe Pool.

Option 11

7.3.4 With considerations of the possible future housing development, the dumbbell roundabouts were designed closer together compared to Option 6 to minimise the risk of landtake making the development unviable. The western roundabout was designed to be larger than the eastern one principally in order to accommodate the B4082 arm at an acute angle, further reducing landtake; however, this could passively provide for a fifth arm directly serving the housing development or hospital.

7.3.5 In advance of consultation with Coventry City Council, the design speed for the B4082 connector road was taken as a maximum worst case scenario, on the assumption that the road would be adopted by the local highway authority.

7.3.6 The design of the separation of the B4082 and A46 at their closest approach was driven by maintenance requirements for the anti-dazzle screening/noise bund/safety barrier.

7.4 Drainage

7.4.1 The ground around Walsgrave junction generally falls towards the River Sowe to the west (1), Smite Brook to the southwest (2) and Coombe Pool to the east (3). Two high points are shown, (4) the area north of Coombe Pool (83m AOD) and (5) the Hungerley Hall Farm building area (at 80 m AOD), as shown on Figure 7-1. Walsgrave junction is at 75m AOD.

7.4.2 Coombe Pool is a designated SSSI and an important hydrological feature along the A46 route. The artificial lake was formed in the drowned valley of Smite Brook. Surface water overflows from the Pool and currently drains along the brook to the confluence with the River Sowe, near the B4082, Clifford Bridge Road.

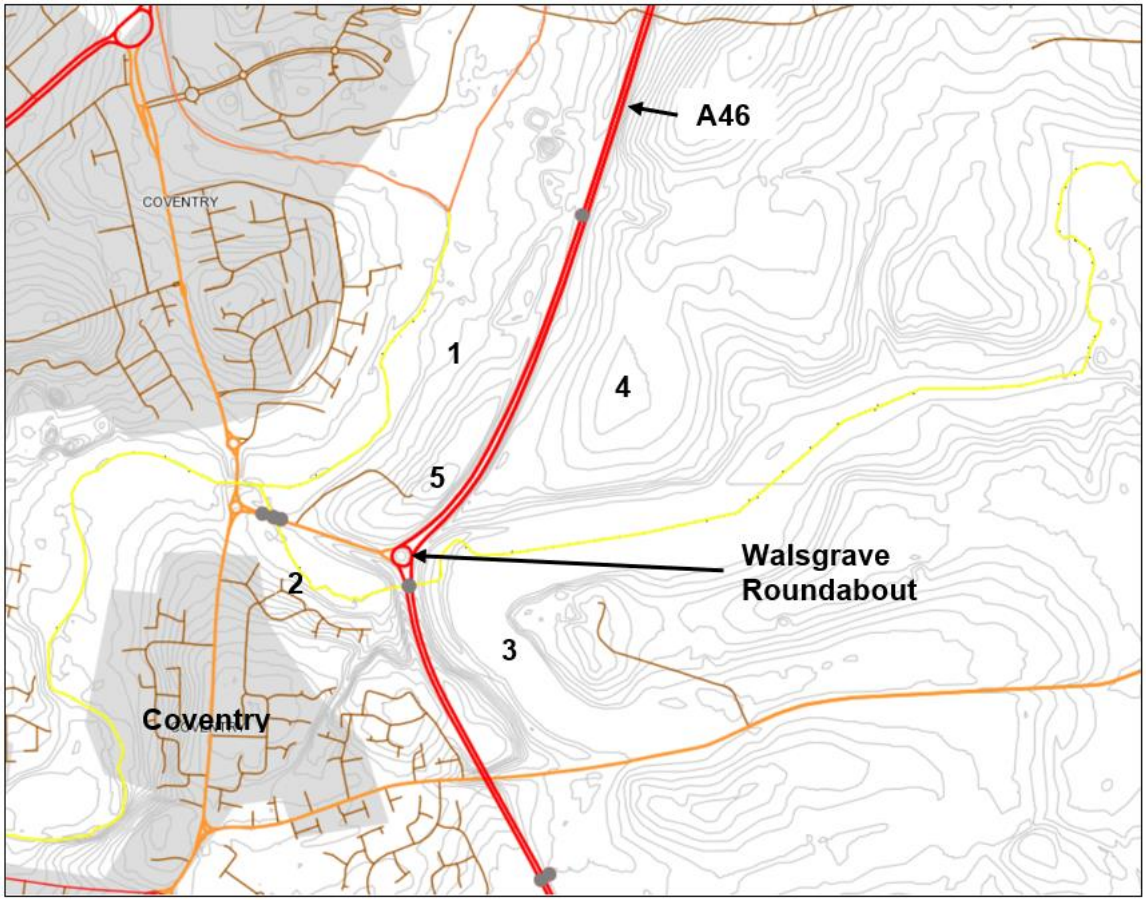


Figure 7-1 - Land, Contours and Watercourses (ref: HADDMS 22nd June 2018)

7.4.3 National Highways Drainage Data Management System (HADDMS) was reviewed. Surface water runoff is collected by gullies that are located around the roundabout and on the approaching roads. Runoff is conveyed to Smite Brook, located some 70m south of the roundabout. The only exception is the B4082 which is drained northwest to the Smite Brook. HADDMS data is covers the A46 and the B4082, up to and including Clifford Bridge Road roundabout. The recorded assets include gullies and catch pits; however, records for the connecting pipework and filter drains are incomplete.

7.4.4 There is a total of four culverts in the area, three crossing the A46 and one crossing the B4082. The culvert crossing the A46 within the works area and the culvert crossing the B4082 can be found on Figure 7-2 below.

7.4.5 Coombe Pool, the River Sowe and Smite Brook are within the Environment Agency (EA) flood zones 2 and 3 with a high risk of flooding. The flood zones can be seen on Figure 7-2 below.

7.4.6 HADDMS reported four flood events, all located in the vicinity of Walsgrave junction. The reasons for the flooding were recorded as defective gullies and drainage leading to standing water on the carriageway. All flooding incidents have been closed.

7.4.7 Flood risk assessment and modelling has been undertaken for the River Sowe and tributes. This shows that in the 1 in 100-year flood event in the baseline case (without the Walsgrave Upgrade), Clifford Bridge Road and the Clifford Bridge Road roundabout would flood.

7.4.8 During PCF Stage 2 National Highways engaged with Coventry City Council who are responsible for the maintenance and operation of the Coombe Pool dam. It was agreed that the two parties would cooperate during the next stages of design development to ensure that the stability of the dam is not affected and that any changes such as to bunding and culverts associated with the A46 consider mutual requirements.

7.4.9 Refer to Road Drainage and Water Environment section of the Environmental Assessment Report in Appendix B for further detail as well as Appendix N for Proposed Drainage Drawings.

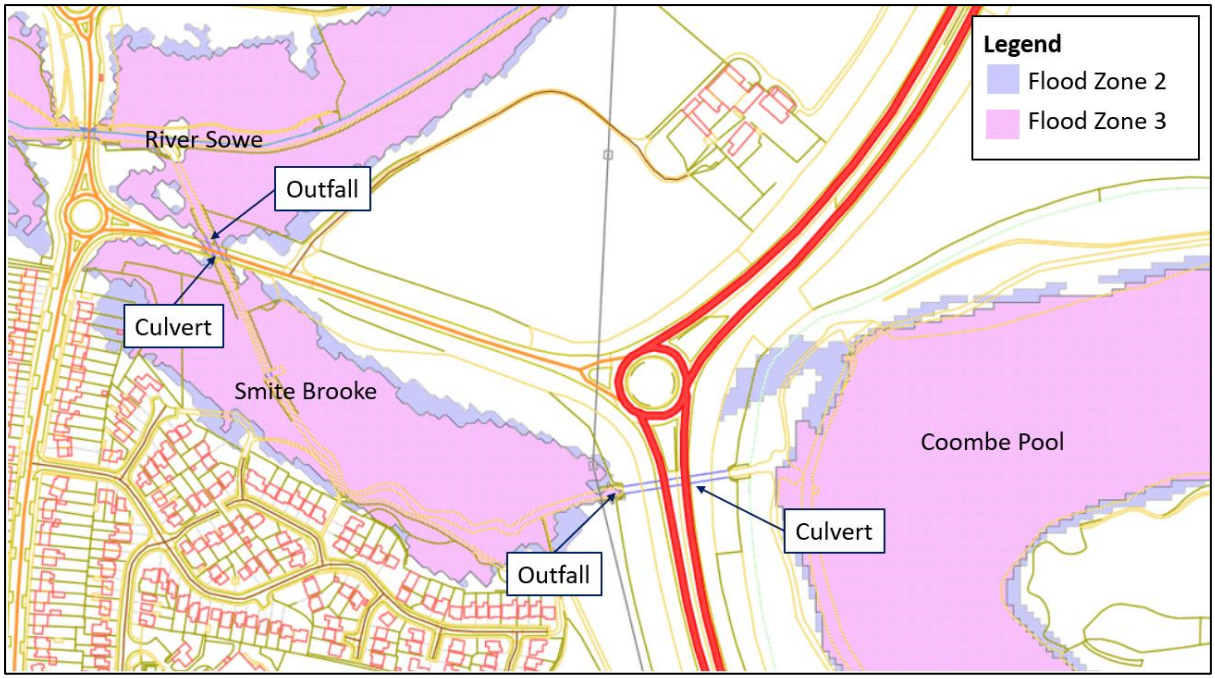


Figure 7-2 - Outfalls, Culverts and Flood Zones (ref: HADDMS 22nd April 2020)

Option 6

7.4.10 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. 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.

7.4.11 The pond volumes 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 would also need to be removed and replaced with in-situ reinforced concrete wingwalls and headwalls.

Option 7

7.4.12 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.

7.4.13 This Option results in a net decrease in impermeable area of 0.1ha, therefore, no additional attenuation is proposed within this drainage design.

Option 8

7.4.14 As part of the drainage strategy, an attenuation pond would be introduced 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. This Option includes an increase in impermeable area of 0.24ha resulting from the realignment of the A46 mainline and the accompanying slip roads.

7.4.15 The pond volumes would 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 would 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.

Option 11

7.4.16 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. This Option includes an increase in impermeable area of 0.35ha resulting from the realignment of the A46 mainline and the accompanying slip roads.

7.4.17 The pond volumes would 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.

7.4.18 No changes are proposed to the existing culverts.

7.4.19 The Drainage Strategy Report (HE604820-ACM-HDG-WAL_SW_000_Z-RP-CD-0001) provides further details regarding all options.

7.4.20 In PCF Stage 2, design has been limited to catchment analysis, with no pipe network design undertaken. However, drainage design representing a high level layout for the network and the attenuation ponds for Options 6, 7, 8 and 11 can be found in drawings:

- HE604820-ACM-HDG-WAL_SW_OP6_Z-DR-CD-0001
- HE604820-ACM-HDG-WAL_SW_OP7_Z-DR-CD-0002
- HE604820-ACM-HDG-WAL_SW_OP8_Z-DR-CD-0002
- HE604820-ACM-HDG-WAL_SW_OP11_Z-DR-CD-0001

Status: 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.

7.5 Structures / Bridges

7.5.1 The following information outlines changes to the existing structures introduced in Section 3. For information regarding changes to the existing culverts, see Section 7.

Option 6
Dumbbell Junction Bridge

7.5.2 The Option 6 junction bridge would be situated approximately 950m to the north of the existing Walsgrave junction. It would carry the dumbbell junction road over both carriageways of the realigned A46 Coventry Eastern Bypass.

7.5.3 The single span overbridge would be composed of a reinforced concrete and steel composite deck. The proposed structure, with a clear span of 40.50m, would be integral with reinforced concrete abutments at either end of the deck, founded on reinforced concrete spread footings. Splayed wingwalls at both the east and west end, to retain the junction and adjacent earthworks would be provided. Three no. pairs of braced girders and a 0.25m thick reinforced concrete slab would make up the deck construction.

7.5.4 The overall width of the cross section would be 17.80m. There would be 2.50m wide verges either side, continuing around the junction, hardened over the structure. The structure would carry the proposed dumbbell junction road, comprising two 3.65m wide lanes, separated by a 2.5m central reserve Vehicular parapets, with mesh facing, would be mounted on both edge beams.

7.5.5 A minimum of 5.30m plus sag curve would be provided beneath the structure as per Section 4 of CD 127.

Hungerley Hall Farm Accommodation Bridge

7.5.6 The Option 6 mainline realignment would make the existing farm access overbridge redundant as the A46 would no longer separate the eastern and western fields of Hungerley Hall Farm, removing the requirement for an overbridge in this location and allowing it to be demolished. However, as the existing A46 is in cutting there would be a potential requirement for earthworks to build up levels and allow connection between the fields depending on future proposals for use of the ex A46 land.

7.5.7 Access for Hungerley Hall Farm would be provided through an access track from the eastern dumbbell roundabout, to the farm and adjacent owned land.

Gantry No.35 (MS3 97/9A) and No.36 (Signal Portal Gantry 98/9A)

7.5.8 The realigned Option 6 alignment would require the removal of gantry no.35. Replacement details would be determined in future PCF Stages.

7.5.9 Gantry no.36 would be unaffected by the Option.

Option 7

7.5.10 No changes would be required to existing structures.

Option 8

Hungerley Hall Farm Accommodation Bridge

7.5.11 The Option 8 mainline realignment would require the existing farm access overbridge to be demolished and relocated 80m south of the existing accommodation bridge.

7.5.12 The single span structure bridge would comprise of a reinforced concrete and steel composite deck, integral with reinforced concrete abutments at either end of the deck and likely to be founded on reinforced concrete spread footings. The structure would have a clear span of 45.50m, with splayed wingwalls at both the east and west end, to retain the adjacent earthworks.

7.5.13 Two pairs of braced girders and a 0.25m thick reinforced concrete slab would make up the deck construction.

7.5.14 The overall width of the cross section would be 9.50m. Over the structure, 0.60m wide verges would run either side and the proposed farm access track would comprise two 3.65m wide lanes without hard strips. 1.80m high vehicular parapets, with mesh facing, would be affixed to both edge beams.

7.5.15 A minimum of 5.30m plus sag curve would be provided beneath the structure as per Section 4 of CD 127.

Option 11

Dumbbell Junction Bridge

7.5.16 The Option 11 junction bridge would be situated approximately 800m to the north of the existing Walsgrave junction. It would carry the junction road over both carriageways of the realigned A46 Coventry Eastern Bypass.

7.5.17 The single span overbridge would be composed of a reinforced concrete and steel composite deck, integral with reinforced concrete abutments at either end of the deck, founded on reinforced concrete spread footings. The structure would have a clear span of 28.90m and splayed wingwalls at both the east and west end, to retain the junction and adjacent earthworks. Three no. pairs of braced girders and a 0.25m thick reinforced concrete slab would make up the deck construction.

7.5.18 The overall width of the cross section would be 17.80m. There would be 2.50m wide verges either side, continuing around the junction, hardened over the structure. The structure would carry the proposed dumbbell junction road, comprising two 3.65m wide lanes, separated by a 2.5m central reserve. Vehicular parapets, preferably with mesh facing, would be affixed to both edge beams.

7.5.19 A minimum of 5.30m plus sag curve needs be provided beneath the structure as per Section 4 of CD 127.

Hungerley Hall Farm Accommodation Bridge

7.5.20 The Option 11 mainline realignment and proposed dumbbell junction provides an opportunity to make the existing farm access overbridge redundant, removing the requirement for a separate accommodation overbridge in this location and allowing it to be demolished. However, this would be subject to continued engagement with the landowner and local highway authority.

7.5.21 Under this proposal, the existing farm access accommodation overbridge would be demolished, and farm vehicle traffic routed to join the B4082 and utilise the proposed dumbbell overbridge to cross the A46, leading to a dedicated farm access from the proposed eastern roundabout.

7.5.22 Travelling from Hungerley Hall Farm, a private access would lead to an at-grade connection to the new B4082. Vehicles using this proposed route would be expected to travel along the new B4082 for approximately 250m, then across the new dumbbell junction overbridge. Private gated access to and from the eastern dumbbell for the user would also be provided. This proposal is shown on Figure 7-3 below.

7.5.23 The existing private access from the current B4082 would be stopped up or repurposed for maintenance activities relating to the B4082 attenuation pond.

7.5.24 Further details on the Hungerley Hall Farm accommodation proposal and alternative solutions, including retention of a private overbridge can be found in the Accommodation Overbridge Technical Note (HE604820-ACM-GEN-WAL_SW_OP11_Z-RP-CH-0001).

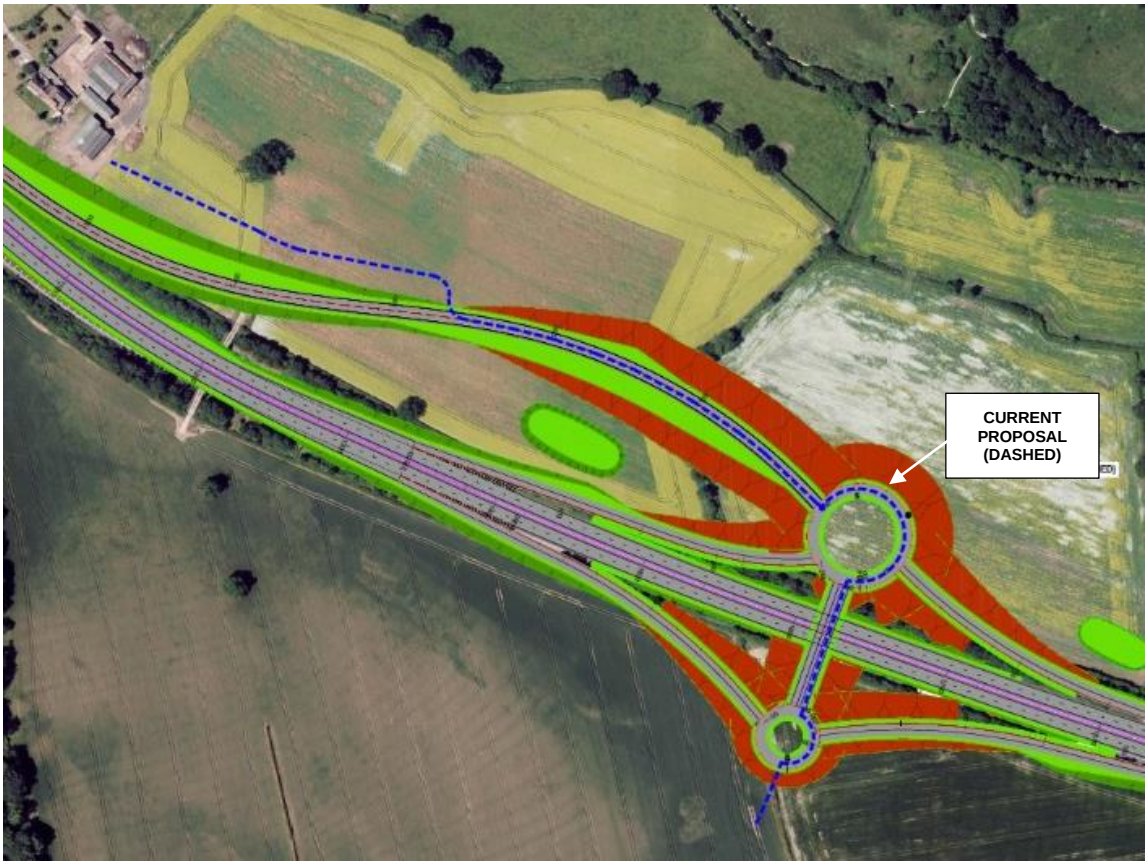


Figure 7-3 - Hungerley Hall Farm Access Route

Gantry No.35 (MS3 97/9A) and No.36 (Signal Portal Gantry 98/9A)

7.5.25 The realigned Option 11 alignment would likely require the removal / relocation of gantry no.35, with requirements to be determined in PCF Stage 3.

7.5.26 Gantry no.36 would be unaffected by the works.

7.6 Lighting

7.6.1 This section summarises the lighting design output for Options 6, 7, 8 and 11 in PCF Stage 2.

7.6.2 The lighting design for the mainline and slip roads has been undertaken to traffic route 'M' Class M3. At present, lighting class information has not been determined so column spacings may be subject to change at subsequent design stages. Where applicable for the highway design Option, the corresponding conflict area 'C' lighting class C2 has been used at the junctions.

7.6.3 The extent of the conflict area is defined by TD501 regarding SSD and defines the lighting class changeover from M3 to C2.

7.6.4 The majority of lighting on the mainline dual carriageway for all options would be central reserve mounted column with twin bracket and lantern arrangement. The lighting columns would require a concrete barrier with a base width of 942mm and a top cap width of 600mm for mounting purposes.

7.6.5 Where possible, the lighting columns at the junction would avoid the structures, but this is subject to the optimal column spacing that can be achieved here. If lighting on the structure cannot be completely designed out, then shallow bridge deck sockets would be proposed for these locations.

7.6.6 The lighting in the area of the 132kV overhead power lines would require further design in future stages. The DNO would need to be consulted to ensure the required clearance from the overhead power lines can be achieved.

7.6.7 Refer to the Lighting Design Report (HE604820-ACM-HLG-WAL_SW_000_Z-RP-EO-0001).

Option 6

7.6.8 The lighting proposal for Option 6 is that lighting would be provided along the mainline and at the junction on the roundabouts and slip roads, in line with National Highways requirements.

7.6.9 Lighting would also be employed for the entire length of the proposed B4082 connector road that would join into the western roundabout, with conflict area lighting at least to the 5 seconds travel time (taken from PLG02) away from the roundabout.

7.6.10 The safe sight stopping distance would be 295m for the 70mph sections.

7.6.11 A conflict area ‘C’ Class would be proposed for the upper grade of the separated junction, including the two roundabouts and the upper end of the slip road approaches. Conflict area extents for the National Highway roads are prescribed by the relevant SSD of 295m.

7.6.12 The lighting for the roundabout would need to be sensitively considered given the roundabouts location at the top of raised embankment areas. Luminaires with a Luminous Intensity Class of G6 would be utilised to minimise lighting glare for drivers on the A46 mainline.

7.6.13 Although lighting at the roundabouts would be elevated, light spill mitigation would be employed here.

7.6.14 Provision of lighting in Option 6 would keep more intense light sources further away from the woodland area and SSSI. The full mainline would be lit adjacent to the SSSI; however, this Option would have the potential to improve the current light spill, as the existing columns which provide a high level of lighting at the conflict area of Walsgrave junction would be removed as part of the clearance works, and more efficient directional LED lighting would be employed at the merge/diverge and through the mainline.

7.6.15 The lighting would extend to Binley interchange which falls at the limit of the 4xSSD (1180m) from the southern slip roads of Option 6. Due to the proximity of lighting at the approach to the M6/M69 junction to the north, lighting would need to be provided to infill the distance which is also less than 4xSSD. This means lighting would be in place from the M6/M69 junction to Binley junction.

7.6.16 The lighting design for this Option can be found in drawings:

- HE604820-ACM-HLG-WAL_SW_OP6_Z-DR-EO-1301
- HE604820-ACM-HLG-WAL_SW_OP6_Z-DR-EO-1302
- HE604820-ACM-HLG-WAL_SW_OP6_Z-DR-EO-1303
- HE604820-ACM-HLG-WAL_SW_OP6_Z-DR-EO-1304

Option 7

7.6.17 The full extents of Option 7 fall under an 'M' Class for traffic routes. Both the mainline dual carriageway and one-way slip roads would be lit to this class.

7.6.18 It is not foreseen that any area of this proposal would require to be lit to a Conflict Area lighting class as there is no conflict between road users.

7.6.19 Currently the A46 mainline is unlit. In addition to the mainline being lit, the junction slip roads areas would be lit through the extents of the junction from the southern slip road through to the northern slip road.

7.6.20 The lighting would be arranged single sided on the slip roads, set back in the verges and through the extents of and leading into the junction to ensure that any lane changes are illuminated according to requirements set out in BS5489 and BS EN13201.

7.6.21 This Option would however put the lighting columns close to the SSSI, an area where light spill and intrusion may pose environmental concerns.

7.6.22 The lighting would extend to Binley junction south of the existing roundabout past the SSSI, whereas currently it extends to less than 100m from the roundabout. This would ensure that the lighting covers the 4xSSD as outlined in TD501. Lighting would not be required further north than the 160m SSD of the northern slip road.

7.6.23 The lighting design for this Option can be found in drawings:

- HE604820-ACM-HLG-WAL_SW_OP7_Z-DR-EO-1301
- HE604820-ACM-HLG-WAL_SW_OP7_Z-DR-EO-1302

7.6.24 The mainline carriageway follows to the alignment proposed under Option 7 and has a tighter radius than alternative options (Options 6 and 8). As such, the speed limit on the proposed mainline is 50mph. The SSD employed for 50mph roads is 160m.

Option 8

7.6.25 Option 8 would have a larger A46 alignment radius allowing a speed limit of 70mph. Lighting provision for the northbound merge would be in very close proximity to the remaining buildings at Hungerley Hall Farm; however, since this Option would require demolition of the residential farmhouse the impact of lighting on the farm would be reduced.

7.6.26 The SSD for this Option would be 295m.

7.6.27 The mainline A46 is currently unlit. In addition to the proposed mainline being lit, the junction slip roads would be lit through the extents of the junction from the southern slip road through to the northern slip road.

7.6.28 The lighting would be arranged with single sided on the slip roads set back in the verges and through the extents of and leading into the junction to ensure that any lane changes are illuminated according to requirements set out in BS5489 and BS EN13201.

7.6.29 Although this Option has a greater A46 radius, the proposals would still put the lighting columns close to the SSSI, an area where light spill and intrusion may pose environmental concerns. The lighting would extend to Binley junction, the extents of which fall within the 4xSSD where continuous lighting is required. This would extend past the SSSI, whereas currently it extends to less than 100m from the roundabout. The lighting would extend to the northern tie-in with the M6/M69 junction, where the lighting would falls within the 4xSSD. Therefore, lighting would be required through the entire design Option from the M6/M69 junction to Binley junction.

7.6.30 The lighting design for this Option can be found in drawings:

- HE604820-ACM-HLG-WAL_SW_OP8_Z-DR-EO-1301
- HE604820-ACM-HLG-WAL_SW_OP8_Z-DR-EO-1302
- HE604820-ACM-HLG-WAL_SW_OP8_Z-DR-EO-1303

7.6.31 The lighting on the mainline would be designed to an 'M' Class for traffic routes. The one-way slip roads would also be lit to this classification of lighting.

Option 11

7.6.32 Option 11 lighting would be provided along the A46 mainline with twin arm columns set in the central reserve, changing to single arm where the reserve widens. Lighting would also be provided on the slip roads and twin roundabouts of the dumbbell.

7.6.33 Provision of lighting on the slip roads would be from the verge.

7.6.34 Light spill mitigation measures would be employed at the elevated area of the junction. Luminaires selected for use here would have a Luminous Intensity Class of G6.

7.6.35 The lighting in the area of the 132kV overhead power lines has been proposed as 6m in height, using a different version of the TRT Aspect luminaire. The DNO would need to be consulted to ensure the required clearance from the overhead power lines can be achieved. The proposal uses a 15m staggered arrangement.

7.6.36 The lighting around the overbridges on the mainline would make use of twin arm 6m columns, with the column spacing reduced to 26m.

7.6.37 The lighting would extend to Binley junction which would fall at the limit of the 4xSSD unlit sections (1180m – on approach to the 70mph section of the A46) from the southern merge slip roads of Option 11. Due to the proximity of lighting at the approach to the M6/M69 junction to the north, lighting would also need to be provided to infill the distance which is also less than 4xSSD unlit sections both for 50mph (640m) and 70mph (1180m). This means lighting would be in place from the M6/M69 junction through Option 11 to Binley junction.

7.6.38 The lighting design for this Option can be found in drawings:

- HE604820-ACM-HLG-WAL_SW_OP11_Z-DR-EO-1301
- HE604820-ACM-HLG-WAL_SW_OP11_Z-DR-EO-1302
- HE604820-ACM-HLG-WAL_SW_OP11_Z-DR-EO-1303
- HE604820-ACM-HLG-WAL_SW_OP11_Z-DR-EO-1304

7.6.39 Refer to Appendix O for further details.

7.7 Technology

7.7.1 The deployment of new technology equipment, systems and infrastructure is not required by DMRB standards for the options as they do not meet the defined requirement criteria within DMRB. However, it should be noted that the inclusion of new technology equipment, systems and infrastructure can be undertaken by specific instruction of the Overseeing Organisation.

7.7.2 No technology design was been undertaken in Stage 2.

Status: 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 in Appendix P for further details.

7.8 Lay-by and Maintenance Hardstandings

7.8.1 Parking laybys are currently located on the northbound and southbound carriageways of the A46 mainline between the existing Walsgrave junction and the M6/M69 junction. These can be seen on Figure 7-4. This section summarises the effects on these laybys of Options 6, 7, 8 and 11.

Option 6

7.8.2 Option 6 would remove both lay-bys north of the existing Walsgrave roundabout.

7.8.3 The proposed new junction would reduce weaving lengths below 2km between:

- The proposed Walsgrave junction northbound merge and existing M6/M69 junction northbound diverge; and
- The existing M6/M69 junction southbound merge and the proposed Walsgrave junction southbound diverge.

7.8.4 This Option would not provide sufficient road chainage to replace these lay-bys whilst meeting weaving length requirements. In order to provide replacement non-emergency stopping areas a departure on both carriageways would be required.

7.8.5 On the southbound carriageway, positioning of a non-emergency stopping area (between Walsgrave and Binley junction, with 1km weaving length from the Binley junction southbound diverge) would also require a departure. Additionally, the SSSI and Brinklow Road overbridge would further hinder lay-by placement.

7.8.6 Due to the close proximity of Tollbar End, Binley, Walsgrave (Option 6) and M6/M69 junctions along the 7km stretch of the A46, this section of the network is already subject significant levels of driving weaving and situating a lay-by in this area would pose additional safety concerns.

7.8.7 Thus, Option 6 would not include for the reprovision of new lay-bys on either the northbound or southbound A46 carriageway.

Option 7

7.8.8 Following the introduction of the proposed Option 7 northbound merge, the weaving length between the merge and the existing northbound lay-by would be reduced from approximately 0.9km to 0.6km. This is below the 1km requirement and would hence require a departure if retained. However, the existing southbound lay-by could remain without a departure, as the connection to the B4082 is removed avoiding weaving length issues.

7.8.9 The replacement of lay-by on the northbound carriage to provide a non-emergency stopping area between Walsgrave and the M6/M69 junction may be possible subject to providing tolerable (but below standard) weaving length between the proposed Walsgrave northbound merge and existing M6/M69 junction northbound diverge (which are approximately 1.85km apart) and undertaking SSD checks. A departure would be required due to the insufficient weaving distance between the lay-by and Walsgrave northbound merge, and between the lay-by and M6/M69 northbound diverge. A proposed location can be seen on Figure 7-4.

7.8.10 It would not be possible to replace this lay-by on the northbound carriageway south of Walsgrave junction due to the proximity of the Binley northbound merge and proposed Walsgrave northbound diverge.

Option 8

7.8.11 With the introduction of the proposed Option 8 alignment, the weaving length between the northbound merge lane and the existing lay-by would be reduced from approximately 1km to 0.5km. This is below the 1km requirement. However, the existing southbound lay-by could remain, as the connection to the B4082 is removed, therefore no weaving length issues arise.

7.8.12 The replacement of the lay-by on the northbound carriage to provide a non-emergency stopping area between Walsgrave and the M6/M69 junction may be possible subject to providing tolerable weaving length between the proposed Walsgrave northbound merge and existing M6/M69 junction northbound diverge (which are approximately 1.85km apart) and undertaking SSD checks. A departure from standard would be required due to the insufficient weaving distances between the Walsgrave northbound merge and the lay-by, and again between the lay-by and M6/M69 northbound diverge. A proposed location can be seen on Figure 7-4.

7.8.13 It would not be possible to replace this lay-by on the northbound carriage south of Walsgrave junction due to the proximity of the Binley northbound merge and proposed Walsgrave northbound diverge.

Option 11

7.8.14 Option 11 would remove both lay-bys north of the existing Walsgrave roundabout. The proposed new junction would reduce weaving length below 2km between:

- The proposed Walsgrave junction northbound merge and existing M6/M69 junction northbound diverge; and
- The existing M6/M69 junction southbound merge and the proposed Walsgrave junction southbound diverge.

7.8.15 This Option would not provide sufficient road chainage to replace these lay-bys whilst meeting weaving length requirements. In order to provide replacement non-emergency stopping areas a departure on both carriageways would be required.

7.8.16 The Option 11 A46 mainline radius would be two steps below standard and therefore positioning of a non-emergency stopping area (between Binley and Walsgrave junction, with 1km weaving length from the Binley junction northbound merge) would require a departure.

7.8.17 On the southbound carriageway, positioning of a non-emergency stopping area (between Walsgrave and Binley junction, with 1km weaving length from the Binley junction southbound diverge) would require a departure. Additionally, the SSSI and Brinklow Road overbridge would further hinder lay-by placement.

7.8.18 Due to the close proximity of Tollbar End, Binley, Walsgrave (Option 11) and M6/M69 junctions along the 7km stretch of the A46, this section of the network is already subject significant levels of driving weaving and situating a lay-by in this area would pose additional safety concerns.

7.8.19 Thus, Option 11 would not include for the reprovision of new lay-bys on either the northbound or southbound A46 carriageway.

All Options

7.8.20 For all options it would be practical for the inclusion of maintenance hardstandings within the project extents to service existing and proposed infrastructure such as:

- The existing culvert south of the current Walsgrave roundabout;
- The existing overhead pylon adjacent (west) of the current Walsgrave roundabout;
- The proposed A46 mainline overbridge providing connection of the dumbbell roundabouts;
- Attenuation pond; and
- The existing accommodation overbridge (if retained) / A new accommodation overbridge connecting to Hungerley Hall Farm (if required).

7.8.21 The proposed position of maintenance hardstandings for all options can be seen in Figure 7-4 below.

7.8.22 Emergency stopping areas are not deemed required at this stage due to the nearest stopping provisions listed above in this section and the close proximity of Tollbar End, Binley, Walsgrave and M6/M69 junctions. These junctions provide opportunities for vehicles to leave the A46 mainline.

7.8.23 See the Lay-by and Maintenance Hardstanding Technical Note (HE604820-ACM-HGN-WAL_SW_000_Z-RP-CH-0003) for further details. For information regarding maintenance considerations in PCF Stage 2, see the Maintenance and Repair Statement (HE604820-ACM-HGN-WAL_SW_000_Z-RP-CH-0002).

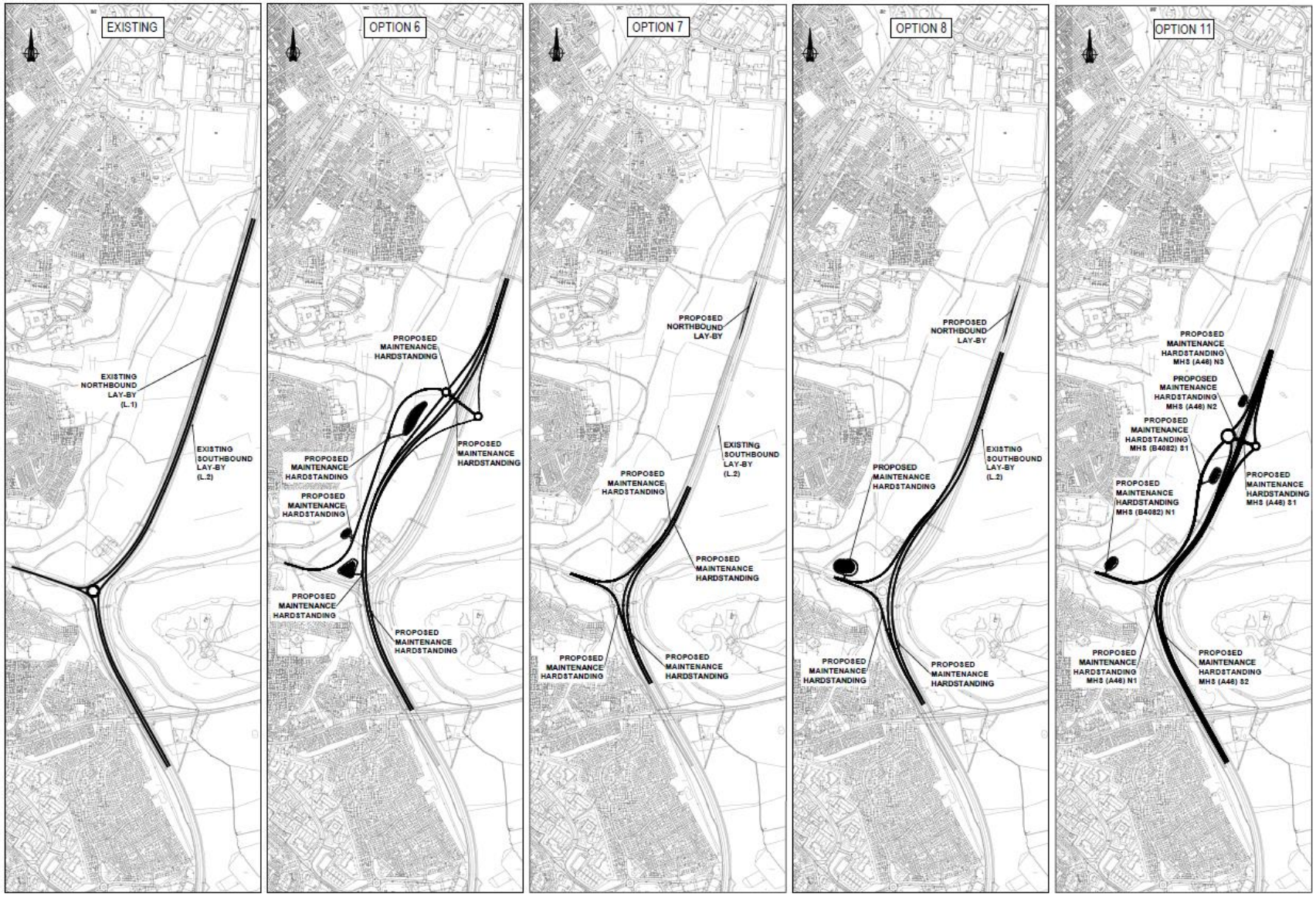


Figure 7-4 - Proposed Non-Emergency Stopping Areas and Maintenance Hardstanding Locations

7.9 Departures

7.9.1 The Departures from Standards Checklist (HE604820-ACM-HGN-WAL_SW_000_Z-RP-CH-0004) provides details on why it was required to depart from standards for each recorded departure.

7.9.2 In the checklist the departures listed by their location and type and, where appropriate, are classified in terms of their design steps below the relevant desirable minimum standard. Justification and mitigation associated with each departure is given to provide an understanding of its requirement and impact, as well as listing any constraints that influence provision of a compliant design.

7.9.3 Permitted relaxations used within the project are not shown in the below tables, only those elements where the number of design steps below the desirable minimum constitute a departure from standards.

7.9.4 The Departures from Standards Checklist (HE604820-ACM-HGN-WAL_SW_000_Z-RP-CH-0004) lists both departures which are highlighted and relaxations which are provided for information purposes only.

Option 6

7.9.5 For Option 6 the following design speeds have been applied to the project:

- A46 Mainline – 120kph
- A46 Merges and Diverges – 70kph
- A46 Overbridge – 100kph
- B4082 Connector Road – 100kph

7.9.6 Table 7-2 below summarises the number of departures by type and applicable design standard. Refer to the Departures from Standards Checklist for an overview of the departure locations in plan. For information, the departures have been split and included individually for Lane 1 and Lane 2 as well as northbound and southbound travel.

Table 7-2 - Option 6 Departures Summary

	CD 109	CD 122	Total
MAINLINE			
Horizontal Geometry	1		
Stopping Sight Distance	6		
Combination (Vertical Curve and Stopping Sight Distance)	9		
Weaving Length		2	
Sub-Total:	16	2	
JUNCTION			
Stopping Sign Distance	3		
B4082 CONNECTOR ROAD			
Horizontal Geometry	3		
Total:	**23**	**2**	**25**

Option 7

7.9.7 For Option 7 the following design speeds have been applied to the project:

- A46 Mainline – 85kph
- A46 Merges and Diverges – 60kph

7.9.8 Table 7-3 below summarises the number of departures by type and applicable design standard. Refer to the Departures from Standards Checklist for an overview of the departure locations in plan.

Table 7-3 - Option 7 Departures Summary

	CD 109	CD 122	Total
MAINLINE			
Weaving Length	1		
JUNCTION			
Diverge Layout		1	
Total:	**1**	**1**	**2**

Option 8

7.9.9 For Option 8 the following design speeds have been applied to the project:

- A46 Mainline – 120kph
- A46 Merges and Diverges – 70kph

7.9.10 Table 7-4 below summarises the number of departures by type and applicable design standard. Refer to the Departures from Standards Checklist for an overview of the departure locations in plan.

Table 7-4 - Option 8 Departures Summary

	CD 109	CD 122	Total
MAINLINE			
Stopping Sight Distance	2		
Combination (Vertical Curve and Stopping Sight Distance)	4		
Combination (Vertical Curve and Stopping Sight Distance)	1		
Weaving Length	1		
Sub-Total:	8		
JUNCTION			
Diverge Layout		1	
Stopping Sight Distance	3		
Sub-Total:	3	1	
Total:	**11**	**1**	**12**

Option 11

7.9.11 For Option 11 the following design speeds have been applied to the project:

- A46 Mainline – 85kph
- A46 Merges and Diverges – 60kph
- A46 Overbridge – 100kph
- B4082 Connector Road – 100kph

7.9.12 Table 7-5 below summarises the number of departures by type and applicable design standard. Refer to the Departures from Standards Checklist (HE604820-ACM-HGN-WAL_SW_OP11_Z-RP-CH-0101) for an overview of the departure locations in plan.

Table 7-5 - Option 11 Departures Summary

	CD 109	CD 122	Total
MAINLINE			
Weaving Length (GEO-01 and GEO-02)		2	
JUNCTION			
Diverge Layout (GEO-03, GEO-04, GEO-05 and GEO-06)		4	
Vertical Geometry (GEO-07 and GEO-08)	2		
Sub-Total:	2	4	
B4082 CONNECTOR ROAD			
Horizontal Geometry Vertical Geometry (GEO-09 and GEO-10)	2		
Total:	**4**	**6**	**10**

7.10 Programme Outline

7.10.1 Refer to Table 7-6 below for PCF stage start and end dates extracted from programme submission MP_0418_CL32 01032022 (WD-2) submitted on 28th January 2022 (accepted 10th February 2022).

Table 7-6 - PCF Stage Start and End Dates

PCF Stage	Start	End	Duration
3	Aug 2022	Jan 2024	18 Months
4	Jan 2024	May 2025	17 Months
5	May 2025	Oct 2025	6 Months
6	Oct 2025	Mar 2027	18 Months
7	Mar 2027	Mar 2028	12 months

7.11 Buildability Assessment

7.11.1 In PCF Stage 2, AECOM appointed Osborne to undertake a buildability assessment for all options.

7.11.2 This assessment included the production of construction programmes. The programme calendar was based upon 5 day/week 8 hrs/day working and all UK holidays and the following assumptions were made within all the programmes:

- The statutory undertaker's lead-in periods will have been completed to allow diversion works to start on site as per each programme.
- The site clearance works will have been completed to allow works to progress. This is particularly important when seasonal constraints such as nesting birds are considered. This risk may be mitigated by undertaking the site clearance works in advance of DCO provided suitable provisions are made in the draft of the DCO.
- That an adequate period has been allowed for mobilisation and in particular to enable long lead-in item procurement.
- That two lanes of traffic in all directions on the A46 mainline must be provided at peak times.

7.11.3 The construction durations provided below are the periods for site works, additional durations will need to be considered for enabling works, mobilisation and for documentation closeout.

- Option 6 - 90 weeks
- Option 7 - 73 weeks
- Option 8 - 67 weeks
- Option 11 - 68 weeks

7.11.4 The construction programmes for the options are provided in the Buildability Report (HE604820-ACM-GEN-WAL_SW_000_Z-RP-XX-0001).

7.11.5 Option 11 has five key phases and a brief commentary on the construction phasing for this Option is shown below:

- **Phase 1** - Slip Roads - Build the 4 new interchange slip roads (without the roundabouts) and joining them up as through roads.
- **Phase 2** - Overbridge and A46 - Put the A46 traffic onto the slip roads as temporary A46. This will retain two lanes in each direction. This allows the overbridge to be built and the A46 to be reconstructed between Ch.1400 and 2050. Once the A46 has been reconstructed and the bridge built up to deck level move the traffic back onto the A46 and build the new roundabouts.
- **Phase 3 (runs concurrently with Phase 1 and 2)** - B4082 Link Road – Build the new B4082. The farm accommodation bridge will be demolished toward the end of the B4082 link road construction. There will be short period (approx. 4 weeks) where the farmer will be required to access the fields to the east of the A46 via the mainline A46. Temporary mitigations to may be possible subject to discussions with the farmer. The new interchange and B4082 link road will then be opened.

- **Phase 4** - A46 - Construct temporary carriageway across the existing Walsgrave roundabout to allow continuous dual two-lane traffic. Build the new southbound off-line A46 between Ch.650 and 1050. Once traffic is using the new interchange and B4082, build the new northbound section between CH650 and 1050.
- **Phase 5** - A46 - Re-construct the A46 between Ch.400 and 650 at nights for the central reserve and at weekend closures for the new carriageway. Re-construct the A46 between Ch.1050 and 1400 at nights for the central reserve and at weekend closures for the new carriageway. Remove the existing roundabout.

7.11.6 Phasing diagrams for all options and the proposed temporary traffic management layouts required can be found in the Buildability Report. Refer to Appendix Q for further detail.

7.11.7 Each of the options require installations of narrow lanes in contraflow, off peak closures of the A46 / B4082 and full weekend closures. The table below summarises the duration / number of each of these types of closures based on the proposed programmes for each Option.

Table 7-7 Summary of TM requirements

	Units	Option 6	Option 7	Option 8	Option 11
Narrow Lanes	Calendar Days	404	323	310	300
No right hand turning	Calendar Days	0	225	225	0
2-way Contra-Flow	Calendar Days	272	205	158	47
Off peak A46 Carriageway closure	Night Shifts	15	0	0	0
Off peak B4062 Carriageway closure	Night Shifts	10	256	181	5
Full weekend closure of the A46 highway	Number	20	20	8	20

7.11.8 Full weekend closures are required to safely construct and demolish bridge structures over live carriageway or to construct overlaid sections of carriageway which require full depth reconstruction. Some of these closures may be mitigated by overlaying the existing carriageway rather than reconstructing. This opportunity has been captured on the project risk register. Opportunities for mitigation which will be pursued at later stages include obtaining a departure from standard for omission of cement bound sub-base, completing additional Site Investigation to reduce full depth reconstruction areas and further vertical alignment optimisation.

7.11.9 During full closures of a carriageway, diversion routes will be in place.

7.11.10 The proposed location of the site compound for Option 11 is shown below.

Figure 7-5 Option 11 Site Compound Location

7.11.11 The site compound for Option 11 will be accessible off the B4082 throughout the construction phase, utilising the existing farm access. It is assumed that this compound and its access will be allowable under permitted developments and therefore no programme time has been allocated to obtain S278 agreements.

7.11.12 The access to Hungerley Hall Farm should be unaffected by construction works for Option 11.

7.11.13 The proposed site compound locations for Options 6, 7 and 8 can be found in the Buildability Report.

7.11.14 The buildability assessment undertaken includes Environmental Mitigation methods relating to the following:

- Badger, bat and other protected species
- Bird nesting constraints
- Water Course Protection and culvert impacts
- Environmental and ecological consents / constraints
- Noise nuisance management and local constraints
- Asbestos

7.11.15 Full details of these and the requirements in relation to each Option can be found in the Buildability Report. Additionally, for information on the Planning Licences and Consents noted for each Option also see this report. These licences and consents relate to the following:

- Site Compound
- Permission to demolish a listed building (Option 8)
- Permission to work in the flood zone (Option 6 and 11)
- Permission to work in a water course
- SSSI

7.12 Environmental Assessment

Environmental Assessment Report

7.12.1 The EAR presents a thorough description of the environmental effects predicted at this stage of design. A summary of the EAR is presented below for ease of reference in this SOAR. This summary is inherently focussed on key issues and potentially significant effects; it does not identify all environmental aspects or impacts if, for example, the EAR concluded they would be insignificant.

7.12.2 The scope of the environmental assessments in the EAR reflects the approach set out in the Scoping Report (HE604820-ACM-EGN-WAL_SW_000_Z-RP-LE-0001). Site visits and surveys were carried out between February and September 2021 to inform the assessments of the potential impacts on biodiversity, landscape and visual and the road drainage and water environment.

7.12.3 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.

Do-Minimum

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

Do-Something

7.12.5 Four options are being considered and have been assessed for the upgrade to Walsgrave junction at this Option selection stage.

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

7.12.6 Further detail is provided in the EAR. The proposed scheme boundary 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).

7.12.7 See Section 5 for information on the footprint of Options 6,7,8 and 11.

Option 6

Construction

7.12.8 Land would be required from the curtilage of Hungerley Hall Farm and whilst it would not require the demolition of any of its three listed buildings, the new road alignment immediately adjacent to the western side of the three Grade II listed assets would detract from their setting through the scale and proximity to this out of character infrastructure within their setting. This is considered to be a moderate impact, which would result in a large adverse effect (construction), which is significant.

7.12.9 Permanent heritage construction phase effects would be anticipated in relation to the physical presence of the proposed scheme. This is considered to be a moderate impact, which would result in a large adverse effect, which is significant.

7.12.10 The Grade II listed assets at Hungerley Hall Farm would be impacted by significant construction traffic in very close proximity during construction of the new road alignment. This proximity would carry the risk of vibration impacts, as well as noise and views of construction traffic. This is considered to be a minor impact, which would result in a moderate adverse effect for the duration of the construction period. This is significant.

7.12.11 There would be the potential for significant construction noise and vibration effects on nearby residential properties and Hungerley Hall Farmhouse. Construction traffic noise was not assessed.

7.12.12 The severance from the road network of Hungerley Hall Farmhouse would result in large adverse permanent effects with a moderate adverse permanent effect on Hungerley Hall Farmhouse in terms of residential access.

7.12.13 This Option would bring infrastructure closer to and within the flood plain of the River Sowe. As a result of the large land take required and its position closer to the River Sowe, very large adverse visual effects would be predicted during construction on residential receptors at the southern end of Fontmell Close/ Abbotsbury Close, and residential receptors at Hungerley Hall Farm Grade II Listed Building. Large adverse visual effects during construction would be predicted on residential receptors at the northern end of Fontmell Close/ Abbotsbury Close and moderate adverse visual effects during construction would be predicted on recreational receptors in the River Sowe open space.

7.12.14 The large land take and requirement to remove the existing overbridge would also result in a moderate adverse permanent effect due to habitat loss and severance (local to county scale) with direct mortality and loss of wildlife corridor (local to county scale) and there would be the potential for moderate adverse effects (significant) on Coombe Pool SSSI and broad leaved semi-natural woodland in the short term which would be expected to reduce to not significant in the long term. This habitat loss and severance would be predicted to result in major adverse impacts on bats which is significant.

7.12.15 It is assumed that during construction, standard measures to minimise and manage impacts in relation to the water environment would be implemented. There would be the potential for moderate adverse temporary effects on water quality within the River Sowe and Smite Brook through the widening of the River Sowe Channel, and the extension to the Smite Brook culvert. No significant groundwater effects have been highlighted during the construction phase.

7.12.16 Constructing the western ramp would involve lowering the ground level to below the existing level of the riverbank whilst constructing the northern end would involve raising ground levels within the floodplain. This would result in a major adverse impact on site and a moderate impact off site and the unmitigated effect would therefore be 'very large' for the site and 'large or very large' for off-site areas (significant). There are a number of potential mitigation measures which could be explored to reduce the impact 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 and potential impact on other environmental factors.

Operation

7.12.17 A moderate adverse effect on Coombe Abbey Grade II* RPG would be predicted due to 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. Traffic and noise changes would not be anticipated to result in further impacts to this asset.

7.12.18 During operation, the realigned A46 and the associated slip roads and realignment of the B4082 would be visible to residential receptors at Hungerley Hall Farm, resulting in a moderate permanent adverse visual effect on residential receptors at Grade II Listed Hungerley Hall Farmhouse.

7.12.19 There would be a risk of major adverse effects on bats, barn owl and riparian mammals as a result of the extensive new offline road alignment impeding movement of the species across the landscape and risk of species collision with operational traffic.

7.12.20 B4082 traffic would run further away from properties located to the south-west of the junction; however, traffic would run closer to Dorchester Way resulting in noise increases. Traffic noise would move from the rear to the front of Hungerley Hall Farmhouse. As a result of traffic noise, significant adverse effects would be likely to occur at approximately 66 noise sensitive receptors (NSRs) located to the south-west of the junction, and 45 residential properties would be predicted to experience moderate and major increases in traffic noise. Although the proposed realigned A46 carriageway would be in cutting for much of the section south of the existing junction, it would be higher than its current position as it would rise to cross the existing roundabout on embankment, resulting in an increase in traffic noise levels in this area.

7.12.21 Significant adverse effects would also be likely to occur at Hungerley Hall Farmhouse which is predicted to experience a major increase in traffic noise due to the realignment of both the A46 and B4082 closer to the front of the property.

7.12.22 Significant adverse effects would also likely occur at approximately 157 NSRs located in the vicinity of Dorchester Way. This includes moderate increases in traffic noise at Pearl Hyde School and University Hospital and 113 residential properties in Dorchester Way, Sturminster Close, Fontmell Close, Abbotsbury Close, Bridport Close, Bracadale Drive and Wimborne Drive. These NSRs would have a direct line of sight to both the realigned A46, B4082 and new dumbbell junction, all of which would move traffic noise closer to these properties.

7.12.23 The significant adverse effects 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.

7.12.24 There would be a moderate adverse effect on hydromorphology due to the loss of floodplain connectivity of the River Sowe and increased risk of scour within the River Sowe channel from constriction of flood flows. Re-engineering of the River Sowe would also be required locally to enhance flood storage, whilst maintaining conveyance. Channel widening would result in a major adverse impact and a moderate or large effect which is significant. The proposed scheme would include attenuation ponds providing water quality mitigation, and there would be an opportunity to undertake additional mitigation of existing Priority Outfalls, which is considered a minor beneficial impact, resulting in a slight beneficial effect (which is not significant).

Option 7

Construction

7.12.25 Option 7 would require the least land take of all four do-something options, being mostly along the alignment of the current A46; however, some temporary land take would be required along the boundary of the Coombe Pool SSSI. 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, plus earthworks and vegetation removal to the localised realignment of the sections of the A46 western boundary and B4082. Large visual effects would be likely during construction on the residential receptor at the Grade II Listed Hungerley Hall Farmhouse, with Moderate visual effects during construction on recreational receptors in Gainford Rise Open Space, Binley and residential receptors at southern end of Fontmell Close/ Abbotsbury Close.

7.12.26 There would be for potential for a moderate adverse effect (significant) on Coombe Pool SSSI and associated broad-leaved semi-natural woodland in the short term due to temporary landtake, reducing to not significant in the long term.

7.12.27 There would be potential for significant construction noise and vibration effects on nearby residential properties in the vicinity of Valencia Road and Hungerley Hall Farmhouse due to their proximity to the A46. Construction traffic noise was not assessed.

7.12.28 It is assumed that during construction, standard measures to minimise and manage impacts in relation to the water environment would be implemented. With these measures in place, no significant water quality issues are highlighted. No significant groundwater effects are highlighted during the construction phase.

7.12.29 The hydraulic model results show that there would be no fluvial flood risk impacts on and off-site as a result of Option 7.

Operation

7.12.30 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.

7.12.31 It is predicted that a greater number of NSRs would experience significant adverse effects due to increases in traffic noise compared to Option 11, but fewer than Option 8.

7.12.32 Significant adverse effects would be likely to occur at 29 NSRs in Gainford Rise and Royston Close. Major or moderate increases in traffic noise would be 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 would be predicted to experience an increase in traffic noise within the top 1 dB of the minor band. The increases in traffic noise would 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 would be predominantly in shallow cutting, there would be sections at grade or on embankment which would result in a view of the free flow link from these properties. Their view of the realigned roads and new junction would likely 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.

7.12.33 There would be an opportunity to undertake additional mitigation of existing Priority Outfalls which is considered a minor beneficial impact, which would result in a slight beneficial effect (which is not significant).

Option 8

Construction

7.12.34 Option 8 would require the demolition of the listed farmhouse (The Grade II listed Hungerley Hall Farmhouse [NHLE 1265694]) and the total loss of its heritage value (during construction). This would be a major impact, which would result in a very large adverse effect, which is significant.

7.12.35 This Option would bring the new road alignment closer to the Grade II listed barn [NHLE 1226789] 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. Demolition of the associated listed farmhouse within the complex would alter the setting and significance of the listed barn as the functional and visual focus of the farmstead. Permanent heritage construction phase effects would be anticipated in relation to the physical presence of the proposed scheme through demolition and road realignment. This combination of negative impacts is considered to be a major impact, which would result in a large adverse effect, classified as significant.

7.12.36 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, together with earthworks and vegetation removal to the localised realignment of the sections of the A46 western and eastern boundaries and the B4082. There would be large visual effects during construction on residential receptors at Hungerley Hall Farm Grade II Listed Building and Valencia Road with moderate visual effects during construction on recreational receptors Gainford Rise Open Space, Binley and the southern end of Fontmell Close/ Abbotsbury Close.

7.12.37 This Option would require some permanent loss of woodland within the Coombe Pool SSSI resulting in a moderate adverse permanent effect on Coombe Pool SSSI and broad-leaved semi-natural woodland habitat loss (county scale) with direct mortality and loss of wildlife corridor (local to county scale). There would be potential for major adverse effects on bats as a result of the demolition of Hungerley Hall Farmhouse with the potential loss of bat roosts, as well as woodland loss through land take in the SSSI.

7.12.38 There would be potential for significant construction noise and vibration effects on nearby residential properties. Construction traffic noise was not assessed.

7.12.39 A large adverse permanent effect would be predicted on Hungerley Hall Farm due to permanent loss of farmland, with moderate adverse permanent effects on Hungerley Hall Farmhouse due to its demolition and the severance of access to the eastern field.

7.12.40 It has been assumed that during construction, standard measures to minimise and manage impacts in relation to the water environment would be implemented. A moderate adverse temporary effect would be predicted on Coombe Pool SSSI with widened embankments encroaching onto the Coombe Pool SSSI, with a culvert extension to the east of the A46 also potentially resulting in an impact on the Coombe Pool SSSI area. No significant groundwater effects have been highlighted during the construction phase, though there may be a need for dewatering of the cutting area as, based evidence from a BGS borehole, the groundwater level may be higher than the base of the cutting.

7.12.41 The hydraulic model indicates the A46 would flood, resulting in a decrease in flood level upstream (east) of the A46 which would be major adverse and significant. 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).

Operation

7.12.42 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.

7.12.43 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. 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.

7.12.44 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.

7.12.45 The proposed scheme would include attenuation ponds providing water quality mitigation, and there is an opportunity to undertake additional mitigation of existing Priority Outfalls, which is considered a minor beneficial impact, resulting in a slight beneficial effect (which is not significant).

Option 11

Construction

7.12.46 Option 11 would bring infrastructure closer to the rear of Hungerley Hall Farmhouse. It would require the removal of part of the field immediately adjacent to the garden to the south of the house (The Grade II listed Hungerley Hall Farmhouse [NHLE 1265694], which forms part of the asset's setting. This would be considered to result in a moderate adverse effect, which is significant. Impacts on the other listed buildings at Hungerley Hall Farm would be neutral.

7.12.47 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. During construction, very large visual effects would be predicted on the residential receptor at Hungerley Hall Farmhouse Grade II Listed Building, with large visual effects on residential receptors at the southern end of Fontmell Close/ Abbotsbury Close (winter) and moderate visual effects on residential receptors at the southern end of Fontmell Close/ Abbotsbury Close (summer) and the northern end of Fontmell Close/ Abbotsbury Close (winter).

7.12.48 There would be the potential for a moderate adverse effect (significant) on Coombe Pool SSSI and associated broad-leaved semi-natural woodland in the short term as a result of temporary land take, reducing to not significant in the long term. There would be the potential for major adverse effects on bats (significant) associated with substantial land take, with potential to impact species and severance associated with raising of the junction on embankment and the farm access over the A46 being removed.

7.12.49 There is potential for significant construction noise and vibration effects on nearby residential properties along and in the vicinity of Valencia Road and Hungerley Hall Farmhouse which are in close proximity to the A46 due to proximity to construction works. Construction traffic noise was not assessed.

7.12.50 It is assumed that during construction, standard measures to minimise and manage impacts in relation to the water environment would be implemented. With these measures in place no significant water quality issues are highlighted. No significant groundwater effects have been highlighted during the construction phase. The base of the cutting would be higher than the proposed cutting, so the likelihood of dewatering being required would be less than for Option 8. The hydraulic model results show that there would be no fluvial flood risk impacts on or off site.

Operation

7.12.51 For heritage, a moderate adverse effect on Coombe Abbey Grade II* RPG would be predicted due to 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. Traffic and noise changes would not be anticipated to result in further impacts to this asset.

7.12.52 There would be a risk of major adverse effects (significant) on bats, barn owl and riparian mammals as a result of the extensive new offline road alignment impeding movement of the species across the landscape and risk of species collision with operational traffic.

7.12.53 B4082 traffic would run further away from properties located to the south-west of the junction; however, noise would increase from traffic running closer to properties in the vicinity of Dorchester Way and the rear façade of Hungerley Hall Farmhouse. Significant adverse effects would be likely to occur at Hungerley Hall Farmhouse which would be predicted to experience a moderate increase in traffic noise due to the realignment of both the A46 and B4082 closer to the rear of the property. Significant adverse effects from noise may be avoided or minimised by the provision of 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.

7.12.54 The proposed scheme would include attenuation ponds providing water quality mitigation, and there would be an opportunity to undertake additional mitigation of existing Priority Outfalls, which would be considered a minor beneficial impact, resulting in a slight beneficial effect (which is not significant).

All Options

7.12.55 During construction large or very large adverse effects on soil quality and surrounding agricultural land and moderate or large adverse effects on controlled surface waters would be predicted, with no significant effects during operation. No significant air quality effects would be anticipated as all predicted NO2 concentrations at qualifying features near PCM links that are within the ARN would be within the EU limit value. There would be a low risk of non-compliance with the EU Directive with each of the four options.

7.12.56 With regard to climate change during operation, in comparison to the Do-Minimum scenario, some options would provide a net increase in carbon budget periods; however, this net difference would never be more than 0.001% of the budget and therefore effects are not significant.

7.12.57 Table 7-8 summarises the environmental constraints specific to each route option to assist in understanding which environmental considerations were involved in the process of selecting the preferred option.

Table 7-8 - Summary of Environmental Constraints to each Option

Emerging Assessment	Option 6	Option 7	Option 8	Option 11
Air Quality				
Noise & Vibration	HHF+ Housing west of R.Sowe			
Cultural Heritage			Loss of HHF Grade II	
Landscape & Visual	Sowe Valley amenity			
Biodiversity			Landtake from SSSI	
Geology & Soils				
Material Assets & Waste				
Population and Human Health				
Road Drainage & Water Environment	Flood impact on R.Sowe			
Climate				

Cumulative impacts

7.12.58 No developments have been shortlisted for inclusion in the assessment of cumulative effects. Other developments identified within the Zones of Influence (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.

7.12.59 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.

Combined Effects

Option 6

Construction

7.12.60 Hungerley Hall Farm Grade II Listed Building has the potential for combined large adverse effects which are significant, arising from noise, vibration, visual and population and human health impacts.

7.12.61 There is the potential for residual moderate adverse effects on the residential receptors at both the southern and northern ends of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave which are significant, arising from noise and visual impacts.

Operation

7.12.62 Hungerley Hall Farm Grade II Listed Building and the residential receptors at the southern end of Fontmell Close/ Abbotsbury Close, Binley/ Walsgrave have the potential for combined moderate adverse effects which are significant, arising from noise and visual impacts.

Option 7

Construction

7.12.63 Hungerley Hall Farm Grade II Listed Building has the potential for combined large adverse effects which are significant, arising from noise, vibration, and visual impacts.

Operation

7.12.64 No significant combined effects were identified for Option 7 during operation.

Option 8

Construction

7.12.65 Hungerley Hall Farm Grade II Listed Building has the potential for combined moderate adverse effects which are significant, arising from visual and population and human health impacts.

Operation

7.12.66 No significant combined effects were identified for Option 8 during operation.

Option 11

Construction

7.12.67 Hungerley Hall Farm Grade II Listed Building has the potential for combined large adverse effects which are significant, arising from noise, vibration, and visual impacts.

7.12.68 There is the potential for a residual moderate adverse effect which is significant on the residential receptors at the southern end of Fontmell Close/ Abbotsbury Close, Binley / Walsgrave, arising from noise and visual impacts.

Operation

7.12.69 No significant combined effects were identified for Option 11 during operation.

7.13 Traffic & Junction Assessment

7.13.1 Six scenarios were tested: a Do Nothing (DN), a Do Minimum (DM), an Option 6 Do Something (DS6), an Option 7 Do Something (DS7), an Option 8 Do Something (DS8), and an Option 11 Do Something (DS11). With the exception of the Do Nothing, all scenarios contained the improvements at Binley junction which were previously tested using the CoSTM model. The four Do Something scenarios each contained one of the Stage 2 options for Walsgrave junction.

7.13.2 All six scenarios were tested in three forecast years, namely 2025, 2040 and 2051, using AM peak, Interpeak and PM peak hour models.

7.13.3 The forecast networks were developed following current TAG guidance including uncertainty.

7.13.4 The forecast matrices were developed in two stages, namely development of the Reference Case matrices and variable demand models to derive the final demand. The Reference Case matrices were produced using trip end factors derived from NTEM v7.2 for cars and rail, and NTM for goods vehicles. Demand for specific developments was explicitly calculated where the size of the development warranted this. Following this, the demand model was run to derive the final demand used for the appraisal.

7.13.5 The forecast traffic impacts are summarized below, comparing each of the proposed Do Something options with the Do Minimum network in order to isolate the traffic impacts at Walsgrave junction.

Option 6

7.13.6 Analysis of the 2040 DS6 models against the 2040 DM show that the Option 6 improvements at Walsgrave would result in a significant increase in A46 traffic through the junction in all time periods.

7.13.7 In the AM Peak, the notable changes on the A46 include nearly 1500 PCUs of additional traffic in the southbound direction north of Walsgrave, reducing to around 500 PCUs of additional traffic south of Binley; and around 300 PCUs of additional traffic north of Walsgrave in the northbound direction, and very little change south of Walsgrave.

7.13.8 In the PM Peak, the notable changes on the A46 include between 800 and 1100 PCUs of additional traffic in both directions north of Walsgrave, reducing to around 400 additional PCUs south of Binley.

7.13.9 The B4082 shows a consistent reduction in eastbound traffic flows accessing the A46. This is a re-routeing effect, as strategic traffic that was using the A4600-Clifford Bridge Road-B4082 route to avoid the delays on the A46 southbound at Walsgrave is drawn back to the less congested A46.

7.13.10 There is a consistent increase in traffic on the B4082 westbound from the A46, up to an additional 400 PCUs in the PM Peak.

7.13.11 A46 northbound journey times reduce by between 15 seconds and two minutes. Southbound journey times reduce by between one and four minutes.

7.13.12 On the A46 southbound, all time periods show large reductions in delays at Walsgrave (approximately 8 minutes in the AM Peak, and about half that in the other time periods). This causes additional congestion at Binley and Tollbar End that damps this effect somewhat. A46 southbound journey times reduce by between one and four minutes.

7.13.13 In the PM peak, a significant reduction in northbound delays at Walsgrave is modelled, with the additional traffic causing slightly increased congestion elsewhere including at Binley and Tollbar End.

7.13.14 In the interpeak, similar patterns to the PM Peak are modelled, but the delay changes are less significant. AM peak northbound delay impacts are small.

Option 7

7.13.15 Analysis of the 2040 DS7 against the 2040 DM show that the Option 7 improvements at Walsgrave result in a significant increase in A46 traffic through the junction in all time periods.

7.13.16 In the AM Peak, the notable changes on the A46 are nearly 1450 PCUs of additional traffic north of Walsgrave in the southbound direction, reducing to around 550 PCUs of additional traffic south of Binley; and around 250 PCUs of additional traffic north of Walsgrave on the northbound direction, and very little change south of Walsgrave.

7.13.17 In the PM Peak, the A46 the changes modelled are between 650 and 900 PCUs of additional traffic north of Walsgrave, reducing to around 400 additional PCUs in each direction south of Binley.

7.13.18 The B4082 shows a consistent reduction in eastbound traffic flows accessing the A46, and by more than in the equivalent Option 6 data. This is not only the impact of the re-routing effects from delay reductions at Walsgrave seen in the Option 6 reductions, but also the re-routeing effects from right-turn movements at Walsgrave being banned.

7.13.19 There is an increase in traffic turning onto the B4082 from the A46 in the IP and PM Peak (up to about 350 PCUs in the PM Peak). In the AM Peak there is a slight reduction in such movements.

7.13.20 A46 northbound journey times reduce by up to three minutes. Southbound journey times reduce by between two and four minutes.

7.13.21 On the A46 southbound all time periods show large reductions in delays at Walsgrave (approximately 7 minutes in the AM Peak, and about half that in the other time periods). This causes additional congestion at Binley and Tollbar End that damps this effect somewhat.

7.13.22 In the PM peak, a significant reduction in northbound delays is modelled at Walsgrave, with the additional traffic causing slightly increased congestion elsewhere including at Binley and Tollbar End. Similar patterns are seen in the interpeak but to a lesser magnitude. AM peak northbound delay impacts are small.

Option 8

7.13.23 Analysis of the 2040 DS8 against the 2040 DM show that the Option 8 improvements at Walsgrave result in a significant increase in A46 traffic through the junction in all time periods.

7.13.24 In the AM Peak, the notable changes on the A46 changes are nearly 1500 PCUs of additional traffic in the southbound direction north of Walsgrave, reducing to around 550 PCUs of additional traffic south of Binley; and around 300 PCUs of additional traffic in the northbound direction of travel north of Walsgrave, and very little change south of Walsgrave.

7.13.25 In the PM Peak, the A46 modelled changes are between 700 and 950 PCUs of additional traffic north of Walsgrave, reducing to around 400 additional PCUs in each direction south of Binley. This is modelled in both directions.

7.13.26 The changes in flows on the B4082 relative to the DM show similar patterns to those seen in the Option 7 models, with the Option 8 models being slightly greater in both directions in all time periods. As with the Option 7 models the banning of right turns at Walsgrave has resulted in greater flow reductions accessing the A46 at Walsgrave than is seen in Option 6.

7.13.27 Overall, the A46 northbound journey times reduce by up to 90 seconds, and the northbound journey times reduce by between two and four minutes.

7.13.28 On the A46 southbound all time periods show large reductions in delays at Walsgrave (approximately 7.5 minutes in the AM Peak, and about half that in the other time periods). This causes additional congestion at Binley and Tollbar End that damps this effect somewhat.

7.13.29 In the PM peak, a significant reduction in delays is modelled at Walsgrave, with the additional traffic causing slightly increased congestion elsewhere including at Binley and Tollbar End. Similar patterns are seen in the interpeak but to a lesser magnitude. AM peak northbound delay impacts are small.

Option 11

7.13.30 Analysis of the 2040 DS11 against the 2040 DM show that the Option 11 improvements at Walsgrave result in a significant increase in A46 traffic through the junction in all time periods.

7.13.31 In the AM Peak the notable changes on the A46 are nearly 1450 PCUs of additional traffic in the southbound direction north of Walsgrave, reducing to around 500 PCUs of additional traffic south of Binley; and around 250 PCUs of additional traffic in the northbound direction north of Walsgrave, and very little change south of Walsgrave.

7.13.32 In the PM Peak the A46 changes are between 750 and 1000 PCUs of additional traffic north of Walsgrave, reducing to around 350 to 400 additional PCUs in each direction south of Binley.

7.13.33 Similar to Option 6, the B4082 shows a consistent reduction in eastbound traffic flows accessing the A46. This is a re-routeing effect, as strategic traffic that was using the A4600-Clifford Bridge Road-B4082 route to avoid the delays on the A46 southbound at Walsgrave is drawn back to the less congested A46.

7.13.34 Analysis of Journey Time route 1 in the 2040 DS6 relative to the 2040 DM shows that on the A46 northbound the journey time impacts are:

7.13.35 Overall, the A46 northbound journey times reduce by up to 100 seconds, and the A46 southbound journey times reduce by between 1.5 and four minutes.

7.13.36 In the PM peak, a significant reduction in northbound delays at Walsgrave is modelled, with the additional traffic causing slightly increased congestion elsewhere including at Binley and Tollbar End. Similar are modelled during the interpeak but to a lesser magnitude. AM peak northbound delay impacts are small.

7.13.37 On the A46 southbound, all time periods show large reductions in delays at Walsgrave (approximately 7 minutes in the AM Peak, and about half that in the other time periods). This causes additional congestion at Binley and Tollbar End that damps this effect somewhat.

Summary

7.13.38 All four DS options result in congestion relief at Walsgrave relative to both the Do Minimum and the Do Nothing. Option 6 shows the greatest levels of congestion relief, Option 7 is forecast to have the least impact on congestion.

7.13.39 All four options result in reductions in delays at Walsgrave and on the wider A46 route. All four options result in lower volumes of strategic traffic using Clifford Bridge Road to bypass delays seen at Walsgrave in the DM.

7.13.40 In all four options the demand responses show evidence of additional long-distance trips along the A46. Options 6 and 8 show greater additional traffic volumes through Walsgrave. Options 7 and 11 show the least additional traffic volumes through Walsgrave due to the lower speed limit on the A46 through the junction.

Operational Assessment

7.13.41 The operational effectiveness of each scheme was assessed using a Vissim microsimulation model.

7.13.42 The results of the DS6 and DS11 scenarios are almost identical with slightly lower flows along the A46 in DS11 due to the road being a less attractive route as the speed limit is lower. The 2025 forecast year modelling results for these options show that the grade-separated all-movement junction at Walsgrave eliminates queues and delays along the A46, which makes the route more attractive with an increase in traffic flows on the A46. There is also an increase in traffic flows on the A428 and Clifford Bridge Road, as vehicles are not held back in the queues on the A46 as occurs in the Do Minimum. The scheme also causes a significant reduction of flows between the A46 south and Clifford Bridge Road to the north, as this route is used as an alternative route to avoid delays along the A46 in the Do Minimum scenarios. Despite the increase in traffic flows, traffic congestion along the A428 and Clifford Bridge Road does not increase significantly in the 2025 forecast year. The operation of the models indicates that the Binley and Walsgrave junctions would accommodate the predicted level of traffic.

7.13.43 In 2040, the traffic growth predicted by the strategic models results in significant levels of congestion in Vissim, as the available capacity in the local road network is exceeded. In the 2040 PM, the models of the DS6 and DS11 options predict that the increase in congestion on the local road network would impact the operation at the Binley and Walsgrave junctions. The capacity of the Binley junction is limited by the capacity at nearby junctions along the A428, which causes westbound congestion mainly in the 2040 PM. Similarly, the increase in congestion at the B4082/ Clifford Bridge Road roundabout results in significant queues on the B4082 link which extends back to the A46 northbound off-slip at Walsgrave and the A46 carriageway. The queues formed on the A46 in the 2040 PM are comparatively longer in DS11 than in DS6 because DS11 provides slightly less queueing space on the B4082 westbound link.

7.13.44 In 2025, the Do Something 7 and 8 options eliminate queues and delays along the A46, with an increase in traffic in both directions due to the route being more attractive. However, the removal of the right turn movements at Walsgrave results in an increase in flows along Clifford Bridge Road and the A428 in both directions, as vehicles travelling from the north on the A46 and towards the south on the A46 are compelled to use Binley junction. This results in extensive congestion building up from the A428 westbound link and the B4082 westbound link, with queues extending back onto the A46 carriageways in both directions. The models indicate that the storage space between the Walsgrave junction and the approach to the B4082/ Clifford Bridge Road roundabout is insufficient to accommodate the predicted westbound queue lengths in the 2025 forecast years.

7.13.45 In the 2040 DS7 and DS8 scenarios, the traffic growth results in significant levels of congestion as the available capacity in the local road network is exceeded. The operation of the model at Binley junction demonstrates that the roundabout would accommodate the predicted level of demand. However, it should be noted that there is a high volume of latent demand in the Do Something 7 and Do Something 8 models and if these vehicles were able to enter the network, the operation at Binley junction could be impacted. Furthermore, the capacity of the junction is limited by the capacity at nearby junctions along the A428, which cause westbound congestion. The congestion on the B4082 westbound link increases significantly and the queues extent back blocking the A46 mainline carriageway.

7.13.46 The conclusions from the CoSTM traffic forecasting report suggest that all four options result in congestion relief at Walsgrave junction relative to the Do Minimum which is consistent with Vissim forecast results; however, the greater level of operational detail modelled in Vissim has highlighted the capacity constraints of the local road network near the A46, and the potential increase in congestion resulting from removal of right turning movements at Walsgrave junction in Do Something 7 and 8. The CoSTM predicts that Do Something 6 and Do Something 11 shows the greatest levels of congestion relief out of all four Scheme options which is consistent with the predictions from the Vissim forecast models.

7.13.47 Based on the outputs of strategic and microsimulation Vissim models, it is evident that Do Something Options 6 and 11 perform best in traffic terms considering both the strategic and local road networks, as the results indicate marginal differences. The Vissim models predict that the network would operate under capacity for the 2025 opening year in both AM and PM if either Option 6 or Option 11 is implemented. However, the models predict that with the increase in demand in 2040 (design year), although the Scheme designs for these options are predicted to operate satisfactorily, the local network may have insufficient capacity to accommodate the traffic growth in the PM peak hour and may require additional mitigation.

7.14 Safety Assessment

7.14.1 During Stage 2, design development for Option 11 (as sole viable solution) has sought to eliminate hazards as far as reasonably practical or otherwise reduce and control risks as required under the Construction (Design and Management) Regulations. This section of the SOAR focuses on operational safety.

Construction

7.14.2 Safety during construction had been considered in developing all proposed options. This includes the alignments which sought to avoid where possible or maximising the distance to overhead utilities such as the 132kV powerline. Furthermore, these have also aimed to avoid changes to existing culverts, reducing the need to work in close proximity to water.

7.14.3 Temporary land take has been identified to allow adequate space for safe construction alongside two running lanes in each direction on the A46 throughout construction.

7.14.4 The junction design within Option 6 and 11 allows for construction of the new bridge between the dumbbell roundabouts without live traffic running beneath.

Maintenance

7.14.5 Safety during maintenance activities has also been integrated into the scheme designs, with all Option designs provided compliant stopping sight distance, reducing the risk of collision with maintenance vehicles and personnel.

7.14.6 The lighting design of all options respects the overhead powerline exclusion zone and includes articulated lighting columns to allow maintenance at ground level near the overhead powerlines. The proposed locations of attenuation ponds are also away from powerlines and provide for safe access by maintenance vehicles.

7.14.7 Maintenance laybys have been designed to enable safe access for maintenance to all significant assets such as the anti-dazzle screening/noise bund/safety barrier between the B4082 and A46 in Option 11.

Key safety challenges

7.14.8 The existing Walsgrave junction does not have a particularly poor road user safety record. Verified National Highways collision data for the 2012-2019 period show that 26 accidents were recorded in total: 19 slight, 6 serious, 1 fatal. The extents of the “existing” Safety Assessment Study Area for these statistics can be seen in Figure 7-6 below. For further details on the Severity Assessment Extents refer to the PCF Stage 2 Safety Plan (HE604820-ACM-GEN-WAL_SW_000_Z-RP-OS-0001).

7.14.9 There is a significant challenge to achieving a definitive safety improvement at Walsgrave junction during operation from this low baseline of accident collisions.

7.14.10 No data beyond 31st December 2019 was used in the assessment as it has not yet been published by the Department for Transport. Refer to Appendix R for further detail.

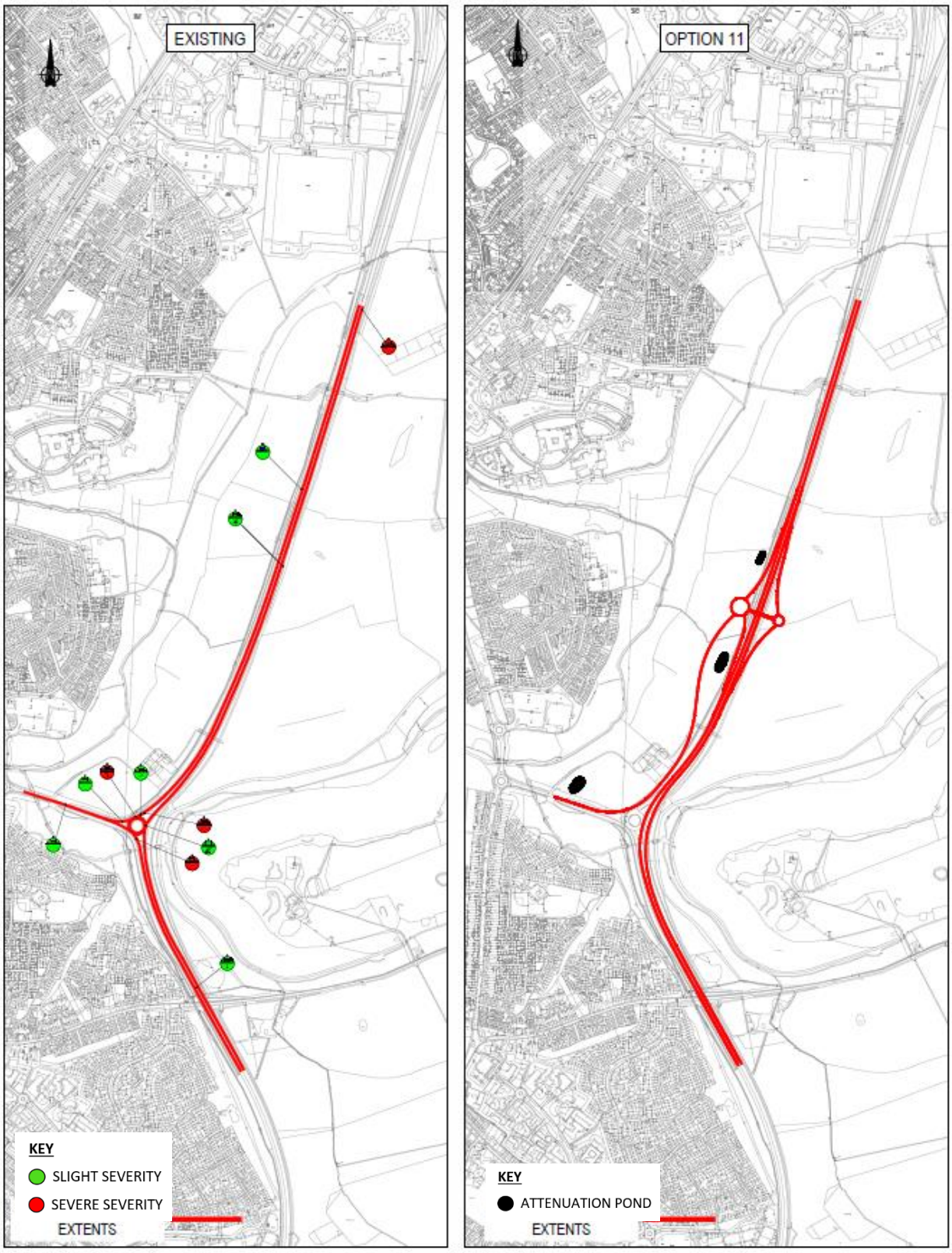


Figure 7-6 - Safety Assessment Extents

Safety Baselines

7.14.11 Within the Safety Assessment Extents (Figure 7-6), the latest available three-year data set (2017-2019) recorded zero fatalities, four incidents resulting in serious injury, and seven in slight injury.

7.14.12 The safety baselines used to define the project safety objectives are listed in Table 7-9 below:

Table 7-9 - Safety Baselines

Measure at or on approach to Walsgrave junction	Abbreviation	Baseline for 3-year period (2017-2019)
Personal Injury Collisions	PICs	11 No.
Fatality and weighted injury	FWI	0.47

Safety Objectives:

7.14.13 The corresponding safety objectives for the three-year period after becoming fully operational are as follows:

- PICs would be no worse than existing baseline within the project limits.
- FWI would be no worse than existing baseline within the project limits.

7.14.14 These objects were agreed with National Highways SES Health & Safety Risk Senior Advisor (Ron Thompson) on 27th November 2020.

7.14.15 The traffic modelling facility CoBALT has been used to appraise the change in accidents forecast across the assessed study area after the A46 Coventry Junctions upgrade is opened to traffic (2028). This includes both Binley and Walsgrave being operational. The CoBALT forecasts for the first 3-years of operation currently assumed as 2028 to 2030 can be seen below in Table 7-10:

Table 7-10 - 2028-2030 CoBALT Forecasts

Measure at or on approach to Walsgrave junction	Abbreviation	CoBALT Forecasts (2028-2030)
Personal Injury Collisions	PICs	13.08 No.
Fatality and weighted injury	FWI	0.65

7.14.16 Although these values show an increase in PICs and the FWI value, they do not take into account the increase in traffic using the A46 due to the grade separation of Binley and Walsgrave. Table 7-11 below isolates the mainline traffic flow before and after the junction upgrade in 2018 (the mid-year between 2017-2019) and 2029 (the mid-year between 2028 – 2030) respectively, showing the average AADT northbound and southbound. For simplicity, this calculation has only considered the increased traffic flow on the mainline; however, all accidents in the study extents are included. An average combined percentage growth of 28% has been calculated.

Table 7-11 - AADT 2018 and 2029

Period	Year Used	AADT	
		Northbound	Southbound
2017-2019	2018	25,663	22,765
2028-2030	2029	30,098	31,549
% Increase		17%	39%
Average Increase		28%	

7.14.17 Table 7-12 below shows the adjusted PIC and FWI figures after applying the 28% reduction to the Predicted CoBALT Statistics, to allow a like for like comparison with the baseline PIC and FWI values:

Table 7-12 - 2028-2030 CoBALT Forecasts (28% reduction)

Measure at or on approach to Walsgrave junction	Abbreviation	CoBALT Forecasts (2028-2030) (28% reduction)
Personal Injury Collisions	PICs	9.42 No.
Fatality and weighted injury	FWI	0.47

7.14.18 The above figures show, that for an equal volume of AADT in the baseline and assessment years, the project achieves the safety objectives for the three-year period after becoming operational. As expected, due to grade separation, the predicted number of PICs are lower; however, the severity of accidents increases due to the increased speed of free-flowing traffic leading to an FWI the same as the baseline. PICs reduce from 11 to 9.42 and FWIs remain at 0.47 in the three years following operation.

7.14.19 For further details regarding the project's safety baseline, objectives and crash collision plans see the PCF Stage 2 Safety Plan (HE604820-ACM-GEN-WAL_SW_000_Z-RP-OS-0001).

7.14.20 The Safety Plan also details the following:

- Describes how the Safety Management System (SMS) has been selected;
- Describes the SMS and corresponding safety activities that would be undertaken to achieve the defined safety objectives, including a description of the activities that have been carried out to date; and
- Describes the project organisation, how responsibility for safety activities has been devolved, and the associated programme management and control processes.

7.14.21 The selection of the appropriate Safety Management System (SMS) for the project at PCF Stage 2 has been determined through assessing Option 11 against six design-related activities referred to in DMRB GG 104 (Table 2.6). The project SMS selected is Type A, as detailed in the aforementioned Safety Plan.

7.14.22 The Safety Plan also identifies key safety challenges during the construction and operation which are noted below. Stage 3 designers will further identify hazards and implement design interventions to eliminate so far as reasonably practicable or otherwise reduce and control risks as required under the Construction (Design and Management) Regulations. The safety of road users and road workers will be managed during construction through CDM compliance.

7.14.23 The key safety challenges relating to the operational phase would be determined and developed in PCF Stage 3 (Preliminary Design). At the current PCF Stage 2, the general key challenges identified are as follows:

- Geometric design is limited due to project constraints. This includes a 132kV pylon, SSSI, listed building and extensive flood plain.
- Operation of a grade separation junction, allowing free flowing traffic would lower the likelihood of collision but increase the severity outcomes of collisions as a fatality is more likely.
- Inspection and maintenance of new structure / infrastructure including the A46 overbridge, signage, road restraint barriers and lighting columns.

Construction Phase

7.14.24 Key road related safety challenges (related to road users) for the construction phase identified in PCF Stage 2 include:

- Two lanes of traffic in all directions on the A46 mainline must be provided at peak times. To maintain two lanes of traffic in each direction significant temporary works would be required.
- Queues during peak periods leading to customer frustration and potential driver behavioural concerns.
- Access for maintenance of existing assets outside working areas required without affecting road users.
- Access to Hungerley Hall farm would need to be maintained at all times. Connectivity would also need to be maintained between the farm and fields both east and west of the A46.

7.15 Economic assessment

7.15.1 The calculation of economic benefits to road users (excluding accident benefits) was undertaken using the Department for Transport's (DfT) TUBA v1.9.14 (Transport Users Benefit Appraisal) program.

7.15.2 TUBA compares the costs associated with the 'without scheme' scenario (the Do Minimum/Do Nothing) and the 'with scheme' scenario (the Do Something Option) to establish the value of the savings in travel time and vehicle operating costs. By comparing all construction and associated costs with the traffic benefits, conventionally over a 60 year period from the opening of the first phase, a Benefit to Cost Ratio (BCR) is calculated.

7.15.3 The assessment of accident benefits (the reduction in accident costs) as a result of the scheme was undertaken using the DfT's COBALT program. The assessment was undertaken using the current version of the COBALT economic parameter file 2013.2.

7.15.4 An Environmental Impact Assessment was conducted in accordance with TAG Unit A3.

7.15.5 The assessment of the Wider Economic Benefits was carried out using the WITA evaluation tool. The assessment of benefits as a result of improvements in journey time reliability was assessed.

7.15.6 As this is for PCF Stage 2 it was decided that the assessment of delays caused by traffic management measures during construction of the scheme would be carried out in a qualitative manner, and any costs/benefits provided would be indicative only.

7.16 Annualisation Factors – TUBA

7.16.1 Annualisation factors are required so that the benefits from each distinct modelled time period can be expanded to represent the full appraisal period across the whole year. The economic assessment takes account of the benefits accruing during the 11-hour modelled period 07:00-18:00 on standard weekdays.

7.16.2 Although the scheme is expected to provide benefits in the weekday off-peak period and during the weekend, these were not directly included in the modelling. The impacts of these were taken account of by appropriate incrementation of the annualisation factors for the three modelled time periods.

7.16.3 Annualisation factors to expand the modelled time periods to the appraised period were derived through analysis of traffic flow data from various WebTRIS sites for which the traffic flow data was available for all 12 months.

7.16.4 The modelled AM and PM peak hours represent an average hour in each of the 2-hour peak periods and each of these periods were therefore expanded using a factor of 2. The modelled interpeak hour represents an average hour in the 7-hour interpeak period and was expanded using a factor of 7.

7.16.5 The annualisation factor for each TUBA time period also has to incorporate the number of times the period occurs per year, with the year divided up as follows:

- 253 normal weekdays;
- 52 weekends and
- 8 Bank Holidays.

7.16.6 Average flow data were used to determine which of the hours in the weekday off-peak, Saturdays, Sundays and Bank Holidays had flows within the range experienced during the modelled 11-hour period. Hours which had such flows were deemed to be represented by the appropriate modelled hour, for which the expansion factor was incremented accordingly. This process is documented in Technical Note 24 (provided as part of the Economic Appraisal Package).

7.16.7 For the purposes of the TUBA assessment, it was assumed that the demand matrices for the relevant non-modelled hours are sufficiently similar to the demand matrices for the relevant modelled hours.

7.16.8 The resulting annualisation factors therefore include both the expansion from the modelled hour to the appraised period and further to an annual period, and additional terms deriving from the expansion of selected hours in the non-modelled periods. They are presented in Table 7-13: Summary of Annualisation Factors Used below.

Time Period	Modelled Weekday	Weekday Off-Peak	Weekends	Bank Holidays	Total
AM	506	0	0	0	506
IP	1771	253	572	24	2620
PM	506	0	0	0	506

Table 7-13: Summary of Annualisation Factors Used

7.17 User Classes

7.17.1 The economic appraisal of user time and vehicle operating costs, using TUBA, was based on the following 6 user classes:

- Car – Employers Business
- Car – Journey between home and work/education (“Commute”)
- Car – Other trip purposes
- Light Goods Vehicle
- Heavy Goods Vehicle (OGV1)
- Heavy Goods Vehicle (OGV2)

7.17.2 The 5 user classes defined within the SATURN traffic model were split into the above user classes by disaggregating HGVs. HGVs were split into Medium (OGV1) and Heavy Goods Vehicles (OGV2).

7.17.3 For HGVs there were limited data that could be used to split between OGV1 and OGV2, so the 50:50 split used in the economics for earlier stages of this project was retained.

7.17.4 The economic appraisal of accident costs using COBALT was based on all of the user classes combined at AADT level, which is consistent with TAG guidance.

7.18 Transport Economic Efficiency Benefits

7.18.1 The Transport Economic Efficiency (TEE) benefits consist of travel time and Vehicle Operating Cost (VOC) benefits as a result of the scheme.

7.18.2 The DfT program TUBA was used to assess the benefits arising from changes in journey times and vehicle operating costs which are calculated separately for Business Users and Consumer Users.

7.18.3 Business benefits are the benefits accrued by business travellers, including car (and van) occupants travelling on employers' business. This group also includes HGV drivers.

7.18.4 Consumer users are non-business travellers, in cars and vans. This group includes people travelling for "other" purposes (i.e. not business or commuting).

7.18.5 Commuters are also classed as consumers as they are travelling in their own time, not that of their employers. For economics purposes (including in TUBA) commuters and those travelling for "other" purposes are treated as distinct classes of consumers with different values of time.

7.18.6 TUBA uses standard values of time, based on average earnings, with the values for time in the course of work (employers' business) being much higher than personal time (including commuting).

7.18.7 TUBA supplies three value of time mechanisms. In accordance with TAG guidance, Method 3 (the traditional single value of time for all trip distances) has been used for all modes and purposes with the exception of car trips for Employers' Business, for which Method 1 (varying value of time by distance) has been used. In both cases the values of time are specified in 2010 values and are uprated using TAG-specified growth factors.

7.18.8 TUBA takes, as its principal input, zone to zone matrices of trip numbers, travel times and distances travelled. Values of time and operating costs are applied over a 60 year period and costs and benefit streams calculated.

7.18.9 TAG requires that costs should be presented in the Department for Transport's (DfT) base year which is 2010. These are then discounted to a present value year also defined by the DfT as 2010.

7.18.10 By subtracting the road user costs for the Do Something case (i.e. with the scheme in place) from those for the Do Minimum case (i.e. without the scheme in place) the net road user benefits are derived.

7.18.11 A masking process was applied to certain sector-sector movements (see Figure 7-7 for Sector plan) which were deemed unlikely to be affected by the proposed scheme, i.e. the route between those sectors did not cross the Area of Influence (AoI) / Area of Detailed Modelling (AoDM) (Figure 7-8). This was done to ensure that only trips likely to experience a benefit / disbenefit from the scheme are included in the appraisal.

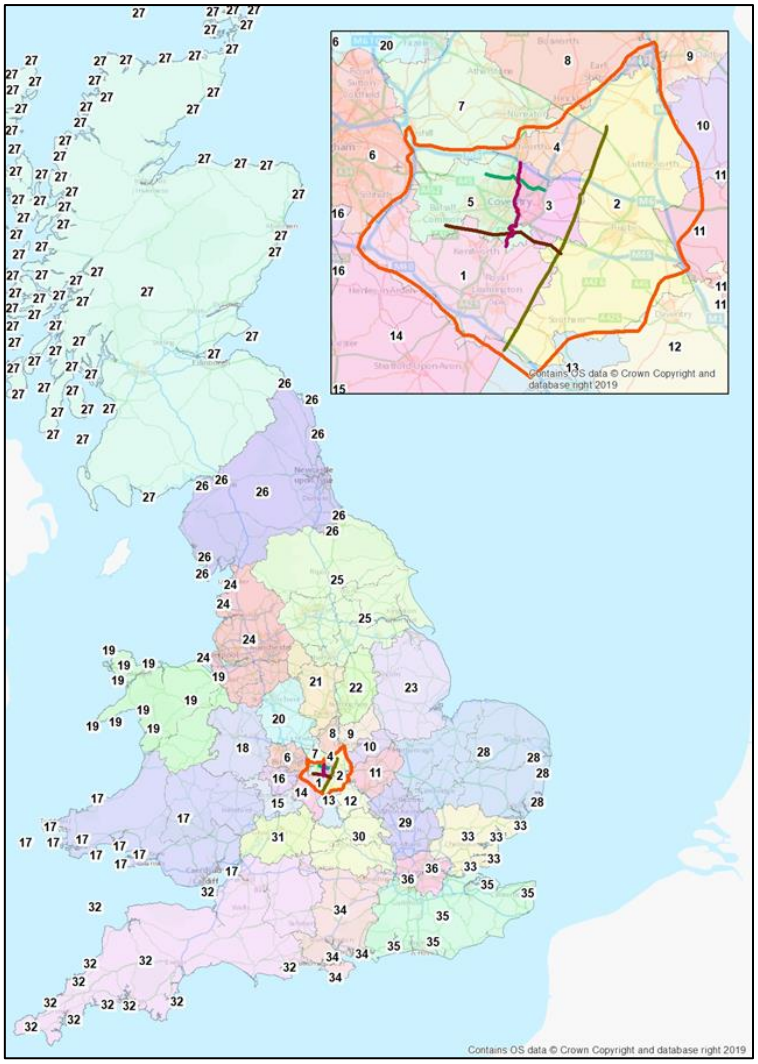


Figure 7-7 - Sector Plan

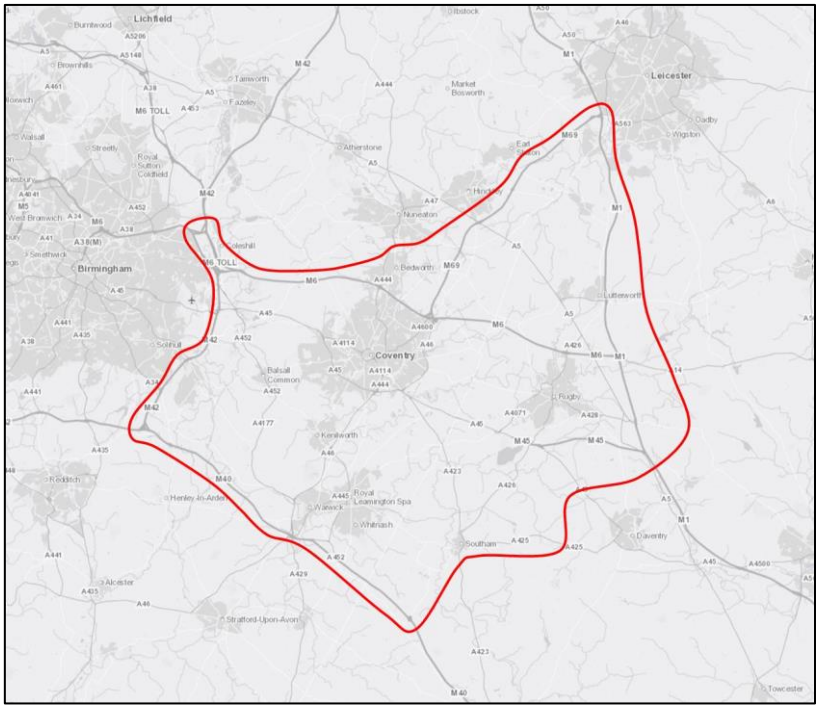


Figure 7-8 – Area of Detailed Modelling (AoDM)

7.18.12 Any instability in the demand or assignment models outside of the AoI (model noise) could result in benefits that would not be realised in the real world and therefore could dilute or enhance the economic appraisal of the scheme. Masking, or removing these sector-sector benefits from the appraisal provides a more realistic, consistent and stable assessment. A more detailed description of the masking process is described in Technical Note HE604820-ACM-GEN-WAL_SW_000_Z-RP-TR-0009.

7.19 Accident Savings and Benefits

7.19.1 An assessment of accident benefits was undertaken using COBALT, the DfT cost benefit analysis program that assesses the benefits from accident savings.

7.19.2 COBALT calculates the number of accidents on each link in each year of the evaluation period using Average Annual Daily Traffic flows (AADT) and accident rates per km and link length.

7.19.3 COBALT was run in combined link and junction mode with both Binley and Walsgrave junctions being run in separate modes. Both these approaches used assignment results from the traffic model as inputs.

7.19.4 The numbers of accidents on the key links within the study area as well as the Binley and Walsgrave junctions, collected from publicly available accident data over a 5-year period from 2013 to 2017, were input to COBALT. For other roads, standard accident rates were adopted for each type of road.

7.19.5 COBALT calculates a severity split using standard factors which estimate the number of accidents classified by injury severity of fatal, serious or slight. COBALT then applies the appropriate costs per accident to establish the economic cost of accidents over the appraisal period.

7.19.6 Average Annual Daily Traffic (AADT) flows were taken from the traffic model assignment for the forecast opening and design years for input to COBALT.

7.20 Monetised Environmental Benefits

Greenhouse Gases & Local Air Quality

7.20.1 Guidance in TAG unit A3 Environmental Impact Appraisal was followed to assess the impacts of A46 Binley junction on air quality and greenhouse gases.

7.20.2 Emissions of nitrogen oxides (NOx), particulate matter (PM10) and carbon dioxide (CO2) were calculated in the opening year of the Scheme (2025) and design year (2040). Emissions were calculated for both the Do Minimum scenario (without Scheme) and with Scheme scenario in both assessment years.

7.20.3 The vehicle emissions were calculated based on daily traffic flows on each road link, the proportion of heavy duty vehicles on each road link and speed banded emission factors. All road links in the traffic model area were included in the assessment. Emissions over a 60 year period commencing in the opening year were calculated with emissions interpolated for intervening years and assumed to remain constant after the design year. The overall change in emissions over 60 years due to the Scheme was calculated for NOx and PM10 for the air quality assessment and for CO2 for the greenhouse gas assessment.

7.20.4 The air quality impact was monetised by considering the damage costs associated with the change in emissions of each pollutant. The greenhouse gas impact was monetised by considering the marginal abatement costs for the change in emissions from the non-traded sector which includes emissions from petrol and diesel.

7.21 Noise Assessment

7.21.1 Chapter 2: Noise impacts of TAG Unit A3 – Environmental Impact Appraisal outlines a step-by-step process by which noise implications of road schemes can be appraised. This guidance refers to the assessment guidance contained within the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 7, Noise and Vibration. This guidance has been followed during the scoping for the appraisal and quantification of the noise impacts.

7.21.2 The forecast year for the scheme is 2040 – i.e. the design year, 15 years after the proposed opening year, 2025.

7.22 Construction Related Delays

7.22.1 The impacts to transport users caused by traffic management measures during the construction of the scheme has been analysed by reviewing the results of the construction delay analysis carried out for the Binley PCF Stage 4 economics. No Walsgrave-specific modelling has been carried out for this area, and any benefits/disbenefits presented are indicative.

7.23 Scheme Costs

Historic Project cost estimates (PCF Stage 0 and 1)

7.23.1 The PCF stage 0 and PCF stage 1 OME (Order of Magnitude Estimate), as set out in the SOBC (Strategic Outline Business Case) and assessed throughout PCF stages 0 and 1 were based upon grade separation improvements to Binley junction; relocation and grade separation of the Walsgrave junction and realignment of the A46. Both stage estimates exceeded the RIS funding allowance in 2015/2016. A summary of the range cost estimates for this stage is shown in Table 7-14. This is the cost estimate for Binley and Walsgrave combined.

Table 7-14 – PCF Stage 0 and 1 Range Estimate History

Date	Min	Most Likely	Maximum	Reason for Change
27.04.2016	£112.060M	£138.520M	£192.013M	PCF stage 1 OME
30.09.2015	£104.427M	£118.591M	£151.708M	PCF stage 0 OME

7.23.2 It was identified at this stage that unless the funding could be allocated within RIS2 or by developer contributions, there was potential that the assessed project (depending on Option taken forward) could not be delivered under the existing funding allowance.

7.23.3 The previous construction costs were provided by National Highways between December 2018 and February 2020. These were provided for PCF Stage 1 options.

7.23.4 The associate outturn costs for Option 1-10 are displayed in Table 7-15 below. Operation and maintenance costs were not estimated at this stage of the assessment and therefore were not included in the outturn calculations.

Table 7-15 - Outturn Project Costs

Option	Outturn costs
1 - Clifford Bridge Rd closure	£3M
2 - Flyover and free flow link	£108M
3 - Signalised T-junction	£75M
4 - Left in-left out	£77M
5 - Compact GSJ	£115M
6 - Dumbbell GSJ	£191M
7 - Left in-left out (reduced Radii – 50mph)	£38M
8 - Left in-left out (Re-aligned A46 - 70mph)	£65M
9 – No Junction (50mph)	£38M
10 - No Junction (70mph)	£59M

7.23.5 No formal costing was undertaken for Option 8 or 9, due to their similarities to Option 7 and 10, respectively. However, the outturn costs of Options 8 and 9 were estimated and are shown the table above.

PCF Stage 2 Project cost estimates

7.23.6 For each option a separate cost estimate was prepared. High level quantities were taken off from the design of each option and recorded in standard Form 103 format. For example, lighting costs were estimated using cost per linear metre of road requiring lighting, the restoration of rural land was captured in cost per square metre and signage costs were estimated per sign unit. For further detail, see Appendix S. To illustrate the general distribution of cost between elements, Table 7-16 below shows example percentage costs for the principal items of Option 11.

Table 7-16 Option 11 % Bill of Quantities

Series	Most Likely % Cost Estimate
Site Clearance & Fencing	1%
Road Restraint Systems, Traffic Signs, Road Markings, Road Lighting Electrical Works, Columns, Signs & Comms	8%
Drainage and Ducts	15%
Earthworks	38%
Pavements	20%
Kerbs, Footways and Paved Areas	6%
Landscape and Ecology	3%
Bridge Structures, Culverts and other minor structures	9%

7.23.7 The most recent construction costs were provided by National Highways in May 2021 for Options 6, 7 and 8. The construction costs for Option 11 were provided in September 2021. Further details of the project cost estimate can be found in Economic Appraisal Package (HE604820-ACM-GEN-WAL_SW_000_Z-RP-TR-0008) but are summarised in Table 7-17 below.

Table 7-17 Options 6,7, 8 and 11 PCF Stage 2 Range Estimate

Option	Min	Most Likely	Maximum
6	£94,564,122	£164,090,617	£266,120,449
7	£22,456,664	£41,160,155	£76,132,127
8	£45,424,709	£77,224,336	£143,314,073
11	£52,381,615	£93,368,806	£172,163,678

7.23.8 For the economic appraisal, a whole life Present Value Cost (PVC) is required. This includes future preparation costs, land costs, construction costs and supervision costs.

7.23.9 All costs are adjusted to market prices and discounted using standard Treasury discount rates to a PVC according to when they occur in the future. This is described below.

7.23.10 The base costs for each of the options for the Scheme included supervision, construction, land, and preparation plus an allowance for inflation. The latest cost estimates were prepared in 2021 and estimated at 2010 prices. These base costs were converted to a Present Value of Cost (PVC) through discounting to 2010.

7.23.11 In line with TAG Unit A1.2 (Scheme Costs), it is standard practice to include a risk allowance and optimism bias on top of the scheme estimated costs. The Present Value Cost (PVC) was derived from the base costs adjusted to take account of project/residual risk, and portfolio risk.

7.23.12 For the economic assessment of the various options against the DN it was necessary to add the costs for the Binley improvements. These costs were taken from the Binley PCF Stage 4 economics without alteration (i.e. expenditure carried out between the date of the Binley economics work and the date of the Walsgrave economics work was not excluded from the calculations). As with the costs for the various Walsgrave options, these were adjusted as needed to 2010 prices, discounted to 2010.

7.24 Wider Impacts

7.24.1 Wider Impacts is the current term for the quantities previously known as Wider Economic Benefits. Wider economic impacts refer to economic impacts which are additional to transport user benefits. They arise because market failures in secondary markets (non-transport markets), such as the labour and land markets, mean that the full welfare impact of a transport investment may not be reflected in the transport market.

7.24.2 The wider economic impacts are described in TAG Units A2 and can be divided into three distinct groups on the basis of land use change. This determines within which level of analysis they are included and how these impacts are reported within the Value for Money assessment.

7.24.3 The benefits associated from the Wider Impacts were calculated using the DfT program WITA that follows the principles and formula set out in the TAG A2.1 guidance. The following components were assessed:

i. **Agglomeration Benefits (referred to as Static Clustering)** – These arise from the positive link between density and productivity. When employment clusters together, the jobs in the cluster are likely to be more productive than they otherwise would be, due to better access to labour, increased competition between suppliers and greater interaction between businesses spreading knowledge;

ii. **Increase in Output in Markets with Imperfect Competition** – In markets which are dominated by a few suppliers, prices may be above the quantity which would occur in competitive markets. Transport investment may induce a price reduction and an increase in the quantity supplied, through its impact upon firms' cost base. This benefit is calculated as 10% of the benefits to business users, which are extracted from the TUBA appraisal; and

iii. **Labour Supply Impacts** –The guidance for this Wider Impact is given in TAG Unit A2.3. This Wider Impact generates benefits resulting from calculated changes in national employment (paragraph 3.1.2 of the Unit). As such – if it is included – data from the full model network/matrix should be included in the calculations (otherwise displacement of jobs from external areas to internal areas might be missed). The calculations (performed within WITA) use the change in generalised cost for a commuting round trip to calculate the change in employment, the resulting increment in GDP and the resulting increase in taxation paid.

7.24.4 As the highway model forecasts demonstrated that the scheme would largely benefit movements that bypass Coventry, it was unlikely to facilitate movements into businesses in Coventry and therefore the scheme is considered unlikely to drive agglomeration benefits for local businesses. For this reason, the agglomeration benefits were not included in the appraisal.

7.25 Journey Time Reliability

7.25.1 In accordance with TAG, the measure of journey time variability employed was the standard deviation of journey times. The monetary benefits of improved reliability were calculated by applying TAG values of time (as adjusted by the reliability ratio) to the change in standard deviation of the journey times.

7.25.2 Benefits were calculated for a 60-year period and discounted to 2010 following TAG Unit 3.5.4.

7.26 Analysis of Monetised Costs and Benefits (AMCB) Tables

7.26.1 An aggregated version of the AMCB table for each Option is shown as Table 7-18.

Overall Impact	2010 Prices discounted to 2010 (£000s)			
	Option 6	Option 7	Option 8	Option 11
Present Value Benefits (PVB):				
Noise Benefits	-1,501	-290	-807	-115
Local Air Quality Benefits	-7,548	-3,585	-3,804	-3,653
Greenhouse Gases Benefits	-21,389	-19,829	-21,442	-22,871
Accident Benefits	-8,321	-5,602	-5,871	-7,424
TEE Benefits	154,455	136,517	148,404	154,074
Indirect Tax Revenues	9,414	8,336	9,949	8,347
Total PVB	**125,110**	**115,547**	**126,430**	**128,357**
Present Value Costs (PVC):				
Broad Transport Budget	115,430	29,146	54,457	60,345
Total PVC	**115,430**	**29,146**	**54,457**	**60,345**
Net present Value (NPV)	**9,680**	**86,401**	**71,973**	**68,012**
BENEFIT COST RATIO (BCR)	**1.08**	**3.96**	**2.32**	**2.13**

Table 7-18: Scheme Option Aggregated AMCB Table, £ Thousands (2010 Prices Discounted to 2010)

7.27 Adjusted Benefit-Cost Ratios

7.27.1 The initial BCRs presented above are adjusted to include Journey Time Reliability and Wider Impacts and are summarised in Table 7-19 below.

	2010 prices discounted to 2010 (£000s)			
Adjusted BCR	**Option 6**	**Option 7**	**Option 8**	**Option 11**
Initial Present Value of Benefits PVB	**125,110**	**115,547**	**126,430**	**128,357**
Wider benefits	13,931	11,568	12,911	13,804
Journey Time Reliability	24,208	24,208	24,208	24,208
Adjusted Present Value of Benefits (PVB)	**163,249**	**151,323**	**163,548**	**166,368**
Present Value of Costs (PVC)	**115,430**	**29,146**	**54,457**	**60,345**
Net Present Value (NPV)	**47,819**	**122,177**	**109,091**	**106,023**
Adjusted BCR	**1.41**	**5.19**	**3.00**	**2.76**

Table 7-19: 2021 Prices Discounted to 2021 (£000s)

7.28 Appraisal summary & Benefits Register

7.28.1 The Appraisal Summary and Benefits Register records the for benefits of each Option. The performance specifications (RIS2) of the scheme are as follows:

- Meeting the need for all users
- Providing fast and reliable journeys
- Being environmentally responsible
- Improving safety for all

7.28.2 During Option operation, mitigation will have been constructed to ensure routine road runoff discharges are attenuated and there will be no adverse effects on the flooding potential of the receiving watercourses

7.28.3 Metrics for the benefits had been recorded. Key benefits and disadvantages are listed in Table 7-20 below. Refer to Appendix I for further detail.

Performance Specification (RIS2)	Description
Meeting The Needs Of All Users	**Business, commuting and other users & transport providers** Total Travel Time Benefits contributions for Business users/Commuters and Other Users: - Option 6: £111.1million / £53.8million - Option 7: £89.2million / £53.7million - Option 8: £101.0million / £56.2million - Option 11: £109.6million / £53.2million
	Wider Impacts All options benefit businesses under conditions of imperfect competition approximately £11million and benefit employment for labour supply an average of £2million.
Providing Fast And Reliable Journeys	**Reliability impact on Business, commuting and other users** All options would reduce the variability of journey times along the A46 between Tollbar End and the M6/M69 junction.
Being Environmentally Responsible	**Noise** Option 6 would result in the greatest number of significant adverse effects from moving closer to the residential areas. Both Option 7 and 8 would have fewer significant adverse effects than Option 6. Option 11 has the least number of significant adverse effects. All options may qualify Hungerley Hall Farm for noise insulation work.
	Water Environment The attenuation ponds of Options 6, 8 and 11 provide water quality benefits. Appropriate flood mitigation would need to be incorporated for Options 6 and 8. Mitigation for Option 6 would be costly and lead to other environmental impacts. Options 7 and 11 would not significantly change fluvial flood risk.
	Landscape & Townscape Option 6 would have the most significant adverse effect on the land and townscape due to its large footprint. Option 11 would be less intrusive than Option 6, while Options 7 and 8 would have minimal and minor adverse effects.
Improving Safety For All	**Accidents** Overall, across the 60-year appraisal period, it is predicted that there would be increases in accidents across the road network of 171 for Option 6, 112 for Option 7, 118 for Option 8 and 145 for Option 11. Analysis focusing on the junction itself showed that for a like for like volume of AADT, the number of Personal Injury Collisions (PICs) is reduced. In the design year the volume of traffic will increase, however the number of accidents will increase to a lesser degree, thus representing an improvement in safety.

Table 7-20. Benefits Register Summary

8 Statutory Undertakers' Assets Impacted

8.1 Public Utilities

8.1.1 Statutory Undertakers (SU) C2 searches have been undertaken in PCF Stage 2, identifying. 26 utility companies as potentially having assets within the vicinity of Walsgrave junction. 5 out of the 26 utility companies have existing apparatus that would likely be affected by at least one option to upgrade Walsgrave junction). These SUs are:

- Western Power Distribution (WPD) - high and low voltage power assets
- Severn Trent Water (STW) - both clean and wastewater assets
- BT Openreach - underground Telecoms cables
- Vodafone - underground Telecoms cables
- Coventry City Council (CCC) Street Lighting and Drainage assets.

8.1.2 C3 budget estimates and proposed diversionary drawings for Options 6, 7 and 8 were requested from each SU between November 2020 to February 2021. More details including the responses are in the Statutory Undertakes Diversions Report (HE604820-ACM-VUT-WAL_SW_000_Z-RP-CU-0001). C3 returns were received from 4 out of the 5 affected SUs; the only remaining one being CCC Street lighting and Drainage Services.

8.1.3 CCC have maintained that they are not legally defined as a Statutory Undertaker, thus are not required to comply with C3 requests. Any such design reviews of their existing assets would require payment beforehand and therefore re-engagement should be carried out in PCF Stage 3. It should be noted that the cost for installation of street lighting and drainage on the proposed merges and diverges in Options 7 and 8, and the proposed B4082 connector road in Option 6 has been included in the cost estimation exercise undertaken for the project in PCF Stage 2.

8.1.4 Option 11 was added in PCF Stage 2 following the Solution Review and Validation Event held in May 2021. For this Option, the C3 budget estimates and proposed diversionary drawings were requested from each SU in July 2021.

8.1.5 In summary, based on the current information available and documented within Statutory Undertakers Diversion Report, Option 6 would be the costliest solution in terms of diversionary works and lead-in/works durations (£2.32m). Options 7 and 8 would be considerably less in cost and complexity of diversionary works, valued at approximately £57k and £123k respectively. Note that the Option 7 costs exclude potential protection works associated with Vodafone telecoms assets which have not been provided at this stage; however, those are not expected to be significant.

8.1.6 Option 11 would be the least expensive Option, requiring no diversions (excluding aforementioned Local Authority assets) and only protection works, estimated at £30,000. As above, no total costs for the protection measures required (for the Vodafone and WPD Telecoms assets) were received. However, a nominal fee of £1,500 per day for protection supervision was received from Vodafone. The £30,000 estimate was prepared in discussion with the buildability advisor having recently undertaken similar works at Binley junction. Both Vodafone and WPD Telecoms have stated they will refine the fee estimate as the design progresses.

8.1.7 Consultations with WPD to avoid diversion of the 132kV overhead transmission cables and associated pylons structures (works valued at circa £17m in PCF Stage 1) commenced during the start of PCF Stage 2. These discussions successfully informed the design development process, avoiding diversionary works through exclusion zones and requirements being better defined. Further details are provided within the Statutory Undertakers Diversions Report.

8.1.8 A summary of the SU assets impacted by each of the proposed options is provided in Table 8-1 below.

8.1.9 Full details of the C2 enquiries, C3 responses and associated diversionary drawings can be found in the Statutory Undertakers Diversions Report. Refer to Appendix T for further details.

Status: It is crucial that utility services are not interrupted during the construction phase, particularly the services that are critical to the Coventry and Warwickshire University hospital. Therefore, it is heavily recommended that refreshing and obtaining further information regarding utility services be carried out in Stage 3.

Table 8-1 - Summary of Statutory Undertakers assets impacted

Option	Statutory Undertaker	Service affected	Impact description	C3 estimate (exc. VAT)
6	BT Openreach	Telecoms	Diversion of overground route to underground.	£42,045
	Vodafone	Telecoms	Cable diversion of approximately 270m of the existing Vodafone ducts & fibre optic cables away from works area.	£47,945
	WPD Telecom (Surf)	Telecoms	Diversion of existing duct and cables.	£57,400
	WPD	Power	Diversion of existing LV overhead cable servicing HHF. Installation of approx. 470m of LV mains cables and dismantling 400m of Overhead Conductor and poles.	£114,021
	Severn Trent	Sewer	Diversion of approx. 450m HDPE pressurised sewer main and air valve/washout chamber (ex. pipe abandoned). Lay approx. 500m x 315mm dia. foul rising main	£472,000
	Severn Trent	Clean Water	Diversion of underground water main.	£1,588,707
			Total	**£2,322,118**
7	Vodafone	Telecoms	In-situ protection of ex. Vodafone apparatus. Vodafone supervision on site to ensure no work within 100mm of Vodafone apparatus.	Cost not provided.
	WPD	Telecoms	100m of duct and cable to be diverted. Redundant apparatus will be disconnected and left in situ.	£57,300
			Total	**£57,300**
8	BT Openreach	Telecoms	Dismantling of ex. overhead telecoms cable servicing HHF. Apparatus removed back to Public Highways near Clifford Bridge Road.	£16,207
	Vodafone	Telecoms	Cable diversion of approximately 200m of the existing Vodafone ducts and fibre optic cables.	£44,204
	WPD	Power	Dismantling of existing low voltage cable.	£6,000
	WPD Telecom (Surf)	Telecoms	100m of duct & cable diverted. Redundant apparatus disconnected & left in situ.	£57,300
			Total	**£123,711**
11	Vodafone	Telecoms	In-situ protection of ex. Vodafone apparatus. Vodafone supervision required on site.	10 x £1,500/day
	WPD Telecom (Surf)	Telecoms	No diversions required. In-situ protection of apparatus likely to be required due to proximity.	10 x £1,500/day
			Total	**£3,000**
Options 6,7,8,11	Coventry City Council - Street Lighting	Other	CCC decline to provide C3 response. To be obtained in PCF Stage 3.	Cost not provided.
	Coventry City Council - Drainage	Other	C3 return not received as per above. To be obtained in PCF Stage 3.	Cost not provided.

9 Walking, Cycling and Horse-Riding Assessment and Review (WCHAR)

9.1 Walkers, Cyclists and Horse riders (WCH) provision

9.1.1 No provisions have been made at this stage for pedestrians or cyclists as the existing Walsgrave section of the A46 does not provide safe and viable access to local points of interest. There are no existing public footpaths, bridleways, or cycle routes on the A46 or B4082.

9.1.2 There are no changes proposed to types of access / users currently allowed on the B4082 and A46.

9.1.3 The nearest crossings over the A46 for WCHAR to the north of Walsgrave is located at Farber Road using the Public Right of Way (PRoW) R75X. The project will not affect any PRoWs in the vicinity.

9.1.4 Brinklow Road provides a crossing under the A46 to the south of the existing Walsgrave junction.

9.1.5 There is a publicly accessible path following the River Sowe on the west side. This is not affected by the upgrade.

9.1.6 At present, WCH surveys and a Walking, Cycling & Horse-Riding Assessment and Review (WCHAR) as per GG 142, has not been undertaken for the Walsgrave junction area as no impact to existing facilities is foreseen from any of the proposed options.

9.1.7 During the Stage 2 Public Consultation the need for improved provision for pedestrians, cyclists, and horse riders, integrated with local authority plans was highlighted. Alternative access to the hospital, principally for emergency vehicles, but potentially for pedestrians and cyclists was also suggested.

9.1.8 The findings of the Public Consultation and other stakeholder engagement will be incorporated and explored further during the Stage 3 Preliminary Design in collaboration with the local authority, the hospital, and the housing developers - adjacent to the University Hospital. Refer to the Report on Public Consultation in Appendix C for further detail.

9.1.9 The Equality Impact Assessment (EqIA) report is based on the screening assessment of PCF Stage 2 of the A46 Coventry Junctions Upgrade – Walsgrave junction project, focused on Option 11 with mention of Options 6, 7 and 8. The screening assessed the following demographics against the Option designs:

- Sex
- Religion/Belief
- Age
- Disability
- Race
- Sexual Orientation
- Gender Re-assignment (inc. transexual and transgender)
- Pregnancy & Maternity
- Marriage & Civil Partnership

9.1.10 The findings of the Public Consultation and other stakeholder engagement events will be incorporated and explored further during the – Stage 3 – Preliminary Design phase, as these are all elements that can be explored further in collaboration with the local authority, the hospital and the housing developers - adjacent to the University Hospital.

9.1.11 Refer to the EqIA in Appendix U for further detail.

9.2 Land Take and Impact

9.2.1 There are no existing proposals for WCHAR access, hence there is no land take or impact associated; however, this will be considered further in PCF Stage 3.

10 Conclusions and Recommendations

10.1 Summary

10.1.1 With the adjacent Binley junction upgrade currently under construction, the existing at-grade Walsgrave junction is the remaining major cause of congestion on the A46 near Coventry. It also requires upgrade to facilitate economic growth, contribute to a safe and efficient strategic road network, minimise environmental impact and improve operational maintenance with reduced disruption.

10.1.2 On the periphery of the Coventry urban area, the largely rural setting of Walsgrave junction is constrained by nearby housing, a SSSI, flood plains, overhead high voltage lines and several listed buildings and features.

10.1.3 Four options have been developed and assessed during PCF Stage 2, three of which (Options 6, 7 & 8) were concluded as non-viable due to their impact on flooding and re-routing of traffic, with the one remaining viable option (Option 11) being taken forward and presented at non-statutory Public Consultation in early 2022. Feedback from the consultation was largely positive and supportive of Option 11 and helped identify areas for further development in coordination with key stakeholders during the next stage.

10.1.4 Option 11 is a fully grade separated dumbbell junction approximately 800m to the north of the existing roundabout. The geometry allows a 50mph speed limit on the mainline dual carriageway. A re-aligned B4082 connector road links the proposed junction back to the local road network at Clifford Bridge Road.

10.1.5 All roads on the junction would be lit, as well as the A46 continuously between Binley and the M6/M69. The parking laybys immediately north of the existing junction would be removed, but maintenance hardstandings would be provided for all significant assets. Ten geometric departures from standards have been identified at this stage.

10.1.6 A buildability assessment has been undertaken and estimates that, commencing in 2025, the junction upgrade would take approximately 16 months to construct, whilst maintaining two lanes in each direction on the A46.

10.1.7 The Environmental Assessment has concluded that there is potential for significant adverse effects due to Option 11. These are principally associated with noise and vibration at Hungerley Hall Farm, land and townscape due to the elevated and lit junction affecting the setting of listed Coombe Abbey Registered Park and Gardens, and the new road alignment plus removal of the existing Hungerley Hall Farm accommodation overbridge affecting movement of bats, barn owls and riparian mammals.

10.1.8 Both strategic and local traffic modelling was undertaken, based on an opening year of 2025 and a design year of 2040. The models were validated against existing surveyed traffic flows and growth forecasts included specific major developments in the Coventry and Rugby area. Option 11 shows significant congestion relief and reduced delays at Walsgrave junction and on the wider A46 route as well as evidence of significant additional traffic volumes generated. With this growth, Walsgrave junction is predicted to operate satisfactorily in 2040; however, the local road network may have insufficient capacity and may require additional mitigation.

10.1.9 Compensating for the growth in traffic volumes, the safety assessment shows that Option 11 achieves the safety objectives for the three-year period after opening, with a lower Personal Injury Collision (PIC) number and a stable Fatality and weighted injury (FWI) rate. However, due to the growth in vehicle flows, the number of accidents is forecast to increase.

10.1.10 The economic assessment was undertaken over a 60 year period from opening and principally considered road user benefits, accident savings, greenhouse gases and local air quality, noise impacts, construction delays, wider impacts, and journey time reliability. Costs were derived from the option estimates. Both benefits and costs were discounted to present (2021) prices. Option 11 demonstrated a present value of benefits of £166million, present value of costs of £60million, a Net Present Value of £106million and an adjusted Benefit Cost Ratio of 2.76, representing a high value for money as defined in the Department for Travel Value for Money Framework.

10.1.11 Of the 26 utility companies identified, only 5 have assets in the vicinity of Walsgrave junction. However, the alignment of Option 11 was developed to avoid these as far as possible and as such no diversions of Statutory Undertaker's apparatus would be required, with only minor protection work associated with two telecoms assets.

10.1.12 There are no existing public footpaths, bridleways, or cycle routes on the A46 or B4082 and no changes proposed to the users allowed to access these roads. The Public Consultation did however identify the need for improved provision and integration with local authority plans.

10.2 Key Findings

10.2.1 The assessment of Option 11, alongside feedback from the Public Consultation, demonstrates that all of the scheme objectives for the Walsgrave junction upgrade can be met:

- A strategic road network that supports and facilitates economic growth, supporting employment and residential development opportunities;
- A strategic road network that is maintained to safe and serviceable condition;
- Improve the operation and efficiency of the existing transport network, delivering capacity enhancements to the SRN;
- A strategic road network that minimises its negative impacts on users, local communities, and the environment;
- A strategic road network that balances the need of individuals and businesses that use and reply upon it;
- Reducing/minimising the impact on the wider environment, whilst seeking to bring enhancement;
- Operational maintenance to be considered holistically during the design stage and at a balance of cost versus disruption.

10.2.2 Despite challenging constraints, the alignment of Option 11 largely complies with standards. The arrangement performs well by reducing congestion and journey times without adversely affecting the local road network and is assessed as being high value for money economically.

10.2.3 Risks associated with Option 11 are acceptable and it can be built and operated safely. Whilst there is potential for significant environmental impact, there is also opportunity to mitigate the impacts and to achieve a positive biodiversity net gain. Feedback from Public Consultation was largely positive and areas for further development in PCF Stage 3 with key stakeholders have been identified.

10.3 Consenting Route

10.3.1 Option 11 is considered to be either a construction or alteration scheme as it involves new sections of carriageway that are outside the existing highway boundary and the realignment of the existing junction. It is located wholly within England and the Secretary of State is the Highway Authority. The area of development for Option 11 exceeds the 12.5ha threshold and so it is likely that it would be classed as a NSIP requiring a DCO. The consenting route will be determined in the Planning Route Proforma published by National Highways.

10.4 Recommendations

10.4.1 It is recommended that Option 11 is taken forward to the Preferred Route Announcement and developed further at PCF Stage 3.

10.4.2 Refer to Appendix D for further detail on the status of design elements and tasks recommended to be completed in PCF Stage 3.

11 Detailed Appendices

Appendix A - Preliminary Sources Study Report

Appendix B - Environmental Assessment Report

Appendix C - Report on Public Consultation

Appendix D - Status Box Summary Table

Appendix E - Reference List

Appendix F - Solution Review & Validation Event Sept21

Appendix G - Culvert As-Built Drawings and Existing Structures TN

Appendix H - Environment Constraints Map

Appendix I - Benefits Register

Appendix J - Attenuation Pond Drawings

Appendix K - NNNPS Accordance

Appendix L - Mouchel PCF Stage 1 Options Assessment

Appendix M - A46 Walsgrave Junction Drawings (General Arrangement)

Appendix N - Proposed Drainage Drawings

Appendix O - Lighting Layouts

Appendix P - ITS Technology Report

Appendix Q - Buildability Report

Appendix R - Scheme Safety Assessment Extents

Appendix S - Cost Estimation Form 103

Appendix T - Statutory Undertaker Diversions Report

Appendix U - Equality Impact Assessment