OxSRFI

OXFORDSHIRE

STRATEGIC RAIL FREIGHT INTERCHANGE

DESIGN APPROACH DOCUMENT

HIGHWAYS DESIGN APPROACH

Document 5.5C

Revision Number – Rev B

October 2026

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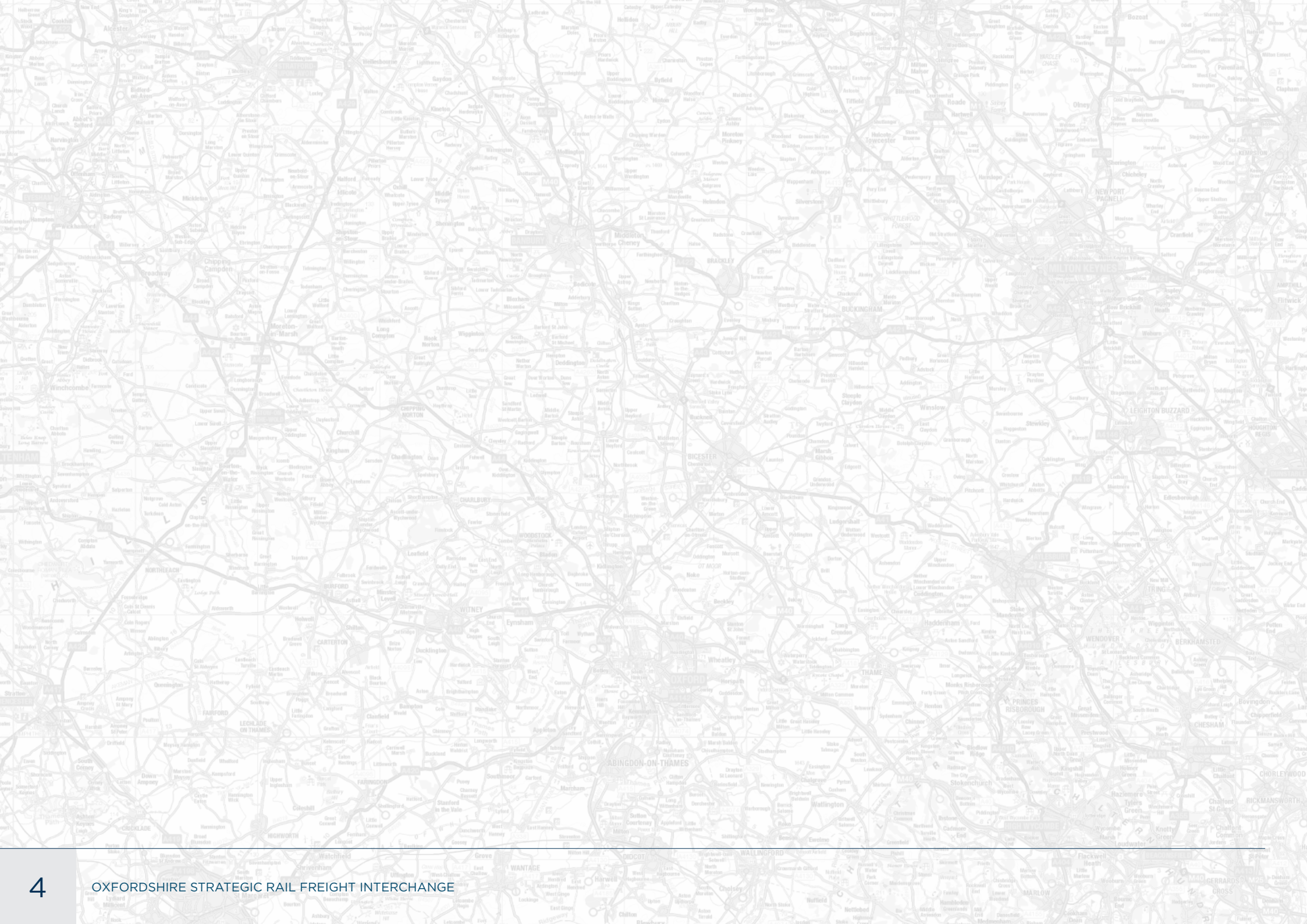
- Makes roads safe and useful
- Is inclusive
- Makes roads understandable
- Fits in context
- Is restrained
- Is environmentally sustainable
- Is thorough
- Is innovative
- Is collaborative
- Is long-lasting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Gloucester

SECTION 1

INTRODUCTION

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STRATEGIC RAIL FREIGHT INTERCHANGE

1. INTRODUCTION

1.1 Oxfordshire Railfreight Ltd (the Applicant) is promoting the Oxfordshire Strategic Rail Freight Interchange (OxSRFI, the Scheme), on land (the Main Site) located south of the Chiltern Main line Railway and near M40 Junction 10.

1.2 OxSRFI also proposes large-scale improvements to the surrounding highway network, including a major upgrade of M40 Junction 10 and the adjacent junctions on the A43, a bypass to the village of Ardley, a link road to Heyford Park, a relief road to the north-east of the village of Middleton Stoney and a number of other highway works including improvements at M40 Junction 9. Together, these proposed works are referred to as the Highway Works.

1.3 Chapter 2 of this DAD sets out the need, vision and objectives for the highway works. Chapter 3 then goes onto describe how these have informed the overall design of the highway works.

1.4 Chapter 4 of this DAD explains how the principles of good road design have been taken into account and informed the design approach to the highway works. The ten principles of good road design are set out in DMRB standard GG 103[1]. That standard states that good road design:

- makes roads safe and useful;
- is inclusive;
- makes roads understandable;
- fits in context;
- is restrained;
- is environmentally sustainable;
- is thorough;
- is innovative;
- is collaborative; and
- is long-lasting.

ACRONYMS AND ABBREVIATIONS

Consultant	Discipline and Chapters
BNG	Biodiversity net gain
CDC	Cherwell District Council
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges
DAD	Design Approach Document
EIA	Environmental Impact Assessment
HPLR	Heyford Park Link Road
LRN	Local Road Network
MRS	Maintenance and repair statement
MSA	Motorway Service Area
MSRR	Middleton Stoney Relief Road
NH	National Highways
NSIP	Nationally Significant Infrastructure Project
OCC	Oxfordshire County Council
OxSRFI	Oxfordshire Strategic Railfreight Interchange
PIC	Personal injury collision
PRoW	Public right of way
SRN	Strategic Road Network
SuDS	Sustainable drainage systems
TWG	Transport Working Group
WCHAR	Walking, cycling, horse-riding assessment and review

1 DMRB GG 103 “Introduction and general requirements for sustainable development and design”, para E/2

SECTION 2

HIGHWAY WORKS NEED, VISION AND OBJECTIVES

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NEED FOR HIGHWAY WORKS

2.1 The primary reason for the highway works arises from the need to connect the OxSRFI Main Site, which is an NSIP, to the SRN. At the same time it is important that the Scheme does not have inappropriate impacts on both the SRN and LRN.

VISION AND OBJECTIVES

2.2 The following overall objectives have been developed for the highway works:

- Connect the OxSRFI Main Site to the SRN;
- Minimise journey times and improve road safety on the SRN adjacent to OxSRFI;
- Minimise impact on surrounding communities;
- Provide the appropriate scale of works;
- Active travel and the needs of pedestrians, cyclists and horse-riders (where appropriate) to be at the forefront of the design of the highway works; and
- Where new roads are required they are to be designed to minimise their impact on the environment and integrate into the landscape as much as reasonably practicable.

OVERVIEW OF THE HIGHWAY WORKS

2.3 Through lengthy design development and collaboration with key stakeholders the following highway works have been devised to meet this overall need. Chapter 3 of this report sets out more detail of the design development undertaken for each of these elements of the highway works.

2.4 **Figure 2.1, Figure 2.2, Figure 2.3** and **Figure 2.4** below show the overall location and layout of the highway works. These are shown in full on the Highway Works Overview (Document 6.2A).

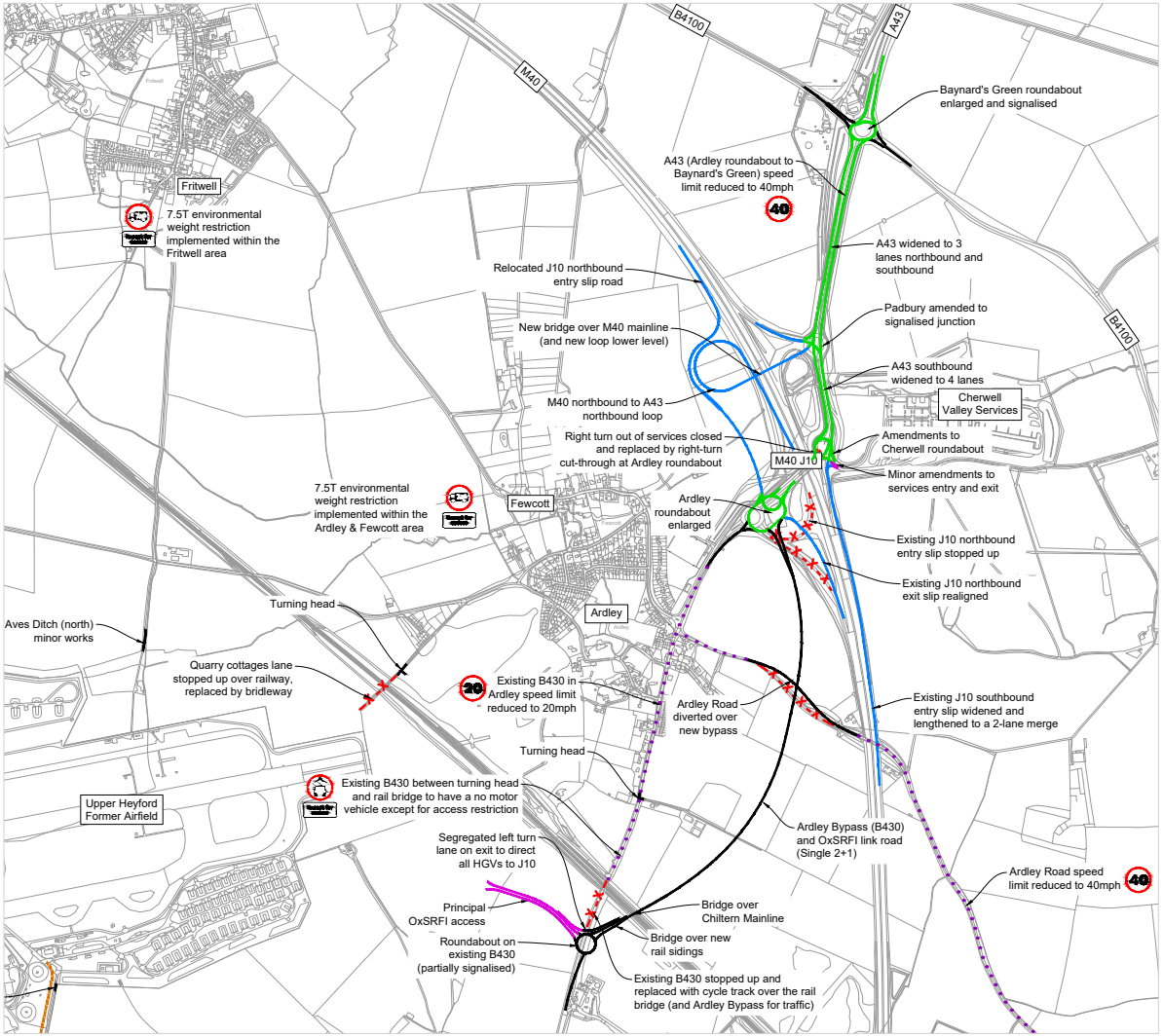


Figure 2.1 Location plan: M40 Junction 10, A43 and Ardley Bypass

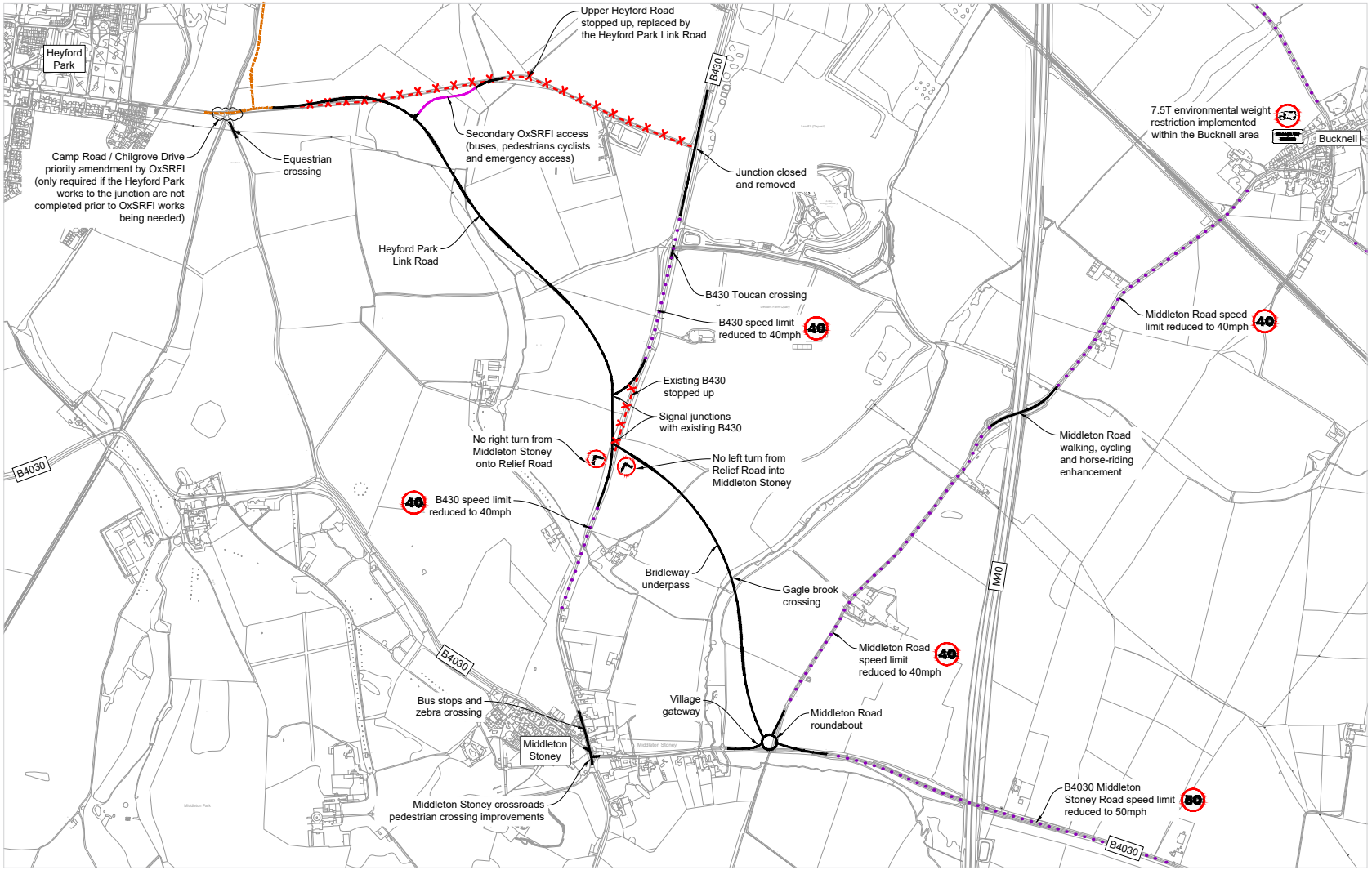


Figure 2.2 Location plan: HPLR, MSRR and various other local highway works



Figure 2.3 Location plan: M40 Junction 9

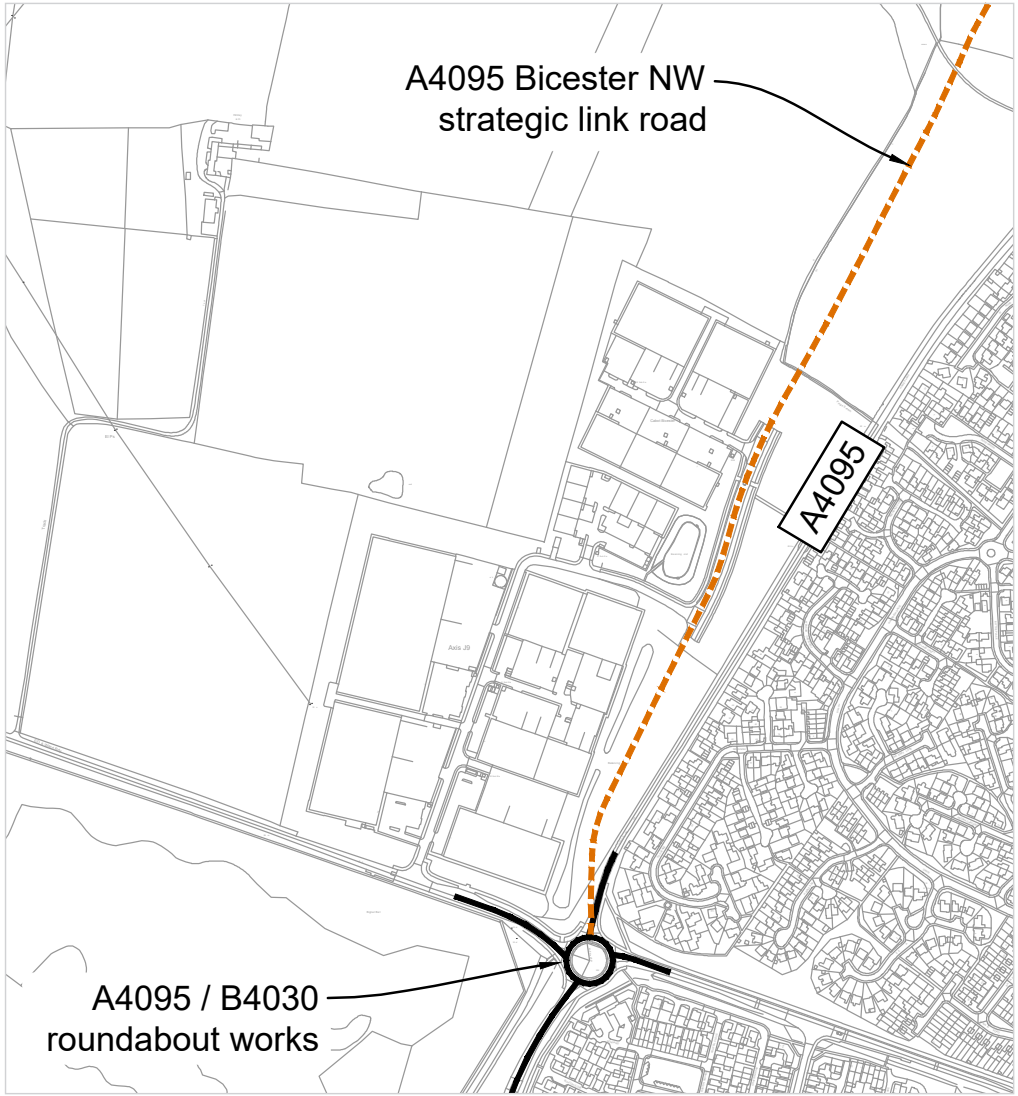


Figure 2.4 Location plan: A4095/B4030 junction

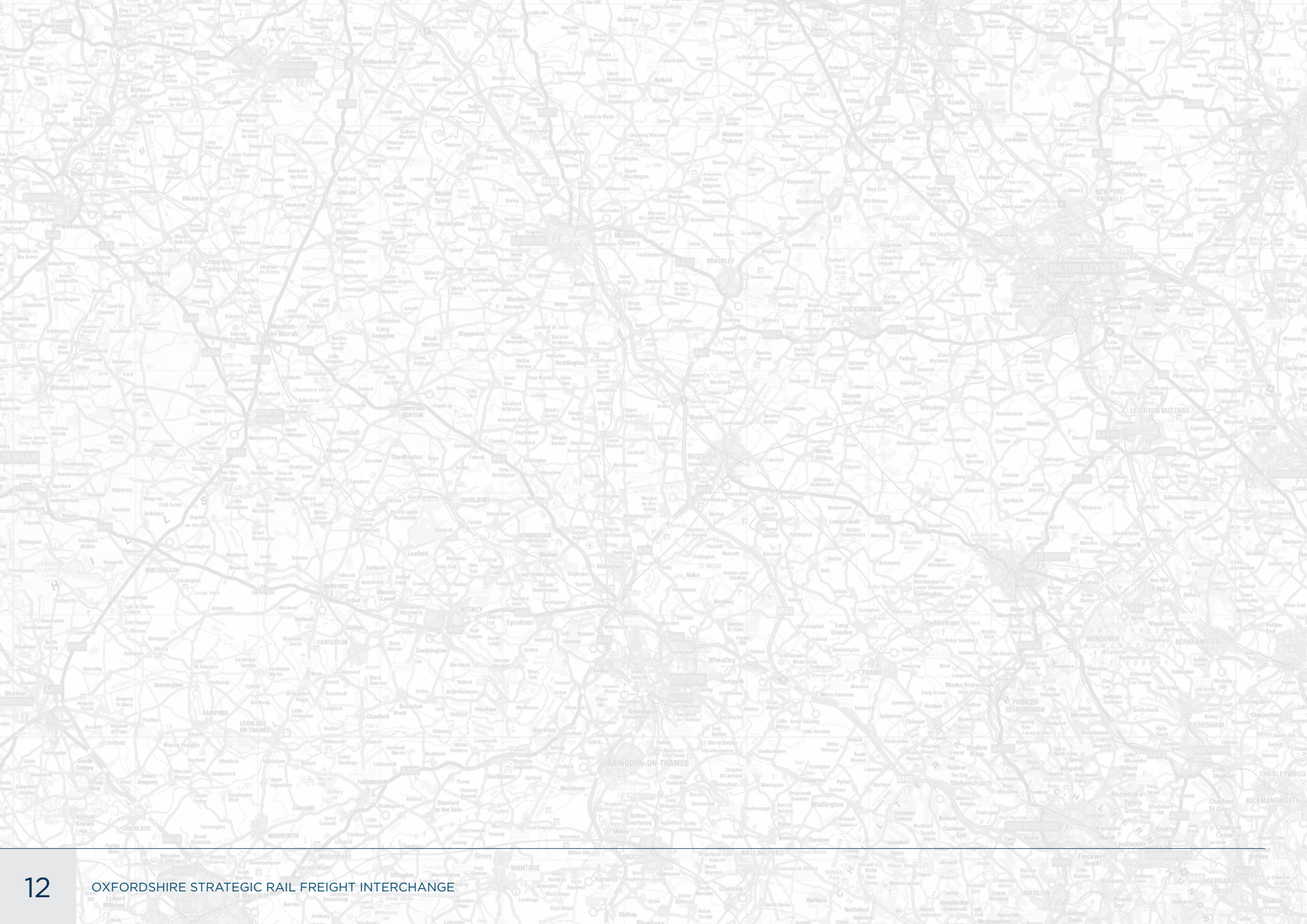
2.5 The following table provides a summary of why each element of the highway works is required and is cross-referenced to the relevant Work No. within the DCO.

Highway element	DCO Work No.	Summary of need for highway works
OxSRFI principal access to the Main Site	11	To provide access into OxSRFI
HPLR	12A & 12B	The existing Upper Heyford Road is consumed by the OxSRFI Main Site and this new road is needed to retain access into Heyford Park and other areas to the west of the OxSRFI
Camp Road/ Chilgrove Drive junction	13B	To connect the HPLR into the Camp Road junction (in the event the HPLR is constructed prior to works at this junction being proposed in connection with Heyford Park)
M40 Junction 10 (including works to the A43)	14A to 18	Strategic need to improve the SRN at Junction 10 and the A43 to accommodate traffic to and from OxSRFI and thereby enabling OxSRFI to be connected to the SRN
Ardley Road and Ardley Bypass	19, 20 and 36	Avoid otherwise significant adverse effects on the village of Ardley
M40 Junction 9	22	To minimise the likelihood of use of the adjacent B430 corridor as an alternative to the M40 and improve safety on the SRN on the A34 approach
MSRR	23	Avoid otherwise significant adverse effects on the village of Middleton Stoney and to allow for OxSRFI to be served effectively by bus
B430 Upper Heyford Road junction	25B	Removal of the junction with Upper Heyford Road following opening of the HPLR
A4095 / B4030 roundabout	39	To address an otherwise unacceptable impact of OxSRFI traffic on the LRN on the western side of Bicester

2.6 In addition to the above, a number of elements of the highway works have been derived to enable and improve active travel and for recreational use by pedestrians, cyclists and horse riders. These elements are listed below but are not assessed in detail in this report as they are covered by the WCHAR assessment (Document 6.3A (ES Appendix 3.1)).

Highway element	DCO Work No.
Chilgrove Drive (bridleway connection)	10
Aves Ditch (bridleway connection)	13A
Ardley Bypass PRoW works	21
Middleton Road	24
B430 active travel route	25A
Quarry cottages turning head and bridleway	26
Ardley Road (Middleton Stoney), bus stops and crossing	27A
Middleton stoney crossroads	27B
Aves Ditch north (bridleway connection)	28
Cycle link to Middleton Road	33

2.7 The OxSRFI highway works on the local road network, which address capacity needs, are focussed on the B430 and B4030 corridors along with the HPLR. However, it is also important to consider the role that local rural roads have within the context of the OxSRFI scheme. These routes, linking local villages, have a function and role to provide appropriate routes for local use by varying modes. Therefore, to complement the highway works on the B430 and B4030 corridors and the HPLR, OxSRFI will implement changes to various local rural roads connecting Bicester, Bucknell, Middleton Stoney, Ardley and Somerton.



SECTION 3

DESIGN DEVELOPMENT OF HIGHWAY WORKS

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3. DESIGN DEVELOPMENT OF HIGHWAY WORKS

3.1 The purpose of this chapter is to set out an overview of each element of the highway works, how their design has been developed and how they meet the overall need, vision and objectives.

OXSRFI PRINCIPAL ACCESS (WORK NO. 11)

3.2 The location of the principal access has been positioned at the northern end of the Main Site so that it is as close as practicable (within the Main Site) to M40 Junction 10. The masterplanning of the OxSRFI Main Site and is covered in the Main DAD (Document 5.8A).

3.3 An important consideration in the design of the principal access is to direct all HGV traffic north to M40 Junction 10 which is an integral part of the HGV routeing strategy (Document 6.3A (ES Appendix 3.1)). This is achieved by providing a segregated left-turn lane for traffic leaving OxSRFI and a height barrier (with a bypass lane for buses) connecting onto the main junction.

3.4 Traffic modelling, as presented in the Transport Assessment (Document 6.3A), has shown that a partially signalised roundabout is the most appropriate design approach to accommodate the forecast traffic whilst at the same time not providing an overly large junction (which would be the case if signals were not proposed).

3.5 The principal access junction will form the southern end of the Ardley Bypass (see further below on the bypass alignment).

3.6 A north south active travel route is to be taken through the junction with a connection for pedestrians and cyclists into OxSRFI.

HEYFORD PARK LINK ROAD (HPLR) (WORK NOS. 12A AND 12B)

3.7 The need for the HPLR arises as a direct result of the masterplanning of the OxSRFI Main Site which is covered in the Main DAD (Document 5.8A). This masterplanning work determined that the HPLR should run in a corridor to the south of the proposed warehousing, and integrated into the landscaping within this southern area of the Main Site.

3.8 An alternative route for the HPLR was considered running closer to Middleton Stoney as shown on **Figure 3.1** below, running from the B4030 northwest of Middleton Stoney to the B430 north of Middleton Stoney. However, this was rejected due to its proximity to Middleton Stoney and additional distance required for users travelling between J10 and Heyford Park.

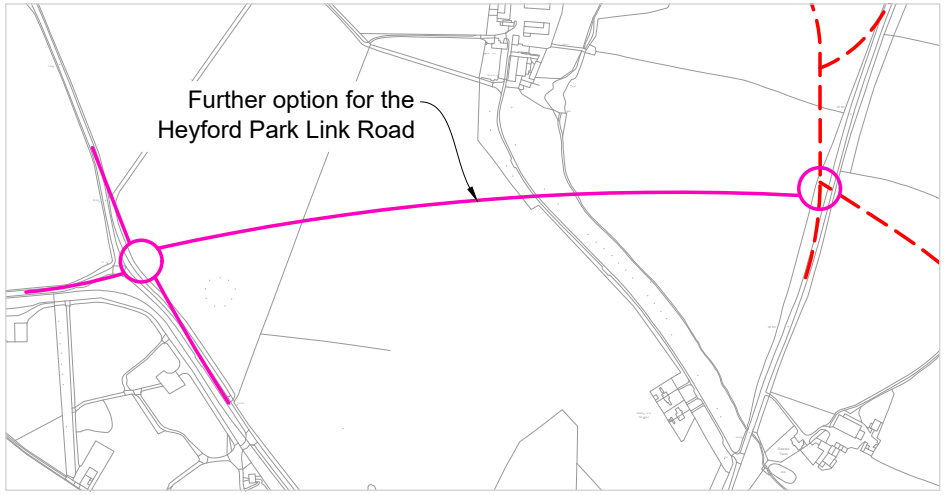


Figure 3.1 HPLR southern alignment option (Middleton Stoney is to the immediate south)

3.9 The alignment of the HPLR allows for the efficient and effective use of the land available together with a comprehensive approach to the design and landscaping of the southern area of the Main Site. It enables appropriate landscape mitigation measure to be incorporated into the design of the scheme north of the HPLR and therefore, together with a comprehensive approach to the landscaping of the southern area of the Main site, creating an attractive route to and from Heyford Park along the southern part of the site. Care has been taken to minimise the impact on the woodland south of the HPLR.

3.10 A junction on the HPLR will be provided into the southern end of the OxSRFI Main Site which is the secondary access for use by public transport, pedestrians and cyclists, and it will also provide an emergency access into OxSRFI. Active travel is provided for along the route in the form of an off-carriageway pedestrian and cycle facility. Between the secondary access and Chilgrove Drive junction this is a segregated facility to encourage walking from Heyford Park into OxSRFI as well as cycling.

3.11 At the eastern end of the HPLR there is a junction with the B430 and the MSRR. The location of this has been determined as part of the design of the MSRR (see further below). The proposed HPLR is designed to integrate with the MSRR and therefore will encourage traffic from Heyford Park to utilise this route, away from Middleton Stoney.

3.12 As described in the Middleton Stoney-Heyford Park Options Report which is appended to the Transport Assessment (ES Appendix 3.1) two options for the junction between the HPLR and B430 have been considered in the form of a roundabout or traffic signals. The roundabout option did not have sufficient capacity and traffic signals cater better for crossings points for pedestrians, cyclist and horse-riders; the crossing for horse-riders being located at the southern end of the overall junction which is part of the new bridleway provision.

3.13 Based on it not running through an urban area and with infrequent junctions a design speed of 100kph is proposed with the road being designed to DMRB standards and subject to the national speed limit. However, reduction in the speed limit at the junctions at each end of the HPLR are proposed.

3.14 Further details on the landscaping design of the HPLR are presented at Chapter 4 below.

CAMP ROAD / CHILGOVE DRIVE JUNCTION (WORK NO. 13B)

3.15 This junction is to be reconstructed as part of the consented Heyford Park residential scheme, that scheme would realign Chilgrove Drive to the east and a new signalised junction provided. The HPLR would connect into this junction.

3.16 In the event that the OxSRFI scheme is constructed prior to the Heyford Park scheme, small scale works to change the priority at this junction is proposed such that priority is given to traffic between Camp Road and the HPLR as this, with the MSRR, will divert east-west traffic away from Middleton Stoney. As this is a straightforward element of work it is not considered in detail in this report.

CONNECTING OXSRFI TO THE SRN: WORKS TO THE SRN (WORK NOS. 14A TO 18)

Option for a new junction on the M40

3.17 At an early stage in the design process an east-west new road corridor was considered alongside a new junction on the M40, approximately midway between junctions 9 and 10. The concept design of this is shown on **Figure 3.2** below. The overall OxSRFI scheme evolution is described in the Main DAD (Document 5.8A).

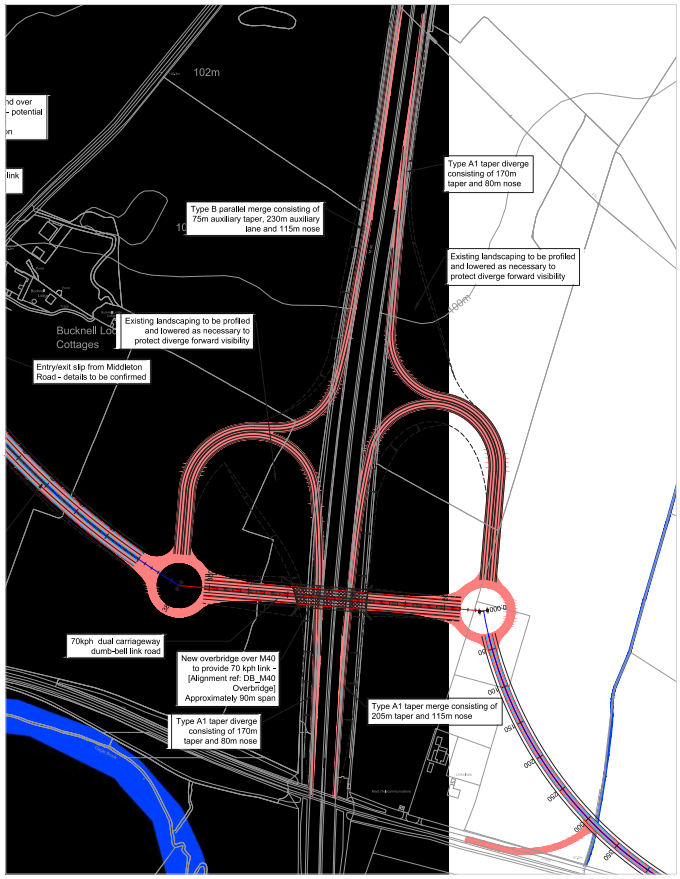


Figure 3.2 New M40 junction concept design

3.18 As the design of a potential new junction was developed it quickly became apparent that this could introduce unacceptable impacts on both the SRN and LRN. On the SRN weaving issues were identified due to the proximity of junction 9 to the south and junction 10 to the north and the new junction was forecast to transfer local journeys onto the SRN which would go against the requirements of DfT Circular 01/2022 (paras 18 to 20).

3.19 Furthermore, as well as providing a new junction, substantial works to M40 junction 10 would still be needed to take OxSRFI traffic to and from the A43.

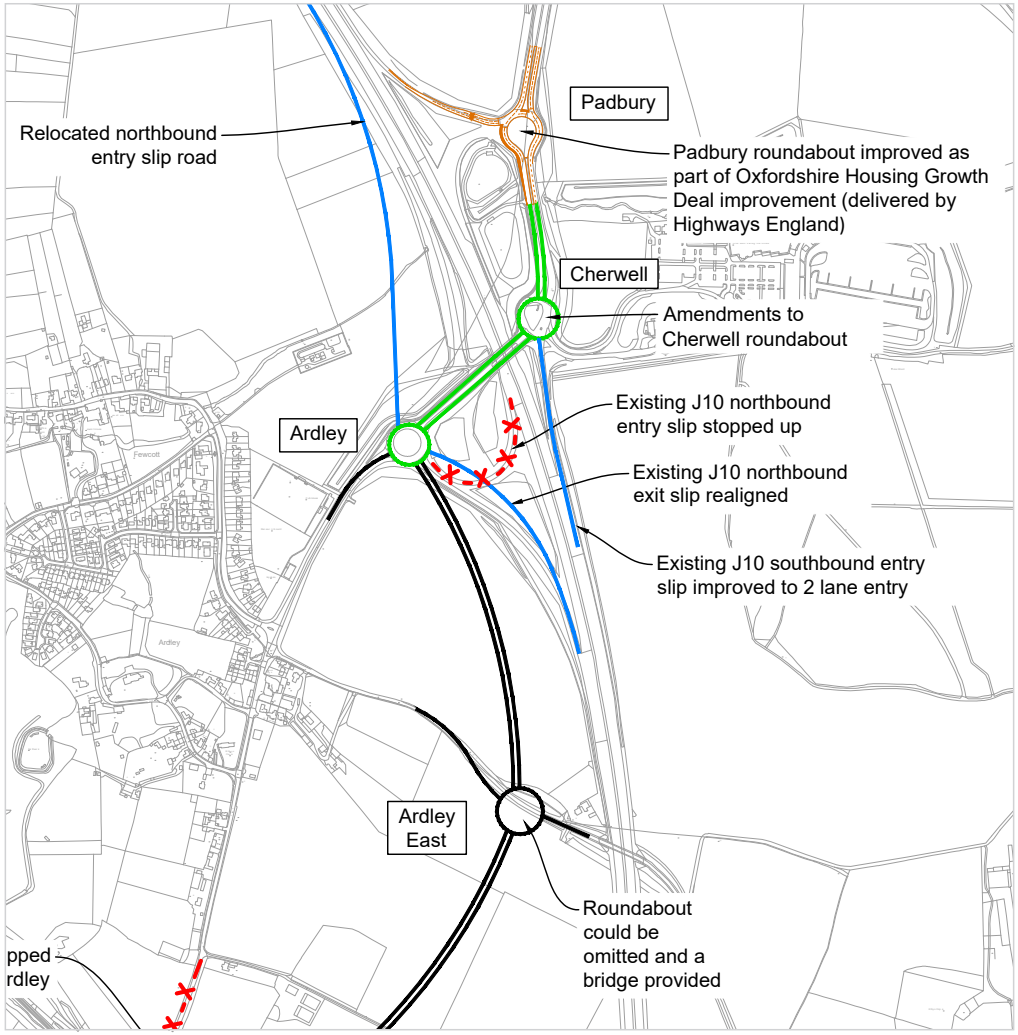
3.20 On the LRN the junction would directly connect the western side of Bicester to the M40 thus inducing traffic onto this side of Bicester and could impact its proposed western extension.

3.21 The new link road from a new junction to the OxSRFI Main Site would have run through Dewars Quarry which would have an adverse impact on the ability to continue mineral extraction at the quarry.

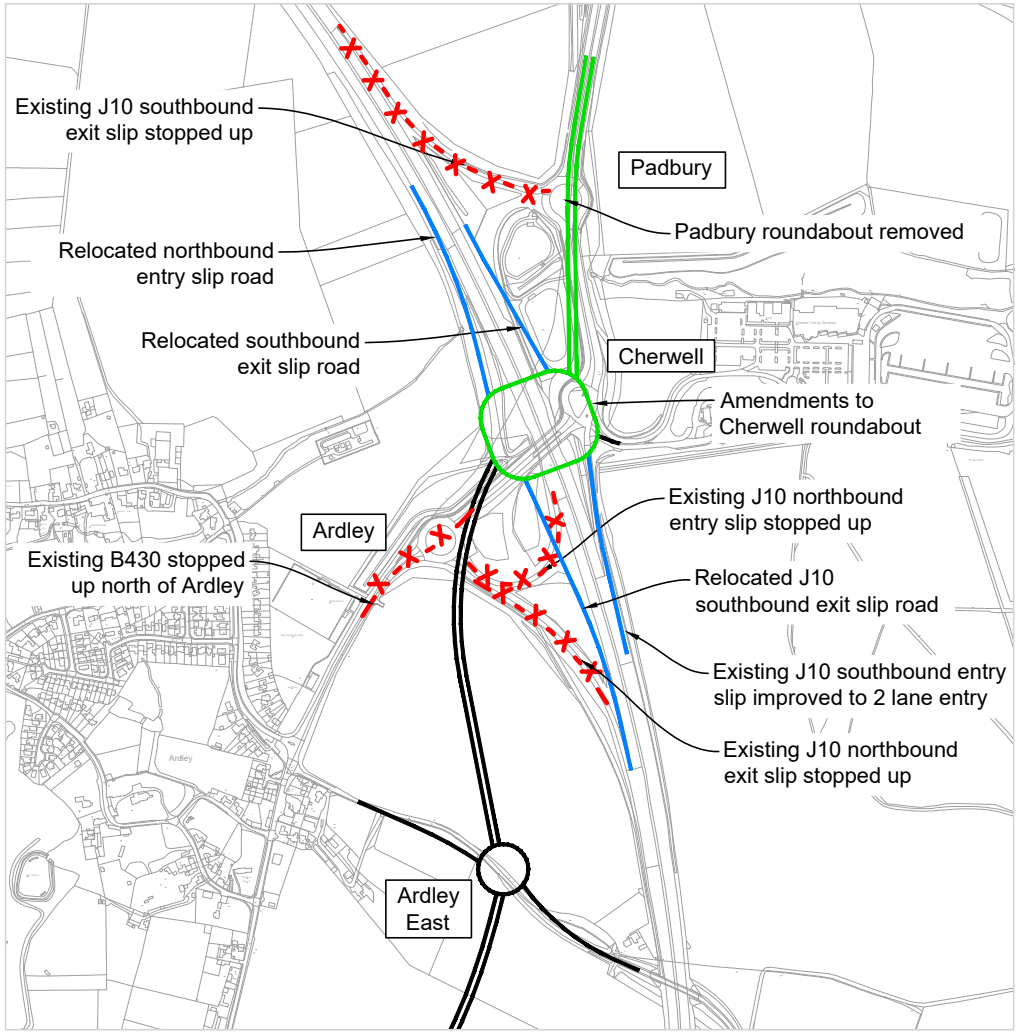
3.22 For the above reasons it was determined that OxSRFI should connect to the SRN at junction 10 and the scheme should focus on improving that existing junction on the SRN rather than creating a new one. This is in accordance with paragraphs 18 to 20 of DfT Circular 01/2022 which sets out the preference will always be that access to new development should make use of existing junctions.

M40 junction 10

3.23 Based on the decision to connect to junction 10 the Applicant has considered several mitigation options and design solutions in coming to its proposals for this complex junction, in consultation with the relevant highway authorities. High-level sketches of some of the options reviewed are shown below, and this demonstrates that a thorough approach to the layout of Junction 10 has been undertaken.



Option 1



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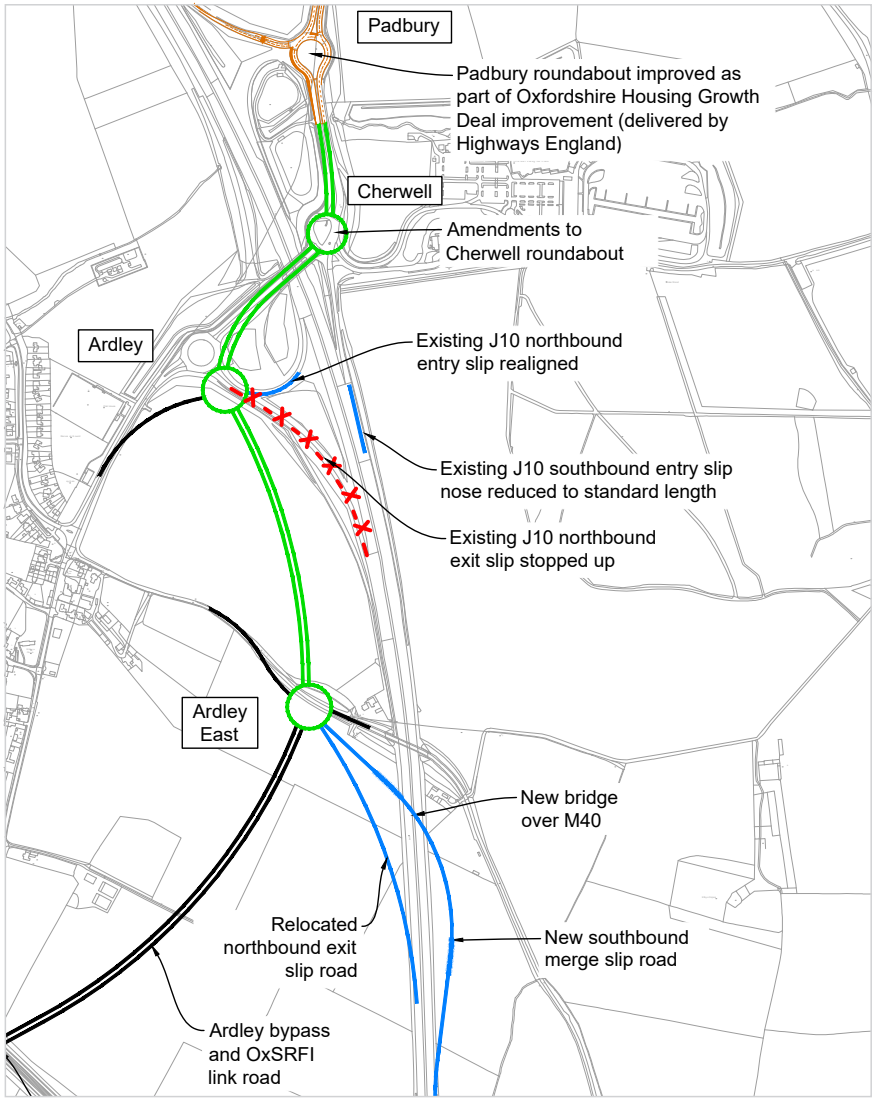

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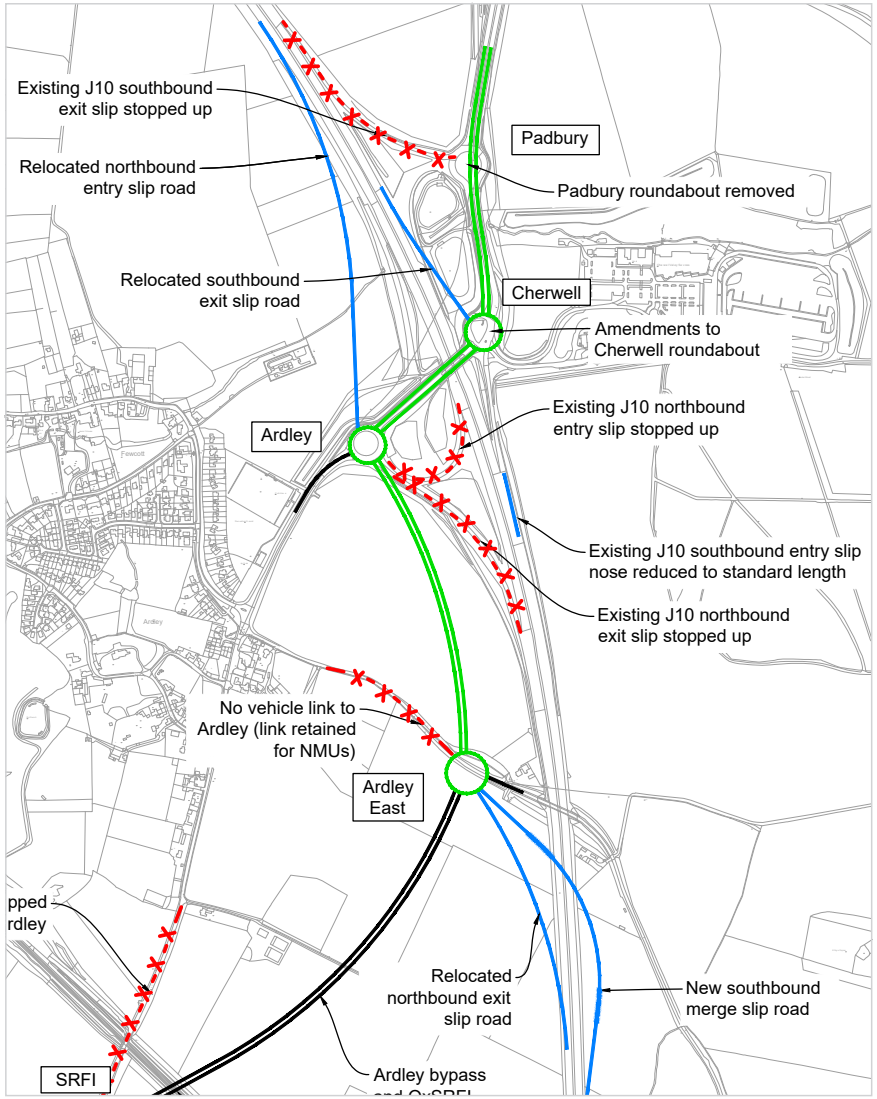
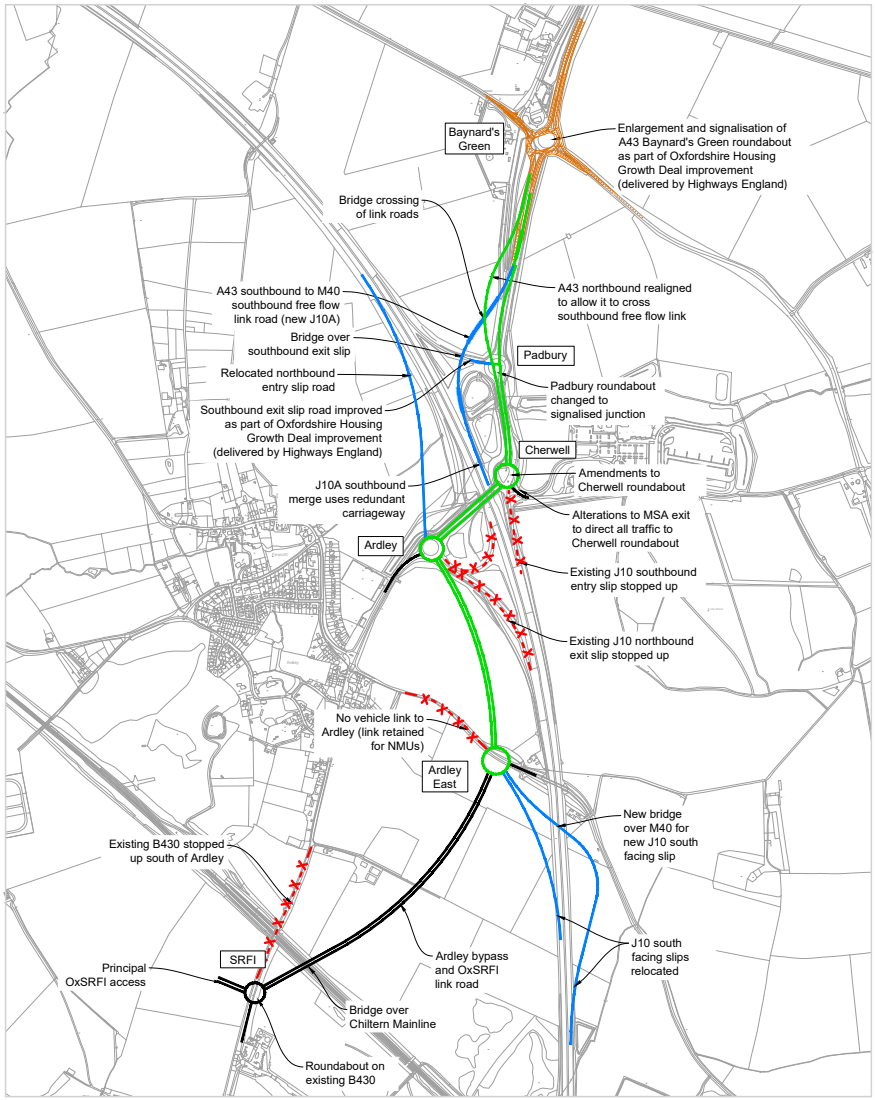


Option 9



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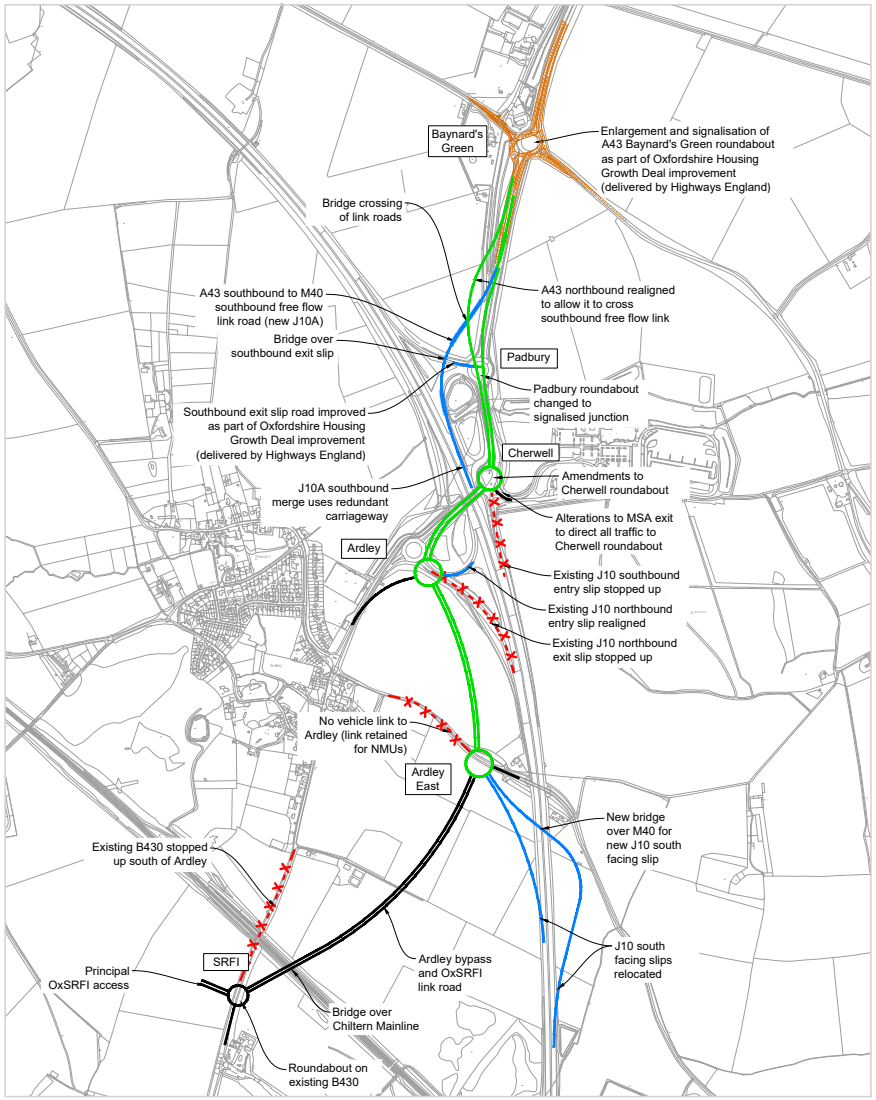

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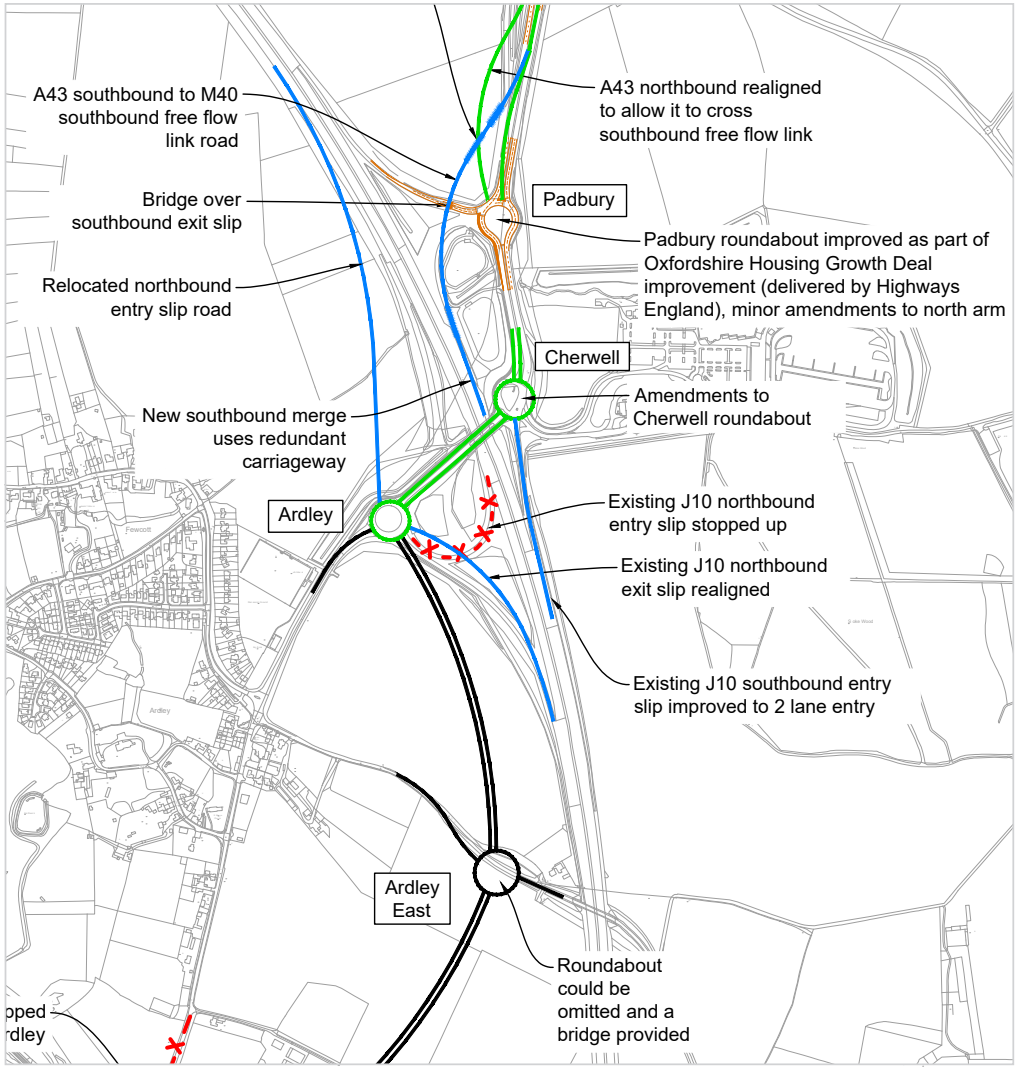

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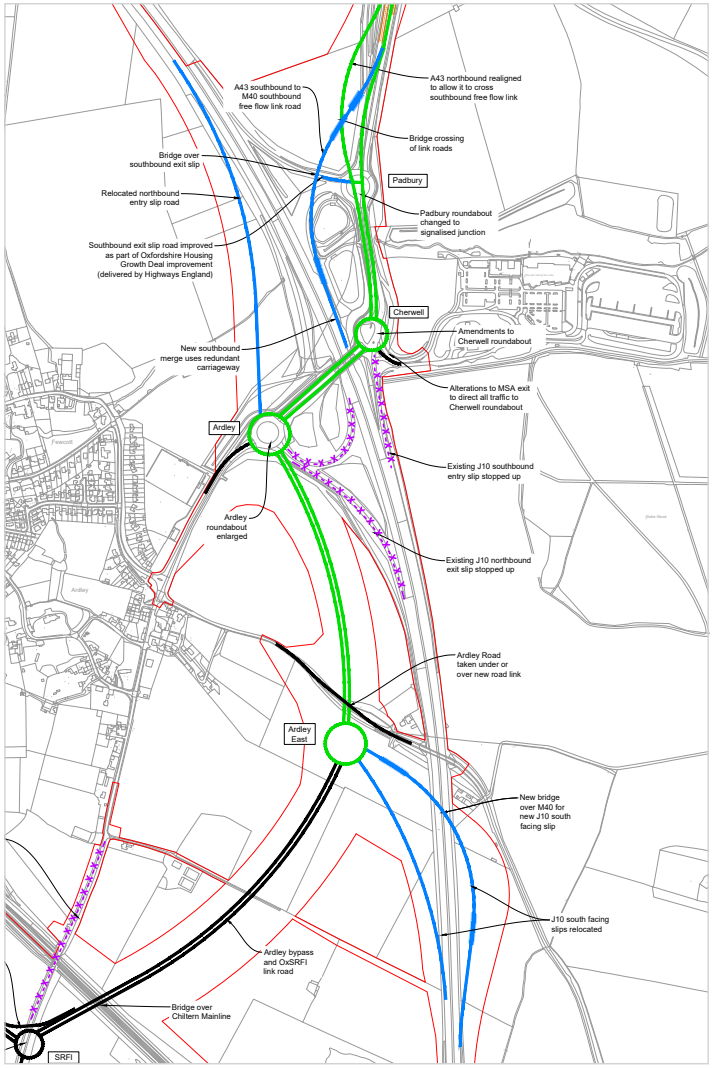

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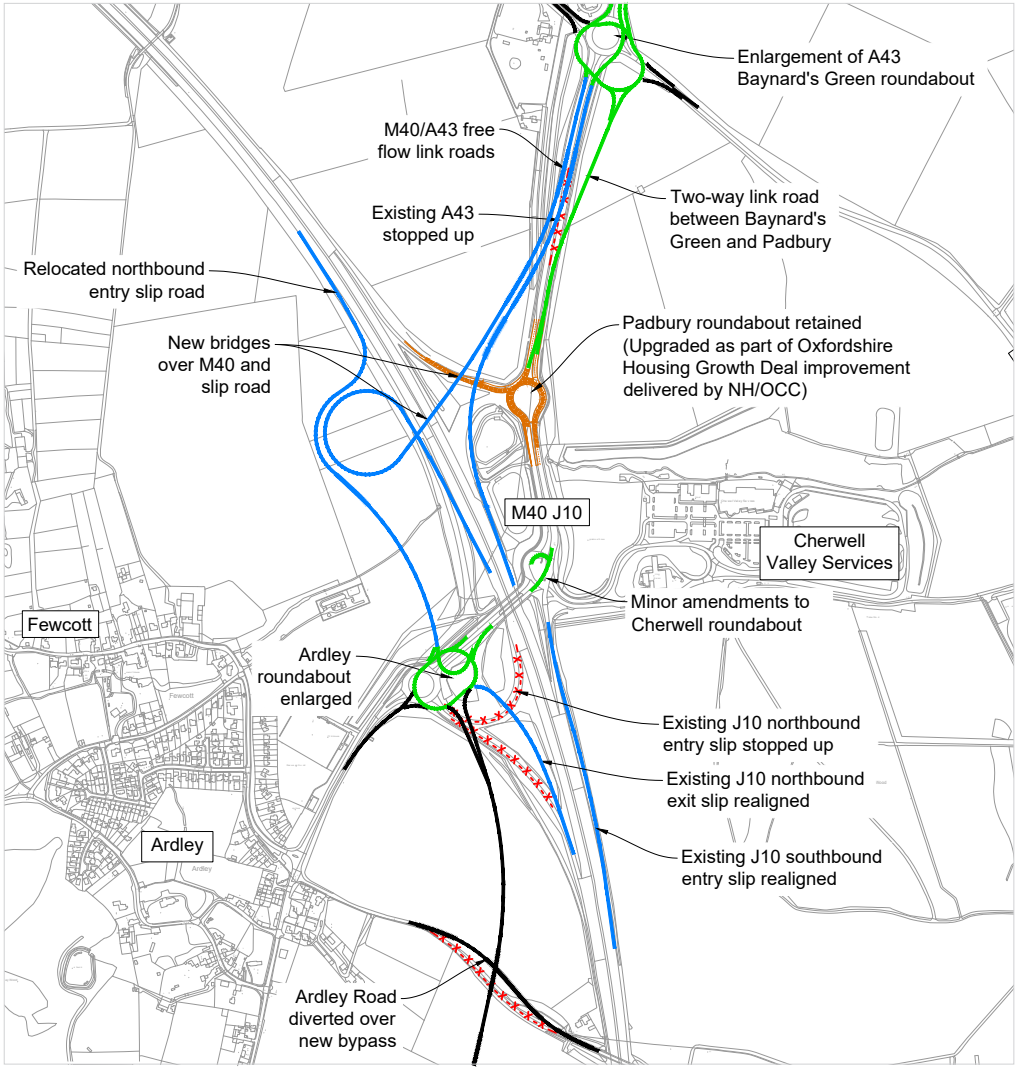

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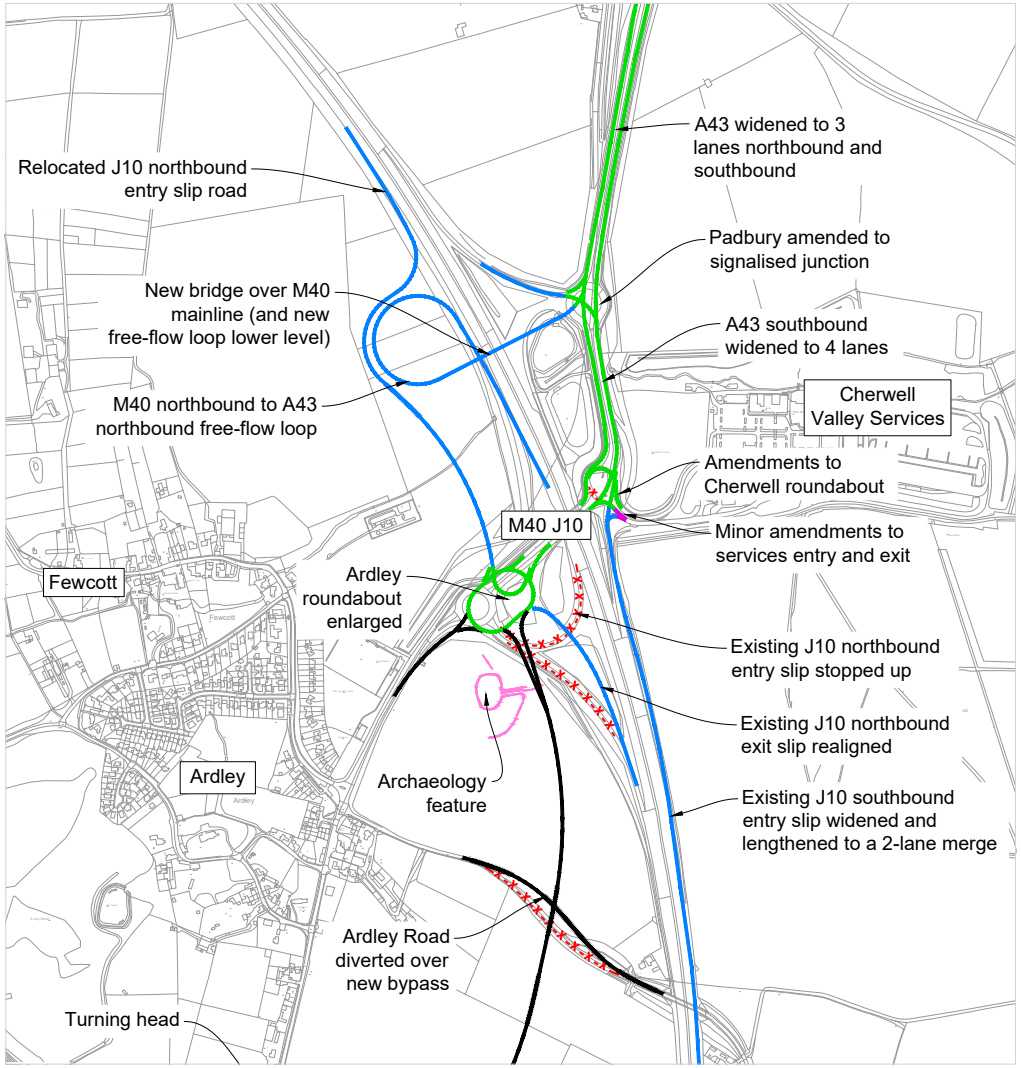

Option 28

3.24 The Transport Assessment (ES Appendix 3.1) sets out in detail how these options were assessed and that document includes copies of the relevant technical notes that were prepared as part of the option assessment proposes, as summarised in the table below.

3.25 Given the integrated nature of the proposed Ardley Bypass with M40 J10, the options development work at the M40 Junction 10 complex also included the development of the options for the Ardley Bypass and A43 Baynard's Green junction.

Technical Note and ES Appendix reference	Issued to TWG	Summary
TN5 – M40 Junction 10 Options Report (ref. ADC1794-RP-M -V3)	Jun 21	Identified and assessed a long list of potential interventions at M40 J10 that could be implemented by OxSRFI to mitigate the development impact. A short list of options was identified in agreement with the TWG for further consideration.
TN6 – M40 Junction 10 Options Report – Traffic Flow Derivation (ref. ADC1794-RP-N-V2)	Jun 21	Calculation of traffic flow demands used in the Stage 1 transport modelling
TN5 Addendum - Response to National Highways Comments (ref. ADC1794-RP-M1-V2)	Oct 21	A response to the initial National Highways feedback on TN5.
TN7 – Scope of Highway Design Prior to DCO application (ref. OxSRFI-BWB-GEN-XX-RP-CH-001-S4-P05)	Jul 21	Specifies the level to which the highway design will be developed prior to and for submission with the DCO application. Version P05 was agreed with the TWG in January 2025
TN8 - M40 Junction 10 Options 3A and 3B (ref. ADC1794-RP-Q-V4)	Oct 21	At the request of National Highways, TN8 considers in greater detail the opportunity to provide a large single grade-separated gyratory at M40 J10. TN8 concluded that Options 11, 13, 18 and 19 offer long-term benefit over a large and complex signal-controlled roundabout. In January 2022, National Highways and OCC confirmed that Options 18 and 19 were the preferred options to be taken forward for further assessment.
TN9 - M40 Junction 10 Option 25 (ref. ADC1974-RP-T-V3)	Apr 22	As part of the further assessment work required for Options 18 and 19, National Highways requested that analysis was undertaken to determine whether a M40 to A43 northbound free-flow link road could be reasonably achieved in terms of geometrical compliance with DMRB, formation of appropriate junctions, and environmental impact, as this would provide future resilience at M40 Junction 10. Following consideration of a number of sub-options (Options 20 to 24), that work led to the development of strategic highway Option 25. This resulted in agreement with the TWG that Option 25 be taken forward for further assessment. Option 25 included free flow links between the A43 and M40 in both southbound and northbound directions. The proposed northbound free flow link resulted in the need for substantial changes to the A43 Baynard's Green Roundabout, and the provision of a new local link between Baynard's Green and the M40 Junction 10 Padbury Roundabout.

Stage 1 (non-statutory consultation)	May to Jul 22	Work continued to progress Option 25 as the preferred highway strategy, and this was included in the Stage 1 non-statutory consultation. Following the Stage 1 consultation the arrangement at the A43/ Baynard's Green was slightly amended, in consultation with the TWG, to simplify the junction arrangement and this became Option 26, which was agreed in principle with TWG.
TN9 Addendum - M40 Junction 10 Option 25a (ref. ADC1794-RP-T1 V2)	Jan 23	Addressed comments regarding the form of the M40 J10 Option 25 layout at Baynard's Green, proposing that Option 25a (thereafter referred to as Option 26) should be taken forward as the preferred option.
HGV Routeing Strategy (ref. OxSRFI-BWB-GEN-XX-RP-CH-005-SO-P05)	Jan 23	The HGV Routeing Strategy for the Proposed Development that requires all HGV traffic to arrive and depart the Main Site by M40 Junction 10 and the Ardley Bypass.
TN10 - M40 Junction 10 Highway Improvements (ref. ADC1794-RP-U-V2)	Mar 23	TN10 addresses TWG comments on Option 26 and presented the M40 Junction 10 highway improvements to be tested in the BTM. TN10 also proposed a phasing strategy for the implementation of the M40 Junction 10 highway works.
TN11 – Highway Works Phasing (ref. ADC1794-RP-AF-v4)	Mar 23	Proposed phasing of the embedded Highway Works, this report was updated in February 2025 to reflect Option 28 following the agreed in principle with the TWG (see TN13 below)
TN13– M40 Junction 10 Option 28 (ref. ADC1794-RP-AI-V4)	Nov 24	In April 2023, the Applicant took the decision to pause work on the OxSRFI project pending a review of the highway access strategy. TN13 reports on the outcome of that review. That work resulted in strategic highway Option 28 becoming the preferred option. Option 28 was agreed in principle with the TWG in January 2025.

3.26 **Option 28** was ultimately selected. It was demonstrated to provide journey time improvements for the M40 to A43 northbound traffic through the provision of a new link, whilst providing the required high-quality access to the SRN for OxSRFI traffic and delivering enhancements to the A43, and a simplified layout at Cherwell improves journeys southbound. The enlargement to the Ardley Roundabout addresses the capacity constraint on the M40 northbound exit slip approach to the existing junction, and the Ardley Bypass removes all B430 through traffic from Ardley village.

3.27 **Option 28** would:

- connect the Ardley Bypass into the Ardley junction which would remain connected to the M40 northbound slip roads;
- provide a new dedicated exit slip road to the A43 northbound taking that traffic out of the Ardley and Cherwell junctions thus providing capacity for traffic to and from OxSRFI;
- provide a new slip road to the M40 northbound to accommodate the new exit slip;
- widen the A43 southbound between the Padbury and Cherwell junctions to four lanes;
- replace the Padbury signalised 'teardop' junction with a new signalised junction;
- widen the A43 between the Padbury and Baynard's Green junctions to three lanes in each direction; and
- improve the capacity of the A43 / B4100 Baynard's Green junction.

3.28 An important consideration in the development of Option 28 was the need to maintain access to the Cherwell Valley MSA and recognise the importance MSAs provide in terms of the safety and welfare of users of the SRN.

3.29 As well as catering for vehicle users, these works provide the opportunity for significant improvements to facilities for pedestrians and cyclists, by connecting Ardley to Baynard's Green with a new pedestrian and cycle route which would also connect into existing bridleways north and south of the Cherwell Valley MSA.

CONNECTING OXSRFI TO THE SRN: ARDLEY BYPASS (WORK NOS. 19, 20 & 36)

3.30 Following the decision to connect OxSRFI to the SRN at M40 junction 10 it was apparent that the level of traffic using the B430 between the OxSRFI principal access and M40 junction 10 would result in unacceptable severance, noise and air quality impacts on the village of Ardley. Furthermore, the existing B430 railway bridge over the Chiltern Main Line would act as a capacity constraint.

3.31 It was therefore decided that a bypass to the village of Ardley was to be provided and there is only one reasonable route for this bypass which is on the land between Ardley and the M40. The bypass would directly link the OxSRFI principal access to the Ardley junction which is part of the M40 junction 10 complex.

3.32 The route of the bypass has been developed such that it:

- Is sufficiently remote from the eastern side of Ardley such that the bypass (with necessary mitigation) does not result in unacceptable impacts on these receptors;
- Minimises the impact on the archaeological banjo (see further details in Chapter 4 below);
- Minimises the impact on the Ardley Kennels property located on Ardley Road just to the west of the M40; and
- Aligns with the OxSRFI Principal Access and propose bridge over the Chiltern Main Line railway.

3.33 The case for direct connection between Ardley Road and the bypass was assessed as part of the options appraisal. A direct connection is not to be provided as providing a connection would likely increase traffic through the village of Bucknell.

3.34 The B430 through Ardley is to be downgraded south of the village but connectivity retained for pedestrians, cyclists and horse-riders.

M40 JUNCTION 9 (WORK NO. 22)

3.35 The works to M40 Junction 9 were developed following assessment of the traffic behaviour forecast by the strategic transport modelling. That work forecast that congestion in the evening peak hour on the A34 approach to M40 Junction 9 would result in some background traffic on the A34 wishing to travel north choosing to alter route away from using the SRN and to instead use the B430, through Weston-on-the-Green and Middleton Stoney. It was also identified that there was the potential for worsening the already poor collision record on this approach.

3.36 The junction was last modified in the 2010s where the previous segregated left turn lane (albeit that it did not have any actual segregation) was removed and the approach was signalised. The earlier layout is shown on **Figure 3.3** below.



Figure 3.3 M40 Junction 9 A34 approach prior to 2010s scheme (image courtesy of Google)

3.37 A new segregated left turn lane was considered for OxSRFI but the DMRB only permits these to be a single lane and the forecast traffic flow seeking to turn left from the A34 onto the M40 northbound is significantly greater than can be accommodated in a single lane. To provide a freely flowing direct connection from the A34 to the M40 northbound this would need to be an interchange link with a new A34 diverge and M40 merge. Such a provision is not commensurate with the impact of the OxSRFI scheme and cannot be justified by it.

3.38 The proposed scheme is therefore to provide an additional left turn lane at the traffic signals to provide three lanes from the A34 to M40 northbound, with a lane reduction at the start of the M40 slip road. This is commensurate with the impact of OxSRFI and mitigates the congestion impact of it. The impact on road safety is discussed further in Chapter 4 below.

MIDDLETON STONEY RELIEF ROAD (MSRR) (WORK NO. 23)

3.39 The purpose of the MSRR is to mitigate an otherwise unacceptable impact on traffic at the B430/B4030 crossroads within Middleton Stoney. Whilst a full bypass was considered, this is not justifiable based on the impacts of OxSRFI and a relief road connecting the B430 north of the village and B4030 east of the village was found to provide sufficient mitigation.

3.40 A series of options were investigated for the MSRR as shown on **Figure 3.4** below. Options closer to the village of Middleton Stoney were discounted due to potential visual and noise impacts, and a location where the Gagle Brook corridor was narrowest was chosen. The northernmost option was discounted due to impact on the Dewars Farm quarry. The upper central option was selected based on the above.

3.41 When considered in conjunction with the HPLR the MSRR will enable traffic using the route between Heyford Park and Bicester to avoid Middleton Stoney.

3.42 The construction of the MSRR and with the relief it (and the HPLR) provides to the village of Middleton Stoney, enables a pedestrian crossing improvement to take place within the village at the crossroads. The details of this are presented in the Sustainable Transport Strategy for the Proposed Development, which is appended to the Transport Assessment (ES Appendix 3.1).

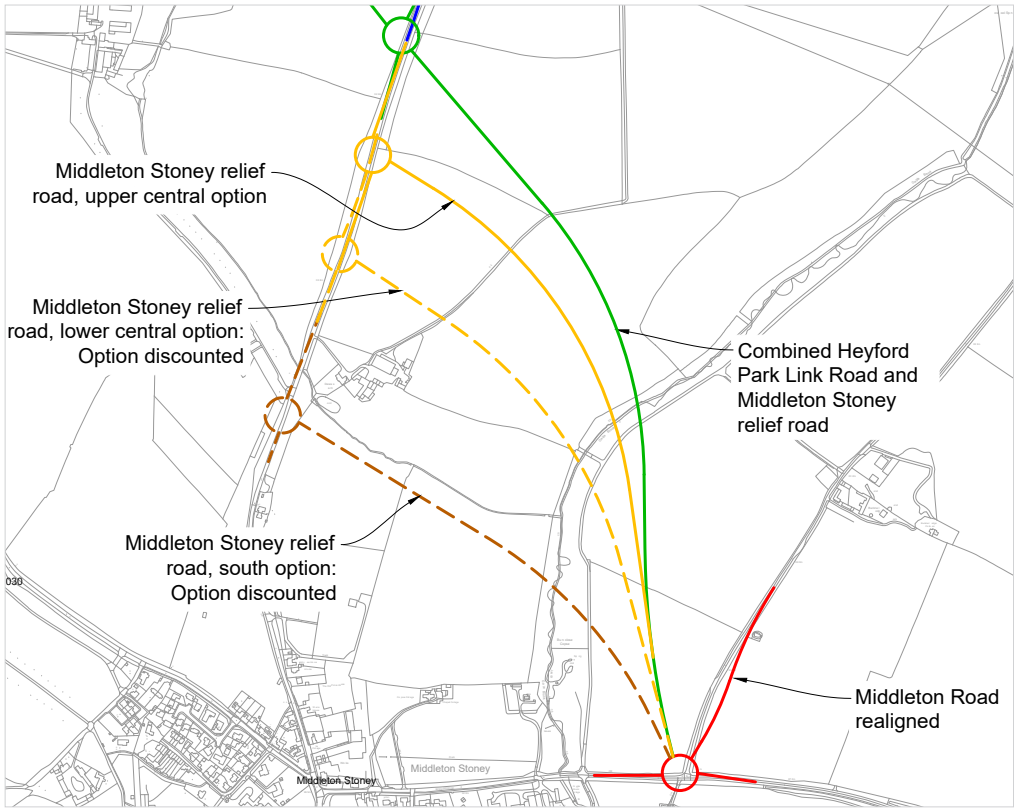

Figure 3.4 MSRR alignment options

B430 / UPPER HEYFORD DRIVE JUNCTION (WORK NO. 25B)

3.43 The highway works to the junction of the B430 and Upper Heyford Drive are straightforward in that they are for the removal of the junction following the stopping up of Upper Heyford Drive and diversion onto the HPLR. This involves narrowing of the existing carriageway and removal of associated signage. As this is a straightforward element of work it is not considered in detail in this report.

A4095 / B4030 ROUNDABOUT (WORK NO. 39)

3.44 These works are identified in the Transport Assessment (ES Appendix 3.1) as being required in addition to the embedded highway works, as part of a proposed connectivity and capacity improvement to the roundabout. ~~These works are currently included in the Application Site, but ongoing discussion are being held with~~ The need for these works is driven by wider traffic reassignment following opening of the MSRR. The works are to be implemented as part of the wider OxSRFI highway works but a mechanism has been agreed with OCC where the Applicant ~~is likely to~~ may instead provide a financial contribution to works proposed to be delivered by OCC. This is because there are other committed works proposed at this junction ~~notably including~~ in the form of the realignment of the A4095 Howes Lane north of the junction as part of the A4095 North West Strategic Link Road Bicester proposals which are associated with the expansion of north west Bicester. **Figure 3.5** below shows the general arrangement of this scheme at the A4095 / B4030 roundabout. If these other committed works are to take place within a similar timeframe as the OxSRFI highway works then this mechanism allows a single scheme to be delivered addressing both commitments, minimising disruption to the public.

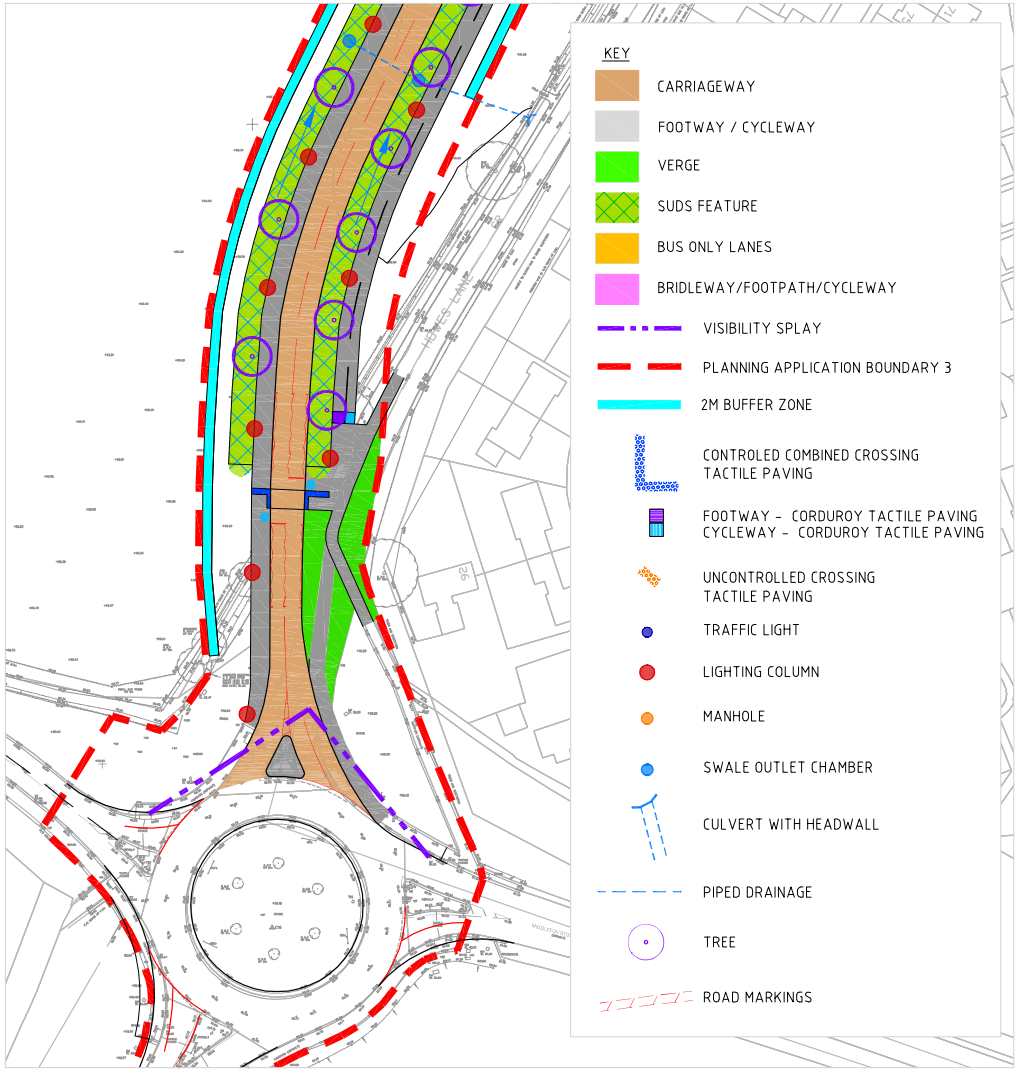

Figure 3.5 A4095 NW Strategic Link Road Bicester proposals at the A4095 / B4030 roundabout

SECTION 4

PRINCIPLES OF GOOD ROAD DESIGN

OxSRFI
OXFORDSHIRE
STRATEGIC RAIL FREIGHT INTERCHANGE

POLICY AND OPERATIONAL OBJECTIVES

4.1 This Chapter sets out how, where relevant, the ten principles of good road design have informed the design of each element of highway works discussed in this report. The chapter goes into more detail on specific elements of the highway design.

MAKES ROADS SAFE AND USEFUL

4.2 GG 103 states that *"Safety is fundamental to good road design; it is integral to both the usefulness of its function and the confidence of road users and their well-being. Good design creates safe roads which support and link to other wider imperatives, both nationally and locally, and that are fundamentally useful, meeting users' need for mobility effectively"*.

Scheme-wide considerations

4.3 Overall the highway works seek to:

- improve safety and reduce collisions;
- reduce delays particularly at M40 Junctions 9 and 10 and make journey times more reliable;
- help sustainable economic growth by supporting employment development opportunities; and
- improve facilities for active travel users, notably cyclists, thus providing vulnerable users with a safer environment.

4.4 An initial Stage 1 Road Safety Audit has been undertaken to inform the development of the highway design. As the design develops further road safety audits will be undertaken in collaboration with NH and OCC.

4.5 Departures from standard are required due to the overall constraints of the existing road network, these will be subject to a rigorous safety risk assessment and departure from standard approval process.

4.6 The highway works will be delivered pursuant to protective provisions with NH and OCC which will be secured through the DCO. This is important for many reasons but from a safety perspective it gives the highway authorities an active role in the detailed design and approval of the highway works.

M40 Junction 10

4.7 M40 Junction 10 and the A43 Baynard's Green roundabout experience congestion at peak times and this congestion is forecast to worsen without any further interventions.

4.8 The highway works at M40 Junction 10 will deliver a substantial capacity improvement. They will take the key M40 northbound to A43 northbound movement out of the Ardley and Cherwell roundabouts and an additional bridge over the M40 will be constructed to accommodate this new link.

4.9 As discussed above a considerable number of options have been assessed, and safety was a key consideration in the options appraisal process.

4.10 From DfT collision data there have been 46 PICs on the SRN within the five years study period within the area of M40 Junction 10, most of which are clustered at the junctions, and the Scheme provides a clear opportunity to address the underlying issues through the design of the highway works.

Ardley Bypass and Ardley Road

4.11 There is a cluster of PICs on the B430 near the railway bridge which will be addressed by the provision of the bypass.

M40 Junction 9

4.12 There have been a large number of PICs on the A34 northbound approach to M40 Junction 9. Between January 2015 to December 2020, which is the study period included in the statutory consultation, 83 PICs have occurred. A review of more recent PIC data, for the period between January 2021 and December 2023, shows that a further 11 PICs have occurred on this approach. These PICs are notable, in that they are overwhelmingly the same type of PIC (rear shunt), occurring in the same location (on the A34 approach to J9), with a likely contributory factor being queuing on the approach to the junction.

4.13 The proposed works at M40 Junction 9 provide an opportunity to reduce the number of PICs through improved capacity which will reduce the length of queuing. Furthermore the OxSRFI scheme proposes a 50mph speed limit on the A34 approach to the junction with the aim of slowing down vehicles which enables drivers to better react to queuing traffic ahead.

Local rural roads

4.14 As discussed above OxSRFI will implement changes to various local rural roads connecting Bicester, Bucknell, Middleton Stoney, Ardley and Somerton. These are reduced speed limits, environmental weight restrictions and, between Bicester and Bucknell, an active travel scheme (secured by financial contribution to with the works delivered by OCC). These will improve safety for all users on these local rural roads.

IS INCLUSIVE

4.15 GG 103 states that *"Inclusive environments facilitate dignified and equal use by all. An inter-disciplinary design process involves and places people's needs and views at its heart, nurturing well-being and creating a shared sense of ownership of the road. All users and communities are considered carefully in order to reduce barriers to access and participation, particularly mindful of the most vulnerable."*

Scheme-wide considerations

4.16 Active travel and enhancing amenities for local walkers, cyclists and horse-riders has been at the forefront of the development of the highway works, which seek not only to provide active transport access to the Main Site but also to enhance connectivity and amenity for the local area.

4.17 Several bridleways and footpaths in the Ardley area were cut off when the M40 was constructed, resulting in lengthy diversions for users and sometimes putting these users onto inappropriate routes. The Scheme provides an opportunity to address some of the severance issues caused to the PRoW network.

4.18 The detailed design of the highway works will provide well-designed routes on appropriate desire lines and street clutter will be minimised.

HPLR

4.19 The HPLR will have an active travel route constructed alongside its length in the form of an off-carriageway pedestrian and cycle facility. Between the secondary access and Chilgrove Drive junction this is a wider and segregated facility to encourage walking from Heyford Park into OxSRFI as well as cycling.

M40 Junction 10

4.20 Whilst the underlying need for the Highway Works at Junction 10 is to provide for motor vehicles serving OxSRFI, the highway works enable enhancements to active travel and leisure routes. Notable examples of this are as follows:

- Providing for pedestrian and cycle connectivity though Junction 10 between and through the Ardley and Cherwell roundabouts, thus addressing severance issues resulting from the M40;
- Connecting the above route into bridleways north and south of the Cherwell Valley MSA; and
- Providing a pedestrian and cyclist route between and through the Cherwell, Padbury and Baynard's Green junctions on the A43.

4.21 These works will connect communities and employment areas thus enhancing sustainable travel within the area of M40 Junction 10 and providing new active travel opportunities.

Ardley Bypass and Ardley Road

4.22 The Ardley Bypass, which will become the B430, will remove north/south through traffic from Ardley thus improving the environment within the village. It will improve amenity of the current B430, south of Ardley Road, for use by pedestrians, cyclists and equestrians. As a result the speed limit in Ardley on the current B430 is proposed to be reduced to 20mph.

4.23 The provision of a new B430 bridge over the Chiltern Main Line Railway allows the existing B430 bridge, shown at **Figure 4.1** to be repurposed for active travel.



Figure 4.1 B430 / Chiltern Main Line railway bridge (image courtesy of Google)

4.24 There is a network of footpaths and bridleways affected by the bypass, many of which were severed by the M40. The provision of a bypass allows for new routes and connections together with improved amenity (for example by removing the Bucknells Farm Level Crossing where the bridleway crosses the Chiltern Main Line Railway and moving the bridleway away from the M40).

MSRR

4.25 The provision of the MSRR will enable new active travel links to be provided, connecting the active travel facilities along the HPLR and around the boundary of the Main Site to the B4030 and Middleton Road. Together with the works to improve the M40 Middleton Road bridge, those new links will provide enhanced routes towards Bicester.

MAKES ROADS UNDERSTANDABLE

4.26 GG 103 states that *"Easy to read, a good road is intuitive to use so as to be safe and efficient for all. 'Self-explaining roads' focus on the essentials and eliminate unnecessary and confusing clutter to make them legible, while responding to place and enhancing both environmental and economic outcomes."*

Scheme-wide considerations

4.27 The Highway Works will be designed so that the layouts are as intuitive as possible, for example by having spiral lane markings at junctions with associated signing so drivers do not have to change lanes unnecessarily. A directional signage strategy has been developed for the Scheme to ensure consistency of destination naming.

4.28 Directional signage will be provided for pedestrians and cyclists using the active travel routes and for the local footpath and bridleway network.

4.29 Care will be taken at detailed design stage to ensure that appropriate clear signage is provided and unnecessary signage is avoided, thus minimising clutter.

M40 Junction 10

4.30 Consideration has been given to the locations of signage on the SRN for clear and concise signing for this section of the overall junction complex, including for how users can access the Cherwell Valley MSA.



Figure 4.2 Example of directional sign at M40 J10

M40 Junction 9

4.31 As discussed above there is an existing safety issue on the A34 approach which notably relates to rear-end shunts. As well as reducing the queue lengths the OxSRFI proposals will reduce the speed limit to give drivers more time to react to queuing traffic and enhance directional signage to better advise drivers of which lane to use when approaching the junction.

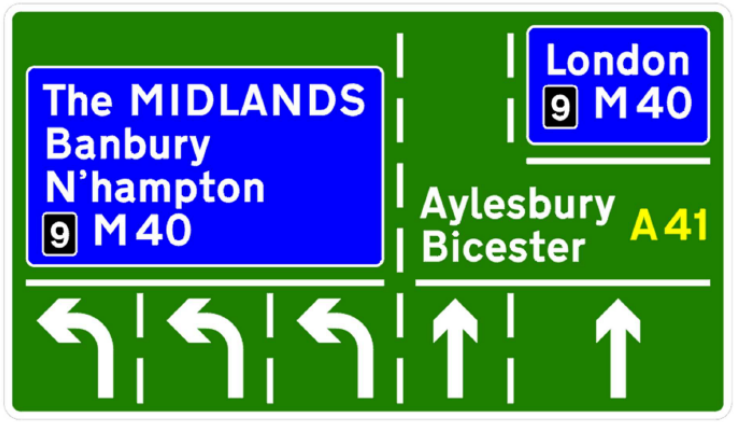

Figure 4.3 Example of dedicated lane sign at M40 J9 (A34 approach)

FITS IN CONTEXT

4.32 GG 103 states that *"The aesthetic quality of a road and its design in relation to the places through which it passes, is integral to its function and the experience of those that use it. Good road design demonstrates sensitivity to the landscape, heritage and local community, seeking to enhance the place while being true to structural necessities. It builds a legacy for the future."*

Scheme-wide considerations

4.33 The highway design has followed an iterative process with design, assessment and design refinement taking place so that the design fits in context, and the design is then fully assessed as part of the EIA process.

4.34 New roads are to be provided, as far as practicable, at or just below existing ground levels to minimise visual impact and avoid major engineering features such as cuttings or embankments. Screening bunds have been incorporated designed as far as possible to integrate with the landscape and minimise hard engineering features.

4.35 The active travel works have been designed as far as possible to minimise major engineering interventions such as earthworks and they will be landscaped to provide suitable boundary treatments that fit in context with the landscape.

4.36 Except for bridges crossing the railway lines, bridge parapets will be in metal, with rails and mesh infill, and the mesh will be barely visible. A galvanized finish will dull to a light grey rapidly and tend not to be intrusive against the sky.

4.37 Bridge abutments will be mass concrete. They allow some variation in appearance such as vertical fluting which would be in keeping with other bridge substructures nearby. The wingwalls of the abutments may be formed either in reinforced earth or concrete.

HPLR

4.38 As described in Chapter 3 above the HPLR has been designed to fit in the context of a high-quality landscape corridor to the south of the Main Site on the approach to Heyford Park, running through both blue and green infrastructure. It's route follows a natural line between Camp Road and the new MSRR, avoiding where possible existing mature trees and existing watercourses. Well designed screening bunds are provided between the HPLR and the Main Site. The HPLR, looking towards Heyford Park, is shown in the context of the landscaping on **Figure 4.4** below.

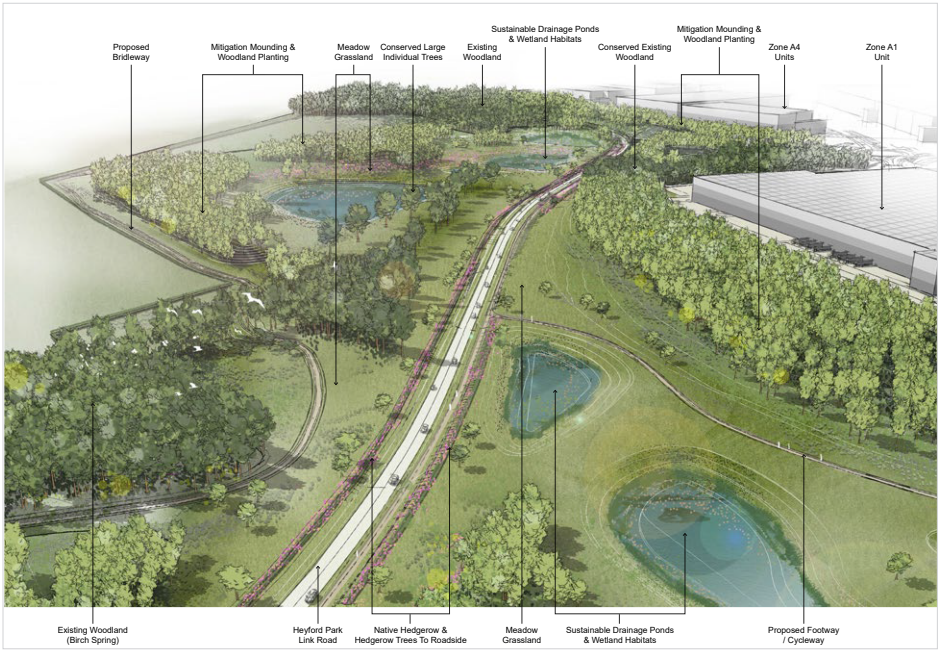

Figure 4.4 Image of the HPLR and the approach to Heyford Park

M40 Junction 10

4.39 Although there are elements of new construction, overall the highway works seek to provide a scheme of a scale compatible with an overarching sustainability and environmental driver to retain a compact overall junction layout that sits within the general footprint of the existing highway network. Works east of the M40 have been minimised through improvement of the A43 and the Padbury, Cherwell and Ardley junctions rather than construction of a new highway alignment.

4.40 The highway works were developed to take into account the proposed Albion Land and Tritax developments on land east of the M40 and the improvements to the Baynard's Green junction have been designed to minimise land take so they would not be of detriment to these schemes should they be consented. Whilst those schemes were refused planning permission in January 2026, both schemes have appealed the refusal.

4.41 The proposed bridge structure over the M40 will be adjacent to two existing bridges and the A43. The bridge therefore will not look out of place; moreover, its impact will be minimised so as not to provide a further visual block and its visual 'weight' minimised. Consideration has been given to including a 'feature' structure such as a cable-stayed bridge, but that would in itself create a wider visual impact and it was concluded would look out of place when compared to the adjacent structures.

Ardley Bypass and Ardley Road

4.42 As described in Chapter 3 the route of the bypass has been chosen to provide a direct route between the Main Site and Junction 10 whilst located as far as possible, away from existing properties and avoiding landscape and heritage features.

4.43 At the northern end of the bypass alignment there is an existing archaeological banjo feature, this is described in detail in the Heritage and Archaeology ES Chapter (Document 6.10) The highway design minimises the impact on this feature, by its alignment swinging east of it, as can be seen by comparing the earlier and later design iterations as shown on **Figure 4.6** below.

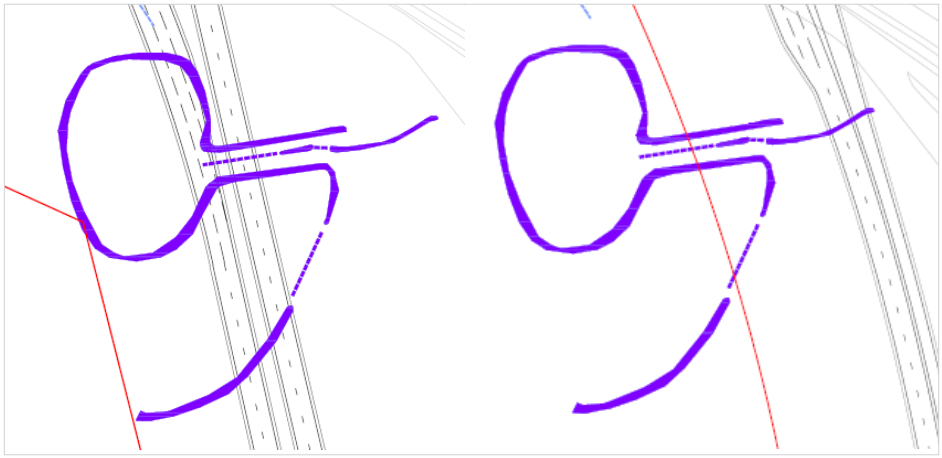

Figure 4.6 Ardley Bypass archaeological banjo (in purple) and iteration of road layout with earlier design on the left and later design on the right

4.44 The Ardley Bypass has been designed to be at or slightly below the existing ground levels so it is not visually intrusive. The road corridor has been designed to provide both an attractive route to drive along and so that views to it, from existing properties are minimised and filtered by landscaping, it will therefore have landscaping including hedging and tree planting on both sides together with landscaped bunding along key sections. These design measure will also help to minimise the effects of noise from the new road.

4.45 The Ardley Road bridge over the bypass and its approaches will unavoidably be visible from surrounding areas. To minimise the visual impact, the bypass will be lowered into the ground. The bridge is proposed to be a precast concrete arch structure which, with the skew alignment of the Ardley Road relative to the bypass, will enable the 'dead' spaces of the structure to be landscaped, giving the visual impression of a green bridge designed into the landscape. This is shown on **Figure 4.5** below.

4.46 Screening bunds have been added to the north side of Ardley Road and eastern side of the bypass to minimise impact on the adjacent kennels.

4.47 The bridge taking the bypass over the Chiltern Main Line railway does not need to be elevated above the surrounding ground levels due to the depth of the railway cutting, even when the potential for future electrification of the railway is taken into account.

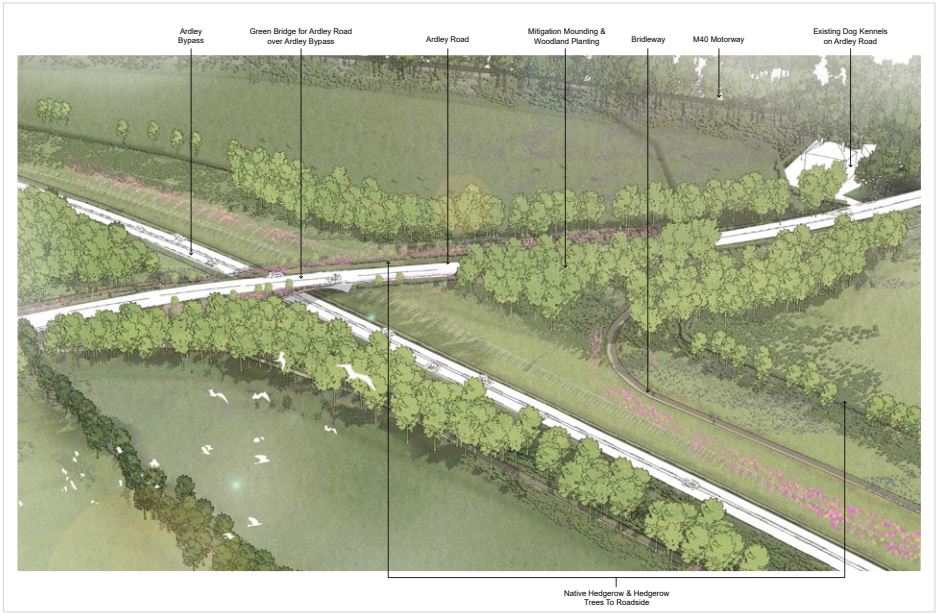

Figure 4.5 Ardley Bypass and Ardley Road green bridge

MSRR

4.48 As set out in Chapter 3 a number of potential route options have been considered. The preferred route takes into account existing properties and landscape and ecological features as well as the need for efficient connection of the MSRR to other existing and new roads. The MSRR is to pass through the Gagle Brook corridor and care has been taken to minimise the impact on this corridor by taking the new road at a point where the corridor is narrow.

4.49 More generally the alignment of the MSRR, north of the Gagle Brook corridor, is designed to follow existing ground levels with screening bunding and planting as shown on **Figure 4.7** below to assimilate into the surroundings and minimise effects of the new road.

4.50 At the southern end of the MSRR the new road is generally within a new cutting. As it approaches the B4030 roundabout additional bunding is proposed to enable the road to be screened and landscaped. This is shown on **Figure 4.8** below.

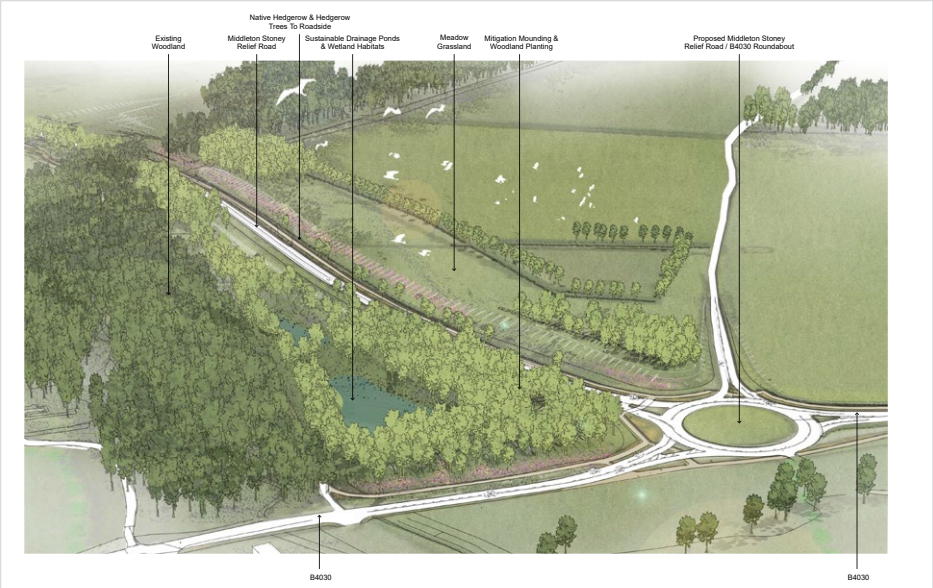

Figure 4.8 Image of the MSRR and the approach to the B4030 roundabout

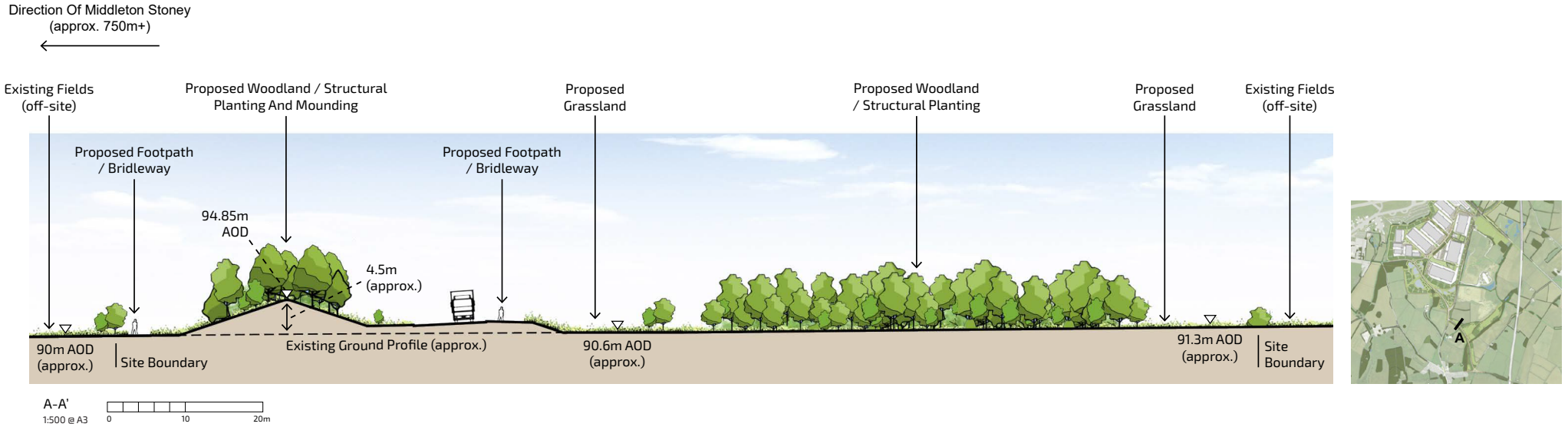

Figure 4.7 MSRR typical cross-section north of Gagle Brook

IS RESTRAINED

4.51 GG 103 states that *"Functional, but responding positively and elegantly to the context, good road design allows for the expression of the character and identity of the places and communities through which a road passes. Good road design can enhance a sense of place and add to what we have inherited, particularly through the use of appropriate materials and traditions, but does not make unnecessary superficial or superfluous visual statements".*

M40 Junction 10

4.52 Although there are elements of new construction, overall the highway works seek to provide a road layout of a scale compatible with an overarching sustainability and environmental driver to retain a compact overall junction layout that sits within the general footprint of the existing highway network.

4.53 As discussed above the bridge over the M40 does not make an unnecessary and superfluous visual statement.

Ardley Bypass and Ardley Road

4.54 The initial concept design for the bypass was for a dual carriageway. However, this was challenged by the design team to determine if this is necessary and appropriate, given that the Scheme will also provide for sustainable transport modes. Through the detailed traffic modelling process it was determined that a wide single carriageway (with two lanes northbound and a single lane southbound) will be appropriate for the bypass.

IS ENVIRONMENTALLY SUSTAINABLE

4.55 GG 103 states that *"Making an important contribution to the conservation and enhancement of the natural, built and historic environment, good road design seeks to achieve net environmental gain. It is multi-functional, resilient and sustainable, allowing for future adaptation and technical requirements, while minimising waste and the need for new materials."*

Scheme-wide considerations

4.56 The highway design has followed an iterative process with design, assessment and design refinement taking place so that the design is environmentally sustainable. The highway works are included within the EIA process for the Scheme. As part of the EIA process, design influence and mitigation / enhancement measures are integrated as early as possible.

4.57 The active travel routes provided within the highway works will provide a much-improved network of high-quality pedestrian and cycle routes around the Ardley, Heyford Park, Middleton Stoney areas, plus the western side of Bicester, promoting active travel and enabling a shift to sustainable transport modes.

4.58 The drainage design will make use of SuDS, and landscaping will be provided to match the surrounding environment. Allowance for climate change has been made within drainage design.

4.59 OxSRFI is committed to delivering biodiversity improvements across the Scheme, and a BNG assessment has been used to inform the design. This demonstrates that the Scheme will have the ability to deliver beyond the 10% net gain goal for habitat area, hedgerows, and watercourses calculated using the Statutory Biodiversity Metric and covers the whole Scheme Main Site and Highways Works.

4.60 Opportunities will be explored during the detailed design stage to provide new habitats including species-rich grassland, scrub, and woodland, delivering long-term benefits for nature across the Scheme. An examples of an area of land that can be used for this is the land between the M40 and proposed northbound slip roads.

4.61 The design of the highway works has considered the potential impact of future climate change, accounting for increased incidence of high temperatures, increased precipitation, and extreme weather events. The highway works will be constructed in line with current guidance and relevant highway design standards, which are continued to be updated to incorporate climate risk and resilience considerations.

4.62 One of the Applicant's key commitments is to strive to reduce embodied carbon in construction across their developments. A Carbon Management Plan has been prepared, which sets out a strategy regarding how OxSRFI will minimise greenhouse gas emissions throughout the lifetime of the highway works (i.e. through low carbon procurement and encouraging low carbon construction practices), including the identification of roles and responsibilities regarding the process by which emissions reduction measures will be reviewed and implemented.

4.63 It should be noted that emission reduction measures for the highway works are constrained by NH and OCC requirements for road design. As such, whilst the range of emissions reduction measures detailed within the Carbon Management Plan will be explored where relevant to highways infrastructure, any specific measures must align with the relevant highway design requirements at the time of construction. Any updates made by NH and OCC to their design requirements will be kept under review.

M40 Junction 10

4.64 The Scheme design allows for excavated materials arising from the Main Site to be used in forming embankments at M40 Junction 10. This will minimise the need to export waste or import filling materials, reducing the need for transportation of bulky materials.

Ardley Bypass and Ardley Road

4.65 As discussed above the cross-sectional width of the bypass has been optimised through design iteration, minimising the need for new materials. As with M40 Junction 10, material needed for the Ardley Road bridge approach embankments will be taken from the Main Site, minimising the need to export waste or import filling material.

4.66 At its southern end, south of the railway, the bypass crosses the corner of an existing landfill site. Removal of the landfill waste from under the road corridor is required and through careful design the impact on the landfill has been minimised.

4.67 Along the east side of the bypass, south of Ardley Road, a noise and visual screening bund is proposed which would be landscaped to screen views of traffic on the bypass from Ardley.

MSRR

4.68 There will be an excess of earthworks material generated by the construction of the MSRR. This material will be taken into the Main Site and incorporated into earthworks there.

4.69 At the southern end of the MSRR additional landscaping bunds would be provided to provide visual screening of the new road from nearby properties. These bunds have been incorporated into the design as a result of the iterative design and assessment process described above.

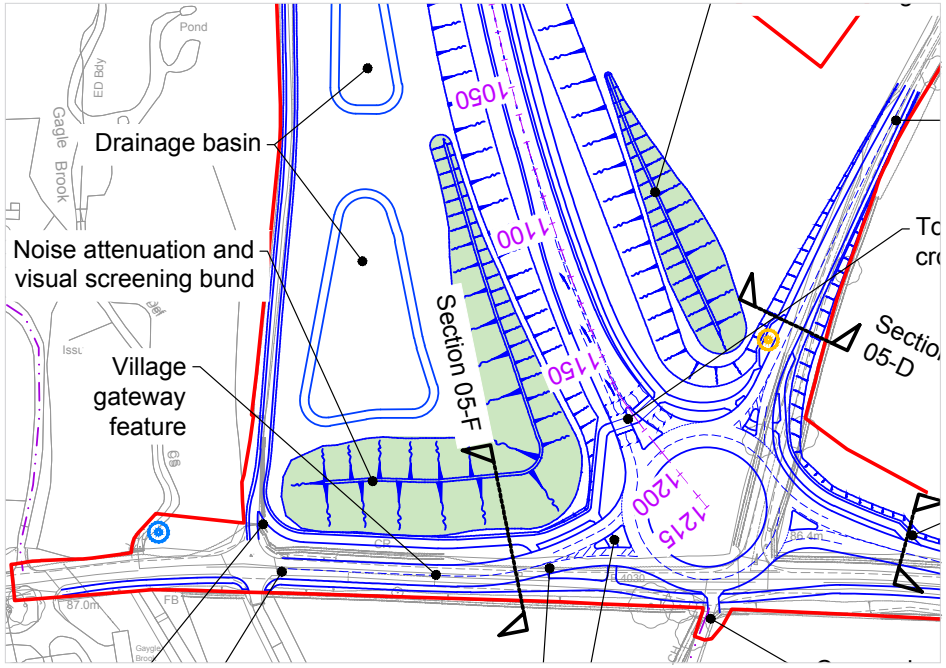

Figure 4.9 Bunds (highlighted green) at the MSRR / B4030 roundabout

4.70 The crossing of the Gagle Brook corridor has been given careful consideration to minimise the length of the corridor affected but at the same time catering for protected bat species. Whilst for hydraulic purposes pipes are sufficient to take the flow of the Gagle Brook, a large culvert that will provide an open void of circa 6m wide x 3.5m high is to be provided to allow bats to fly under the MSRR using the culvert. A mammal shelf will be provided suitable to enable the passage of other fauna at times of high flow, and a soft bed will be provided within the culvert. The bridge is shown on the bridge plan (Document 2.12H).

IS THOROUGH

4.71 GG 103 states that *"The result of robust processes that create a continual cycle of improvement, good road design starts with an in-depth understanding of people, place and context; learning from best practice worldwide. The design of all elements of the road environment are considered together and integrated into a responsive design."*

Scheme-wide considerations

4.72 Through detailed surveys, consultation and stakeholder engagement the OxSRFI consultant team have worked hard to understand the local environment and context of the highway works.

4.73 The ongoing consultation process will continue during the detailed design stage to refine the design as appropriate.

M40 Junction 10

4.74 The works to M40 Junction 10 are in the context of an already busy SRN junction connecting the M40, A43, B430 and B4100, and serving the Cherwell Valley MSA which is accessible from all routes. As set out in the Transport Assessment and summarised in Chapter 3 above, a considerable number of options have been assessed based on key considerations including road safety, user legibility, traffic capacity and environmental impact.

4.75 Notwithstanding the context of this being a motorway junction, the Scheme has been able to include extensive new provision for pedestrians and cyclists by focussing on the needs of all users not just motorists. The need to maintain access to the MSA is a key consideration as MSAs provide important facilities for road users to take a break during their journey.

Ardley Bypass and Ardley Road

4.76 Whilst it may appear that there is a broad corridor for the bypass to be located in, there are a number of key constraints such as the archaeological banjo, Ardley kennels, the M40, Ardley itself and the need to cross the Chiltern Main Line Railway. The need for the bypass to be integrated into the relatively flat landscape is key, along with allowing sufficient space within the overall corridor for screening and planting.

4.77 Due to the proximity of the kennels to the bypass and realigned Ardley Road the need for screening has been given careful consideration and following statutory consultation an additional L shaped landscaped screening bund has been added to the design which has several purposes:

- Minimising headlight impact from vehicles going over the bridge which are elevate above the kennels, this has been achieved by the bund being approximately 2m above the road level of Ardley Road;
- Improving security of the kennels; and
- Reducing the visual impact of the bypass and Ardley Road on the kennels.

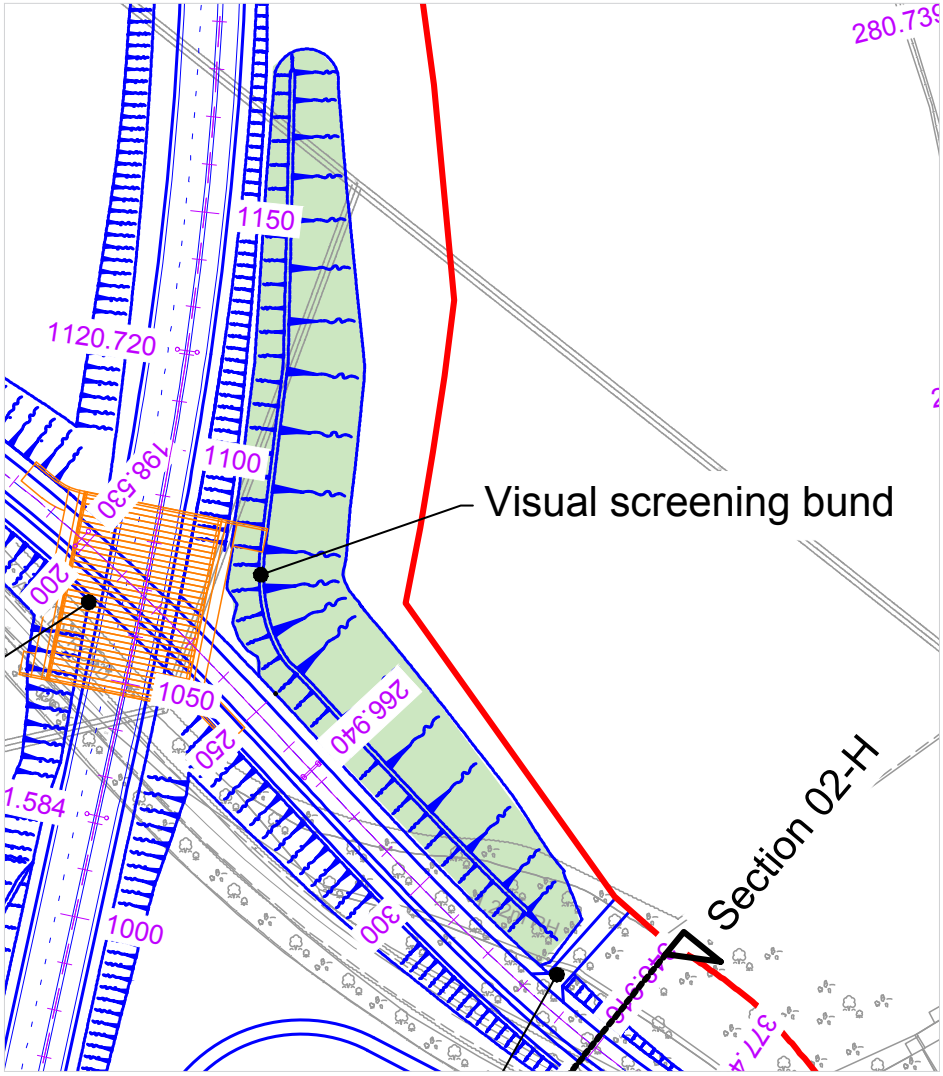

Figure 4.10 Bunds (highlighted green) at Ardley Bypass and Ardley Road

IS INNOVATIVE

4.78 GG 103 states that *"Responding positively to change, good road design captures opportunities for betterment and develops in tandem with emerging new technologies. Designing to a standard is not the same as achieving good design; an innovative and resourceful approach that is mindful of context is necessary to achieve better outcomes."*

Scheme-wide considerations

4.79 The detailed design of the highway works will make best use of emerging technologies, standards and products to minimise environmental impact.

Ardley Bypass and Ardley Road

4.80 As discussed above use of precast concrete arches for the Ardley Road bridge over the bypass enables landscaping to be provided over the bridge thus giving the impression of a green bridge.

IS COLLABORATIVE

4.81 GG 103 states that *"Collaboration ensures roads are useful to and accepted by the communities they serve. Collaborative working requires a rigorous process that identifies dependencies and wider opportunities, and facilitates effective communication and engagement from the start. Community engagement will be led by a local sense of culture, place and value."*

Scheme-wide considerations

4.82 The Applicant has engaged with key statutory stakeholders, local authorities, local communities and other parties in the development of the Scheme. This has included statutory consultation prior to the submission of the DCO. A key part of this is the establishment of the TWG which has been meeting from November 2020 to present and is attended by CDC, NH and OCC along with the Applicant.

4.83 Engagement with NH and OCC, as well as other local stakeholders as appropriate, will continue as the Scheme is developed and the detailed design of the highway works will go through a full technical approval process following the making of the DCO before construction, and this will be controlled through protective provisions in the DCO.

4.84 So far as is reasonably practicable the highway works are designed to co-ordinate with but are not reliant upon highway works being promoted by other parties, examples being:

- The realignment of Chilgrove Drive and construction of a signalised junction at Chilgrove Drive, Upper Heyford Road and Camp Road, as promoted by Dorchester; and
- The construction of the A4095 Bicester NW Strategic Link Road promoted as part of the growth of Bicester.

4.85 As discussed above, the Scheme provides an opportunity to address some of the severance issues caused to the PRoW network when the M40 was constructed. The proposals for the PRoW network, and how they are affected by the highway works, has been developed in collaboration with OCC. Further detail is provided in the WCHAR.

4.86 Liaison has taken place with various parties in relation to minimising impacts during construction, examples being with the operators / owners of:

- Dewars Farm quarry;
- Cherwell Valley MSA;
- the Ardley Energy Recovery facility;
- Ardley Kennels; and
- the Ardley Fields recycling centre.

4.87 Some specific examples of the outcome that the collaborative approach has had on the design are given below.

M40 Junction 10

4.88 Engagement with OCC has ensured that improved connectivity for pedestrians and cyclists can be provided through M40 Junction 10, connecting up and linking existing footpaths.

4.89 As discussed above the highway works were developed to take into account the proposed Albion Land and Tritax developments on land east of the M40 and the improvements to the Baynard's Green junction have been designed to minimise land take so they would not be of detriment to these schemes should they be consented. Whilst those schemes were refused planning permission in January 2026, both schemes have appealed the refusal.

4.90 Liaison with National Highways has informed the directional signage strategy, an example being reviewing the signage to the Cherwell Valley services so users seeking the service area are given clear guidance to enter the facility and find the appropriate route when leaving.

Ardley Bypass and Ardley Road

4.91 Following feedback from local stakeholders, the alignment of the Ardley Bypass, Ardley Road and the associated earthworks have been adjusted to minimise the impact on the kennels and the archaeological banjo.

4.92 Liaison with affected landowners has taken place regarding access to their retained land and the outcome of these discussions is reflected in the design.

MSRR

4.93 The alignment of the MSRR taken on board consultation with the adjacent Dewars Farm quarry so that the impact on the quarry and its mineral assets has been minimised, thus ruling out the northernmost option shown on **Figure 3.4**.

4.94 The incorporation of additional bunds as shown on **Figure 4.9** above address local residents concerns about visual impact.

IS LONG-LASTING

4.95 GG 103 states that *"With quality materials and careful detailing, good road design brings lasting value. The design process requires sufficient time for challenges to be resolved before delivery and is adaptable to future needs and technologies as part of the commitment to whole-life operation, management and maintenance."*

Scheme-wide considerations

4.96 The design process will take maintenance needs into account from the outset and the MRS will document how access for maintenance is to be provided.

4.97 The detailed design process will continue following making of the DCO with NH and OCC involved in the technical approval process, thus allowing sufficient design time to resolve detailed issues prior to delivery.

4.98 The proposed structures have been designed with due regard to the long-term maintenance requirements, and they will be designed to a 120-year design life.

4.99 The design of the highway works has considered the potential impact of future climate change, accounting for increased incidence of high temperatures, increased precipitation, and extreme weather events. The highway works will be constructed in line with current guidance and relevant NH and OCC design standards, which are continued to be updated to incorporate climate risk and resilience considerations. The highway drainage design allows for a 25 % uplift in peak rainfall intensity together with a sensitivity test to 40 % uplift in peak rainfall intensity, thus providing a resilient and long-lasting drainage system, accounting for potential future climatic change. Resistance to drought will be part of the consideration in choosing appropriate species for landscaping works.

4.100 The enhanced network of footpaths and bridleways will be dedicated as PRoW thus ensuring their long-term status, with the scheme providing a net increase in bridleway length of over 5km.

4.101 The MRS will set out how the highway works have been designed for maintenance.

M40 Junction 10

4.102 As part of the options appraisal detailed consideration has been given to the operation of the M40 and the A43 Baynard's Green junction at M40 Junction 10 and how this is affected by the highway works. The traffic modelling work shows that the junctions are forecast to operate with significantly improved capacity in 2034.

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