

# M42 Junction 6 Development Consent Order Scheme Number TR010027

8.42 Junction 5A Location and Constraints

Summary

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The Infrastructure Planning (Examination Procedure) Rules 2010

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#### Infrastructure Planning

#### Planning Act 2008

The Infrastructure Planning (Examination Procedure) Rules 2010

## **M42 Junction 6 Development Consent Order**

Development Consent Order 202[]

#### **Junction 5A Location and Constraints Summary**

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- A. Location Options and Constraints.
- B. Final Options Presented at Public Consultation 2016/2017.



#### 1 Introduction

1.1.1 This note has been prepared in response to the Examining Authority's request to summarise the key constraints identified during the process of siting of junction 5A as depicted in the Development Consent Order (DCO) application for the M42 Junction 6 scheme (the Scheme).

## 2 Constraints and Influencing Factors

- 2.1.1 Design is an iterative process of development, assessment and refinement. Some constraints can be identified before design commences, while others are established through development and assessment. The relative significance of each constraint may also change through design iteration.
- 2.1.2 Through the junction and proposed mainline link road alignment design development process, the following key constraints and other influencing factors were identified:
  - Proximity to junction 5 and 6 and the weaving lengths between successive merge and diverge slip roads.
  - The location of existing major infrastructure such as Airport Way underpass and Clock Interchange.
  - Planning the Scheme's proposed mainline link road sits within the Green Belt.
  - Environmental receptors, including: (a) the Ancient Woodland at Aspbury's Copse, (b) Bickenhill Conservation Area, (c) Bickenhill Meadows Site of Special Scientific Interest (SSSI).
  - Residential and business properties in Bickenhill and along Catherine-de-Barnes and Shadowbrook Lane.
  - The Warwickshire Gaelic Athletic Association (WGAA) facility.
  - Impacts on Local Road Network
  - Statutory Undertakers' equipment including the 132kV overhead powerlines.
  - The proposed Motorway Service Area (MSA) south-west of the existing Solihull Road overbridge.
- 2.1.3 These constraints and influencing factors are shown in **Appendix A**.
- 2.1.4 Section 3 describes in more detail the nature and significance of these when determining the location of junction 5A. Section 4 provides a design narrative with regard to these constraints and within the context of the required design standards set out in the Design Manual for Roads and Bridges (DMRB).



## 3 Description of Constraints and Influencing Factors

- 3.1.1 Proximity to junction 5 and 6 and the weaving lengths between successive merge and diverge slip roads.
- 3.1.2 The proposed junction 5A facilitates the proposed mainline link road connection to the M42 between junctions 5 and 6. The distance between the centres of those junctions is approximately 5.6km as shown in Figure 1. A key design consideration is the weaving length between the existing and proposed junction merges and diverges.

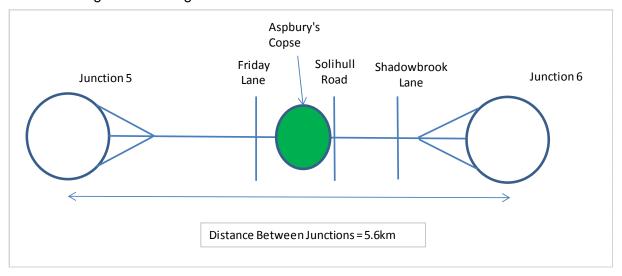


Figure 3-1 - Distances between Junctions 5 and 6

3.1.3 A weaving section is defined as the length of the carriageway between a successive merge and diverge, where vehicles leaving the mainline at the diverge have to cross the paths of vehicles that have joined the mainline at the merge. The existing length of the weaving section between junction 5 (J5) and junction 6 (J6) are shown in **Table 3-1** below.

**Table 3-1: Existing Weaving Lengths** 

Direction	Weaving Length (m)
J5 to J6 Northbound	4400
J6 to J5 Southbound	4500

3.1.4 The minimum weaving length required by DMRB TD22/06 – Layout of Grade Separated Junctions, Section 4.35 for successive merges and diverges is 2km on the rural motorway network. In the situation where this requirement is not realistically achievable a departure from standard could be sought. It should be noted that the existing merge and diverge arrangements at J5 and J6 are ghost island layouts and the weaving lengths have been calculated in accordance with DMRB TD22/06.



## 3.2 The location of existing major infrastructure such as Airport Way underpass and Clock Interchange.

3.2.1 The proposed mainline link road would provide a direct connection between the A45 and the M42 between J5 and J6. Its alignment at the northern end is fixed by the need to connect to Clock Interchange and pass under the Airport Way connector road overbridge. Photographs of these are shown in **Figure 3-2**.





Aerial view of the A45 Clock Interchange and Airport Way Connector Road overbridge

Elevation of Airport Way Connector Road overbridge – looking north

#### Figure 3-2 - A45 Clock Interchange and Airport Way Connector Road Overbridge

#### 3.3 Planning – Scheme Corridor Sits Within the Green Belt

3.3.1 The Scheme is situated within the Meriden Gap, an area of land protected by Solihull Metropolitan Borough Council Green Belt designation. Details of this protection and the circumstances that allow development in the Green Belt are located within the Planning Statement [APP-173/Volume 7.1]. A key characteristic of Green Belt is the "openness" of the land. There is no alternative corridor outside of the Green Belt that could relieve J6.

#### 3.4 Environmental Receptor – (a) Aspbury's Copse Ancient Woodland

3.4.1 Aspbury's Copse ancient woodland is located south of the existing Solihull Road and adjacent to the northbound and southbound carriageways of the M42 motorway. It is located approximately midway between junctions 5 and 6. Details of this are described in Chapter 9 – Biodiversity of the Environmental Statement [APP-054/Volume 6.1] and its proximity to the Scheme is shown in Figure 3-3. It represents a constraint to the location of the proposed junction and, therefore, the Scheme.





Figure 3-3 – Proposed Junction 5A Layout Showing proximity to Aspbury's Copse Ancient Woodland (shown in green)

3.4.2 Ancient woodland is an irreplaceable habitat and significant harm should be avoided. Its loss cannot be mitigated and all measures to avoid its loss should be taken. Compensation is a last resort. The Scheme proposed in the DCO application results in the loss of an area of irreplaceable habitat. During option and design development opportunities to minimise this impact were explored as described in Appendix 4 to the Planning Statement [APP-173/Volume 7.1].

#### 3.5 Environmental Receptor – (b) Bickenhill Conservation Area

3.5.1 The village of Bickenhill, which forms an eastern boundary to the proposed mainline link road, is of early-medieval origins. The historic core of the village is contained within the Bickenhill Conservation Area shown in **Figure 3-4**. The village is located on flat ground and, although located adjacent to the busy B4438 Catherine-de-Barnes Lane (Catherine-de-Barnes Lane), the village retains its historic agricultural character. Further details of this receptor and the Scheme's likely impact on it can be found in Chapter 7 – Cultural heritage of the Environmental Statement [APP-052/Volume 6.1].





Figure 3-4 - Extent of Bickenhill Conservation Area (shown in purple)

3.5.2 The alignment and permanent landtake requirements of the proposed mainline link road have been developed to minimise the extent of truncation of the conservation area. The proposed mainline link road has been designed to position the majority of its length within an earthwork cutting: the objectives being to maintain the open character of the Green Belt, screen the proposed mainline link road and traffic movements from existing views, and to contain traffic-sourced noise which can also influence the setting of the area. However, the proposed Order Limits still intrude slightly into the north western corner of the area due to the need to connect the local road network with St Peters Lane.

## 3.6 Environmental receptor – (c) Bickenhill Meadows SSSI North West and South East Units

3.6.1 Bickenhill Meadows SSSI covers 7.2 hectares and is split between two units located either side of Catherine-de-Barnes Lane and the proposed mainline link road, as shown below. The north west unit is known as the 'First Castle Meadow Unit' (the NW Unit) and this forms a constraint to the west of the Scheme's proposed mainline link road. The south east unit is known as 'Shadowbrook Meadows Unit' (the SE Unit) and this forms a constraint to the east of the Scheme's proposed mainline link road. Both units have a mixture of rare grassland species (in dry and wet meadows) and mixed woodland with certain areas potentially vulnerable to disruption to the existing hydrology. The location of these units is shown on **Figure 3-5**.



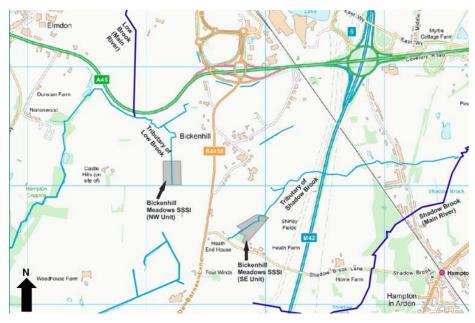


Figure 3-5 - Location of NW and SE SSSI Units.

- 3.6.2 Following survey and assessment based on the Scheme in the DCO application it has been concluded that there will be no adverse effects on the NW Unit's hydrology due to the predicted minimal contribution from groundwater (<5%) of catchment lost see **Figure 3-6** for catchment areas.
- 3.6.3 It has been determined that the SE Unit will lose around one fifth of the surface water catchment to the west of the new mainline link road and beneath the Scheme footprint. The majority of this surface water loss would ordinarily drain towards the dry meadow grassland fields within the SE Unit, or the central watercourse.
- 3.6.4 Additionally, approximately 3.6% of the surface water catchment to the wet meadow field, contained within the overall SE Unit's catchment area, would be lost due to construction of the Scheme.
- 3.6.5 Moving junction 5A to the north, or the proposed mainline link road alignment to the east, would increase the impact further on the overall catchment area and potentially remove sub-surface deposits that potentially provide a ground water recharge reservoir for the SE Unit.



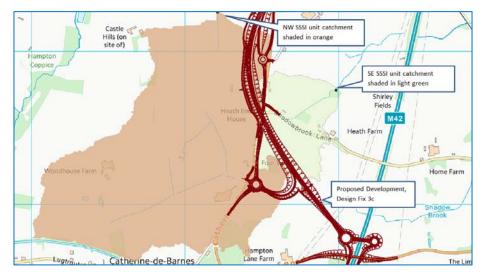


Figure 3-6 - Catchment Areas for the NW and SE SSSI Units

- 3.7 Residential and business properties in Bickenhill and along Catherine-de-Barnes and Shadowbrook Lane
- 3.7.1 **Figure 3-7** shows that the Haven Caravan Park presents a constraint to the west of the Scheme's proposed mainline link road and that the residential and business properties in Bickenhill village presents a constraint to the east.



Figure 3-7 - Constraints around Scheme's proposed mainline link road



3.7.2 **Figure 3-8** shows that residential and business properties along Catherine-de-Barnes Lane and Shadowbrook Lane present a constraint to the east of the Scheme's proposed mainline link road.



Figure 3-8 - Residential and business properties along Catherine-de-Barnes Lane and Shadowbrook Lane

#### 3.8 The WGAA facility

- 3.8.1 The WGAA facility is regionally important and is the principal Gaelic games sports facility in the West Midlands. It is currently the home grounds of Britain GAA and hosts numerous Warwickshire Gaelic football and hurling matches as well as the provincial knockout championships and the British University Gaelic football Championships.
- 3.8.2 The facility provides a constraint to the west of the Scheme's proposed mainline link road, see **Figure 3-9** below, and is already affected by the proposed mainline link road. Any further movement to the west would risk the extinguishment of the WGAA facility.



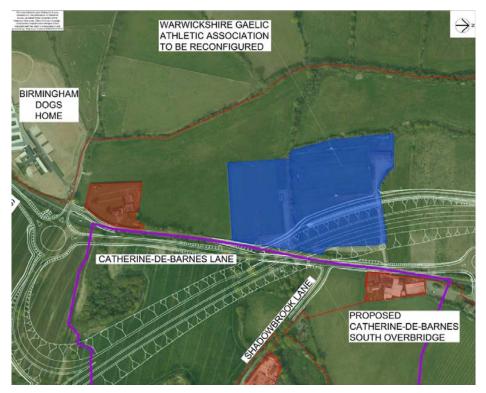


Figure 3-9 - Impact on the WGAA facility

#### 3.9 Impacts on Local Road Network

- 3.9.1 There are a number of local road crossings over the M42 motorway. These local roads are important in providing connectivity between the villages surrounding the M42 and beyond. Between junctions 5 and 6, three local road crossings are identified and will be retained:
  - Shadowbrook Lane (north of Solihull Road);
  - Solihull Road; and
  - Friday Lane (south of Solihull Road).
- 3.9.2 The proposed Scheme already requires the reconstruction of Solihull Road overbridge. Moving the location of junction 5A could additionally impact on the crossing points.
- 3.9.3 In addition, there is a need to retain a separation between traffic using the strategic road network and the local road network.

#### 3.10 Statutory Undertakers' Equipment

- 3.10.1 Two existing 132kV overhead powerlines run across the existing Solihull Road and parallel to the M42 motorway. The location of the pylons and the layout of the overhead powerlines are highlighted in **Figure 3-3** and the drawing in **Appendix A**.
- 3.10.2 The overhead powerlines run above the existing ground with approximately 15m clearance although localised ground conditions will either increase or decrease



- these levels. Minimum clearance to existing overhead powerlines is 6.7m from the road surface.
- 3.10.3 The 132kV pylons are located along the run of the south-west to north-east powerlines. The location of these pylons is a constraint as they would need to be diverted if they clash with the proposed road infrastructure.
- 3.10.4 The presence of buried utilities was also considered as part of the assessment, although no significant utility impacts were noted in the vicinity of the junction 5A location.

#### 3.11 Potential MSA Area

3.11.1 An outline planning application for a MSA was submitted by Extra MSA to Solihull Metropolitan Borough Council on 30 June 2015 (application reference: PL/2015/51409/PPOL). The works include construction of a new service station, a new grade separated Junction on the M42 motorway with north and south facing slips and an access road from the proposed junction to the MSA including an underpass beneath Solihull Road, demolition of the existing Solihull Road bridge across the M42 and its replacement with a new bridge and associated works.

Figure 3-10 displays an outline layout of the MSA development.

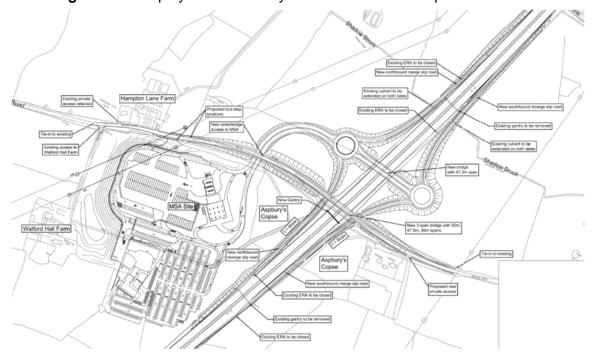


Figure 3-10 – Outline Layout of the Proposed MSA Scheme Development Adjacent to the new Junction 5A

3.11.2 The application for planning consent for the MSA precedes the Scheme non-statutory consultation which began in December 2016. It was therefore an objective to ensure that, where practicable, the design of junction 5A would not preclude the MSA scheme from being delivered if authorised, either in advance of or following the implementation of the Scheme.



- 3.11.3 The MSA north facing slip roads join the M42 immediately south of Shadowbrook Lane overbridge. The provision of north facing slip roads would introduce an additional operational weaving constraint between junction 5A and junction 6. The MSA developer has reported it has secured approval in principle from Highways England for a departure from standards to reduce in weaving length from 2km to approximately 1.1km as shown in **Figure 3-11** below. The developer would also convert the current smart motorway dynamic hard shoulder running operational regime to all lanes running in order to minimise the weaving impacts.
- 3.11.4 The north facing slip roads proposed by the MSA consist of connecting the slip roads with the M42 motorway immediately south of the existing Shadowbrook lane overbridge to avoid the need to relocate/reconstruct the overbridge. The MSA has also reported it has secured approval in principle from Highways England for departures on its north facing slip roads for a sub-standard taper length and a sub-standard stopping site distance.
- 3.11.5 Any reduction in the distance between junction 5A and junction 6 would subsequently reduce the weaving distance between the two junctions for the MSA Scheme. The proximity of junction 5A to Shadowbrook Lane Overbridge will also be reduced. The MSA will have to apply for new departures from standard for reduced weaving lengths, sub-standard taper, and stopping sight distance (SSD) to avoid reconstruction of the overbridge. There is no guarantee that the developer would be able to secure further reductions in weaving through the departure process and therefore be unable to implement their proposal.

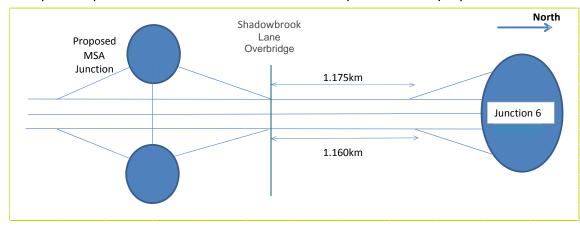


Figure 3-11 - Proposed MSA Junction and Weaving Lengths on M42 Motorway (Derived from Stage 2 technical Note based on MSA Planning Application Documents)



## 4 Design Narrative: Impact of the Constraints on Determining the Location of the Junction 5A

#### 4.1 Initial Assessment

- 4.1.1 The previous sections of this technical note identify and describe a number of constraints and influencing factors determined through the iterative design process used whilst developing the scheme and locating junction 5A. This section seeks to examine any flexibility which exists in the junction position through consideration of a number of alternative junction positions, presented on the drawing in Appendix A.
- 4.1.2 Chapter 4 Scheme history of the Environmental Statement [APP-049/Volume 6.1] summarises the process through which a number of options were identified and assessed. Over 40 options were identified, evaluated and consulted on with stakeholders. Details of these processes is explained in the Scheme Assessment Report and the Technical Appraisal Report. This optioneering process resulted in 3 specific options being selected and presented to the stakeholders for feedback. Details of these options is presented in Appendix B. The outcome of the consultation process was a preference for Option 2R which is broadly the layout presented in this DCO application.
- 4.1.3 Development of the junction philosophy initially was to consider a wide range of options for location and junction type. Following Preferred Route Announcement the junction philosophy was refined to provide a new junction south of junction 6, initially with north and south facing slip roads. The junction would be designed to a dumb-bell form which would: minimise land-take, reduce the footprint, reduce impact on the Green Belt, and accommodate future development in line with the scheme objective of supporting economic growth and improving access to local businesses.

#### Starting Point for Junction Position

- 4.1.4 As stated above, the initial junction concept had both north and south facing slip roads. To maximise the weaving sections between junction 5 and 5A, and junction 5A and 6, the first point considered for the location of junction 5A was the mid-point between junctions 5 and 6. This is approximately 300m south of Solihull Road. However, to locate the junction in this location would require a departure from standards. Thus pushing the preferred junction location further north. However, the position of Aspbury's Copse located immediately north of the midpoint, was a major constraint on the junction position.
- 4.1.5 To remove all impacts of the Scheme on the Ancient Woodland, junction 5A would need to be relocated approximately 900m north (the length of the current junction 5A northbound diverge slip road). From a practical point of view, this would mean commencing the diverge taper to the north of Solihull Road overbridge to retain the current structure; the centre line of junction 5A would be broadly coincident with the connector road tapers presented as Option 3 at non-statutory consultation (between December and January 2017). This option was not supported by consultation respondents, particularly residents of Bickenhill Village.



- 4.1.6 The drawing in Appendix A shows a representation of 4 junction positions, together with the DCO application junction 5A position.
- 4.1.7 Section 3 above sets out constraints and influencing factors which effectively fix the alignment of the mainline link road at its northern end, which include Clock Interchange itself, Airport Way connector road overbridge, Bickenhill Village, The Haven Caravan Park, properties along the local roads, Bickenhill Meadows SSSI and the WGAA facility. This effectively limits the potential to move the alignment further east or west from a point around Catherine-de-Barnes South Overbridge.
- 4.1.8 To navigate through these constraints and thus avoid further impacts, while complying with the highway geometry requirements under DMRB, the alignment of the proposed mainline link road is broadly fixed between Clock Interchange and Catherine-de-Barnes South Overbridge. This constrains the location of junction 5A.
- 4.1.9 While the Extra MSA planning application remains to be determined, the initial planning application predates the development of the Scheme, as described in Section 3.11. Highways England has confirmed that it has sought not to preclude the MSA coming forward either before or after the Scheme following determination by the local authority, Solihull Metropolitan Borough Council.
- 4.1.10 The MSA planning application features both north and south facing slip roads, with the applicants north facing slip roads joining the motorway immediately south of Shadowbrook Lane. The MSA Scheme is promoting north facing slip roads which comply with urban road design standards rather than motorway design standards. Moving junction 5A further north would require Extra MSA to demolish and replace Shadowbrook Lane overbridge and apply for further departures from standards, which is not guaranteed.
- 4.2 Options Evaluated to fix location of Junction 5A
- 4.2.1 A number of options were considered an indicative layout of the options considered is provided in Appendix A. An outline explanation of these impacts is explained within this section below.
- 4.3 Option 1 Locating Junction 5A at Midway Between Junctions 5 and 6
- 4.3.1 Option 1, a Junction at the midpoint, would be positioned immediately south of Solihull Road and the Ancient Woodland at Aspbury's Copse. Key factors which led to the rejection of this position include:
  - the impact of the MSA's north facing slip roads on the Ancient Woodland at Aspbury's Copse;
  - the proposed mainline link road would require raising of Solihull Road with associated impacts on residential and commercial property, Green Belt and 132kv overhead powerlines;
  - the western dumb-bell roundabout and mainline link road would be positioned in land identified in the planning application for Extra MSA; and
  - the new junction would be closer to Catherine-de-Barnes.



#### 4.4 Option 2 – Junction 5A Located North

- 4.4.1 Option 2 moves the junction north by approximately 100m from the DCO application position. This is achieved by providing a tighter 1440m radius curve on the mainline link from a tangent point at the intersection of Catherine-de-Barnes Lane South overbridge and the mainline link. Moving the junction approximately 100m further north would not remove the impact on the Ancient Woodland. Key factors which led to the rejection of this option were:
  - the location of the junction 5A roundabouts would require re-routing of the existing Shadow Brook;
  - the vertical level differences between roundabout level and motorway level could not be accommodated while retaining the length of straight or near straight, nosing and taper, to urban road standards before the Shadowbrook Lane (these are key geometric requirements of slip road design as outlined in DMRB TD22/06); and
  - the MSA's north facing slip roads which would necessitate the demolition and reconstruction of Shadowbrook Lane overbridge and would further reduce the weaving distance between Junctions 5A and 6, potentially precluding the MSA.

#### 4.5 Option 3 – Junction 5A Located North

- 4.5.1 Option 3 moves the junction north by approximately 250m from the DCO application position. This is achieved by providing a tighter 1020m radius curve (desirable minimum horizontal radius for mainline link design speed) on the mainline link from a tangent point at the intersection of Catherine-de-Barnes Lane South overbridge and the mainline link. Moving the junction approximately 250m further north would not remove the impact on the Ancient Woodland. Key factors which led to the rejection of this option were:
  - the increased impact on Bickenhill Meadows SSSI through reduction in natural catchment and potential impact on ground water recharge reservoir;
  - the increased scheme footprint to accommodate verge and central reserve widening on the mainline link;
  - the alignment is moved closer to residential properties on Shadowbrook Lane;
  - the western dumb-bell roundabout would require diversion of the 132kV overhead pylons;
  - the vertical level differences between roundabout level and motorway level could not be accommodated while retaining the length of straight or near straight, nosing and taper, to urban road standards before the Shadowbrook Lane (these are key geometric requirements of slip road design as outlined in DMRB TD22/06);
  - the MSA's north facing slip roads which would necessitate the demolition and reconstruction of Shadowbrook Lane overbridge and would further reduce the weaving distance between Junctions 5A and 6, potentially precluding the MSA; and
  - the increase in length of connector road between MSA and junction.



#### 4.6 Option 4 – Junction 5A Located North

- 4.6.1 Option 4 location shows the junction moved north by approximately 300m from the DCO application position. This is achieved by providing a tighter 720m radius curve (one step below desirable minimum horizontal radius for mainline link design speed) on the mainline link from a tangent point at the intersection of Catherine-de-Barnes Lane South overbridge and the mainline link. Moving the junction approximately 300m further north would not remove the impact on the Ancient Woodland. Key factors which lead to the rejection of this option were:
  - the increased impact on Bickenhill Meadows SSSI through reduction in natural catchment and possible impact on ground water recharge reservoir;
  - the increased scheme footprint to accommodate verge and central reserve widening on the mainline link;
  - the alignment is moved closer to residential properties on Shadowbrook Lane;
  - the western dumb-bell roundabout would require diversion of the 132kV overhead pylons;
  - the vertical level differences between roundabout level and motorway level could not be accommodated while retaining the length of straight or near straight, nosing and taper, to urban road standards before the Shadowbrook Lane (these are key geometric requirements of slip road design as outlined in DMRB TD22/06);
  - the MSA's north facing slip roads which would necessitate the demolition and reconstruction of Shadowbrook Lane overbridge and would further reduce the weaving distance between Junctions 5A and 6, potentially precluding the MSA; and
  - the increase in length of connector road between MSA and junction.

#### 4.7 Positioning of Junction 5A Presented in the DCO Application

- 4.7.1 The position of the junction in the DCO application, in comparison to options considered above, would:
  - have less impact on the natural catchment of the Bickenhill Meadows SSSI SE Unit;
  - have less of an impact on the Green Belt with a reduced Scheme footprint;
  - not prevent modification for future infrastructure provision, subject to necessary consents;
  - not impact on 132kV pylons; and
  - not preclude the MSA from coming forward subject to modification of the junction.

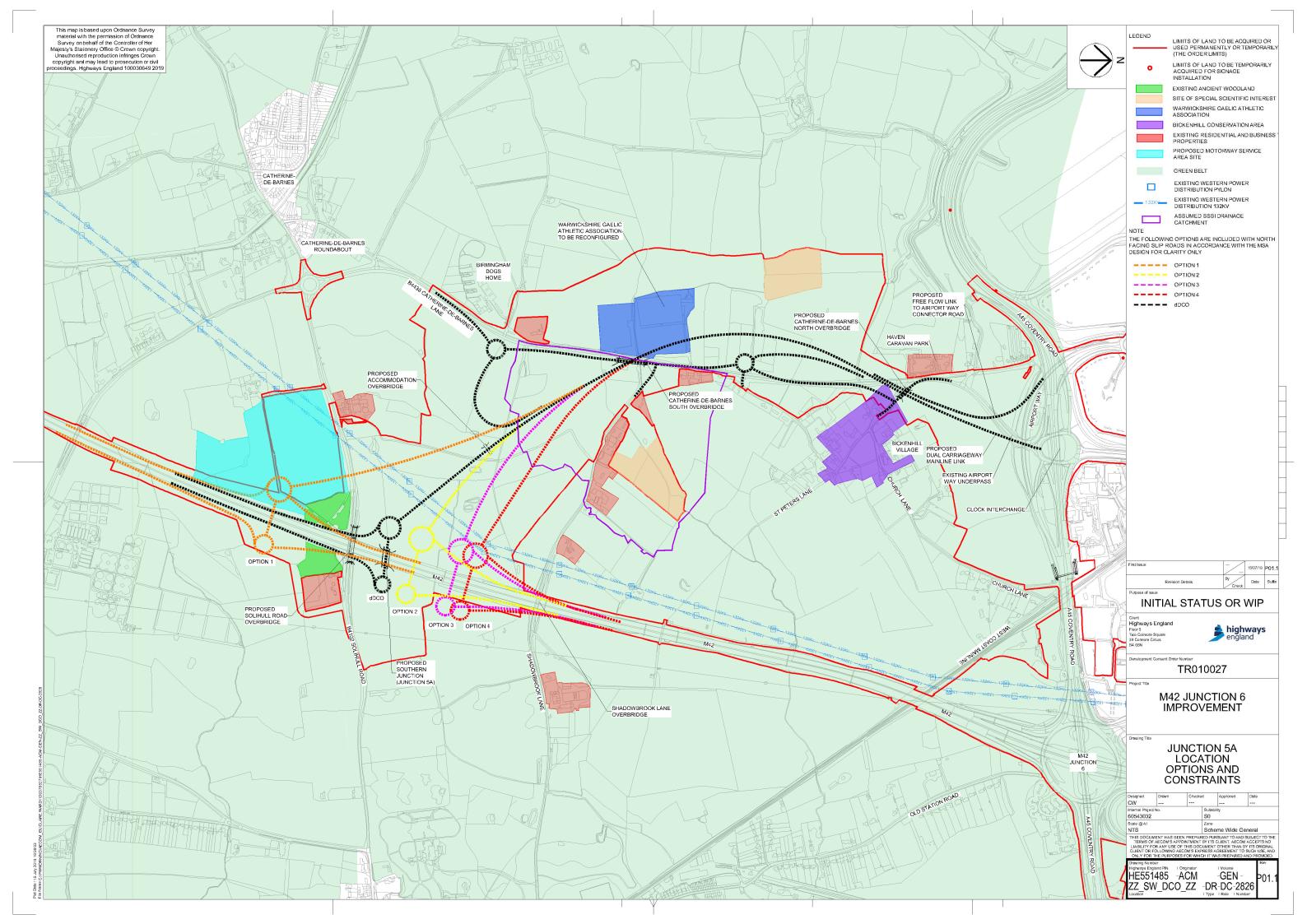


### 5 Summary and Conclusion

- 5.1.1 To remove all impacts of the Scheme on the Ancient Woodland, junction 5A would need to be relocated approximately 900m north. This option was not supported by consultation respondents, particularly residents of Bickenhill Village.
- 5.1.2 This Technical Note demonstrates that as junction 5A is moved further north, the mainline link road (which is fixed by the constraints from Clock Interchange down to at least the Catherine-de-Barnes Lane Bridge South) shifts further north with increasingly reduced geometric standards. The change in geometry also has an increasing degree of impact (mainly negative) on the constraints and influencing features adjacent to the mainline dual carriageway link road as described in sections 3 and 4. This Technical Note demonstrates that shifting the junction marginally further north has little beneficial impact on the ancient woodland and will preclude the MSA.
- 5.1.3 Having applied an iterative design and assessment process, and balancing the key constraints and physical impacts, the applicant is satisfied that the position of junction 5A in the DCO application is in the appropriate location to meet the scheme objectives.



## **Appendix A – Location Options and Constraints**





## **Appendix B – Final Options Presented at Public Consultation 2016/2017**

