

Project:	Highways England Spatial Planning Arrangement 2016-2020	Job No:	60600479 DM014.013
Subject:	South Caldecotte - Kelly's Kitchen Proposed Junction Review (DMRB Review)		
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Executive Summary

This Technical Note summarises a review on behalf of Highways England of a revised junction design for the Kelly's Kitchen junction, to support an employment led development proposal in South Caldecotte in Milton Keynes. Following this review, AECOM make the following recommendations.

Recommendations regarded as critical to the agreement in principle of the design proposals:

1. Further details should be provided with respect to any additional third party land required, this should include the full extent of the proposals that could influence land requirements including proposed revisions to earthworks, areas required for drainage ditches etc and whether or not this land is currently within the control of the scheme proposer, also that details should be provided of the land extents which would be transferred to Highways England (para 4.7).

A4146 Approach

2. AECOM recommend that vehicular swept path plots should be provided in support of the proposed layout on the A4146 approach to demonstrate the ability of large heavy goods vehicles (HGVs) to navigate the junction whilst remaining within any lane widths proposed (para 4.10).
3. The required visibility parameters and the visibility splays should be illustrated on subsequent versions of the layout drawing and/or its successors in title. The appropriate stopping sight distances (SSD) for the widened carriageway should be identified and if necessary, justified with reference to observed vehicle speeds and demonstrated free of obstructions in both the vertical and horizontal planes (para 4.11).

A5 north-western approach and Brickhill Street

4. The Brickhill Street exit should be revised in accordance to the design standards set out in CD 116 (para 4.14).
5. Vehicular swept path plots should be provided in support of the proposed layout on the Brickhill Street approach and exit to demonstrate the ability of large heavy goods vehicles (HGVs) to navigate the junction whilst remaining within any lane widths proposed (para 4.18).
6. The required visibility parameters and the visibility splays should be illustrated on subsequent versions of the layout drawing and/or its successors in title. The appropriate stopping sight distances (SSD) should be identified and if necessary, justified with reference to observed vehicle speeds and demonstrated in both the vertical and horizontal planes (para 4.21).

Recommendations regarded as important but not critical to the agreement in principle of the design proposals:

7. The vertical aspects of the proposed layout presented in drawing no SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2 and/or its successor in title should be provided in due course (para 4.5).
8. Subsequent versions of the proposed layout drawings and/or its successors in title should illustrate relevant proposed traffic signs and road markings in accordance with the guidance contained in CD 116, TSM and TSRGD (para 4.6).

A4146 Approach

9. The proposed realignment of the footway/cycleway adjacent to the A4146 approach should be illustrated, including in the assessment for the potential need for third party land, and shown in subsequent versions of drawing no. SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2 and/or its successors in title (para 4.12).
10. A Walking, Cycling and Horse-Riding Assessment (WCHAR) should be undertaken in accordance with the requirement and guidance set out with DMRB GG142 (para 4.12).

A5 north-western approach and Brickhill Street

11. The road markings (and traffic signs on the approach) should be enhanced to minimise the risk of weaving, and shown in subsequent versions of drawing no. SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2 and/or its successors in title (para 4.16).
12. The taper length proposed on the dedicated left turning lane on the Brickhill Street approach to the roundabout should be revised in accordance with the 1 in 5 ratio required by CD 123 (para 4.17).
13. The proposed locations for the primary and secondary signal heads should be illustrated on subsequent versions of the layout drawing and/or its successors in title and that the signal heads proposed (both primary and secondary) should be located in accordance to DMRB requirements. (para 4.19).
14. Junction intervisibility zones should be illustrated on subsequent versions of the drawing (para 4.20).
15. A Walking, Cycling and Horse-Riding Assessment (WCHAR) should be undertaken in accordance with the requirement and guidance set out with DMRB GG142 (para 4.22).

AECOM recommend that Highways England reserve judgement on the acceptability of the layout currently proposed until such time as the recommendations above have been addressed.

1. Introduction

- 1.1. AECOM, on behalf of Highways England, have undertaken a review of a drawing produced by BWB Consulting Ltd (BWB) to reflect design proposals at the Kelly's Kitchen roundabout junction which forms the junction of the A5 with the A4146, Watling Street and Brickhill Street to the south-east of Milton Keynes.
- 1.2. The drawing has been prepared to support an outline planning application for a proposed employment development in South Caldecotte, Milton Keynes (planning reference: 19/01818/OUT).
- 1.3. The outline planning application proposes that the development will encompass up to 241,540 sqm (2,600,000sqft) of B1(c), B2, and B8 land uses. This includes storage, warehouses, distribution and light industrial and ancillary offices.
- 1.4. The development site is allocated under policy SD14 of MKC's 'Adopted local plan: Plan MK' (March 2019) for a mixed employment development of B2/B8 uses.
- 1.5. AECOM understand that the proposed drawing is intended to accommodate the additional traffic growth anticipated with the proposed development. The drawing has been provided along with the traffic modelling assessments of the proposed design. This Technical Note (TN12) is limited to a review of the proposed layout with respect to guidance contained within the Design Manual for Roads and Bridges (DMRB) whilst TN11 considers the capacity and operational aspects of the design. Therefore, this TN12 should be read in conjunction with AECOM's TN11.
- 1.6. The drawing provided is detailed below:
 - Drawing number SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2 'Proposed Kelly's Kitchen Roundabout Mitigation'. The 'Reviewed' box is dated 20/05/20 and hence in this instance is assumed to supersede the P2 Revision dated 21/05/18.
- 1.7. This TN12 will provide an overview of the highway layout revisions proposed at the Kelly's Kitchen Junction as presented in the above drawing, with a view to determining whether or not the proposed measures are likely to be compliant with the requirements of the DMRB as they relate to the Strategic Road Network (SRN). It is to be noted that the AECOM review will only consider the changes proposed for the South Caldecotte development relative to the underlying junction arrangement proposed for the Eaton Leys development (Ref: 14/02146/EIASCO) illustrated by drawing no. 481693.01.GA01 (CH2MHILL, June 2015) which for the purposes of this review are considered to be committed.
- 1.8. For ease of reference, AECOM's main comments and recommendations are presented in bold and underlined text within this note. Recommendations that are critical in nature are coloured **red**. Recommendations that are of concern but are not critical to agreement in principle of the proposed layout are highlighted in **amber**.

2. Background

Kelly's Kitchen Roundabout

- 2.1. Highways England is the highway authority with respect to the SRN, comprising in the context of this technical review the A5 mainline carriageway and its approaches to and exits from the Kelly's Kitchen roundabout. The local highway and planning authority is Milton Keynes Council (MKC).

- 2.2. Kelly's Kitchen roundabout is located to the south of Bletchley and forms the intersection of the A5 and A4146. Kelly's Kitchen roundabout currently operates as a signalised five-arm at-grade roundabout junction. The junction has a service area located to its south-eastern quadrant, accessed from the A5 south-eastern approach upstream of the junction and from the A4146 southbound exit downstream of the junction. The service area has a signalised exit onto the A4146 serving southbound access onto the A4146 and northbound access onto the Kelly's Kitchen roundabout. The junction currently has localised footway/cycleway provision to its southern and western quadrants, connecting the service area with on-street cycle network on Watling Street and the A5 north-west of the junction.
- 2.3. At the time of drafting this TN the committed mitigation for the junction associated with the proposals for the Eaton Leys development (Ref: 14/02146/EIASCO) is assumed to comprise of a number of amendments to the signalised roundabout to incorporate two 'throughabout' lanes connecting the A5 north-western approach to the A4146 exit and A5 south-eastern approach to the A5 north-western exit respectively. The layout presented in drawing no. 481693.01.GA01 (CH2MHILL, June 2015) represents the baseline layout for the purposes of this review.
- 2.4. With regard to the Kelly's Kitchen roundabout, Highways England's primary interests will be:
 - The impact of the mitigation measures on the safe and free flow of traffic using the Kelly's Kitchen roundabout, specifically the A5 Mainline carriageway, its approaches to and exits from the junction.

3. DMRB Technical Review

Introduction

- 3.1. TN12 represents a technical review of the drawing provided by BWB Consulting Ltd, encompassing a preliminary high-level overview and assessment of the proposed mitigation measures and their compliance with the guidance contained within the DMRB. The review does not constitute a detailed design check of all aspects of the proposals, but is intended to identify aspects of the design which are potential 'showstoppers' and/or aspects which if revised could have an impact upon the predicted operation of the junction.
- 3.2. The proposed layout has not been subject to a Stage 1 Road Safety Audit (RSA). This review, as presented in TN12, does not constitute a Road Safety Audit.
- 3.3. This section provides a technical review of the proposed layout with reference to the DMRB guidance set out in:
 - CD 116 – Geometric design of roundabouts (DMRB Volume 6 Section 2 Part 3, Revision 0, July 2019);
 - CD 123 – Geometric Design of at-grade priority and signal-controlled junctions (DMRB Volume 6 Section 2 Part 6, Revision 0, August 2019).
- 3.4. It is to be noted that the scope of this review is limited to the proposed changes to the Kelly's Kitchen junction as set out within Drawing no. SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2 'Proposed Kelly's Kitchen Roundabout Mitigation' dated 20/05/20.
- 3.5. AECOM has not appointed a Principal Designer or considered the associated aspects that would apply within this role. It is recommended that should these schemes proceed; a Principal Designer is appointed by the client in accordance with CDM Regulations.

4. Kelly's Kitchen Proposed Revisions and DMRB Review

- 4.1. The Kelly's Kitchen junction currently comprises of a signalised five-arm at-grade roundabout providing interconnection between the A5, A4146, Watling Street and Brickhill Street. The junction consists of signalised arms on all approaches at their intersections with the circulatory carriageway.
- 4.2. The mitigation scheme is broadly based around the existing Kelly's Kitchen footprint, largely retaining the existing circulatory carriageway alignments in situ. As mentioned earlier in this report, it is to be noted that the AECOM review only considers the changes proposed for the South Caldecotte development, relative to the assumed committed baseline comprising the Eaton Leys mitigation layout.
- 4.3. The mitigation scheme involves:
 - With regard to the A4146 approach arm, the 'baseline' short flare has been increased to provide an additional short lane;
 - With regard to the A5 north-western approach arm, the 'baseline' left only lane serving Brickhill Street has been remarked to allow the ahead and left movements;
 - Amendments to 'baseline' lane markings within the intersection between the A5 north-western approach and the northern circulatory of the roundabout to facilitate two ahead lanes;
 - Realignment and dualling of Brickhill Street between the A5 and proposed site access roundabout, introducing a two-lane exit onto Brickhill Street and increasing the 'baseline' short flare to provide an extended left-turn lane with a three-lane stop line on Brickhill Street approach to the junction; and
 - The extension of footway/cycleway facilities on the northern quadrant from the A5 approach crossing onto Brickhill Street towards the proposed site access.

General Principles

- 4.4. Geometric measurements referenced within this technical note with regard to the layout (Drawing number SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2 'Proposed Kelly's Kitchen Roundabout Mitigation' dated 20/05/20 have been taken from AutoCAD drawing SCD-BW8-GEN-01-SK-TR-SK01_Kelly's Kitchen Roundabout.
- 4.5. It should be noted that the information presented on the layout is in two-dimensional form only and therefore a review of the vertical aspects of the proposal has not been undertaken. The vertical aspects could have implications in terms of alignment in both vertical and horizontal planes and also the perceived visibility available. **The vertical aspects of the proposed layout presented in drawing no SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2 and/or its successor in title should be provided in due course.**

- 4.6. CD 116 identifies that guidance for the appropriate use of traffic signs and road markings at roundabouts is contained in the Traffic Signs Manual (TSM) and the Traffic Signs Regulations and General Directions (TSRGD). Details of traffic signage proposed are not shown on the drawings. Whilst some road markings are shown, AECOM assumes that they are indicative of the proposed allocation of road space to traffic lanes and do not constitute a detailed road marking drawing. **AECOM recommend that subsequent versions of the proposed layout drawings and/or its successors in title illustrate relevant proposed traffic signs and road markings in accordance with the guidance contained in CD 116, TSM and TSRGD.**
- 4.7. The full extent of the earthworks/ drainage works required is not shown at this stage. The proposed widening to the junction on the A4146 approach arm and realignment and widening of the Brickhill Street exit and approach arms may require the associated drainage/earthworks/signing to extend outside of the existing highway boundary and may need to acquire third party land, which may impact on the feasibility of the scheme proposed, some of the land may potentially need to be transferred into Highways England's ownership. **AECOM therefore recommends that further details are provided with respect to any additional third party land required, this should include the full extent of the proposals that could influence land requirements including proposed revisions to earthworks, areas required for drainage ditches etc and whether or not this land is currently within the control of the scheme proposer, also that details are provided of the land extents which would be transferred to Highways England.**
- 4.8. AECOM assesses each element of the layout where changes are made to the 'baseline' junction geometry (i.e. changes from the committed Eaton Leys mitigation layout) and/or signing and lining amendments against the appropriate design guidance. Where approach or exit arms are not specifically referenced below no geometric changes or road signage / marking amendments are identified relative to the baseline junction layout.

A4146 Approach

- 4.9. The A4146 approach 'baseline' layout illustrates a two-lane approach at the signalised stop line with the service area exit with a short taper downstream providing three-lanes at the stop line on the roundabout. The proposed mitigation incorporates widening of the approach to the nearside, to provide a dedicated left-turn approach lane approximately 49m in length and 3.1m in width, developed with a taper of circa 15.5m from the mainline carriageway preceding the signalised stop line with the service area. The proposals include nearside kerb realignment which amends the baseline entry kerb radius to circa 32m.
- 4.10. No vehicular swept paths have been provided to support the proposed mitigation measures on the A4146 approach. **AECOM recommend that vehicular swept path plots are provided in support of the proposed layout on the A4146 approach to demonstrate the ability of large heavy goods vehicles (HGVs) to navigate the junction whilst remaining within any lane widths proposed.** This should be undertaken for any legitimate movement by a HGV in any traffic lane where the number of running lanes is being increased or the alignment altered. The swept path analysis should demonstrate as appropriate the ability of HGVs to run side by side in adjacent lanes.
- 4.11. AECOM note that neither forward visibility splays nor junction intervisibility zones have been illustrated on drawing no. SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2 with respect to the proposed widened A4146 approach. **AECOM recommend that the required visibility parameters and the visibility splays are illustrated on subsequent versions of the layout drawing and/or its successors in title. The appropriate stopping sight distances (SSD) for the widened carriageway should be identified and if necessary, justified with reference to observed vehicle speeds and demonstrated free of obstructions in both the vertical and horizontal planes**

4.12. AECOM note that the existing footway/cycleway adjacent to the A4146 approach in the baseline layout is severed by the proposed widening to accommodate a dedicated left-turn approach lane. Drawing no. SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2 does not illustrate any realignment or mitigation of this effect. **AECOM recommend that the proposed realignment of the footway/cycleway adjacent to the A4146 approach is illustrated, including in the assessment for the potential need for third party land, and shown in subsequent versions of drawing no. SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2 and/or its successors in title.** In order to determine the potential impact of the proposed pedestrian/cycleway on users of this facility, **AECOM recommend that a Walking, Cycling and Horse-Riding Assessment (WCHAR) should be undertaken in accordance with the requirement and guidance set out with DMRB GG142.**

A5 north-western approach and Brickhill Street

4.13. The proposed mitigation comprises remodelling of the Brickhill Street exit and approach arms to incorporate dualling of Brickhill Street between the A5 and proposed site access roundabout along with localised amendments to the baseline lane markings on the A5 north-western approach and northern quadrant of the circulatory carriageway.

4.14. The baseline layout comprises a single lane exit from the roundabout onto Brickhill Street served by a dedicated left-turn from lane one of the A5 north-western approach and lanes one and two of the circulatory carriageway. The proposed layout illustrated by drawing no. SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2 seeks to provide a two-lane exit (8m in width) from the roundabout along with localised kerb realignment and an amendment to lane allocations on the A5 north-western approach. CD 116 (para. 3.28.3) identifies that, where the downstream link is an all-purpose two-lane dual carriageway road, the exit width should be between 10m and 11m, with the exit tapering down to two lanes wide. The exit width for the Brickhill Street exit, at 8m wide, is therefore below the standard required. **AECOM recommend that the Brickhill Street exit should be revised in accordance to the design standards set out in CD 116.**

4.15. The layout currently proposed appears to conform to the requirements of CD 116 (para 3.29.2 to 3.29.3) with respect to exit kerb radius. Nevertheless, the exit kerb radius will need to be reviewed in respect of any changes to the layout to resolve the exit width and should be 40m or, where an exit kerb radius of 40m cannot be achieved, should be no less than 20m and no greater than 100m.

4.16. The proposals incorporate the amendment of the left-turn marking in lane one of the A5 north-western approach and circulatory lane markings to enable the straight-ahead movement from four lanes. AECOM are concerned that the lane continuity is provided for traffic entering the circulatory carriageway from the A5 north-western approach could potential result in four lanes of traffic attempting to enter the three lane circulatory or cut through. AECOM consider that the proposed arrangement may increase the risk of weaving traffic and clear distinction needs to be made between traffic intended to use the circulatory traffic and that traffic which is intended to utilise the cut through and **recommend that the road markings (and traffic signs on the approach) are enhanced to minimise the risk of weaving, and shown in subsequent versions of drawing no. SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2 and/or its successors in title.**

4.17. The Brickhill Street approach 'baseline' layout illustrates a single-lane approach with a taper providing three-lanes at the stop line on the roundabout. The proposed mitigation incorporates realignment and dualling of the mainline carriageway and widening of the approach to the nearside, to provide a dedicated left-turn approach lane approximately 38m in length and 3.65m in width, developed with a taper of circa 16.9m from the mainline carriageway preceding the signalised stop line. The proposals include nearside kerb realignment which amends the baseline entry kerb radius to circa 44m. AECOM note that the taper length proposed falls short of the 1 in 5 ratio required by CD 123 (para. 7.8), where a 3.65m dedicated turning lane width (as proposed) equates to a taper of 18.25m. **AECOM recommend that the taper length proposed on the dedicated left turning**

lane on the Brickhill Street approach to the roundabout is revised in accordance with the 1 in 5 ratio required by CD 123.

- 4.18. No vehicular swept paths have been provided to support the proposed mitigation measures on either the Brickhill Street approach or exit. **AECOM recommend that vehicular swept path plots are provided in support of the proposed layout on the Brickhill Street approach and exit to demonstrate the ability of large heavy goods vehicles (HGVs) to navigate the junction whilst remaining within any lane widths proposed.** This should be undertaken for any legitimate movement by a HGV in any traffic lane where the number of running lanes is being increased or the alignment altered. The swept path analysis should demonstrate as appropriate the ability of HGVs to run side by side in adjacent lanes.
- 4.19. Primary and secondary signal heads have not been illustrated on the drawing provided. AECOM assume that some signal heads will need to be relocated e.g. where the Brickhill Street stop line appears to have been moved forward from its baseline position. **AECOM recommend that the proposed locations for the primary and secondary signal heads are illustrated on subsequent versions of the layout drawing and/or its successors in title and that the signal heads proposed (both primary and secondary) are located in accordance to DMRB requirements.** Consideration should be given to the required position of the signal heads ahead of the stop line together with the required clearance to the signal heads from the carriageway edge.
- 4.20. AECOM note that junction intervisibility zones have not been illustrated on drawing no. SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2 with respect to the Brickhill Street approach. Whilst AECOM are satisfied that baseline intervisibility is not likely to be adversely affected by the proposed amendments to the Brickhill Street approach it is **recommended that junction intervisibility zones are illustrated on subsequent versions of the drawing.**
- 4.21. AECOM note that the required forward visibility parameters and the visibility splays achievable for the Brickhill Street approach and exit arms at the roundabout have not been illustrated on drawing no. SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2. **AECOM recommend that the required visibility parameters and the visibility splays are illustrated on subsequent versions of the layout drawing and/or its successors in title. The appropriate stopping sight distances (SSD) should be identified and if necessary, justified with reference to observed vehicle speeds and demonstrated in both the vertical and horizontal planes.**
- 4.22. The proposed layout illustrated by drawing no. SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2 incorporates a 3m wide footway / cycleway alongside the western kerb line of Brickhill Street, connecting the existing crossing provision on the A5 north-western approach with the roundabout serving the site access of the proposed development. In order to determine the potential impact of the proposed footway / cycleway upon users of this facility, **AECOM recommend that a Walking, Cycling and Horse-Riding Assessment (WCHAR) should be undertaken in accordance with the requirement and guidance set out with DMRB GG142.**

5. Conclusion

- 5.1. AECOM, on behalf of Highways England, have undertaken a review of a drawing produced by BWB Consulting Ltd (BWB) to reflect design proposals at the Kelly's Kitchen roundabout junction.
- 5.2. The drawing has been prepared to support an outline planning application for a proposed employment development in South Caldecotte, Milton Keynes (planning reference: 19/01818/OUT). The following drawing provided by BWB has been reviewed:

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- Drawing number SCD-BWB-GEN-01-SK-TR-SK01 S2 Rev P2 'Proposed Kelly's Kitchen Roundabout Mitigation' dated 20/05/20.
- 5.3. This review has identified a number of issues relating to the compliance of the proposed roundabout layouts with the requirements of the Design Manual for Roads and Bridges (DMRB). AECOM's recommendations regarding these concerns are highlighted by the use of bold underlined text throughout this document and are listed in the executive summary. Recommendations requiring immediate action are coloured **red**. Recommendations that are of concern but are not detrimental to agreement in principle are highlighted in **amber**.