Luton Rising
Our airport.
Our community.
Our planet.

November 2023

London Luton Airport Expansion

Planning Inspectorate Scheme Ref: TR020001

Volume 8 Additional Submissions (Examination)

8.118 Applicant's Response to Issue Specific Hearing 4 Action 7 - Updates on Road Safety Audits

Infrastructure Planning (Examination Procedure) Rules 2010

Application Document Ref: TR020001/APP/8.118

The Planning Act 2008

The Infrastructure Planning (Examination Procedure) Rules 2010

London Luton Airport Expansion Development Consent Order 202x

8.118 Applicant's Response to Issue Specific Hearing 4 Action 7 – Update on Road Safety Audits

Deadline:	Deadline 5
Planning Inspectorate Scheme Reference:	TR020001
Document Reference:	TR020001/APP/8.118
Author:	Luton Rising

Version	Date	Status of Version
Issue 1	November 2023	Additional Submission – Deadline 5

Contents

1 INTRODUCTION

1.1.1 This note has been prepared to provide an update to the Examining Authority (ExA) with regard to Issue Specific Hearing 4 (ISH4) Action 7 in relation to the progress on completing the Stage 1 Road Safety Audits (RSA1).

1.1.2 The note provides an update on the status of the RSA1s for the strategic network (specifically M1 Junction 10) and the local highway network.

M1 Junction 10

1.1.3 A Stage 1 RSA is required to be completed on the basis of the proposed highway mitigation designs shown in drawings LLADCO-3C-ARP-SFA-HWM-DR-CE-0009, -0024/25 and -0029/30, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

1.1.4 The proposals form a three-stage approach to mitigation at M1 Junction 10, with works proposed at all three Assessment Phases of the Proposed Development. All three stages of the works will be assessed as part of the RSA.

1.1.5 An audit brief has been developed in conjunction with National Highways (NH), and this has been agreed and signed off by NH on 5 November 2023. The audit team has also been approved by NH. As such, the safety audit is expected to be undertaken in the week commencing 13th November 2023, and the results of which are intended to be shared with the ExA at Deadline 6. A copy of the Audit Brief including the details of the audit team is appended to this document (**Appendix A**).

1.1.6 In order to satisfy the requirements of Design Manual for Roads and Bridges (DMRB) GG119 'Road Safety Audit' guidance (Ref 1), it will be necessary to engage further with NH (Overseeing Organisation) in order to agree the proposed actions in response to the issues raised within the audits. This engagement process will be started following completion of the RSA.

Off-site Highway Mitigation

1.1.7 The RSAs associated with the off-site highway mitigation works on the local highway network were undertaken by TMS Consultancy Ltd. on 10th October 2023, and the recommendations of the audits were received on 23rd October 2023.

1.1.8 The audits were undertaken on the basis of the proposed highway mitigation designs shown in drawings LLADCO-3C-ARP-SFA-HWM-DR-CE-0005 to -0033, as contained within **Appendix A** of the **Transport Assessment Appendices-Part 1 of 3 (Appendices A to E) [APP-200].**

1.1.9 Whilst details of the proposed 'Future Baseline' highway schemes were provided to TMS for context, only the highway mitigation schemes which are proposed to be delivered as part of the Proposed Development were audited.

1.1.10 The off-site highways RSAs set out various recommendations at each of the junctions which were audited. Subsequently, designer's response reports have

been created to respond to the audit recommendations, and these are grouped into three Appendices within this report according to which local authority the junctions are located within, namely:

a. Appendix B: Luton Borough Council
b. Appendix C: Hertfordshire County Council; and
c. Appendix D: Central Bedfordshire Council.

1.1.11 The audited junctions which fall within Luton Borough Council are:

a. A505 Vauxhall Way / Eaton Green Road
b. A505 Vauxhall Way / Kimpton Road
c. A1081 New Airport Way / London Road (North)
d. A1081 New Airport Way / Percival Way
e. Airport Access Road (Assessment Phase 2a)
f. Airport Access Road (Assessment Phase 2b)
g. Crawley Green Road / Lalleford Road
h. Eaton Green Road / Frank Lester Way
i. Eaton Green Road / Lalleford Road
j. Wigmore Lane / Crawley Green Road
k. Wigmore Lane / Eaton Green Road
l. Windmill Road / Kimpton Road; and
m. Windmill Road / St. Mary's Road / Crawley Green Road.

1.1.12 The audited junctions which fall within Hertfordshire County Council are:

a. A505 / Upper Tilehouse Street
b. A505 Upper Tilehouse Street / A602 Park Way; and
c. A602 Park Way / A602 Stevenage Road / Hitchin Hill.

1.1.13 The audited junctions which fall within Central Bedfordshire Council are:

a. A1081 New Airport Way / Gipsy Lane; and
b. A1081 New Airport Way / London Road (South).

1.1.14 As with the M1 Junction 10 audit process, it will be necessary to engage with the three above local authorities (Overseeing Organisations) in order to agree the proposed actions in response to the issues raised within the audits. As of the week commencing 13th November 2023, engagement with the three local authorities has begun, and the draft designer's responses in the GG119 format supplied within this report in the following appendices form the basis of engagement.

REFERENCES

Ref 1 'GG119- Road safety audit', Revision 2 (January 2020), Design Manual for Road and Bridges, National Highways

APPENDIX A - M1 JUNCTION 10 AUDIT BRIEF

Contents

Tables

Figures

1 PROJECT SUMMARY

Date:	**6th November 2023**
Document reference:	TP001/01
Prepared By:	Arup
On behalf of:	Luton Rising
AUTHORISATION SHEET	
Project:	Luton Airport Development Consent Order
Report Title:	M1 Junction 10: Stage 1 Road Safety Audit Brief
PREPARED BY:	
Name:	Neil Scott
Signed:	[redacted]
Organisation:	Arup
Date:	6 November 2023
I APPROVE THE RSA BRIEF AND INSTRUCT THE RSA TO TAKE PLACE ON BEHALF OF THE OVERSEEING ORGANISATION:	
Name:	Jeremy Bloom
Signed:	[redacted]
Organisation:	National Highways
Date:	5 November 2023

1. GENERAL DETAILS

<table>
<tr><td colspan="2">Highway scheme name and road number:</td><td colspan="4">Motorway M1 Junction 10</td></tr>
<tr><td>Type of scheme:</td><td colspan="5">Preliminary Design of Junction Capacity Improvement</td></tr>
<tr><td rowspan="2">RSA stage tick as appropriate</td><td>1 √</td><td>2</td><td>3</td><td colspan="2" rowspan="2">4</td></tr>
<tr><td colspan="3">Interim</td></tr>
<tr><td colspan="3">Overseeing Organisation Details</td><td colspan="3">Design Organisation Details</td></tr>
<tr><td colspan="3">National Highways</td><td colspan="3">Arup, Arup Campus, Blythe Valley Business Park. Solihull, B90 8AE, United Kingdom</td></tr>
<tr><td colspan="3">Police contact details</td><td colspan="3">Maintaining Agent contact details</td></tr>
<tr><td colspan="3">N/A</td><td colspan="3">National Highways (Trunk/Motorway Network)</td></tr>
<tr><td colspan="6">RSA team membership (see Appendix A for team member CVs)</td></tr>
<tr><td colspan="3">Team Leader:</td><td colspan="3">Ema Jones
Senior Engineer
Arup
[redacted]</td></tr>
<tr><td colspan="3">Team Member(s):</td><td colspan="3">Anna Goldie
Engineer
Arup
[redacted]</td></tr>
<tr><td colspan="3">Observer(s):</td><td colspan="3">N/A</td></tr>
<tr><td colspan="6">Terms of Reference</td></tr>
<tr><td colspan="6">– DMRB Vol 5.2 GG 119 Road Safety Audit</td></tr>
</table>

2 SCHEME DETAILS

2.1 Scheme description / objective

2.1.1 The proposed mitigation schemes submitted for a Stage 1 RSA are located at Motorway M1 Junction 10, with the measures designed in a phased approach to support the expansion of Luton Airport as part of a DCO application.

2.1.2 The mitigation has been designed to an outline level of detail, considering highway standards including the Design Manual for Roads and Bridges (DMRB), Traffic Signs Manual (TSM) and local standards where relevant.

2.1.3 The proposed airport expansion would take place in three distinct phases:

- Assessment Phase 1 (21.5mppa- million passengers per annum),
- Assessment Phase 2a (27mppa) and
- Assessment Phase 2b (32mppa),

2.1.4 There are different highway mitigation schemes to be provided for each of these phases to provide additional highway capacity with the design in each phase building upon the design preceeding phase.

2.1.5 It is noted that National Highways has developed indicative measures to future improve the merge and diverge on the south facing slips and the mitigation scheme subject to this Stage 1 RSA would not preclude those works or any other wider works to the M1 itself.

2.2 RSA Scope

2.2.1 Stage 1 RSA is required to be carried out for the proposed mitigation schemes as attached in **Error! Reference source not found.** under Assessment Phase 1, Assessment Phase 2a and Assessment Phase 2b on all road safety matters and the needs of all road users rather than the technical matters without any implication on road safety as stated in DMRB Vol 5.2 GG 119 Road Safety Audit Section 5.1.

2.3 Design standards applied to the scheme design

Table 1: Design Manual for Road and Bridges standards

Reference	Title
CD109	Highway link design
CD116	Geometric design of roundabouts
CD123	Geometric design of at-grade priority and signal-controlled junctions
CD127	Cross-sections and headrooms

Table 2: Other Standards

Reference	Title
Manual for Streets	Section C Detailed design issues
Traffic Signs Manual	Chapter 5 Road Markings and Chapter 6 Traffic Control
Central Bedfordshire Design Guide	Chapter 7 Movement
Hertfordshire Highway Design Guide	Section 2: Highway Layout and Strategies

2.4 Design Speeds

2.4.1 The design speed of the affected road sections under the proposed mitigation schemes will remain unchanged.

2.5 Speed limits

2.5.1 The speed limits at the concerned road sections are listed below:

a. A1081 New Airport Way: 50mph
b. Motorway M1 and its slips: with a variable speed limit
c. Junction 10 Roundabout: 50mph

2.6 Existing traffic flows

Figure 2-1: 2017 base year traffic flows – AM peak

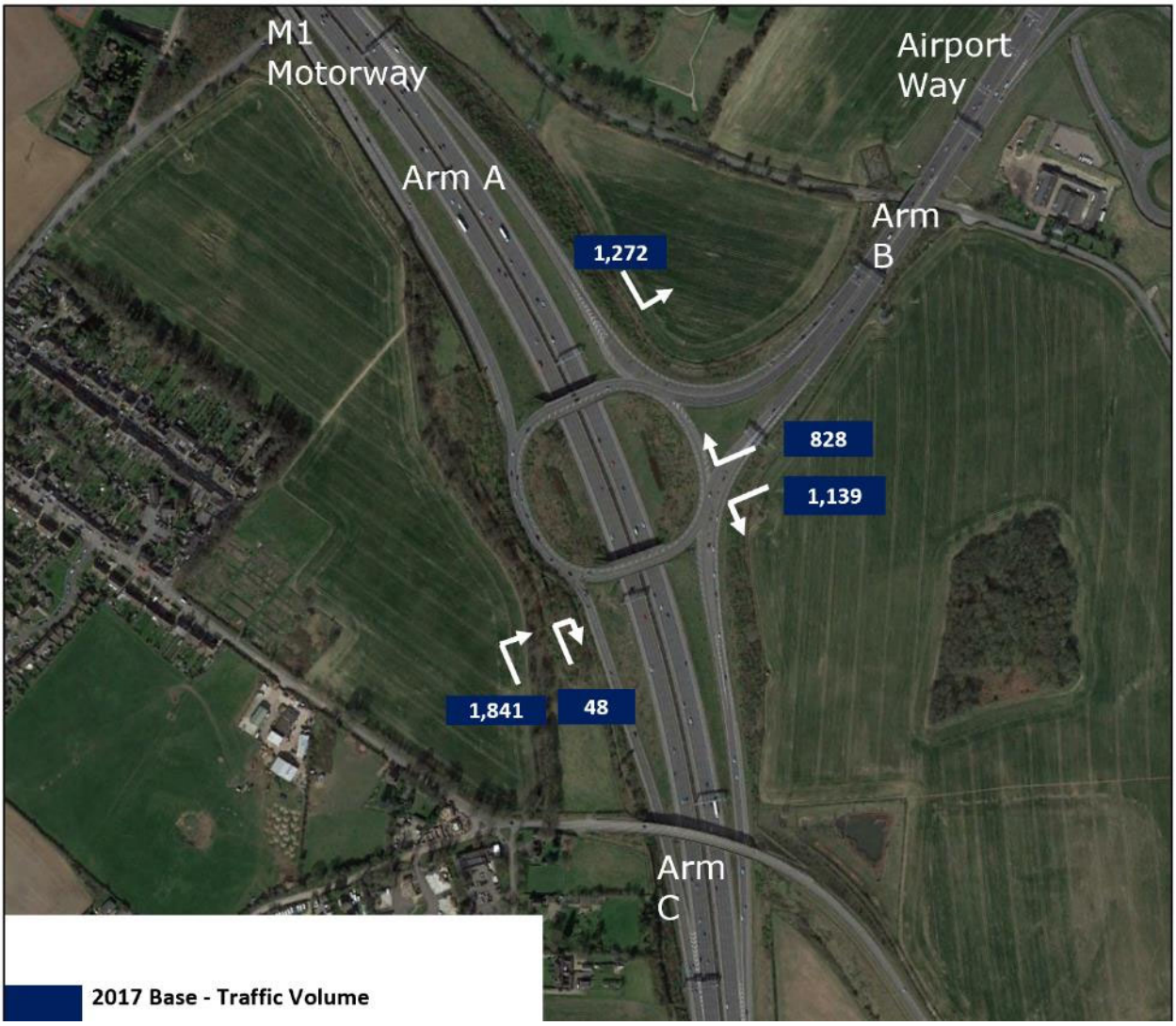
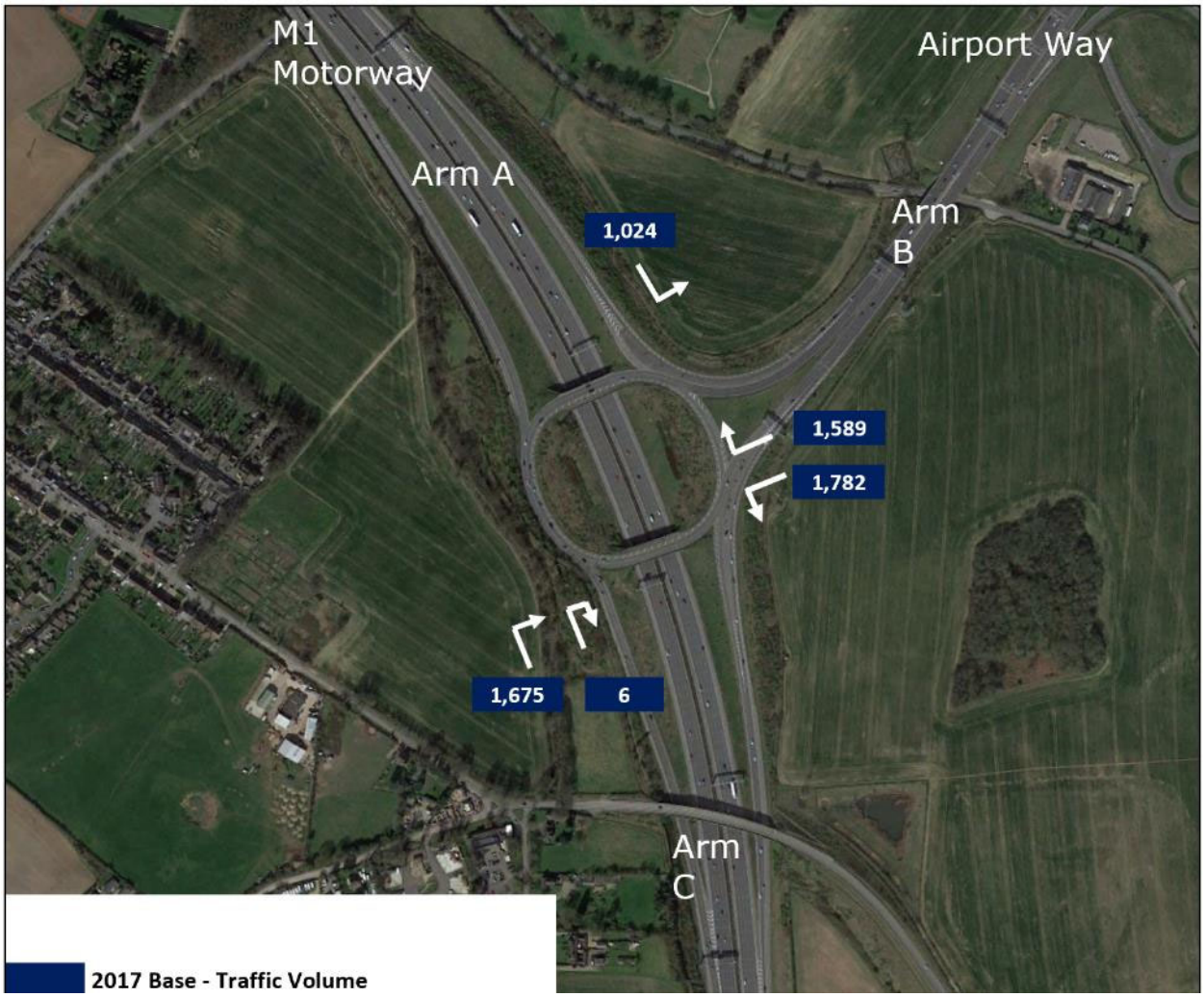


Figure 2-2: 2017 base year traffic flows – PM peak



2.7 Forecast traffic flows

Figure 2-3: 2027 forecast traffic flows, both “Do minimum” and “Do-something” Scenarios – AM peak

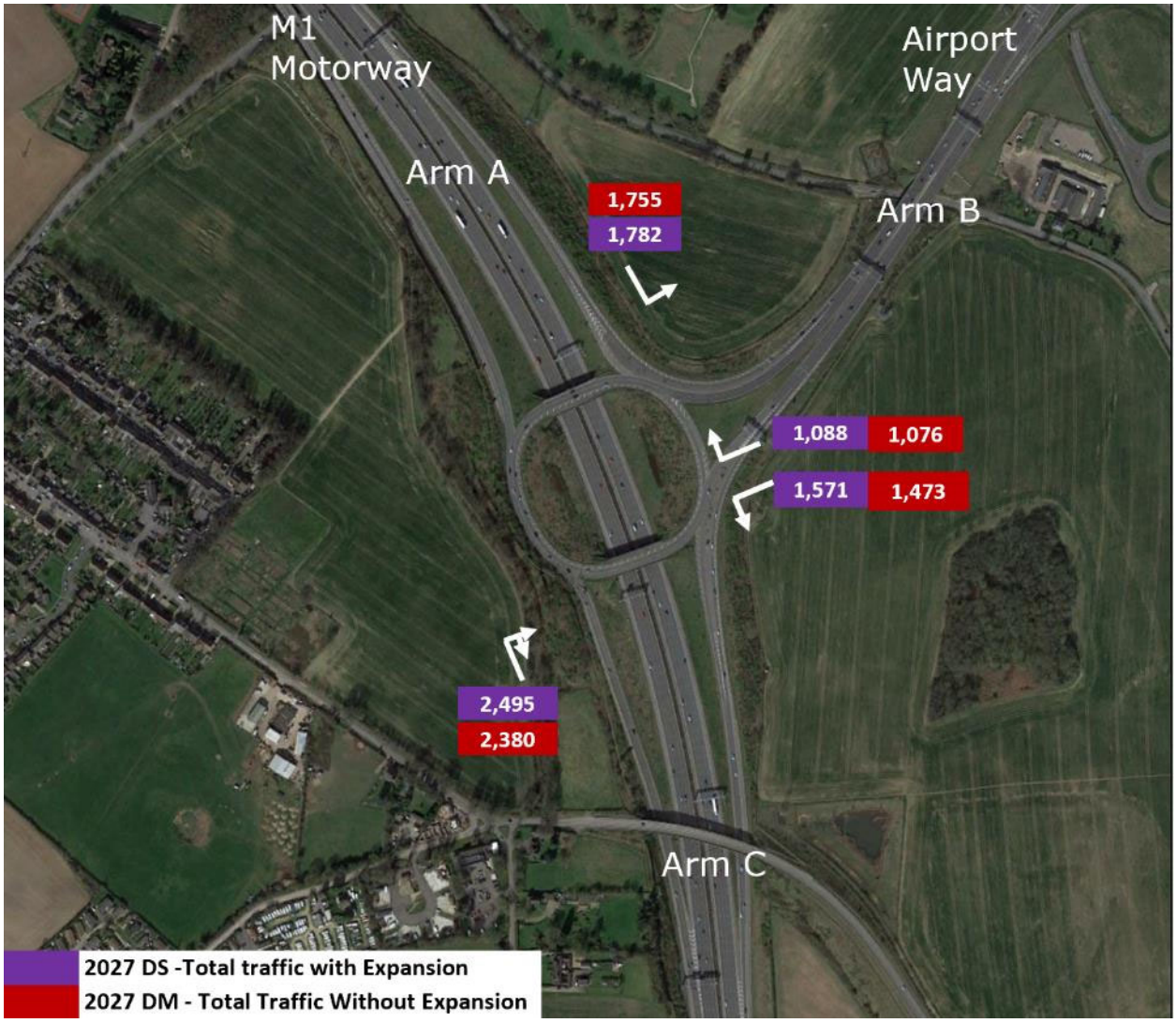


Figure 2-4: 2027 forecast traffic flows, both “Do minimum” and “Do-something” Scenarios – PM peak

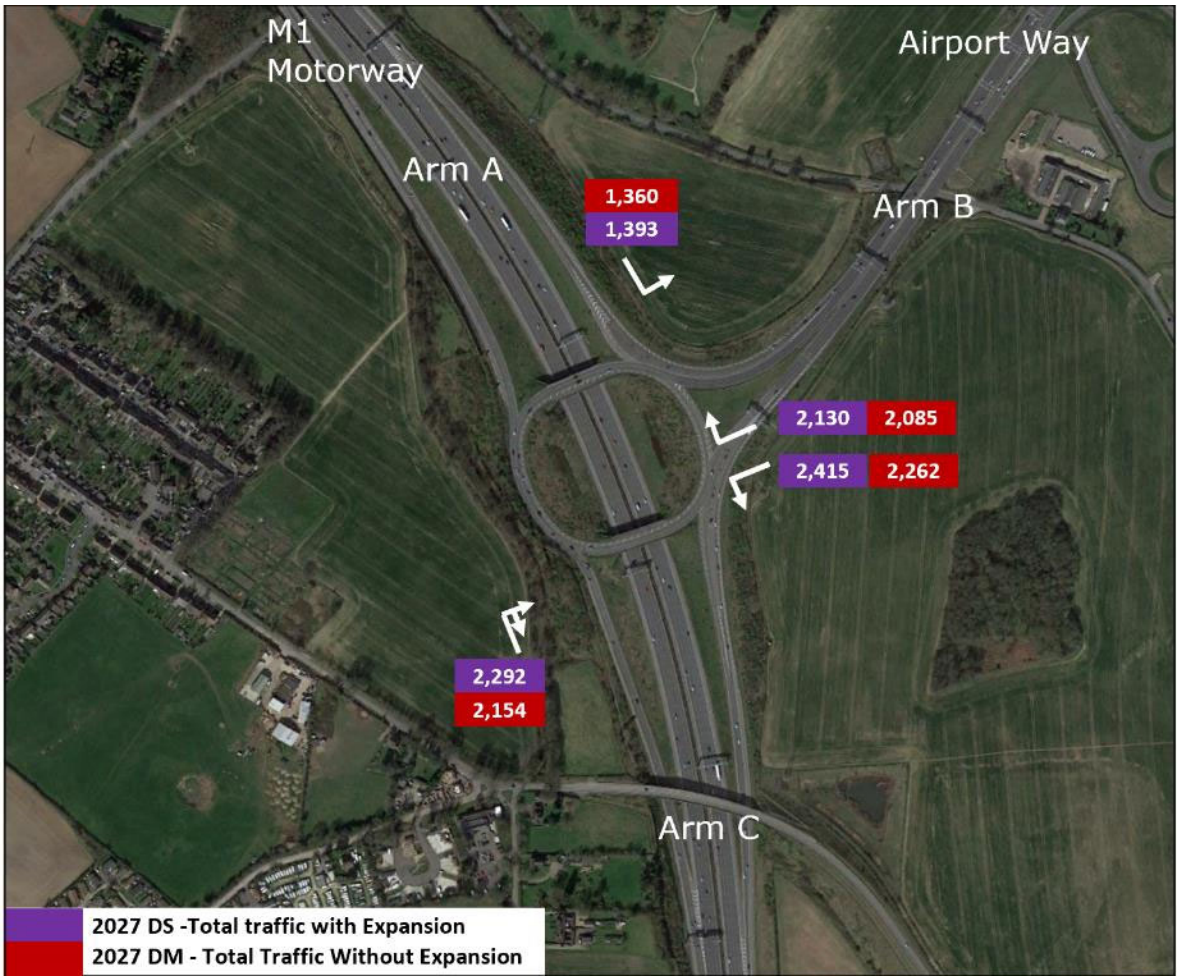


Figure 2-5: 2039 forecast traffic flows, both “Do minimum” and “Do-something” Scenarios – AM peak

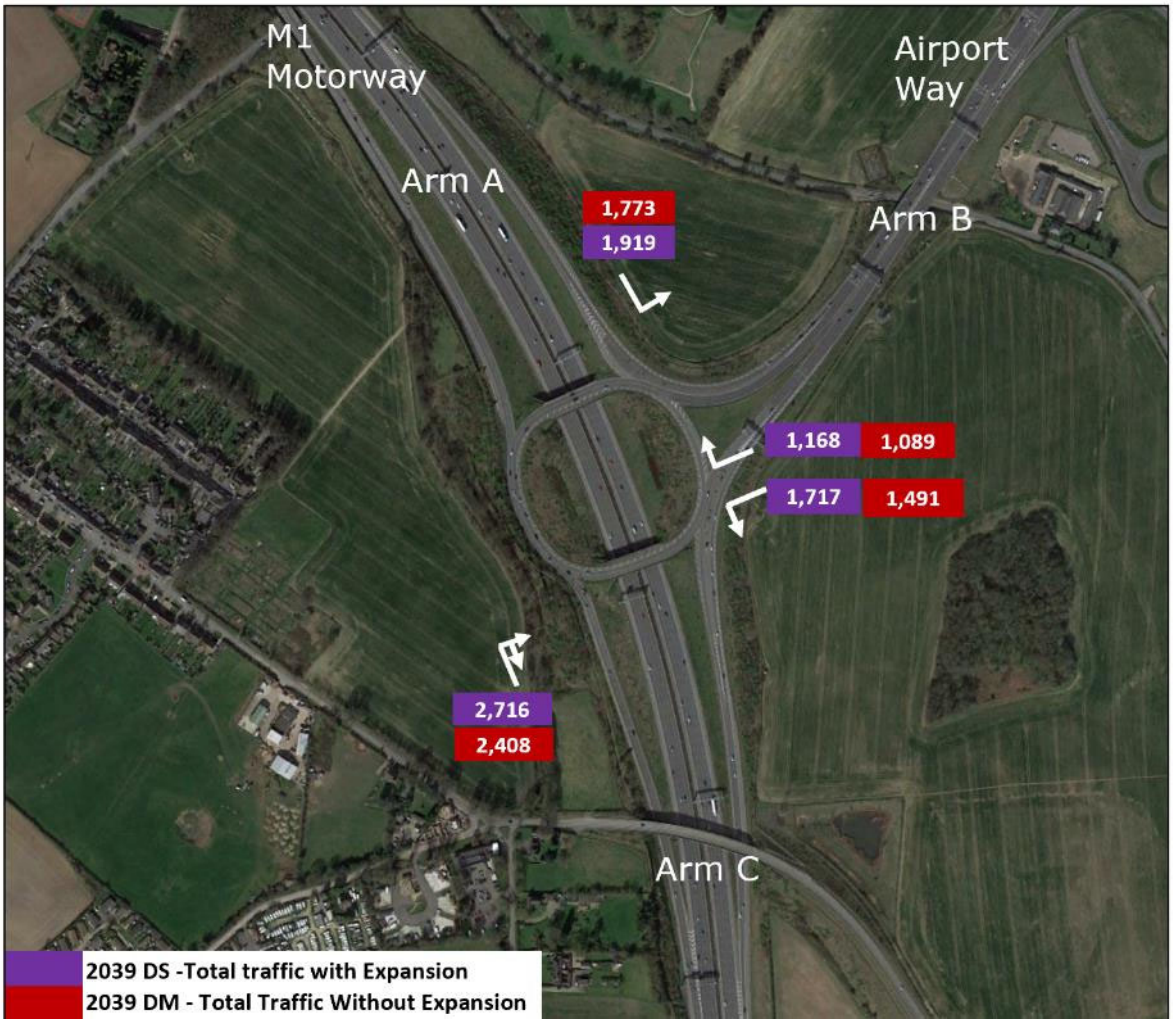


Figure 2-6: 2039 forecast traffic flows, both “Do minimum” and “Do-something” Scenarios – PM peak

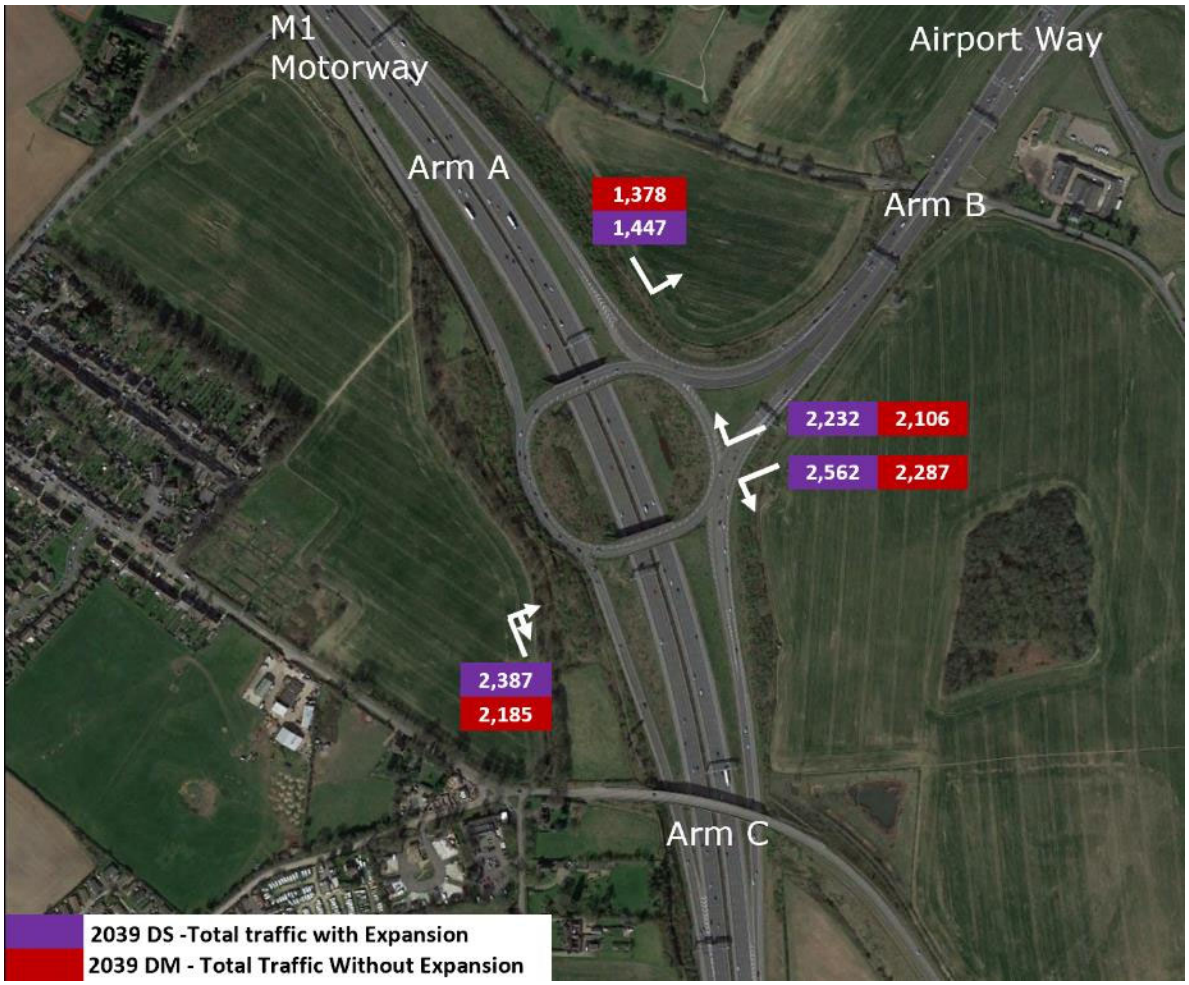


Figure 2-7: 2043 forecast traffic flows, both “Do minimum” and “Do-something” Scenarios – AM peak

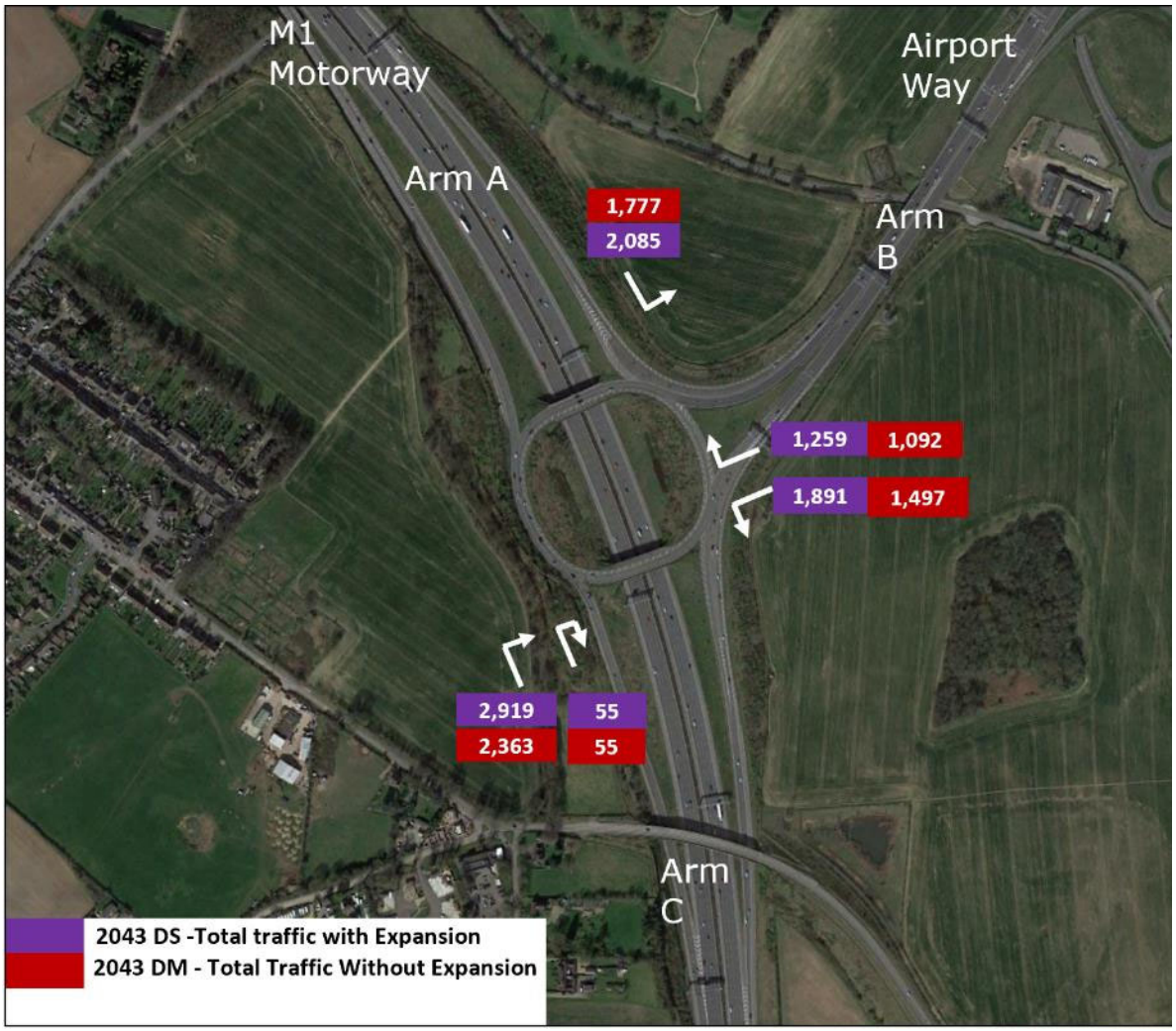
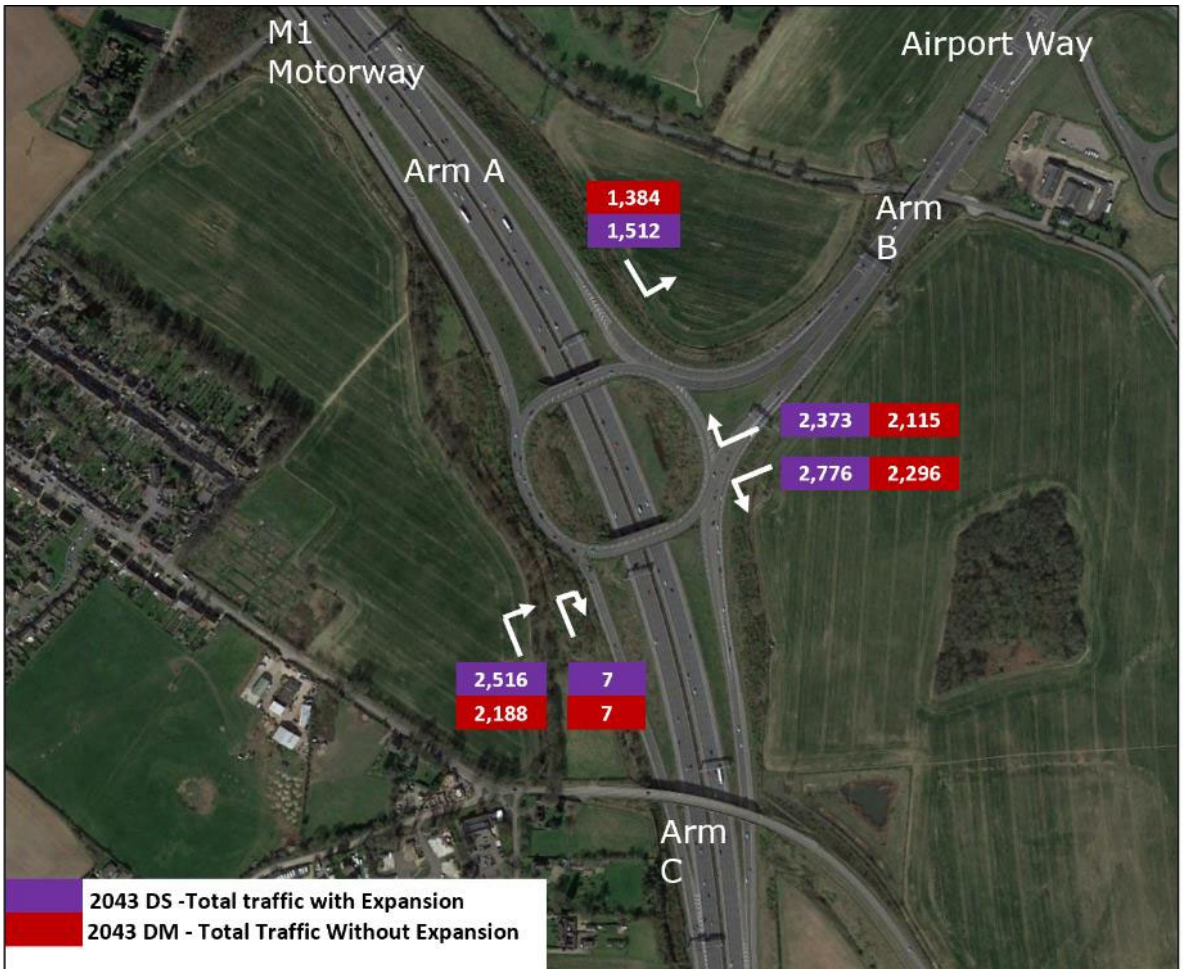


Figure 2-8: 2043 forecast traffic flows, both “Do minimum” and “Do-something” Scenarios – PM peak



2.8 Pedestrian, cycle and desire lines

2.8.1 There are no pedestrian and cycle routes in the area.

2.9 Environmental constraints

2.9.1 No environmental constraints are identified.

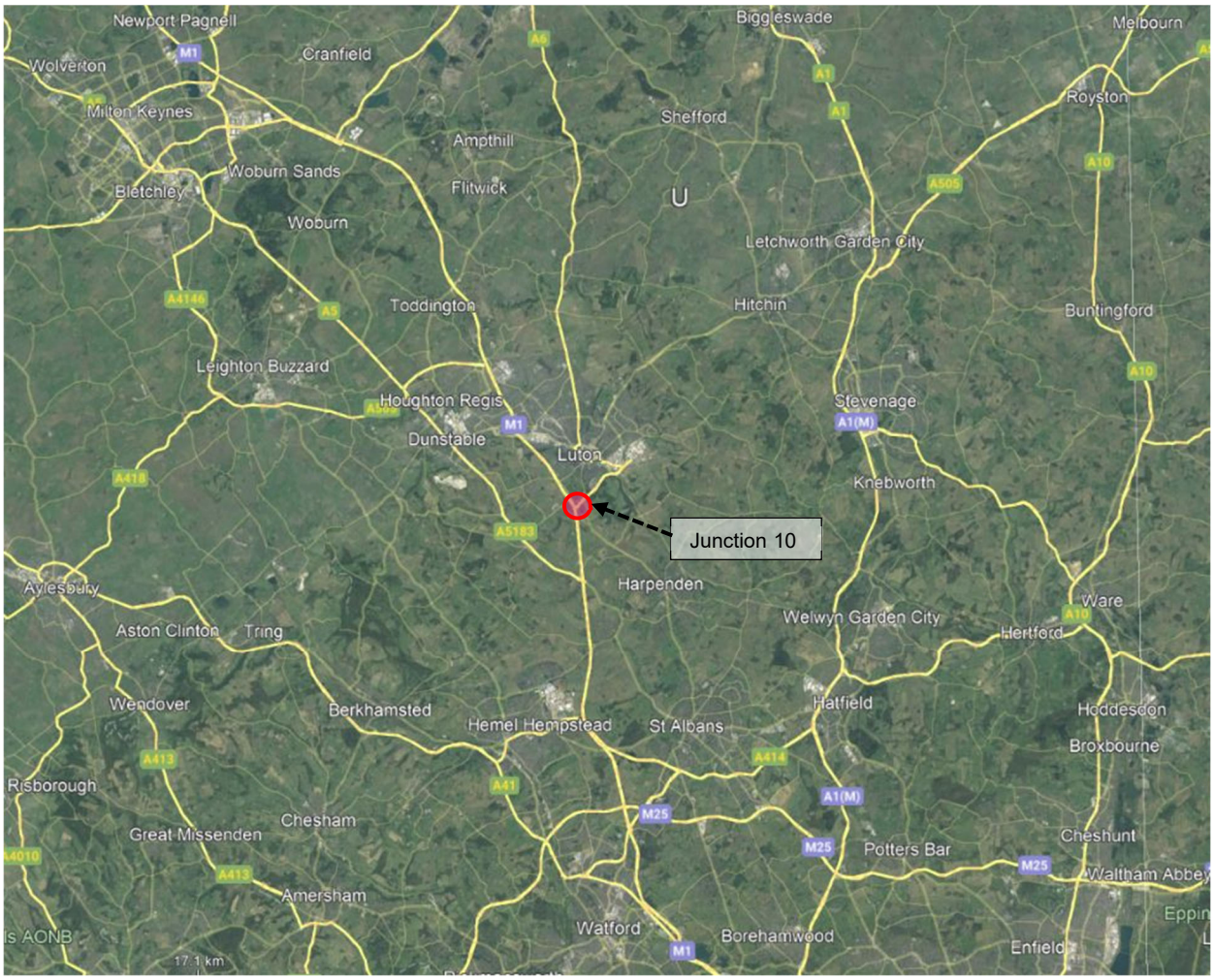
3 SITE DESCRIPTION

3.1 Site Location

3.1.1 Junction 10 is located on M1 motorway is fall under the boundary of Central Bedfordshire Council and Luton Borough Council near the town of Luton. The roundabout is an integral part of the road network, connecting several major routes, including the M1 motorway and several local routes in Luton area.

3.1.2 The Junction 10 roundabout is partially signal controlled to facilitate the traffic movement between motorway and local roads and connects to M1 motorway to local roads including A1081 Airport Way and other nearby routes.

Figure 9: Site Location



(Source from Google Earth)

3.2 Proposed Works

Assessment Phase 1

3.2.1 Widening to the northbound off-slip to provide a third lane on the approach to the roundabout, with the widening accommodated in existing verge and embankment.

3.2.2 Widening to the western circulatory carriageway to provide four circulating lanes, with this widening accommodated in the existing landscaped area on the inside of the roundabout.

3.2.3 Amendments to the exit from the roundabout onto the A1081, to allow three lanes to diverge from the roundabout. This widening would be accommodated within existing verge area.

3.2.4 See drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0009 in Appendix B.

Assessment Phase 2a

3.2.5 Widening to the A1081 westbound carriageway to enable two left turn lanes to continue onto the M1 southbound on-slip, where widening is also proposed.

3.2.6 See drawings LLADCO-3C-ARP-SFA-HWM-DR-CE-0024 and LLADCO-3C-ARP-SFA-HWM-DR-CE-0025 in Appendix B.

Assessment Phase 2b

3.2.7 Widening of the western circulatory carriageway to provide five lanes. Realignment of the A1081 exit to enable three lanes to exit roundabout onto A1081, with segregated left turn lane removed and junction of southbound off-slip signalised.

3.2.8 See drawings LLADCO-3C-ARP-SFA-HWM-DR-CE-0029 in Appendix B.

3.2.9 These works would tie in with the proposed improvement to the southbound on-slip are shown in Assessment Phase 2a LLADCO-3C-ARP-SFA-HWM-DR-CE-0025 in Appendix B.

4 ANALYSIS

4.1 Collision Data Analysis

4.1.1 The following table provides information on collisions recorded over the latest 5 year period.

Table 3: 5-year collision data

Junction	Severity	Arm	Number of collisions				
			2017	2018	2019	2020	2021
M1 Junction 10	Fatal	NB off-slip (roundabout entry)	0	0	0	0	0
		NB on-slip (roundabout exit)	0	0	0	0	0
		SB off-slip (roundabout entry)	0	0	0	0	0
		SB on-slip (roundabout exit)	0	0	0	0	0
		A1081 (roundabout entry)	0	0	0	0	0
		A1081 (roundabout exit)	0	0	0	0	0
		Total	**0**	**0**	**0**	**0**	**0**
	Serious	NB off-slip (roundabout entry)	0	0	1	0	0
		NB on-slip (roundabout exit)	0	0	1	0	0
		SB off-slip (roundabout entry)	0	0	0	0	0
		SB on-slip (roundabout exit)	0	1	0	0	0
		A1081 (roundabout entry)	0	0	0	0	0
		A1081 (roundabout exit)	0	0	0	0	0
		Total	**0**	**1**	**2**	**0**	**0**
	Slight	NB off-slip (roundabout entry)	2	0	0	0	2
		NB on-slip (roundabout exit)	2	2	2	0	0
		SB off-slip (roundabout entry)	0	0	0	0	0
		SB on-slip (roundabout exit)	0	0	0	0	1
		A1081 (roundabout entry)	1	0	1	1	0
		A1081 (roundabout exit)	1	0	1	0	1
		Total	**6**	**2**	**4**	**1**	**4**

4.2 Departures from Standards

4.2.1 The proposed mitigation schemes are understood to comply with the requirements of DMRB, TSM and other local design standards.

4.3 Previous road safety audit stage reports, road safety audit response reports and evidence of agreed actions

4.3.1 There are no previous road safety audit stage reports, road safety audit response reports and safety risk assessment for the proposed mitigation schemes.

4.4 Strategic Decisions

4.4.1 There are no design strategy records produced for the proposed mitigation schemes.

5 LIST OF INCLUDED DOCUMENTS AND DRAWINGS

5.1 Drawings

Work No.	Drawing Number	Drawing Name
Assessment Phase 1		
6e(n)	LLADCO-3C-ARP-SFA-HWM-DR-CE-0009	Highway Mitigation- M1 Junction 10 Assessment Phase 1
Assessment Phase 2a		
6e(o)	LLADCO-3C-ARP-SFA-HWM-DR-CE-0024	Highway Mitigation- M1 Junction 10 (Sheet 1 of 2) Assessment Phase 2a
6e(o)	LLADCO-3C-ARP-SFA-HWM-DR-CE-0025	Highway Mitigation- M1 Junction 10 (Sheet 2 of 2) Assessment Phase 2a
Assessment Phase 2b		
6e(p)	LLADCO-3C-ARP-SFA-HWM-DR-CE-0029	Highway Mitigation- M1 Junction 10 Future Baseline* (Sheet 1 of 2)

* whilst the drawings indicate that the works are a future baseline scheme, the works would only be delivered as part of the development proposals and are a ‘do-something’ mitigation scheme.

5.1.1 Appendix C provides swept path information for the above scheme improvements.

Appendix A- CVs

ARUP

Profession
Road Safety Engineer

Current position
Senior Engineer

Joined Arup
May 2022

Years of experience
7 Years

Nationality
British

Qualifications
BSc Psychology 2007

Professional associations
Member of the Chartered Institution of Highways and Transportation (MCIHT)

Member of the Society of Road Safety Auditors (MSoRSA)

GG119 Requirements
RSAs last 12/24 Months

- **45** Road Safety Audits completed in **2023 - To date**
- **40** Road Safety Audits completed in **2022**
- **76** Road Safety Audits completed in **2021**

Formal Road Safety Training

- 10-day RoSPA Accident Investigation and Prevention

Relevant CPD last 12 months

- SoRSA Conference 2023 – 19/06/23 – 2 days

Formal Training

- Introduction to Traffic Signals JCT Consultancy Ltd 16/11/21 - 2-day course
- Restraint Systems and Passive Safety TMS Consultancy 06/05/21- 2-day course
- LANTRA Highway Safety Inspectors Certificate of Competency

Ema Jones

Ema Jones experienced Traffic & Road Safety Engineer – Qualified Road Safety Audit Team Leader to DMRB GG119 for Road Safety Audits

Ema Jones is an experienced Traffic and Road Safety Engineer undertaking Road Safety Audits across the UK (including fatal audits) and she has achieved the Certificate of Competence in Road Safety Audit under EU Directive 2008/96/EC and is a member of the Society of Road Safety Auditors. Ema is also practised in school safety assessments, collision analysis and casualty reduction schemes and has developed content for and delivered various road safety training courses, such as: RoSPA – 10-day collision investigation, Road Safety Audit and Speed Limits.

Project experience

Selected Recent Road Safety Audits

Hertfordshire County Council Hagden Lane, Watford

September 2023

Ema was the Team Leader for a Stage1/2 Road Safety Audit for a proposed Zebra crossing and associated works.

Hertfordshire County Council A602 Improvements

June 2023

Ema was the Team Member for an Interim Stage 3 Road Safety Audit for works associated with improvements to the A602 which included a new off-line road construction, localised junction improvements and cyclist routes.

Hertfordshire County Council A10 Improvements

June 2023

Ema was the Team Member for a Stage 1 Road Safety Audit for a works associated with improvements to the A10 which included a throughabout, new mini roundabouts, zebra crossings, signalised crossings, shared use routes, turning bans and one-way system.

National Highways M25 MSA

March 2023

Ema was the Team Member for a Stage 1 Road Safety Audit for works associated with a proposed Motorway Service Area on the M25. The audit identified problems with the proposed diverge slip speed limits and existing infrastructure maintenance.

Arup on behalf of National Highways, RAF Newton, Nottingham, UK

February 2023

Ema was the Team Member for a Stage 1/2 Road Safety Audit for a proposed footbridge and associated works. The audit identified issues with pedestrian and cyclist facilities, vehicle speeds, lighting visibility of proposed signal heads and the lack of access facilities for maintenance staff.

HS2, Euston Cavern Shaft, London, UK

February 2023

Ema was the Team Leader for a Stage 1 Road Safety Audit for a proposed access junction for HS2. Problems were identified with visibility from the access point, drainage facilities and inadequate kerb provision.

Gatwick NRP, London, UK

November 2022

Ema was the Team Member for a Stage 1 Road Safety Audit for a scheme that included proposed Junction improvements at North Terminal Roundabout, South Terminal Roundabout and conversion of the existing hard shoulder on the M23.

HS2, Gatemead Embankment, London, UK

October 2022

Ema was the Team Leader Stage 2 Road Safety Audit on proposals for a 3-vehicle parking area for maintenance vehicles and associated footpath (accessed using an existing business access), maintenance access and relocation of a bridleway.

TRU Alliance, Huddersfield, West Yorkshire, UK

August 2022

Ema was the Team Member for a Combined Stage 1/2 Road Safety Audit for a scheme to introduce a new access junction related to new rail infrastructure. The audit identified problems drainage, kerb types, service covers and swept paths for larger vehicles.

London Legacy Development Corporation, Stratford, London, UK

July 2022

Ema was the Team Leader for a Stage 1 Road Safety Audit for a scheme to introduce hostile vehicle mitigation in the vicinity of Queen Elizabeth Olympic Park. The audit identified problems with the spacing between proposed bollards and cycle parking.

Arup on behalf of AstraZenica, Francis Crick Avenue, Cambridge, UK

June 2022

Ema was the Team Leader for a Stage 1 Road Safety Audit for a scheme to introduce a parallel crossing. The audit identified problems with the shared use space and identified cycle and pedestrian conflict points, gullies and street furniture within the crossing point and proximity of the crossing to a new access junction.

Environment Agency, Matlock Bridge, Matlock UK

May 2022

Ema was the Team Leader for a Stage 1 Road Safety Audit for a scheme to reintroduce two-way traffic across Matlock Bridge. signals at an existing crossroads junction. The audit identified problems with cycle and pedestrian facilities, footway width, carriageway width, road markings, vehicle barriers and lighting.

HS2, B4115 Ashow Road/Stoneleigh Road Junction, Warwickshire, UK

March 2022

Ema was the Team Leader for a Stage 1/2 Road Safety Audit for a scheme to introduce traffic signals at an existing crossroads junction. The audit identified problems with cycle and pedestrian facilities, road markings, a retaining wall proposal, lighting, and signal operation.

Bellway Homes, Tidbury Heights, Fulford Hall Road, Solihull, UK

March 2022

Ema was the Team Leader for a Stage 3 Road Safety Audit for a S38 works associated with a residential development. The audit identified problems with lighting, drainage, vegetation, kerbing, and utilities.

Bloor Homes, Barlestone Road, Newbold Verdon, UK

February 2022

Ema was the Team Leader for a Stage 3 Road Safety Audit of S278 works which comprised of a priority junction, ghost lane and pedestrian and cyclist facilities. The audit identified problems with signs, tactile paving, kerbing, bus facilities and drainage.

A4150 Ring Road, Central Reserve Cycle Corridor, Wolverhampton, UK

February 2022

Ema was the Team Leader for a Stage 1/2 Road Safety Audit of a proposed cycle corridor within the central reserve of the A4150. Works included a blue coloured permeable cycle track and some footpath construction with associated tram and ladder tactile paving and signing and lining. The audit identified problems with pedestrian/cyclist 'tie-ins' to existing infrastructure, inspection cover PSV, and low-level vegetation over the shared use footway/cycleway.

Hayfield Development, Main Street, Tiddington, UK

February 2022

Ema was the Team Leader for a Stage 3 Road Safety Audit for S38 works which included the construction of carriageways and footways for a small residential development. The audit identified problems with services covers and lack of pedestrian facilities.

Bloor Homes Development, Normandy Fields, Hinkley, UK

January 2022

Ema was the Team Leader for a Stage 3 Road Safety Audit undertaken on recently constructed Section 278 works located on and just off Normandy Way. The works included construction of two roundabouts and two toucan crossings, shared/segregated use footway/cycleway and pedestrian dropped crossing points with associated buff colour tactile paving and pedestrian refuges. The audit identified problems such as insufficient kerb upstand, lighting columns located and speed limit terminal signs located within existing tree canopies, blocked gullies and standing water, uneven service covers, lack of appropriate transitions between shared and non-shared areas, lack of maintenance area for roundabout.

Fairhurst on behalf of IM Properties Development, East Hinkley, A5/M69, UK

January 2022

Ema was the Team Member for a Stage 3 Road Safety Audit undertaken on a proposed 50mph speed limit installation. The audit identified problems with the size of signs, vegetation, lack of maintenance hard standing on the off-slip, channel levels, and lack of appropriate tactile paving.

HS2, A452-M42 Roundabout Access, UK

January 2022

Ema was the Team Leader for a Stage 1/2 Road Safety Audit undertaken on the proposed construction of an access within the A452 roundabout, at a point where the M42 passes under the roundabout. The audit

identified problems with the lack of signs and forewarning of works, lane designation and guidance, and existing national speed limit into the works.

Barratt Homes, Phase Q4, Ashlawn Road, Rugby, UK

November 2021

Ema was the Team Leader for a Stage 1 Road Safety Audit undertaken on proposed S38 works associated with a new residential development. The proposed works included cul-de-sac roads with adjacent footways, raised table, service strips and turning heads. The audit identified problems with parking, forward visibility, pedestrian/vehicle conflict where the service strips and footpaths met and inappropriate tactile paving.

Recent Road Safety Engineering Work

Telford and Wrekin Council

2021

Old Park Roundabout, Telford

Ema undertook a collision investigation review of the eastern approach arm of Old Park Roundabout in Telford (West Centre Way). In approximately 2008 on this arm of the roundabout a Chevroflex wall had been installed to reduce visibility of traffic on the circulatory for approaching westbound traffic following several collisions. Over time this barrier had become damaged, and a review of its effectiveness was requested. A review of the collision data from 2003 onwards was undertaken. The review found that there was a reduction in collisions on this arm following the installation of the Chevroflex barrier. The review also highlighted that the northern arm (Old Park Way) had a similar pattern of collisions that had not received any treatment and these types of collisions had continued to occur. The study recommended that the Chevroflex wall was repaired, and a similar structure be installed on the southbound approach to restrict visibility of the circulatory carriageway to reduce approach speeds and shunt type collisions at this location.

TMS Consultancy

2020

A27 Lewes - Collision Investigation

Ema analysed Collision data for part of the A27 corridor, running from the Cop Hall roundabout in Polegate to a point just east of Bedding ham. 38 collisions over a 24-month period, (32 were slight, five serious and one was fatal). The most frequent failed to look properly, judge another person’s path or speed resulting in shunt type collisions. The section of the A27 studied is single carriageway and it is likely that it experiences peak hour congestion given that it is a strategic Highways England (Now National Highways) managed route, 12 of the collisions occurred between 06:00-09:00hrs and 13 between 16:00-19:00hrs supporting that there are issues connected with peak hours. Cluster sites at simple priority junctions along the route and at the main link in Polegate. Recommended that a significant study of the corridor is Undertaken including AADT to assess if the corridor is within theoretical road capacity along with speed data and journey time information. Dual off-line routes should be investigated or the possibility of capacity improvements to the existing corridor to provide a smooth flow of traffic and reduce the likelihood of shunt type collisions. Junction improvements should also be carried out where land is available to provide separate turning lanes at existing simple priority junctions. SSD should be assessed along the route ensuring necessary forward visibility is achieved. A system of live traffic interactive queue warning signs that are only activated when required should also be investigated.

Road Safety Training and Development

Ema has undertaken regular professional development on road safety and related subjects since 2015. This includes the 10-day RoSPA Accident Investigation and Prevention course held during September 2016.

In the past 12 months Ema has attended/undertaken:

- SoRSA Conference 2023 – 19/06/22 – 2 days

ARUP

Anna Goldie

Anna is a Chartered Engineer with extensive road safety experience in both the public and private sectors. Anna has met the training requirements for Road Safety Audit in accordance with UK DMRB standard GG119.

Profession
Traffic Engineering & ITS

Current position
Engineer

Joined Arup
2018

Years of experience
9

Nationality
British

Qualifications
CEng – Chartered Institute of Highways and Transportation

BA (Hons) Human Geography and Planning

MSc Transport Planning

Professional associations
Member of the Chartered Institution of Highways and Transportation

Fellow of the Institute of Highway Engineers

Associate Member of the Society of Road Safety Auditors

Anna is a Chartered Engineer with extensive experience in traffic engineering in the public and private sectors. In addition to RSA audits and engineering undertaken whilst at Arup, Anna has experience conducting fatal collision investigations, cluster analysis and route treatment for a large shire county highway authority.

Project experience

Road Safety Audits

The Causeway, Billingham, Stockton on Tees, UK – August 2023
Anna observed a stage 1 road safety audit of the proposed installation of signals at The Causeway/Melrose Avenue junction.

The audit raised issues including, insufficient intervisibility envelopes, bus stop locations, and the inappropriate retention of existing trees.

Middle Road, Ingleby Barwick, Stockton on Tees, UK – August 2023
Anna observed a stage 1 road safety audit of the proposed installation of signals at the Ingleby Way/Middle Road junction including the provision of a maintenance hardstanding immediately east of the junction.

The audit raised issues in relation to sign and bus stop locations.

Thornaby to Stockton Cycleway, Stockton on Tees, UK – August 2023
Anna observed a stage 1 road safety audit of a proposed cycleway between Thornaby and Stockton.

The audit raised issues in relation to a Copenhagen crossing proposed across an arm of a signalised junction, the excessive width of Copenhagen crossings, the use of staggered toucan crossings, and the location of lighting columns.

Norton to Stockton Cycleway, Stockton on Tees, UK – August 2023
Anna observed a stage 1 road safety audit of a proposed cycleway between Norton and Stockton.

The audit raised issues in relation to the lack of consistency of side roads and accesses, the removal of existing crossings, and the mixed control of pedestrian facilities.

Durham Lane Cycleway, Eaglescliffe, Stockton on Tees, UK – August 2023
Anna observed a stage 1 road safety audit of a proposed cycleway between Eaglescliffe and Elton Interchange.

The audit raised issues in relation to the gradient of the cycleway on approach to a priority junction, the absence of guard-railing by a signalised crossing by the main entrance to a secondary school, and the position of a new signalised crossing on the radius of a junction.

M25 West MSA, London, UK. – February 2020

Anna observed a stage 1 road safety audit of the proposed development of a new on-line Motorway Service Area (MSA) with fuel filling station, amenity building with a café, restaurants and toilets, and vehicle parking for motorcycles, cars, caravans, coaches, and HGV vehicles. The development will be accessed from a new dedicated junction on the M25 consisting of a one-bridge 'loop' arrangement.

The audit identified issues including the visibility of lane control signals on gantries, the relocation of a HADECs camera in the nosing of a diverge slip-road and the location of maintenance hard-standings.

Kingsway, Gateshead, UK. – February 2020

Anna observed a stage 1 road safety audit of the proposed signalisation of the Kingsway/Second avenue junction.

The audit identified issues including the inadequate visibility to proposed signal heads and lack of pedestrian crossing facilities.

Road Safety Engineering Work

T0152 Network Studies Technical Partner, Sub-task T-3.10a, Operation and Maintenance of Junctions, Yorkshire and Humber, UK. – July 2023

Anna undertook look and feel assessments of junctions identified as case studies to understand the interface between NH and LA networks. As a part of this work, road safety reviews were undertaken of the junctions which included the assessment of signage, road markings and general maintenance.

Road Safety Training and Development

Anna has undertaken regular professional development on road safety and related subjects since 2017. This includes the TMS 10-day RoSPA Collision Investigation and Prevention course held during October 2017.

In the past 12 months Anna has attended:

- SoRSA Conference 2023, June 2023 (2 days)

ARUP

Tom Corke

Tom Corke is an experienced Road Safety Audit Team Leader. He has met the training requirements for Road Safety Audit in accordance with UK DMRB standard GG119

Profession
Civil Engineer

Current position
Associate

Joined Arup
October 2007

Years of experience
23 years

Nationality
British

Qualifications
BEng (Hons) Civil Engineering (1999)

MSc Highways Management and Engineering (2000)

CEng Chartered Engineer (2005)

Professional associations
Member of the Institution of Civil Engineers (MICE)

Fellow of the Chartered Institution of Highways and Transportation (MCIHT)

Member of the Society of Road Safety Auditors (MSoRSA)

Tom Corke is a Chartered Civil Engineer with experience of traffic engineering and highway design for projects ranging from development access to major highway improvements. He has undertaken Road Safety Audits across the UK as well as in the EU and Middle East and has achieved the Certificate of Competence in Road Safety Audit under EU Directive 2008/96/EC.

Tom has worked on Accident Investigation and Prevention schemes to mitigate against identified road safety hazards.

Project experience

Selected Recent Road Safety Audits

Central Waters, Hong Kong
June 2023

Tom was the Team Leader for a Stage 1 Road Safety Audit of 7.8km of new dual carriageway including three major junctions in Hong Kong.

The audit identified problems with cross sections, forward visibility and junction geometry.

18 Blackfriars, London
June 2023

Tom was the Team Leader for a Stage 1 Road Safety Audit of the offsite highway works for a new mixed-use development in central London.

The audit identified problems with pedestrian and cycle facilities, planting that obstructed junction visibility and street lighting columns obstructing the footway.

M49 Link Road, Severn Beach, UK
March 2023

Tom was the Team Leader for a Stage 2 Road Safety Audit of a new development access from a newly built motorway junction. The scheme involved approximately 600m of new road and a new roundabout junction. This was a repeat audit following design changes to the original scheme which was audited in December 2021.

The audit identified problems with obstructed junction visibility, missing tactile paving and missing signs.

Hampstead Road temporary alignment, London, UK
January 2023

Tom was the Team Leader for a Stage 1 Road Safety Audit of a temporary realignment of Hampstead Road during construction for HS2.

The audit identified problems with drainage infrastructure in the cycle lane, signs overhanging a pedestrian route and missing delineation at ends of islands.

Reading Green Park Station, Reading, UK
November 2022

Tom was the Team Leader for a Stage 3 Road Safety Audit of the works to Smallmead bridge adjacent to a new railway station. The works involved the creation of a new emergency escape route for pedestrians from the west platform to the muster point in the car park.

The audit identified problems relating to slips, trips and falls, and for potential abuse of the route. It also identified concerns about the handrail and risk posed to errant vehicles.

8 Bishopsgate, London, UK
May 2022

Tom was the Team Leader for a Stage 1 Road Safety Audit of a junction improvement in the City of London. The scheme involved amending kerblines and traffic signal arrangements, and the provision of pedestrian facilities.

The audit identified problems with visibility around the junction and signal timings.

Mynydd Isa School, Wales
May 2022

Tom was the Team Leader for a Stage 1 Road Safety Audit of a school drop off and access in North Wales. The scheme involved the construction of a new drop off area for students and a new car park access and layout.

The audit identified problems with pedestrian crossings and vehicle swept paths.

A358 Taunton to Southfields Dualling, Taunton, UK
March 2022

Tom was the Team Leader for a Stage 1 Road Safety Audit for a major project involving construction of 14km of dual carriageway, works to side roads, new grade separated junctions and NMU routes.

The audit identified problems with cycle facilities, position of laybys, inconsistent tie-ins on site roads, flat spots on the carriageway and visibility on side roads.

Greenwich Peninsula Plot 19.05, London, UK
December 2021

Tom was the Team Leader for a Stage 1&2 audit of the streetscape around a commercial development on Greenwich Peninsula. The audit identified problems with drainage paths, pedestrian crossings and lack of vehicle turning facilities.

M49 Link Road, Severn Beach, UK
December 2021

Tom was the Team Leader for a Stage 1&2 Road Safety Audit of a new development access from a newly built motorway junction. The scheme involved approximately 600m of new road and a new roundabout junction.

The audit identified problems with pedestrian and equestrian routes, visibility, lack of VRS at hazards and unclear speed limit signing.

Granby Terrace, Camden, London, UK

November 2021

Tom was the Team leader for a Stage 2 audit of the HS2 S1/S2 contract works to Granby Terrace bridge near Euston Station. The audit identified problems with pedestrian crossing facilities and the provision of tactile paving for visually impaired users.

A400 Hampstead Road Temporary Diversion

October 2021

Tom was the Team leader for a Stage 2 audit of the HS2 S1/S2 contract works for a temporary diversion of Hampstead Road near Euston Station. The audit identified problems with cycle facilities along the temporary road and with the position of traffic signs overhanging the carriageway.

Recent Road Safety Engineering Work

M25 Chiltern Chalfont services, UK

November 2022

Tom prepared a study of collision data (17 personal injury collisions over a 5-year period) in proximity to the proposed Motorway Service Area development.

A1 Torun to Gdansk, Poland

July 2021

The A1 toll road in Poland saw a reduction in traffic during 2020 due to the impact from the pandemic, but also a significant increase in fatal accidents. Arup were engaged to conduct a review of accident data to identify the root causes behind the increase in accidents. The study found that there was a common trend of excessive speed and tailgating.

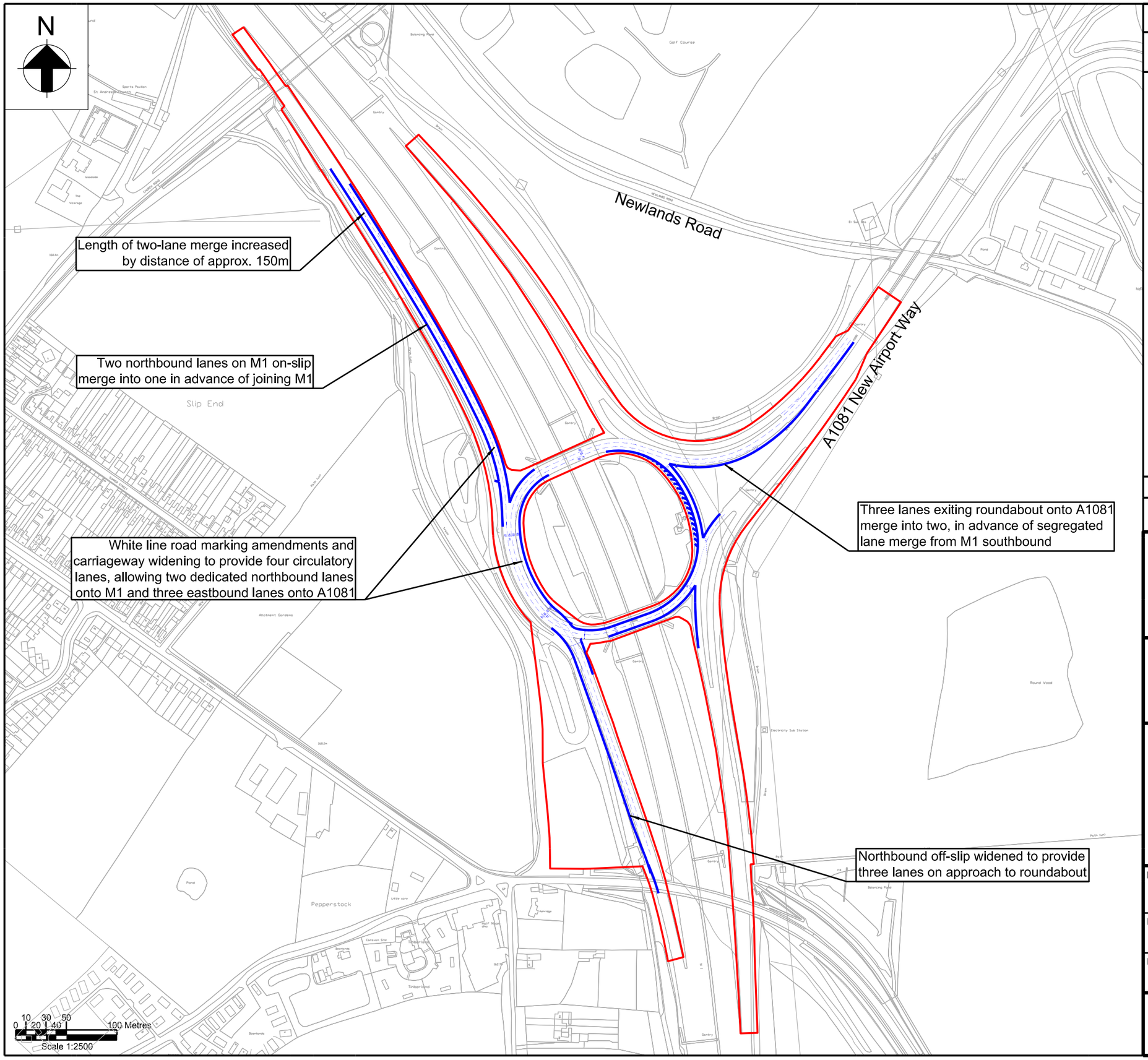
Road Safety Training and Development

Tom has undertaken regular professional development on road safety and related subjects since 2002. This includes the 10 day RoSPA Accident Investigation and Prevention course held during June 2002.

In the past 12 months Tom has attended:

- SoRSA Conference 2023, June 2023 (2 days)

Appendix B- Scheme Drawings



All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

KEY

- Existing Mapping
- Proposed Highway Layout
- Order Limits

INDICATIVE LAYOUT

Revision History	Drawn	Checked / Approved	Date	Rev.
First Issue	NS	NS / NS	07/12/21	P01
Minor Amendments	NS	JR / RG	17/10/22	P02.2

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Drawing Title

HIGHWAY MITIGATION M1 JUNCTION 10 ASSESSMENT PHASE 1

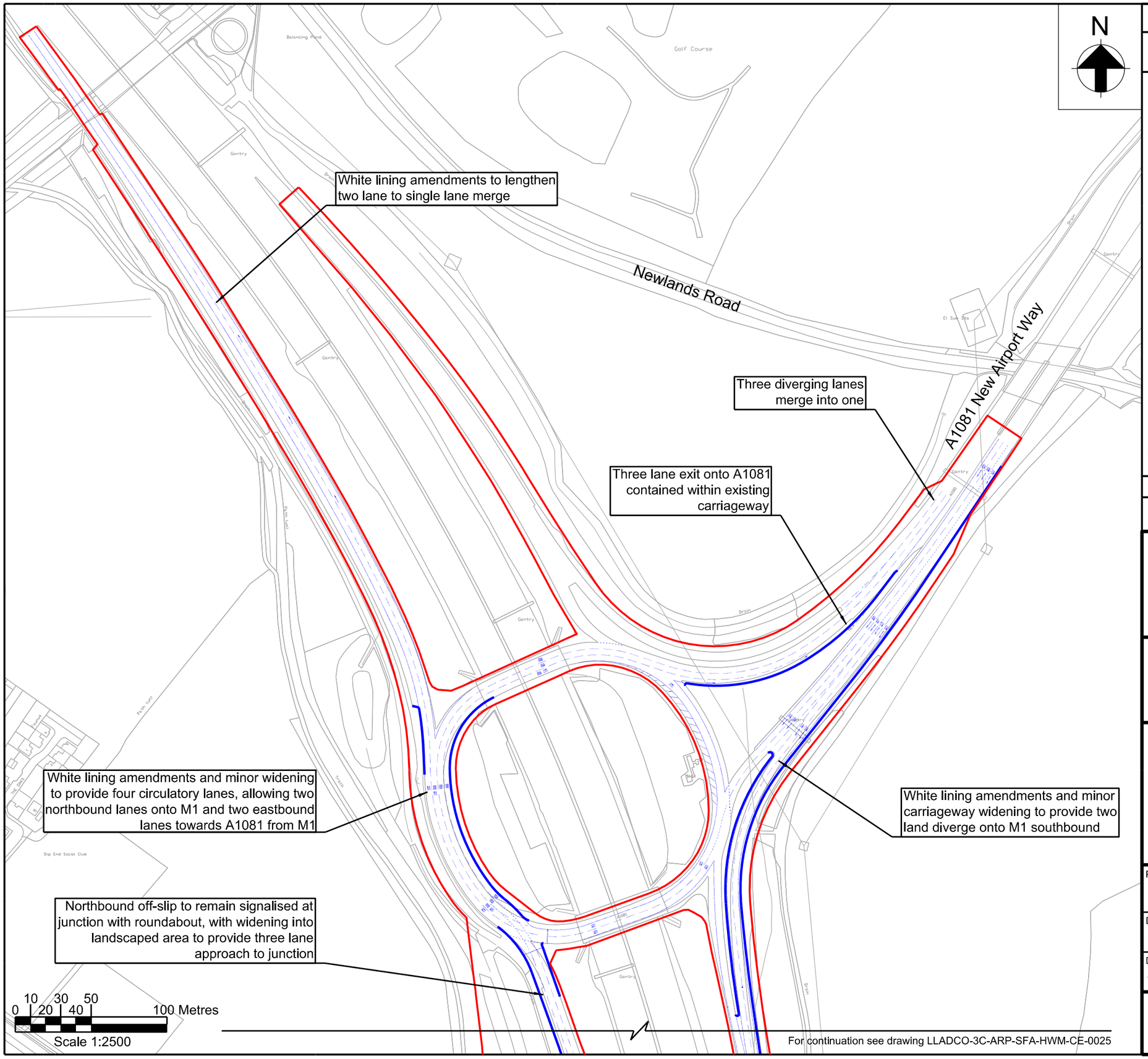
Purpose of issue	Suitability
DCO SUBMISSION	S6

Drawn	Checked	Approved	Date	Scale	Size
N.Scott	J.Riat	R.Goodall	22/09/22	1:2500	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	5(2)(o)	TR020001/APP/7.02

Drawing Number	Revision
LLADCO-3C-ARP-SFA-HWM-DR-CE-0009	P02.2

Project – Phase – Originator – Asset/Zone – Sub Asset – Type – Discp. – Number



All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

KEY

- Existing Mapping
- Proposed Highway Layout
- Order Limits

INDICATIVE LAYOUT

Revision History	Drawn	Checked / Approved	Date	Rev.
First Issue	NS	NS / NS	07/12/21	P01
Minor Amendments	NS	JR / RG	17/10/22	P02.2

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Drawing Title

HIGHWAY MITIGATION M1 JUNCTION 10 ASSESSMENT PHASE 2A SHEET 1 OF 2

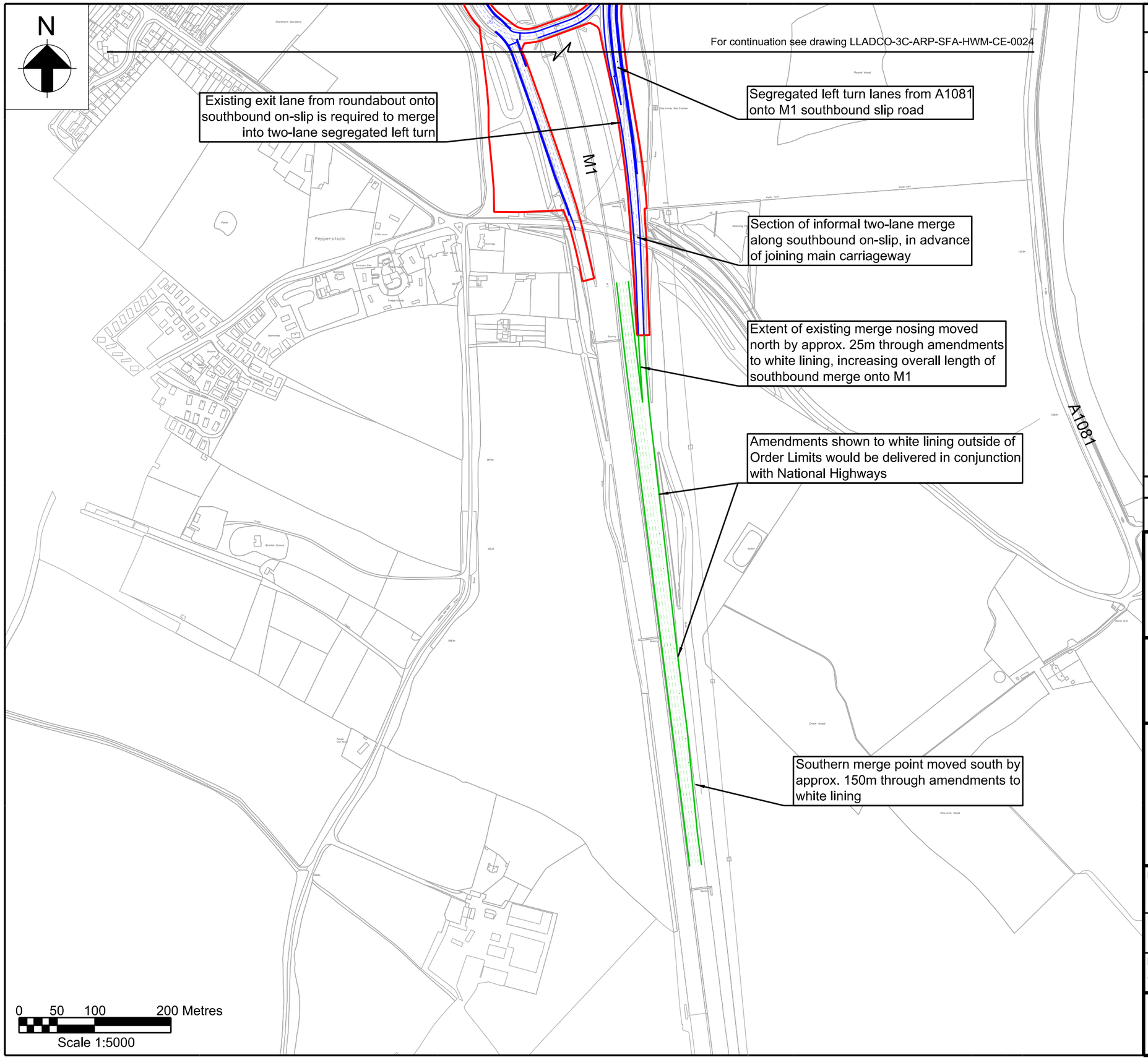
Purpose of issue	Suitability
DCO SUBMISSION	S6

Drawn	Checked	Approved	Date	Scale	Size
N.Scott	J.Riat	R.Goodall	22/09/22	1:2500	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	5(2)(o)	TR020001/APP/7.02

Drawing Number	Revision
LLADCO-3C-ARP-SFA-HWM-DR-CE-0024	P02.2

Project – Phase – Originator – Asset/Zone – Sub Asset – Type – Discp. – Number



All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

KEY

- Existing Mapping
- Proposed Highway Layout
- Proposed Highway Layout outside of Order Limits (to be undertaken by National Highways)
- Order Limits

INDICATIVE LAYOUT

Revision History	Drawn	Checked / Approved	Date	Rev.
First Issue	NS	NS / NS	07/12/21	P01
Minor Amendments	NS	JR / RG	17/10/22	P02.2

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Drawing Title

HIGHWAY MITIGATION
M1 JUNCTION 10
ASSESSMENT PHASE 2A
SHEET 2 OF 2

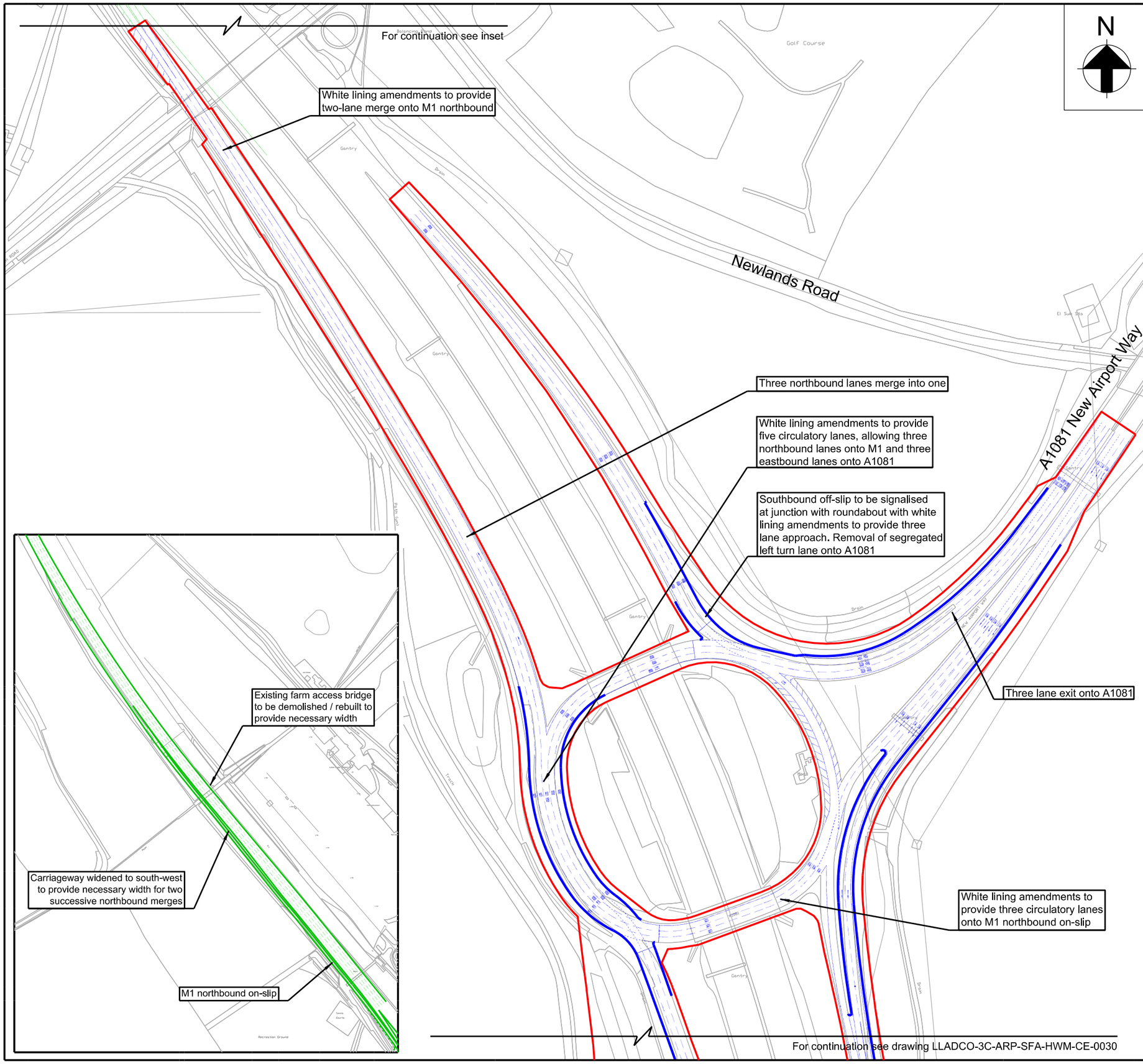
Purpose of issue	Suitability
DCO SUBMISSION	S6

Drawn	Checked	Approved	Date	Scale	Size
N.Scott	J.Riat	R.Goodall	22/09/22	1:5000	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	5(2)(o)	TR020001/APP/7.02

Drawing Number	Revision
LLADCO-3C-ARP-SFA-HWM-DR-CE-0025	P02.2

Project – Phase – Originator – Asset/Zone – Sub Asset – Type – Discp. – Number



All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

KEY

- Existing Mapping
- Proposed Highway Layout
- Proposed Highway Layout outside of Order Limits (to be undertaken by National Highways)
- Order Limits

INDICATIVE LAYOUT

Revision History	Drawn	Checked / Approved	Date	Rev.
First Issue	NS	NS / NS	07/12/21	P01
Minor Amendments	NS	JR / RG	17/10/22	P02.2

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Drawing Title

HIGHWAY MITIGATION
M1 JUNCTION 10
FUTURE BASELINE
SHEET 1 OF 2

Purpose of issue	Suitability	Drawn	Checked	Approved	Date	Scale	Size
DCO SUBMISSION	S6	N.Scott	J.Riat	R.Goodall	22/09/22	1:2500	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	5(2)(o)	TR020001/APP/7.02

Drawing Number	Revision
LLADCO-3C-ARP-SFA-HWM-DR-CE-0029	P02.2

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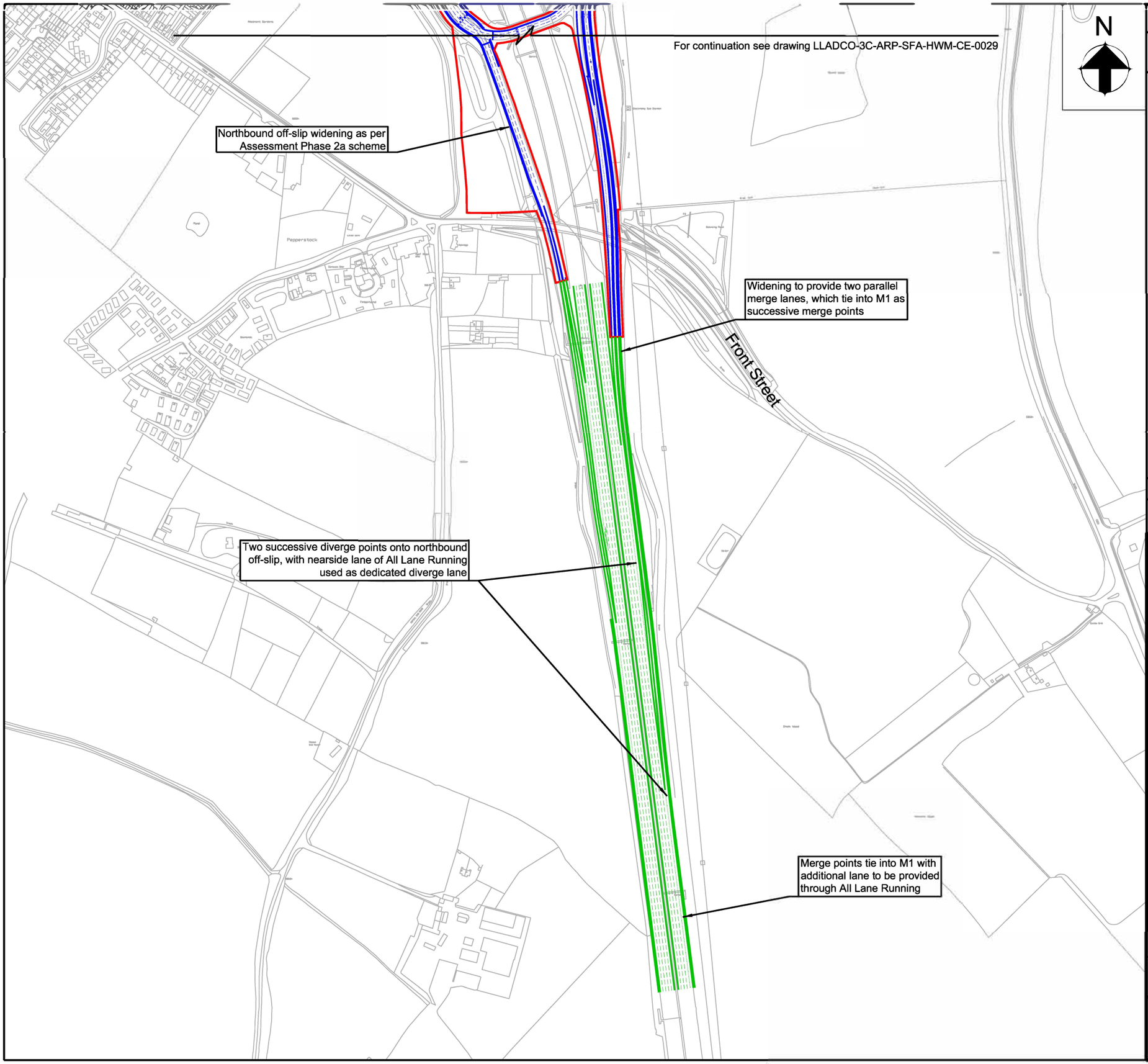

N

All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

KEY

- Existing Mapping
- Proposed Highway Layout
- Proposed Highway Layout outside of Order Limits (to be undertaken by National Highways)
- Order Limits

INDICATIVE LAYOUT

Revision History	Drawn	Checked / Approved	Date	Rev.
First Issue	NS	NS / NS	07/12/21	P01
Minor Amendments	NS	JR / RG	17/10/22	P02.2

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Drawing Title

HIGHWAY MITIGATION
M1 JUNCTION 10
FUTURE BASELINE
SHEET 2 OF 2

Purpose of issue	Suitability
DCO SUBMISSION	S6

Drawn	Checked	Approved	Date	Scale	Size
N.Scott	J.Riat	R.Goodall	22/09/22	1:5000	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001	5(2)(o)	TR020001/APP/7.02

Drawing Number	Revision
LLADCO-3C-ARP-SFA-HWM-DR-CE-0030	P02.2

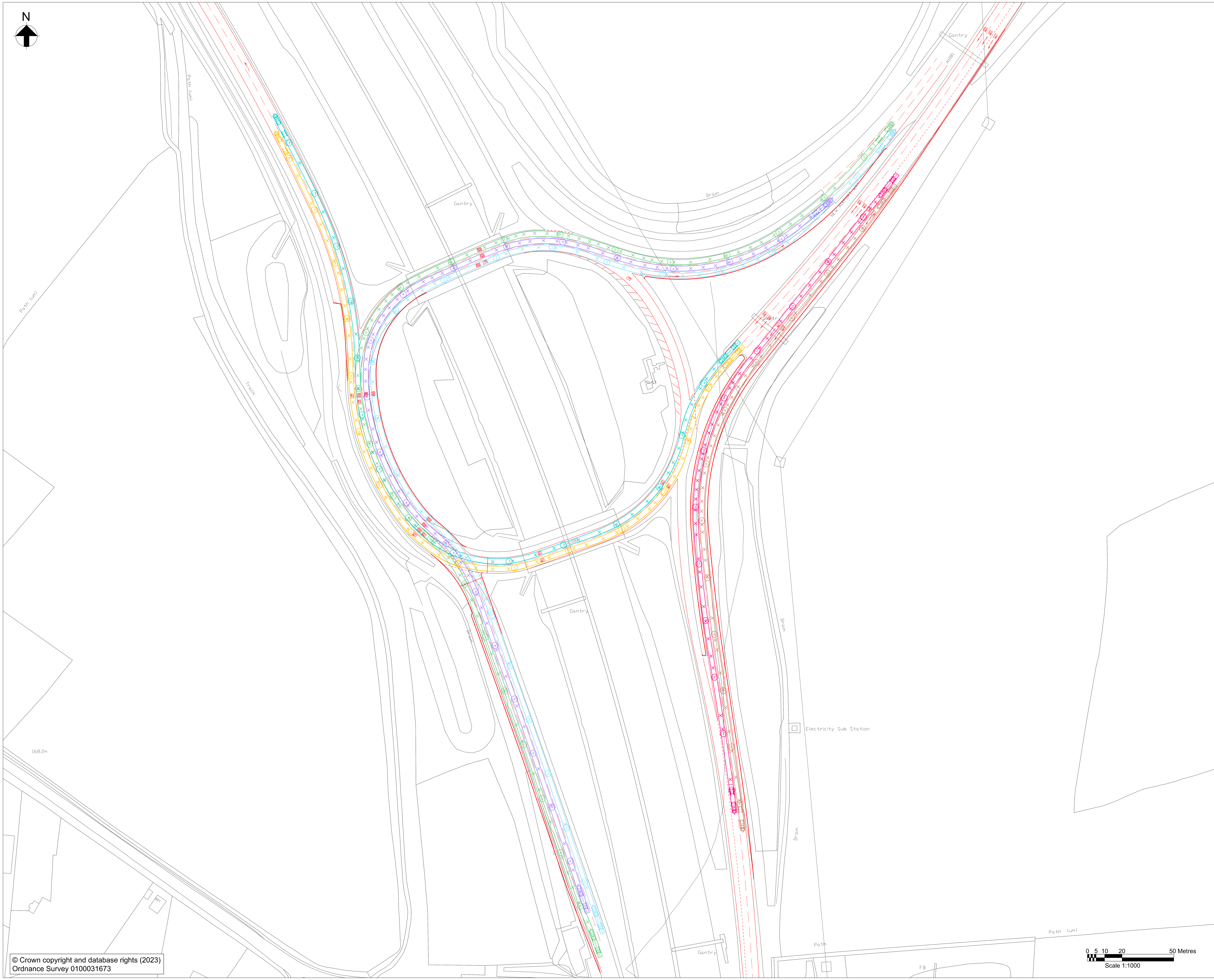
Project – Phase – Originator – Asset/Zone – Sub Asset – Type – Discp. – Number

Appendix C- Swept Path Drawings

16.5m Artciculated HGV
Swept Paths At Junction 10
of the M1 with 2027
21.5mppa Mitigation Scheme

Scale 1:1000 at A1

Drawing Number - SK052



16.5m Artciculated HGV Swept Paths At Junction 10 of the M1 with 2039 27mppa Mitigation Scheme

Scale 1:1000 at A1

Drawing Number - SK053

N

Path (um)

Gantry

Drain

NEW AIRPORT WAY

Gantry

Path (um)

Track

Track

Gantry

Drain

Electricity Sub Station

168.2m

Path (um)

Path

FB

0 5 10 20 50 Metres
Scale 1:1000

16.5m Artciculated HGV
Swept Paths At Junction 10
of the M1 with 2043
32mppa Mitigation Scheme

Scale 1:1000 at A1

Drawing Number - SK054

APPENDIX B - LUTON BOROUGH COUNCIL STAGE 1 RSA DESIGNER'S RESPONSES

B.1 A505 Vauxhall Way / Eaton Green Road

Contents

Tables

Figures

1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - A505 Vauxhall Way / Eaton Green Road
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - A505 Vauxhall Way / Eaton Green Road
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

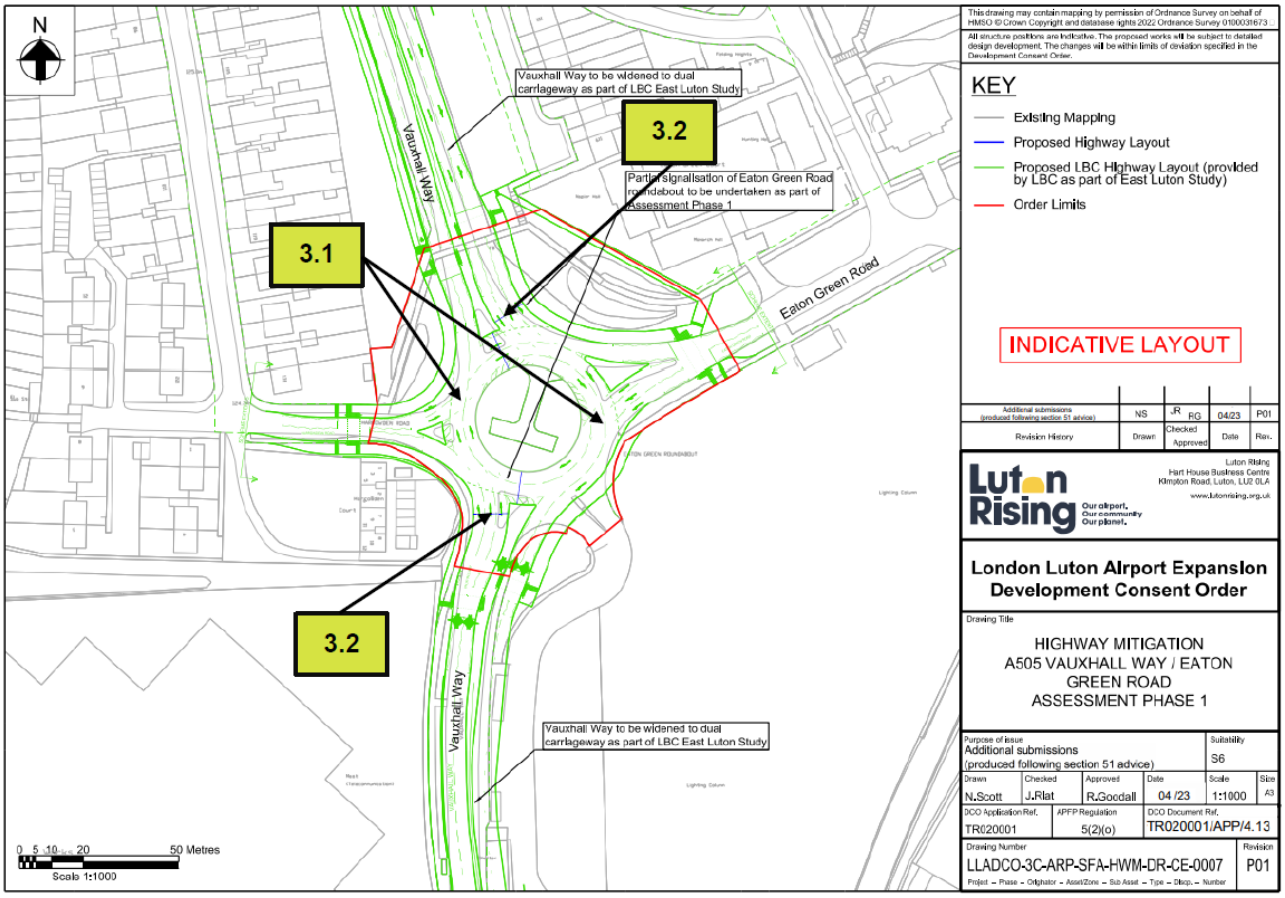
2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between A505 Vauxhall Way / Eaton Green Road, in Luton.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0007, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1.

Figure 2.1: Locations of Problems Identified within the Audit



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Luton Borough Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scot t- Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	The stacking distance between successive signal stop lines is quite short, which could lead to vehicle queues extending across the Harrowden Road and Eaton Green Road entries to the roundabout. As a result, collisions could occur as road users attempt to weave through queues or change lane suddenly.	It should be ensured that the road layout and traffic signalling strategy is suitable to prevent vehicles queuing across entry arms to the roundabout.	Accepted. The operation of the signals would be optimised to ensure the efficient operation of the junction and would include consideration of queue lengths within the circulatory carriageway of the roundabout.		
3.2	The widening to three lanes on the approaches to the junction could increase the likelihood of the primary signals being masked by high sided vehicles. If a red signal is not clearly visibly to road users, there could be an increased risk of overshoot collisions or accidents involving sudden and late braking, such as rear-end shunts.	High-mounted duplicate primary signals should be provided on the Vauxhall Way approaches to the junction.	Accepted. The provision of high-mounted signals would be considered at the detailed design stage.		

3.2 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	Luton Borough Council
Date:	

B.2 A505 Vauxhall Way / Kimpton Road

Contents

Tables

Figures

1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - A505 Vauxhall Way / Kimpton Road
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - A505 Vauxhall Way / Kimpton Road
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between A505 Vauxhall Way / Kimpton Road, in Luton.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0016, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1.

Figure 2.1: Locations of Problems Identified within the Audit

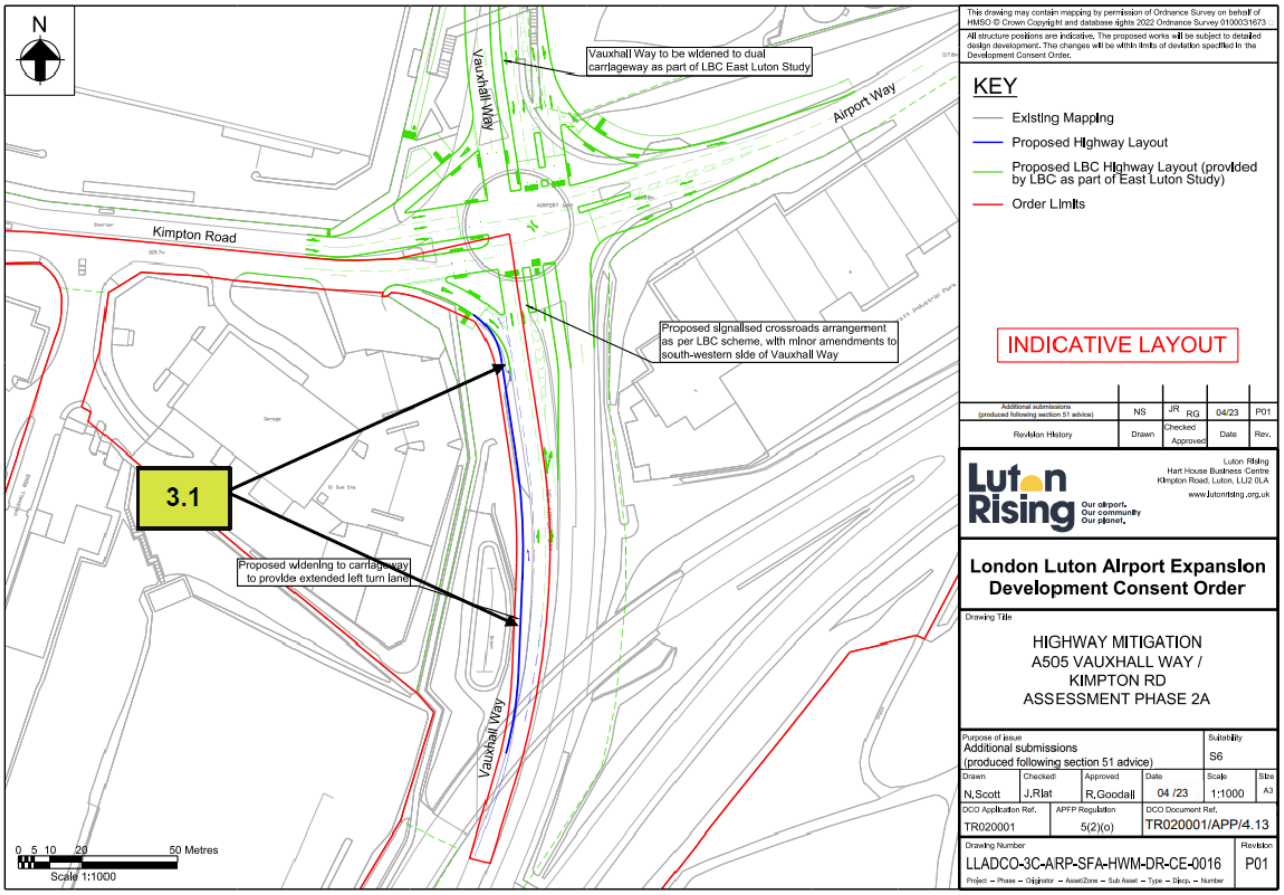


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Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Luton Borough Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	There are lamp columns and trees within the verge that will be closer to the edge of carriageway when the road is widened. A temporary vertical concrete barrier is also present, but it is not clear whether this will be retained. If not, the lamp columns and trees could present a roadside hazard to road users if they lose control and collide into the objects. Injuries could be serious if vehicles are brought to an abrupt halt or redirected violently.	A suitable vehicle restraint system should be provided, unless the lamp columns are replaced by passively safe systems and any mature trees removed that will be close to the edge of carriageway.	Accepted. This would be addressed at the detailed design stage.		

3.2 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	Luton Borough Council
Date:	

B.3 A1081 New Airport Way / London Road (North)

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Figures

1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - A1081 New Airport Way / London Road (North)
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - A1081 New Airport Way / London Road (North)
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

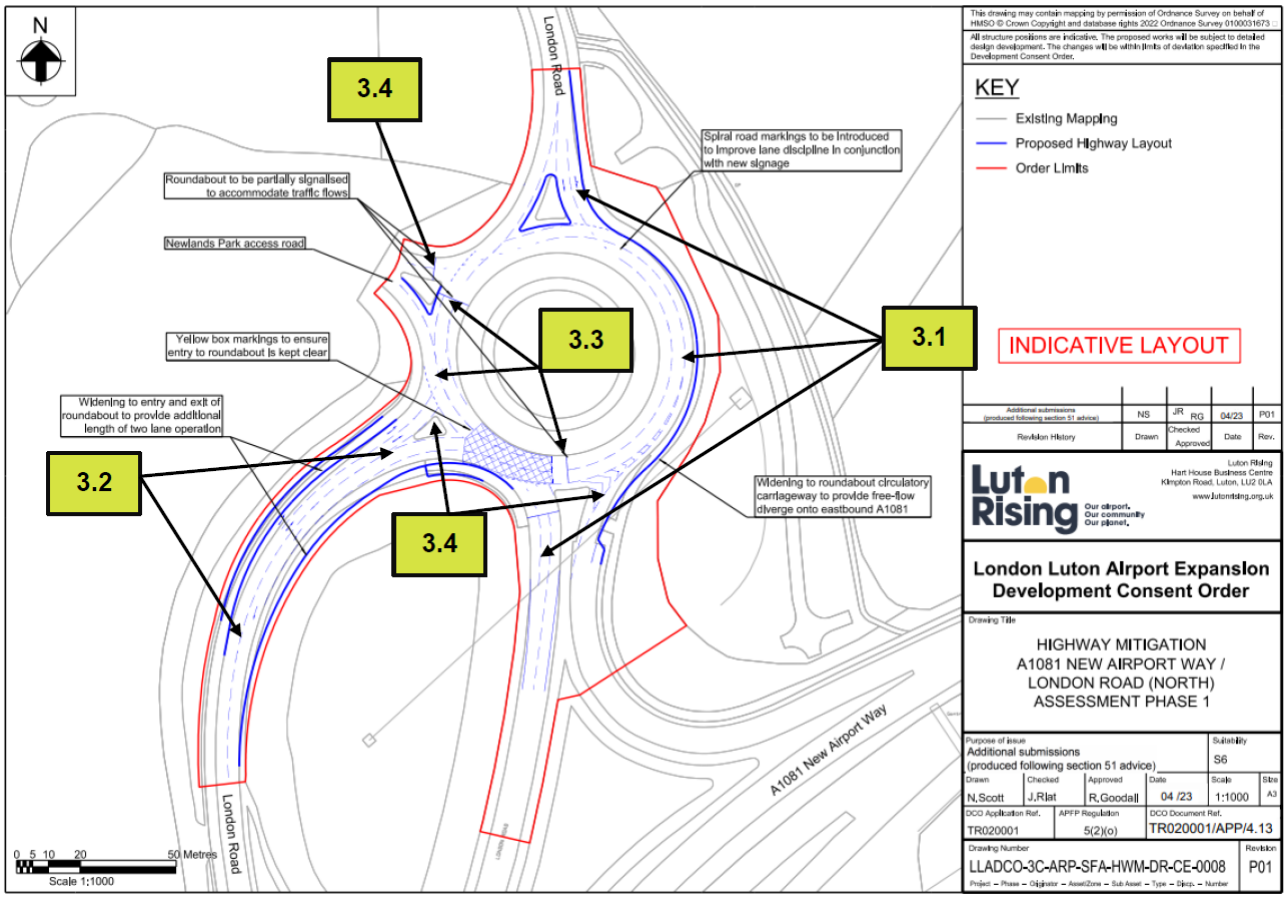
2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between A1081 New Airport Way / London Road (North), in Luton.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0008, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1.

Figure 2.1: Locations of Problems Identified within the Audit



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Luton Borough Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	Road users may not be able to anticipate which lanes to use to reach their intended destination. For example, on the A1081 approach, road users may use the middle lane to reach London Road (north) rather than the designated offside lane. On the London Road southbound approach, road users may use the offside lane to reach the A1081 (which they can currently), instead of using the nearside lane only. If road users find that they are in the incorrect lanes, side swipe and lane change collisions could occur.	Lane destination signs and road markings should be provided at strategic locations to inform road users of the correct lanes to use.	Accepted. Lane markings and signage would be provided to clarify which destinations are reached from each approach lane. This would be addressed at the detailed design stage.		
3.2	As there will be four lanes on the London Road southern arm (two in each direction), road users may be unsure of the direction of each lane and enter opposing lanes by mistake. In addition, there could be an increased likelihood of road users straying across the centre line, especially within the southbound merge area. These issues could lead to head-on type collisions, which can result in serious injury.	A marginal strip with the use of cross-hatching road markings should be provided to separate the northbound and southbound traffic lanes.	Accepted. There is scope within the Order Limits to create a marginal strip between northbound and southbound lanes, and this would be addressed at the detailed design stage.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.3	The stacking distance between successive signal stop lines is quite short, which could lead to vehicle queues extending across the London Road southern entry to the roundabout. As a result, collisions could occur as road users attempt to weave through queues or change lane suddenly.	It should be ensured that the road layout and traffic signalling strategy is suitable to prevent vehicles queuing across entry arms to the roundabout.	Accepted. The operation of the signals would be optimised to ensure the efficient operation of the junction and would include consideration of queue lengths within the circulatory carriageway of the roundabout.		
3.4	The widening of the roundabout could make crossing movements more hazardous for pedestrians and cyclists, especially at times of high vehicle flows (peak times) or when speeds could be higher at off-peak times. This could be a particular issue on the London Road southern arm and on the A1081 exit arm. On the Newlands Park access entry to the roundabout, the position of the signal stop line could make it difficult to provide a crossing point. Vulnerable road users could be at increased risk of being struck by vehicles under such circumstances.	It should be ensured that the pedestrian and cycle crossing points will be safe to use (for example, controlled crossings may be beneficial at some locations).	Noted. The proposed realignment on the A1081 exit arm increases the crossing distance by approximately 1.0m and could be reduced at the detailed design stage to minimise any additional crossing distance. The pedestrian demand on the London Road (south) exit arm is likely to be very low, and the proposed signalisation of the A1081 arm should create gaps in the traffic for pedestrians to cross. In addition, the widening to the London Road exit is c1.5m and would only add c.1 second to the crossing time for pedestrians.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
			The position of the stop line at the exit from Newlands Park would be adjusted to accommodate a pedestrian crossing at the detailed design stage.		
3.5	The widening of the carriageway could result in utility service covers being located into new carriageway areas, rather than the verges. Ironwork within critical braking and turning areas, such as the roundabout entries, exits and the circulatory carriageway, could increase the risk of skidding and loss of control type collisions, particularly involving two-wheeled vehicles.	All utilities affected by the scheme should be identified at an early stage and diverted where necessary to ensure ironwork does not coincide with new carriageway areas.	Accepted. Whilst the proposed realignment is not anticipated to impact any existing utility covers, this would be considered at the detailed design stage.		

3.2 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	Luton Borough Council
Date:	

B.4 A1081 New Airport Way / Percival Way

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1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - A1081 New Airport Way / Percival Way
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - A1081 New Airport Way / Percival Way
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

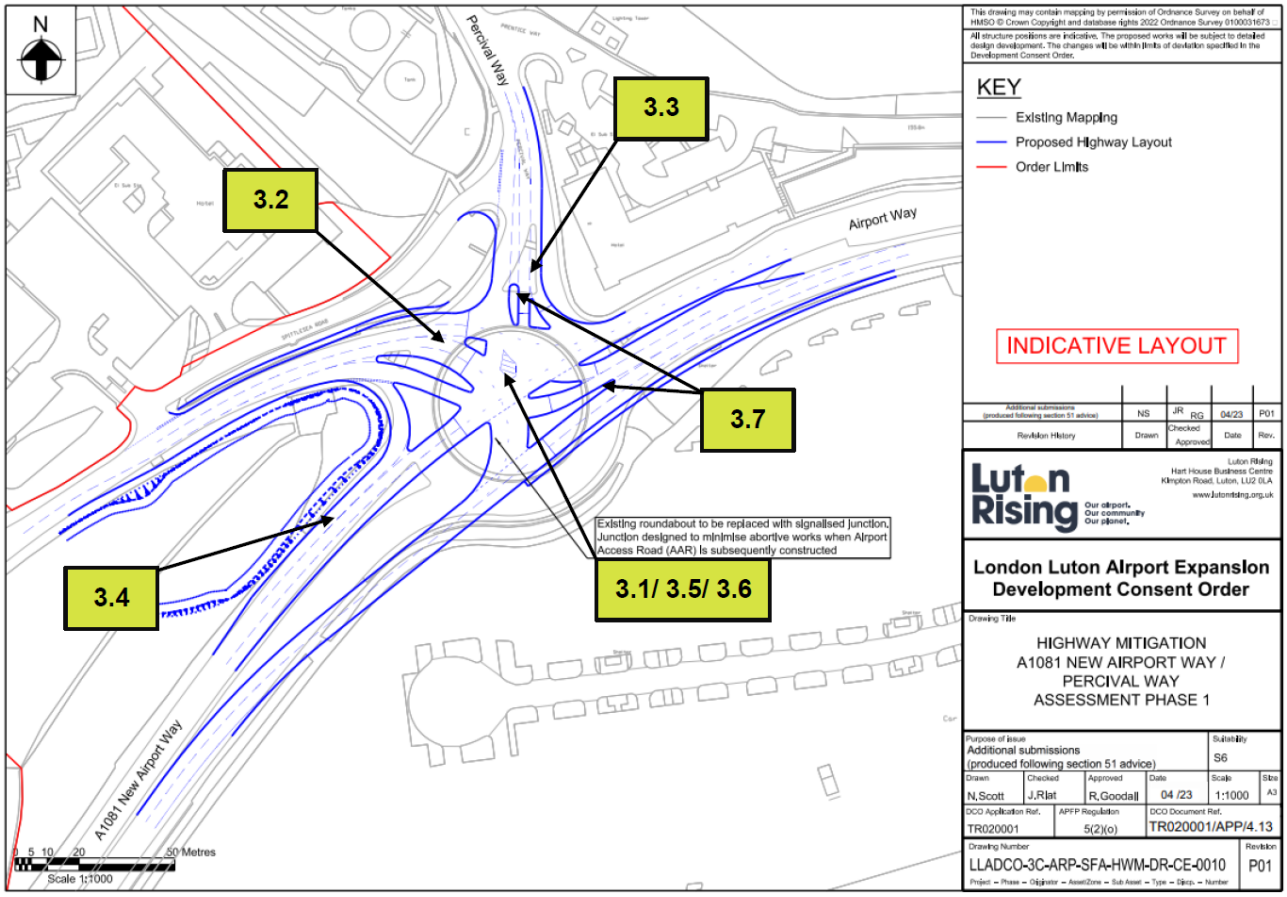
2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between A1081 New Airport Way / Percival Way, in Luton.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0010, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1.

Figure 2.1: Locations of Problems Identified within the Audit



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Luton Borough Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

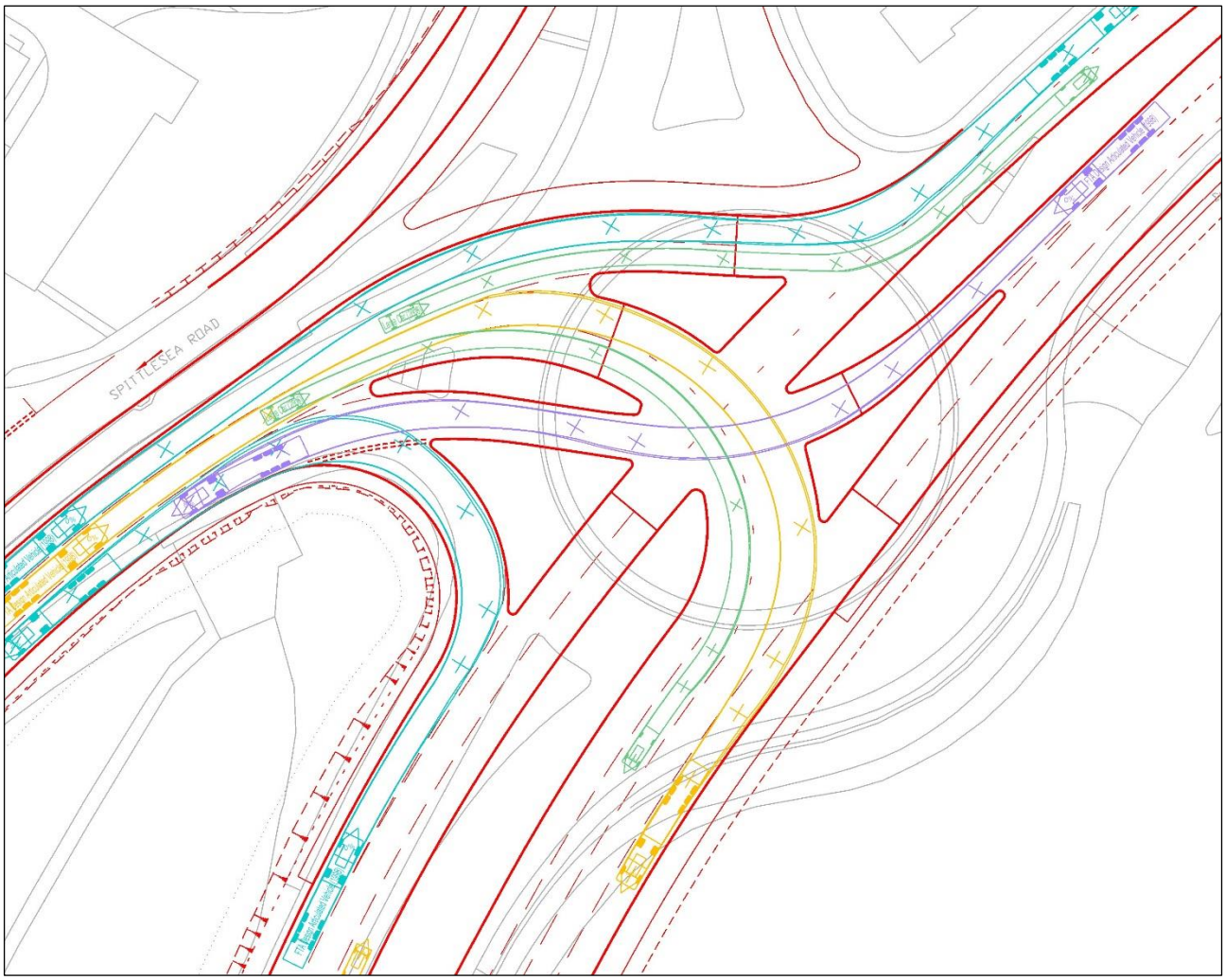
Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	It was noted that the existing roundabout for New Airport Way and Percival Way is on a steep gradient which slopes away from the north side. With the introduction of the signalised junction there could be a level difference between each approach, which could create an adverse camber for vehicles turning at the junction. This could increase the risk of loss of control collisions and could cause larger, high sided vehicles to turn over.	The levels should be checked for each approach ensuring a level junction platform with no adverse cambers for vehicle turning movements.	Accepted. It is accepted likely that some regrading would be required on the approaches to and within the junction. This would be addressed at the detailed design stage.		
3.2	Airport Way currently has a steep approach to the roundabout with no level dwell area. With the introduction of the signalised junction, there are likely to be more hill starts from traffic being stationary on a red light. This could result in slow get aways, especially for HGVs, where there could be the increased risk of shunt collisions from traffic following, who might not be expecting the slow speeds. This could also reduce the throughput capacity for this arm at the junction and increase queue lengths.	A level dwell area of suitable length should be created for this arm of the junction.	Accepted. See response to 3.1.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.3	The vertical alignment for Percival Way on the approach to the junction is on a steep downhill section. With the introduction of the signal control there could be more sudden braking movements such as when the lights change from green to red. This combined with being on a downhill section could increase the risk of loss of control and subsequent shunt and junction overshoot collisions.	A level dwell area of suitable length should be created for this arm of the junction.	Accepted. See response to 3.1.		
3.4	It is not known what speed limit will be set at this proposed signalised junction, where New Airport Way is currently a high-speed road of 40mph. With the increased potential for heavy and late braking from the introduction of the traffic signals, there could be an increased risk of speed related collisions at the junction, such as skidding and shunts.	At detailed design stage, the design speed should be reviewed and established for the junction, where for high-speed approaches, high friction or anti-skid surfacing should be installed. Passive safety for any roadside objects or street furniture should also be included.	Accepted. The existing speed limit is 40mph however it is likely that the revised junction would be covered by a 30mph limit as per the existing airport access roads / Percival Way / Airport Way. This would be addressed at the detailed design stage.		
3.5	With numerous lanes and splitter islands, road users turning at the signalised junction might have difficulty manoeuvring into the correct lane for their required destination. These potentially late lane swapping manoeuvres could increase the risk of side swipe collisions with other users. Furthermore, they might get confused and turn into the incorrect	At detailed design stage appropriate signing, lining and bollards should be installed at the junction to guide users to the correct lanes for their desired destination. Signal phasing should be reviewed ensuring minimal conflicts between opposing traffic	Accepted. Appropriate signage, road markings and bollards would be provided at the detailed design stage to reinforce appropriate manoeuvres throughout the junction.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	lane on the destination arm, which might have an opposing traffic flow and head-on collisions could occur as a consequence.	flows, such as separate right turn lane phases.			
3.6	No vehicle swept path analysis has been provided for the junction, which has a number of different turning movements, where vehicles will have to pass through splitter island pinch points. It is therefore not known if the geometry will allow for all size vehicles to negotiate these. This could result in excess kerb strikes and overrun collisions if there is not adequate road width available for turning movements.	A swept path analysis should be carried out for each potential turning movement at the junction and adjustment made to the geometry where required.	Swept path analysis has been undertaken for16.5m articulated HGVs to ensure that all manoeuvres can be accommodated, see Figure 3.1.		
3.7	It is not known at this stage if there are going to be any controlled crossing facilities at the proposed signalised junction. It is noted that for Airport Way and Percival Way there are existing shared footway/ cycleways and uncontrolled crossing facilities which link to a nearby hotel and car park area. With the new multilane signalised arrangements with greater crossing distances this could increase the risk of collisions with pedestrians and cyclists.	Pedestrian and cyclist movement should be reviewed around the junction and appropriate controlled crossing facilities should be installed where required such as Toucan crossings. These should also be compliant with the latest cycling guidance, such as LTN 1/20.	Accepted. There is flexibility within the junction design to accommodate crossing facilities on existing desire lines and this would be considered at the detailed design stage.		

3.2 Swept Path Information

Figure 3.1: Swept Paths - A1081 New Airport Way / Airport Way



3.2.1 Figure 3.1 above shows the swept path analysis for 16.5m articulated HGVs and large cars at the signalised junction between A1081 New Airport Way, Airport Way and Percival Way.

3.3 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	Luton Borough Council
Date:	

B.5 Airport Access Road (Assessment Phase 2a)

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Tables

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1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - Airport Access Road Schemes, Assessment Phase 2a
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - Airport Access Road Schemes, Assessment Phase 2a
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design for the Airport Access Road schemes, at Assessment Phase 2a.

2.1.2 The audit was undertaken on the basis of the proposed Airport Access Road highway mitigation design shown in drawings LLADCO-3C-ARP-SFA-HWM-DR-CE-0019 to 0023 as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1 to Figure 2.5.

Figure 2.1: Locations of Problems Identified within the Audit - Sheet 1 of 5

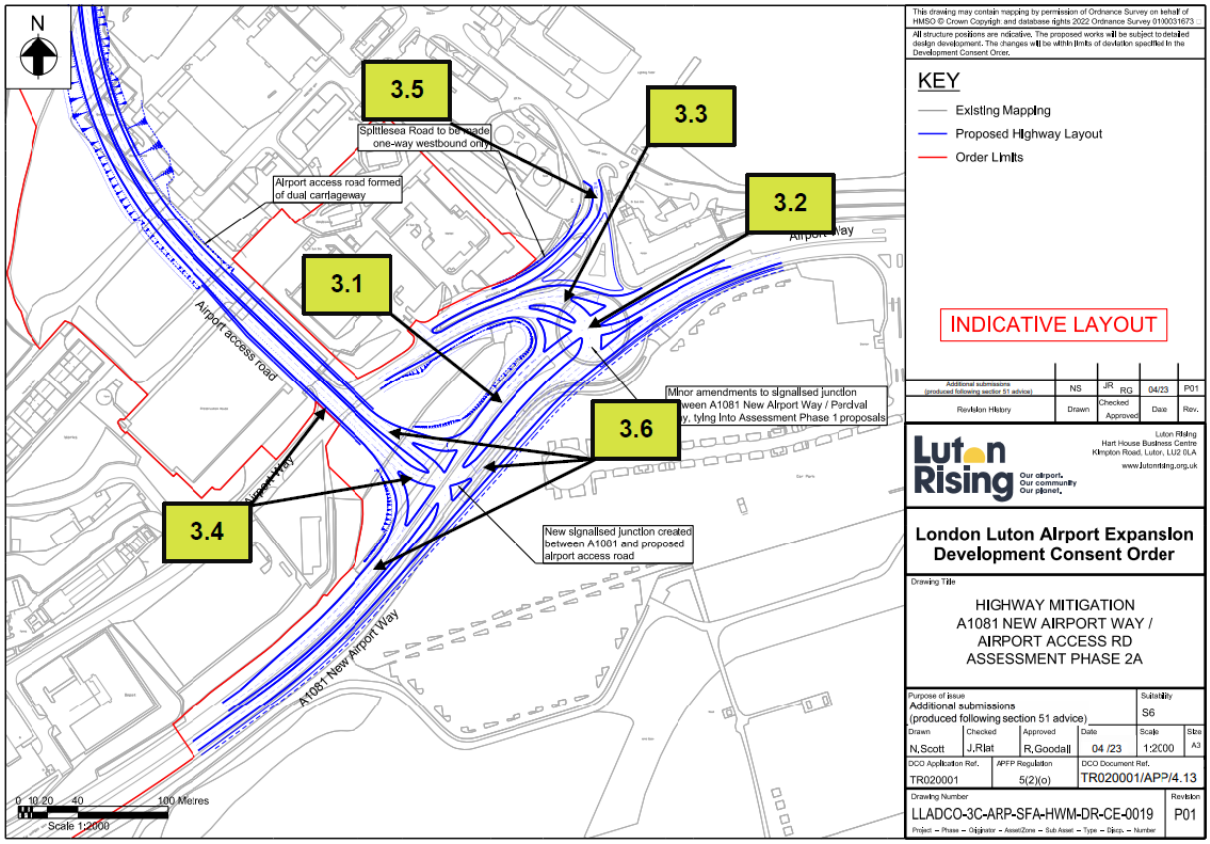


Figure 2.2: Locations of Problems Identified within the Audit - Sheet 2 of 5

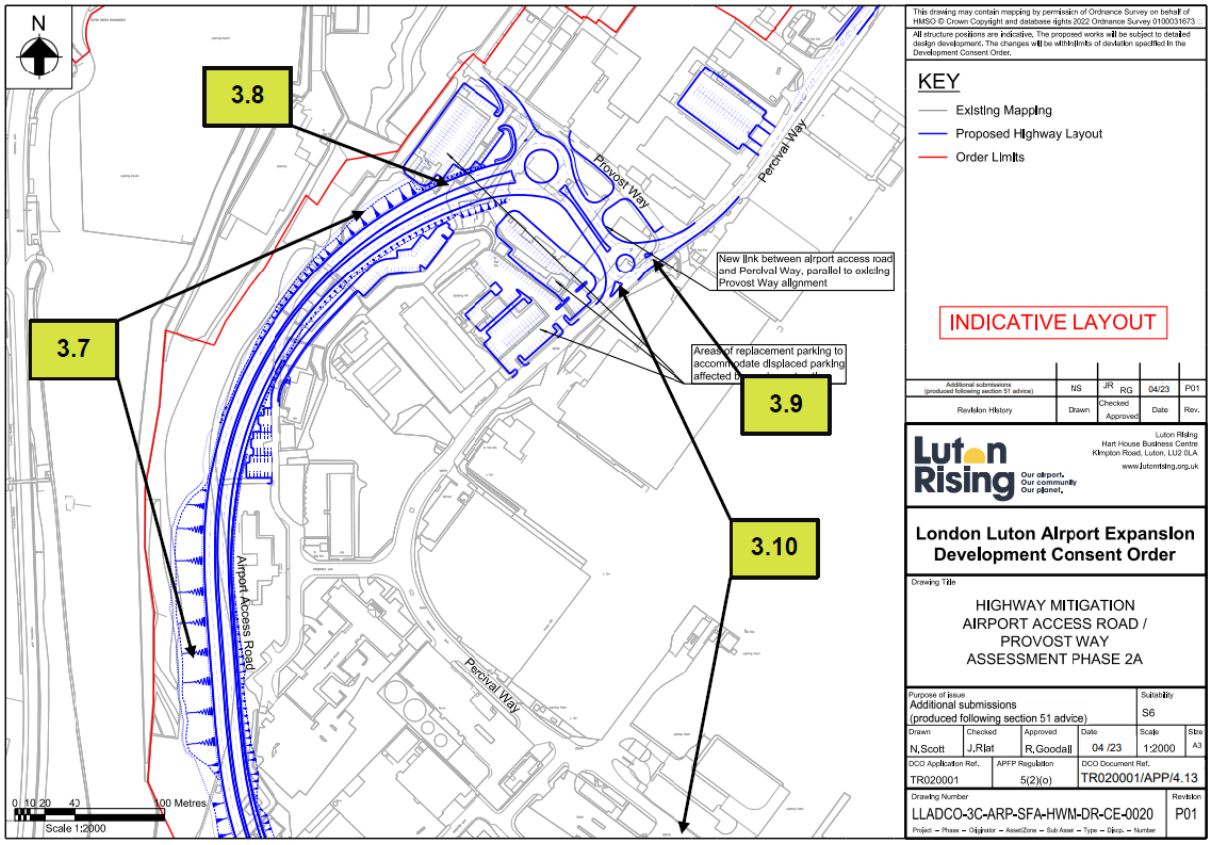


Figure 2.3: Locations of Problems Identified within the Audit - Sheet 3 of 5

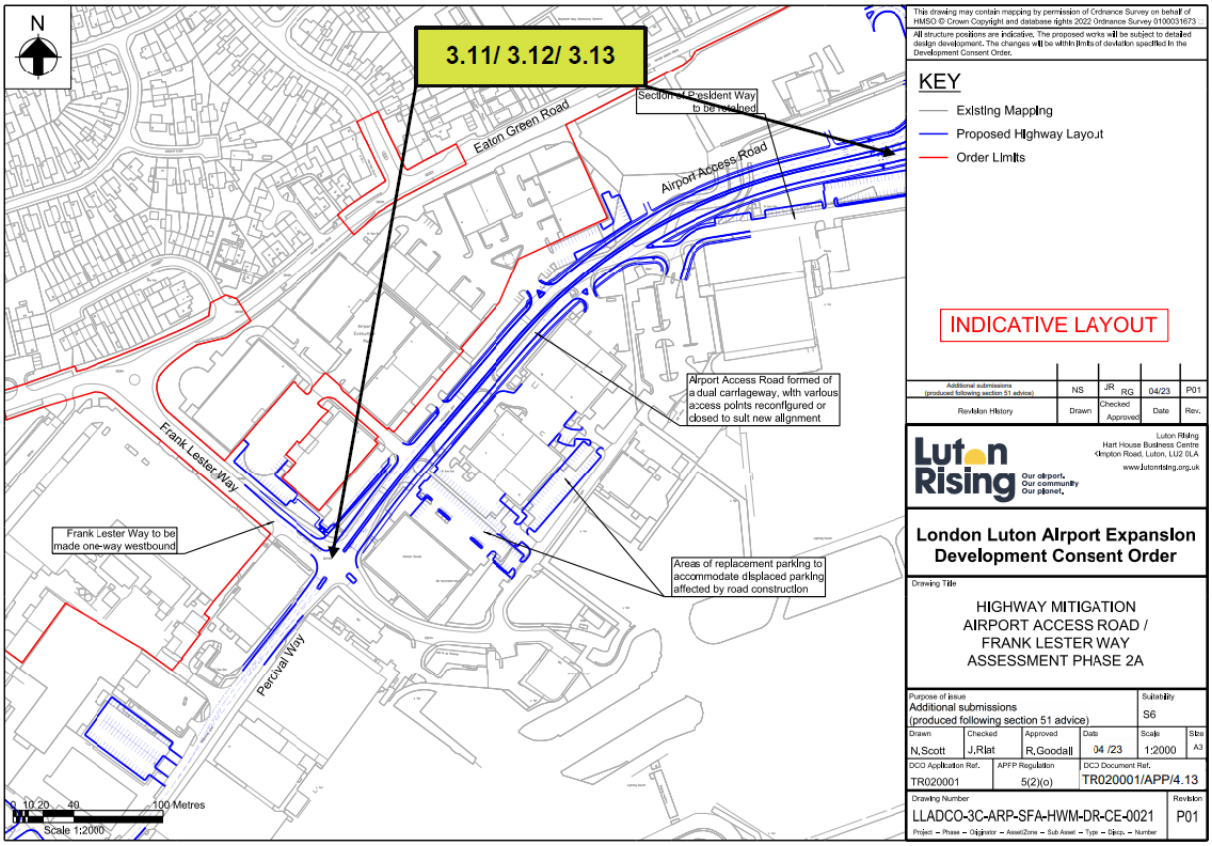


Figure 2.4: Locations of Problems Identified within the Audit - Sheet 4 of 5

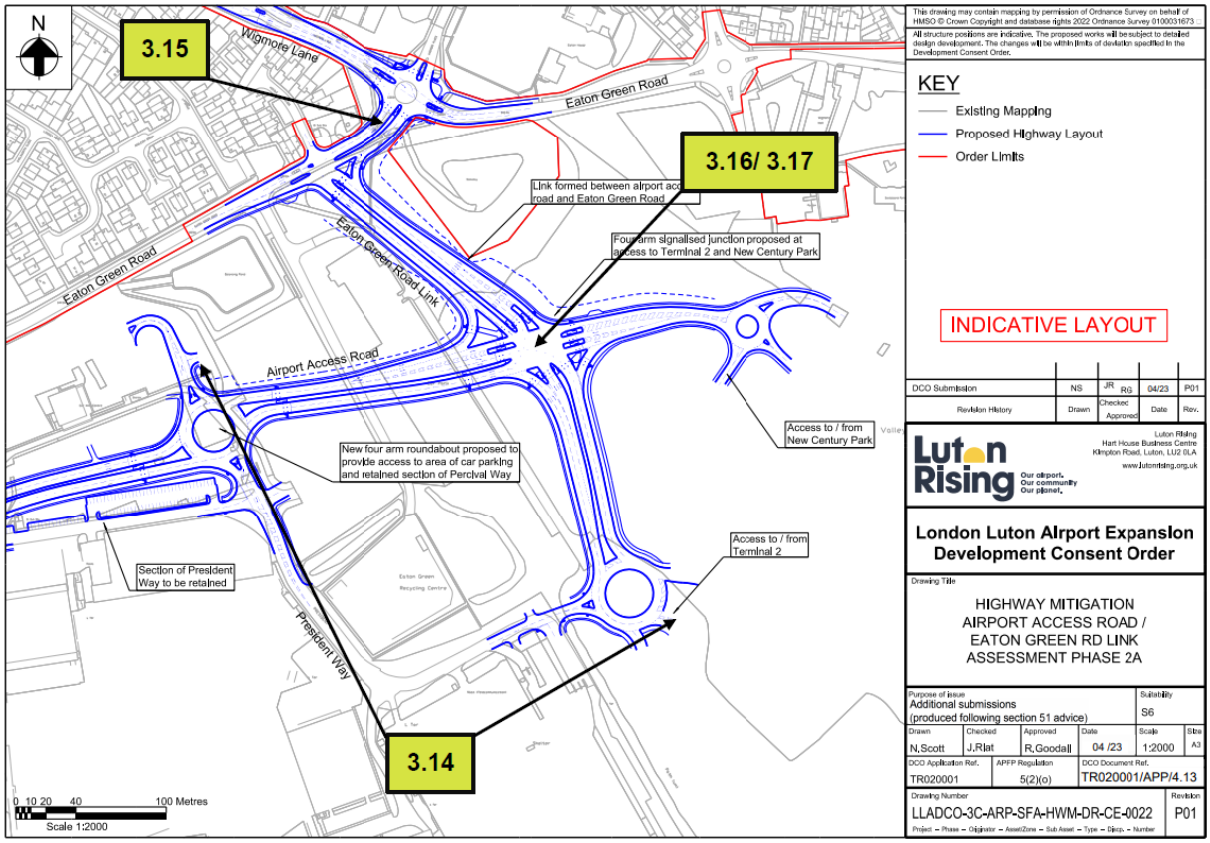
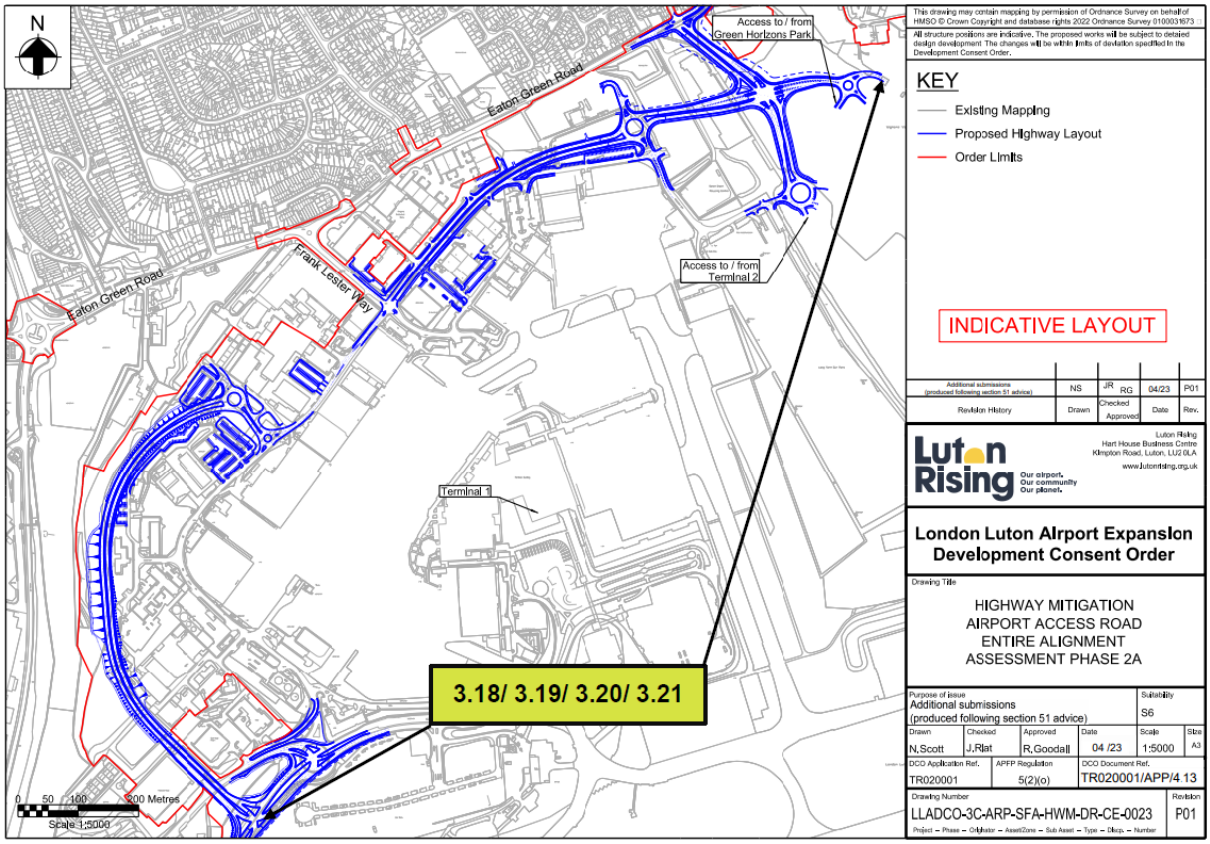


Figure 2.5: Locations of Problems Identified within the Audit - Sheet 5 of 5



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Luton Borough Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	Due to the close proximity of the two proposed signalised junction for this A1081 section of the scheme, there is limited traffic stacking capacity between them. Depending on the signal phasing and timings for each junction, traffic could queue back into the other junction, such as when one is at a red light phase and the other is on a green light. Road users might not expect to have to slow down suddenly for queuing traffic as they pass through the junction, increasing the risk of shunt collisions.	At detailed design stage the stacking capacity and signal phasing of the junctions should be reviewed, ensuring they are synchronised, and that the junction throughput is adequate for the expected traffic flow levels.	Accepted. The traffic signals would be designed to operate in the most efficient manner, taking account of the stacking capacity between the junctions. This would be addressed at the detailed design stage.		
3.2	It was noted that the existing roundabout for New Airport Way and Percival Way is on a steep gradient which slopes away from the north side. With the introduction of the signalised junction there could be a level difference between each approach, which could create an adverse camber for vehicles turning at the junction. This could increase the risk of loss of control collisions and could cause larger, high sided vehicle to turn over.	The levels should be checked for each approach ensuring a level junction platform with no adverse cambers for vehicle turning movements.	Accepted. It is acknowledged that regrading of the existing levels would be required to construct the new signalised junction. This would be addressed at the detailed design stage.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.3	Airport Way currently has a steep approach to the roundabout with no level dwell area. With the introduction of the signalised junction, there are likely to be more hill starts from traffic being stationary on a red light. This could result in slow get aways, especially for HGV's, where there could be the increased risk of shunt collisions from traffic following, who might not be expecting the slow speeds. This could also reduce the throughput capacity for this arm at the junction and increase queue lengths.	A level dwell area of suitable length should be created for this arm of the junction.	Accepted. See response to 3.2.		
3.4	With the steep level differences between the proposed airport access road and the New Airport Way (A1081) Junction, it is assumed to overcome this, the access road will be elevated and there will be a bridge at its intersection with Airport Way. This could lead to high drop offs from the edge of the carriageway, which could increase the risk of fall hazards, such as in the case of any errant vehicle leaving the carriageway.	At detailed design stage a suitable vehicle restraint system should be devised for the junction and its approaches, including at the intersection with Airport Way. As per Problems 3.2 and 3.3, the camber should also be reviewed for turning vehicles and level dwell areas introduced for all approaches.	Accepted. A vehicle restraint system (VRS) would be provided where appropriate and levels regraded as necessary. This would be addressed at the detailed design stage.		
3.5	With the merging of Percival Way into Spittlesea Road, which will form a righthand bend into a one-way road, the alignment on this approach is on a downhill section,	The levels should be reviewed ensuring the righthand bend is a banked turn.	Accepted. Levels would be designed to the appropriate standard at the detailed design stage.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	which might slope away. This could create an adverse camber and increase the risk of loss of control collisions.				
3.6	It is not known what speed limit will be set at this proposed signalised junction, where New Airport Way is currently a high-speed road of 40mph. With the increased potential for heavy and late braking from the introduction of the traffic signals, there could be an increased risk of speed related collisions at the junction, such as skidding and shunts.	At detailed design stage, the design speed should be reviewed and established for the junction, where for high-speed approaches, high friction or anti-skid surfacing should be installed. Passive safety for any roadside objects or street furniture should also be included.	Accepted. It is likely that a speed reduction to 30mph would be proposed in the vicinity of the new junction with Airport Access Road (AAR), extending the existing 30mph speed limit to the west of the proposed junction. The design speed would be further considered at the detailed design stage.		
3.7	From the indicative layout drawing provided it would appear that sections of the Airport Access Road could be elevated, with a gradual righthand bend, heading north. With the potentially high-speed nature of the dual carriageway, should any errant vehicle lose control and leave the carriageway, they could descend steep embankments, which could increase the severity of a collision and the risk of injury to the vehicle occupants. Furthermore, there could also be the risk of adverse cambers given the potential level differences for this section of the scheme.	At detailed design stage a suitable restraint system should be designed appropriate for the speed of the road with suitable cambers.	With the exception of the bridge link as AAR crosses Airport Way, there are no proposed elevated structures. North of Airport Way, AAR would be at ground level, albeit with a length of significant cutting into an embankment, where a VRS would be provided on the outer edge of the bend. The VRS and cambers would be considered further at the detailed design stage.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.8	The stopping site distance (SSD) might be restricted due to the curvature of the proposed access road for traffic approaching the roundabout from the south. If the SSD is insufficient for the speed of the road, then this could increase the risk of shunt collisions with potentially queuing traffic at the roundabout. There is also the risk that traffic could overshoot the roundabout give way line and collide with traffic on the circulatory.	It should be ensured that there is sufficient stopping site distance on the approach to the roundabout, suitable for the speed of the road.	Accepted. The SSD on the north easterly approach to the Provost Way roundabout has been checked and at least 90m SSD is achievable to the roundabout, suitable for a 30mph speed limit. This will be confirmed at the detailed design stage.		
3.9	For the northeast approach to the proposed Percival Way roundabout, there is little entry path deflection and potential 'see through' to the road ahead. This could result in road users straight lining the roundabout at speed, where they might fail to give way and collide with traffic turning on the circulatory.	Entry path deflection should be increased on the northeast approach to the roundabout and measures implemented to reduce 'see through' from this approach.	There is limited scope to provide deflection on the south-westbound entry to the proposed roundabout between Provost Way and Percival Way due to existing highway boundary and third party land constraints. This can however be considered further at the detailed design stage to maximise the available deflection.		
3.10	From the indicative drawings provided, it is not clear at this stage how traffic will be directed to use the new Airport Access Road, when approaching northeast from Percival Way. They could instead head straight on at the roundabout, continue along Percival Way and turn onto Airport Way to get back to	Signing and restrictions should be put in place to prevent non-authorised road users from accessing the southern section of Percival Way.	Accepted. Signage would be provided to direct general traffic along the AAR, with Percival Way proposed to be retained for local access traffic. This could include formal restrictions such as 'Except for Access'		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	the main A1081 carriageway for exiting the airport. By taking this alternative route, which has more accesses and intersections, there could be the increased risk of collisions at these additional conflict points.		signage and this would be addressed at the detailed design stage.		
3.11	With the Airport Access Road replacing President Way with an upgraded dual carriageway, which will likely encourage higher speeds, there will still be numerous accesses branching off from this main road. This could increase the risk of speed related pull out type collisions, especially as it was noted that some of these already had limited visibility splays due to overgrown vegetation.	The visibility splays at all of the accesses along the proposed Airport Access Road should be reviewed ensuring they are sufficient for the speed of the road.	Visibility splays at the side-road accesses onto AAR are not expected to be impacted by the proposals, with similar or improved visibility splays to existing being retained at all locations.		
3.12	Currently there are footways on both sides of President Way, where many business units are in the vicinity. It is not known if there are pedestrian crossing desire lines to access these. With the proposed dual carriageway layout, which could have higher speeds and two lanes of traffic travelling in each direction, this will likely make crossing more difficult. These two factors could increase the risk of pedestrians being struck by oncoming vehicles.	Pedestrian crossing movements should be reviewed for the Airport Access Road and appropriate crossing facilities installed where required.	Accepted. Pedestrian crossing points have been indicated at locations where crossing activity is considered likely to occur.		
3.13	It appears from the drawing that there will be a central reserve along	It should be ensured that the U-turn points will be	The intention is that U-turns would be made at		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	the extents of the Airport Access Road, with no breaks to turn right into the existing accesses. This will mean that road users will have to make U-turns at the junctions, at both ends of the Airport Access Road to access these. It is not known if these are appropriate for this type of manoeuvre, where there could be the increased risk of collisions with oncoming vehicles, especially at the junction with Frank Lester Way where the manoeuvre is likely to be tight.	suitable for all vehicle types and appropriate signing specified at the detailed design stage.	the Provost Way roundabout to the west, and the President Way roundabout to the east. These roundabouts are large enough to enable U-turn manoeuvres by HGVs. At the Frank Lester Way/AAR signal controlled crossroads, U-turns would be banned. There is insufficient space to include dedicated U-turn facilities at locations along AAR.		
3.14	It is not known at this stage what pedestrian facilities will be available to safely access the airport terminal from the car park areas. If these are not adequate, or not located at potential desire lines, then there could be the increased risk of collisions with pedestrians crossing or walking in the road heading to and from the terminal building.	Pedestrian crossing movements should be reviewed between the car park areas and the terminal building(s), and footways and crossing facilities installed where required.	The proposed areas of replacement parking along AAR are generally provided for staff usage, and to replace areas of existing staff parking in broadly similar locations to the spaces which are affected by the AAR alignment. Crossing points have been provided at appropriate locations along AAR and the adjacent Eaton Green Road Link to enable access to/from the terminal for pedestrians. Pedestrian facilities would be reviewed at the detailed design stage.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.15	The two signalised junctions proposed along Eaton Green Road are in close proximity to each other, where there is little traffic stacking capacity between them. Traffic could queue up into these junctions and increase the risk of shunt collisions, where road users might not be expecting stationary traffic as they accelerate through the junction on a green light phase.	At detailed design stage the stacking capacity and signal phasing of the junctions should be reviewed, ensuring they are synchronised, and that the junction throughput is adequate for the expected traffic flows.	Accepted. The traffic signals would be designed to operate in the most efficient manner, taking account of the stacking capacity between the junctions. This would be addressed at the detailed design stage		
3.16	At this multi-lane signalised junction there are numerous splitter islands on each of the four arms. This could result in multiple crossing stages for pedestrians to negotiate the junction from one side to the other. Pedestrians might get frustrated having to wait for the signals at each of these phases and bypass the controlled crossings. They might cross at less appropriate locations or take chances with red light phases, increasing the risk of them being struck by oncoming vehicles.	The junction should be simplified ensuring pedestrians have desirable crossing points with as few stages as possible.	The form of the signal-controlled crossroads is designed to provide a balance between vehicular capacity and pedestrian connectivity, whilst acknowledging that airports by their very nature generally have a low pedestrian mode share. Simplifying the layout would likely have a detrimental impact on vehicular capacity but reducing crossing points could be investigated further during the detailed design stage.		
3.17	Further to Problem 3.16, with numerous lanes and splitter islands, road users turning at the signalised junction might have difficulty manoeuvring into the correct lane for their required	At detailed design stage appropriate signing, lining and bollards should be installed at the junction to guide users to the correct lanes for their	Accepted. Appropriate signage, road markings and bollards would be provided at the detailed design stage to reinforce		

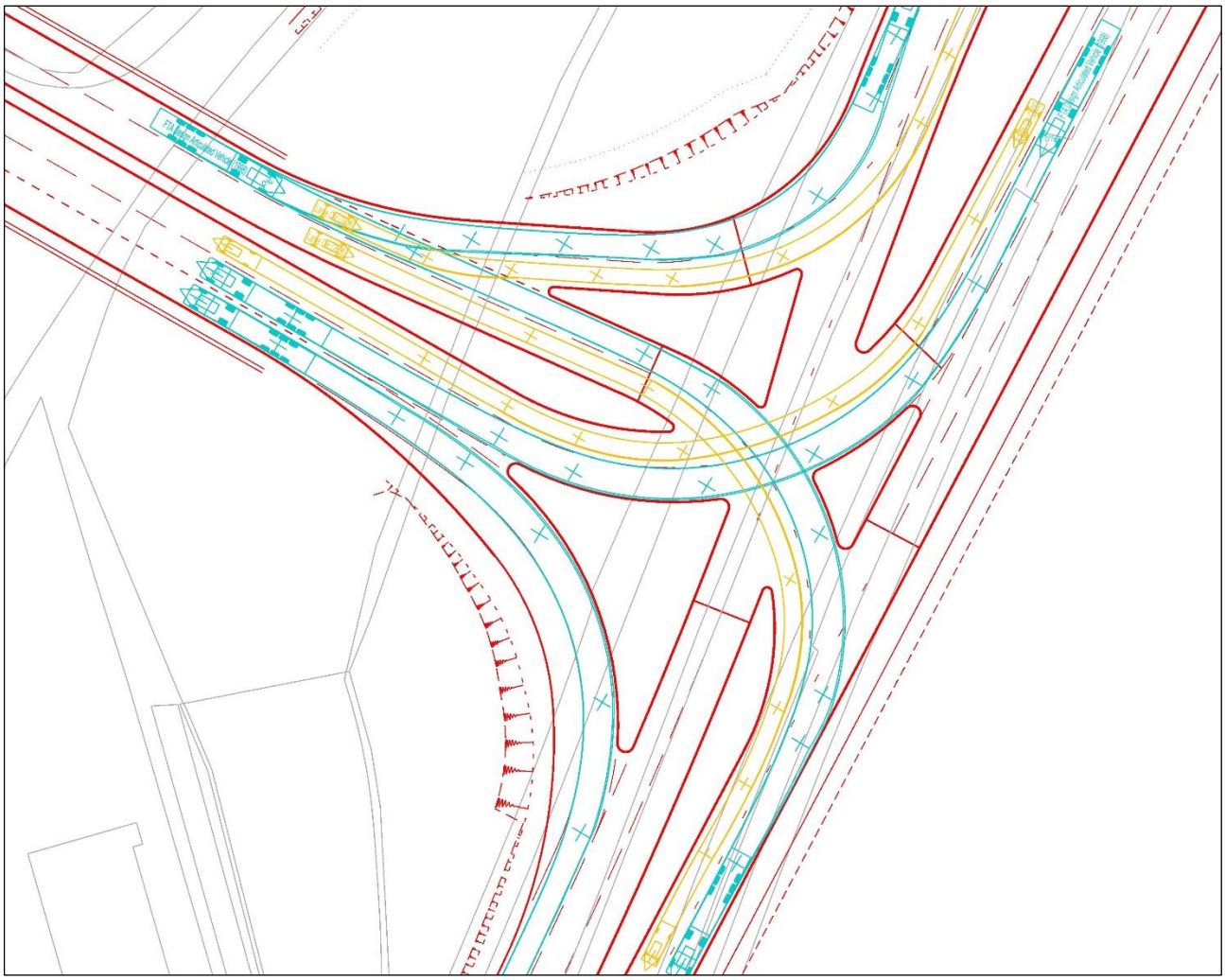
Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	destination. These potentially late lane swapping manoeuvres could increase the risk of side swipe collisions with other users. Furthermore, they might get confused and turn into the incorrect lane on the destination arm, which might have an opposing traffic flow and in head-on collisions could occur as a consequence.	desired destination. Signal phasing should be reviewed ensuring minimal conflicts between opposing traffic flows, such as separate right turn lane phases.	appropriate manoeuvres throughout the junction.		
3.18	At this preliminary stage, no vehicle swept path analysis has been provided for any of the junctions, including for roundabouts and signalised crossroads/ T-junctions. It is therefore not known if the geometry will allow for all size vehicles to negotiate the junctions. Otherwise, there could be excess kerb strikes and overrun collisions if there is not adequate road width available for turning movements.	A swept path analysis should be carried out for each junction and adjustment made to the geometry where required.	Swept path analysis has been carried out for all manoeuvres to ensure that vehicles can be accommodated. See Figures 3.1 to 3.6.		
3.19	No facilities have been specified for cyclists at this preliminary stage, where it is not known if there will be a requirement for this mode of transport as part of the travel plan (such as for staff living in the local vicinity, who might choose to cycle to work). Currently the existing scheme is unlikely to safely accommodate this type of vulnerable road user as there are many junction intersections and conflict points where the risk of	It should be determined if cyclists are to be included as part of the travel plan, and appropriate cycling facilities should be provided if this is a requirement. These should also be compliant with the latest cycling guidance, such as LTN 1/20.	The AAR design (including the Eaton Green Road Link and the access road linking AAR to the new terminal) includes an off-road shared pedestrian / cycle route along one side. Advanced Stop Lines and toucan crossings could be provided at the signalised junctions for cyclists who wish to ride		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	collisions with cyclists could be high.		on-road, with cycle parking also to be provided at the new terminal. This would be addressed at the detailed design stage.		
3.20	The speed limit for the Airport Access Road has not yet been specified. If this is not appropriate, it could increase the risk of speed related collisions occurring. This could include being set too high or too low, where compliance could be low with the posted speed limit and therefore be counterproductive.	At detailed design stage an appropriate speed limit should be determined in accordance with the latest speed limit guidance. This should be a self-enforcing limit using the highway geometry rather than relying on police enforcement, where resources might not be available. Passive safety of roadside features should also be included in the design if this it to be set as a high-speed road (40mph or above).	Accepted. The proposed AAR design is based on a 30mph speed limit.		
3.21	Throughout the scheme there are numerous multilane approaches to junctions where users must navigate into specific lanes to get to their desired destinations. If this is not clear, this could result in late lane swapping manoeuvres, which could increase the risk of side swipe collisions. Additionally, they could head into the wrong lanes on	At detailed design stage, lane designation road markings and destination signs should be proposed at suitable locations to assist users to navigate the airport access road and associated routes.	Accepted. Provision of appropriate signage and road markings would be addressed at the detailed design stage.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	the destination arms of junctions, where some of these are not well aligned, resulting in further junction collisions.				

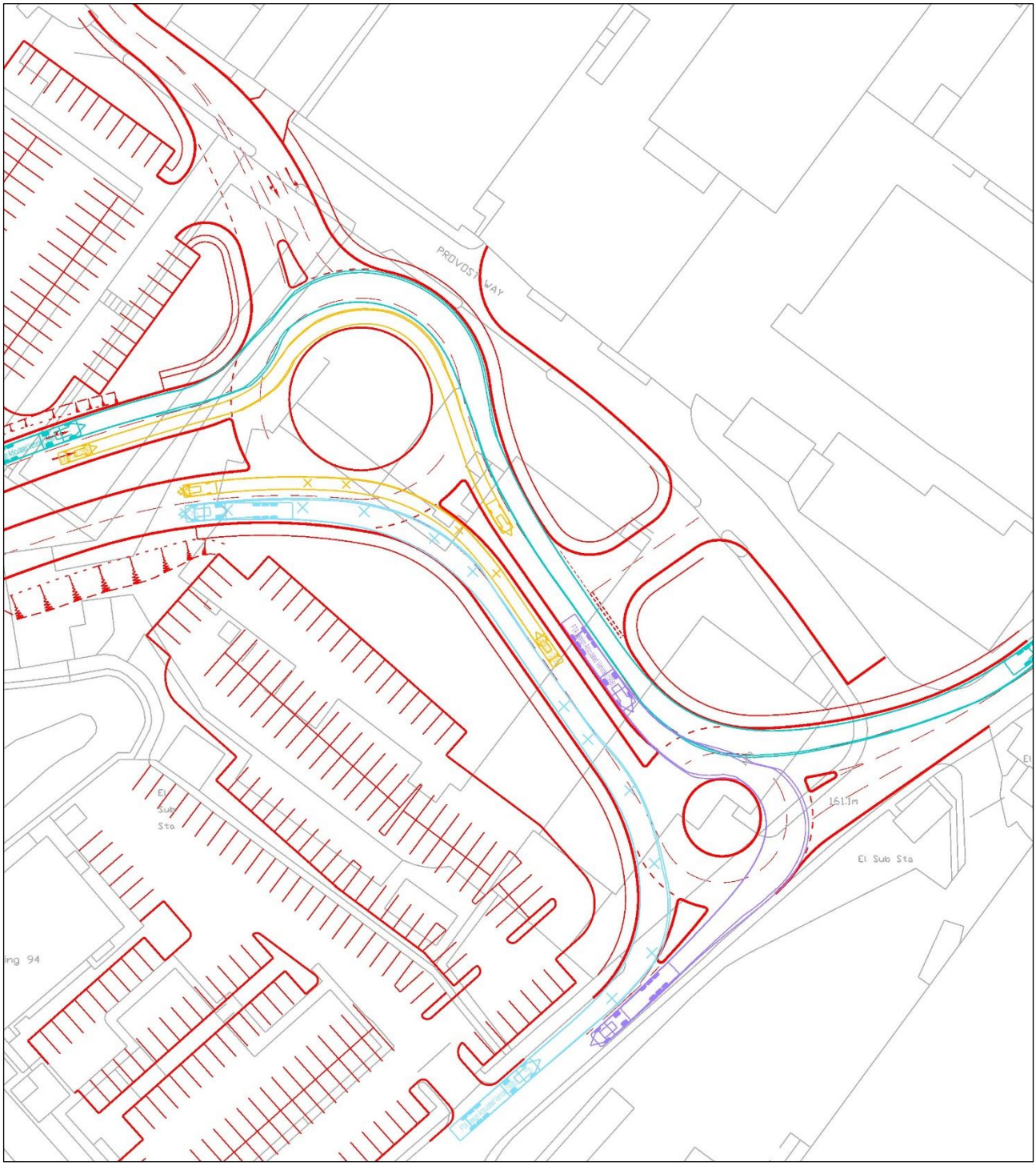
3.2 Swept Path Information

Figure 3.1: Swept Paths - A1081 New Airport Way / AAR



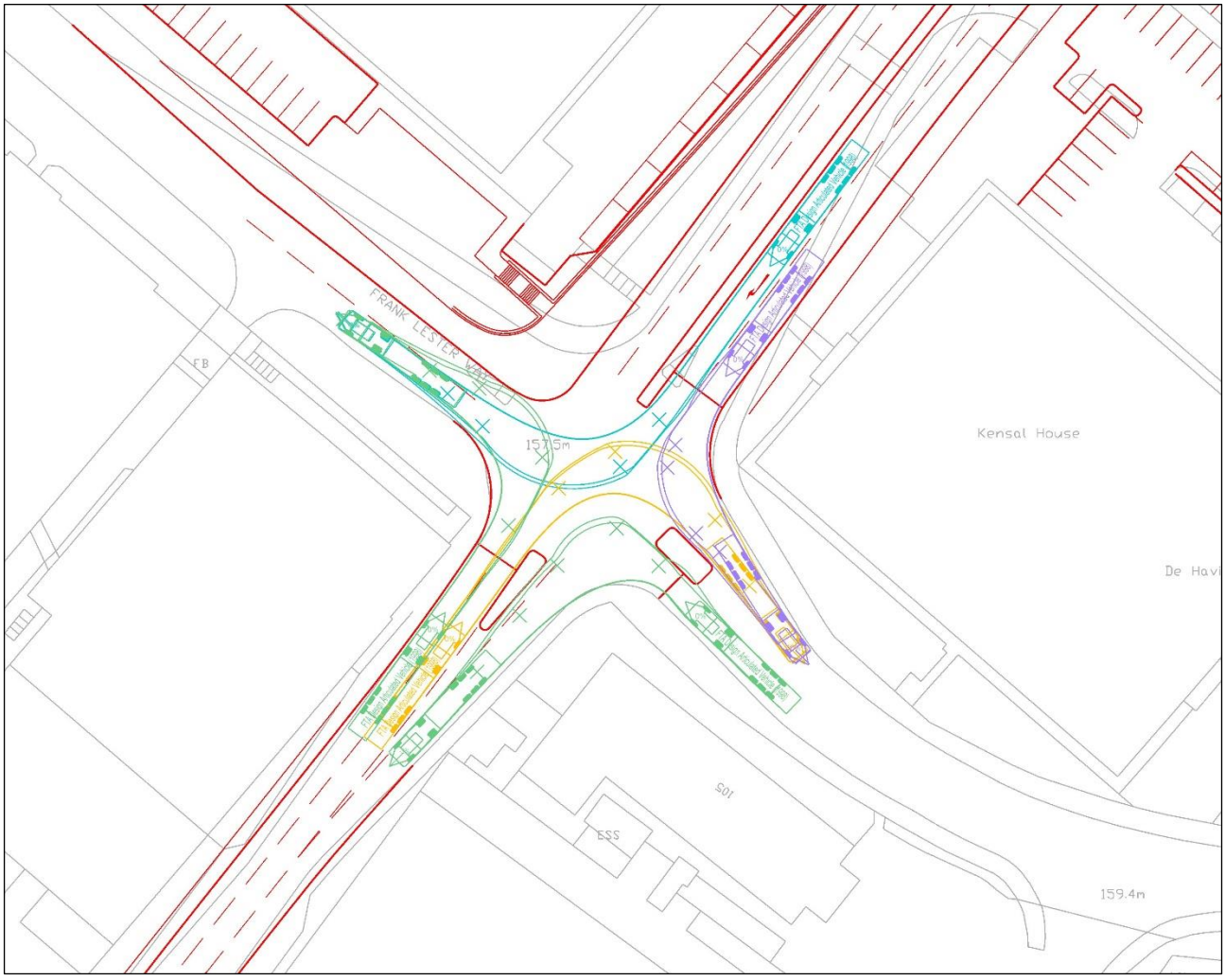
3.2.1 Figure 3.1 above shows the swept path analysis for 16.5m articulated HGVs and large cars at the signalised junction between A1081 New Airport Way and the proposed AAR.

Figure 3.2: Swept Paths - AAR / Provost Way



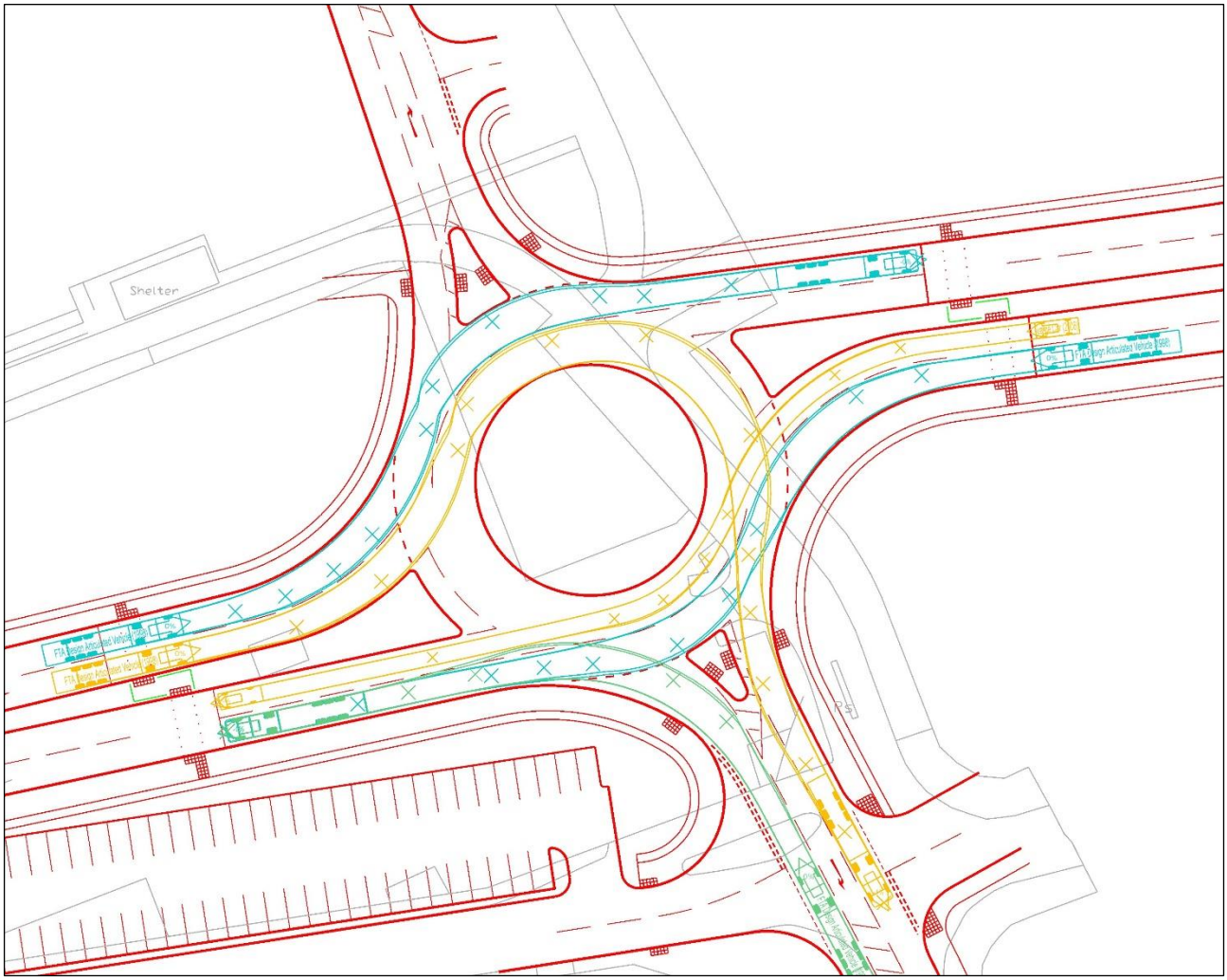
3.2.2 Figure 3.2 above shows the swept path analysis for 16.5m articulated HGVs and large cars at the roundabout junctions between the proposed AAR / Provost Way and Percival Way.

Figure 3.3: Swept Paths - AAR / Percival Way / Frank Lester Way



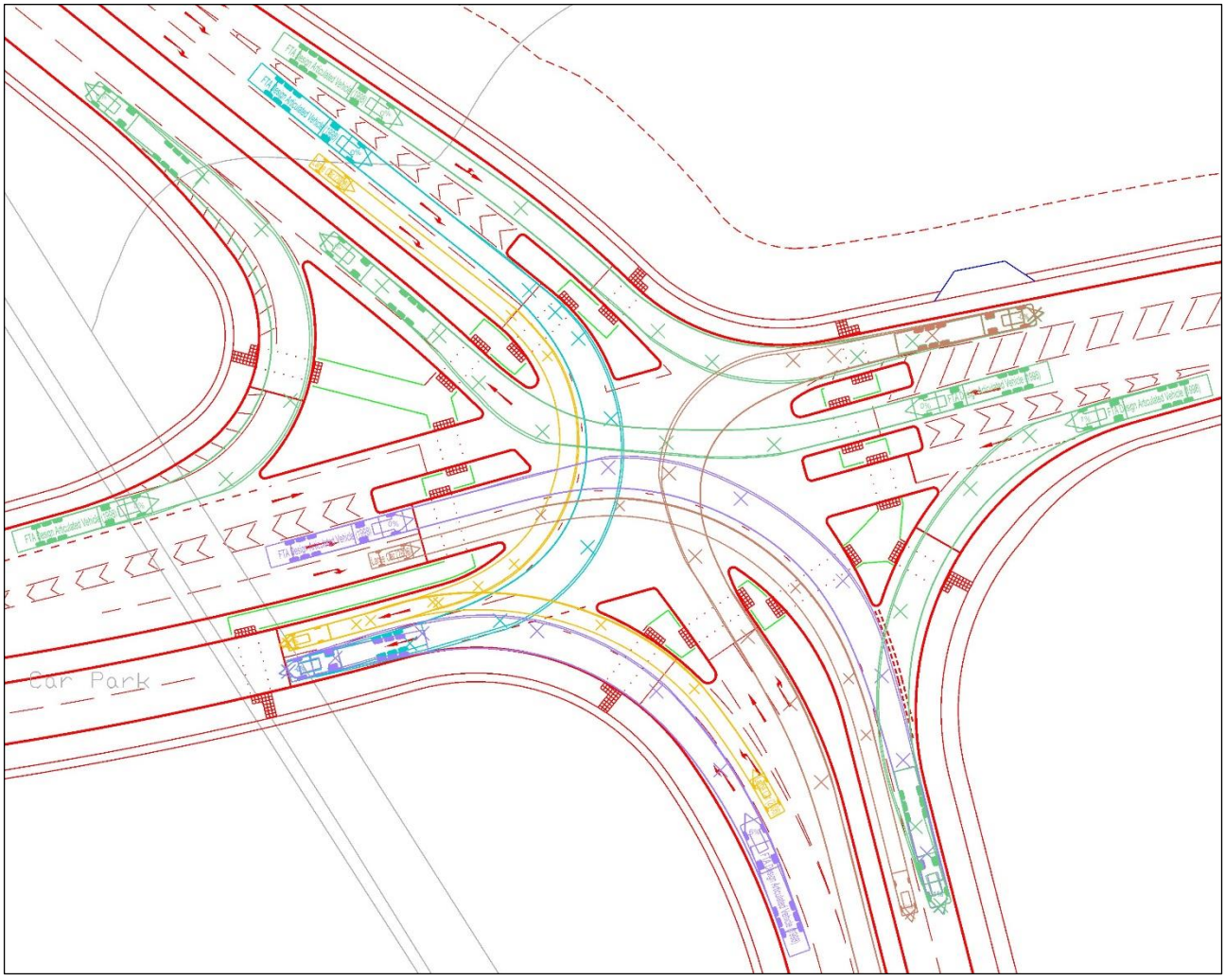
3.2.3 Figure 3.3 above shows the swept path analysis for 16.5m articulated HGVs at the signalised junction between the proposed AAR / Percival Way / Frank Lester Way.

Figure 3.4: Swept Paths - AAR / President Way Roundabout



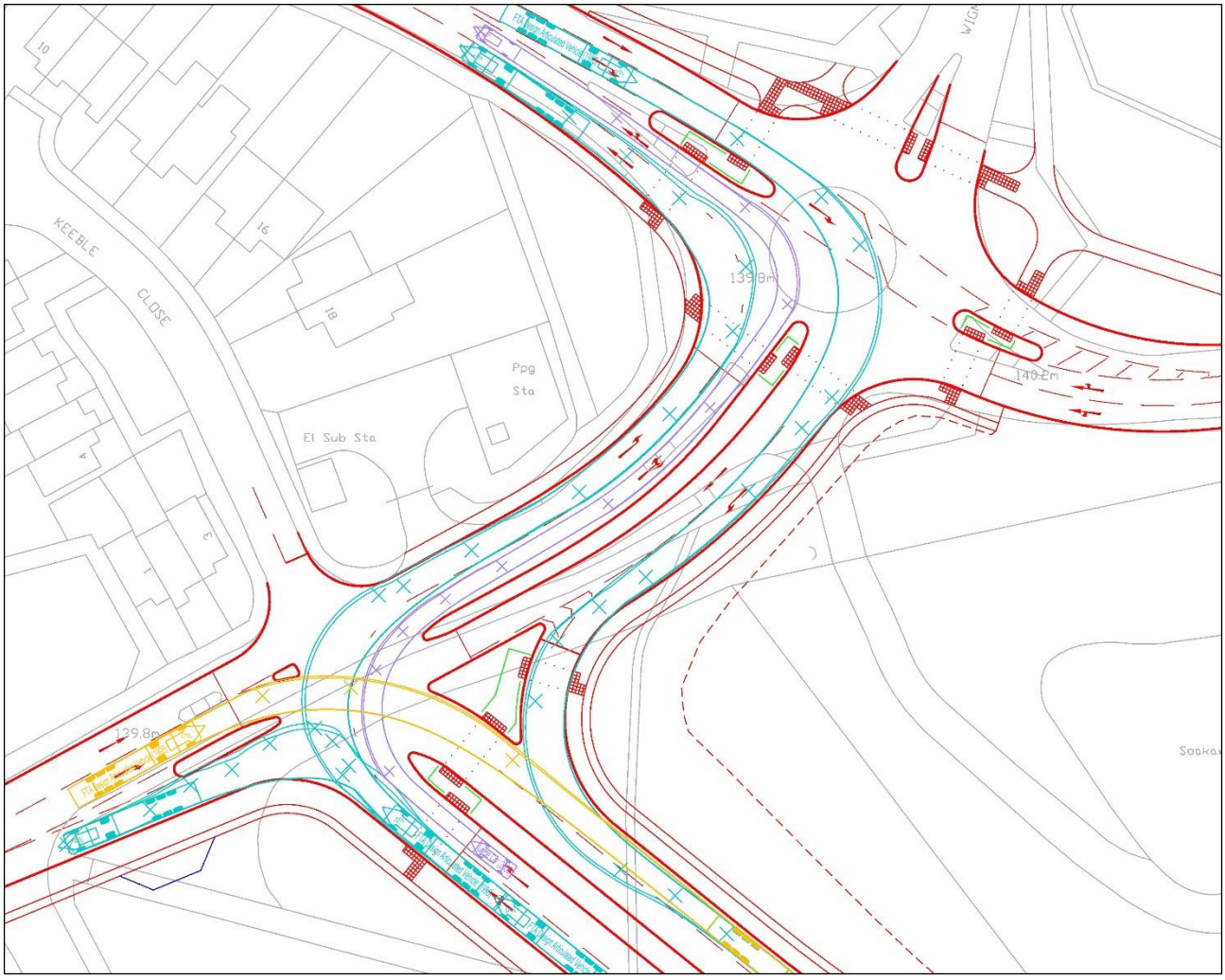
3.2.4 Figure 3.4 above shows the swept path analysis for 16.5m articulated HGVs and large cars, at the roundabout junction between the proposed AAR and the retained section of President Way.

Figure 3.5: Swept Paths - AAR / Eaton Green Road Link



3.2.5 Figure 3.5 above shows the swept path analysis for 16.5m articulated HGVs and large cars at the signalised junction between the proposed AAR / Eaton Green Road Link / Terminal 2 access road.

Figure 3.6: Swept Paths - Eaton Green Road Link / Eaton Green Road / Wigmore Lane



3.2.6 Figure 3.6 above shows the swept path analysis for 16.5m articulated HGVs at the signalised junctions between the proposed Eaton Green Road Link / Eaton Green Road and Eaton Green Road / Wigmore Lane.

3.3 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	Luton Borough Council
Date:	

B.6 Airport Access Road (Assessment Phase 2b)

Contents

Tables

Figures

1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - Airport Access Road Schemes, Assessment Phase 2b
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - Airport Access Road Schemes, Assessment Phase 2b
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design for the Airport Access Road schemes, Assessment Phase 2b.

2.1.2 The audit was undertaken on the basis of the proposed Airport Access Road highway mitigation design shown in drawings LLADCO-3C-ARP-SFA-HWM-DR-CE-0031 to 0033 as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1 to Figure 2.3.

Figure 2.1: Locations of Problems Identified within the Audit - Sheet 1 of 3

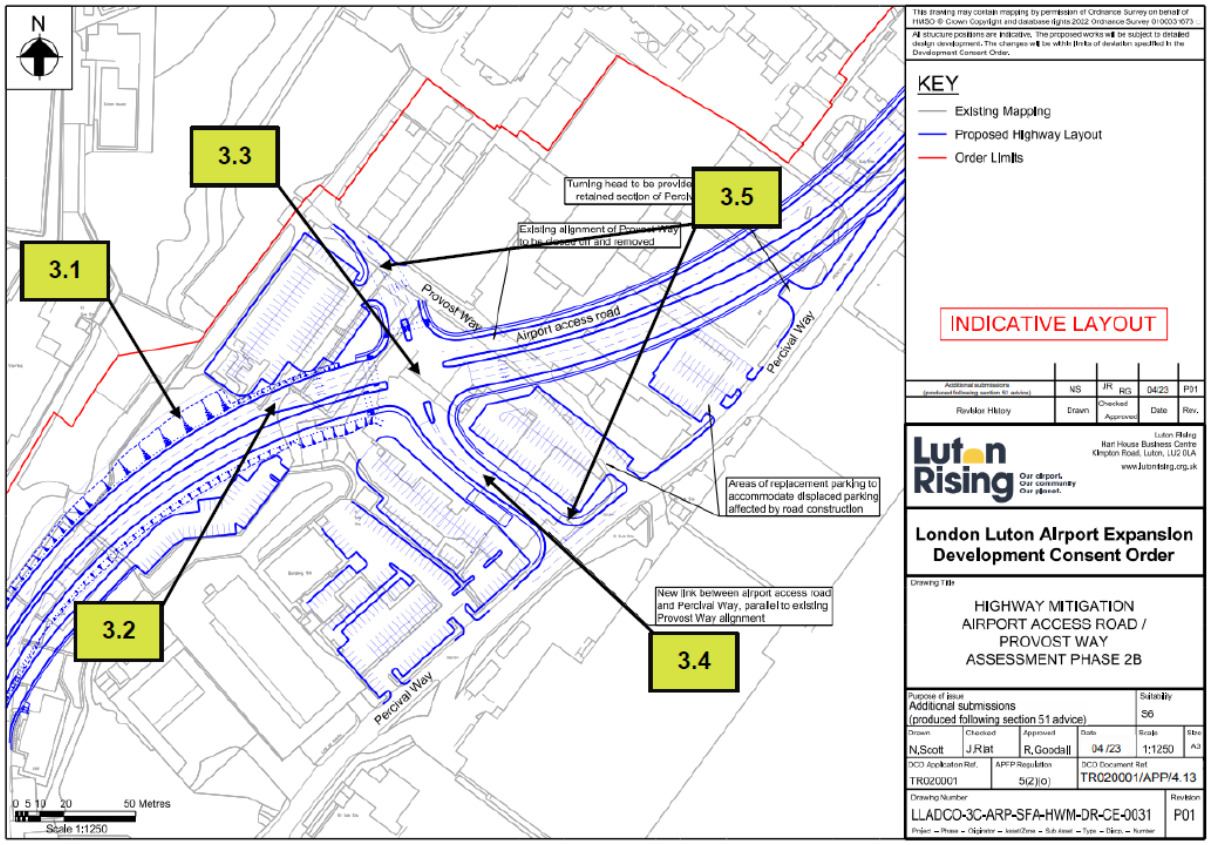


Figure 2.2: Locations of Problems Identified within the Audit - Sheet 2 of 3

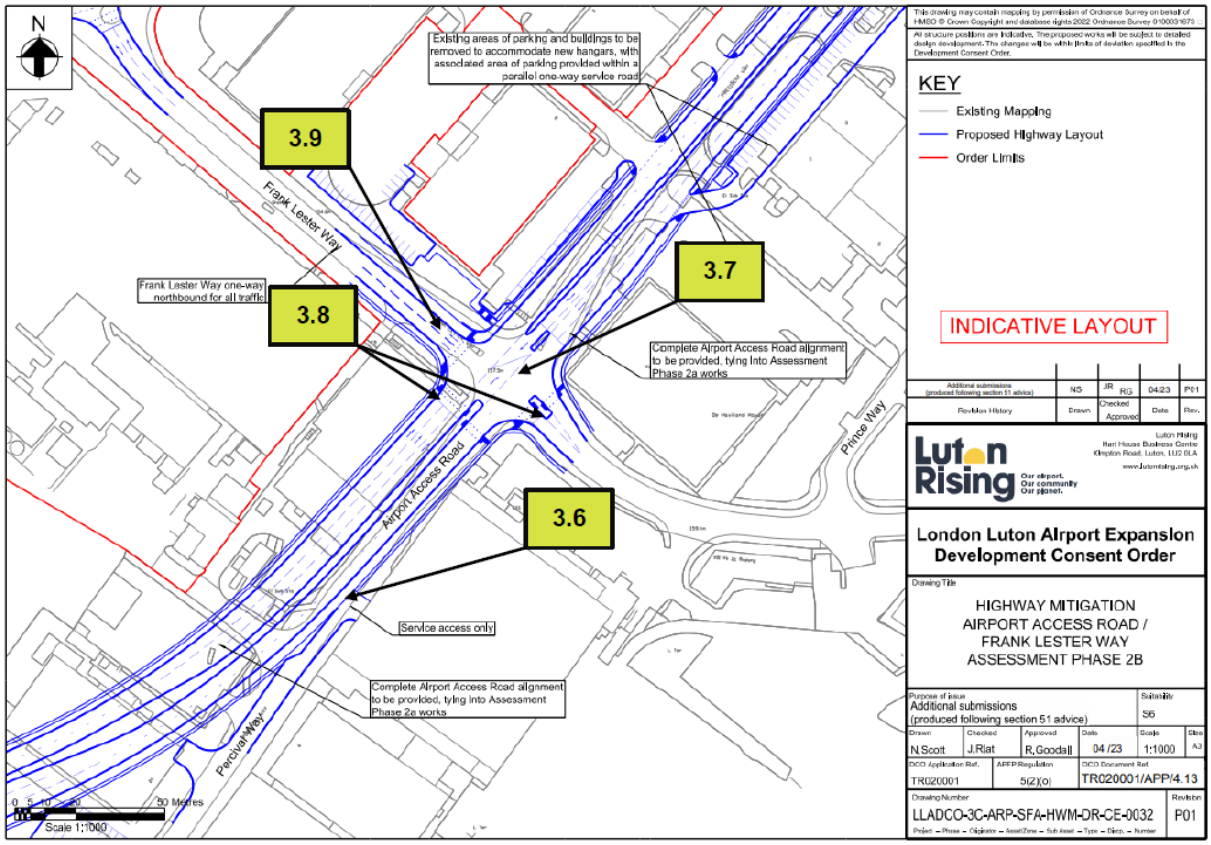
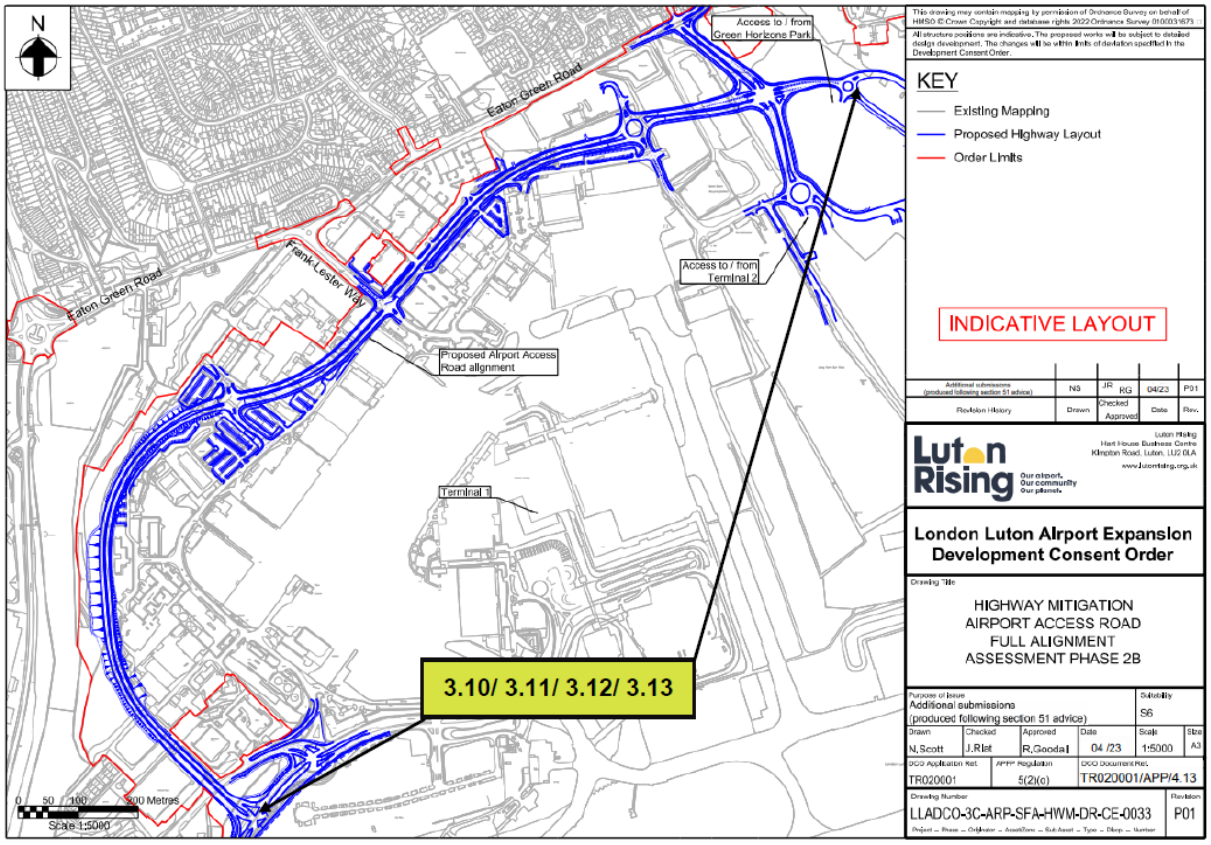


Figure 2.3: Locations of Problems Identified within the Audit - Sheet 3 of 3



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Luton Borough Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	With the vertical alignment on the righthand bend approaching the signal junction, an errant vehicle leaving the carriageway could descend the steep embankment. Vehicles could gain speed and roll down the embankment which could increase the severity of any resultant collision and the risk of injury to the vehicle occupants.	At detailed design stage, a suitable vehicle restraint system (VRS) should be proposed at this location.	Accepted. A VRS would be provided on the AAR at suitable locations and this would be addressed at the detailed design stage.		
3.2	Given the curvature of the carriageway which bends to the right, the stopping sight distance (SSD) might be compromised. Approaching road users might not view the signals until late or see potentially queuing traffic. This could increase the risk of shunt and overshoot type collisions.	It should be ensured that there is sufficient stopping site distance on the approach to the signalised junction, suitable for the speed of the road.	Accepted. The SSD on the north-eastbound approach to the traffic signals has been checked and at least 90m SSD is achievable, which is suitable for a 30mph speed limit. This will be confirmed at the detailed design stage.		
3.3	It was noted from the site assessment that Provost Way slopes downhill at its north extents, approximately where the new junction will be located. With these potential level differences, this could create adverse cambers for vehicles turning at the junction which could increase the risk of	The vertical alignment for the junction and its approaches should be reviewed and rectified where required, including level dwell areas and no adverse cambers for turning vehicles.	Accepted. The vertical alignment has been considered as part of the design and an indicative vertical alignment has been produced in this location and submitted as part of the DCO submission and can be		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	loss of control collisions or high sided vehicles toppling over. Furthermore, the junction dwell areas might be on slopes which could result in slow getaway shunt and turning collisions (if uphill) or overshoot collisions (if heading downhill).		seen in drawing LLADCO-3C-ARP-SFA-HWM-DR-HY-0701 of Volume 4.11 Airport Access Road and Luton DART Long Section Plans **[APP-027]**. This seeks to provide a level dwell area as far as reasonably practicable on the junction approaches, and this will be revisited at the detailed design stage.		
3.4	A link is being provided from the Airport Access Road (AAR) to the existing Percival Road. It is not known at this stage if this is to be accessible for the general public or is intended for staff and authorised business users only. Without any signing or restrictions in place, traffic could use this as an alternative route to the main access road, where there could be the increased risk of collisions due to the additional conflict points at accesses and junctions along Percival Way.	Appropriate signing and restrictions should be put in place to prevent non-authorised road users from accessing Percival Way if this is not intended to be used by the general public and through traffic.	Accepted. Signage would be provided to direct general traffic along the AAR, with Percival Way proposed to be retained for local access. This could include formal restrictions such as 'Except for Access' signage, and this would be addressed at the detailed design stage.		
3.5	At this preliminary stage although the 'Indicative' layout drawing shows footways and some crossing points at the junction, pedestrian movements are not clear. With the proposals for a number of car parks	Pedestrian movements should be reviewed and adequate footway and crossing facilities implemented at the detailed design.	The proposed areas of replacement parking along AAR are generally provided for staff usage, and to replace areas of existing staff parking in		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	in this area, pedestrians are likely to require comprehensive routes and crossing points to and from the airport amenities. If the facilities are not adequate, there could be the increased risk of collisions with pedestrians, especially as they might have to cross high speed dual carriageway sections.		broadly similar locations to the spaces which are affected by the AAR alignment. Crossing points have been provided at appropriate locations along AAR and the adjacent Eaton Green Road link to enable access to/from the terminal for pedestrians. Pedestrian facilities would be reviewed at the detailed design stage.		
3.6	A service access is intended to link from the AAR and Percival Way. From the drawing provided this would appear to be a footway crossover, which unauthorised vehicles may use as a short cut if there are no restrictions in place. This could increase the risk of collisions with pedestrians on the footway.	Signing and restrictions should be put in place to ensure non-authorised users do not use the service access.	Accepted. The footway crossover is intended to be used as an access to the existing hangar service door only. Appropriate signage and road markings would be considered at the detailed design stage.		
3.7	It was noted that a number of tall buildings surround the existing roundabout junction of the Percival Way (AAR) and Frank Lester Way. With the introduction of a signalised junction to replace this, the junction intervisibility zone could be compromised by the building obstructions. Road users waiting at the stop line of each arm of the	It should be ensured that the junction intervisibility zone can be achieved, with adjustment made to the junction geometry where required.	Accepted. There would be a potential constraint on intervisibility between the AAR and the north-eastern arm of AAR due to the position of Kensal House. The positions of the stop lines (particularly on the north-eastern arm of AAR) could be		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	junction might not be able to view each other in the event that the signals fail, or a user fails to stop at a red light, increasing the risk of junction collisions.		amended to maximise the available intervisibility zone, and this would be addressed at the detailed design stage.		
3.8	Although the controlled crossings at this junction might only be for illustrative purposes at this preliminary design stage. It is noted that the two staggered pedestrian crossings feature a righthand stagger instead of the preferred lefthand stagger. Pedestrians will therefore walk in the central island with their backs to approaching traffic, which could make them less aware of the traffic flow. In the case of a user failing to stop at a red light, this could increase the risk of pedestrians being struck should they step out, where they might not be observing the traffic and be relying on the signal control instead.	All staggered signalised crossings should feature a lefthand stagger	The layout of the junction was designed to provide a balance between pedestrian provision, intervisibility and intergreen times. The provision of left hand staggers could be investigated at the detailed design stage.		
3.9	As Frank Lester Way is to be one way only and to be made into a two lane carriageway, road users will have the option of two lanes to turn into from the other three approaches. The details of the signal phasing are not known at this stage, and it is not known how road users will select either the left or right lane to head into Frank Lester Way. This ambiguity could	Vehicle movements into Frank Lester Way and signal phasing should be determined at the junction, with a clear lane designation strategy and appropriate signing and road markings.	The risk of side-swipe collisions should be reduced by there being only single lane entries into Frank Lester Way from AAR and the Airport Approach Road. Signage and road markings would however be provided to clarify directions and destinations, and this		

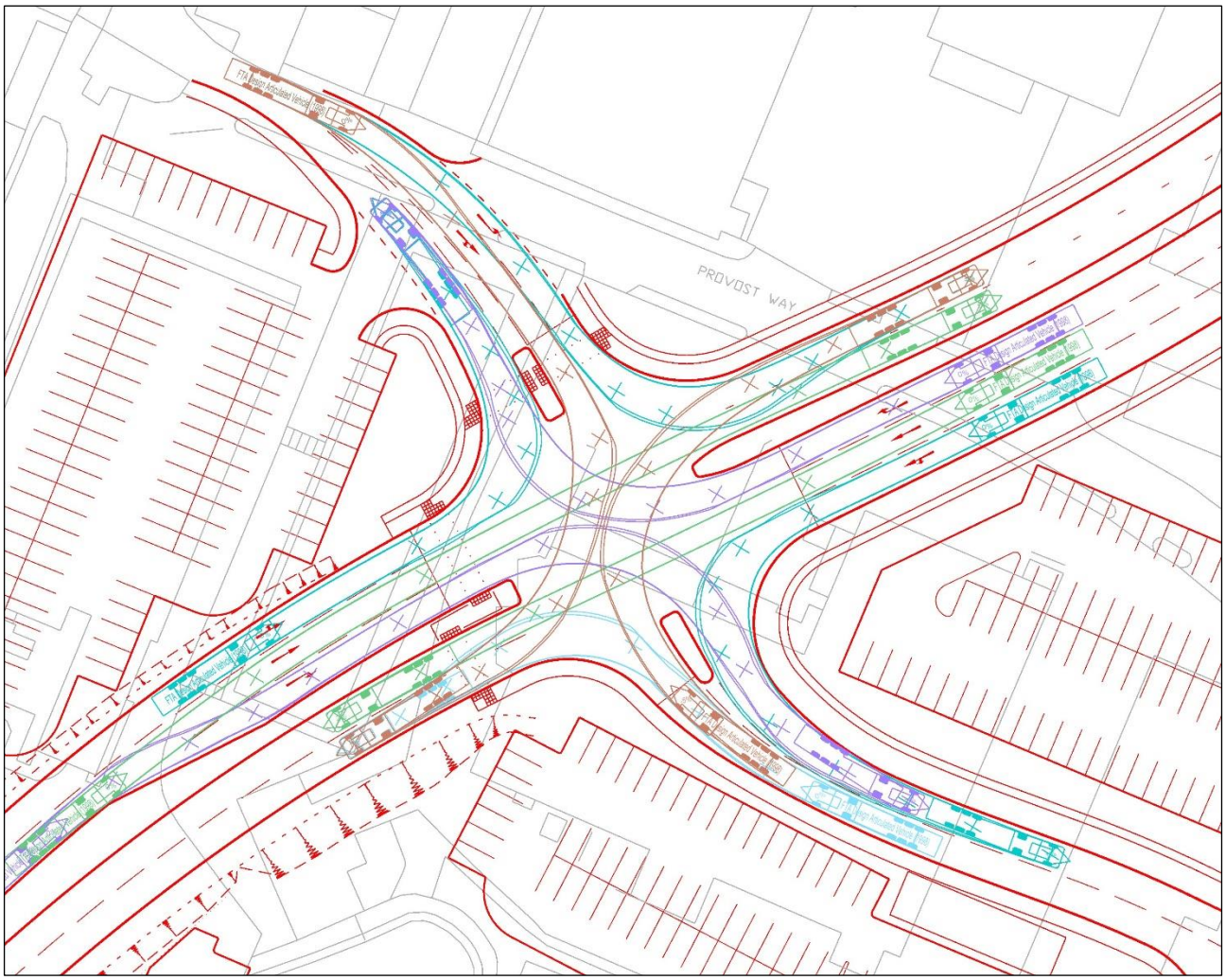
Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	lead to merge and side swipe collisions between users who might opt for different lanes, leading to late lane swapping on the approach to the Eaton Green Road junction.		would be addressed at the detailed design stage.		
3.10	At this preliminary stage no vehicle swept path analysis has been provided for any of the junctions. It is therefore not known if the geometry will allow for all size vehicles to negotiate the junctions. Otherwise, there could be excess kerb strikes and overrun collisions if there is not adequate road width available for turning movements.	At detailed design stage, swept path analysis should be carried out for each junction and adjustment made to the geometry where required.	Accepted. Swept path analysis has been carried out for all manoeuvres to ensure that vehicles can be accommodated, and these are shown in Figures 3.1 and 3.2. Note: many of the junctions along the proposed route of AAR are retained from Assessment Phase 2a, and therefore only new junctions created at Assessment Phase 2b are shown on Figures 3.1 and 3.2.		
3.11	No facilities have been specified for cyclists at this preliminary stage, where it is not known if there will be a requirement for this mode of transport as part of the travel plan (such as for staff living in the local vicinity, who might choose to cycle to work). Currently the existing scheme is unlikely to safely accommodate this type of vulnerable road user as there are many junction intersections and conflict points where the risk of	It should be determined if cyclists are to be included as part of the travel plan, and appropriate cycling facilities provided if this is a requirement. These should also be compliant with the latest cycling guidance, such as LTN 1/20.	Accepted. The AAR design (including the Eaton Green Road Link and the access road linking to the new terminal) includes for an off-road shared pedestrian / cycle route along one side. Advanced Stop Lines and toucan crossings could be provided at the signalised junctions for		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	collisions with cyclists could be high.		those cyclists choosing to ride on-road, with cycle parking also to be provided at the new terminal. This would be addressed at the detailed design stage.		
3.12	The speed limit for the AAR has not yet been specified. If this is not appropriate, it could increase the risk of speed related collisions occurring. This could include being set too high or too low where compliance could be low with the posted speed limit and therefore be counterproductive.	At detailed design stage an appropriate speed limit should be determined in accordance with the latest speed limit guidance. This should be a self-enforcing limit using the highway geometry rather than relying on police enforcement, where resources might not be available. Passive safety of roadside features should also be included in the design if this it to be set as a high-speed road (40mph or above).	Agreed. The proposed AAR design is based on a 30mph speed limit.		
3.13	Throughout the scheme there are multi-lane approaches to junctions where users must navigate into specific lanes to get to their desired destinations. If this is not clear, this could result in late lane swapping manoeuvres, which could increase the risk of side swipe collisions. Additionally, they could head into	At detailed design stage, lane designation road markings and destination signs should be proposed at suitable locations to assist users to navigate the AAR and associated routes.	Accepted. Signage and road markings would be provided to inform road users of the directions available from the respective lanes. This would be considered at the detailed design stage.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	the wrong lanes on the destination arms of junctions where some of these are not well aligned resulting in further junction collisions.				

3.2 Swept Path Information

Figure 3.1: Swept Path s- AAR / Provost Way signalised junction



3.2.1 Figure 3.1 above shows the swept paths of 16.5m articulated HGVs at the proposed signalised junction between AAR and Provost Way.

Figure 3.2: Swept Paths - AAR / Frank Lester Way signalised junction

3.2.2 Figure 3.2 above shows the swept paths of 16.5m articulated HGVs at the proposed signalised junction between AAR and Frank Lester Way / Airport Approach Road.

3.3 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	Luton Borough Council
Date:	

B.7 Crawley Green Road / Lalleford Road

Contents

Tables

Figures

1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - Crawley Green Road / Lalleford Road
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - Crawley Green Road / Lalleford Road
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

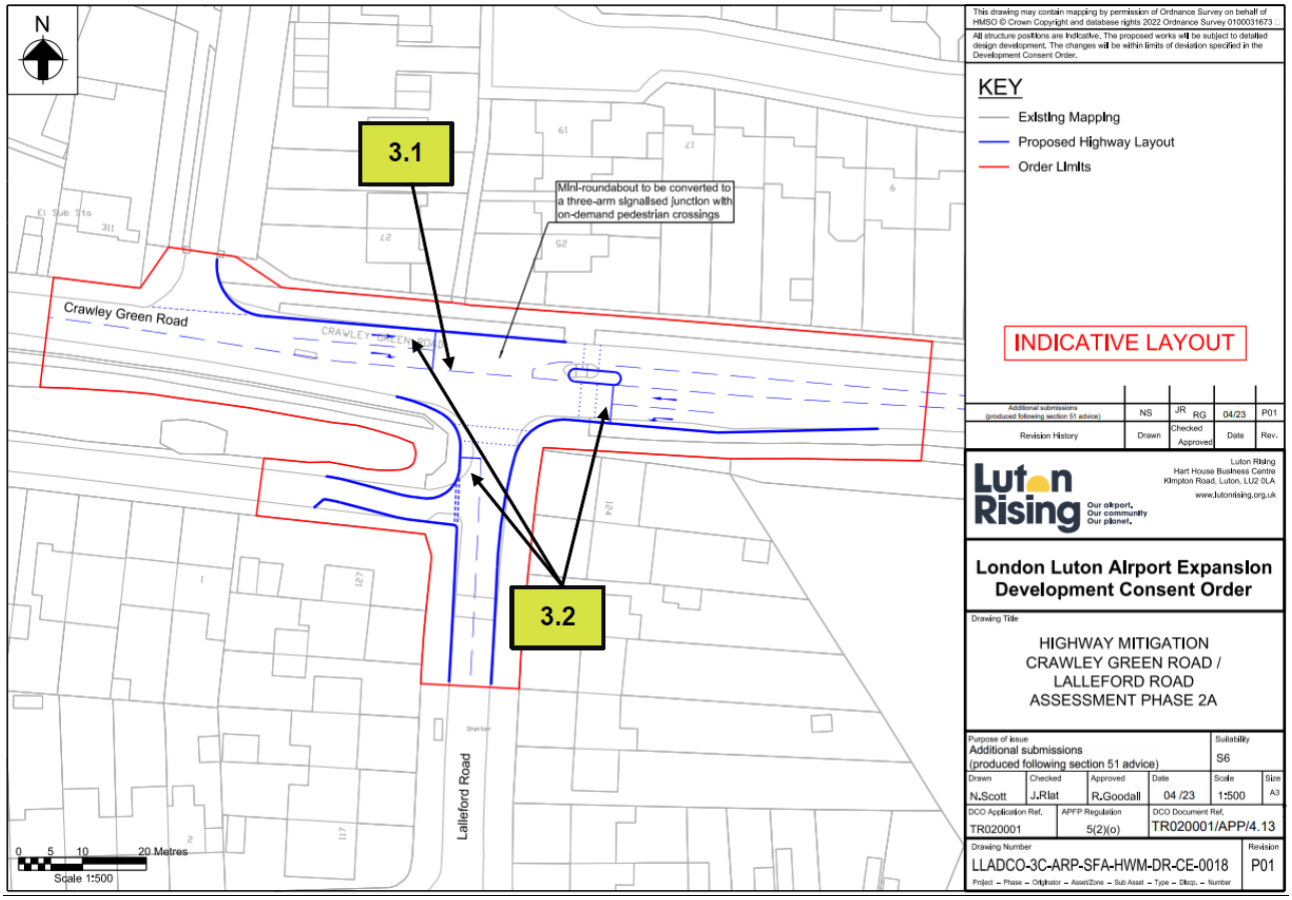
2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between Crawley Green Road / Lalleford Road, in Luton.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0018, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1.

Figure 2.1: Locations of Problems Identified within the Audit



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Luton Borough Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	A pedestrian crossing point is not shown at the western arm of the junction, even though the signals are likely to operate an all-red pedestrian phase. The lack of a crossing point at this location could increase the risk of pedestrians being struck by vehicles or being injured if they trip and fall whilst negotiating full height kerbs.	A pedestrian crossing point should be provided across the western arm of the traffic signal junction. This would allow the existing narrow pedestrian refuge island to be removed.	A pedestrian crossing is not proposed on the western arm of Crawley Green Road, as an existing zebra crossing is located approximately 75m to the west, on the pedestrian desire line. The existing narrow painted island is not a pedestrian refuge and will be removed as part of the proposed works.		
3.2	The design does not show any facilities for cyclists. They could be vulnerable negotiating the junction in the absence of facilities, especially when turning right, and could be struck by vehicles.	Cycle facilities should be provided, such as advanced stop lines with cycle feeder lanes.	Accepted. Advanced Stop Lines could be provided on all arms of the junction. Alternatively, the Overseeing Organisation has wider aspirations to develop a segregated off-road route along Crawley Green Road. As such, appropriate cycle facilities would be provided through the junction in conjunction with the Overseeing Organisation as part of		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
			the detailed design stage.		

3.2 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	Luton Borough Council
Date:	

B.8 Eaton Green Road / Frank Lester Way

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Tables

Figures

1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - Eaton Green Road / Frank Lester Way
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - Eaton Green Road / Frank Lester Way
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

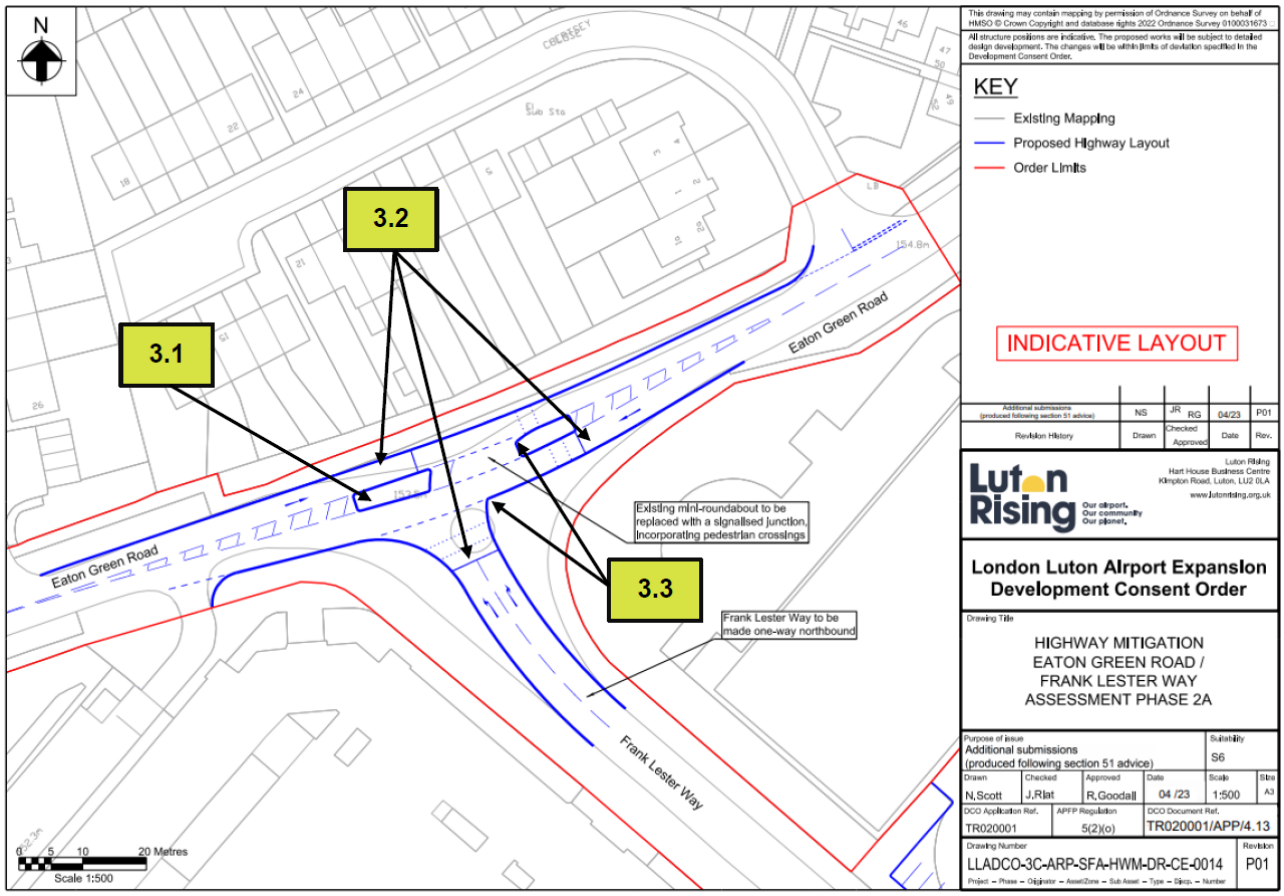
2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between Eaton Green Road / Frank Lester Way, in Luton.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0014, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1.

Figure 2.1: Locations of Problems Identified within the Audit



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Luton Borough Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

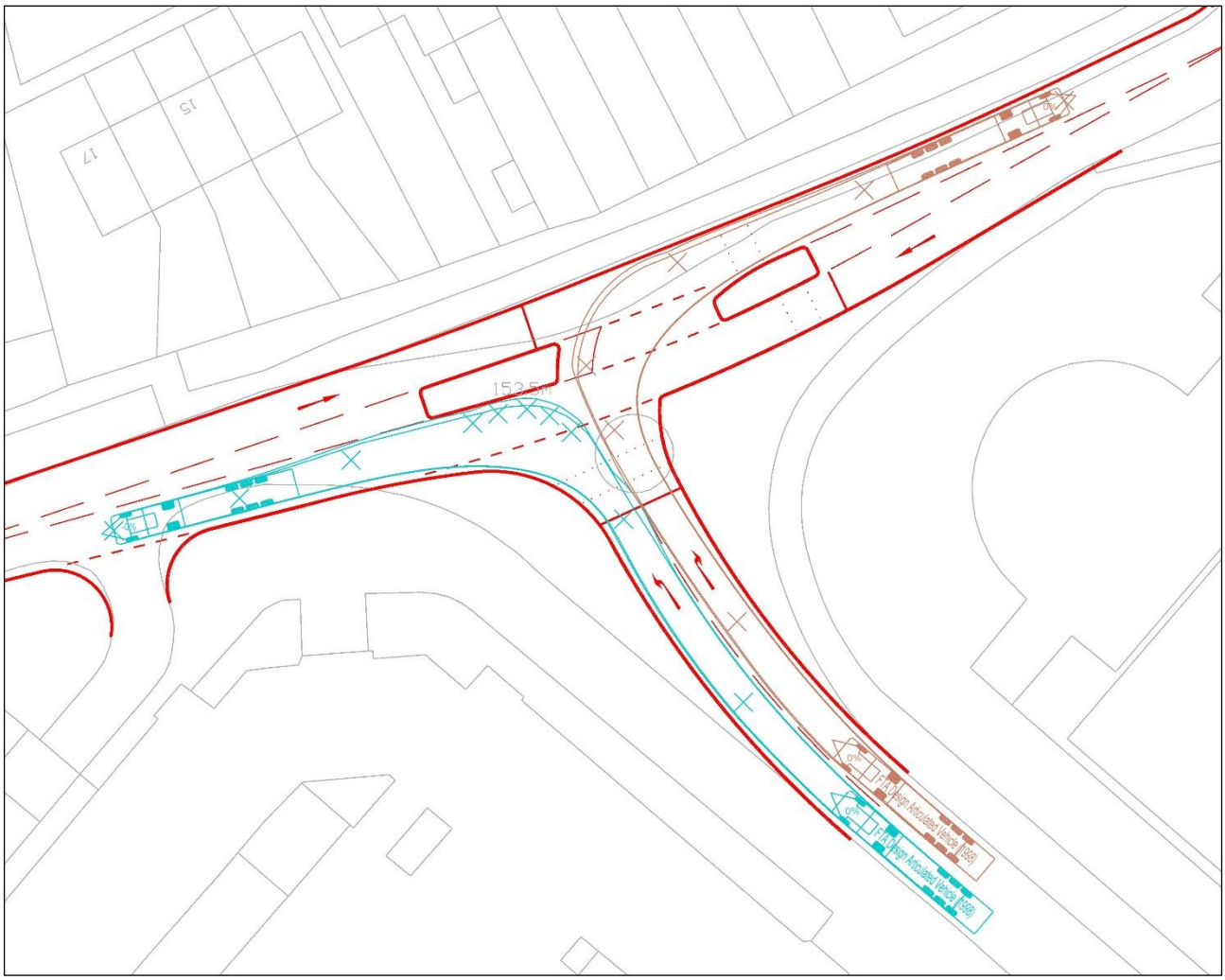
Table 3.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	A pedestrian crossing point is not shown at the western arm of the junction. The lack of a crossing point at this location could increase the risk of pedestrians being struck by vehicles or being injured if they trip and fall whilst negotiating full height kerbs.	A pedestrian crossing point should be provided across the western arm of the traffic signal junction if there is likely to be a desire line at the location.	Accepted. A staggered pedestrian crossing could be provided across the western arm of the junction, and this would be considered at the detailed design stage.		
3.2	The design does not show any facilities for cyclists. They could be vulnerable negotiating the junction in the absence of facilities, especially when turning right from Frank Lester Way into Eaton Green Road. They could also be vulnerable travelling eastbound towards to the junction (on Eaton Green Road) as the uphill gradient is likely to mean that their speeds will be low. Cyclists could be vulnerable to being struck by vehicles, particularly if road users attempt to squeeze past them where the physical central islands are located.	Cycle facilities should be provided, such as advanced stop lines with cycle feeder lanes.	Noted. Advanced stop lines and cycle feeder lanes could be provided as part of this junction. However, Eaton Green Road and Frank Lester Way are part of Route J in the LBC LCWIP, and this proposes a one-sided, two-way segregated cycle track in this area. The provision of cycle facilities at this junction would be considered at the detailed design stage in conjunction with LBC.		
3.3	The kerb alignment and position of the physical central island could make the right turn movement difficult for large vehicles. As a	A swept path analysis of large vehicles should be carried out and the	Swept path analysis has been undertaken to ensure that the right turn from Frank Lester Way		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	result, they may mount the kerbs or strike street furniture, creating a hazard to other road users or pedestrians walking along the footway.	geometry of the junction amended if required.	into Eaton Green Road was achievable for vehicles including articulated HGVs and buses – see Figure 3.1		

3.2 Swept Path Information

Figure 3.1: Swept Paths - Frank Lester Way / Eaton Green Road



3.2.1 Figure 3.1 above shows the swept path analysis for 16.5m articulated HGV manoeuvres at the proposed signalised junction between Frank Lester Way and Eaton Green Road.

3.3 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	Luton Borough Council
Date:	

B.9 Eaton Green Road / Lalleford Road

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Tables

Figures

1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - Eaton Green Road / Lalleford Road
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - Eaton Green Road / Lalleford Road
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

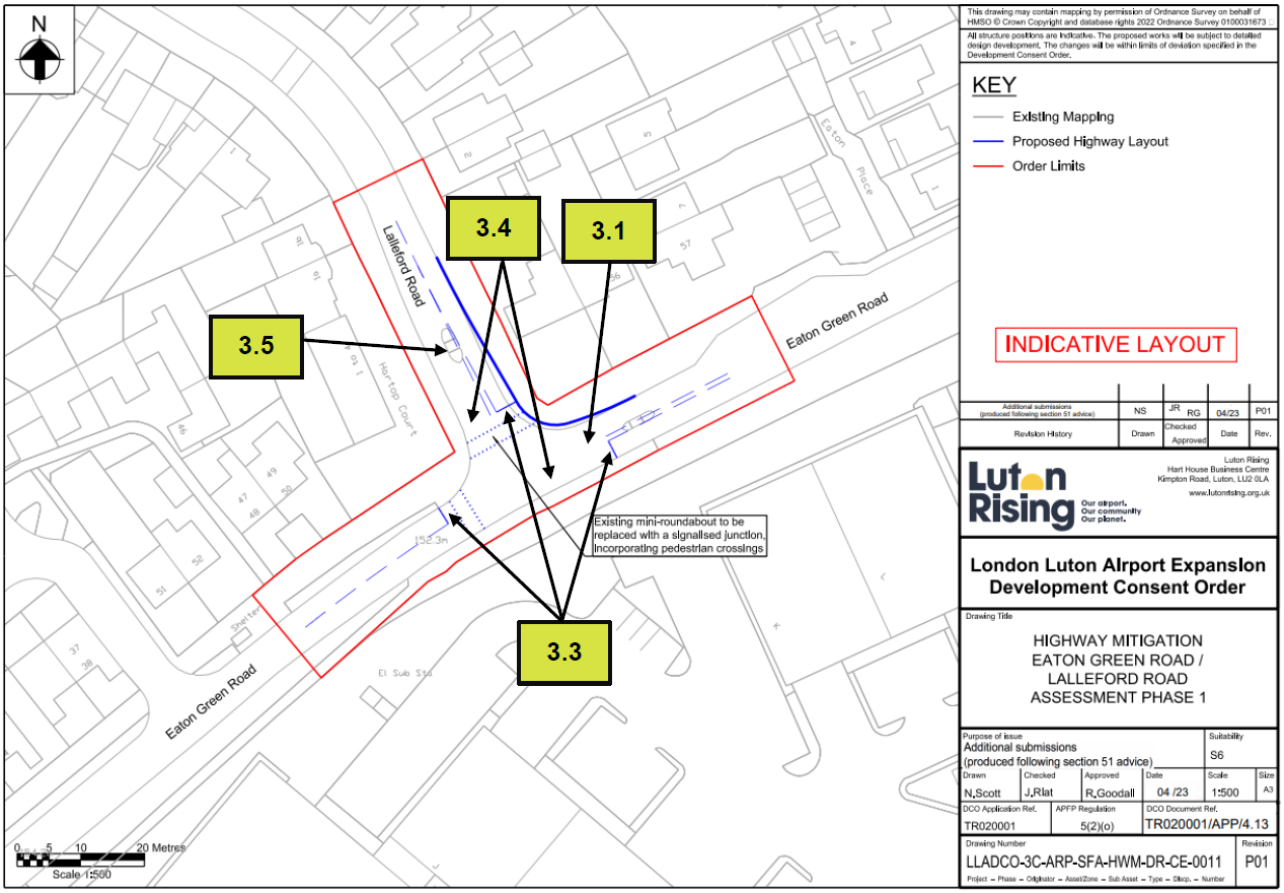
2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between Eaton Green Road / Lalleford Road, in Luton.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0011, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1.

Figure 2.1: Locations of Problems Identified within the Audit



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Luton Borough Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

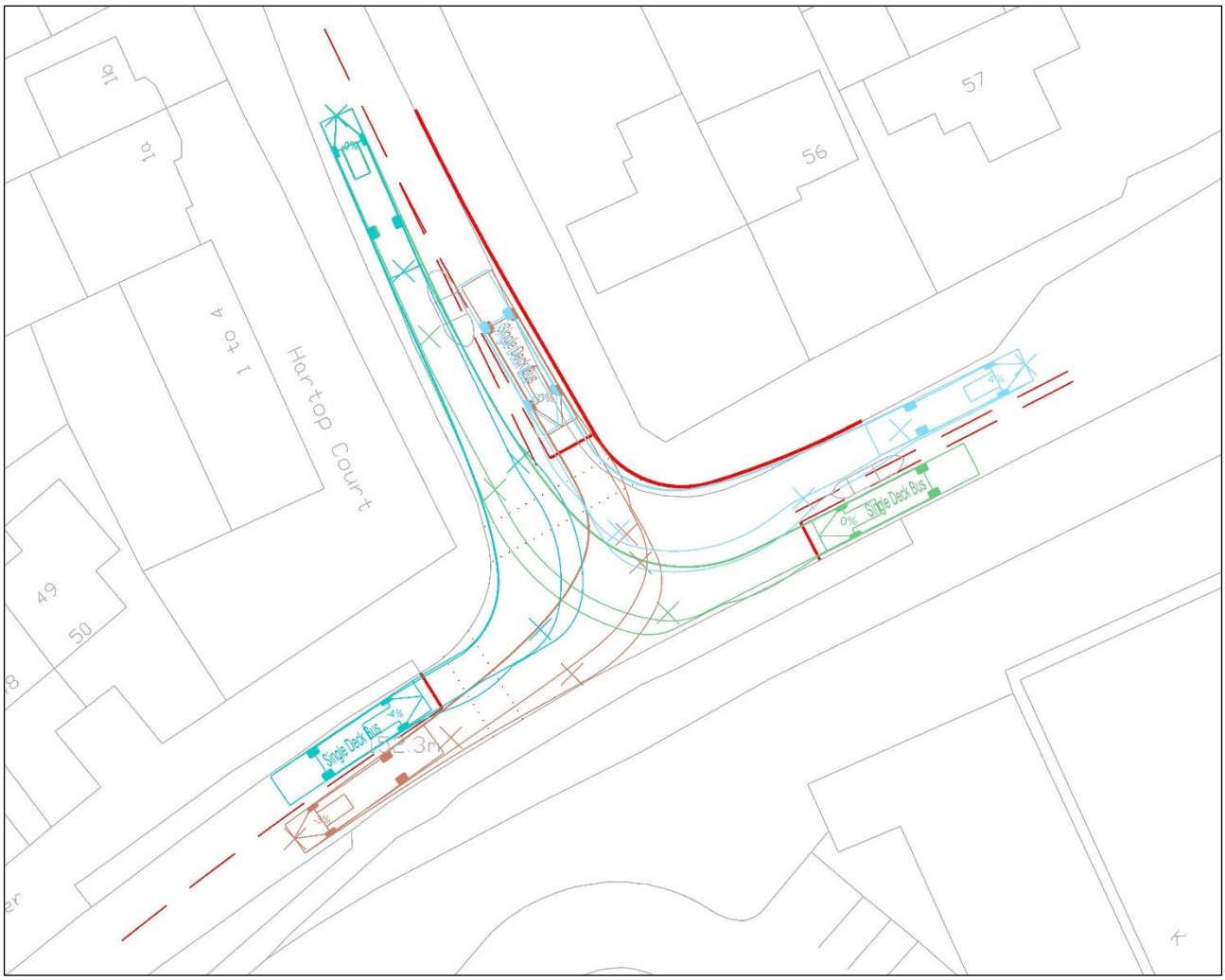
Table 3.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	A pedestrian crossing point is not shown at the eastern arm of the junction, even though the signals are likely to operate an all-red pedestrian phase. The lack of a crossing point at this location could increase the risk of pedestrians being struck by vehicles or being injured if they trip and fall whilst negotiating full height kerbs.	A pedestrian crossing point should be provided across the eastern arm of the traffic signal junction. This would allow the existing narrow pedestrian refuge island to be removed.	Accepted. A pedestrian crossing point would be provided on the eastern arm of the junction and this would be addressed at the detailed design stage.		
3.2	The design does not show any facilities for cyclists. They could be vulnerable negotiating the junction in the absence of facilities, especially when turning right, and could be struck by vehicles.	Cycle facilities should be provided, such as advanced stop lines with cycle feeder lanes.	Noted. Advanced stop lines could be provided on all arms of the junction. However, Eaton Green Road is part of Route J in the LBC LCWIP, and this proposes a one-sided, two-way segregated cycle track (south side). The provision of cycle facilities at this junction would be considered at the detailed design stage in conjunction with LBC.		
3.3	The position of the signal stop lines could make turning manoeuvres difficult for large vehicles, such as buses (it is noted that Lalleford	A swept path analysis of large vehicles should be carried out and the	Swept path analysis has been undertaken for all design vehicles, including 12m single deck buses,		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	Road is a bus route). As a result, large vehicles may mount the kerbs or strike street furniture, creating a hazard to other road users or pedestrians walking along the footway.	position of the stop lines adjusted if required.	to ensure that all manoeuvres can be accommodated without overrunning stop lines – see Figure 3.1.		
3.4	Road users waiting to turn right into Lalleford Road could be vulnerable to rear-end shunt type collisions as they wait in the middle of the junction. Vehicles waiting to turn right will also hold up vehicles behind, which could increase the risk of red-light violations due to driver frustration and impatience.	A right turn facility, such as a right turn indicative arrow (early cut-off arrangement) should be provided as part of the traffic signal strategy.	Analysis of the junction operation has not highlighted the need for a right turn indicative arrow, however this would be considered at the detailed design stage.		
3.5	It is not clear whether the existing pedestrian refuge island on Lalleford Road will be removed. If not, the road markings do not tie into the island, which could lead to it being struck by vehicles.	The island should be removed as pedestrians will be able to use the controlled crossing at the signal junction instead.	It is proposed to remove the existing pedestrian refuge island as part of the works to convert the mini-roundabout to a signalised junction. This would be addressed at the detailed design stage.		

3.2 Swept Path information

Figure 3.1: Swept Paths - Eaton Green Road / Lalleford Road



3.2.1 Figure 3.1 above shows the swept path analysis for 12m single deck buses at the proposed signalised junction between Eaton Green Road and Lalleford Road.

3.3 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	Luton Borough Council
Date:	

B.10 Wigmore Lane / Crawley Green Road

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1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - Wigmore Lane / Crawley Green Road
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - Wigmore Lane / Crawley Green Road
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between Wigmore Lane / Crawley Green Road, in Luton.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0012, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

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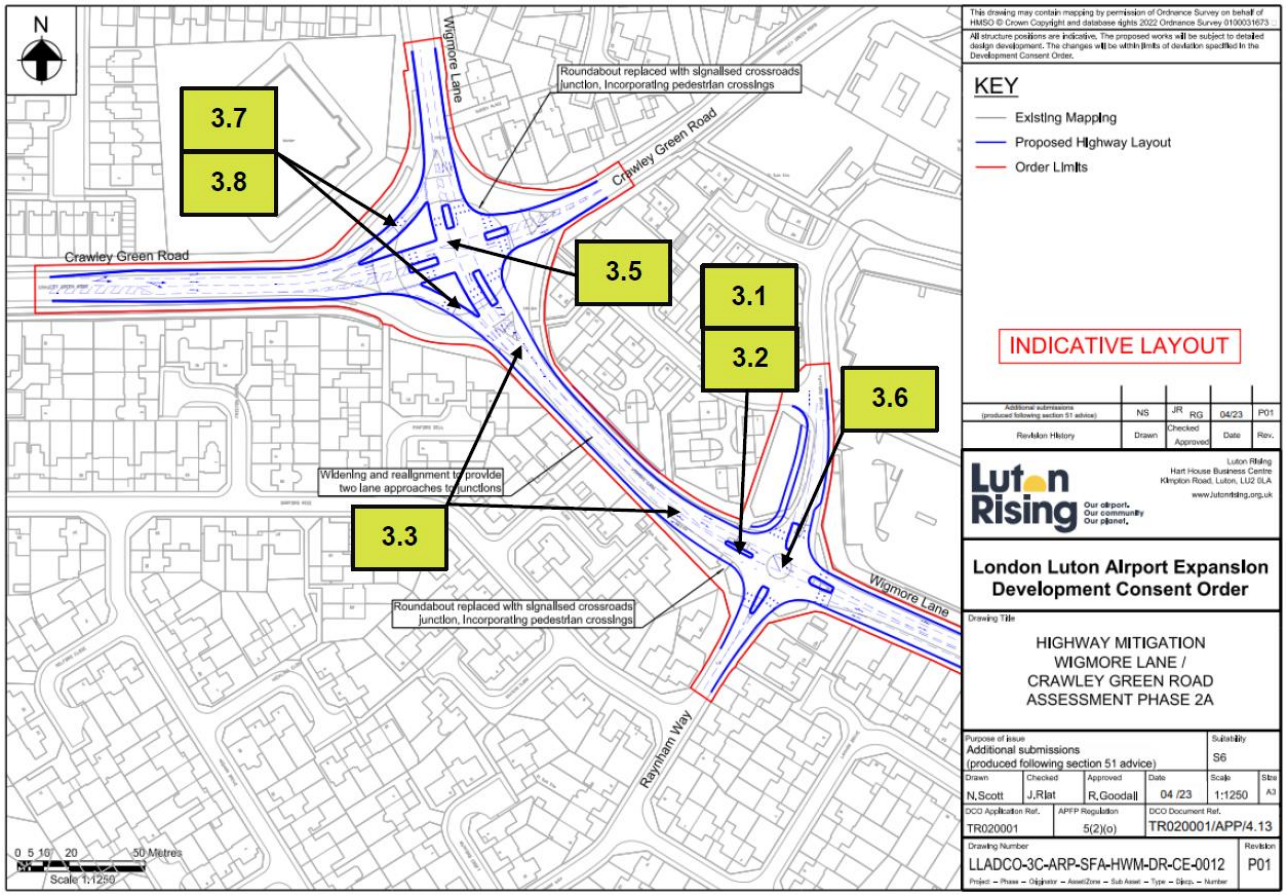
Figure 2.1: Locations of Problems Identified within the Audit



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Luton Borough Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scot t- Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	The traffic signal junction does not show a pedestrian/cycle crossing across the Wigmore Lane western arm of the junction. The absence of a crossing could increase the risk of pedestrians and cyclists being struck by vehicles, or they could be injured whilst attempting to cross where full height kerbs are present.	A controlled crossing should be provided across the western arm of the junction.	Accepted. This would be considered at the detailed design stage.		
3.2	On the Wigmore Lane western arm of the junction, a narrow physical island is proposed. The island may be inconspicuous at night or during poor weather conditions and may be too small to house reflective bollards and signal equipment. Therefore, the physical island may be prone to being struck by vehicles, creating an injury hazard to road users.	The local geometry should be amended to allow a larger physical island to be provided.	The width of the island is approximately 1.6m, which is sufficient to accommodate reflective bollards or signalised equipment. There may be scope to increase this width and this would be considered at the detailed design stage in conjunction with Issue 3.1.		
3.3	As there will be three lanes on Wigmore Lane, road users may be unsure of the direction of each lane and enter opposing lanes by mistake. In addition, there could be an increased likelihood of road users straying across the centre line into opposing lanes. These	A marginal strip with the use of cross-hatching road markings should be provided to separate the eastbound and westbound traffic lanes. Arrow road markings depicting the direction of	There is insufficient width to provide a marginal strip with cross-hatching on Wigmore Lane between Raynham Way and Crawley Green Road. Road markings and lane signage would		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	issues could lead to head-on type collisions, which can result in serious injury.	travel for each lane should also be provided at regular intervals along the link section.	be provided to guide traffic and this would be addressed at the detailed design stage.		
3.4	The design does not include any facilities for cyclists, who could be vulnerable when travelling through the junctions, especially when turning right. They could also get squeezed by passing vehicles where traffic lanes are narrow, especially where three lanes of traffic are proposed along Wigmore Lane.	Facilities for cyclists should be provided at the junctions and link sections, with guidance taken from LTN 1/20 Cycle Infrastructure Design. Where existing shared use footways are provided along Wigmore Lane, these should be expanded and improved with Toucan crossings specified at the signal junctions.	The proposed highway works could include advanced stop lines and Toucan crossings at the junctions. In this area, Wigmore Lane currently provides shared use pedestrian/cycle facilities on both sides of the road. Where possible, the widths of the existing shared use paths are proposed to be improved. The provision of cycle facilities in this area would be considered at the detailed design stage in conjunction with LBC.		
3.5	There is likely to be a high demand for vehicles to turn right from Crawley Green Road into Wigmore Lane, but it is not clear whether the traffic signals will incorporate a right turn phase. At peak-times, road users may make rash judgments and turn right into the path of oncoming vehicles and collisions could occur as a result.	A right turn phase should be incorporated as part of the traffic signal strategy.	Analysis of the junction operation has not highlighted a need for a right turn phase, however this would be considered at the detailed design stage.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.6	The stacking space for right turning vehicles in the middle of the junction is small. Therefore, at peak times when the Primary School is in operation on Twyford Drive, right turning vehicles may queue back into the offside ahead lane and so rear-end shunt and side swipe type collisions could occur. In addition, road users may make rash judgments and turn right into the path of oncoming vehicles and collisions could occur as a result.	It should be ensured that the layout is suitable to accommodate right turning vehicles. A right turn phase may be necessary as part of the traffic signal strategy.	Analysis of the junction operation has not highlighted a need for a right turn phase, however this would be considered at the detailed design stage.		
3.7	On the western side of the junction, dedicated left turn slip-lanes are proposed with triangular splitter islands. Drivers waiting at the give-way lines at the end of the left turn lanes would have to look back over their right shoulder before pulling out and so may not see approaching vehicles clearly (especially two-wheelers). Collisions could occur as a result.	A conventional junction layout without the left turn slip-lanes should be provided.	Whilst the provision of left-turn slips allows additional flexibility with regard to the staging of pedestrian crossing movements, removal of the dedicated left-turn slips would be considered at the detailed design stage.		
3.8	On the western side of the junction, the dedicated left turn slip-lanes with triangular splitter islands add a stagger to the pedestrian/cycle crossings and thereby increasing the journey time for pedestrians and cyclists. The additional stagger also makes crossing movements more discontinuous. If pedestrians and cyclists attempt to cross in	A conventional junction layout without the left turn slip-lanes should be provided, thereby reducing the number of staggers at the controlled crossings.	A conventional junction layout would be considered as an option at the detailed design stage.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	gaps in traffic rather than wait for the green man, they may be at an increased risk of being struck by vehicles.				

3.2 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	
Date:	

B.11 Wigmore Lane / Eaton Green Road

Contents

Tables

Figures

1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - Wigmore Lane / Eaton Green Road
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - Wigmore Lane / Eaton Green Road
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between Wigmore Lane / Eaton Green Road, in Luton.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0013, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

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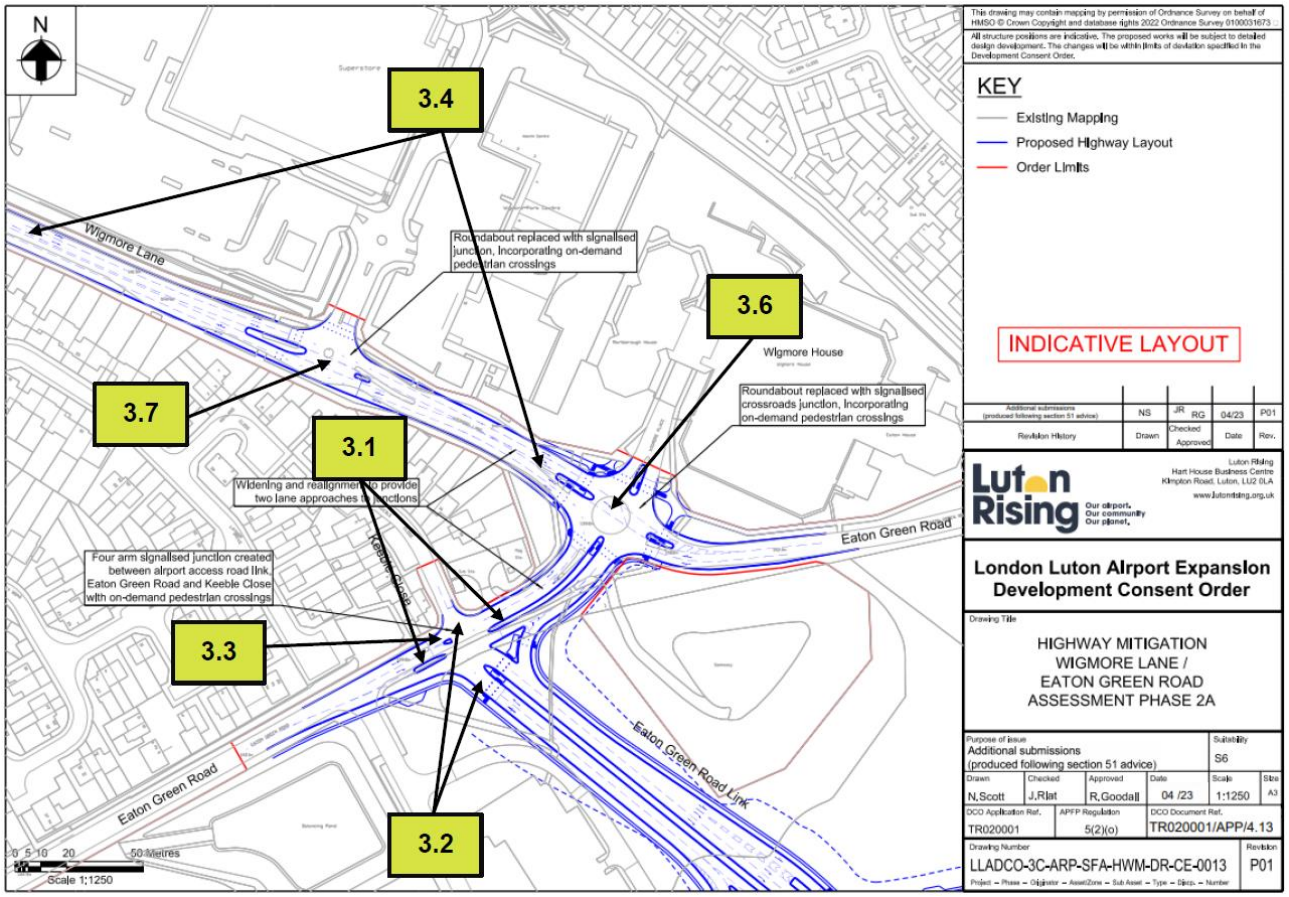
Figure 2.1: Locations of Problems Identified within the Audit



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Luton Borough Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	The traffic signal junction does not show any pedestrian/cycle crossings across the Eaton Green Road arms of the junction. The absence of crossings could increase the risk of pedestrians and cyclists being struck by vehicles, or they could be injured whilst attempting to cross where full height kerbs are present.	Controlled crossings should be provided across the Eaton Green Road arms of the junction.	Provision of a pedestrian/cycle crossing on Eaton Green Road (at the junction with the Eaton Green Road Link) would be considered at the detailed design stage.		
3.2	The approaches to the traffic signal junction on the Eaton Green Road Link and Keeble Close do not align. Therefore, if these movements run together within a traffic signal stage, collisions could occur between opposing vehicle streams. For example, vehicles turning right from both the approaches could conflict in the middle of the junction.	As part of the traffic signal strategy, the two approaches should run in separate stages, rather than together.	Accepted. It is likely that Keeble Close would run as a separate stage. This would be considered at the detailed design stage.		
3.3	On the Eaton Green Road western arm of the junction, a small triangular splitter island is proposed. The island may be inconspicuous at night or during poor weather conditions and may be too small to house reflective bollards and signal equipment.	The need for the island should be reassessed. Otherwise, the local geometry should be amended to allow a larger physical island to be provided.	Accepted. This would be considered at the detailed design stage.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	Therefore, the physical island may be prone to being struck by vehicles, creating an injury hazard to road users.				
3.4	As there will be four lanes on Wigmore Lane, road users may be unsure of the direction of each lane and enter opposing lanes by mistake. In addition, there could be an increased likelihood of road users straying across the centre line into opposing lanes. These issues could lead to head-on type collisions, which can result in serious injury.	A marginal strip with the use of cross-hatching road markings should be provided to separate the eastbound and westbound traffic lanes. Arrow road markings depicting the direction of travel for each lane should also be provided at regular intervals along the link section.	Accepted. The proposed design allows for the provision of a marginal strip between lanes. This would be supplemented by road markings and signage, and would be addressed at the detailed design stage.		
3.5	The design does not include any facilities for cyclists, who could be vulnerable when travelling through the junctions, especially when turning right. They could also get squeezed by passing vehicles where traffic lanes are narrow, especially where four lanes of traffic are proposed along Wigmore Lane.	Facilities for cyclists should be provided at the junctions and link sections, with guidance taken from LTN 1/20 Cycle Infrastructure Design. Where existing shared use footways are provided along Wigmore Lane, these should be expanded and improved with toucan crossings specified at the signal junctions.	The proposed highway works could include advanced stop lines and Toucan crossings at the junctions on Wigmore Lane. In this area, Wigmore Lane currently provides shared use pedestrian/cycle facilities on both sides of the road. Where possible, the widths of the existing shared use path is proposed to be improved. The provision of cycle facilities in this area would be considered at		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
			the detailed design stage in conjunction with LBC.		
3.6	There is likely to be a high demand for vehicles to turn right from Wigmore Lane into Eaton Green Road, but it is not clear whether the traffic signals will incorporate a right turn phase. At peak times, road users may make rash judgments and turn right into the path of oncoming vehicles (where two ahead lanes are proposed) and collisions could occur as a result.	A right turn phase should be incorporated as part of the traffic signal strategy.	Accepted. Analysis of the junction operation has not highlighted a need for a right turn phase, however this would be considered at the detailed design stage.		
3.7	The stacking space for right turning vehicles in the middle of the junction is small. Therefore, at peak times, right turning vehicles may queue back into the offside ahead lane and so rear-end shunt and side swipe type collisions could occur. In addition, road users may make rash judgments and turn right into the path of oncoming vehicles (where two ahead lanes are proposed) and collisions could occur as a result.	It should be ensured that the layout is suitable to accommodate right turning vehicles. A right turn phase may be necessary as part of the traffic signal strategy.	Accepted. Analysis of the junction operation has not highlighted issues with vehicles blocking back, but the requirement for a right turn phase would be considered at the detailed design stage.		

3.2 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	Luton Borough Council
Organisation:	
Date:	

B.12 Windmill Road / Kimpton Road

Contents

Tables

Figures

1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - Windmill Road / Kimpton Road
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - Windmill Road / Kimpton Road
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

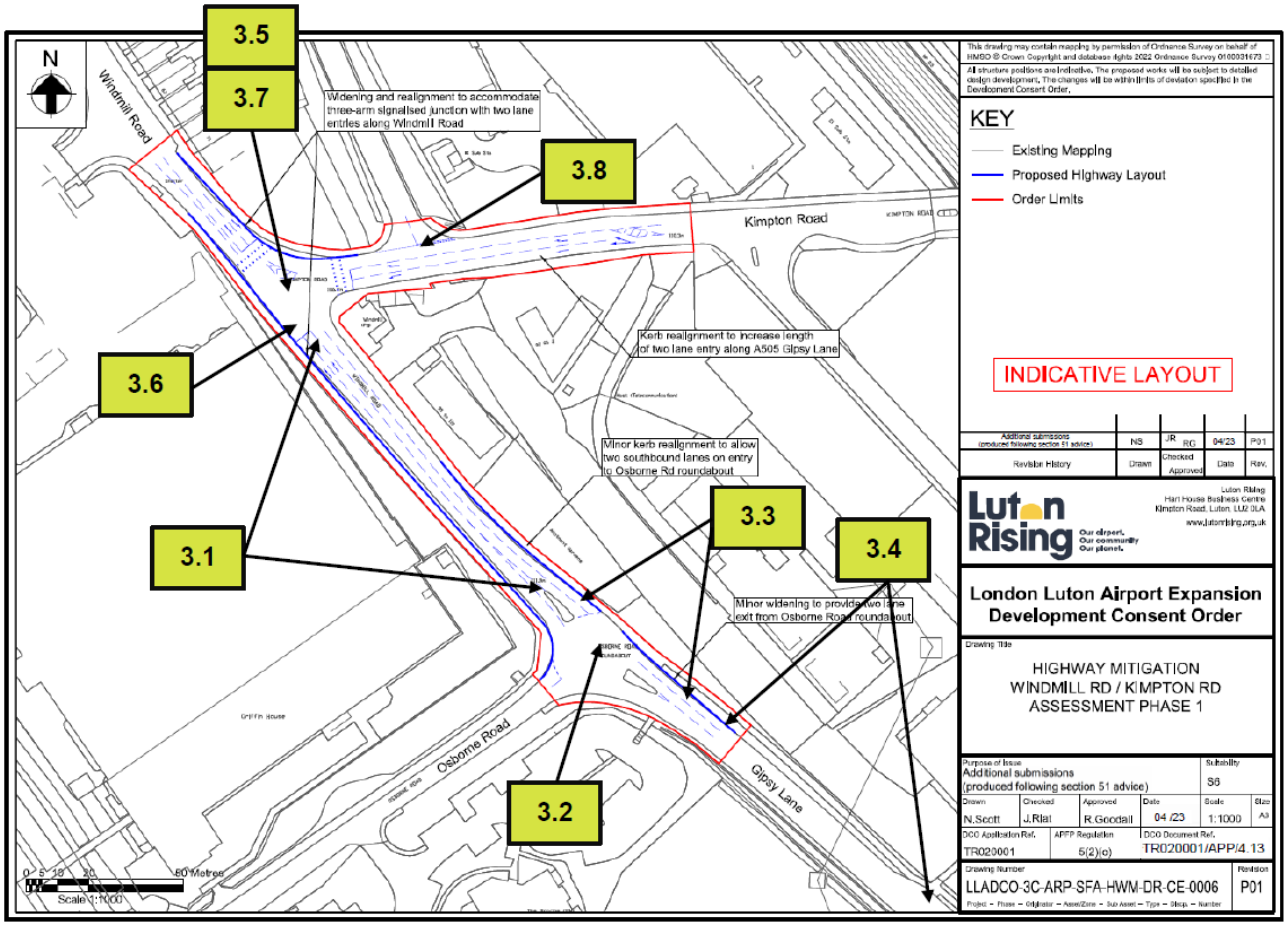
2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between Windmill Road / Kimpton Road, in Luton.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0006, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1.

Figure 2.1: Locations of Problems Identified within the Audit



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Luton Borough Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	As there will be between three and four lanes on Windmill Road, road users may be unsure of the direction of each lane and enter opposing lanes by mistake. In addition, there could be an increased likelihood of road users straying across the centre line into opposing lanes. These issues could lead to head-on type collisions, which can result in serious injury.	A marginal strip with the use of cross-hatching road markings should be provided to separate the northbound and southbound traffic lanes. Arrow road markings depicting the direction of travel for each lane should also be provided at regular intervals along the link section.	There is insufficient width to provide a marginal strip with cross-hatching on Windmill Road. Road markings and lane signage would be provided to guide traffic and this would be addressed at the detailed design stage.		
3.2	The mini-roundabout would be inconsistent with the traffic signal junctions either side at the Kimpton Road and retail park junctions. The inconsistency in the road layout could increase the risk of collisions at the mini-roundabout if road users do not anticipate the road layout ahead, especially as visibility to the mini-roundabout in the southbound direction is restricted by the vertical alignment of the road.	The Osborne Road junction should be upgraded to a traffic signal layout for consistency and improve coordination of traffic flows.	The Windmill Road/Gipsy Lane corridor between the A1081 and Crawley Green Road currently has a mix of signal controlled junctions and roundabouts. The proposal to upgrade the Windmill Road/Kimpton Road roundabout to signals would still leave two roundabouts on the corridor. In addition, crashmap does not indicate an accident issue at the Gipsy Lane/Osborne Road		

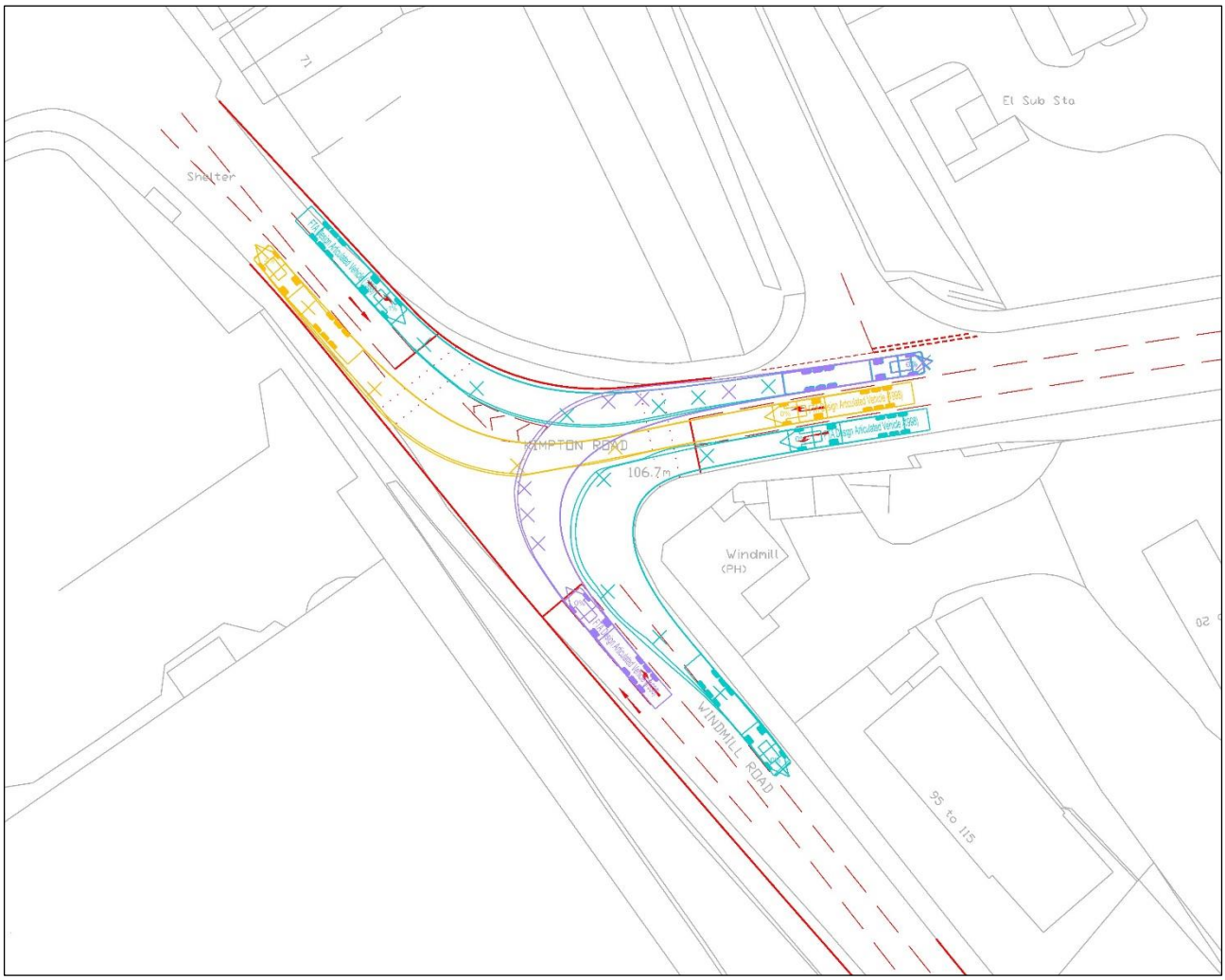
Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
			roundabout where there has been one slight accident in the last 5 years, suggesting that the visibility of the junction has not been an issue with the mix of junction types. The impacts from the airport expansion did not necessitate a junction upgrade to signals.		
3.3	In the southbound traffic on Windmill Road, two approach and exit lanes are proposed. This is unusual at mini-roundabouts as it could increase the risk of failure to give-way type collisions, particularly as deflection is lacking on this approach. Pedestrians could also be more vulnerable to being struck by vehicles if they are crossing in front of vehicles that may not slow down.	A single ahead lane configuration should be retained, unless the junction format could be improved, for example, by upgrading the junction to traffic signals so that traffic flows and speeds could be more easily regulated (see also Problem 3.2).	Deflection is not required on approach to a mini-roundabout and is an existing feature of the junction, where there has been one slight accident in the last 5 years. Two-lane approaches are allowed by the design standards. The design and operation of the junction would be reassessed at the detailed design stage.		
3.4	In the southbound direction after the mini-roundabout, it is unclear how the road markings will tie into the layout at the downstream retail park junction, where a dedicated left turn lane is provided at the traffic signals. Inconsistency in the road markings and traffic lane designation could result in side	It should be ensured that there is a logical tie-in to the road markings at the retail park traffic signal junction.	The proposed road markings would tie into the recently completed works along Gipsy Lane on the southbound approach to the retail park signalised access junction, whereby the nearside lane is for		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	swipe type collisions if road users suddenly find themselves in the incorrect lane.		vehicles turning left/ahead, and the offside lane is for vehicles turning right into the Aldi supermarket. Road markings and signage would be provided on the exit from the roundabout to clarify these movements, and this would be addressed at the detailed design stage.		
3.5	Some of the turning manoeuvres for large vehicles could be difficult due to the geometry of the traffic signal junction, such as the left turn from Kimpton Road to Windmill Road and the vice versa right turn movement. Large vehicles could strike other vehicles whilst turning or they could mount footways damaging the surface and street furniture.	A swept path analysis of large vehicles should be carried out and the geometry adjusted as needed (for example, the stop lines may need setting back).	Swept path analysis was carried out as part of the design process to ensure that all turning manoeuvres could be accommodated. The left turn from Kimpton Road to Windmill Road is eased by the provision of a two-lane exit onto Windmill Road, and the stop line on Kimpton Road is positioned such that the right turn from Windmill Road can be accommodated – see Figure 3.1		
3.6	A pedestrian crossing point is not shown at the southern arm of the junction, even though the signals are likely to operate an all-red pedestrian phase. The lack of a	A pedestrian crossing point should be provided across the southern arm of the traffic signal junction.	Accepted. A pedestrian crossing point could be accommodated on all arms and this would be		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	crossing point at this location could increase the risk of pedestrians being struck by vehicles or being injured if they trip and fall whilst negotiating full height kerbs.		considered at the detailed design stage.		
3.7	There are currently polished metal service covers within the junction, that are likely to coincide with the turning arc of vehicles travelling through the traffic signals. They could pose a skidding and loss of control hazard to two-wheeled vehicles, especially in wet weather conditions.	Service apparatus should be identified at an early stage and redirected as necessary to avoid service covers being located within the junction turning and braking areas.	The turning area within the junction remains largely as per the existing mini-roundabout, with only minor kerb realignment proposed. However, this would be considered at the detailed design stage.		
3.8	With the new road layout, it could be more difficult for buses to turn right onto Kimpton Road from the busway junction. At peak times, vehicle queues on the approach to the traffic signals could make the right turn movement more onerous and as a result, pull-out type collisions could occur.	The right turn movement from the busway should be accommodated as part of the traffic signal design.	Accepted. This would be considered at the detailed design stage.		
3.9	The design does not include any facilities for cyclists, who could be vulnerable when travelling through the junctions, especially when turning right. They could also get squeezed by passing vehicles where traffic lanes are narrow.	Facilities for cyclists should be provided at the junctions and link sections, with guidance taken from LTN 1/20 Cycle Infrastructure Design.	The design has the potential to accommodate advanced stop lines on all arms of the Windmill Road/Kimpton Road junction. The provision of cycle facilities would be considered at the detailed design stage in conjunction with LBC.		

3.2 Swept Path Information

Figure 3.1: Swept Paths - Windmill Road / Kimpton Road



3.2.1 Figure 3.1 above shows the swept path manoeuvres for 16.5m articulated HGVs at the proposed signalised junction between Windmill Road and Kimpton Road.

3.3 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	Luton Borough Council
Date:	

B.13 Windmill Road / St. Mary's Road / Crawley Green Road

Contents

Tables

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1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - Windmill Road / St. Mary's Road / Crawley Green Road
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - Windmill Road / St. Mary's Road / Crawley Green Road
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

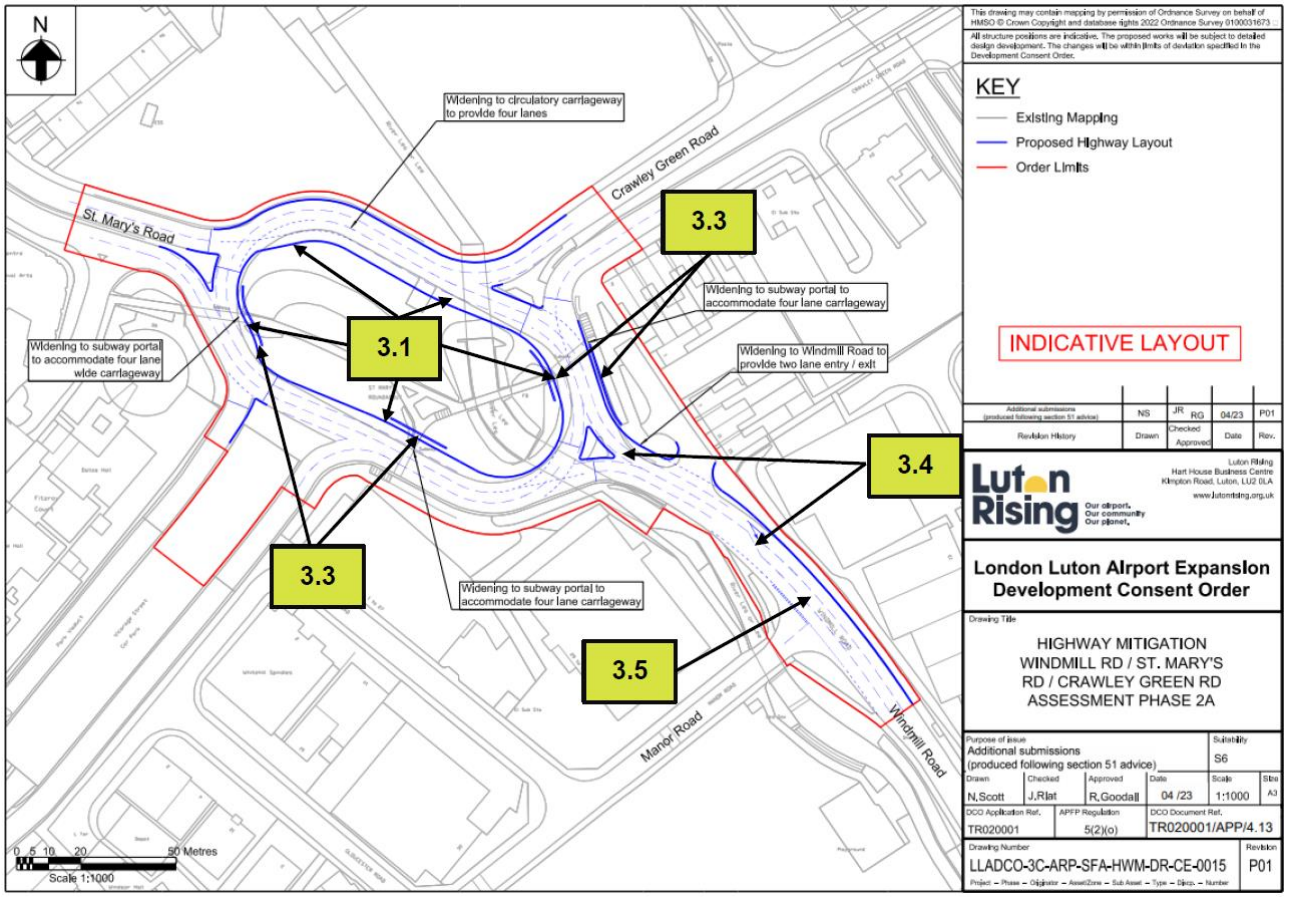
2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between Windmill Road / St. Mary's Road / Crawley Green Road, in Luton.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0015, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1.

Figure 2.1: Locations of Problems Identified within the Audit



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Luton Borough Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

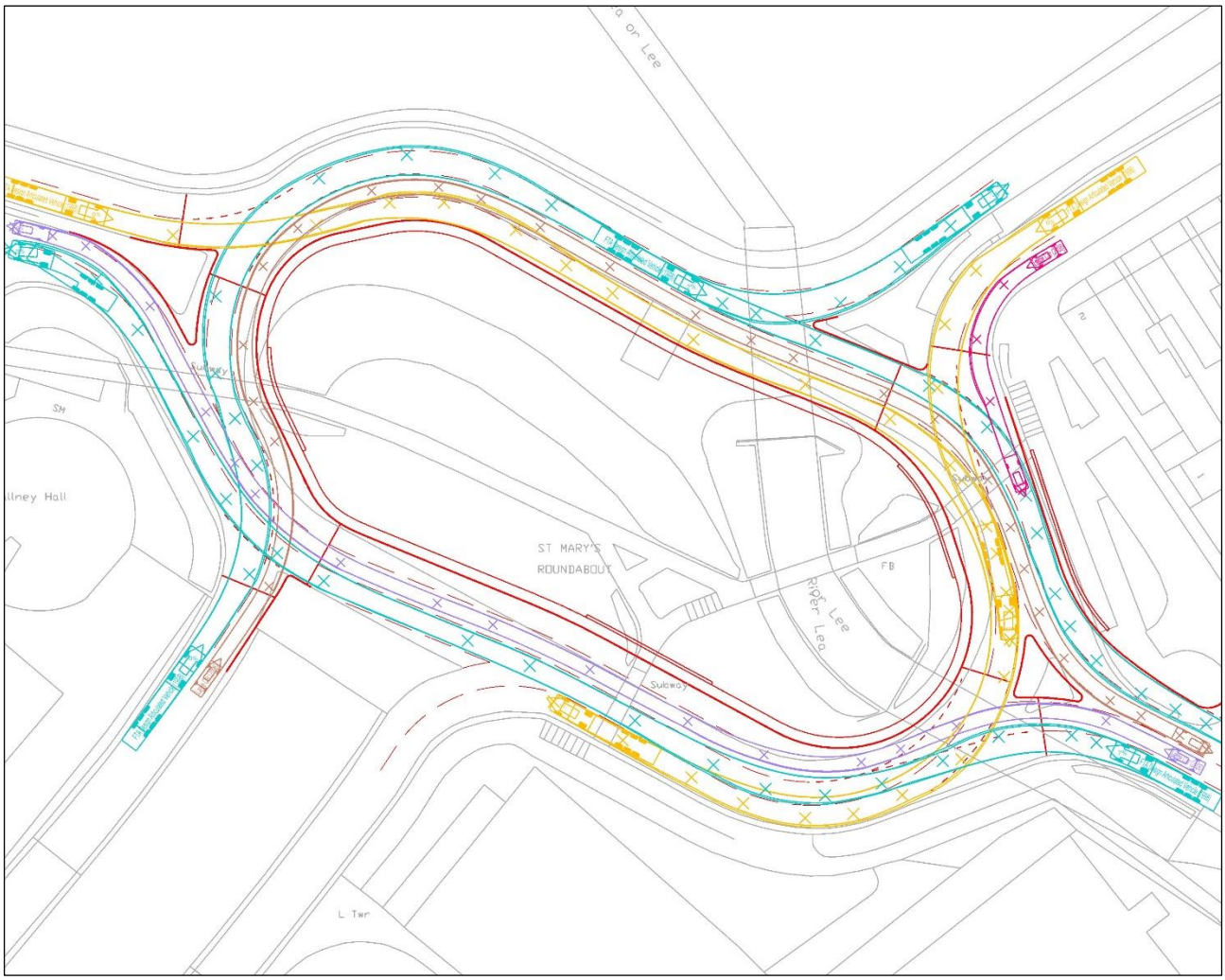
Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	The alignment of the central island is not consistent and there are areas where it changes abruptly, such as on the western side. There are also curves along the northern and southern straight sections. These issues could make the alignment difficult to follow by large vehicles, causing them to stray into adjacent lanes and side swipe type collisions could occur as result. HGVs may also snag along the Trief kerbing provided around the central island.	A consistent alignment should be provided around the central island. A swept path analysis should also be carried out to ensure the layout can be negotiated by large vehicles.	The alignment of the central island is designed to facilitate spiral markings and guide vehicles into the correct lanes, with the 'lane gain' alignment on the centre of the island designed to maximise the length of the circulating lanes, in relation to the adjacent exiting lanes. It is noted that the existing road layout is unable to contain 16.5m articulated HGV manoeuvres fully within their lanes as the vehicles enter and negotiate the gyratory. As the proposed layout generally builds on the existing layout by providing an additional circulatory lane of the same width, many of the swept paths in the proposed layout will also overhang adjacent lanes. Despite this, swept path analysis has been		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
			undertaken to show HGV movements - see Figure 3.1.		
3.2	Road users may not be able to anticipate which lanes to use to reach their intended destination, especially on the circulatory carriageway where up to four lanes will be available. If road users find that they are in the incorrect lanes, side swipe and lane change collisions could occur.	Lane destination signs and road markings should be provided at strategic locations to inform road users of the correct lanes to use.	Accepted. Appropriate road markings and signage would be provided at the detailed design stage.		
3.3	The widening works will result in the subway portals being positioned closer to the edge of carriageway. Currently, protection is only provided in the form of Trief kerbing. This may be insufficient to prevent errant vehicles from descending into the portals, which could result in serious injury to road users and people travelling through the subways.	The subway portals should either be amended to ensure they are positioned at a suitable distance back from the edge of carriageway, or the form of protection should be improved.	Accepted. The drawing suggests that the subway portals would need to be extended to suit the widened circulatory carriageway alignment, and this would be considered further at the detailed design stage.		
3.4	As there will be between three and four lanes on Windmill Road, road users may be unsure of the direction of each lane and enter opposing lanes by mistake. In addition, there could be an increased likelihood of road users straying across the centre line into opposing lanes. These issues could lead to head-on type collisions, which can result in serious injury.	A marginal strip with the use of cross-hatching road markings should be provided to separate the northbound and southbound traffic lanes. Arrow road markings depicting the direction of travel for each lane should also be provided at regular intervals along the link section.	There is limited scope to provide a marginal strip between opposing lanes due to existing width restrictions. Appropriate road markings and signage would be considered at the detailed design stage.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.5	It is not clear how the road markings will accommodate the right turn from Windmill Road into Manor Road. Drivers travelling southbound and entering the offside lane may not expect vehicles in front to suddenly stop as they wait to turn right. Rear-end shunt collisions could occur as a result.	A right turn lane should be marked for the Manor Road junction, before the two southbound lanes on Windmill Lane are developed. At the southern tie-in to the scheme, it should also be ensured that the road markings are suitably blended into the road markings downstream.	Accepted. The exit from the roundabout onto Windmill Road is a two-lane exit which merges down to a single lane, in advance of the Manor Road junction. Following this merge, a ghost island right turn lane is formed to the offside. South of Manor Road, Windmill Road would continue as a two-lane wide standard carriageway. Appropriate road markings and signage would be provided at the detailed design stage to mark the right turn to Manor Road.		

3.2 Swept Path Information

Figure 3.1: Swept Paths - Windmill Road / St. Mary's Road / Crawley Green Road



3.2.1 Figure 3.1 above shows the swept path analysis for a combination of 16.5m articulated HGVs and large cars, for various manoeuvres at the Windmill Road / St. Mary's Road / Crawley Green Road gyratory.

3.2.2 Whilst these swept paths show that there would be some overrunning of lanes for HGV manoeuvres, it is noted that a significant majority of the design retains the current lane widths and entry widths/radii, with the main change being the addition of an additional circulatory lane on the inside of the roundabout. As such, many of the areas where overrunning occurs are existing, and widening or realignment has been proposed where possible to mitigate these issues.

3.3 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	
Date:	

APPENDIX C - HERTFORDSHIRE COUNTY COUNCIL STAGE 1 RSA DESIGNER'S RESPONSES

C.1 A505 / Upper Tilehouse Street

Contents

Tables

Figures

1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - A505 / Upper Tilehouse Street
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - A505 / Upper Tilehouse Street
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

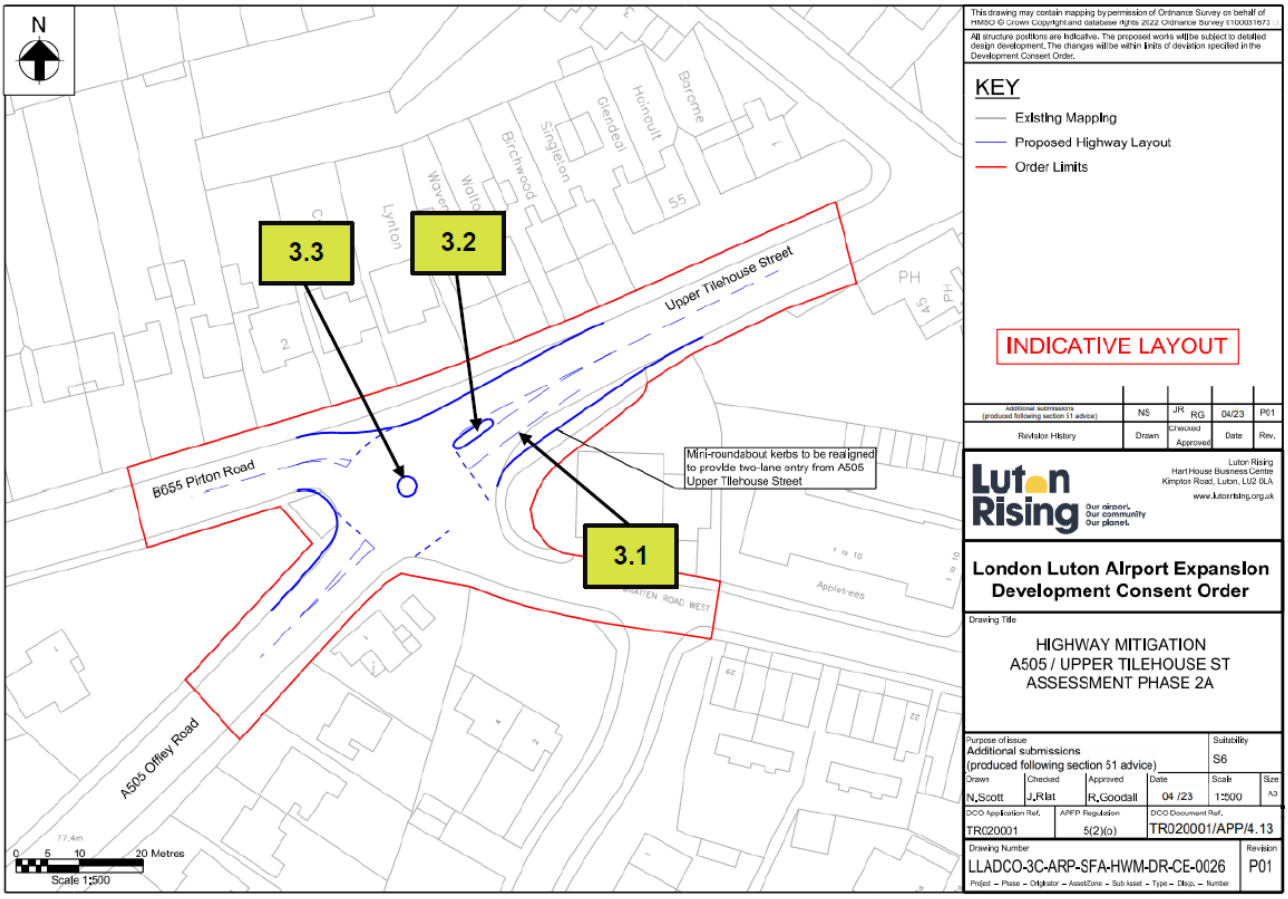
2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between A505 / Upper Tilehouse Street, in Hitchin.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0026, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1.

Figure 2.1: Locations of Problems Identified within the Audit



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Hertfordshire County Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	It is not clear whether the two-lane entry will allow ahead movements simultaneously, or whether the lanes will be dedicated for specific movements. If drivers attempt to travel ahead simultaneously, side swipe type collisions could occur as there is only one lane at the Offley Road exit.	The lanes should be dedicated for specific movements with the use of arrow road markings.	Accepted. Arrow markings will be added to the two-lane entry arm of the junction to clarify movements. This would be addressed at the detailed design stage.		
3.2	The widening to two lanes could make crossing movements more hazardous for pedestrians, especially at peak-times when traffic flows are likely to be high. This could increase the risk of pedestrians being struck by vehicles.	An uncontrolled pedestrian crossing point should be provided, with a wider physical central island specified.	There are no existing pedestrian crossing facilities on the Upper Tilehouse Street (eastern) arm of the mini-roundabout. Whilst an uncontrolled pedestrian crossing could be considered at the detailed design stage, the location of vehicular dropped kerbs on the northern kerb line means it would be difficult to provide a crossing point at this location. It is noted that there is an existing controlled signal crossing across Upper Tilehouse Street		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
			(eastern) arm to the east of the junction.		
3.3	The central island of the mini-roundabout is small and so deflection is very limited. The lack of deflection could increase the risk of entry versus circulatory type collisions as road users may not slow down sufficiently as they travel through the junction. The widening on Upper Tilehouse Street would exacerbate this problem.	A larger central island should be provided at the mini-roundabout to improve deflection.	The size of the central island is largely as per the existing arrangement and accident data for the last five years does not highlight any particular issues. Whilst it is helpful to have entry deflection, it is not a requirement for a mini-roundabout, however increasing the size of the central island can be considered at the detailed design stage.		

3.2 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	Hertfordshire County Council
Date:	

C.2 A505 Upper Tilehouse Street / A602 Park Way

Contents

Tables

Figures

1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - A505 Upper Tilehouse Street / A602 Park Way
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - A505 Upper Tilehouse Street / A602 Park Way
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

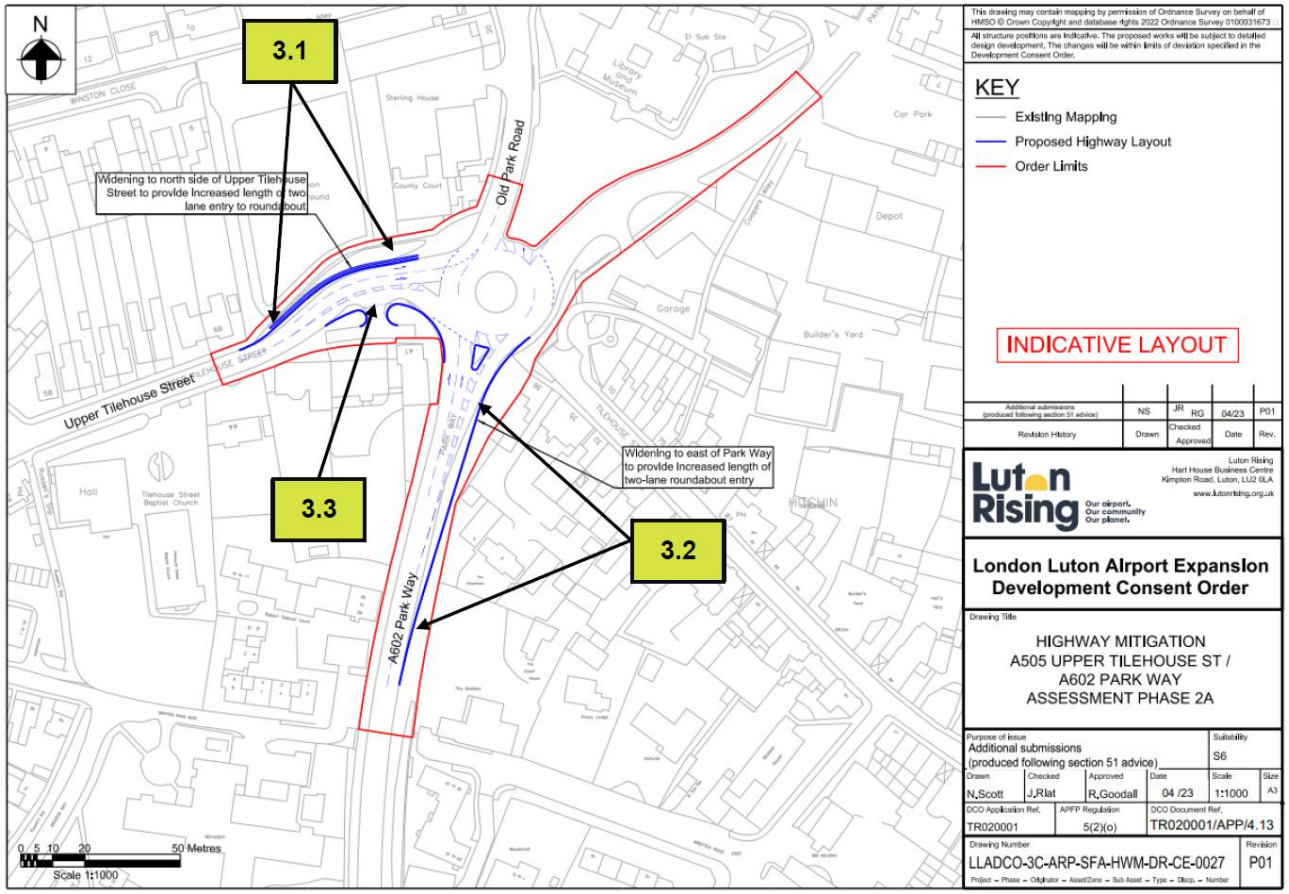
2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between A505 Upper Tilehouse Street / A602 Park Way, in Hitchin.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0027, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1.

Figure 2.1: Locations of Problems Identified within the Audit



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Hertfordshire County Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	There is a high and steep embankment slope on the northern side of Upper Tilehouse Street, which will be impacted by the widening works. The proximity of the embankment to the carriageway could increase the risk of errant vehicles descending down the slope, causing injury to the occupants and any pedestrians that may be walking along the footpath.	It should be ensured that the embankment can be protected by a suitable vehicle restraint system, taking into account the working width requirements of the VRS.	Accepted. The proposed design would require amendments to the VRS and embankment to accommodate the proposed widening, and this has been indicatively shown as part of the proposal. The amendment to the VRS would be considered further at the detailed design stage.		
3.2	There are mature trees, dense vegetation, signs and lamp columns on the eastern side of Park Way, that could be impacted by the carriageway widening works. If these items are positioned close to the edge of carriageway, there could be an increased risk of them being struck by errant vehicles, resulting in injury to road users.	It should be ensured that any dense vegetation and mature trees are removed if they are likely to be positioned close to the edge of carriageway and other items of street furniture relocated as necessary.	Accepted. This would be addressed at the detailed design stage.		
3.3	The realignment of the kerbs could reduce the right-hand visibility splay for road users emerging from the access onto Upper Tilehouse Street. As a result, pull-out type	It should be ensured that a suitable right-hand visibility splay can be provided at the access, in particular allowing drivers to see vehicles about to	Accepted. Vegetation within the highway boundary would be trimmed to improve visibility on exit from the private access. It should		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	collisions could occur at the access.	turn left into Upper Tilehouse Street from Park Way.	however be noted that the design also reduces the angle at which drivers are required to look over their shoulder to see oncoming traffic. This would be addressed at the detailed design stage.		

3.2 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	Hertfordshire County Council
Date:	

C.3 A602 Park Way / A602 Stevenage Road / Hitchin Hill

Contents

Tables

Figures

1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - A602 Park Way / Stevenage Road / Hitchin Hill
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - A602 Park Way / Stevenage Road / Hitchin Hill
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

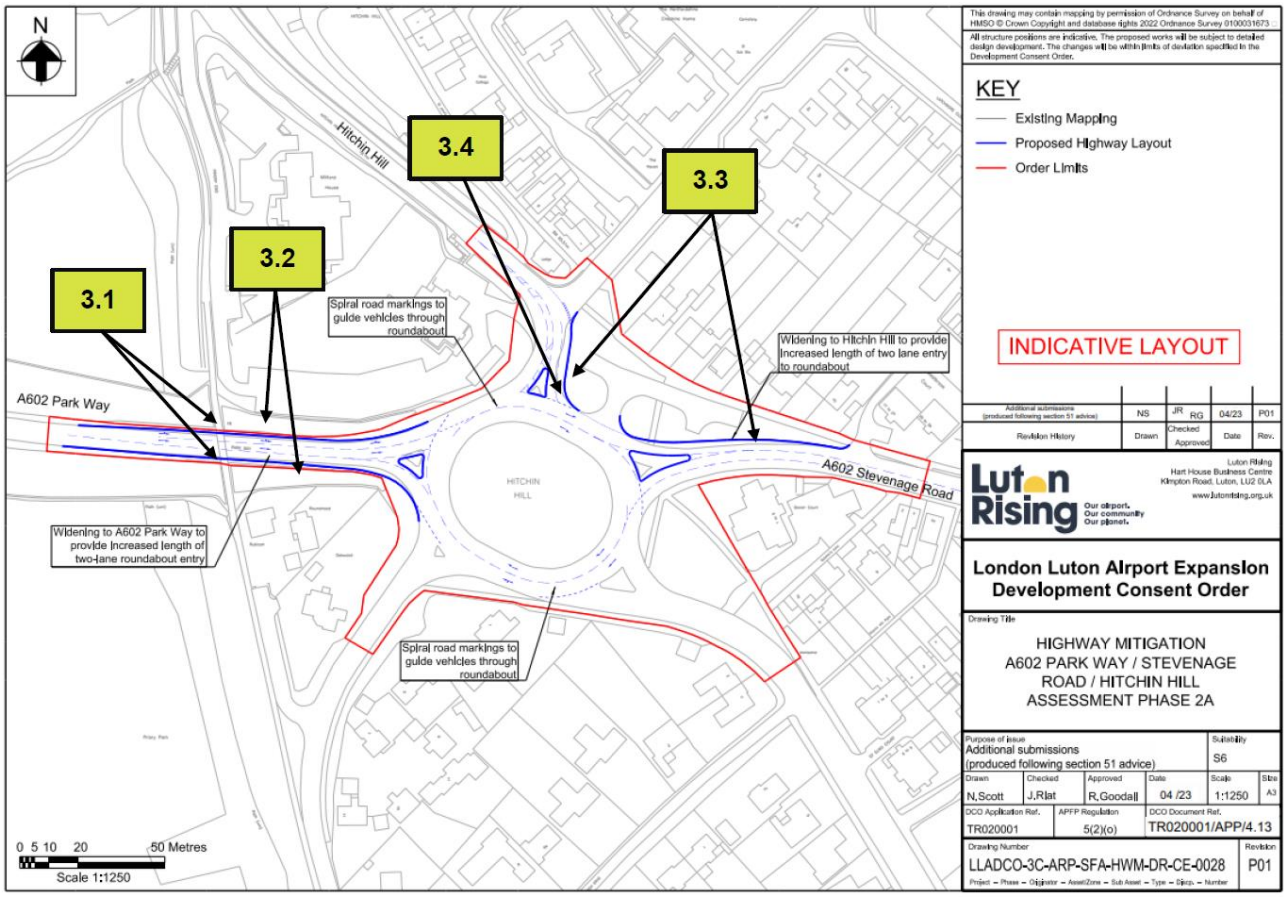
2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between A602 Park Way, A602 Stevenage Road, Hitchin Hill, London Road and Gosmore Road.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0028, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1.

Figure 2.1: Locations of Problems Identified within the Audit



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Hertfordshire County Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	The piers for a footbridge could be impacted by the carriageway widening works. If sufficient protection cannot be provided for the bridge piers due to the working width requirements of the vehicle restraint systems (VRS), they could be a hazard to road users if struck by errant vehicles.	It should be ensured that the bridge piers can be suitably protected as part of the carriageway widening works.	Accepted. The VRS would be redesigned to suit the proposed highway widening at the detailed design stage.		
3.2	There are mature trees, dense vegetation, signs and lamp columns on Park Way, that could be impacted by the carriageway widening works. If these items are positioned close to the edge of carriageway, there could be an increased risk of them being struck by errant vehicles, resulting in injury to road users.	It should be ensured that any dense vegetation and mature trees are removed if they are likely to be positioned close to the edge of carriageway and other items of street furniture relocated as necessary.	Accepted. Vegetation would be trimmed back and street furniture relocated as necessary, and this will be addressed at the detailed design stage.		
3.3	There are numerous heavy-duty items of street furniture, such as lamp columns, utility cabinets and a telegraph pole, in addition to mature trees, that will be impacted by the carriageway widening works. If these items are positioned close to the edge of carriageway, there could be an increased risk of them	It should be ensured that street furniture is relocated, and mature trees removed as necessary as part of the widening works.	Accepted. Vegetation would be trimmed back and street furniture relocated as necessary, and this will be addressed at the detailed design stage.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	being struck by errant vehicles, resulting in injury to road users.				
3.4	Utility service covers currently in the verge will become located in the carriageway due to the widening works. Ironwork at the roundabout entry could present a skid and loss of control hazard to road users (particularly to two-wheeled vehicles) whilst they are braking or accelerating.	The service apparatus should be identified at an early stage and diverted as necessary so that metallic covers are positioned in verge areas, rather than the carriageway.	Accepted. The impact on utility apparatus including service covers would be addressed at the detailed design stage.		

3.2 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	Hertfordshire County Council
Date:	

APPENDIX D - CENTRAL BEDFORDSHIRE COUNCIL STAGE 1 RSA DESIGNER'S RESPONSES

D.1 A1081 New Airport Way / Gipsy Lane

Contents

Tables

Figures

1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - A1081 New Airport Way / B653 Gipsy Lane
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - A1081 New Airport Way / B653 Gipsy Lane
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

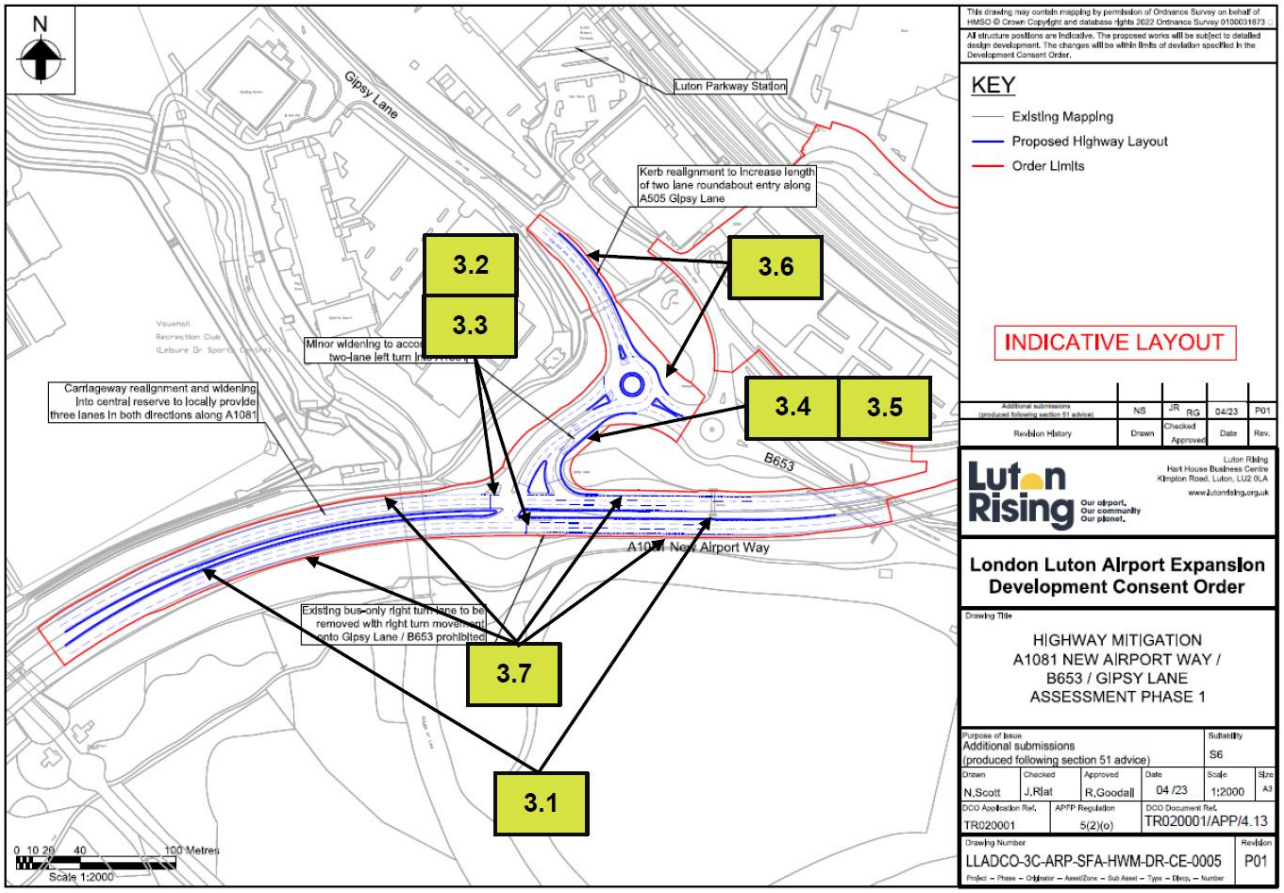
2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between A1081 New Airport Way and B653 Gipsy Lane, in Luton.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0005, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1.

Figure 2.1: Locations of Problems Identified within the Audit



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Central Bedfordshire Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

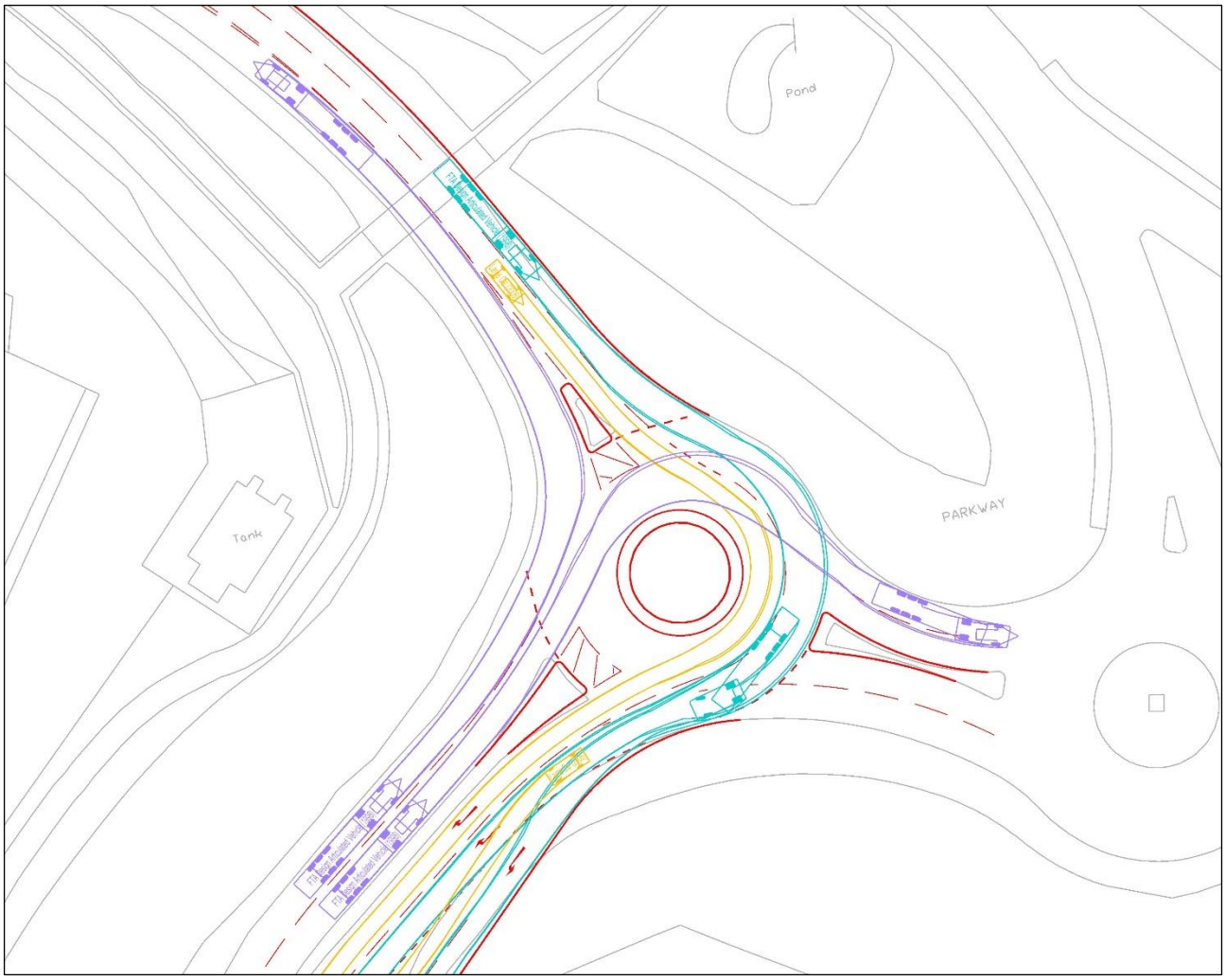
Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	There are existing heavy-duty items of street furniture within the central reservation, such as lamp columns, a gantry support and signposts. When the reservation is narrowed to accommodate the widening works, there may be insufficient width to provide protection for the items. In addition, the items may be within the working width of the vehicle restraint system (VRS). Road users could suffer serious injury if vehicles collide into the street furniture and are brought to an abrupt halt or redirected violently.	It should be ensured that the items of street furniture can be adequately protected by vehicle restraint systems, without encroaching into the working width of the VRS.	Accepted. The detailed design of the realignment would ensure that sufficient clearance is provided to items of street furniture, with the potential for relocation if required. Sufficient width is proposed within the central reserve to retain a minimum 0.6m offset to lighting columns etc, and the proposed carriageway realignment remains clear of the existing overhead gantry, which would be unaffected by the proposals.		
3.2	The equipment associated with the traffic signals, such as signal poles and the controller, could be a roadside hazard to road users if they lose control and collide into the items at high speed. The speeds along the A1081 could be higher than the posted 40mph speed limit, due to rural dual	Passively safe traffic signal equipment should be specified for the scheme, with the controller not located in a likely run-off area for errant vehicles.	Accepted. The design of the roadside equipment would be considered at the detailed design stage.		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	carriageway and widened nature of the road.				
3.3	The widening to three lanes on the approaches to the junction could increase the likelihood of the primary signals being masked by high sided vehicles. If a red signal is not clearly visibly to road users, there could be an increased risk of overshoot collisions or accidents involving sudden and late braking, such as rear-end shunts.	High-mounted duplicate primary signals should be provided on the A1081 approaches to the junction.	Accepted. The provision of high-mounted signals would be considered at the detailed design stage.		
3.4	There is dense vegetation in the verge and a cutting slope on the approach to the traffic signals. These features will be closer to the edge of carriageway when the road is widened, creating a roadside hazard to road users if they lose control and leave the carriageway. The vegetation and slope could also restrict the stopping sight distance (SSD) to the signal heads, increasing the risk of overshoot and failure to stop type collisions.	The verge should be cleared of dense vegetation and the slope regraded over a sufficient distance to ensure the features do not present a roadside hazard to road users, and to ensure suitable SSD can be provided to the traffic signals.	Accepted. The verge would be cleared of vegetation as necessary to maintain the SSD to signal heads. This would be addressed at the detailed design stage.		
3.5	The widening to create the two lanes on the approach to the traffic signal junction is abrupt and the alignment may be difficult to follow by large vehicles. This could lead to side swipe collisions and incidents of large vehicles striking	A swept path analysis should be carried out and amendments to the alignment implemented if necessary.	Accepted. Swept path analysis was undertaken as part of the design process to ensure that vehicles can undertake all manoeuvres within lane, see Figures 3.1 and		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	street furniture if they override the kerbs onto verge areas.		3.2 in the following section.		
3.6	There is a high drop on the northern side of Gypsy Lane where the road widening is proposing (including the parapet for a subway). When the kerbs are realigned, the drop could be within the working width of the vehicle restraint system (VRS). If so, errant vehicles slip under the VRS after it has deformed, and enter the drop, resulting in injury to road users.	It should be ensured that there is sufficient width available to reposition the VRS and adequately protect the drop.	Accepted. The proposed widening along the northern edge of Gipsy Lane can be contained within the existing verge, with scope to adjust the position of the VRS. There is also scope to adjust the position of the southern kerbline to 'balance' the proposed widening across both sides of the carriageway. The position of the VRS would be considered at the detailed design stage.		
3.7	There are existing cycle facilities along the A1081 New Airport Way in both directions. It is not clear how the proposed layout will accommodate cyclists. If the cycle routes become discontinuous, cyclists could be vulnerable to being struck by vehicles, if they have to travel within or close to the live traffic lanes of the dual carriageway.	It should be ensured that adequate and safe cycle facilities are provided as part of the proposals.	Noted. There is scope within the width of the Order Limits to retain on-road cycle lanes along the A1081, to the same width as the existing provision. This would be developed further at the detailed design stage.		

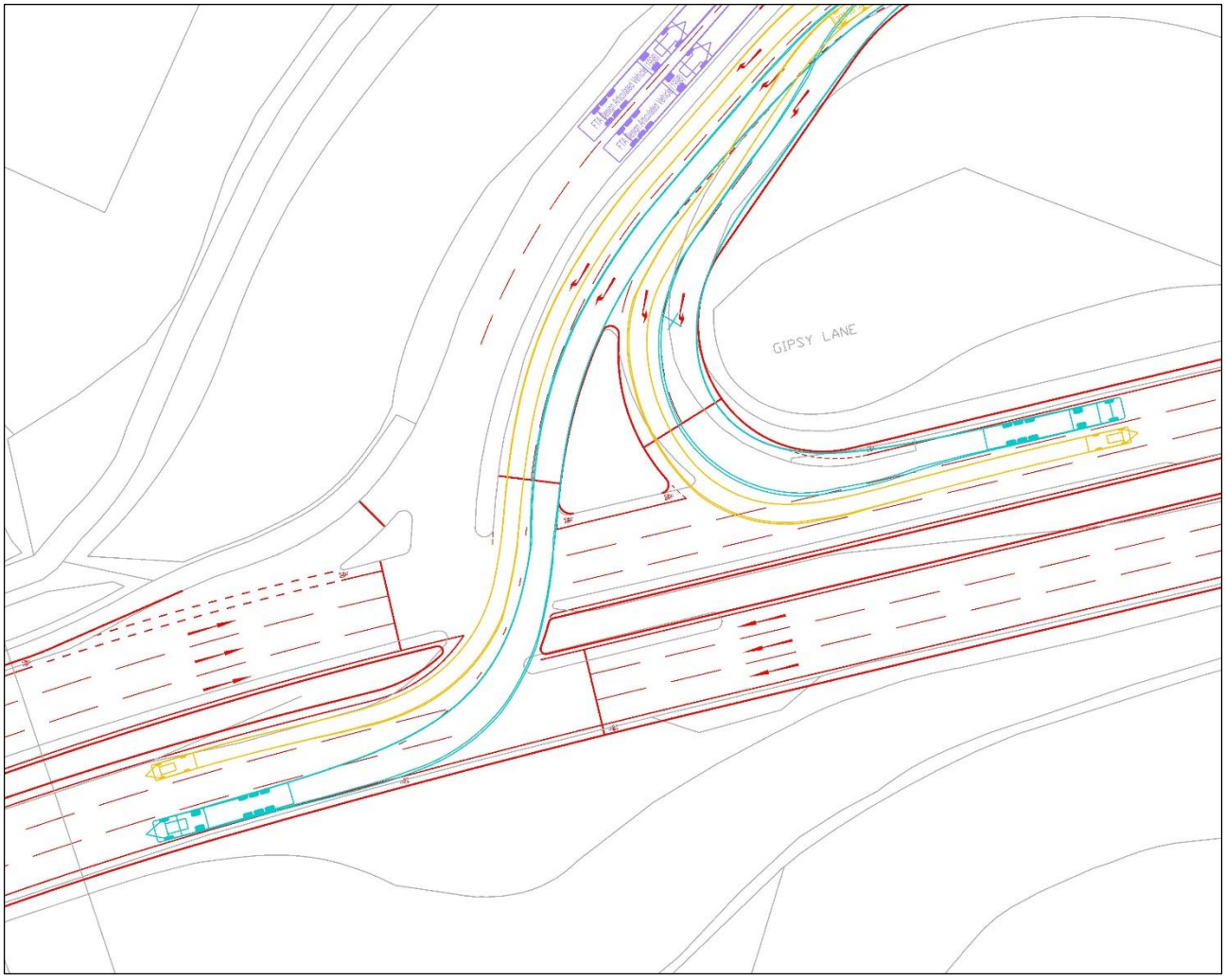
3.2 Swept Path Information

Figure 3.1: Swept Paths – B653 Gipsy Lane / A1081 New Airport Way Link Road



3.2.1 Figure 3.1 above shows the swept path analysis for 16.5m articulated HGVs and large cars at the roundabout junction between B653 Gipsy Lane and the A1081 New Airport Way link road.

Figure 3.2: Swept Paths - A1081 New Airport Way / B653 Gipsy Lane Link



3.2.2 Figure 3.2 above shows the swept path analysis for 16.5m articulated HGVs and large cars at the signalised junction between A1081 New Airport Way and the Gipsy Lane link road.

3.3 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	
Date:	

D.2 A1081 New Airport Way / London Road (South)

Contents

Tables

Figures

1 PROJECT DETAILS

Table 1.1: Project Details

Report title:	Stage 1 Road Safety Audit Designer's Response - A1081 New Airport Way / London Road (South)
Date:	November 2023
Document Reference and Revision:	TR020001/APP/8.118
Prepared by:	Neil Scott
On behalf of:	Luton Rising

Table 1.2: Authorisation Sheet

Project:	Luton Airport
Report title:	Stage 1 Road Safety Audit Designer's Response - A1081 New Airport Way / London Road (South)
Prepared by:	
Name:	Neil Scott
Position:	Senior Technician
Signed:	
Organisation:	Arup
Date:	November 2023
Approved by:	
Name:	Jagjit Riat
Position:	Associate Director
Signed:	
Organisation:	Arup
Date:	November 2023

2 INTRODUCTION

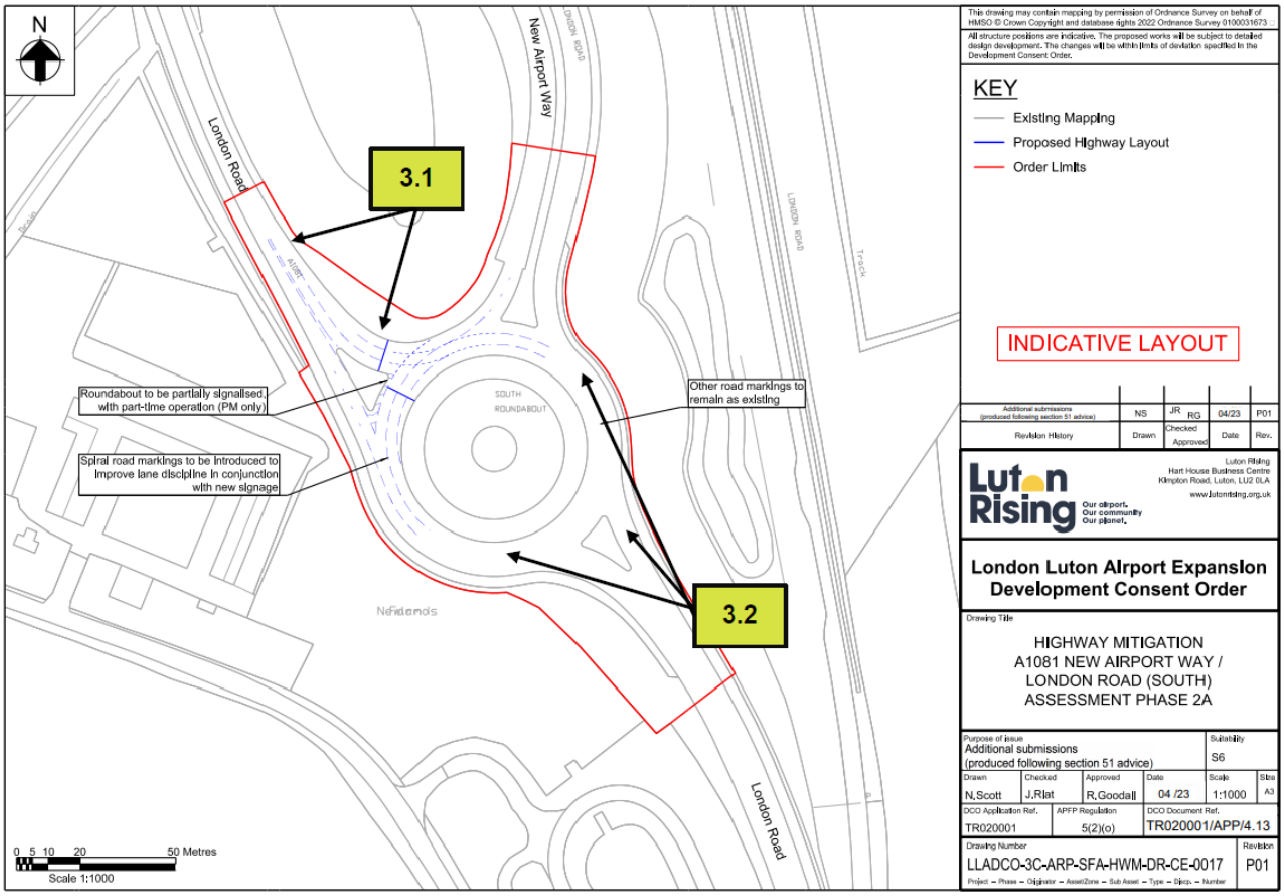
2.1 Stage 1 Road Safety Audit

2.1.1 This Designer's Response report has been compiled to summarise the recommendations of the Stage 1 Road Safety Audit (RSA) undertaken by TMS Consultancy on Monday 10th October 2023, for the proposed mitigation design at the junction between A1081 New Airport Way / London Road (South), in Luton.

2.1.2 The audit was undertaken on the basis of the proposed highway mitigation design shown in drawing LLADCO-3C-ARP-SFA-HWM-DR-CE-0017, as contained within **Appendix A** of the **Transport Assessment Appendices - Part 1 of 3 (Appendices A to E) [APP-200].**

2.1.3 The report sets out the problems, summary and recommendations of the TMS audit, together with the designer's response. The locations of the problems identified within the audit are shown below, in Figure 2.1.

Figure 2.1: Locations of Problems Identified within the Audit



2.2 Key Personnel

Table 2.1: Key Personnel

Overseeing Organisation:	TBC - Central Bedfordshire Council
RSA Team:	Harminder Aulak - TMS Consultancy Lee Williams - TMS Consultancy
Design Organisation:	Neil Scott - Arup (Luton Rising) Jagjit Riat - Arup (Luton Rising) Robert Blair - Arup (Luton Rising)

3 ITEMS RESULTING FROM THE STAGE 1 RSA AUDIT

3.1.1 The following sections provide detail on the audit recommendations and actions.

Table 3.1: Road Safety Audit Decision Log

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
3.1	The stopping sight distance (SSD) to the nearside primary traffic signal is likely to be reduced by the nearside cutting slope and vegetation (due to the curvature of the road). If the appropriate SSD is not provided, there could be an increased risk of overshoot and shunt type collisions, especially if the offside signals are obscured by high-sided vehicles.	Appropriate SSD to the signals should be provided, which is likely to require the regrading of the cutting slope and removal of vegetation.	The existing design speed of 30mph (60B) would be retained at the roundabout and on the approaches, where a desirable minimum SSD is 90m and a one-step below desirable minimum SSD is 70m. CD123 of the DMRB suggests that visibility should be provided to at least one primary signal head (on the nearside or offside). The proposed design would achieve desirable minimum SSD to the offside signal head, and one step below desirable minimum SSD to the nearside signal head.		
3.2	The existing road markings on the circulatory carriageway are significantly worn and so when compared to the new markings, will be less visible to road users. The sudden reduced visibility of the road markings could result in poor	All road markings at the roundabout should be refreshed so that the quality is uniform throughout.	Accepted. Road markings would be refreshed / replaced in line with the proposed spiral marking design, with the potential for a line marking refresh of the remaining existing markings. This would be		

Ref.	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
	lane discipline and side swipe type collisions could occur as a result.		addressed at the detailed design stage.		

3.2 Design Organisation and Overseeing Organisation Statements

Table 3.2: Design Organisation Statement

On behalf of the design organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation**	
Name:	Jagjit Riat
Signed:	
Position:	Associate Director
Organisation:	Arup
Date:	

Table 3.3: Overseeing Organisation Statement

On behalf of the Overseeing Organisation I certify that: **1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and** **2) the agreed RSA actions will be progressed.**	
Name:	
Signed:	
Position:	
Organisation:	Central Bedfordshire Council
Date:	