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February 2023

London Luton Airport Expansion

Planning Inspectorate Scheme Ref: TR020001

Volume 5 Environmental Statement and Related Documents

5.02 Appendix 18.1 Traffic and Transportation Methodology

Application Document Ref: TR020001/APP/5.02

APFP Regulation: 5(2)(a)

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

London Luton Airport Expansion Development Consent Order 202x

5.02 ENVIRONMENTAL STATEMENT APPENDIX 18.1 TRAFFIC AND TRANSPORTATION METHODOLGY

Regulation number:	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference:	TR020001
Document Reference:	TR020001/APP/5.02
Author:	Luton Rising

Version	Date	Status of Version
Issue 01	February 2023	Application issue

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1 INTRODUCTION

1.1 Purpose of this Appendix

1.1.1 This appendix describes the methodology for assessing the environmental impact of the change in surface access trips.

1.1.2 The significance of environmental effects is a function of the magnitude of an impact and the sensitivity of the receptor.

1.1.3 National, regional and local planning policy and best practice guidance as well as local policies relating to transport have been used to inform the assessment.

1.1.4 The methodology utilised in this assessment reflects the guidance for preparing traffic and transportation chapters in Environmental Statements (ES) contained within:

a. The Guidelines for the Environmental Assessment of Road Traffic (Ref. 1);
b. LA 101 Introduction to environmental assessment (Ref. 2);
c. LA 104 Environmental assessment and monitoring (Ref. 3); and
d. LA 112 Population and human health (Ref. 4).

1.1.5 The new documents in the Design Manual for Roads and Bridges (DMRB), bullet points b to d above, do not provide specific guidance on likely changes in traffic volumes that can be associated with different magnitudes of impact. It has therefore been necessary to refer to two documents that have been withdrawn.

a. DMRB Volume 11 Section 3 Part 8 (11.3.8) Pedestrians, Cyclists, Equestrians and Community Effects (Ref. 5); and
b. DMRB Volume 11 Section 3 Part 9 (11.3.9) Vehicle travellers (Ref. 6).

1.1.6 The following section provides a brief description of the various types of issues that are covered in **Chapter 18** of this ES **[TR020001/APP/5.01]**. The procedure for determining the magnitude of impact of changes in the traffic volume on individual links is described in **Section 2.2**. The levels of sensitivity that have been assigned to road links for the categories of driver, pedestrian, other road users, and occupants are presented in **Section 3**. The process for the translation of the levels of magnitude of impact and the receptors' sensitivity into the level of environmental effect is described in **Section 4.**

2 ENVIRONMENTAL ISSUES

2.1 Introduction

2.1.1 The environmental issues that have been assessed to determine the Traffic and Transportation effects of the Proposed Development during both the construction and operation of the Proposed Development are set out in **Section 18.3** of **Chapter 18** Traffic and Transportation of the ES **[TR020001/APP/5.01]** under the heading 'Matters scoped in'.

2.2 Magnitude of Impact

2.2.1 The IEMA guidelines suggest following two broad rules-of-thumb that can be used as a screening process to delimit the scale and extent of the assessment:

a. Rule 1 – include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles (HGVs) will increase by more than 30%).

b. Rule 2 – include any other specifically sensitive areas where traffic flows have increased by 10% or more.

2.2.2 Where the predicted increase in traffic flows is lower than these thresholds, the IEMA guidelines suggest the significance of the effects can be stated to be negligible and further detailed assessments are not warranted. Given that daily variations in background traffic flow may vary by ±10%, it should be assumed that projected changes of less than 10% create no discernible environmental impact. Where the flows being examined are very low, the actual change in traffic for much higher percentage changes can still be low and unlikely to require further assessment. Where this may be the case a justification is set out in the chapter.

2.2.3 These broad rules will remain subject to professional judgement and are specifically relevant to the assessment of the traffic-related environmental effects considered in the chapter. Smaller traffic changes than those set out above may, in some circumstances, be relevant in the consideration of congestion or congestion related effects. Similarly, there will be occasions where there may be in percentage terms a high increase in traffic flow, but this is a result of a low baseline and a low projected increase. As an extreme example, if there were an increase of 20 vehicles on a base flow of 10 vehicles that would give a 200% increase; however, in terms of those environmental effects that are to be examined in the Traffic and Transportation chapter (**Chapter 18** of the ES **[TR020001/APP/5.01]**) it would be highly unlikely that there would be any adverse environmental effect.

Severance

2.2.4 The magnitude of community severance is assessed as set out in DMRB, Volume 11.3.8 (Ref. 5). The guidance for new severance is summarised below.

a. Slight: In general, the current journey pattern is likely to be maintained, but there will probably be some hindrance to movement for example:

i. pedestrian at-grade crossing of a new road carrying below 8,000 vehicles per day (AADT); or
ii. a new bridge will need to be climbed or a subway traversed; or
iii. journeys will be increased by up to 250m.

b. Moderate: Some residents, particularly children and elderly people, are likely to be dissuaded from making trips. Other trips will be made longer or less attractive, for example:

i. two or more of the hindrances set out under `slight' applying to single trips; or
ii. pedestrian at-grade crossing of a new road carrying between 8,000-16,000 vehicles per day (AADT) in the opening year; or
iii. journeys will be increased by 250-500m.

c. Severe: People are likely to be deterred from making trips to an extent sufficient to induce a re-organisation of their habits. This would lead to a change in the location of centres of activity or in some cases to a permanent loss to a particular community. Alternatively, considerable hindrance will be caused to people trying to make their existing journeys. Such effects can be brought about by, for example:

i. pedestrian at-grade crossing of a new road carrying over 16,000 vehicles per day (AADT) in the opening year; or
ii. an increase in length of journeys of over 500 m; or
iii. three or more of the hindrances set out under `slight' or two or more set out under `moderate'.

2.2.5 In Section 7 of DMRB, Volume 11.3.8 guidance is providing for the assessment of the relief from existing severance. There is no guidance on the increase in severance; it is not unreasonable that DMRB does not consider that because one of the benefits of a new roads scheme should be the reduction in severance on the existing highway. In the absence of any alternative guidance Table 1 in that document has been adapted to provide categorisation of an increase in severance by increases in existing traffic levels. This is set out in **Table 2.1**. The same ranges are used for categorising decreases in traffic on existing roads.

2.2.6 A first sift of road links for further assessment has been based on the exclusion of roads that have an AADT flow of less than 8,000 vehicles for both the Do Minimum or Do Something scenarios on the basis that the resultant magnitude of impact, even if any of the relevant receptors have a 'high' level of sensitivity, when combined with the resultant magnitude of impact will not have an environmental effect that is either moderate or major and therefore will not be significant.

Table 2.1: Categorisation of intensification in severance by increase/decrease in existing traffic levels

	Level of increase in severance		
	Slight	Moderate	Substantial
Built up area	c.30%	30-60%	60%+
Rural area	60-75%	75-90%	90%+

2.2.7 As the level in the DMRB is not specific for the lower level of 'slight' for the level of increase in severance, a lower limit of 27.5% has been adopted in this assessment.

2.2.8 For the purpose of this assessment the DMRB magnitudes of 'slight', 'moderate', and 'severe/substantial' have been equated to 'low', 'medium', and 'high'.

Driver Stress and Delay

Driver Stress

2.2.9 There is a series of tables in the DMRB (Ref. 6) that give guidance on the appropriate category of stress for use in environmental assessments. The tables cover motorways, dual carriageways, and single carriageway roads and have been used to develop **Table 2.2** and **Table 2.3**.

Table 2.2: Driver stress thresholds for motorways and dual carriageway roads

Average peak hourly flow per lane, in flow units/hour(1)	Average Journey Speed (kph)					
	Motorway			Dual Carriageway Roads		
	Under 75	75 – 95	Over 95	Under 60	60 – 80	Over 80
Under 600	High	Moderate	Low	High(2)	Moderate	Low
600 – 800	High	Moderate	Moderate	High	Moderate	Moderate
Over 800	High	High	High	High	High	High

Notes

(1) A car or light van equals one flow unit. A commercial vehicle over 1½ tons unladen weight or a public service vehicle equals 3 flow units.

(2) 'Medium' in urban areas.

Table 2.3: Driver stress thresholds for single carriageway roads

Average peak hourly flow per lane, in flow units/hour	Average Journey Speed (kph)		
	Under 50	50 – 70	Over 70
Under 600	High[3]	Moderate	Low
600 – 800	High	Moderate	Moderate

Average peak hourly flow per lane, in flow units/hour	Average Journey Speed (kph)		
	Under 50	50 – 70	Over 70
Over 800	High	High	High

Notes
(3) 'Medium' in urban areas.

2.2.10 Where the driver sensitivity is 'high' or 'medium' and the change is flow is ±30%, ±10% for sensitive links, the change in driver stress levels as identified using either **Table 2.2** or **Table 2.3** as appropriate has been investigated.

2.2.11 The change in the levels of driver stress have been converted to a magnitude of impact using the relationship shown in the following table. Where there are two levels of magnitude shown, the lower value has been used if the change in the average peak hourly flow per lane is less than 100 flow units/hour.

Table 2.4: Conversion of changes in driver stress to magnitude of impact

'Do-Minimum'	'Do-Something'		
	High	Medium	Low
High	No change	Very Low or Low	Medium or High
Medium	Very Low or Low	No change	Very Low or Low
Low	Medium or High	Very Low or Low	No change

2.2.12 The DMRB (Ref. 6) advised that "*for new or improved routes, designed in accordance with the Department's current standards, the appropriate category will normally be `moderate' or `low' for the whole route*".

Driver Delay

2.2.13 Driver frustration can be associated with uncertainty regarding journey time which is influenced by delays that will be experienced. In order to reflect this in the assessment a test has been adopted to consider delays at junctions. This has been based on the 'Level of Service' (LOS) which is a quantitative stratification, developed in the United States (Ref. 7), of a performance measure or measures that represent quality of service. The measures used to determine LOS for transportation system elements are called service measures. There are six levels of service, ranging from A to F, based on the predictions of the level of vehicle delay. LOS 'A' represents the best operating conditions from the travellers' perspective and LOS 'F' the worst.

Table 2.5: Level of service of junction based on vehicle delay

Level of Service	Average Vehicle Delay (seconds)	
	Traffic Signals	Roundabout
A	⩽10	⩽ 10
B	>10 and ⩽20	>10 and ⩽15

Level of Service	Average Vehicle Delay (seconds)	
	Traffic Signals	Roundabout
C	>20 and ⩽35	>15 and ⩽25
D	>35 and ⩽55	>25 and ⩽35
E	>55 and ⩽80	>35 and ⩽50
F	>80	>50

2.2.14 The magnitude of impact has been based on the LOS changing between the levels between the 'Do-Minimum' and 'Do-Something' scenarios. In the absence of any definitive guidance, the values in **Table 2.5**: Level of service of junction based on vehicle delay have been based on professional judgement. A change in LOS can encompass a wide range in the change in delay. For example, if one considers a change from level B to level C at a junction controlled by traffic signals one could have a situation where the delay changes from 19 seconds to 21 seconds, that is a change of just two seconds. Alternatively, for the same levels of service there could be a delay changing from 11 seconds to 35 seconds, an increase of 24 seconds.

2.2.15 In order to reflect the scale of delay within any particular band and also to compare the level of service when the form of junction control changes each delay has been given a numerical value, referred to as an 'equivalent delay' that reflects its position within the LOS band. Delays for LOS 'A' will be between zero and one, for LOS 'B' it will be between one and two, with the numbers increasing by one for each further band. The equivalent value is calculated using the following formula.

$$Equivalent\ Delay = L_l + (D - L_l)/(L_u - L_l)$$

Where $D = actual\ delay$
$L_l = Lower\ value\ of\ delay\ for\ the\ band$
$L_u = Upper\ value\ of\ delay\ for\ the\ band$

2.2.16 The following is an example of calculating a delay of 23 seconds at a traffic signal controlled junction which is a LOS level of 'C'. In this instance the variables in the junction have the following values.

$D = 23\ seconds$
$L_l = 20\ seconds$
$L_u = 35\ seconds$

$$\text{Equivalent delay} = 20 + (23 - 20)/(35 - 20) = 2.2$$

2.2.17 The equivalent delay has been calculated for each junction in the morning and evening peak periods and the average produced. A magnitude of impact based on the difference in the value of equivalent delay between the 'Do Minimum' and 'Do Something' scenarios has been determined using the ranges in **Table 2.6**.

Table 2.6: Magnitude of impact based on equivalent delay

Magnitude of Impact	Range of Equivalent Delay
No Change	0 to ≤1
Very Low	1 to ≤2
Low	2 to ≤3
Medium	3 to ≤4
High	4+

2.2.18 The process described above has been applied to the delay predictions at the following key junctions for which data on vehicle delay has been extracted from the VISSIM AM and PM peak models:

a. M1 Junction 10;
b. A1081 Slip Roads/London Road (north);
c. A1081 Slip Roads/London Road (south);
d. B653 Gypsy Lane/Link to A1081 New Airport Way;
e. A505 Kimpton Road/B653 Gypsy Lane;
f. A6/A505 St Mary's Roundabout;
g. A505 Vauxhall Way/Crawley Green Road;
h. Wigmore Lane/Wigmore Hall Shopping Centre;
i. Wigmore Lane/Twyford Drive;
j. Wigmore Lane/Crawley Green Road;
k. Crawley Green Road/Lalleford Road;
l. Crawley Green Road/Ashcroft Road;
m. Eaton Green Road/Wigmore Lane;
n. Eaton Green Road/Lalleford Road;
o. Eaton Green Road/Frank Lester Way;
p. A505 Vauxhall Way/Eaton Green Road;
q. A505 Vauxhall Way/Airport Way;
r. President Way (Airport Access Road (AAR) in DS for 2039 and 2043)/Frank Lester Way;
s. Airport Access Road/Eaton Green Road Link/T2 Access Road (2039 and 2043 only);
t. Airport Way/Mid Tern Car Park;
u. A1081 New Airport Way/Percival Way; and
v. A1081 New Airport Way/Airport Access Road (2039 and 2043 only).

2.2.19 As has been described earlier where there is a change in traffic flow of less than 30% or for roads where there is a receptor that is classified as have a high level

of sensitivity 10%, the IEMA guidelines suggest the significance of the effects can be stated to be negligible and further detailed assessments are not warranted. However, when considering the environmental effect at a junction there may be differing levels of sensitivity on the roads leading into the junction. In order to take this into account, an 'amended' threshold has been calculated using the following equation.

$$\frac{\sum_1^N F_x \ T_x}{\sum_1^N F_x}$$

Where F_x *is the input flow on Arm x*
T_x *is the sensitivity threshold for Arm x(0.1 for sensitive links and 0.3 for all other links)*
N is the number of links feeding traffic into the junction.

2.2.20 As an example, if a junction has three arms two of which have a medium level of sensitivity and flows of 6,000 and 4,000 per day and the third arm has a high degree of sensitivity and a flow of 2,000. The calculation to determine the amended threshold would be as follows.

$$\frac{6{,}000 \times 0.3 + 4{,}000 \times 0.3 + 2{,}000 \times 0.1}{(6{,}000 + 4{,}000 + 2000)} = \frac{3{,}200}{12{,}000} = 0.2667$$

2.2.21 In the above example, the amended threshold for an assessment to be required would be 26.67%. In the above list only Junction 10 on the M1 falls into this category.

Pedestrian Delay

2.2.22 In its introduction to pedestrian delay the IEMA Guidelines note that changes in the volume, composition or speed of traffic may affect the ability of people to cross roads. It continues by observing that in general increases in traffic levels are likely to lead to greater increases in delay. However, it also observes that delays will also depend on the general level of pedestrian activity, visibility and general physical conditions of the site. Text in DMRB Volume 11.3.8 (Ref. 5) suggests that the impact of changes in traffic flow on pedestrian journeys should be considered when the change is ±30%.

2.2.23 With respect to pedestrian delay, the IEMA Guidance makes reference to a study undertaken by Halcrow Fox Associates (Ref. 8) that suggests that a pedestrian delay of ten seconds could represent a lower threshold for there to be the potential for the magnitude of the impact to lead to an effect. However, the guidance also recommends that assessments should be based on judgement rather than specific thresholds to determine whether or not there is significant pedestrian delay.

2.2.24 In this assessment a two-level process has been adopted. The first identifies those road links where the change in traffic volume is ±30% and the second identifies those where the change in the predicted average pedestrian delay is greater than ten seconds. In a variation to the approach recommended in the DMRB, the first level of the assessment applies a threshold of ±10% to those links where the relevant receptor or receptors have a high level of sensitivity.

2.2.25 The average delay has been calculated based on the relationships that are shown in Figure 1 of DMRB Volume 11.3.8 (Ref. 5). Polynomial functions with the form shown below have been developed that replicate the lines shown on that figure. The values for the constants are set out in **Table 2.7**.

$$y = ax^2 + bx + c$$

Table 2.7: Constants for pedestrian delay equations

Coefficient	No Facility	Signal Junction	Refuges	Zebra	Pelican
a	6.00E-06	2.00E-06	2.00E-06	7.00E-07	6.00E-06
b	0.0009	0.001	0.0002	0.0019	0.0012
c	1.3176	1.5946	3.9068	0.9784	4.7297

2.2.26 For those instances where the pedestrian delay is predicted to increase by more than ten seconds there is descriptive text provided to support the judgement made regarding the magnitude of impact.

Pedestrian Fear and Intimidation

2.2.27 There is neither formal guidance nor a consensus on thresholds for the assessment of the level of fear and intimidation experienced by pedestrians. However, the degree of fear and intimidation experienced is generally dependent on traffic volumes, composition and the presence of protection such as wide footways or guardrails. Therefore, the assessment of the level of fear and intimidation has been made based on professional judgement taking into account the combination of these factors.

2.2.28 The IEMA Guidelines under the heading ‘fear and intimidation’ sets out some examples of thresholds, provided in **Table 2.8** that have been used in this assessment.

Table 2.8: Thresholds for pedestrian fear and intimidation

Degree of Hazard	Average traffic flow over 18-hour day (vehicles/hour)	Total 18-hour heavy goods vehicle (HGV) flow
Extreme	1,800+	3,000+
Great	1,200 – 1,800	2,000 – 3,000
Moderate	600 – 1,200	1,000 – 2,000

2.2.29 **Table 2.9** below provides a relationship between the degree of hazard for the ’Do Minimum’ and ’Do Something’ levels so that magnitude of impact can be assigned when the degree of hazard changes.

Table 2.9: Magnitude of impact based on changes in degree of hazard

'Do-Minimum'	'Do-Something'			
	Extreme	Great	Moderate	Negligible
Extreme	No change	Beneficial low	Beneficial medium	Beneficial High
Great	Adverse low	No change	Beneficial low	Beneficial medium
Moderate	Adverse Medium	Adverse low	No change	Beneficial low
Negligible	Adverse high	Adverse Medium	Adverse low	No change

2.2.30 This assessment also includes a two-stage process. The first stage is to identify those road links where the increase or decrease in either the average flow over an 18-hour day or the 18-hour volume of HGV flow is greater than 30%, or in the case of the sensitive links (identified in **Table 3.1**) a change of 10%. The degree of hazard is then calculated for the identified links and from the comparison of the values for the 'Do-Minimum' and 'Do-Something' scenarios a magnitude of impact is categorised using **Table 2.9.**

Collisions and Safety

2.2.31 For the Statutory Consultations in 2019 and 2022 there was no Transport Assessment (TA), so it was necessary to provide more information on data for Personal Injury Collisions (PIC) in the Traffic and Transport chapters in the 2019 and 2022 Preliminary Environmental Information Reports (PEIR). This information is now available in the **TA [TR020001/APP/7.02]**. A review has been undertaken of the PIC data for the five year period from 1 January 2015 to 31 December 2019 and it was concluded that there were no noticeable clusters indicating an underlying issue in the highway layout.

2.2.32 The following junctions have been assessed with regard to potential environmental effects relating to collisions and safety:

a. A1081 New Airport Way/Parkway Roundabout Link Road
b. A1081/London Road/New Airport Way Eastbound slip roads
c. A1081/London Road/New Airport Way Westbound slip roads
d. M1 Junction 10
e. A505 Vauxhall Way/A505 Kimpton Road/A1081 New Airport Way/Airport Way
f. A505 Vauxhall Way/Eaton Green Road
g. A505 Vauxhall Way/Crawley Green Road
h. A505 Vauxhall Way/A505 Hitchin Road/A5228 Hitchin Road
i. A505 Stopsley Way/A505 Hitchin Road/Ashcroft Road

j. A505 Moormead Hill/Pirton Road/A505 Upper Tilehouse Street
k. A505 Upper Tilehouse Street/A505 Paynes Park/A602 Park Way
l. A602 Park Way/Hitchin Hill/A602 Stevenage Road/London Road
m. A505 Kimpton Road/Windmill Road
n. A5228 Hitchin Road/A5228 Stockingstone Road/Hitchin Road
o. A6 Crawley Green Road/Windmill Road/A505 Park Viaduct/St Mary's Road
p. A6 New Bedford Road/A5228 Stockingstone Road/Montrose Avenue
q. Gipsy Lane/Lower Harpenden Road/Link to A1081 New Airport Way
r. Crawley Green Road/Ashcroft Road
s. Crawley Green Road/Lalleford Road
t. Crawley Green Road/Wigmore Lane
u. Eaton Green Road/Frank Lester Way

2.2.33 In order to assess whether any of these junctions experience a PIC rate that is appreciably higher than would be expected, the theoretical number of expected PICs for the 'Do Minimum' and 'Do Something' scenarios have been calculated using the formula that is used to predict PIC rates in the COBA economic assessment of road schemes, details of which are provided in the now withdrawn DMRB Volume 13 Section 1 Chapter 4 Part 2 (Ref. 9).

2.2.34 There is no guidance in IEMA or DMRB on appropriate thresholds for degrees of magnitude of severity, therefore it has been necessary to establish an analytical approach that informs professional judgement. The particular parameters that are being considered are;

a. increasing volumes of traffic creating greater likelihood of collisions; and
b. influence of change of junction type on the probability of a collision.

2.2.35 The consequence of both of these can be predicted using the COBA formula and relevant coefficients which vary according to the junction type.

2.2.36 A sift of the data for further examination with the possibility that there may be a significant environmental effect is based on those junctions where the flow has changed by more than amended threshold that has been calculated in the manner described in **paragraphs 2.2.19 to 2.2.21**.

2.2.37 The sections of the chapter that consider the environmental effects associated with this topic for each of the assessment phases, each contain a table that sets out the following for each junction that have been identified in the sift process:

a. annual predicted PIC rate for the forecast 'Do Minimum' traffic flows;
b. annual predicted PIC rate for the forecast 'Do Something' traffic flows;
c. change in the rate from 'Do Minimum' traffic flows to 'Do Something' traffic flows, taking into account any change to the junction type;
d. change in the daily volume of traffic passing through the junction.

2.2.38 The levels for magnitude of impact that have been adopted for this assessment are shown in **Table 2.10.**

Table 2.10: Magnitude of impact for combinations of changes in traffic flow and PIC rate

Change in Traffic Flow	Change in PIC Rate per Annum				
	<10%	10%-30%	30%-60%	60%-90%	90%+
<10%	No Change	No Change	Very Low	Very Low	Low
10%-30%	No Change	No Change	Very Low	Low	Low
30%-60%	Very Low	Very Low	Very Low	Low	Medium
60%-90%	Very Low	Low	Low	Medium	Medium
90%+	Low	Low	Medium	Medium	High

Hazardous and Dangerous Loads

2.2.39 The following advice is provided in the IEMA Guidelines[1] (Ref. 1) regarding the assessment of the transport of hazardous loads:

"Some developments may involve the transportation of dangerous or hazardous loads by road and this should be recognised within any Environmental Statement. Such movements should include specialist loads which might be involved in the construction or decommissioning phases of the development, in addition to movements associated with the operation of the establishment.

The environmental statement needs to clearly outline the estimated number and composition of such loads. Where the number of movements is considered to be significant, the statement should include a risk or catastrophe analysis to illustrate the potential for an accident to happen and the likely event of such an event. The extent of such analysis would clearly have to reflect the nature of the product being distributed. For instance, much more detail would be required for a scheme that involved the transportation of nuclear products than for one that involved the delivery of petroleum.

In the absence of more specific information a basic estimate of the risk of a vehicle being in an accident can be determined from national accident records which can give values of accidents per million vehicle kilometres."

2.2.40 A worked example at the end of this section in the IEMA Guidelines (Ref. 1) identifies the accident record as being HGV driver casualty (killed or seriously injured (KSI)) rate per of billion kilometres. The value for 2019, the last year before the pandemic, was 6.0 which has been obtained from Table RAS30013 on the Department for Transport's website (Ref.10). This rate has then been applied to the total kilometres travelled by tankers while carrying fuel over the assessment period. This provides an indication of the likelihood of the occurrence of a major event. From which professional judgement must be used to assign a level for the magnitude of impact.

[1] Pages 23 and 24 of the guidance.

Public Transport Users

2.2.41 There are no standard guidelines for the effect of changes in trips on public transport services.

Rail

2.2.42 The following criteria were used to determine the magnitude of impact on rail services in the ES that was produced to support the planning application for the expansion of Stansted Airport (Ref. 11) to 43 mppa.

Table 2.11: Magnitude of impact for additional rail passengers used in Stansted Airport Expansion study

Impact	Magnitude of Impact			
	Negligible	Minor	Moderate	Major
Change in Rail Demand to Capacity Ratio (based on total capacity including standing passengers	No change in the demand to capacity ratio	Increase or decrease of the demand to capacity ratio on services below capacity	Increase or decrease of the demand to capacity ratio on services close to capacity	Increase or decrease of the demand to capacity ratio on services above capacity

2.2.43 There is no current passenger loading data available that can be used in this assessment. The introduction of the East Midlands Railway (EMR) Connect service, providing two trains an hour between the Luton Airport Parkway and St Pancras International stations, will have changed the pattern of loading on the Thameslink service making any historic loading data redundant. In addition, it is recognised that a post-pandemic pattern of travel has not yet settled down. As a consequence, it is not possible to determine the full demand to capacity ratio.

2.2.44 In the absence of this data the approach that has been taken to assess the potential environmental effect on existing passengers is to compare the additional number of train users against the capacity provided on the fast services.

2.2.45 For the purpose of this ES the predicted number of additional trips on the rail service between Luton Airport Parkway station and London have been assessed against the capacity on the train service based on the capacity that includes standing passengers, in line with the approach that was adopted for the assessment at Stansted Airport. The methodology for the calculation of the capacity of the rail service is set out in the following paragraphs.

Capacity of the Rail Service

2.2.46 The train service is described in **Section 18.7** of **Chapter 18** of this ES **[TR020001/APP/5.01]**. The capacities for each hour for the Thameslink service has been obtained by multiplying the trains per hour shown in **Table 2.12.**

2.2.47 **Table 2.12** by the capacities of EMR and Thameslink trains. The frequencies set out in the table have been extracted from the Thameslink timetables (Ref. 12) for the period Monday 16 May 2022 to Saturday 10 December 2022 and from the EMR timetable for services to and from St Pancras International station (Ref. 13) for the period Monday 16 May 2022 to Saturday 10 December 2022.

Table 2.12: Hourly arrivals/departures at Luton Airport Parkway station

Time	Southbound				Northbound			
	Thameslink		EMR		Thameslink		EMR	
	Regional	Metro	Connect	Intercity	Regional	Metro	Connect	Intercity
00:00	2	0	0	0	1	3	1	1
01:00	1	0	0	0	3	1	0	0
02:00	2	0	0	0	1	0	0	0
03:00	2	0	0	0	1	0	0	0
04:00	2	2	0	0	2	0	0	0
05:00	2	2	1	0	2	0	0	0
06:00	2	4	2	1	2	3	2	0
07:00	4	3	2	0	4	3	2	0
08:00	3	4	2	0	6	3	2	0
09:00	4	2	2	0	4	3	2	0
10:00	4	2	2	0	4	2	1	1
11:00	4	2	2	0	4	2	2	0
12:00	4	2	2	0	4	2	2	0
13:00	4	2	2	0	4	2	2	0
14:00	4	2	2	0	4	2	2	0
15:00	4	2	1	1	4	2	2	0
16:00	5	2	1	0	4	1	2	0
17:00	4	3	3	0	4	4	2	0
18:00	4	2	2	0	4	3	2	0
19:00	4	2	2	0	4	4	2	0

Time	Southbound				Northbound			
	Thameslink		EMR		Thameslink		EMR	
	Regional	Metro	Connect	Intercity	Regional	Metro	Connect	Intercity
20:00	4	2	2	0	4	2	2	0
21:00	4	2	1	0	4	1	2	0
22:00	4	2	1	0	4	2	2	0
23:00	2	0	1	1	3	3	1	1

2.2.48 EMR Connect, uses a fleet of Class 360 4-car electric multiple unit trains, which have been cascaded down from Greater Anglia. It had been intended that before introduction of these trains to the EMR network they would be refurbished. The seating arrangement while in use with Greater Anglia was 3+2 which is typical for suburban/commuter operation. It was intended that the refurbished carriages would have a 2+2 arrangement; this has not yet been undertaken. The capacity of the trains when operating in their original arrangement with Greater Anglia was 278 seats (Ref. 14) per 4-car set. For this assessment it has been assumed that the refurbishment will have taken place and a 2+2 arrangement adopted. The assumed capacity for a refurbished set (4-car) is 209, which has been based on the seated capacity of the 4-car class 367 'Electrostar' trains operated by Greater Anglia on its London Liverpool Street to Cambridge North service (Ref. 14), which has a 2+2 seating arrangement. The trains can operate as one, two or three 4-car sets which give seated capacities of 209, 418, and 627 passengers per train. Where a capacity for standing passengers is not provided guidance can be found in a document produced by the Department for Transport, Rail passenger numbers and crowding statistics: Notes and definitions (Ref. 15). The document considers overcrowding on trains and has adopted the following:

"the standing capacities have been estimated as 20 per cent of the number of standard class seats for long distance rolling stock, and 35 per cent of the number of standard class seats for commuter rolling stock (rounded down to the nearest integer if this calculation gives a decimal figure)."

2.2.49 Using the percentage figure for long distance rolling stock the additional capacity is 74 passengers.

2.2.50 The Thameslink regional services are operated using Class 700 trains that are formed as 12-car sets. The seated capacity of these trains is 672 with a quoted total capacity of 1,754 passengers (Ref. 16). The suburban services also use Class 700 trains but configured as 8-car sets. The seated capacity of these trains is 433 with a quoted total capacity of 1,148 passengers.

Calculation of Additional Demand

2.2.51 The spatial split to determine the north/south split for rail passengers on trains arriving at and leaving Luton Airport Parkway station has been taken from the

output of the CBLTM-LTN public transport model. The variation in the volume of surface access trips through the day is based on the future year passenger schedules that are shown in three Insets in **Section 10.5** of the **TA [TR020001/APP/7.02]**. The percentage of air passengers travelling on a train to the south of the station is provided in the relevant section of the chapter.

2.2.52 A flat profile for the proportion of air passengers travelling by rail throughout the day is unlikely. This is most relevant for those catching early flights out of and those flying into the airport on flights that arrive around midnight. It can be seen from the figures in **Table 2.12** that although there is a 24-hour train service at Luton Airport Parkway station, there is a much reduced frequency between 23:00 and 06:00 travelling south and for trains arriving at the station between 01:00 and 06:00.

2.2.53 The trains will also be used by employees and therefore it is necessary to produce forecasts of the use of rail by employees for each scenario. A number of processes have to be gone through to get from the total number of airport employees to an hourly profile of rail passengers on the section of the Midland Mainline (MML) south of Luton Airport Parkway station; these are to:

a. determine the number of employees on site on a typical weekday;
b. apply the rail mode percentage to the employees;
c. convert the daily rail passengers to hourly profiles of arrivals and departures; and
d. apply directional factors to establish forecasts for passengers on trains on MML south of the station.

2.2.54 There is no detailed information on daily patterns of travel for airport related employees. Figures have been obtained for total airport related employment and for the purpose of building the matrices for employees' travel used to develop the matrices used in the traffic models. This information has been separated into those that work shift patterns and those that work the more traditional five days a week pattern and travel during the traditional commuter periods. The total number of people employed at the airport will not be the same for a variety of reasons. Because the airport is operational every day of the week, individual shift workers will not attend every day. This has been accounted for by factoring the total number of shift employees by 5/7[2]. This is not a pattern that will be worked by all shift employees, but it will give a general indication of those present. Some employees will be on leave, and some will be absent through illness; this has been recognised by reducing the number of both non-shift and shift employees by one tenth.

2.2.55 For the conversion of employee numbers to rail passengers, it has been assumed that the share for existing employees will be seven percent, which remains constant through the years, but a higher value is applied to new employees to reflect the impact of the Travel Plan. The total number of

[2] Assuming working **five** days of a **seven** day week.

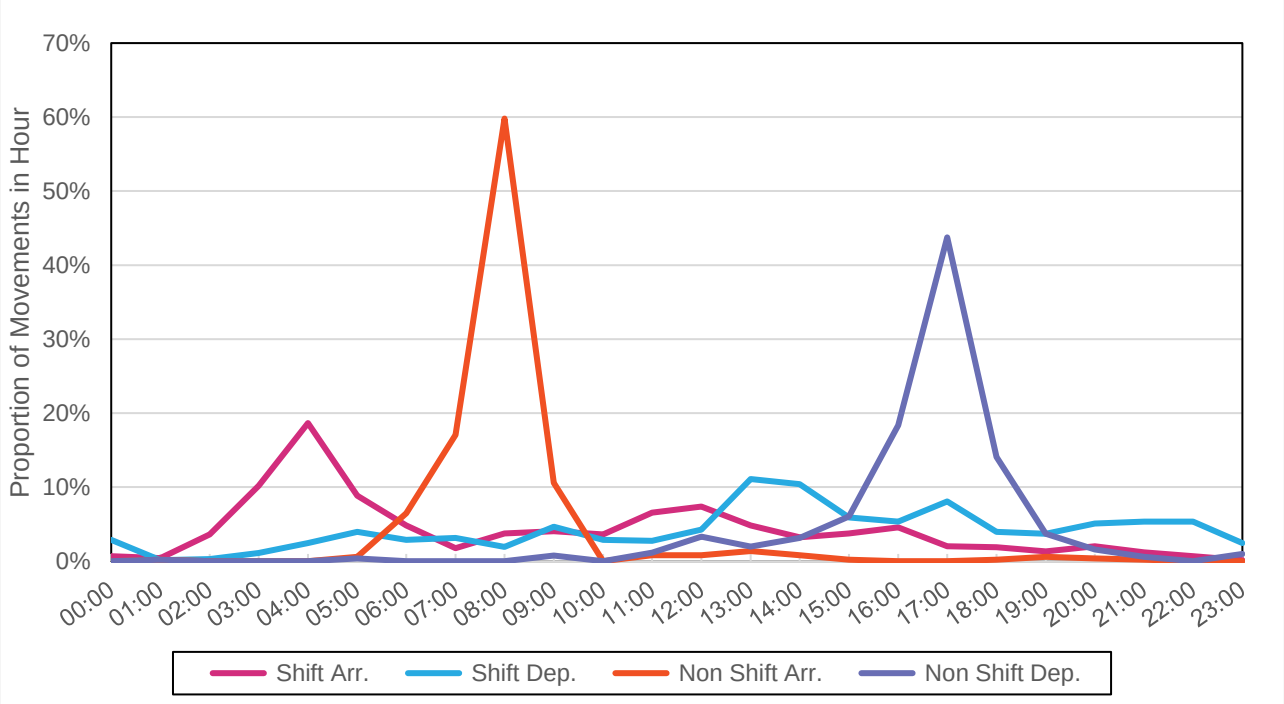
employees and the rail mode share that has been assumed for this assessment is set out in the following table.

Table 2.13: Rail mode share for scenarios

Year	'Do Minimum'		'Do Something'			
	Employees	Rail Mode Share	Existing Employees	Rail Mode Share	New Employees	Rail Mode Share
2027	10,935	7.0%	10,935	7.0%	1,225	10.0%
2039	10,935	7.0%	10,935	7.0%	3,150	11.0%
2043	10,935	7.0%	10,935	7.0%	4,900	12.0%

2.2.56 In the absence of any direct information regarding the overall pattern of arrivals and departures for employees, data recorded at the entrance and exit of employee car parks has been used to develop profiles that can be used to assess the additional level of travel by train. The profile for shift and non-shift employees as a percentage in each hour is shown on **Inset 2.1**.

Inset 2.1: Arrival and departure profile for shift and non-shift employees



2.2.57 The profile is applied to the number of employees that have been identified as rail travellers before the final stage which is the application of the spatial splits taken from the public transport model. The directional splits are set out in **Table 2.14.**

Table 2.14: Proportion of rail passengers travelling on section of MML between Luton Airport Parkway and Harpenden station

Year	Direction	AM Peak	Interpeak	PM Peak
2027	Northbound	68%	79%	81%
	Southbound	84%	84%	83%
2039	Northbound	71%	78%	79%
	Southbound	90%	84%	81%
2043	Northbound	72%	78%	79%
	Southbound	88%	84%	81%

2.2.58 The combined patterns of predicted airport passengers and employees have been compared to the capacity provided by the services that call at the station. These figures are presented in **Section 18.9** of **Chapter 18** of this ES **[TR020001/APP/5.01]**.

2.2.59 Based on data that has been extracted from the taken from the CBLTN-LTN Public Transport Model an indication of the manner in which the additional passengers are spread over the section of the railway between London Bridge and Market Harborough is also presented. The model provides data for the average hour for both the AM and PM peak periods and for the average interpeak hour. The average hour flows have been factored up to represent the whole period and then combined to produce figures for the twelve hour period 07:00 to 19:00.

2.2.60 This data relates to total predicted loadings on the services that have been modelled. It is not possible to extract figures that relate directly to the additional airport related rail passengers; however, a good indication can be found in the difference in loadings for the 'Do-Minimum' and 'Do-Something' scenarios. A separate inset has been provided for assessment Phases 1, 2a, and 2b figure that presents a graph that indicates the scale of the distribution of the additional airport related trips over this section of the rail network. The figures do not cover all of the sections but seek to highlight where there are the greatest changes. The sections to the north and south of Harpenden and St Albans have been included since Hertfordshire County Council has expressed an interest in knowing how these stations would be affected.

Determination of the Magnitude of Impact

2.2.61 In the absence of existing data on train loadings, it has been necessary to set some preliminary parameters that could be used to determine an appropriate level of magnitude. Considering the parameters used on the study for the expansion of Stansted Airport, there is likely to be a sensitivity to the existing loading; therefore, different bands have been used for different times of the day to reflect likely loadings. For example, a lower value of the ratio of passengers to capacity is more likely to have an effect on the amenity of existing passengers during commuter peak periods than in the early hours of the morning when there is generally little other demand for travel. These are set out below.

Table 2.15: Magnitude of impact for rail travel based on ratio of passengers to capacity

Scale of Sensitivity	Magnitude of Impact				
	No Change	Very Low	Low	Medium	High
midnight-07:00	<=5%	>5%-10%	>10%-20%	>20%-50%	>50%
07:00-10:00 (southbound)	<=1%	>1%-2.5%	>2.5%-5%	>5%-10%	>10%
07:00-10:00 (northbound)	<=2%	>2%-5%	>5%-10%	>10%-20%	>20%
10:00-16:00	<=2%	>2%-5%	>5%-10%	>10%-20%	>20%
16:00-19:00 (southbound)	<=2%	>2%-5%	>5%-10%	>10%-20%	>20%
16:00-19:00 (northbound)	<=1%	>1%-2.5%	>2.5%-5%	>5%-10%	>10%
19:00-midnight	<=2%	>2%-5%	>5%-10%	>10%-20%	>20%

Coaches and Buses

2.2.62 There has been no quantitative analysis of the effects of air passengers travelling by coach. The environmental effect would be related to the ratio of demand to capacity. Data on existing loading is not readily available and there is a greater flexibility in providing additional capacity at short notice to cater for a growth in demand than is possible for train operators; therefore, there is too much uncertainty in the future capacity of the coach and bus network to undertake an analysis.

3 SENSITIVITY OF RECEPTORS

3.1.1 The sensitivity of a road reflects the vulnerability of the road users' groups who may use it. These can be pedestrians, cyclists, and vehicle drivers and passengers. Paragraph 2.5 of the IEMA Guidelines identifies the affected groups and special interests as follows,

a. people at home;
b. people in work places;
c. sensitive groups including children, elderly and disabled;
d. sensitive locations, e.g. hospitals, churches, schools, historic buildings;
e. people walking;
f. people cycling;
g. open spaces, recreational sites, shopping areas;
h. sites of ecological/nature conservation value; and
i. sites of tourist/visitor attraction.

3.1.2 This list covers those groups or locations that could be affected by a range of environmental effects, some of which such as noise and air quality are considered in other chapters. The nature of the environmental effects that are considered in this chapter are described above and the receptors are likely to be those groups/locations identified in bullet points c, d, e, and f, in addition to travellers in motorised vehicles who are not included in the IEMA Guidelines list. For some receptors the physical layout of the highway may affect the sensitivity. For example, pedestrians walking along a road that has no footway will be more sensitive to increases in traffic than pedestrians walking along a wide footway adjacent to a carriageway.

3.1.3 **Table 3.1** provides the details of the sensitivity for all road links where one or more categories of receptor is not 'medium'. The second and third columns only have an entry where the road has a 'high' level of sensitivity for at least one of the receptors.

Table 3.1: Degrees of sensitivity for road links

Road Name	Reason for High Sensitivity	Class	Receptor			
			Drivers	Pedestrians	Other Road Users	Occu-pants
Access route to and from the M1						
A1081 New Airport Way between A505 Airport Way and Percival Way	N/A	N/A	Medium	Low	Medium	Very Low
A1081 New Airport Way	N/A	N/A	Medium	Low	Medium	Very Low

Road Name	Reason for High Sensitivity	Class	Receptor			
			Drivers	Pedestrians	Other Road Users	Occu-pants
between Lower Harpenden Road and Airport Way						
A1081 New Airport Way between Capability Green Estate and B653	N/A	N/A	Medium	Low	Medium	Low
Slip road to Capability Green Estate from A1081 New Airport Way WB	N/A	N/A	Medium	Low	Medium	Low
Slip road from Capability Green Estate to A1081 New Airport Way EB	N/A	N/A	Medium	Low	Medium	Low
A1081 New Airport Way between Capability Green Estate slip roads	N/A	N/A	Medium	Low	Medium	Low
Slip road from Capability Green Estate to A1081 New Airport Way WB	N/A	N/A	Medium	Low	Medium	Low
Slip road to Capability Green Estate from A1081 New Airport Way EB	N/A	N/A	Medium	Low	Medium	Low
A1081 New Airport Way between A1081 London Road and Capability Green Estate	N/A	N/A	Medium	Low	Medium	Very Low
Slip road to A1081 London Road from A1081 New Airport Way WB	N/A	N/A	Medium	Low	Medium	Low
Slip road from A1081 London Road to A1081	N/A	N/A	Medium	Low	Medium	Low

Road Name	Reason for High Sensitivity	Class	Receptor			
			Drivers	Pedestrians	Other Road Users	Occu-pants
New Airport Way EB						
Slip road from A1081 London Road to A1081 New Airport Way WB	N/A	N/A	Medium	Low	Medium	Low
Slip road to A1081 London Road from A1081 New Airport Way EB	N/A	N/A	Medium	Low	Medium	Low
A1081 New Airport Way between M1 Jct. 10 and A1081 London Road	N/A	N/A	Medium	Very Low	Medium	Very Low
M1 Jct. 10 southbound on-slip road	Strategic Highway	Highway	High	Very Low	High	Very Low
M1 Jct. 10 northbound off-slip road	Strategic Highway	Highway	High	Very Low	High	Very Low
M1 Jct. 10 roundabout (west side)	Strategic Highway	Highway	High	Very Low	High	Very Low
M1 Jct. 10 roundabout (northern overbridge)	Strategic Highway	Highway	High	Very Low	High	Very Low
M1 between Jct. 9 and Jct. 10	Strategic Highway	Highway	High	Very Low	High	Very Low
M1 between Jct. 8 and Jct. 9	Strategic Highway	Highway	High	Low	High	Low
M1 Jct. 10 northbound on-slip road	Strategic Highway	Highway	High	Very Low	High	Very Low
M1 Jct. 10 southbound off-slip road	Strategic Highway	Highway	High	Very Low	High	Very Low
M1 between Jct. 10 and Jct. 11	Strategic Highway	Highway	High	Very Low	High	Very Low
M1 within Jct. 11	Strategic Highway	Highway	High	Very Low	High	Very Low
M1 between Jct. 11 and Jct. 11A	Strategic Highway	Highway	High	Very Low	High	Very Low

Road Name	Reason for High Sensitivity	Class	Receptor			
			Drivers	Pedestrians	Other Road Users	Occu-pants
Access route to and from the A1(M)						
Airport Way between A505 Vauxhall Way and London Luton Roundabout			Medium	Low	Medium	Very Low
A505 Hitchin Road between Lothair Road and Butterfield Green Road	Inspire: Luton Sports Village	Community	Medium	High	Medium	High
A505 Hitchin Road between Butterfield Green Road and Mount Grace Road	The Vale Cemetery and Crematorium	Community	Medium	High	Medium	High
A505 Beech Hill between Great Marlings and Lilley Bottom	Putteridge Bury (University of Bedford)	Education	Medium	High	Medium	High
A602 Stevenage Road between Whitehill Road and Stevenage Road	Kingshott Preparatory School	Education	Medium	High	Medium	High
Other A roads						
A6 New Bedford Road between Kingsdown Avenue and Barnfield Avenue	Barnfield College	Education	Medium	High	Medium	High
Other urban local roads						
Eaton Green Road between Frank Lester Way and Lalleford Road	N/A	N/A	Medium	Medium	Medium	Low
Eaton Green Road between Lalleford Road and Eaton Green Road Link (AAR)	Raynham Way Community Centre	Community	Medium	High	Medium	Low
Eaton Green Road between Eaton Green Road Link (AAR) and Wigmore Lane	N/A	N/A	Medium	Medium	Medium	Low

Road Name	Reason for High Sensitivity	Class	Receptor			
			Drivers	Pedestrians	Other Road Users	Occu-pants
Eaton Green Road between Wigmore Lane and Colwell Rise	N/A	N/A	Medium	Medium	Medium	Low
Eaton Green Road between Colwell Rise and Darley Road			Medium	Medium	Medium	Low
Wigmore Lane between Hayling Drive and Sowerby Avenue	Someries Infant and Junior Schools	Education	Medium	High	Medium	High
Wiogmore Lane between Crawley Green Road and Twyford Drive	Wigmore Primary School	Education	Medium	High	Medium	Medium
Ashcroft Road between Wigmore Lane and A505 Hitchin Road	Ashcroft Road Recreation Ground	Community	Medium	High	Medium	High
Ashcroft Road between Turners Road North and Hallwicks Road	Lady Zia Wernher School (primary community special school) and Sacred Heart Church	Education	Medium	High	Medium	High
Crawley Green Rd between Ashcroft Road and Lalleford Road	Queen Elizabeth School	Education	Medium	High	Medium	High
Crawley Green Road between Wigmore Lane and Rochford Drive	Richmond Hill School East	Education	Medium	High	Medium	High
Crawley Green Road between Rochford Drive and Hedley Rise	Wigmore Church	Community	Medium	High	Medium	High
St Mary's Road between Park Viaduct and Church Street	University of Bedford and St Mary' Church	Education	Medium	High	Medium	High

Road Name	Reason for High Sensitivity	Class	Receptor			
			Drivers	Pedestrians	Other Road Users	Occu-pants
Rural roads to east and north of the airport						
Darley Road between Brick Kiln Lane and Mill Way	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Church Road between The Heath and Lilley Bottom	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Church Road between Lilley Bottom Road and Whitehall Lane	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Parsonage Lane/Church Lane/Back Lane (Preston) between Whitehall Road and School Lane	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Lilley Bottom Road between Church Road and Bendish Lane	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Lilley Bottom Road (Whitwell) between Bendish Lane and B651 Horn Hill	St Paul's Walden Primary Scholl (Whitwell)	Education	Medium	High	Medium	High
Codicote Road between B651 Hitchin Road and B656 Hitchin Road (Codicote)	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Chapel Road between Oxford Road and Baileys Lane	Breachwood Green Baptist Church	Community	Medium	High	Medium	High
Lye Hill/Chiltern Green Road between Baileys Lane and Kimpton Road	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Kimpton Road between Chiltern Green Road and Fox Hill Road	Rural road with no pedestrian facility	Highway	Medium	High	Medium	Medium

Road Name	Reason for High Sensitivity	Class	Receptor			
			Drivers	Pedestrians	Other Road Users	Occu-pants
Luton Road between Fox Hill Road and High Street Kimpton)	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
B652 High Street (Kimpton) between Claggy Road and Hitchin Road	Kimpton Primary School	Education	Medium	High	Medium	High
Stony Lane between Durley Road and Brick Kiln Lane	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Stony Lane between Brick Kiln Lane and Lilley Bottom	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
The Road near Lodge Farm between Stony Lane and King's Walden Road	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Brick Kiln Lane between Stony Lane and Chalk Hill	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Luton Road between Elmtree Avenue and Hedley Rise	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Chalk Hill between Brick Kiln Lane and Lilley Bottom	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Lilley Bottom between Church Road and Stony Lane	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Lilley Bottom between Stony Lane and Chalk Hill	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Lilley Bottom between Chalk Hill and Luton White Hill	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium

Road Name	Reason for High Sensitivity	Class	Receptor			
			Drivers	Pedestrians	Other Road Users	Occu-pants
Lilley Bottom between Luton White Hill and Hollybush Hill	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Lilley Bottom between Hollybush Hill and A505 eastbound Off-slip road	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Hexton Road between East Street and Streatley Road	Rural road with no pedestrian facility.	Highway	Medium	High	Medium	Medium
Airport roads						
Airport Way between Mid Term Car Park access and Central Terminal Area	N/A	N/A	Medium	Low	Medium	Low
Airport Way between Percival Way and Mid Term Car Park Access	N/A	N/A	Medium	Low	Medium	Low
A1081 New Airport Way between A505 Airport Way and Percival Way	N/A	N/A	Medium	Low	Medium	Very Low
Percival Way between Airport Way and Prospect Way	N/A	N/A	Medium	Low	Medium	Low
Percival Way between Prospect Way and Frank Lester Way	N/A	N/A	Medium	Low	Medium	Low
AAR between A1081 New Airport Way and Provost Way	N/A	N/A	Medium	Very Low	Medium	Low
AAR between Provost Way and Frank Lester Way	N/A	N/A	Medium	Low	Medium	Low
President Way between Car Rental and Frank	N/A	N/A	Medium	Low	Medium	Low

Road Name	Reason for High Sensitivity	Class	Receptor			
			Drivers	Pedestrians	Other Road Users	Occu-pants
Lester Way (AAR in DS)						
AAR between President Way and Eaton Green Road link	N/A	N/A	Medium	Low	Medium	Low
Access road to Terminal 2 from AAR	N/A	N/A	Medium	Low	Medium	Low
Eaton Green Road link	N/A	N/A	Medium	Low	Medium	Low
AAR access road	N/A	N/A	Medium	Low	Medium	Low
President Way between the access to Harrods Aviation, Hangar 201 and Long-Term Car Park	N/A	N/A	Medium	Low	Medium	Low

3.1.4 In response to the comments made by National Highways that because of the existing high volumes of traffic on its network in the area a 30% change represents a very high change in real terms, the sensitivity of drivers and other road users has been set at 'high'. This means that for those potential effects that could be experienced by them the assessment considers changes in traffic volume of 10%. Because pedestrians are not permitted along a motorway or to cross at-grade the sensitivity of 'pedestrians' and 'occupants' has been set as 'very low'.

3.1.5 The sensitivity for pedestrians has been set at 'low' for the length of the A1081 New Airport Way between the M1 and the London Luton Airport Roundabout[3] because there is no provision for pedestrians to cross the road at-grade or walk alongside it. The nature of land ownership to the south of the A1081 with much of it being either airport land or part of the Luton Hoo Estate means that there is little pedestrian demand along a north south axis. There are three crossing points for pedestrians to pass under the A1081 on Lower Harpenden Road, Park Road, and London Road.

3.1.6 Rural roads without any pedestrian provision have been classified as having a 'high' degree of sensitivity for pedestrians. Where a potential effect is identified, consideration is then given to the potential for pedestrian movement.

3.1.7 The level of sensitivity that has been assigned for occupants along the six new links that will be constructed , that is the full length of AAR and the links from its eastern end to Terminal 2 and Eaton Green Road, is 'low'. The reasoning for this is that the roads do not pass through a community and therefore no well-

[3] Junction of A1081 New Airport Way with Airport Way and Percival Way.

used existing pedestrian routes will be cut; in addition, the provision for crossing these roads is greater with pedestrian facilities being incorporated into the new traffic signal controlled junctions and a signal controlled pedestrian crossing being introduced immediately west of the roundabout the is located near the entrance to the existing car rental car park. This level of sensitivity has been assigned to this road because it does not pass through a community and there are no established well-used pedestrian routes that are crossed. Furthermore, as a new road will be provided with controlled pedestrian crossings to reflect the changes to the area around it.

3.1.8 The sensitivity of public transport passengers has been taken as being ‘medium’.

4 ASSESSMENT OF SIGNIFICANCE OF EFFECTS

4.1.1 A general guide for the classification of value and sensitivity is presented as **Table 5.5** in **Chapter 5** of this ES **[TR020001/APP/5.01]**. It is reproduced below for convenience.

Table 4.1: Generic description of effects

Effect level	Description
Major	A large or very large change to the environmental or socio-economic conditions. These are likely to include effects, positive or negative, associated with regional or national, or international issues, objectives or legislation and are crucial to the decision-making process.
Moderate	A medium change to the environmental or socio-economic conditions. These are likely to include effects, positive or negative, associated with local or regional issues, objectives or legislation and are likely to be of importance to the decision-making process.
Minor	A small change to the environmental or socio-economic conditions. These are likely to include effects, positive or negative, associated with local issues and are unlikely to be of importance to the decision-making process.
Negligible	No discernible change to the environmental or socio-economic conditions. An effect likely to have a neutral or negligible influence.

4.1.2 Based on the changes that are predicted to occur a magnitude of the impact has been determined. The receptors for the potential effect have been graded as to their sensitivity.

4.1.3 The significance of effects has been determined based on the combination of the magnitude and sensitivity using the matrix in **Table 4.2** below. This table provides greater flexibility for interpreting the significance of Traffic and Transportation effects than **Table 5.7** in **Section 5 (Chapter 5)** of this ES **[TR020001/APP/5.01]**. This is necessary because there is no legislation defining the level of unacceptable impacts and no well-defined and industry wide accepted ways of assessing the environmental effects of Traffic and Transportation meaning that there is greater reliance on professional judgement supported by the justification for any decisions.

Table 4.2: Effects matrix for Traffic and Transport

Scale of Sensitivity	Magnitude of Impact				
	No Change	Very Low	Low	Medium	High
Very High	No effect	Negligible	Minor or Moderate	Moderate or Major	Major
High	No effect	Negligible	Negligible or Minor	Moderate or Major	Moderate or Major
Medium	No effect	No effect or Negligible	Negligible or Minor	Minor or Moderate	Moderate or Major

Scale of Sensitivity	Magnitude of Impact				
	No Change	Very Low	Low	Medium	High
Low	No effect	No effect or Negligible	No effect or negligible	Minor	Minor or Moderate
Very Low	No effect	No effect	No effect or Negligible	No effect or Negligible	Negligible or Minor

4.1.4 Significance ratings of ‘Major’ and ‘Moderate’ are considered as significant, whereas those classified as ‘Minor’ or ‘Negligible’ are considered not significant.

COMPETENT EXPERTS

Topic	Role	Company	Qualifications/competencies/experience of author
Traffic and Transportation	Author	AECOM	BSc(Eng) Experience Transport Planning/Traffic Engineering – 50 years Environmental Assessments – 32 years Chartered Engineer (CEng) Member of the Institution of Civil Engineers (MICE) Member of the Chartered Institute of Highways and Transportation (MCIHT)r

GLOSSARY AND ABBREVIATIONS

Term	Definition
DMRB	Design Manual for Roads and Bridges
EMR	East Midlands Railway
IEMA	The Institute of Environmental Management and Assessment
KSI	Killed or seriously injured
LOS	Level of Service
MML	Midland Mainline – the railway line between St Pancras International and Sheffield
PEIR	Preliminary Environmental Information Report
PIC	Personal Injury Collisions

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