THE PLANNING ACT 2008

M4 (JUNCTIONS 3 TO 12) (SMART MOTORWAY) DEVELOPMENT CONSENT ORDER APPLICATION

TR010019

Issue Specific Hearing - Road Safety

Appendix A - Road Safety Additional Representations

Deadline IV - 26 November 2015

DEADLINE IV RESPONSES - ROAD SAFETY - APPENDIX A

ADDITIONAL REPRESENTATION

HIGHWAY ENGLAND'S RESPONSE

1. ROAD SAFETY HEARING

1.1 Provide reference for the document that notes the motorway stake 21% of the flows but only have approximately 5% of accidents

Highways England Comment

1.1.1 The reference is in 'Reported Road Casualties Great Britain: 2014 Annual Report - Moving Britain Ahead (September 2015)'. The text on page 31 says:

"Although motorways carry around 21 per cent of traffic, they only account for 5.4 per cent of fatalities and 4.7 per cent of injured casualties".

1.1.2 Chart 11 on page 32 shows that approximately 5% of accidents are on motorways. A copy of the report is provided in Appendix B to the written summary of the Issue Specific Hearing regarding Road Safety.

1.2 Provide details of accident hot spots in the scheme area to compare against national safety figures

Highways England Comment

Background

1.2.1 This response provides details of accident hot spots in the M4 J3-12 Scheme area and compares the accident rates for the M4 J3-12 with the national average.

Comparison of M4 J3-12 Accidents with the National Average

1.2.2 A summary of the review of Personal Injury Accidents ("PIA") and casualty data from STATS19 is presented in Table 2a. England Motorway average figures were calculated from data provided in the 'Reported Road Casualties on the Strategic Network 2012'.

Table 2a: Casualties per 100 million vehicle miles for the Scheme per year and comparison

	Annual number of casualties per 100 million vehicle miles	
	M4 J3-12 average 2009-12	**England motorway average 2012**
Fatal rate	0.12	0.14
Serious rate	1.38	1.04
KSI rate	1.50	1.18

Slight rate	20.86	13.61
Total rate	**22.36**	**14.79**

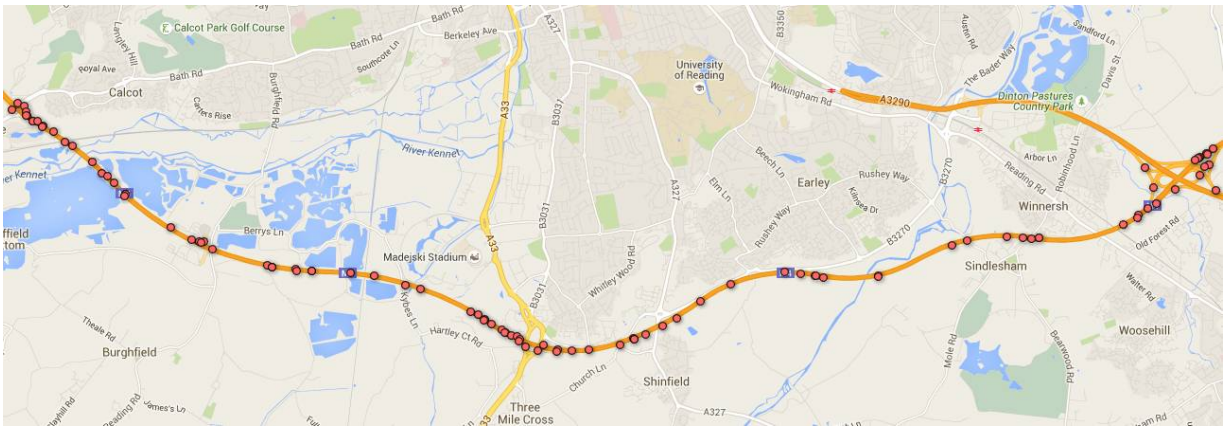
1.2.3 Compared to the England Motorway 2012 data this section of motorway has a similar fatality rate and a higher serious, KSI, slight and total casualties rate per 100 million vehicle miles. The higher slight casualties rate could be due to the regularly experienced high traffic flows and congestion on this section of motorway, as congestion generally results in higher numbers of slight casualty accidents because the accidents occur at lower speed.

Accident plots across M4 J3-12

1.2.4 Accident locations have been analysed on the M4 J3-12 section to ensure that any particular accident cluster locations or links that have a high level of accidents are reviewed and considered in order to provide appropriate design mitigation through the Smart Motorway Scheme.

1.2.5 Figures 3a, b and c below show the number of accidents on the M4 J3-12 section from 2009 to 20121. It can be seen that the accidents are generally fairly evenly distributed across the length of the M4 J3-12 section. The accident plots also show that incidents are more likely to occur at junctions where there is merging and diverging traffic and where vehicles are more likely to make lane changing manoeuvres. The plots also show that as the traffic density increases towards London there is a higher cluster of accidents, particularly on the J5-4b link.

Figure 3a: Accidents on J12-10



[1] The accident analysis for the Hazard Log (Annex E of the Engineering and Design Report - Application Document Reference 7-4) was undertaken in 2014. STATS19 data for 2013 was not available at that time so the accident data analysis was based on 2009 - 2012 figures.

Figure 3b: Accidents on J10-J7

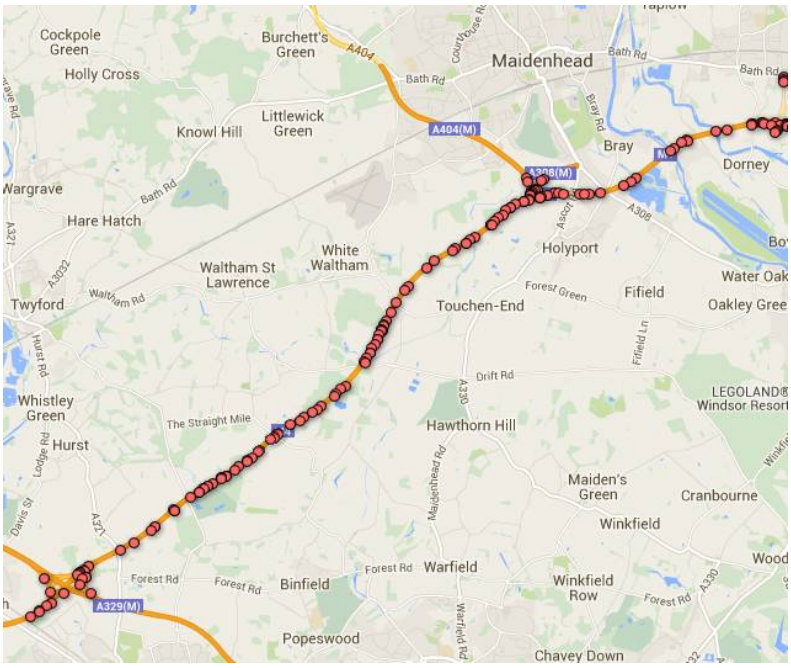
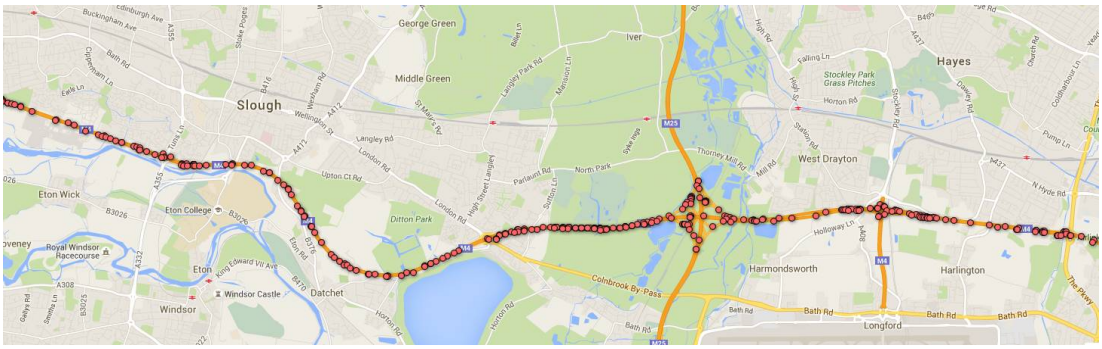


Figure 3c: Accidents on J7-J3



1.2.6 Table 3a below shows accident rates on each link of M4 J3-12 between 1 October 2009 and 30 September 2012.

Table 3a: Accidents per mile for M4 J3-12 links per year and comparisons for 2012

Link	Accidents per 100m veh-km	Accidents per mile
J3 to J4	**19.03**	**7.78**
J4 to J4b	**27.36**	**8.22**
J4b to 5	**41.18**	**15.32**
J5 to J6	**11.70**	**4.35**
J6 to J7	**18.41**	**6.80**
J7 to J8/9	**14.41**	**6.02**

J8/9 to J10	**44.42**	**17.39**
J10 to J11	**14.81**	**5.13**
J11 to J12	**20.01**	**8.58**
M4 J3 to 12 scheme	**14.25**	**6.26**
England motorway average (2012)	**9.14**	**2.70**

1.2.7 It can be seen from Table 3a that two links show a significantly higher accident rate compared to both the Scheme average and the England motorway average for 2012. The eastbound J5-4b link currently experiences a significantly higher than average accident rate. Queuing from the clockwise merge onto the M25 causes congestion to build back to the M4 resulting in a congestion seed point on the M4. This has been considered within the Scheme design, which will provide 5 lane smart motorway operation (an extended diverge) along the J5-4b link east of the Sutton Lane overbridge. The J4b diverge is restricted by the volume of traffic able to merge with the M25 and therefore the Scheme will not be able to address the cause of this capacity restriction. However, the Scheme is expected to be able to limit the subsequent impact on M4 mainline traffic.

1.2.8 The link between J8/9 and J10 is a long link and the junctions at J8/9 and J10 currently contribute to morning peak congestion. In many cases this situation extends the effect of congestion shockwaves which originated downstream (often from J6). These circumstances can also generate new congestion seed-points during the morning peak where merging traffic flows are high. The addition of an extra lane as part of the Scheme will improve mainline capacity and allow the mainline traffic to more easily accommodate the merging flows and reduce the risk of peak flow traffic turbulence.

Summary

1.2.9 The accident rate for the M4 J3-12 does have a slightly higher overall accident rate than the national average. Analysis of the accidents has shown that accidents are generally fairly evenly distributed across the length of the section of the M4 proposed to be improved as part of the Scheme, with a higher number of accidents generally occurring at junctions. In addition, the links between J5-4b and J8/9-10 have a significantly higher rate of accidents when compared with the national average.

1.3 Provide a paper on how safety performance can be secured

Highways England Comment

Background

1.3.1 This paper addresses the question of how the safety performance of the M4 J3 to 12 Smart Motorway Scheme will be secured.

Safety Performance

1.3.2 As stated at the issue specific hearing concerning road safety, the UK strategic highway network is one of the safest in the world and Highways England has declared aspirations to work towards the highest safety performance standards.

1.3.3 The safety of the network is secured through the 'Highway England license - the Secretary of State for Transport Statutory Directions and Guidance to the Strategic Highways Company'. Section 5.16 of the Highways England licence states 'the Licence holder must develop and implement strategic plans that demonstrate how it will meet its legal duties and other obligations with regard to safety, including the requirements of 5.152, to be published to timescales specified in the Licence holder's Delivery Plan'.

1.3.4 Highways England has a legal duty to ensure the safety of the network and the M4 J3-12 Smart Motorway Scheme is designed, and will be operated, in line with this license. The Scheme will align with the Strategic Framework for Road Safety, which the Government has put in place to ensure that Britain remains a world leader in road safety. The framework monitors the performance of the network and provides transparency together with supporting education and enforcement initiatives to continue to improve safety on the road network.

1.3.5 There is consequently no requirement for the safety performance of the Scheme to be secured through the DCO, as Highways England is already under a legal obligation to do so.

1.3.6 Additional reasons for there being no need to secure the safety performance via a requirement in the DCO are as follows:

Confidence of the safety and hazard log approach

1.3.6.1 The M4 J3 to 12 Smart Motorway Scheme has no scheme-specific risks, i.e. risks which are not found within other operational smart motorway schemes or elsewhere on the network. Consequently, all of

[2] Section 5.15 of the Highway England license states 'In complying with 4.2(e) and its general duty under section 5 (2) of the Infrastructure Act 2015 to have regard to safety, the Licence holder should, when exercising functions related to safety, have due regard to the need to protect and improve the safety of the network as a whole for all road users, including:

a. Ensuring that protecting and improving safety is embedded into its business decision-making processes and is considered at all levels of operations;

b. Seeking to achieve the best possible safety outcomes across its activities, while working in the context of sustainable development and delivering value for money; and

c. Taking opportunities to engage with and support wider efforts to improve safety for road users'.

the potential risks have been assessed against performance criteria within the strategic road network. The assessment used for the safety assessment on the Scheme is the same approach and methodology as utilised for previous smart motorway schemes, which have been shown to provide a good indication of the expected safety performance upon implementation. Consequently, Highways England is confident of the robustness of the hazard assessment approach undertaken for the Scheme.

Monitoring and Mitigation Measures

1.3.6.2 Once the Scheme goes live, operational monitoring will be undertaken for a period of at least three years. This operational monitoring will validate key / critical assumptions recorded in the Scheme safety hazard log (ref Annex E of the Engineering and Design Report – Application Document Reference 7-4), those which relate to some departures from standard, and some key design decisions. On receipt of the data obtained through the operational monitoring this information will be compared with the assumptions made in the hazard log and any parameters and performance criteria.

1.3.6.3 Should the data be outside acceptable tolerances then Highways England will analyse the data to understand the root cause of any performance differences. This will include an understanding of how the performance impacts on the overall level of risk on the Scheme.

1.3.6.4 Once a full understanding of the root cause of the problem has been obtained, the following general measures have been identified as potentially suitable mitigation measures for application to the appropriate aspects of the Scheme (individually or in-combination) to achieve expected Scheme performance:

(a) Changes to sign and signal settings (including new MS4 legends if required);

(b) Variation to the duration of Variable Mandatory Speed Limits during specified periods;

(c) Increased CCTV surveillance of the Scheme (using the 100% CCTV coverage to be provided as part of the Scheme);

(d) Changes to Traffic Officer Service procedures (within the Regional Control Centre ("RCC") and/or on-road procedures);

(e) Implementation of appropriate driver education programmes;

(f) Installation of more technology software (e.g. enhanced incident detection system); and

(g) Installation of more signage sequences.

1.3.7 None of the above mitigations will require any changes or have any impact on the provisions of the DCO.

Summary

1.3.8 Highways England is confident of the hazard assessment approach undertaken for the Scheme (which has been proven on previous smart motorway schemes) and there are no Scheme-specific risks. Consequently, there are no grounds to believe the Scheme will not meet its safety objective. The requirement for Smart Motorways is to confirm that the road will be made no worse than the baseline by the introduction of the Scheme and the analysis undertaken for the Scheme shows a safety benefit is expected to result from implementation of the Scheme. The Highways England license provides governance required and the assurance that Highways England has a legal duty to ensure the safety of the network.

1.4 Provide a note confirming the current CCTV coverage percentage on the scheme (Do Minimum)

Highways England Comment

1.4.1 The Scheme will introduce full (i.e. 100%) CCTV coverage, installing approximately 100 additional cameras which will be a significant improvement in the level of coverage currently on the M4 between junction 3 and junction 12.

1.4.2 The existing CCTV cameras within the Scheme area are shown in Table 1. There are 30 existing cameras, 14 are at junction sites and 16 are located within links.

Table 1: Existing CCTV Cameras on M4 between J3 and J12

Link	Existing CCTV Cameras
Within J3	1
Between J3-4	1
Within J4	3
Between 4-4b	1
Within J4b	1
Between J4b-5	2
Within J5	2
Between J5-6	1
Within J6	1
Between J6-7	0
Within J7	2
Between J7-8/9	1
Within J8/9	1
Between J8/9-10	4
Within J10	2
Between J10-11	3
Within J11	1
Between J11-12	2
Within J12	1
Total	**30**

1.4.3 A desktop assessment has been undertaken to establish the number and location of CCTV cameras required to provide full coverage (as outlined within section 6.30 of the IAN 161/13 Smart Motorways All Lane Running design standard) for the Scheme. As outlined within the Engineering and Design Report (Application Document reference 7-3, APP-096), approximately 130 Pan, Tilt and Zoom ("PTZ") CCTV cameras installed on 15m masts will be needed to ensure there is full coverage of all driving lanes.

1.4.4 The final number of cameras will be confirmed during the detailed design stage. There has been no assessment of the existing level of coverage on the M4 between junctions 3 and 12. As the Scheme will introduce full coverage, Highways England considered that it was not necessary to assess the exact percentage coverage on the existing M4 motorway. The exact camera locations and quantity will be determined within the detailed design stage, when a high level survey will be undertaken on site to confirm that full coverage will be achieved.

1.5 Provide source data for 8-10 non safety stops on hard shoulder and compare difference with genuine stops

Highways England Comment

1.5.1 The report entitled 'Evaluation of the provision of Refuge Areas' (Ref: MMFD-ERA-030- Final Issue – June 2012) provides the source for the statistic. On page 16, the report states:

"On dual 3-lane motorways, discretionary stops (comfort stops and vehicle checks on the hard shoulder, i.e. illegal stops) outnumber breakdowns by between 8 and 10 times".

1.5.2 A copy of the report is provided in Appendix C to the written summary of the Issue Specific Hearing regarding Road Safety.

1.6 Provide evidence regarding coasting of vehicles prior to breakdown

Highways England Comment

1.6.1 Evidence regarding coasting of vehicles prior to breakdown is provided below and also the 2001 paper entitled 'Safe Haven Layby Frequency and Specification' which is provided in Appendix D to the written summary of the Issue Specific Hearing regarding Road Safety.

Background

1.6.2 This response provides copies of source reference documents for emergency refuge spacing within Interim Advice Note ("IAN") 161/12 and explains the background to the understanding that the majority of drivers can nurse their vehicle when breaking down to reach a place of safety, such as an Emergency Refuge Area ("ERA").

Evidence used for M4 J3-12 Smart Motorway Scheme

1.6.3 The monitoring of a section of the M42 Pilot scheme where ERAs were located at a nominal 800 metre spacing provided the evidence published in a document entitled 'ATM Safety Monitoring: First set of 4-Lane MVSL Results' (document reference 42690DOC/0056) (attached as Appendix E to the written summary of the Issue Specific Hearing regarding Road Safety). The document summarises the main results from the study and states *"Compared with a similar analysis that took place before the Hard Shoulder was opened to traffic (March 2006), the number of stops on the Hard Shoulder has substantially reduced. None took place during the 4L MVSL [4 Lane Mandatory Variable Speed Limits] operational regime. Of vehicles that needed to stop on the ATM pilot (vehicle checks, comfort stops, other stops and breakdowns) 85% used the ERAs as opposed to the Hard Shoulder"*. This monitoring and the subsequent three year monitoring report indicated that a wider spacing of ERAs did not compromise the expected use or usefulness of the ERAs and gave confidence in the design guidance in IAN 111/09.

1.6.4 Consequently, as the Smart Motorway all lane running ("ALR") design was developed the attached report entitled 'Evaluation of the provision of Refuge Areas' (Ref: MMFD-ERA-030- Final Issue – June 2012) was published. The report presents a number of items of research and evidence that are relevant to the provision of ERAs at a spacing of 2500m adjacent to four permanent running lanes and at Section 4.4 states: *"The vehicle breakdown rate varies considerably depending upon location. It is particularly important to note the evidence from the Bromford Viaduct supports the view that many drivers are able to nurse a broken down vehicle up to a few Km distance before stopping (in carriageway locations where drivers perhaps perceive themselves to be vulnerable)"*.

1.6.5 The report also references an earlier report entitled 'Safe Haven Lay-By Frequency and Specification' – (December 2001 by Oscar Faber) which states the following:

"A statistic that is of particular interest is the number of breakdowns occurring in contra flow systems when the vehicle is being driven in an enforced condition without a hardshoulder. Table 3.1 provides a comparison between breakdowns on motorways with hardshoulders and in motorway/dual carriageway contra flow systems.

Table 3.1 - Comparisons of Breakdowns On Motorways And Contra Flow Systems

Condition	**Breakdown per Million Vehicle Kilometres**	
	Light Vehicle	**Heavy Vehicle**
Motorway with hardshoulder	20	10
Contra-Flow	9	5

The table shows that in the enforced contra-flow condition the number of breakdowns is approximately half that for a motorway with hard shoulder. This suggests that 50% of drivers who have a breakdown in a contra-flow are able to exit the system under their own power before stopping.

This statistic is repeated in other research within the literature review that shows that between 40 and 50% of breakdowns on motorways with hard shoulders travel

to within 50 metres of an emergency telephone indicating that up to half of breakdowns are able to travel under their own power for at least one mile.

Taking these two statistics together, if drivers are equally less inclined to stop in an ATM scheme as for a contra-flow, and, up to 50% of drivers in breaking down vehicles can travel under power for at least a mile, then we may assume that 50% of breakdowns will travel to the nearest safe haven or exit in an ATM scheme".

Summary

1.6.6 Highways England considers that the evidence outlined above evidences the fact that in the case of a breakdown 50% of drivers will be able to get their vehicles to a place of safety.