

## **Appendix 'A'**

### **Traffic safety assessment of the ongoing partial lighting switch off trial on M65 J10-J14 and the current proposal to remove its central reserve's lighting columns**

#### **EXECUTIVE SUMMARY**

This report was prepared as an update to the safety report of March 2011 on the pilot scheme carried out in November 2011 which involved lighting switch off from midnight to 5am on the County's M65 J10-J14 link sections (excluding junctions).

The findings of the study were that in the 2 year 'after' monitoring period, there was a reduction in accident density as well as darkness rate from the long term accident average.

No darkness accidents were reported to the police during the switch off period midnight to 5am.

Based on the limited data in the 24 months 'after' the lighting modification, accident analysis indicates that traffic safety will not be significantly affected if no M65 J10 to J14 link lighting is replaced following the replacement of the existing steel barriers along its central reserve.

#### **INTRODUCTION**

Lancashire County is the highway authority for the M65 motorway between J10 to 14. The Highways Agency in 2009 made changes to the lighting period along M65 west of J10 for reducing energy costs. Lancashire County having assessed such a proposal regarding J10 to J14 (excluding junctions) also applied a similar lighting switch off period, midnight to 5am.

This report reviews traffic collisions reported in the first 24 months since the lighting trial scheme along the M65 length between J10 and J14. Considering that the central reserve barrier is to be taken down and replaced over the next 2 years, it also assesses the safety implications if no lighting is provided between J10 and J14.

#### **COLLISION ANALYSIS**

A comparison of the 59 personal injury accidents (PIA) on M65 J10-J14 (5 year search: 2005-2009) against the 14 PIA (two year 'after' partial switch off period: 1.12.2011-30.11.2013) is shown in Table 1. The following conclusions were drawn from Table 1:

- in the two years 'after' switch off (Dec.2011 to Nov.2013), there have been 14 personal injury accidents reported to the police, producing a low accident density of 0.8 PIA/km/year when compared to the long term average of 1.3 PIA/km/year. A fatal accident which occurred on 23.11.2013 involved a driver under the influence of alcohol who lost control at the central grassed verge during darkness hours and hit the nearside barrier.
- There have been no accidents in the 'after' period between midnight and 5am.

- the annual average of 7 PIA recorded in the 'after' period is lower than the long term average of 11.8 PIA per year.
- in more detail, two PIA occurred during darkness on a flooded surface, just south of Springwood Occupation bridge and a drainage investigation is recommended.
- the reported injury and darkness accident average was reduced in the first 24 months following partial lighting switch off (midnight to 5am). Overall darkness accidents were below norm and the M65 link route had below average PIA risk. Therefore, the trial's modification to its lighting has not significantly affected safety. Two of the 3 darkness accidents occurred during peak periods between November and December and were due to flooded surface or aggressive driving, ie.were not directly related to busy traffic conditions.
- Two fatal PIAs (3.4%) have occurred along the M65 link length J10 to J14, between 2005 and 2009, one occurred during darkness and involved a child pedestrian who walked into the path of an overtaking car, the latter one occurred in daylight when a car driver lost control and overturned. Also from the 10 serious accidents (16.9%), 3 had occurred during darkness.
- the number of darkness accidents per year was down to 14.3% from the long term average of 25.4%.
- assuming that no major traffic pattern change will occur in future, then based on the current 'after' accident trend, the proposed lighting column removal along the M65 mainline in Lancashire County will not adversely affect safety. However, a 3 year 'after' period would produce a more acceptable statistical analysis and conclusions.

Also from Table 2:

- The small data sample of two darkness PIA, was statistically compared to the darkness PIAs along the M65 links J1-J10 which was used as the 'control' site, in order to find out if the reason was due to random fluctuation or due to a real environmental change. A two year 'before' period was also used to analyse the control site data (1.12.2006 - 30.11.2008), ie. before the Highways Agency's lighting switch off (midnight to 5am) in 2009 on M65 west of J10. The control site accidents were used to calculate the probability that any difference in the ratio darkness to daylight risk, was due to random fluctuation than a real one. A Fisher exact statistical test gave a low probability of 52%. This indicates that the small number in darkness 'after' accidents were not significantly different to what would be expected by chance, ie. we can only be 42% confident that a real change has taken place in site risk.

Generally, both sites have exhibited higher PIA numbers during am peak with a lesser extent at midday and at pm peak periods and follow closely the M65 traffic peaks.

From Table 3:

- There were 4 fatal accidents of which one occurred during darkness hours and involved a child pedestrian who walked into the path of an overtaking vehicle. There were 38 darkness accidents (20.7%) from a total of 183 PIA on M65 links between 2004 and 2008. If the lighting columns are removed and are not replaced after the central barrier improvement, we can assume say a 10% increase in the above 38 darkness accidents. This is based on reverse thinking to when installing link section lighting a 10% accident saving would be expected (Ref. 1). In our scenario, the effect of slower reaction when braking during darkness would result in 3.8 additional accidents per year which for the section J10-J14 would correspond to 0.17 PIA/year [ie.  $10\% \times 38 \text{PIA} / 5\text{yr} \times 9.2\text{km} / 41.6\text{km}$ ]. The overall darkness accident percentage with the additional accident would still be below the general 30% darkness norm. If we use the estimate made in 2011 Road & Transport safety assessment report of 0.3 annual accident increase due to lighting switch off, the estimated darkness accidents would still be within the 30% darkness norm.

## RECOMMENDATIONS

- 1) No high risk site was found involving darkness accidents.
- 2) No accidents were reported to the police between midnight and 5am in the two years after the trial switch-off period. However, a three year monitoring period would produce more definite conclusions.
- 3) Investigate the potential of surface flooding at the 100m section south of Springwood Occupation bridge.
- 4) Almost 0.2 PIA per year may be expected if the proposal to remove the lighting columns is materialised. This has been calculated based on the current accident history and existing traffic flows and traffic speeds. Police enforcement may be needed if drivers travel faster during darkness hours after such implementation.

(Ref. 1) .....Highways Agency Advice Note TA49/07: Appraisal of new and replacement lighting on the strategic motorway and all-purpose trunk road network. DMRB Vol 8, Sec 3, London.

If a previous estimated figure of 0.3 annual accident increase would be considered, overall, we would still have a darkness accident rate below 30% norm. Table 4 shows that currently there has been a low accident record during darkness at peak hours.

- 5) Consultation with Emergency Services concerning the proposal to remove the existing lighting columns along the central reserve is needed.
- 6) If the lighting column removal goes ahead, a review of the injury accident situation

one year after scheme completion is recommended. If there was a sudden great increase in darkness accidents following this, the first 12 month review could consider speed limit reduction measures.

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Table 1. Darkness accident relationship over time for M65 J10-J14.

(M65 links J10-J14).	PIA	PIA density (PIA/km/yr)	Darkness PIA Nos (%)	PIA by Time of Day		
				Midnight to 5am	5am to midday	Midday to midnight
5 years (1.1.2005-31.12.2009)	59	1.3	15 (25.4%)	3 (3 in darkness)	25 (2 in darkness)	31 (10 in darkness)
2 years 'After' (1.12.2011-30.11.2013)	14	0.8	3 (21.4%)	0	9 (1 in darkness)	5 (1 in darkness)

Table 2. Night to day accident relationship against the control site (2 years 'before' .v. 2 years 'after')

VARIABLES	'AFTER' SITE M65 J10-J14	'BEFORE' CONTROL SITE M65 J1 to J10
PIA, Darkness hours	3	11
PIA, Daylight hours	11	58

Table 3. M65 LINKS, 2004-2008: Injury accidents by severity and lighting condition

SEVERITY \ LIGHTING	4 Fatal	25 Serious	154 Slight	183 Total
Darkness PIA	1	9	28	38
Daylight PIA	3	16	126	145

Table 4. Accidents by month and lighting condition during the M65 lighting switch

off period, midnight to 5am, Nov2011-Nov 2013.

Month	Time of Day (cause)	
	Daylight	Darkness
January	12:40 (lost control, lane change)	
February	08:30 (shunt), 09:51 (shunt)	
March		
April	19:54 (lost control)	
May	15:40 (flooded area)	
June		
July	11:00 (stone hit car window)	
August		
September	11:25 (speeding)	
October	08:48 (dog in carriageway), 12:49 (shunt)	
November	08:25 (previous accident)	17:12 (aggressive driving)
December	08:45 (ice, lost control)	06:20 (flooded area, lost control), 08:25 (flooded area, lost control)