Highways Consultancy Group - Highways Research Group

M42 MM Monitoring and Evaluation

Three Year Safety Review

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Executive Summary

In September 2006, the Four Lane Variable Mandatory Speed Limit (4L-VMSL) operational regime was introduced in both directions of the M42 Managed Motorway (MM, previously referred to as Active Traffic Management) scheme between junctions 3A and 7.

This report reviews the first 36 months of validated Personal Injury Accident (PIA) data during 4L-VMSL operation and compares the results against Three Lane Variable Mandatory Speed Limit (3L-VMSL) operation and the period prior to the implementation of MM, known as NO-VSL (NO-Variable Speed Limits).

Overall there has been a reduction in the number of PIAs and the severity of accidents during the first 36 months of 4L-VMSL operation compared to 3L-VMSL and NO-VSL operation.

Analysis of the PIA data indicates that:

- **The total number of PIAs during the first 36 months of 4L-VMSL operation has decreased compared to equivalent time periods during 3L-VMSL and NO-VSL operation. During the first 36 months of 4L-VMSL operation a total of 81 PIAs were recorded compared to a prorated number of 114 and 183 PIAs in the 3L-VMSL and NO-VSL cases respectively. This is equivalent to 2.25 accidents per month compared to 3.17 and 5.08 in the 3L-VMSL and NO-VSL cases respectively; this represents a 55.7% reduction between NO-VSL and 4L-VMSL.**
- PIAs which have occurred during the periods when hard shoulder running was operational have accounted for 22 out of the total 81 PIAs; all of these were slight in severity. However, it should be noted that it is not possible to ascertain whether these accidents are directly attributable to MM or hard shoulder running or not.
- There has been a notable reduction in the severity of accidents during 4L-VMSL operation compared to the 3L-VMSL and NO-VSL cases. During the first 36 months of 4L-VMSL operation the accident Severity Index was 0.07 compared to 0.16 for the 3L-VMSL and NO-VSL cases. This is also true for the casualty Severity Index which has fallen from 0.14 and 0.11 in NO-VSL and 3L-VMSL respectively to 0.05 in 4L-VMSL. Furthermore, the monthly mean number of Killed or Seriously Injured (KSI) casualties has fallen from 1.15 in NO-VSL to 0.19 in 4L-VMSL. A definition of what the Severity Index represents, along with other commonly used terms, can be found in the Glossary that immediately follows this Executive Summary.
- Of the 22 accidents that occurred during hard shoulder running, 14 were rear shunt type accidents; despite this the overall percentage of rear shunt collisions has remained fairly constant across the three operational regimes meaning that 4L-VMSL has neither increased nor reduced this type of accident. In contrast, the proportion of side impact type collisions has increased over time from 16.1% during NO-VSL to 30.9% in 4L-VMSL.

- The two-way accident rate per billion vehicle miles travelled (bvmt) for 4L-VMSL was 47.98. This figure is lower than the accident rate for 3L-VMSL of 63.75 accidents per bvmt and notably lower than the accident rate for NO-VSL which was 115.92 accidents per bvmt; the motorway national average is currently 107.15 accidents per bvmt.

In summary, the review of the 4L-VMSL operational regime in terms of road safety has revealed that the number of PIAs has reduced since its introduction compared to equivalent time periods in the previous operational regimes (3L-VMSL and NO-VSL). It should be noted that as only 6 months of PIA data has been reviewed for 3L-VMSL and, it is possible that the results are not fully representative.

Furthermore, there has been a notable reduction in the number of people being fatally or seriously injured suggesting that, when accidents do happen, vehicle occupants are more likely to be slightly injured than fatally or seriously injured.

Glossary

AADT – Annual Average Daily Traffic.

Accident – involves personal injury in which at least one road vehicle is involved and which becomes known to the police within 30 days of its occurrence. This excludes damage only accidents. One accident may give rise to several casualties.

Accident Rate – number of personal injury accidents per billion vehicle miles travelled (bvmt)

Accident Severity Index – the ratio of fatal and serious accidents to all accidents.

ATM – Active Traffic Management.

Bvmt – Billion vehicle miles travelled.

Casualty – a person who is killed or injured in an accident.

Casualty Severity Index – the ratio of fatal and serious casualties to all casualties.

Fatal Accident – an accident in which at least one person is killed in or dies within 30 days of an accident.

Fatality – a casualty who sustained injuries that caused death at the time of or within 30 days of an accident.

Injury Accident – an accident involving human injury or death.

KeyACCIDENT – an accident data analysis software package that allows the user to interrogate STATS19 accident data and is provided by Key Traffic Systems

Killed or Seriously Injured (KSI) – combination of fatalities and serious injuries.

KSI Casualty Rate – number of KSI Casualties per bvmt.

MM – Managed Motorways

Personal Injury Accident (PIA) – an accident involving at least one road vehicle resulting in human injury or death which becomes known to the police within 30 days of its occurrence. This excludes damage only accidents.

Serious Accident – an accident in which at least one person is seriously injured and in which no fatalities occur.

Serious Injury – an injury for which a person is detained in hospital as an in-patient, or any of the following injuries regardless of whether they are detained in hospital: fractures, internal injuries, severe cuts, crushing, burns (excluding friction burns), concussion, severe general shock requiring hospital treatment and lacerations, severe general shock requiring medical treatment and injuries causing death 30 or more days after the accident.

Severity Index – the ratio of fatal and serious accidents or casualties to all accidents or casualties.

Slight Accident – an accident in which at least one person is slightly injured and in which no one was seriously or fatally injured.

Slight Injury – an injury that is minor in character. Slight injuries might not necessarily require medical treatment. The following injuries are classed as minor injuries: sprains, neck whiplash injury, bruises, slight cuts, and slight shock requiring roadside attention.

STATS19 – method by which Personal Injury Accident data is collected. STATS19 consists of a defined list of variables which should be completed by the relevant Police Force.

1st Road – the primary road on which an accident is recorded to have occurred.

2nd Road – a secondary road onto which a vehicle involved in an accident was manoeuvring or came to a rest.

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1. Introduction

1.1 Background

Managed Motorways (MM, formerly known as Active Traffic Management) was introduced by the Highways Agency (HA) on both carriageways of the M42 between J3A and J7 in 2006. The key aspects of MM on the M42 are:

- the use of variable mandatory speed limits;
- the dynamic use of the hard shoulder during periods of congestion;
- the provision of dedicated Emergency Refuge Areas (ERA) for use when vehicles break down;
- the installation of gantries with signals and Variable Message Signs (VMS).

The implementation of MM, in particular hard shoulder running, represents a change in policy in terms of the operation of motorways in England. To determine whether this has had a detrimental impact on road safety or not, MM operation has been monitored throughout its early stages of implementation.

The HA commissioned Mott MacDonald to undertake this monitoring and evaluation of the M42 MM Project. This includes assessing changes in a number of indicators including throughput, journey time, and accidents as a result of the introduction of MM and its associated operational regimes.

1.2 Operational Regimes

Following the period prior to the implementation of MM, known as No-Variable Speed Limits (NO-VSL), MM was introduced through two main operational regimes which are used to manage motorway traffic. These operational regimes are explained below:

- **Three Lane Variable Mandatory Speed Limits (3L-VMSL):** This operational regime uses variable mandatory speed limit signs to maintain flow through heavily congested sections of the motorway. The activation and deactivation of the system are reliant on pre-identified flow and speed thresholds. 3L-VMSL operates automatically, although operators are able to intervene with the operation if necessary.
- **Four Lane Variable Mandatory Speed Limits (4L-VMSL):** This operational regime uses variable mandatory speed limits, as well as the optional use of the hard shoulder as a running lane, to manage the traffic on the motorway. The hard shoulder can only operate as a running lane for traffic when the operators in the West Midlands Regional Control Centre are confident that the lane is free from obstructions and/or stationary vehicles. Once the check is complete, the hard shoulder is opened and a mandatory speed limit of 60mph or less is activated. The activation and deactivation of the system are reliant on pre-identified flow and speed thresholds; although the final decision on the activation of 4L-VMSL can only be made by the operator.

Construction of the MM scheme started in March 2003. **Table 1.1** shows the date ranges of accident data analysed for each operational regime.

Time Period	PIA data start date	PIA data end date	Number of months
NO-VSL	9th June 1998	8th June 2003	60
3L-VMSL	1st February 2006	31st July 2006	6
4L-VMSL	1st October 2006	30th September 2009	36

Table 1.1: Date Ranges of Data for Operational Regimes

1.3 Scope of Report

This report reviews the first 36 months of Personal Injury Accident (PIA) data during 4L-VMSL operation and compares the results against the period of 3L-VMSL operation and the M42 prior to the implementation of MM (NO-VSL).

The results from the analysis of the PIA data are presented in tables and graphs within this report, to illustrate and determine whether there are any unusual patterns in PIAs following the introduction of 4L-VMSL which were not apparent during other operational regimes.

1.4 Outline of Report

This report includes the following sections:

Section 2 outlines the methodology used within the report.

Section 3 provides an analysis of the accident figures for the M42.

Section 4 summarises the findings of this report.

Section 5 gives the references used within this report.

Appendix A details formulae for calculations used in the report.

Appendix B includes the polygon used to search for accidents on the M42.

Appendix C includes the M42 supporting accident tables.

Appendix D contains the detailed accident plots for the three M42 operational regimes.

Appendix E contains tables of all M42 accidents included in the analysis for this report, by operational regimes.

Appendix F includes a table indicating which of the 81 accidents occurring in 4L-VMSL occurred when hard shoulder running was in operation. Tables of accidents occurring during peak periods in all operational regimes are also presented.

Appendix G details the location of the accident cluster sites for the NO-VSL period.

2. Methodology

2.1 Analysis Structure

The analysis presented in this report assesses accident data for the M42 in both directions between Junction 3A and Junction 7. The data analysed covers the five year period prior to construction and the period up to the most recent data available: therefore the period of 9th June 1998 to 30th September 2009 has been assessed.

The accident analysis is divided by operational regimes, as shown in **Table 1.1**.

Although 4L-VMSL became operational on 12th September 2006, PIA data has been analysed from 1st October 2006 to 30th September 2009 so that 36 whole months of data could be analysed. In terms of 3L-VMSL this operational regime became active on the 29th October 2005. However the period up to the end of January 2006 was considered to be a settling in period. As such, PIA data has been analysed for the period from the 1st February 2006 to 31st July 2006.

Accident data analysed as part of the review of the different operational regimes of the M42 has included the following accident analysis techniques:

- **Severity** - The recording of the most severe casualty for each accident. For example, if an accident included one fatal and two serious casualties, the accident would be recorded in this section as a fatal accident.
- **Severity Index** - The Severity Index is the ratio of the number of fatal and serious accidents or casualties to the total number of accidents or casualties recorded. The formula used to calculate the Severity Index is included in **Appendix A**.

The main emphasis of this analysis is on the main carriageway as this is where the main effect of MM is expected. As a result, the analysis has focused on the PIAs occurring on the M42 MM section excluding junctions. A junction is defined as the last 20 metres of the off-slip, together with the junction itself.

- **Accidents per billion vehicle miles travelled** – Accidents along a length of carriageway are calculated over a period of time to determine a value of accidents per billion vehicle miles travelled. This rate is compared against a national average value for motorways. The formula for the calculation is included in **Appendix A**.

2.1.1 Previous Accident Analysis

Previous analysis of the NO-VSL PIA data was completed in 2004 and the results presented in the Road Safety 'Before' Report [Ref. 2] (references can be found in **Section 5** of this report). In addition, 12 Month [Ref. 5] and 24 Month Safety Reviews [Ref. 5] have been completed following the start of operations. A number of changes in the way in which the PIA data has been analysed have occurred since the initial Road Safety 'Before' Report [Ref. 2]; these changes are detailed below:

(i) Accident Analysis Software

The original analysis completed for the 'Before' period [Ref. 2], referred to here as the NO-VSL period, was completed utilising JSYS accident analysis software, which is no longer used. The previous analysis was undertaken manually using data interrogated by JSYS software and was open to subjective interpretation by those undertaking the analysis. The 'Before' period analysis presented in this report was completed during the 12 Month Safety Review [Ref. 4] and uses KeyACCIDENT software. This allows the data analysis process to be more automated and is therefore more reliable.

(ii) Variation in Datasets

It should be noted that prior to 1st January 2005 police authorities had their own individual set of contributory factors and therefore difficulties in comparing accident data between different police authorities could be experienced when the analysis of these contributory factors was undertaken.

From the 1st January 2005 onwards, a number of changes were introduced to the STATS19 recording process which included the recording of contributory factors for accidents from a list of nationally standardised codes. This improved the recording of contributory factors and enabled an easier comparison to be made between the 3L-VMSL and 4L-VMSL operational regimes.

2.1.2 Reviewing Previous Accident Analysis

As a result of the above changes, all the previous safety data analysis completed for the three operational regimes was reviewed during production of the 12 Month Safety Review [Ref. 4] completed by Mott MacDonald so that the methodology for the analysis is consistent across all three periods (NO-VSL, 3L-VMSL, 4L-VMSL).

2.2 Accident Data Details

The PIA data used in this report is in the form of validated STATS19 data sourced from the Department for Transport (DfT). The term 'STATS19' refers to the data fields that are used to record traffic injury accident information. All data recorded in the STATS19 format is validated firstly by the data supplier and then by the DfT. The data available from the DfT does not contain all the STATS19 data fields and certain information, including the accident descriptions, are not available in validated form. As such, provisional STATS19 accident data that includes this information was obtained from the Highways Agency's Managing Agent for Area 9. Provisional STATS19 data is data obtained via Service Providers that has been through Police and/or Local Processing Authority validation, but has not yet been validated by the DfT. Though this data has not been derived from national validated accident statistics, it was cross-referenced with the validated data received from the DfT and a validated dataset including all STATS19 variables was compiled.

2.2.1 Accident Data Search Criteria

The criteria used to search for the accidents used in this analysis was done by drawing a polygon within KeyACCIDENT around the M42 study area and selecting all M42 accidents within the polygon, excluding junctions and the final 20m approach to the junctions on the off-slips. This search criteria was established from the 'Before' report and therefore, if the analysis was now changed to include the junction analysis, the results between the 'Before' and 'After' periods would not be comparable.

The extents of the polygons used for the M42 are given in **Appendix B**.

To enable comparisons between each of the separate operational regimes, the monthly mean number of PIAs has been calculated from the date ranges presented in **Table 1.1**. The monthly mean was calculated for each operational regime to neutralise the impact of using different time periods for each case. Care should be taken when interpreting the dataset of the six month 3L-VMSL period as this period excludes the winter months.

2.3 National Statistics and Formula

The national statistics referred to in this report are taken from either:

- 'Reported Road Casualties Great Britain 2009' published by DfT in 2010, using data from 2009 [Ref. 6];

or;

- 'The Highways Agency: Road Safety Strategy Plan: Operational Guide to the Safety Strategic Plan' (2006 update) using data based on the three year average from 2003 to 2005 [Ref. 7].

Further references used in this report are given in **Section 5**.

The formulae used in the analysis presented in this report are given in **Appendix A**.

2.4 Data Limitations

The data analysed for the 3L-VMSL is a limited dataset of only 6 months. The Highways Agency Operational Guide to the Safety Strategic Plan [Ref. 7] recommends that a minimum of three years of accident data should be analysed when a Managing Agent investigates accident trends in the completion of an accident investigation study. This minimum three year period allows for seasonal trends and other events that may skew a small dataset to be smoothed.

As a result of the limited dataset of 3L-VMSL operational regime it is possible that the results are not fully representative. It is important to note that the interpretation of the results presented in this report should be treated with caution and an emphasis on the limited dataset should be made clear if the results are reported elsewhere.

3. Results: M42 Operational Regimes

3.1 Overview

This section of the report compares the three operational regimes of MM, namely NO-VSL, 3L-VMSL and 4L-VMSL. Detailed supporting accident, casualty and vehicle tables are given in **Appendix C** and are referred to as appropriate throughout this section. Accident plots of all the accidents occurring under each operational regime are given in **Appendix D**. A list of all the accidents included in the analysis for the M42 by operational regime is given in **Appendix E**.

A summary of the PIAs analysed in this section is given in **Table 3.1**.

As described in **Section 2.2.1**, a monthly mean figure has been calculated to allow the three operational regimes to be compared.

Operational Regime	Number of Months	Accidents				
		Fatal	Serious	Slight	Total	Monthly Mean
NO-VSL	60	7	42	256	305	5.08
3L-VMSL	6	0	3	16	19	3.17
4L-VMSL	36	0	6	75	81	2.25

Table 3.1: M42 Summary Accident Data

Table 3.1 indicates that, overall, accidents have fallen following the implementation of MM (3L-VMSL and 4L-VMSL). However, it should be noted that there is a four year gap between the periods of data analysis and, therefore, it would be expected that the PIAs would fall as this would reflect national trends. Though the monthly mean for 36 months of 4L-VMSL is lower than the 3L-VMSL and the NO-VSL figures, it is still slightly higher than the 12 month monthly mean figure of 1.83 (shown in **Appendix C.3**). However, this does reflect a reduction from the 24 month monthly mean figure which was 2.38. It should be noted that these figures highlight the care needed when using small datasets as fluctuations in data can result in notable variations.

3.2 Operational Regimes

3.2.1 Accident Numbers

Table 3.2 indicates the number of accidents by operational regime and by accident severity. Supporting data is available in **Table C.1.1**, **Table C.2.1** and **Table C.3.1**, in **Appendix C**.

Severity	Accidents					
	NO-VSL		3L-VMSL		4L-VMSL	
	60 Months	Monthly Mean	6 Months	Monthly Mean	36 Months	Monthly Mean
Fatal	7	0.12	0	0	0	0
Serious	42	0.70	3	0.50	6	0.17
Slight	256	4.27	16	2.67	75	2.08
KSI[1]	*49*	*0.82*	*3*	*0.50*	*6*	*0.17*
Severity Index	*0.16*		*0.16*		*0.07*	
Total	**305**	**5.08**	**19**	**3.17**	**81**	**2.25**

Table 3.2: M42 Accidents by Operational Regime and Severity

The data indicates that there have been a total of seven fatal accidents recorded during the different operational regimes and these were all recorded during the NO-VSL operational regime, meaning that there have been no fatal accidents since the introduction of MM. Since the introduction of MM there has been a reduction in the monthly mean number of Killed and Seriously Injured (KSI) together with a fall in the Severity Index from 0.16 in the NO-VSL and 3L-VMSL periods to 0.07 in the 4L-VMSL period.

Table 3.2 also indicates that the 36 month Severity Index of 0.07 is below the national average.

Table C.3.1 shows that the 36 month 4L-VMSL monthly mean number of serious accidents has fallen over the three 12 month periods of 4L-VMSL . Though the monthly mean number of slight accidents had increased between the 12 month and 24 month monitoring, it has since fallen slightly. However, it remains above the 12 month monitoring figure.

Whilst the national average Severity Index for motorways increased from 0.11 in 2006 to 0.12 in 2007 and then remained at this level for both 2008 and 2009 [Ref. 6], there has been a decrease in the Severity Index on the 4L-VMSL section of the M42. The Severity Index for the first 12 months of 4L-VMSL was 0.14 which was above the national average whilst the second 12 months of 4L-VMSL has a Severity Index of 0.06 which is below the national average. Furthermore, the third 12 months (01/10/2008 to 30/09/2009) had a Severity Index of 0.04 which again is considerably below the 2009 national average of 0.12 [Ref. 6]. This indicates that the ratio of fatal and serious accidents to all accidents has continued to fall during the first three operational years.

[1] A KSI involves fatal or serious injury.

3.2.2 Accidents by Carriageway Direction

Table 3.3 shows the accident data for the various operational regimes broken down by carriageway direction together with the resultant Severity Index. Supporting data is available in **Table C.1.2**, **Table C.1.3**, **Table C.2.2**, **Table C.2.3**, **Table C.3.2** and **Table C.3.3**, in **Appendix C**.

Severity	Accidents								
	NO-VSL (5 years)			3L-VMSL			4L-VMSL		
	n/b	s/b	total	n/b	s/b	total	n/b	s/b	total
Fatal	3	4	7	0	0	0	0	0	0
Serious	27	15	42	0	3	3	4	2	6
Slight	159	97	256	11	5	16	46	29	75
KSI	*30*	*19*	*49*	*0*	*3*	*3*	*4*	*2*	*6*
Severity Index	*0.16*	*0.16*	*0.16*	*0*	*0.38*	*0.16*	*0.08*	*0.06*	*0.07*
Total	**189**	**116**	**305**	**11**	**8**	**19**	**50**	**31**	**81**

Table 3.3: Accidents by Operational Regime by Carriageway Direction

Table 3.3 shows there are a higher number of accidents on the northbound carriageway for all operational regimes. In terms of the Severity Index there are no identifiable patterns throughout each of the operational regimes. The Severity Index for the 3L-VMSL operational regime southbound accidents is particularly high at 0.38. However, this is due to the low number of accidents (8) occurring in this direction under this regime and also because the ratio is extremely sensitive to the nature of accidents that did occur. It should be noted that the zero value for the Severity Index for the northbound carriageway during 3L-VMSL is a result of there being no fatal or serious accidents during this 6 month time period.

3.2.3 Casualty Numbers

Table 3.4 shows the number of casualties by operational regime and by casualty severity. Supporting data is available in **Table C.1.4**, **Table C.2.4** and **Table C.3.4**, in **Appendix C**. Whilst accident statistics only reflect the severity of the most severely injured person involved in an accident, casualty figures include the severity of all those injured. For example, if a car involved two slight and one serious casualty, all these injuries would be referred to in casualty analysis; however, if accident analysis was completed, the data would refer to a serious accident only. Based on this analysis, the Severity Index for casualties presented in **Table 3.4** is different to the Severity Index for accidents presented in **Table 3.2**.

Table 3.4 shows that the monthly average number of KSIs has reduced in the 36 months of 4L-VMSL compared to NO-VSL and 3L-VMSL operation. This also represents a reduction from the 24 month monitoring as demonstrated in **Table C.3.4**.

Severity	Casualties					
	NO-VSL		3L-VMSL		4L-VMSL	
	60 Months	Monthly Average	6 Months	Monthly Average	36 Months	Monthly Average
Fatal	8	0.13	0	0	0	0
Serious	61	1.02	3	0.50	7	0.19
Slight	440	7.33	24	4.00	127	3.52
KSI	*69*	*1.15*	*3*	*0.50*	*7*	*0.19*
Severity Index	*0.14*		*0.11*		*0.05*	
Total	**509**	**8.48**	**27**	**4.50**	**134**	**3.72**
Casualties per accident	1.67		1.42		1.65	

Table 3.4: M42 Casualties by Operational Regime and Severity

The number of casualties per accident for NO-VSL operation and 4L-VMSL operation are similar to 2009 motorway national average [Ref. 6] of 1.60 casualties per accident. The rate for NO-VSL is 1.67 casualties per accident and the rate for 4L-VMSL is 1.65 casualties per accident.

3.2.4 Accident Rate

Table 3.5 shows the accident rates per billion vehicle miles travelled (bvmt) by operational regime and direction of travel. Supporting data is available in **Table C.1.2**, **Table C.1.3**, **Table C.2.2**, **Table C.2.3**, **Table C.3.2**, **Table C.3.3**, in **Appendix C**.

Link	Accident Rates per Billion Vehicle Miles Travelled (bvmt)								
	NO-VSL			3L-VMSL			4L-VMSL		
	n/b	s/b	2 Way	n/b	s/b	2 Way	n/b	s/b	2 Way
J3A - 4	127.67	93.47	110.36	0	25.18	12.97	39.90	30.65	35.25
J4 - 5	98.44	94.83	96.60	36.04	69.91	53.24	71.35	41.48	56.39
J5 - 6	243.18	101.07	171.96	246.94	72.04	158.27	93.45	36.05	64.55
J6 - 7	99.21	69.96	84.75	0	59.67	30.52	30.53	40.92	35.71
Average	**142.12**	**89.83**	**115.92**	**70.75**	**56.70**	**63.75**	**58.81**	**37.28**	**47.98**

Table 3.5: M42 Accident Rates by Operational Regime, Carriageway Direction and Link

The information presented in **Table 3.5** shows that the average two-way accident rate for the 36 months of 4L-VMSL (47.98) is lower than in 3L-VMSL (63.75) and represents more than a 50% reduction from NO-VSL (115.92). The current 2009 national average figure for motorways is 107.15 PIA per bvmt [Ref. 6]; the average two way rates for 4L-VMSL is notably lower than this. The table also demonstrates that, in all operational regimes, the overall route accident rate was higher on the northbound carriageway than on the southbound.

3.2.5 Accidents by Lighting, Weather and Road Surface Condition

Table 3.6 shows the number of accidents by weather and lighting conditions. Supporting data is available in **Table C.1.8**, **Table C.2.8** and **Table C.3.8**, in **Appendix C**.

National average statistics for motorways [Ref. 6] identify that 70.0% of motorway accidents occur in daylight conditions. The result of the 3L-VMSL indicates that the percentage of accidents occurring during the daylight is notably higher than the national average. The result for 3L-VMSL may be due to the small number of accidents analysed and the lack of data for the winter months, as discussed in detail in **Section 2.4**. The results for the 4L-VMSL indicate a similar percentage to the NO-VSL operational regime, however these are both above the national average for accidents during daylight.

Weather	Percentage of Accidents							
	NO-VSL		3L-VMSL		4L-VMSL		National Statistics	
	Light	Dark	Light	Dark	Light	Dark	Light	Dark
Fine	62.0	18.4	63.2	5.3	67.9	17.9	58.0	20.3
Raining	13.1	4.6	15.8	5.3	3.6	1.8	8.9	6.8
Snowing	0	0	0	0	0	0	0.6	1.1
Fog	0.3	0	0	0	1.8	0	0.2	0.3
Other / Unknown	0.7	1.0	10.5	0	3.6	3.6	2.3	1.4
Total	**76.1**	**23.9**	**89.5**	**10.5**	**76.8**	**23.2**	**70.0**	**30.0**

Table 3.6: Percentage Accidents by Weather Condition and Lighting

Under all weather conditions, 23.2% of accidents in 4L-VMSL operation occurred in darkness conditions; this is lower than the national average figure of 30.0% [Ref. 6].

The number of accidents by road surface condition and daylight and darkness is shown in **Table 3.7**. Supporting data is available in **Table C.1.9**, **Table C.2.9** and **Table C.3.9**, in **Appendix C**. The data for the 4L-VMSL case shows that there is a reduction in the number of accidents in wet or snow/ice conditions compared to the other operational regimes.

Road Surface	Percentage of Accidents							
	NO-VSL		3L-VMSL		4L-VMSL		National Statistics	
	Light	Dark	Light	Dark	Light	Dark	Light	Dark
Dry	50.5	11.8	63.2	5.3	56.8	21.0	51.1	14.4
Wet / Flood	25.2	11.8	26.3	5.3	14.8	7.4	17.3	13.1
Snow / Ice	0.3	0.3	0	0	0	0	1.6	2.5
Other / Unknown	0	0	0	0	0	0	0.0	0.1
Total	**76.1**	**23.9**	**89.5**	**10.5**	**71.6**	**28.4**	**70.0**	**30.0**

Table 3.7: Percentage Accidents by Road Surface Condition and Lighting

It should be noted that the similarities between **Table 3.6** and **Table 3.7** indicate that road surface conditions are often reflective of weather conditions.

3.2.6 Accidents by Month, Day and Time

Percentage figures have been used in this section to allow the three operational regimes to be compared.

Figure 3.1 shows the percentage of accidents per month over a 12 month period for the NO-VSL and 4-L VMSL operational regimes. **Figure 3.2** shows the percentage of accidents per month over a 6 month period for 3L-VMSL. Supporting data is available in **Table C.1.5**, **Table C.2.5**, **Table C.3.5** and **Figure C.1.1**, **Figure C.2.1** and **Figure C.3.1**, in **Appendix C**.

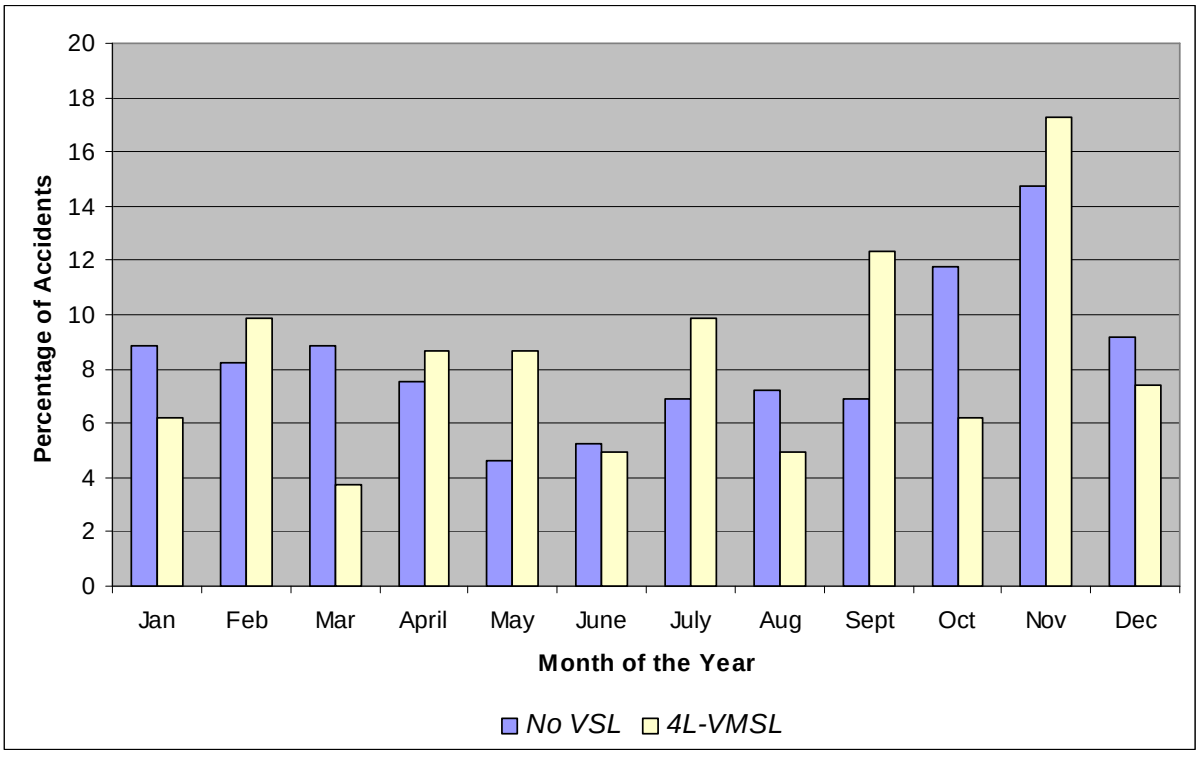


Figure 3.1: NO-VSL and 4L-VMSL Accidents by Month and Operational Regime

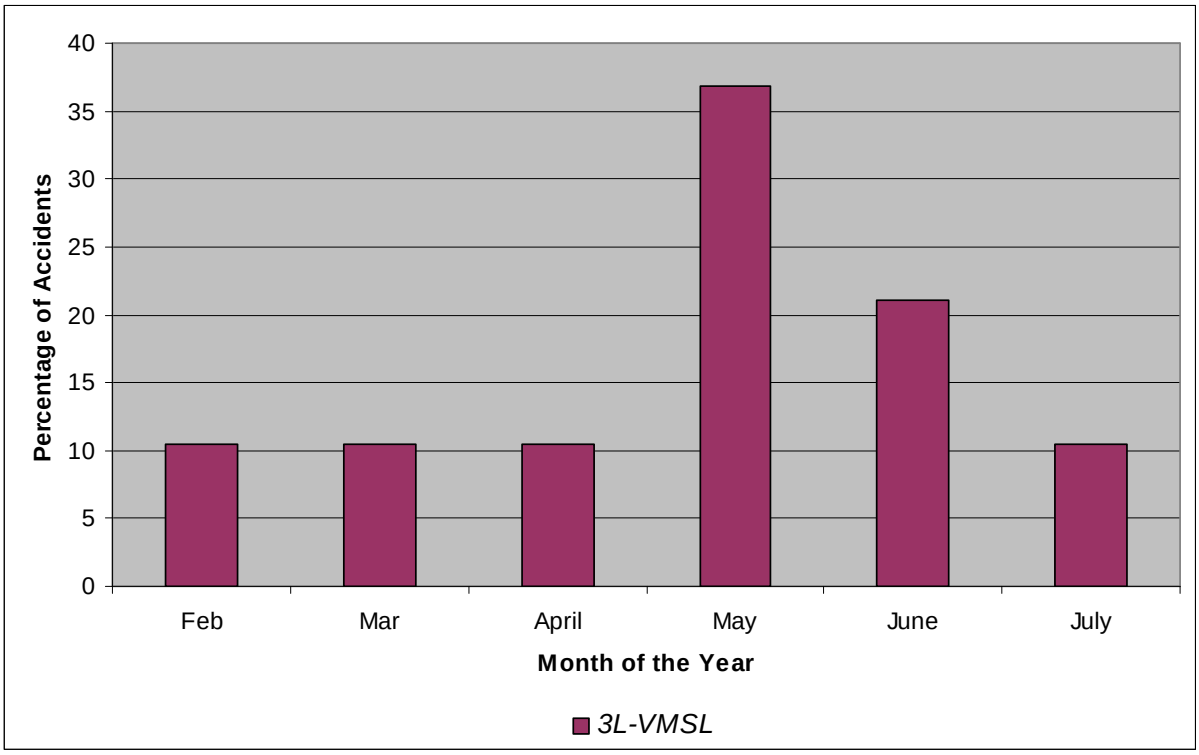


Figure 3.2: 3L-VMSL Accidents by Month and Operational Regime

For the NO-VSL period the percentage of accidents each month remain fairly evenly balanced throughout the year with a peak in the months of October and November. This is fairly consistent with national trends as the winter months tend to exhibit longer periods of darkness and weather conditions which are less favourable to road safety.

PIA data for the 3L-VMSL case is limited to its six month operational period; therefore, monthly trends may not be representative. This can be seen in the six month 3L-VMSL case where there is a disproportionate number of accidents in May.

The percentage of accidents for 4L-VMSL appears to fluctuate more than in the NO-VSL case, however the peak percentage remains in November. Overall, the numbers of accidents per month through each different operational regime do not, at this stage, indicate any areas of concern with 4L-VMSL operation.

Figure 3.3 shows the percentage of accidents by day and by operational regime. Supporting data is available in **Table C.1.6**, **Table C.2.6** and **Table C.3.6** in **Appendix C**. Each operational regime identifies a different peak day of the week where accidents occur. Although it does appear that accidents during 4L-VMSL are more evenly spread throughout the week, the information presented does not indicate any notable trends between the different operational regimes.

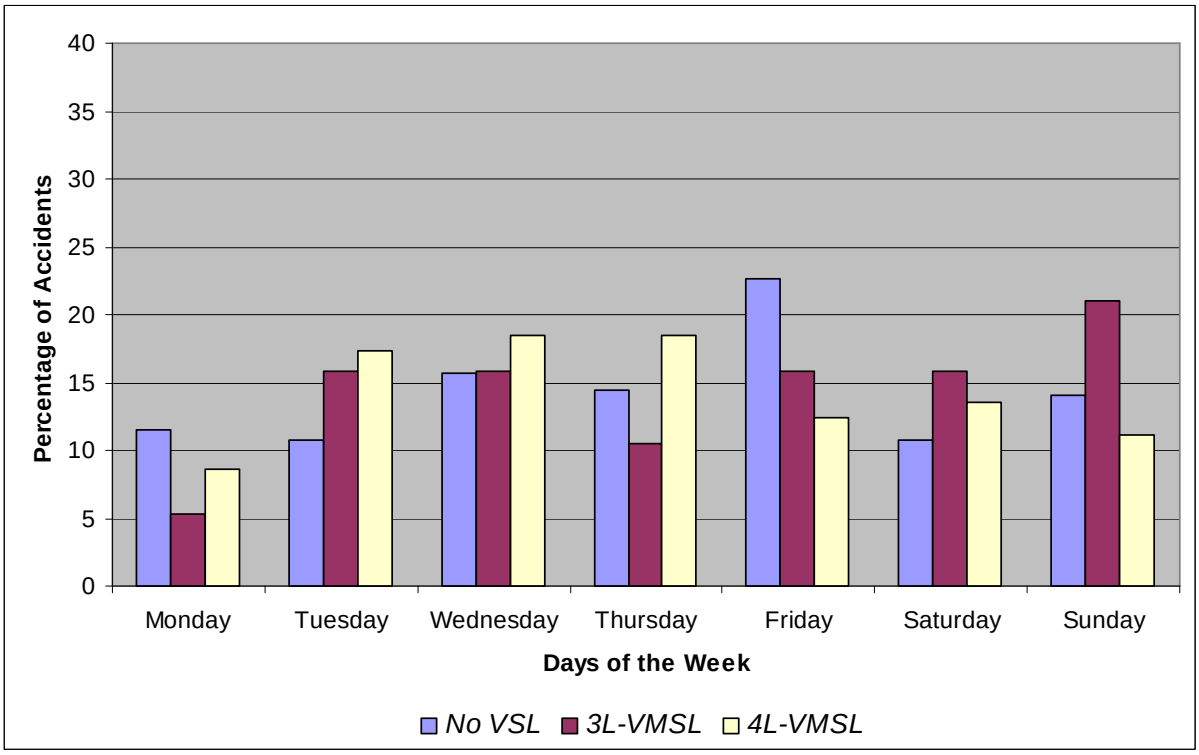


Figure 3.3: Accidents by Operational Regime by Day of the Week

Table 3.8 identifies the percentage of accidents by peak periods through each of the operational regimes. Supporting data is available in **Table C.1.7**, **Table C.2.7** and **Table C.3.7** in **Appendix C**. For the weekday evening peak, NO-VSL and the 4L-VMSL operational regimes display fairly similar characteristics; however, during the weekday non-peak period the NO-VSL has a larger percentage of accidents. The 4L-VMSL has a greater percentage of accidents during the weekday morning peak period compared to both the NO-VSL and 3L-VMSL. The 4L-VMSL also demonstrates a higher percentage of accidents during the weekday than the other operational regimes

Time	Percentage of Accidents					
	NO-VSL		3L-VMSL		4L-VMSL	
	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday
AM Peak (6-11am)	5.2	16.1	15.8	21.1	7.4	27.2
PM Peak (4-9pm)	7.2	28.2	10.5	15.8	4.9	28.4
Non-peak	12.5	30.8	10.5	26.3	6.2	25.9
Total	**24.9**	**75.1**	**36.8**	**63.2**	**18.5**	**81.5**

Table 3.8: Percentage Accidents by Time of Day

Figure 3.4 shows the percentage of accidents by time of the day for each of the operational regimes. Supporting data is available in **Table C.1.7**, **Table C.2.7** and **Table C.3.7** in **Appendix C**. During the NO-VSL regime, more accidents occurred during the evening peak than at any other time of the day. In 4L-VMSL, there now appears to be a morning and evening peak with a less fluctuating inter-peak.

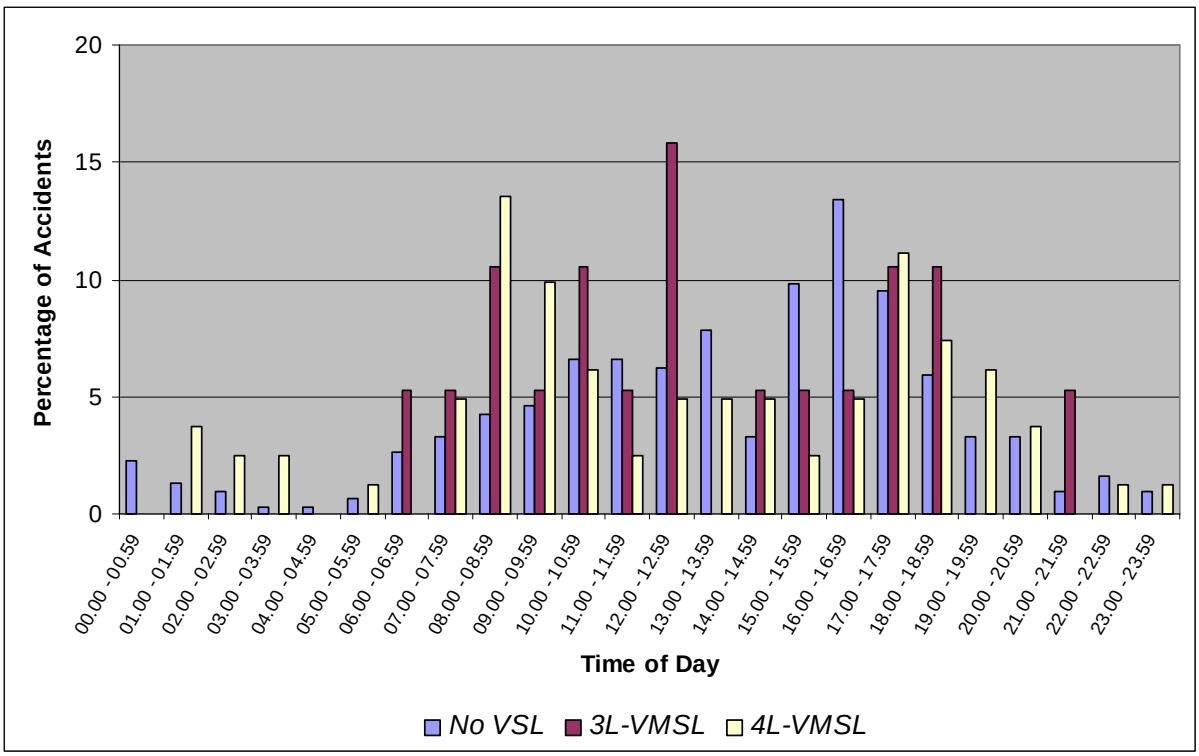


Figure 3.4: Accidents by Operational Regime by Time of the Day

During 4L-VMSL operation, there has been a disproportionate number of accidents (9%) occurring in the early hours of the morning 01.00-03.59hrs compared to the other operational regimes (3L-VMSL and NO-VSL). Closer investigation of these seven accidents reveals that there are no similarities between the accidents to suggest there is a concern with the operation of MM (and it should be further noted that the accidents occurred during a period when hard shoulder running was not operational). Four of the accidents occurred between junction 3A and 4 of the M42 with three of them being single vehicle loss of control accidents on the southbound carriageway. The fourth junction 3A and 4 accident was a collision between two HGVs on the northbound carriageway. One of the accidents involved a driver who gave a positive breath test. This accident should not be attributed to MM as the driver was impaired by alcohol. The fifth accident occurred between junction 5 and 6 during road works and involved a minibus. This was one of two accidents that involved road works as a factor so there does not appear to be any correlation between MM, road works or any other underlying external condition. The sixth accident occurred between junction 4 and 5 on the northbound carriageway and involved a vehicle being struck in the rear by a HGV. The seventh accident occurred between junction 6 and 7 on the northbound carriageway slip road and involved a vehicle being struck from the rear by another vehicle.

Analysis of the 81 accidents that occurred in 4L-VMSL gives no suggestion that there is an underlying factor which suggests that 4L-VMSL is more likely to result in accidents at a particular time of day.

3.2.7 Accidents by Type

A breakdown by accident type and by operational regime is presented in **Table 3.9** and supported by **Table C.1.10**, **Table C.2.10** and **Table C.3.10** in **Appendix C**.

Type	Percentage of Accidents					
	NO-VSL		3L-VMSL		4L-VMSL	
	n/b	s/b	n/b	s/b	n/b	s/b
Rear End Shunts	37.0	19.3	36.8	10.5	38.3	23.5
Side Impact	8.2	7.9	15.8	15.8	21.0	9.9
Single Vehicle	8.9	5.9	5.3	5.3	1.2	3.7
Unknown / other	6.9	5.9	0.0	10.5	1.2	1.2
Total	**61.0**	**39.0**	**57.9**	**42.1**	**61.7**	**38.3**

Table 3.9: Accident Type by Operational Regime and Carriageway Direction

It should be noted that 'Accident Type' is not a field within STATS19. **Table 3.9** has been created by reading each of the accident narratives and assigning each accident to one of the four predefined categories. There is a certain amount of subjectivity with this method, but this has been minimised by using only four categories of accident.

During each operational regime it can be noted that there is a higher proportion of accidents that occur on the northbound carriageway. In terms of the type of accidents, the most common type of collision under each operational regime is 'rear shunt' type accidents. Rear shunt collisions are often synonymous with periods of congestion as traffic begins to group and slow down. The implementation of hard shoulder running during the 4L-VMSL operational regime increases the amount of carriageway space and, therefore traffic is dispersed over a greater number of running lanes so congestion should be less. Though 14 of the 22 accidents that occurred during 4L-VMSL hard shoulder running were rear shunt type accidents, the overall percentage of rear shunt collisions and the northbound/southbound split has remained fairly constant across the three operational regimes.

In contrast, the number of side impact type collisions has increased over time from 16.1% during NO-VSL to 30.9% in 4L-VMSL. The higher number of side impact accidents may be consistent with vehicles travelling closer together, something that VMSL is designed to achieve. Furthermore, through the operation of MM it may be expected that there may be an increase in these types of accidents as the addition of a further running lane may increase the number of lane changing manoeuvres therefore resulting in more side impacts.

3.2.8 Accidents by Skidding / Jack-knifing and Over-turning

Table 3.10 identifies the percentage number of accidents by skidding, jack-knifing and / or overturning for each operational regime. An increase in the number of skidding type accidents may be a result of drivers' perception of the MM road network therefore it is useful to compare the incidences of these types of accidents during each operational regime.

Skidding, Jack-knifing and / or Over-turning	GB motorway national average [Ref. 7]	Accident Percentage					
		NO-VSL		3L-VMSL		4L-VMSL	
		n/b	s/b	n/b	s/b	n/b	s/b
Skidding, Jack-knifing and / or Over-turning	45.0	38.6	38.8	27.3	25.0	28.0	41.9
No Skidding, Jack-knifing and / or Over-turning	55.0	61.4	61.2	72.7	75.0	72.0	58.1
Total	**-**	**100**	**100**	**100**	**100**	**100**	**100**

Table 3.10: Percentage Accident Type by Operational Regime and Carriageway Direction

The numbers of skidding type accidents have decreased on the northbound carriageway during the 4L-VMSL operational regime compared to both the NO-VSL regime. However, the percentage of skidding type accidents has increased on the southbound carriageway compared to the NO-VSL and 3L-VMSL regimes, however both the northbound and southbound carriageways remain below the national average.

3.2.9 Vehicles by Type

Vehicle types involved in accidents are presented in **Table 3.11**. Supporting data is available in **Table C.1.11**, **Table C.2.11** and **Table C.3.11** in **Appendix C**.

Vehicle Type	GB motorway national average [Ref. 6]	Vehicle Percentage		
		NO-VSL	3L-VMSL	4L-VMSL
Motorcycle	2.2	1.3	0	0.5
Car	77.6	78.6	82.4	70.1
Minibus + bus	<1.0	0.9	0	1.5
Goods Vehicle < 3.5T	6.8	7.7	3.9	10.3
Goods Vehicle > 3.5T	12.1	10.0	13.7	17.0
Other	<1.0	1.5	0	0.5
Total	**-**	**100**	**100**	**100**

Table 3.11: Vehicle Numbers by Type by Operational Regime

The most vulnerable road user group on motorways is motorcyclists [Ref. 6]. From a review of the data contained in **Table 3.11** there are only a low number of motorcyclists involved in injury accidents during the NO-VSL and 4L-VMSL cases and no motorcyclists involved in accidents during 3L-VMSL.

The most notable trend in terms of accidents involving a particular vehicle type in the 4L-VMSL operational regime are accidents involving goods vehicles. All goods vehicles are identified separately in the accident data as vehicles with a gross vehicle weight of greater or lower than 3.5T and the percentage number of accidents involving both these groups is higher than those during other operational regimes. The percentage number of accidents is also higher than the national average figure [Ref. 6]. It should be noted, however, that although the percentage split of accidents involving goods vehicles is higher during 4L-VMSL operation compared to the other operational regimes, the average number of accidents per month involving goods vehicles is actually lower than NO-VSL.

Further analysis of the accidents involving goods vehicles during 4L-VMSL reveals that the majority of these accidents occurred on the northbound carriageway (27 northbound, 16 southbound). In terms of the times of the accidents involving goods vehicles, the accidents are spread fairly evenly throughout the day although there are more accidents during the 0800-0859 and 1800-1859 periods (**Figure 3.5** and **Figure 3.6**).

The locations of accidents involving goods vehicles are not contained within any cluster site area within the MM area, and apart from being predominately on the northbound carriageway there does not appear to be an area within the MM operation where goods vehicles are more susceptible to accidents.

A review of accidents involving goods vehicles does not reveal any identifiable reason for why there are a higher number of accidents involving this vehicle type during 4L-VMSL as opposed to other operational regimes.

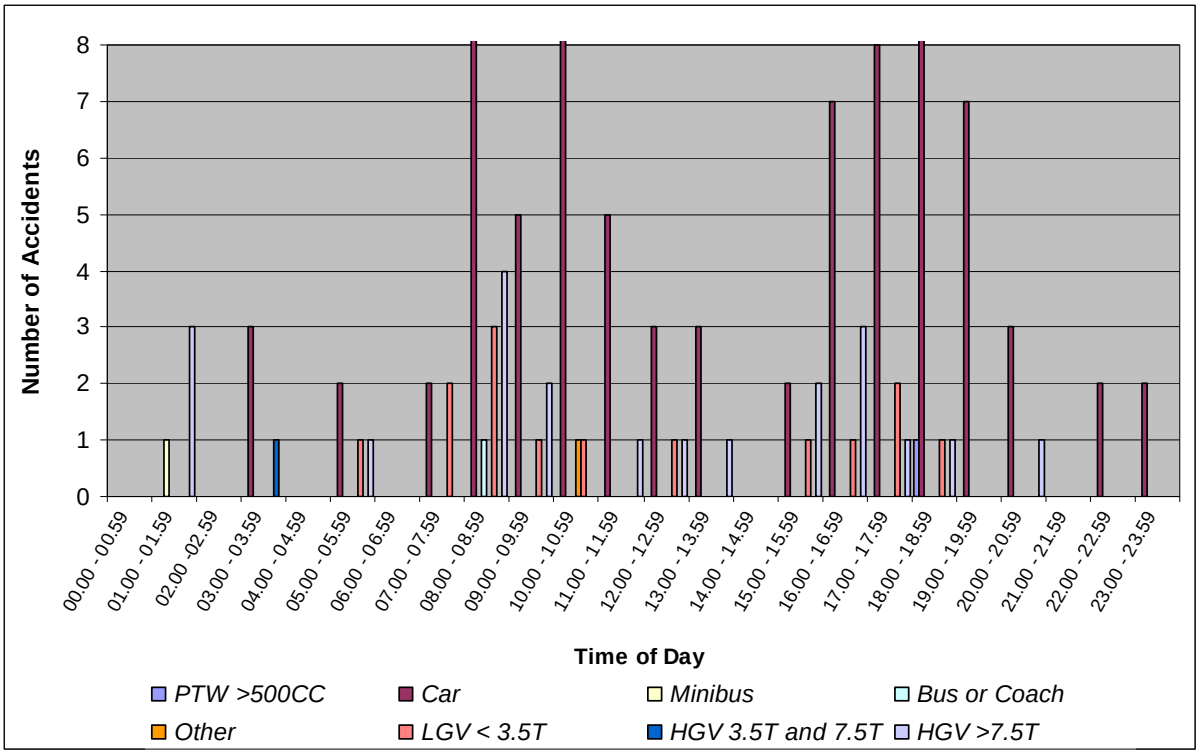


Figure 3.5: Northbound 4L-VMSL: Accidents by Vehicle Type and by Time of Day

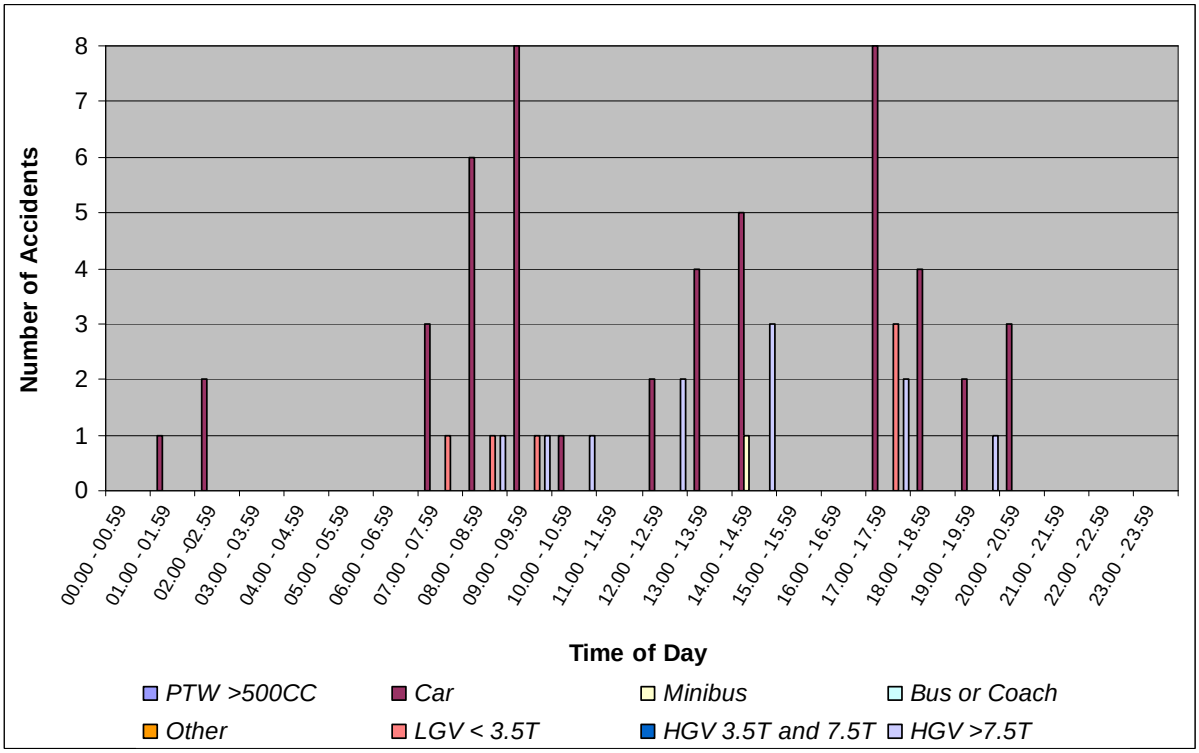


Figure 3.6: Southbound 4L-VMSL: Accidents by Vehicle Type and by Time of Day

3.2.10 Vehicles by Manoeuvre

Table 3.12 show the percentage of vehicles involved in accidents by manoeuvre type as listed in STATS19, for each operational regime. Supporting data is available in **Table C.1.12**, **Table C.2.12** and **Table C.3.12** in **Appendix C**.

Vehicle Manoeuvre	GB motorway national average (%) [Ref. 7]	Vehicle Percentage		
		NO-VSL	3L-VMSL	4L-VMSL
Parked	0.9	1.3	0	1.0
Waiting to go ahead but held up	9.3	13.9	13.7	16.0
Stopping / Starting	15.4	14.0	27.5	19.6
Overtaking a moving vehicle	2.5	3.4	5.9	2.6
Going ahead on a bend	3.0	1.1	2.0	0
Going ahead other	56.3	56.3	39.2	48.5
Changing lane (left or right)	10.4	9.6	11.7	12.4
Total	**-**	**100**	**100**	**100**

Table 3.12: Vehicles by Manoeuvre

The comparison of the operational regimes to national average figures [Ref. 7] shows that there is an increase in the proportion of stopping or starting type accidents since the introduction of VMSL operation. However, the percentage number of accidents has reduced since the introduction of 4L-VMSL compared to 3L-VMSL. Despite this, the percentage of this type of manoeuvre on 4L-VMSL is higher than the national average [Ref. 7]. The number of vehicles waiting to go ahead but held up remains both above the national average and the NO-VSL and 3L-VMSL levels.

For 4L-VMSL, the proportion of accidents involving vehicles overtaking moving vehicles has reduced to the lowest levels of all regimes. This reduction also brings the number of accidents approximately in line with the national average.

The percentage number of accidents involving vehicles changing lanes has increased over time and is consistent with the side swipe type collisions discussed in **Section 3.2.7**. Furthermore, the percentage number of accidents related to lane changing manoeuvres is slightly above the national average.

The figures presented for 4L-VMSL in **Table 3.12** suggest that accidents involving vehicle manoeuvres such as stopping / starting typically associated with congested roads have increased since NO-VSL.

3.2.11 Accidents by MM Operation (4L-VMSL)

During the first 36 months of operation of 4L-VMSL there have been 81 PIAs of which 22 have occurred during periods of hard shoulder running. These are shown in **Table 3.13**, and can be identified in the accident plots in **Figures D.7** and **D.8** in **Appendix D**.

Accident Reference (Fig D.7, D.8 & D.9)	Severity	Junction	Direction	Date	Day	Time
4L - 1	Slight	J5 - J6	SB	24.10.06	Tue	17:15
4L - 4	Slight	J5 - J6	SB	28.11.06	Tue	08:40
4L - 12	Slight	J5 - J6	NB	23.05.07	Wed	09:33
4L - 13	Slight	J4 - J5	NB	29.05.07	Tue	08:09
4L - 23	Slight	J6 – J7	NB	05.10.07	Fri	13:28
4L - 24	Slight	J5 – J6	NB	20.10.07	Sat	10:30
4L - 27	Slight	J5 – J6	NB	10.11.07	Sat	10:30
4L - 28	Slight	J5 – J6	NB	10.11.07	Sat	11:55
4L - 29	Slight	J5 – J6	NB	11.11.07	Sun	10:00
4L - 31	Slight	J3A – J4	SB	19.11.07	Mon	17:30
4L - 33	Slight	J4 – J5	SB	28.11.07	Wed	18:15
4L - 37	Slight	J5 – J6	NB	14.01.08	Mon	16:45
4L - 38	Slight	J5 – J6	NB	01.02.08	Fri	08:50
4L - 41	Slight	J6 – J7	SB	19.02.08	Tue	17:30
4L - 42	Slight	J6 – J7	SB	28.02.08	Thu	09:09
4L - 46	Slight	J6 – J7	SB	11.04.08	Fri	14:35
4L - 47	Slight	J5 – J6	NB	16.04.08	Wed	18:37
4L - 51	Slight	J6 – J7	NB	09.05.08	Fri	15:50
4L - 54	Slight	J4 – J5	NB	01.08.08	Fri	18:45
4L - 60	Slight	J3A – J4	SB	25.11.08	Tue	09:24
4L - 62	Slight	J4 – J5	NB	06.12.08	Sat	10:36
4L - 63	Slight	J4 – J5	SB	11.12.08	Thu	17:15

Table 3.13: 4L-VMSL Accidents during Hard Shoulder Running

From **Table 3.13** it can be noted that the highest number of accidents have taken place between junctions 5-6. This is the longest link within the MM operational area; higher levels of congestion have also previously been reported on this link therefore it is not surprising that PIA rates are higher at this location.

During the first 12 months of 4L- VMSL operation, only four accidents occurred during hard shoulder running and in the second 12 months, there were 15 accidents. Therefore, in the third year of operation, there were only 3 accidents during periods when hard shoulder running was recorded as being in operation. Of the 22 accidents, 13 occurred on the northbound carriageway whilst nine were on the southbound carriageway. Fourteen of the accidents were rear shunts and seven were side swipe type accidents, whilst one accident was a single vehicle loss of control; all of the accidents were slight in severity.

The accident data for each Operational Regime has been reviewed to determine whether the number of PIAs has increased from the 'Before' cases (NO-VSL and 3L-VMSL) to the 'After' case (4L-VMSL) during the periods when hard shoulder running is likely to be operational. In order to undertake this comparison, the peak operational periods of 07:00 to 09:30hrs and 16:00 to 18:30hrs have been used. The accident data in **Appendix F** lists all the PIAs during the different study periods which have occurred during these peak operational periods and **Figure 3.7** presents this information in graph form.

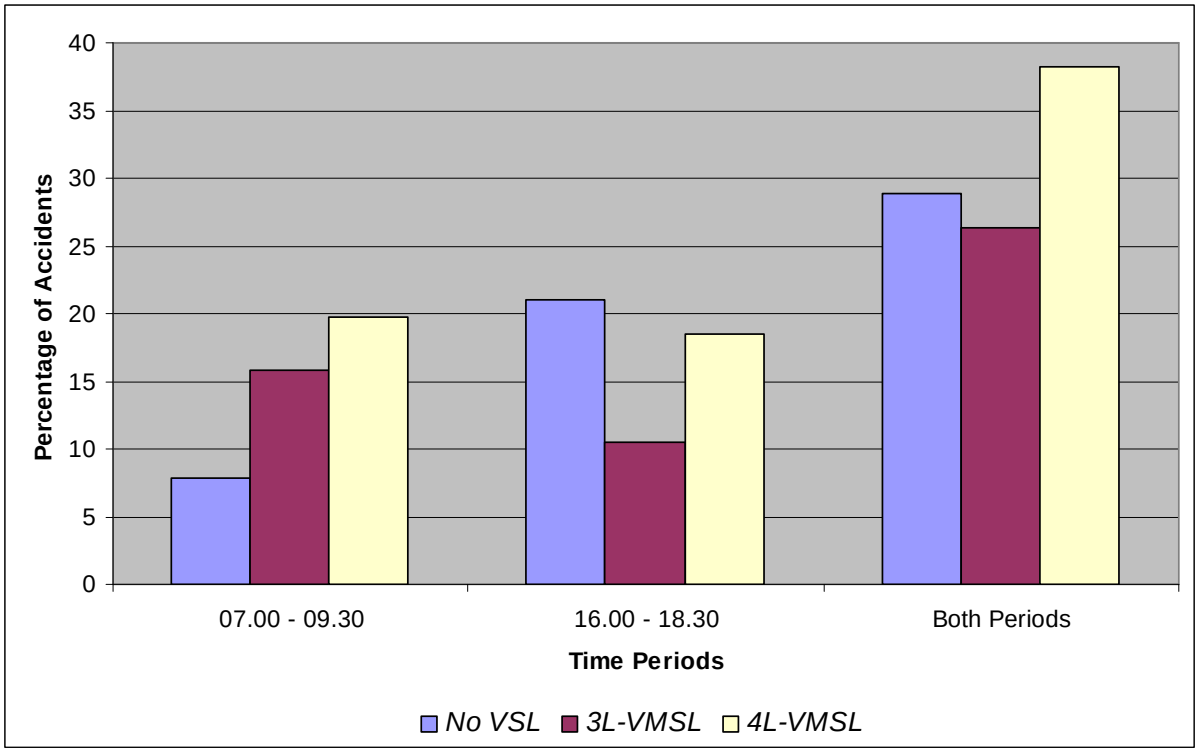


Figure 3.7: Accidents by Assumed Periods of Hard Shoulder Running

The review of the PIA data shows that during 4L-VMSL operation, 31 PIAs (38.3%) occurred in the peak operational periods; this has increased from 18 PIAs (32%) in the first 24 months of 4L-VMSL. Of the 31 accidents, 16 PIAs (19.8%) occurred during the 07:00 to 09:30hrs period whilst 15 PIAs (18.5%) occurred in the 16:00 to 18:30hrs period.

In contrast, under 3L-VMSL operation 5 (26.3%) of the PIAs occurred during these peak periods; 3 PIAs (15.8%) in the 07:00 to 09:30hrs period and 2 PIAs (10.5%) in the 16:00 to 18:30hrs period. Under NO-VSL, 88 PIAs (28.9%) occurred with 24 PIAs (7.9%) in the 07:00 to 09:30hrs period and 64 PIAs (21.0%) in the 16:00 to 18:30hrs period.

In order to investigate this further, the number of accidents occurring during these peak periods has been calculated on a pro-rata basis, and is shown in **Table 3.14**. This shows that the prorated number of accidents occurring during the 07:00 to 09:30hrs period have remained approximately the same across the three operational regimes. In contrast, there has been a notable reduction in accidents during the 16:00 to 18:30hrs time period. It can be seen that the percentages mentioned above are exaggerated by the notable reduction in overall prorated accidents which reduced from 183 during NO-VSL to 81 during 4L-VMSL.

	Accidents		
Time Period	**NO-VSL**	**3L-VMSL**	**4L-VMSL**
	36 Months	**36 Months**	**36 Months**
07:00 – 09:30	14	18	16
16:00 – 18:30	38	12	15
Both Periods	52	30	31
All other periods	131	84	50
Total	**183**	**114**	**81**

Table 3.14: M42 Prorated Peak Period Accidents by Operational Regime

3.2.12 Accidents Cluster Analysis

PIAs have been analysed using Key Traffic Systems KeyACCIDENT database. The KeyACCIDENT database was interrogated to identify accident clusters using the 'Cluster Site Analysis' function. This function searches the PIA data using a "Floating Cursor Algorithm" based on the grid reference of each accident. A circle of user specified radius, in this case 50m, is cast from each accident and any other accidents contained within the circle are included in the total. If the total number of accidents is greater than, or equal to the specified minimum number of accidents (6 in this case) and, if the search radius of any one accident contains another accident, then this search area is increased and the process carried out repetitively until no more accidents fall within the search area. Thus the cluster site is defined. The search criteria used to identify cluster sites was defined as such as it provided a good representative amount of data on which to review accident patterns.

It must be noted that given that accidents are generally not precisely located; the accident cluster selection should only be seen as an initial interrogation process. Once the most accident prone sites have been identified, more detailed accident analysis will be required to determine the exact locations of accidents and the likely causes.

The methodology used to identify cluster sites has changed from that used in the NO-VSL case within the Road Safety 'Before' Report [Ref. 2] as the KeyACCIDENT database now used by Mott MacDonald for the interrogation of accident cluster sites has a bespoke Cluster Site Analysis function that was not available in previous years. Though the mechanism to determine cluster sites has changed, the criteria for identifying sites have not. The new Cluster Site Analysis function is a more accurate and efficient mechanism for identifying clusters and removes subjectivity.

For consistency the 305 accidents in the 'Before' (NO-VSL) case have been reanalysed to identity all clusters of six or more accidents within a 50m radius. Using the search criteria, six clusters were identified. These are detailed in **Table 3.15** and presented in **Figure G.1.1** in **Appendix G**.

Cluster Ref.	Number of Accidents	Centred on Grid Reference	Location
1	6	413785, 274355	between junction 3A-4
2	6	414487, 275618	located south of junction 4
3	9	417345, 278688	located just north of junction 5
4	6	417543, 278759	located north of junction 5
5	6	419578, 282619	located south of junction 6
6	7	419620, 282687	located just south of junction 6

Table 3.15: 'Before' (NO-VSL) Accident Clusters (5 Year Data Northbound and Southbound)

In the 'Before' report [Ref. 2] completed for the NO-VSL operational regime there were seven cluster sites identified. The differences in the number of cluster sites identified between the two different search databases does not have an effect on the information presented in this report or the road safety report completed for the NO-VSL case.

The same search criteria of six or more accidents in a 50m radius have also been applied to the 3L-VMSL and 4L-VMSL. No clusters have been identified, for 3L-VMSL or 4L-VMSL however, this may be due to smaller datasets being used. Cluster site analysis for 4L-VMSL should be completed when 60 months of accident data is available so that a direct comparison between NO-VSL and 4L-VMSL can be undertaken.

4. Conclusion

This report has reviewed the performance of M42 MM operation by analysing the first 36 months of PIA data for the 4L-VMSL operational regime. This analysis has indicated that there has been a reduction in the number of PIAs following the implementation of 4L-VMSL. This reduction is demonstrated by the average number of accidents per month for 4L-VMSL operation compared to the NO-VSL and 3L-VMSL cases. This has resulted in the monthly average number of accidents reducing from 5.08 accidents per month for NO-VSL to 3.17 accidents per month during 3L-VMSL operation and 2.25 accidents per month for 4L-VMSL; therefore this indicates a positive benefit of 4L-VMSL as there has been a reduction in the average number of PIAs per month. It should be noted that as only 6 months of PIA data has been reviewed for 3L-VMSL and, it is possible that the results are not fully representative.

In terms of the severity of the accidents, there appears to have been a notable reduction since MM has been in operation. The number of fatal and serious accidents has reduced from 0.82 accidents per month to 0.17 accidents per month. Furthermore, the accident Severity Index for NO-VSL and 3L-VMSL was 0.16 whereas the accident Severity Index for the 4L-VMSL period has fallen to 0.07; therefore, this again indicates that 4L-VMSL has been beneficial in terms of reducing the Severity Index of PIAs.

This reduction in severity is reflected in the casualty data which indicates that the casualty Severity Index has fallen from 0.14 and 0.11 in NO-VSL and 3L-VMSL respectively to 0.05 in 4L-VMSL. Furthermore, there has been a reduction in the monthly mean number of KSI casualties from 1.15 KSI casualties per month during NO-VSL to 0.19 KSI casualties per month in the 4L-VMSL operational regime. The number of casualties per accidents has remained fairly constant with 1.67 in NO-VSL, 1.42 in 3L-VMSL and 1.65 in 4L-VMSL. This is also generally in line with the national average which in 2009 was 1.60 casualties per accident [Ref. 6]. This indicates that, whilst the number of casualties resulting from an accident has not reduced, the number of accidents and the severity of the injuries have. This is also true for the

The accident rates in 3L-VMSL had dropped notably from NO-VSL and this has continued into 4L-VMSL. NO-VSL had a two-way accident rate of 115.92 accidents per bmvt; this fell to 63.75 accidents per bvmt in 3L-VMSL and 47.98 accidents per bvmt in 4L-VMSL. This is markedly lower than the 2009 motorway national average of 107.15 accidents per bvmt [Ref. 6]. It should be noted that the national average figures include junction accidents, but these have been excluded from the analysis in this and previous MM reports; as such this does not represent a direct comparison. Despite this, the results suggest that 4L-VMSL continues to have a beneficial impact in reducing the number of accidents in relation to the traffic flows experienced on this section of the network.

To date, 4L-VMSL has operated successfully and the PIA data suggests that there is a reduction in the number and severity of accidents during this operational regime.

5. References

Reference Number	Reference
1	Mott MacDonald: *ATM Monitoring project, Road Safety Monitoring Methodology, Technical Note TN033, Version D, December 2003*. (2004)
2	Mott MacDonald: *M42 ATM Monitoring Project, Road Safety 'Before' Report, No. 203754_MM_006 V1, 42691/DOC/1806, December 2004*. (2005)
3	Mott MacDonald: *M42 ATM Monitoring, M42 MM Monitoring and Evaluation, 6 Month Safety Review, 203754_ATM_007_V2, DOC/1807/V2, November 2006*. (2006)
4	Mott MacDonald: *M42 ATM Monitoring, M42 ATM Monitoring and Evaluation, 12 Month Safety Review, 203754_006_V3, September 2008*. (2008)
5	Mott MacDonald: *M42 ATM Monitoring, M42 ATM Monitoring and Evaluation, 24 Month Safety Review, HCG-HRG 260386 001c, October 2009*. (2009)
6	Department for Transport: *Reported Road Casualties Great Britain 2009.* (2010)
7	The Highways Agency: *Road Safety Strategic Plan: Operational Guide to the Safety Strategic Plan.* (2006) http://www.ha-partnernet.org.uk.
8	Department for Transport: *Tomorrows Roads Safer for Everyone* (2000)
9	The Highways Agency: *Making the Network Safer – Highways Agency Strategic Plan for Safety*

Appendix A Formulae

A.1 Severity Index

The Severity Index is sometimes referred to as the Killed and Seriously Injured (KSI) ratio.

The Severity Index is the ratio of the number of fatal and serious accidents to the total number of accidents recorded. The formula used to calculate the Severity Index is:

$$\text{Severity Index} = \frac{\text{(Fatal + Serious PIAs)}}{\text{Total number of PIAs}}$$

Note: to calculate the Severity Index for Casualty figures, interchange PIAs for Casualties in the above formula.

A.2 Accident Rates

Accidents per billion vehicle miles travelled (bvmt) are calculated by dividing the total number of accidents along a section of highway by traffic flow data, length of carriageway and number of days. This provides a rate which can be compared against national average figures and therefore provides a useful indicator on how a road is performing against comparator roads and national average values.

Flow data used in this calculation should be representative of the carriageway being analysed. Therefore, if accident data is being analysed for one direction of traffic flow only, one-way Annual Average Daily Traffic (AADT) data should be used whilst for bi-directional accident data, two-way AADT data should be used.

The formula used to calculate the accident rate is:

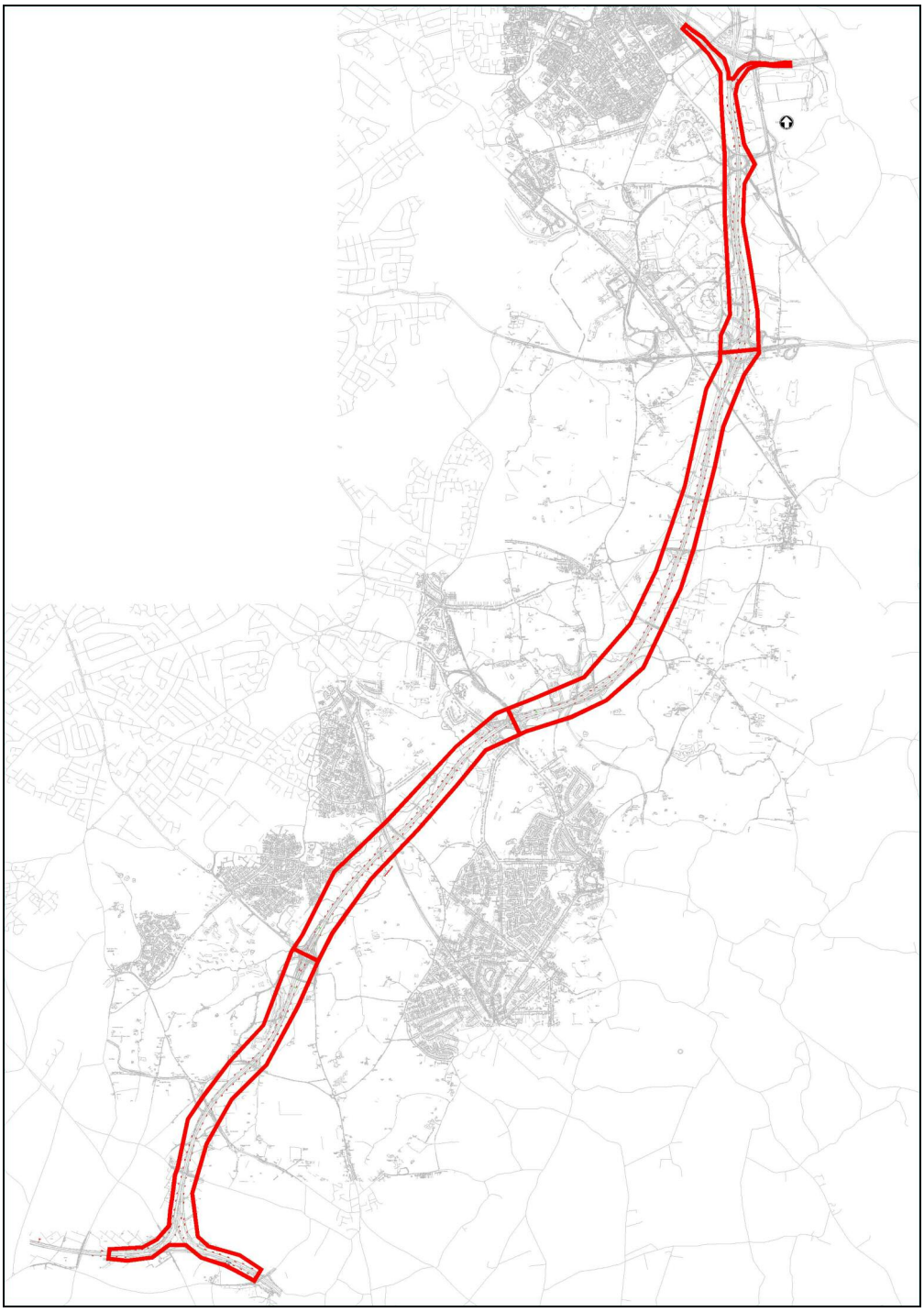
$$\text{PIA per bvmt} = \frac{\text{Total number of PIAs}}{\text{[(Number of days x link length x AADT) / 1000,000,000]}}$$

Note: to calculate the KSI Casualty Rate, interchange PIAs for KSI casualties in the above formula.

Appendix B KeyACCIDENT Polygon

B.1 M42 KeyAccident Polygon

Figure B.1.1: M42 KeyACCIDENT Polygon



Appendix C M42 Supporting Accident Data Tables

C.1 M42 NO-VSL

Severity	Accidents					
	(NOTE: Each year runs 9th June to 8th June the following year)					
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
Fatal	1	1	0	2	3	7
Serious	13	9	7	9	4	42
Slight	39	56	64	53	44	256
KSI	*14*	*10*	*7*	*11*	*7*	*49*
KSI Severity Index	*0.26*	*0.15*	*0.10*	*0.17*	*0.14*	*0.16*
Total	**53**	**66**	**71**	**64**	**51**	**305**

Table C.1.1: NO-VSL Accidents by Year by Severity

Link	Number of PIAs – Northbound				Link Length (miles)	AADT*	bvmt**	PIA rate per bvmt
	Fatal	Serious	Slight	Total				
J3A to 4	1	8	35	44	3.4	55,954	0.34	127.67
J4 to 5	0	3	22	25	2.4	58,592	0.25	98.44
J5 to 6	1	11	79	91	3.5	58,585	0.37	243.18
J6 to 7	1	5	23	29	2.8	58,246	0.29	99.21
Total	**3**	**27**	**159**	**189**	**12.0**	**N/A**	**N/A**	**142.12**

* One-way Nov 2002 to Oct 2003 ** Billion vehicle miles travelled *** Average of all sections

Table C.1.2: NO-VSL Accident Rates by Direction (Northbound)

Link	Number of PIAs - Southbound				Link Length (miles)	AADT*	bvmt**	PIA rate per bvmt
	Fatal	Serious	Slight	Total				
J3A to 4	2	6	25	33	3.4	57,320	0.35	93.47
J4 to 5	1	3	21	25	2.4	60,822	0.26	94.83
J5 to 6	1	6	31	38	3.5	58,861	0.38	101.07
J6 to 7	0	0	20	20	2.8	56,963	0.29	69.96
Total	**4**	**15**	**97**	**116**	**12.0**	**N/A**	**N/A**	**89.83**

* One-way Nov 2002 to Oct 2003 ** Billion vehicle miles travelled *** Average of all sections

Table C.1.3: NO-VSL Accident Rates by Direction (Southbound)

Severity	Casualties					
	(NOTE: Each year runs 9th June to 8th June the following year)					
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
Fatal	1	1	0	3	3	8
Serious	15	21	9	12	4	61
Slight	70	108	114	77	71	440
KSI	*16*	*22*	*9*	*15*	*7*	*69*
KSI Severity Index	*0.19*	*0.17*	*0.07*	*0.16*	*0.09*	*0.14*
Total	**86**	**130**	**123**	**92**	**78**	**509**

Table C.1.4: NO-VSL Casualties by Year by Severity

Month	Accidents			
	n/b	**s/b**	**2 Way**	%
Jan	17	10	27	8.9
Feb	12	13	25	8.2
Mar	16	11	27	8.9
Apr	14	9	23	7.5
May	8	6	14	4.6
Jun	12	4	16	5.2
Jul	10	11	21	6.9
Aug	11	11	22	7.2
Sep	16	5	21	6.9
Oct	27	9	36	11.8
Nov	26	19	45	14.8
Dec	20	8	28	9.2
Total	**189**	**116**	**305**	**100**

Table C.1.5: M42 NO-VSL Accidents by Month

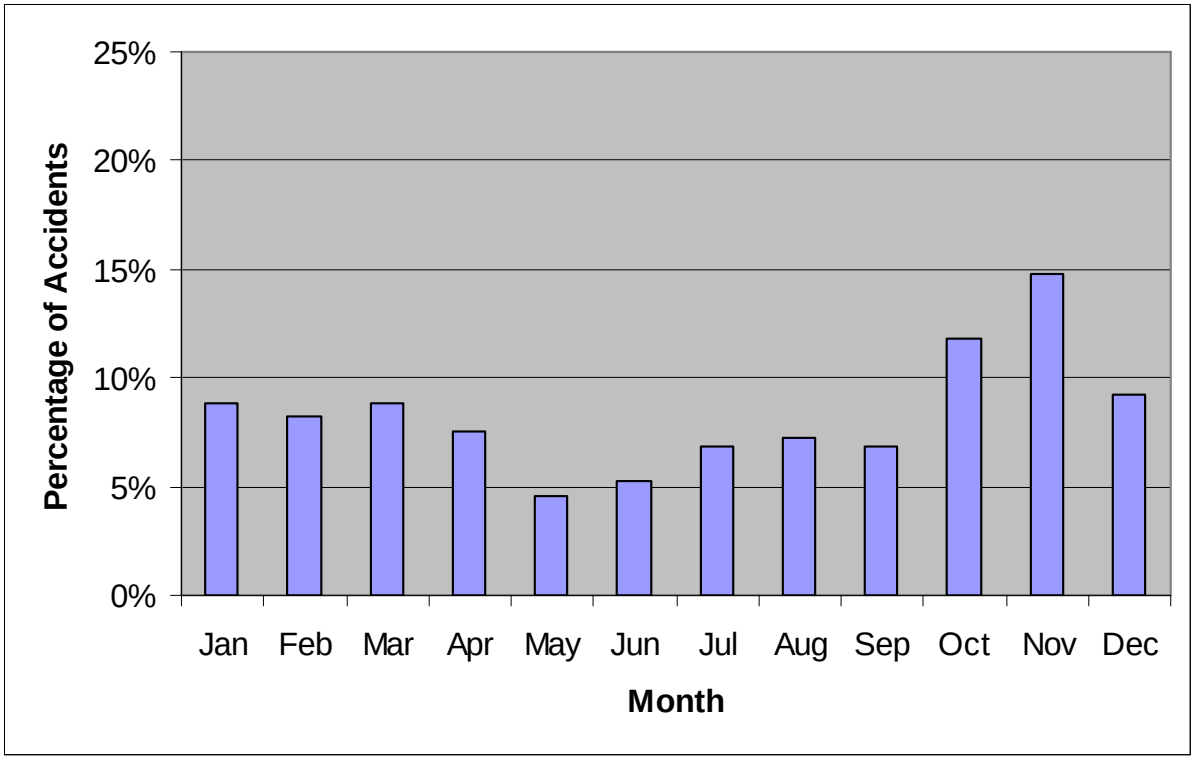


Figure C.1.1: M42 NO-VSL Accidents by Month

Day of Week	Accidents			
	n/b	s/b	2 Way	%
Mon	22	13	35	11.5
Tues	22	11	33	10.8
Weds	33	15	48	15.7
Thurs	28	16	44	14.4
Fri	39	30	69	22.6
Sat	15	18	33	10.8
Sun	30	13	43	14.1
Total	**189**	**116**	**305**	**100**

Table C.1.6: M42 NO-VSL Accidents by Day of Week

Peak / Off Peak	Hour Starting	Accidents					
		Number			%		
		n/b	s/b	2 Way	n/b	s/b	2 Way
Off Peak	00:00	3	4	7	1.6	3.4	2.3
	01:00	3	1	4	1.6	0.9	1.3
	02:00	2	1	3	1.1	0.9	1.0
	03:00	1	0	1	0.5	0	0.3
	04:00	1	0	1	0.5	0	0.3
	05:00	2	0	2	1.1	0	0.7
AM Peak	06:00	4	4	8	2.1	3.4	2.6
	07:00	5	5	10	2.6	4.3	3.3
	08:00	6	7	13	3.2	6.0	4.3
	09:00	9	5	14	4.8	4.3	4.6
	10:00	16	4	20	8.5	3.4	6.6
Off Peak	11:00	12	8	20	6.3	6.9	6.6
	12:00	13	6	19	6.9	5.2	6.2
	13:00	12	12	24	6.3	10.3	7.9
	14:00	8	2	10	4.2	1.7	3.3
	15:00	15	15	30	7.9	12.9	9.8
PM Peak	16:00	31	10	41	16.4	8.6	13.4
	17:00	18	11	29	9.5	9.5	9.5
	18:00	10	8	18	5.3	6.9	5.9
	19:00	5	5	10	2.6	4.3	3.3
	20:00	6	4	10	3.2	3.4	3.3
Off Peak	21:00	1	2	3	0.5	1.7	1.0
	22:00	4	1	5	2.1	0.9	1.6
	23:00	2	1	3	1.1	0.9	1.0
	Total	**189**	**116**	**305**	**100**	**100**	**100**

Table C.1.7: M42 NO-VSL Accidents by Hour of Day

Weather	Accidents			
	Daylight		Darkness	
	Number	%	Number	%
Fine	189	62.0	56	18.4
Raining	40	13.1	14	4.6
Snowing	0	0	0	0
Fog	1	0.3	0	0
Other / Unknown	2	0.7	3	1.0
Total	**232**	**76.1**	**73**	**23.9**

Table C.1.8: M42 NO-VSL Accidents by Weather Condition and Lighting

Road Surface	Accidents			
	Daylight		Darkness	
	Number	%	Number	%
Dry	154	50.5	36	11.8
Wet or Flood	77	25.2	36	11.8
Snow or Ice	1	0.3	1	0.3
Total	**232**	**76.1**	**73**	**23.9**

Table C.1.9: M42 NO-VSL Accidents by Road Surface Condition and Lighting

Type	Accidents					
	Northbound		Southbound		Total	
	Number	%	Number	%	Number	%
Rear End Shunts	113	60.8	59.0	49.6	172.0	56.4
Side Impact	25	13.4	24.0	20.2	49.0	16.1
Single Vehicle	27	14.5	18.0	15.1	45.0	14.8
Unknown / other	21	11.3	18.0	15.1	39.0	12.8
Total	**186**	**100**	**119**	**100**	**305**	**100**

Table C.1.10: M42 NO-VSL Accidents by Accident Type

Vehicle Type	Vehicles											
	Year 1		Year 2		Year 3		Year 4		Year 5		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Motorcycle	2	1.6	1	0.5	1	0.6	3	2.1	3	2.7	10	1.3
Car	99	78.6	162	81.0	135	77.6	113	78.5	86	76.1	595	78.6
Minibus + bus	3	2.4	2	1.0	1	0.6	1	0.7	0	0	7	0.9
Goods Vehicle < 3.5t	9	7.1	15	7.5	15	8.6	13	9.0	6	5.3	58	7.7
Goods Vehicle > 3.5t	9	7.1	19	9.5	20	11.5	12	8.3	16	14.2	76	10
Other	4	3.2	1	0.5	2	1.1	2	1.4	2	1.8	11	1.5
Total	**126**	**100**	**200**	**100**	**174**	**100**	**144**	**100**	**113**	**100**	**757**	**100**

Table C.1.11: M42 NO-VSL Vehicles by Type

Vehicle Manoeuvre	Vehicles											
	Year 1		Year 2		Year 3		Year 4		Year 5		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Reversing	0	0	0	0	0	0	1	0.7	1	0.9	2	0.3
Parked	2	1.6	7	3.5	0	0	1	0.7	0	0	10	1.3
Waiting to go ahead but held up	22	17.5	22	11.0	25	14.4	19	13.2	17	15.0	105	13.9
Stopping	6	4.8	52	26.0	22	12.6	18	12.5	8	7.1	106	14.0
Starting	0	0	0	0	0	0	0	0	0	0.0	0	0
Turning left	0	0	0	0	1	0.6	0	0	0	0.0	1	0.1
Changing lane to left	9	7.1	5	2.5	10	5.7	6	4.2	5	4.4	35	4.6
Changing lane to right	5	4.0	7	3.5	13	7.5	4	2.8	9	8.0	38	5.0
Overtaking a moving vehicle off side	5	4.0	4	2.0	7	4.0	4	2.8	3	2.7	23	3.0
Overtaking - nearside	2	1.6	0	0	0	0	1	0.7	0	0	3	0.4
Going ahead on a left hand bend	0	0	0	0	0	0	2	1.4	3	2.7	5	0.7
Going ahead on a right hand bend	0	0	0	0	3	1.7	0	0	0	0	3	0.4
Going ahead other	75	59.5	103	51.5	93	53.4	88	61.1	67	59.3	426	56.3
Total	**126**	**100**	**200**	**100**	**174**	**100**	**144**	**100**	**113**	**100**	**757**	**100**

Table C.1.12: M42 NO-VSL Vehicles by Manoeuvre

C.2 M42 3L-VMSL

Severity	Accidents	
	6 Month Data (01.02.06 – 31.07.06)	
	Number	%
Fatal	0	0.0
Serious	3	15.8
Slight	16	84.2
KSI	*3*	*15.8*
KSI Severity Index	*0.16*	
Total	**19**	**100**

Table C.2.1: M42 3L-VMSL Accidents by Severity

Link	Number of PIAs - Northbound				Link Length (miles)	AADT*	bvmt**	PIA rate per bvmt
	Fatal	Serious	Slight	Total				
J3A to 4	0	0	0	0	3.4	61,214	0.04	0.00
J4 to 5	0	0	1	1	2.4	64,540	0.03	36.04
J5 to 6	0	0	10	10	3.5	63,923	0.04	246.94
J6 to 7	0	0	0	0	2.8	64,320	0.03	0.00
Total	**0**	**0**	**11**	**11**	**12.0**	**N/A**	**N/A**	**70.75**

* One-way Average Feb 06 to Jul 2006 ** Billion vehicle miles travelled *** Average of all sections

Table C.2.2: M42 3L-VMSL Accident Rates by Direction (Northbound)

Link	Number of PIAs - Southbound				Link Length (miles)	AADT*	bvmt**	PIA rate per bvmt
	Fatal	Serious	Slight	Total				
J3A to 4	0	0	1	1	3.4	65,017	0.04	25.18
J4 to 5	0	0	2	2	2.4	66,551	0.03	69.91
J5 to 6	0	3	0	3	3.5	65,733	0.04	72.04
J6 to 7	0	0	2	2	2.8	67,340	0.03	59.67
Total	**0**	**3**	**5**	**8**	**12.0**	**N/A**	**N/A**	**56.70**

* One-way Average Feb 06 to Jul 2006 ** Billion vehicle miles travelled *** Average of all sections

Table C.2.3: M42 3L-VMSL Accident Rates by direction (Southbound)

Severity	Casualties	
	6 Month Data (01.02.06 – 31.07.06)	
	Number	%
Fatal	0	0.0
Serious	3	11.1
Slight	24	88.9
KSI	*3*	*11.1*
KSI Severity Index	*0.11*	
Total	**27**	**100**

Table C.2.4: M42 3L-VMSL Casualties by Severity

Month	Accidents			
	n/b	s/b	2 Way	%
Jan	-	-	-	-
Feb	1	1	2	10.5
Mar	1	1	2	10.5
Apr	2	0	2	10.5
May	5	2	7	36.8
Jun	0	4	4	21.1
Jul	2	0	2	10.5
Aug	-	-	-	-
Sep	-	-	-	-
Oct	-	-	-	-
Nov	-	-	-	-
Dec	-	-	-	-
Total	**11**	**8**	**19**	**100**

Table C.2.5: M42 3L-VMSL Accidents by Month

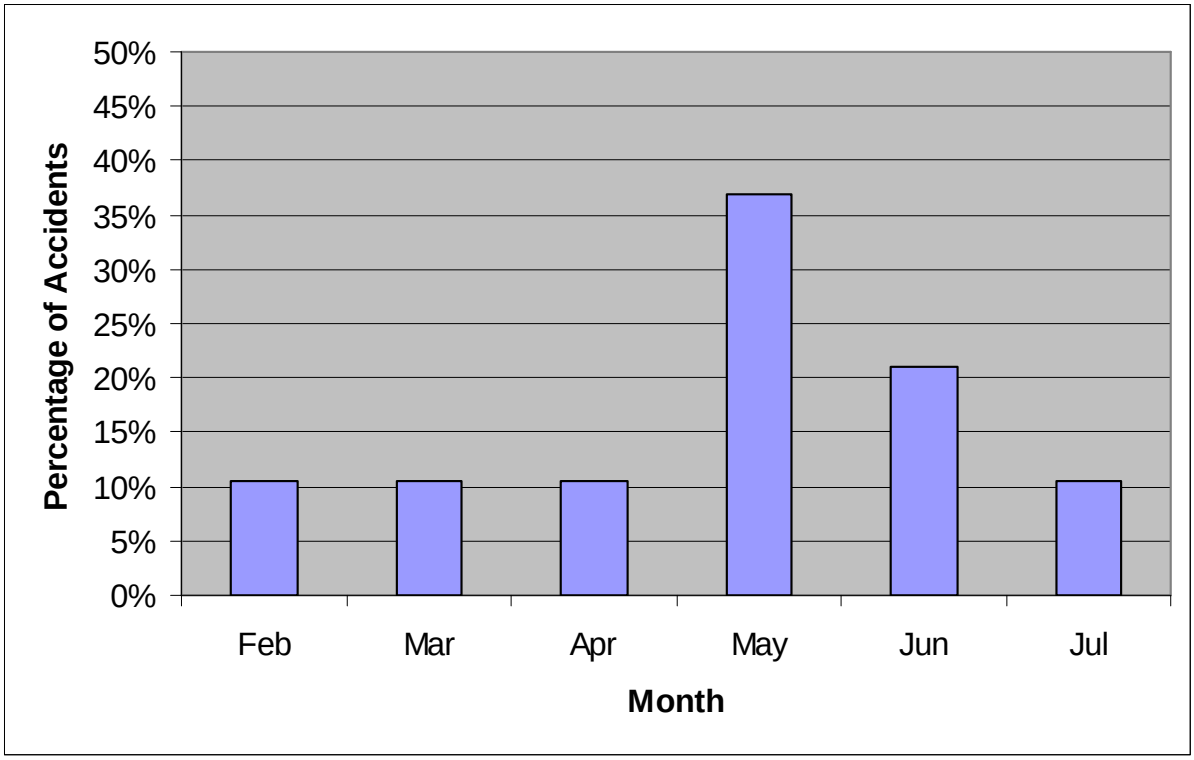


Figure C.2.1: M42 3L-VMSL Accidents by Month

Day of Week	Accidents			
	n/b	s/b	2 Way	%
Mon	1	0	1	5.3
Tues	1	2	3	15.8
Weds	3	0	3	15.8
Thurs	1	1	2	10.5
Fri	2	1	3	15.8
Sat	1	2	3	15.8
Sun	2	2	4	21.1
Total	**11**	**8**	**19**	**100**

Table C.2.6: M42 3L-VMSL Accidents by Day of Week

Peak / Off Peak	Hour Starting	Accidents					
		Number			%		
		n/b	s/b	2 Way	n/b	s/b	2 Way
Off Peak	00:00	0	0	0	0	0	0
	01:00	0	0	0	0	0	0
	02:00	0	0	0	0	0	0
	03:00	0	0	0	0	0	0
	04:00	0	0	0	0	0	0
	05:00	0	0	0	0	0	0
AM Peak	06:00	0	1	1	0	5.3	5.3
	07:00	1	0	1	5.3	0	5.3
	08:00	1	1	2	5.3	5.3	10.5
	09:00	0	1	1	0	5.3	5.3
	10:00	1	1	2	5.3	5.3	10.5
Off Peak	11:00	0	1	1	0	5.3	5.3
	12:00	1	2	3	5.3	10.5	15.8
	13:00	0	0	0	0	0	0
	14:00	1	0	1	5.3	0	5.3
	15:00	1	0	1	5.3	0	5.3
PM Peak	16:00	1	0	1	5.3	0	5.3
	17:00	1	1	2	5.3	5.3	10.5
	18:00	2	0	2	10.5	0	10.5
	19:00	0	0	0	0	0	0
	20:00	0	0	0	0	0	0
Off Peak	21:00	1	0	1	5.3	0	5.3
	22:00	0	0	0	0	0	0
	23:00	0	0	0	0	0	0
	Total	**11**	**8**	**19**	**58**	**42**	**100**

Table C.2.7: M42 3L-VMSL Accidents by Hour of Day

Weather	Accidents			
	Daylight		Darkness	
	Number	%	Number	%
Fine	12	63.2	1	5.3
Raining	3	15.8	1	5.3
Snowing	0	0	0	0
Fog	0	0	0	0
Other / unknown	2	10.5	0	0
Total	**17**	**89.5**	**2**	**10.5**

Table C.2.8: M42 3L-VMSL Accidents by Weather Condition and Lighting

Road Surface	Accidents			
	Daylight		Darkness	
	Number	%	Number	%
Dry	12	63.2	1	5.3
Wet or Flood	5	26.3	1	5.3
Snow or Ice	0	0	0	0
Total	**17**	**89.5**	**2**	**10.5**

Table C.2.9: M42 3L-VMSL Accidents by Road Surface Condition and Lighting

Type	Accidents					
	Northbound		Southbound		Total	
	Number	%	Number	%	Number	%
Rear End Shunts	7	63.6	2.0	25.0	9.0	47.4
Side Impact	3	27.3	3.0	37.5	6.0	31.6
Single Vehicle	1	9.1	1.0	12.5	2.0	10.5
Unknown / other	0	0	2.0	25.0	2.0	10.5
Total	**11**	**100**	**8**	**100**	**19**	**100**

Table C.2.10: M42 3L-VMSL Accidents by Type

Type	Vehicles	
	Number	%
Motorcycle	0	0
Car	42	82.4
Minibus + bus	0	0
Goods Vehicle less than 3.5T	2	3.9
Goods Vehicle greater than 3.5T	7	13.7
Other	0	0
Total	**51**	**100**

Table C.2.11: M42 3L-VMSL Vehicles by Type

Manoeuvre	Vehicles	
	Number	%
Waiting to go ahead but held up	7	13.7
Stopping or starting	14	27.5
Changing lane to left	2	3.9
Changing lane to right	4	7.8
Overtaking a moving vehicle off side	3	5.9
Overtaking a stationary vehicle off side	0	0
Going ahead on a right hand bend	1	2.0
Going ahead other	20	39.2
Total	**51**	**100**

Table C.2.12: M42 3L-VMSL Vehicles by Manoeuvre

C.3 M42 4L-VMSL

Severity	Accidents								
	12 Month Data (01.10.06 – 30.09.07)			24 Month Data (01.10.06 – 30.09.08)			36 Month Data (01.10.06 – 30.09.09)		
	No.	Mean	%	No.	Mean	%	No.	Mean	%
Fatal	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Serious	3	0.25	13.60	5	0.21	8.80	6	0.17	7.41
Slight	19	1.58	86.40	52	2.17	91.20	75	2.08	92.59
KSI	*3*	*0.25*	*13.60*	*5*	*0.21*	*8.80*	*6*	*0.17*	*7.41*
KSI Severity Index	*0.14*			*0.09*			*0.07*		
Total	**22**	**1.83**	**100**	**57**	**2.38**	**100**	**81**	**2.25**	**100**

Table C.3.1: M42 4L-VMSL Accidents by Severity

Link	Number of PIAs - Northbound				Link Length (miles)	AADT*	bvmt**	PIA rate per bvmt
	Fatal	Serious	Slight	Total				
J3A to 4	0	1	8	9	3.4	61028	0.23	39.90
J4 to 5	0	0	12	12	2.4	64668	0.17	71.35
J5 to 6	0	2	21	23	3.5	64218	0.25	93.45
J6 to 7	0	1	5	6	2.8	65254	0.20	30.53
Total	**0**	**4**	**46**	**50**	**12.0**	**N/A**	**N/A**	**58.81*** **

* One-way Average Jan 2009 to Dec 2009 ** Billion Vehicle Miles travelled *** Average of all sections

Table C.3.2: M42 4L-VMSL Accident Rates by Direction (Northbound)

Link	Number of PIAs - Southbound				Link Length (miles)	AADT*	bvmt**	PIA rate per bvmt
	Fatal	Serious	Slight	Total				
J3A to 4	0	1	6	7	3.4	61800	0.23	30.65
J4 to 5	0	0	7	7	2.4	64885	0.17	41.48
J5 to 6	0	1	8	9	3.5	65136	0.25	36.05
J6 to 7	0	0	8	8	2.8	64923	0.20	40.92
Total	**0**	**2**	**29**	**31**	**12.0**	**N/A**	**N/A**	**37.28*** **

* One-way Average Jan 2009 to Dec 2009 ** Billion Vehicle Miles travelled *** Average of all sections

Table C.3.3: M42 4L-VMSL Accident Rates by Direction (Southbound)

Severity	Casualties								
	12 Month Data (01.10.06 – 30.09.07)			24 Month Data (01.10.06 – 30.09.08)			36 Month Data (01.10.06 – 30.09.09)		
	No.	Mean	%	No.	Mean	%	No.	Mean	%
Fatal	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Serious	3	0.25	6.30	6	0.25	6.30	7	0.19	5.22
Slight	45	3.75	93.80	90	3.75	93.80	127	3.53	94.78
KSI	*3*	*0.25*	*6.30*	*6*	*0.25*	*6.30*	*7*	*0.19*	*5.22*
KSI Severity Index		*0.06*			*0.06*			*0.05*	
Total	**48**	**4.00**	**100**	**96**	**4.00**	**100**	**134**	**3.72**	**100**

Table C.3.4: M42 4L-VMSL Casualties by Severity

Month	Accidents			
	n/b	s/b	2 Way	%
Oct	4	1	5	6.2
Nov	3	5	8	9.9
Dec	1	2	3	3.7
Jan	3	4	7	8.6
Feb	6	1	7	8.6
Mar	3	1	4	4.9
Apr	6	2	8	9.9
May	4	0	4	4.9
Jun	5	5	10	12.3
Jul	2	3	5	6.2
Aug	8	6	14	17.3
Sep	5	1	6	7.4
Total	**50**	**31**	**81**	**100**

Table C.3.5: M42 4L-VMSL Accidents by Month

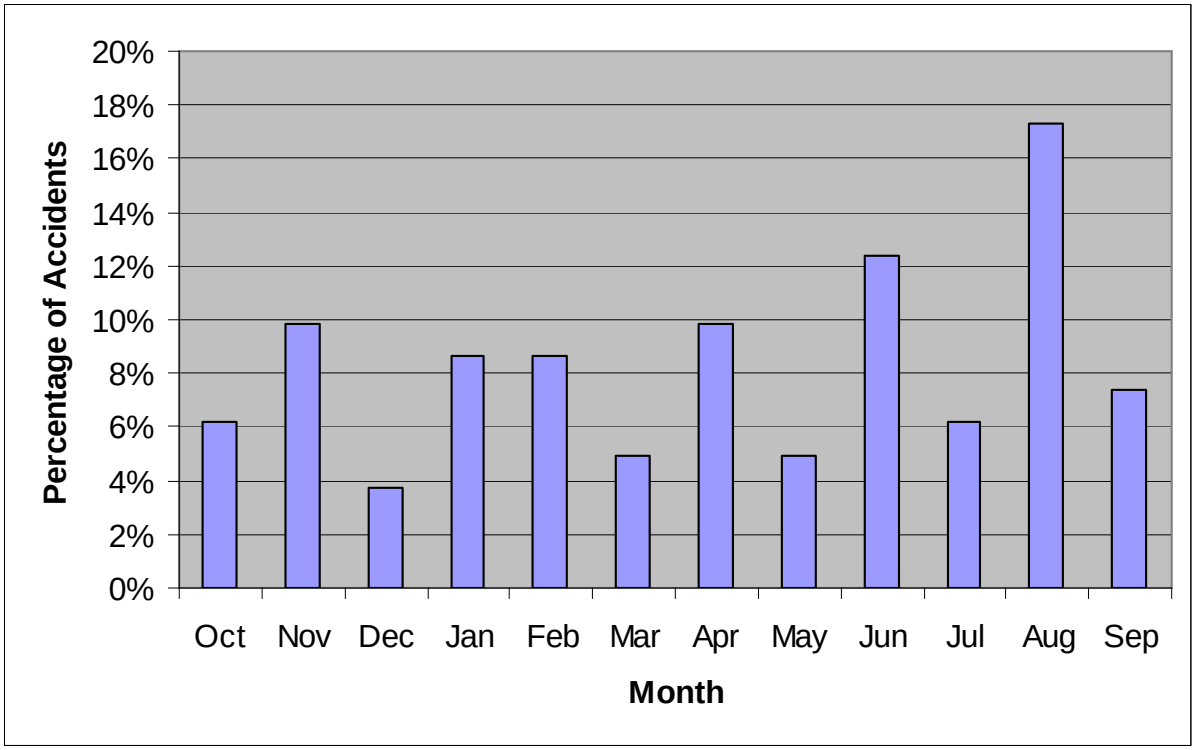


Figure C.3.1: 4L-VMSL Accidents by Month

Day of Week	Accidents			
	n/b	s/b	2 Way	%
Mon	2	5	7	8.6
Tues	7	7	14	17.3
Weds	11	4	15	18.5
Thurs	7	8	15	18.5
Fri	8	2	10	12.3
Sat	9	2	11	13.6
Sun	6	3	9	11.1
Total	**50**	**31**	**81**	**100**

Table C.3.6: M42 4L-VMSL Accidents by Day of Week

Peak / Off Peak	Hour Starting	Accidents					
		Number			%		
		n/b	s/b	2 Way	n/b	s/b	2 Way
Off Peak	00:00	0	0	0	0.0	0.0	0.0
	01:00	2	1	3	2.6	1.2	3.7
	02:00	0	2	2	0.0	2.3	2.3
	03:00	2	0	2	2.6	0.0	2.6
	04:00	0	0	0	0.0	0.0	0.0
	05:00	1	0	1	1.3	0.0	1.3
AM Peak	06:00	0	0	0	0.0	0.0	0.0
	07:00	2	2	4	2.6	2.3	4.9
	08:00	7	4	11	9.0	4.6	13.6
	09:00	3	5	8	3.8	5.8	9.6
	10:00	4	1	5	5.1	1.2	6.3
Off Peak	11:00	2	0	2	2.6	0.0	2.6
	12:00	2	2	4	2.6	2.3	4.9
	13:00	2	2	4	2.6	2.3	4.9
	14:00	0	4	4	0.0	4.6	4.6
	15:00	2	0	2	2.6	0.0	2.6
PM Peak	16:00	4	0	4	5.1	0.0	5.1
	17:00	4	5	9	5.1	5.8	10.9
	18:00	5	1	6	6.4	1.2	7.6
	19:00	4	1	5	5.1	1.2	6.3
	20:00	2	1	3	2.6	1.2	3.7
Off Peak	21:00	0	0	0	0.0	0.0	0.0
	22:00	1	0	1	1.3	0.0	1.3
	23:00	1	0	1	1.3	0.0	1.3
	Total	**50**	**31**	**81**	**62**	**38**	**100**

Table C.3.7: M42 4L-VMSL Accidents by Hour of Day

Weather	Accidents			
	Daylight		Darkness	
	Number	%	Number	%
Fine	38	67.9	10	17.9
Raining	2	3.6	1	1.8
Snowing	0	0.0	0	0.0
Fog	1	1.8	0	0.0
Other / Unknown	2	3.6	2	3.6
Total	**43**	**76.8**	**13**	**23.2**

Table C.3.8: M42 4L-VMSL Accidents by Weather Condition and Lighting

Road Surface	Accidents			
	Daylight		Darkness	
	Number	%	Number	%
Dry	46	56.8	17	21.0
Wet or Flood	12	14.8	6	7.4
Snow or Ice	0	0.0	0	0.0
Total	**58**	**71.6**	**23**	**28.4**

Table C.3.9: M42 4L-VMSL Accidents by Road Surface Condition and Lighting

Type	Accidents					
	Northbound		Southbound		Total	
	Number	%	Number	%	Number	%
Rear End Shunts	31	38.3	19	23.5	50	61.7
Side Impact	17	21.0	8	9.9	25	30.9
Single Vehicle	1	1.2	3	3.7	4	4.9
Unknown / other	1	1.2	1	1.2	2	2.5
Total	**50**	**61.7**	**31**	**38.3**	**81**	**100**

Table C.3.10: M42 4L-VMSL Accidents by Accident Type

Type	Vehicle	
	Number	%
Motorcycle	1	0.5
Car	136	70.1
Minibus + bus	3	1.5
Goods Vehicle less than 3.5T	20	10.3
Goods Vehicle greater than 3.5T	33	17.0
Other	1	0.5
Total	**194**	**100**

Table C.3.11: M42 4L-VMSL Vehicles by Type

Manoeuvre	Vehicle	
	Number	%
Parked	2	1.0
Waiting to go ahead but held up	31	16.0
Stopping or starting	38	19.6
Overtaking a moving vehicle	5	2.6
Changing lane to left	0	0.0
Changing lane to right	94	48.5
Going ahead other	24	12.4
Total	**194**	**100**

Table C.3.12: M42 4L-VMSL Vehicles by Manoeuvre

Appendix D M42 Accident Plots

Appendix E Full List of Accidents included in the Analysis

E.1 NO-VSL Accidents

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
N.1	Serious	Friday	26/06/1998	June	1998	06:03	JDT_year_one (JSYS)	418270	279108
N.2	Serious	Sunday	05/07/1998	July	1998	14:06	JDT_year_one (JSYS)	416097	277619
N.3	Slight	Saturday	11/07/1998	July	1998	10:11	Warwickshire	413234	273381
N.4	Slight	Sunday	12/07/1998	July	1998	07:28	JDT_year_one (JSYS)	417065	278563
N.5	Serious	Friday	17/07/1998	July	1998	19:30	JDT_year_one (JSYS)	419350	281518
N.6	Slight	Thursday	30/07/1998	July	1998	16:06	JDT_year_one (JSYS)	419713	286111
N.7	Slight	Friday	31/07/1998	July	1998	15:55	JDT_year_one (JSYS)	415559	277037
N.8	Slight	Friday	31/07/1998	July	1998	15:10	JDT_year_one (JSYS)	415630	277107
N.9	Slight	Wednesday	19/08/1998	August	1998	08:20	JDT_year_one (JSYS)	413852	274360
N.10	Serious	Wednesday	16/09/1998	September	1998	10:50	Warwickshire	413242	273480
N.11	Slight	Wednesday	16/09/1998	September	1998	15:25	JDT_year_one (JSYS)	417604	278759
N.12	Slight	Friday	18/09/1998	September	1998	16:30	JDT_year_one (JSYS)	417065	278563
N.13	Slight	Saturday	19/09/1998	September	1998	13:00	Warwickshire	413162	273089
N.14	Serious	Sunday	20/09/1998	September	1998	14:00	JDT_year_one (JSYS)	419670	282689
N.15	Slight	Sunday	11/10/1998	October	1998	01:25	JDT_year_one (JSYS)	419481	282112
N.16	Slight	Monday	12/10/1998	October	1998	16:30	JDT_year_one (JSYS)	417604	278759
N.17	Slight	Thursday	15/10/1998	October	1998	18:20	JDT_year_one (JSYS)	414359	275095
N.18	Slight	Monday	19/10/1998	October	1998	10:15	JDT_year_one (JSYS)	418728	279742
N.19	Slight	Friday	23/10/1998	October	1998	17:35	JDT_year_one (JSYS)	419895	283421
N.20	Slight	Friday	23/10/1998	October	1998	13:16	JDT_year_one (JSYS)	419064	280555
N.21	Slight	Friday	23/10/1998	October	1998	11:15	JDT_year_one (JSYS)	419569	282450
N.22	Slight	Sunday	25/10/1998	October	1998	12:20	JDT_Key Accident	417604	278759
N.23	Serious	Tuesday	27/10/1998	October	1998	19:56	Warwickshire	412293	272174
N.24	Slight	Friday	13/11/1998	November	1998	17:27	JDT_year_one (JSYS)	416097	277619
N.25	Serious	Sunday	15/11/1998	November	1998	14:19	JDT_year_one (JSYS)	419802	284150
N.26	Serious	Monday	16/11/1998	November	1998	11:17	Warwickshire	412727	272202
N.27	Serious	Friday	20/11/1998	November	1998	16:15	JDT_year_one (JSYS)	419708	282780
N.28	Slight	Sunday	06/12/1998	December	1998	06:20	JDT_year_one (JSYS)	417808	278828
N.29	Slight	Thursday	10/12/1998	December	1998	18:39	JDT_year_one (JSYS)	414897	276277
N.30	Slight	Friday	11/12/1998	December	1998	13:35	JDT_year_one (JSYS)	419278	281230
N.31	Slight	Sunday	13/12/1998	December	1998	13:20	JDT_year_one (JSYS)	418638	279568
N.32	Slight	Friday	18/12/1998	December	1998	11:10	JDT_year_one (JSYS)	419628	282595
N.33	Slight	Wednesday	23/12/1998	December	1998	13:50	JDT_year_one (JSYS)	414427	275285
N.34	Slight	Friday	08/01/1999	January	1999	12:36	Warwickshire	413238	273454
N.35	Serious	Monday	11/01/1999	January	1999	20:18	JDT_Key Accident	414532	275638
N.36	Slight	Sunday	24/01/1999	January	1999	11:55	JDT_Key Accident	419911	283396
N.37	Slight	Sunday	07/02/1999	February	1999	13:29	JDT_Key Accident	415698	277171

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
N.38	Serious	Friday	19/02/1999	February	1999	22:40	JDT_Key Accident	414081	274565
N.39	Slight	Sunday	21/02/1999	February	1999	10:00	JDT_Key Accident	419504	282213
N.40	Slight	Sunday	28/02/1999	February	1999	09:35	JDT_Key Accident	419556	282411
N.41	Serious	Thursday	11/03/1999	March	1999	11:40	Warwickshire	413256	273525
N.42	Slight	Friday	12/03/1999	March	1999	07:49	JDT_Key Accident	419793	284963
N.43	Slight	Thursday	17/03/1999	March	1999	15:00	Warwickshire	412925	272327
N.44	Slight	Thursday	25/03/1999	March	1999	22:00	JDT_Key Accident	419663	282707
N.45	Slight	Tuesday	30/03/1999	March	1999	10:25	JDT_Key Accident	419439	281916
N.46	Fatal	Wednesday	31/03/1999	March	1999	04:00	Warwickshire	413072	272506
N.47	Slight	Wednesday	31/03/1999	March	1999	10:50	Warwickshire	412402	272156
N.48	Slight	Thursday	15/04/1999	April	1999	15:32	JDT_Key Accident	415400	276876
N.49	Slight	Tuesday	20/04/1999	April	1999	17:00	JDT_Key Accident	419744	282870
N.50	Slight	Monday	10/05/1999	May	1999	14:30	JDT_Key Accident	415074	276522
N.51	Slight	Friday	28/05/1999	May	1999	13:56	JDT_Key Accident	417064	278563
N.52	Slight	Saturday	29/05/1999	May	1999	17:45	JDT_Key Accident	414376	275090
N.53	Serious	Sunday	06/06/1999	June	1999	15:30	JDT_Key Accident	419694	282682
N.54	Slight	Tuesday	15/06/1999	June	1999	17:30	JDT_Key Accident	417421	278690
N.55	Slight	Friday	18/06/1999	June	1999	11:00	JDT_Key Accident	419768	284866
N.56	Slight	Thursday	01/07/1999	July	1999	16:24	JDT_Key Accident	419549	282306
N.57	Serious	Friday	02/07/1999	July	1999	01:00	JDT_Key Accident	416817	278436
N.58	Serious	Saturday	10/07/1999	July	1999	11:50	JDT_Key Accident	419549	282306
N.59	Slight	Wednesday	14/07/1999	July	1999	20:45	JDT_Key Accident	418170	279030
N.60	Slight	Saturday	17/07/1999	July	1999	11:38	JDT_Key Accident	418818	279896
N.61	Slight	Wednesday	21/07/1999	July	1999	14:00	JDT_Key Accident	419375	281624
N.62	Slight	Wednesday	11/08/1999	August	1999	07:20	JDT_Key Accident	419481	282113
N.63	Fatal	Saturday	21/08/1999	August	1999	13:40	JDT_Key Accident	414535	275529
N.64	Slight	Thursday	26/08/1999	August	1999	15:55	Warwickshire	413138	272791
N.65	Serious	Friday	27/08/1999	August	1999	10:40	JDT_Key Accident	419040	280437
N.66	Slight	Thursday	16/09/1999	September	1999	08:00	JDT_Key Accident	414473	275354
N.67	Slight	Friday	17/09/1999	September	1999	18:14	JDT_Key Accident	417223	278632
N.68	Slight	Monday	20/09/1999	September	1999	10:07	JDT_Key Accident	417523	278715
N.69	Slight	Thursday	23/09/1999	September	1999	18:40	JDT_Key Accident	417421	278690
N.70	Serious	Wednesday	29/09/1999	September	1999	16:26	JDT_Key Accident	418987	280349
N.71	Slight	Wednesday	29/09/1999	September	1999	16:25	JDT_Key Accident	417604	278759
N.72	Serious	Sunday	03/10/1999	October	1999	16:47	JDT_Key Accident	417604	278759
N.73	Slight	Sunday	03/10/1999	October	1999	16:30	JDT_Key Accident	419784	282977
N.74	Slight	Sunday	03/10/1999	October	1999	16:30	JDT_Key Accident	419556	282410
N.75	Slight	Sunday	03/10/1999	October	1999	16:15	JDT_Key Accident	419772	282943
N.76	Serious	Monday	04/10/1999	October	1999	15:13	JDT_Key Accident	419787	285163

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
N.77	Slight	Monday	01/11/1999	November	1999	13:00	JDT_Key Accident	419913	283467
N.78	Slight	Tuesday	02/11/1999	November	1999	13:35	JDT_Key Accident	417136	278596
N.79	Slight	Sunday	07/11/1999	November	1999	12:20	JDT_Key Accident	419023	280444
N.80	Slight	Tuesday	09/11/1999	November	1999	20:57	JDT_Key Accident	419460	282014
N.81	Slight	Friday	12/11/1999	November	1999	15:06	JDT_Key Accident	415136	276601
N.82	Slight	Sunday	14/11/1999	November	1999	10:00	JDT_Key Accident	419278	281230
N.83	Serious	Tuesday	15/11/1999	November	1999	18:50	Warwickshire	413138	272791
N.84	Slight	Wednesday	17/11/1999	November	1999	20:50	JDT_Key Accident	413465	273918
N.85	Slight	Friday	19/11/1999	November	1999	16:42	JDT_Key Accident	419790	284332
N.86	Slight	Friday	19/11/1999	November	1999	18:19	JDT_Key Accident	419805	285162
N.87	Slight	Friday	19/11/1999	November	1999	12:05	JDT_Key Accident	419775	284966
N.88	Slight	Saturday	20/11/1999	November	1999	19:15	JDT_Key Accident	416528	278157
N.89	Slight	Saturday	20/11/1999	November	1999	18:55	JDT_Key Accident	416907	278511
N.90	Serious	Friday	26/11/1999	November	1999	15:00	JDT_Key Accident	414453	275303
N.91	Slight	Sunday	05/12/1999	December	1999	10:53	JDT_Key Accident	419539	282355
N.92	Slight	Wednesday	08/12/1999	December	1999	14:10	Warwickshire	413150	272991
N.93	Serious	Thursday	09/12/1999	December	1999	17:10	JDT_Key Accident	417421	278690
N.94	Slight	Sunday	12/12/1999	December	1999	00:05	JDT_Key Accident	419460	282014
N.95	Slight	Tuesday	21/12/1999	December	1999	20:14	JDT_Key Accident	418987	280349
N.96	Slight	Wednesday	29/12/1999	December	1999	11:55	JDT_Key Accident	418728	279742
N.97	Slight	Friday	14/01/2000	January	2000	16:57	JDT_Key Accident	417518	278737
N.98	Slight	Monday	24/01/2000	January	2000	12:23	JDT_Key Accident	418728	279743
N.99	Slight	Thursday	27/01/2000	January	2000	08:35	JDT_Key Accident	414555	275622
N.100	Slight	Thursday	17/02/2000	February	2000	09:57	JDT_Key Accident	414472	275424
N.101	Slight	Thursday	24/02/2000	February	2000	08:10	JDT_Key Accident	416176	277692
N.102	Slight	Thursday	24/02/2000	February	2000	20:55	JDT_Key Accident	419646	282634
N.103	Slight	Friday	25/02/2000	February	2000	15:14	JDT_Key Accident	418685	279659
N.104	Slight	Friday	03/03/2000	March	2000	14:40	JDT_Key Accident	418881	280086
N.105	Slight	Friday	03/03/2000	March	2000	20:35	JDT_Key Accident	418898	280078
N.106	Slight	Saturday	11/03/2000	March	2000	10:15	JDT_Key Accident	419728	282936
N.107	Slight	Wednesday	22/03/2000	March	2000	19:15	JDT_Key Accident	419481	282113
N.108	Slight	Wednesday	22/03/2000	March	2000	19:15	JDT_Key Accident	419135	280753
N.109	Slight	Thursday	23/03/2000	March	2000	17:54	JDT_Key Accident	419278	281230
N.110	Slight	Saturday	08/04/2000	April	2000	16:39	JDT_Key Accident	418422	279259
N.111	Slight	Monday	17/04/2000	April	2000	13:00	JDT_Key Accident	413712	274212
N.112	Slight	Wednesday	19/04/2000	April	2000	21:09	JDT_Key Accident	419694	282682
N.113	Slight	Thursday	20/04/2000	April	2000	15:00	JDT_Key Accident	417421	278690
N.114	Slight	Friday	21/04/2000	April	2000	16:15	JDT_Key Accident	418592	279487
N.115	Slight	Saturday	29/04/2000	April	2000	13:50	JDT_Key Accident	418685	279658

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
N.116	Slight	Thursday	11/05/2000	May	2000	08:53	JDT_Key Accident	413852	274360
N.117	Slight	Tuesday	23/05/2000	May	2000	13:45	JDT_Key Accident	419320	281323
N.118	Slight	Tuesday	30/05/2000	May	2000	06:00	Warwickshire	413438	272165
N.119	Slight	Thursday	08/06/2000	June	2000	17:00	JDT_Key Accident	414495	275507
N.120	Slight	Friday	16/06/2000	June	2000	05:29	JDT_Key Accident	414951	276357
N.121	Slight	Friday	16/06/2000	June	2000	17:57	JDT_Key Accident	416282	277865
N.122	Slight	Wednesday	28/06/2000	June	2000	16:00	JDT_Key Accident	419397	281720
N.123	Serious	Sunday	02/07/2000	July	2000	09:41	JDT_Key Accident	416595	278225
N.124	Slight	Tuesday	04/07/2000	July	2000	17:09	JDT_Key Accident	419876	283571
N.125	Serious	Wednesday	12/07/2000	July	2000	14:58	JDT_Key Accident	414616	275717
N.126	Slight	Friday	21/07/2000	July	2000	17:20	JDT_Key Accident	415275	276741
N.127	Slight	Friday	04/08/2000	August	2000	12:26	Warwickshire	420239	286500
N.128	Slight	Monday	07/08/2000	August	2000	16:10	JDT_Key Accident	419708	282780
N.129	Slight	Friday	18/08/2000	August	2000	18:46	JDT_Key Accident	419775	284690
N.130	Slight	Friday	18/08/2000	August	2000	18:35	Warwickshire	413162	273089
N.131	Slight	Monday	21/08/2000	August	2000	03:22	JDT_Key Accident	415455	276958
N.132	Slight	Wednesday	23/08/2000	August	2000	11:35	JDT_Key Accident	413994	274495
N.133	Slight	Friday	25/08/2000	August	2000	17:05	JDT_Key Accident	416111	277610
N.134	Slight	Thursday	07/09/2000	September	2000	16:50	JDT_Key Accident	417944	278890
N.135	Slight	Friday	22/09/2000	September	2000	13:20	JDT_Key Accident	418685	279658
N.136	Slight	Wednesday	27/09/2000	September	2000	20:50	JDT_Key Accident	419839	283963
N.137	Slight	Wednesday	04/10/2000	October	2000	16:18	JDT_Key Accident	416659	278310
N.138	Slight	Friday	06/10/2000	October	2000	10:58	Warwickshire	413203	273346
N.139	Slight	Thursday	12/10/2000	October	2000	16:42	JDT_Key Accident	417604	278759
N.140	Slight	Wednesday	18/10/2000	October	2000	16:40	JDT_Key Accident	419854	283273
N.141	Slight	Thursday	26/10/2000	October	2000	10:08	JDT_Key Accident	419780	284773
N.142	Slight	Saturday	28/10/2000	October	2000	09:20	JDT_Key Accident	419907	283336
N.143	Slight	Friday	03/11/2000	November	2000	16:43	JDT_Key Accident	415467	276946
N.144	Slight	Wednesday	08/11/2000	November	2000	19:50	JDT_Key Accident	418498	279323
N.145	Slight	Sunday	19/11/2000	November	2000	09:55	JDT_Key Accident	419836	284063
N.146	Slight	Thursday	23/11/2000	November	2000	18:05	JDT_Key Accident	415615	277118
N.147	Slight	Sunday	26/11/2000	November	2000	12:35	JDT_Key Accident	419478	282010
N.148	Slight	Monday	27/11/2000	November	2000	18:00	JDT_Key Accident	419860	283853
N.149	Slight	Tuesday	28/11/2000	November	2000	15:48	JDT_Key Accident	414252	274815
N.150	Slight	Wednesday	29/11/2000	November	2000	16:45	JDT_Key Accident	415388	276890
N.151	Slight	Wednesday	13/12/2000	December	2000	10:07	Warwickshire	413170	273190
N.152	Slight	Friday	15/12/2000	December	2000	19:10	JDT_Key Accident	419730	282774
N.153	Serious	Thursday	21/12/2000	December	2000	17:45	JDT_Key Accident	419784	282977
N.154	Slight	Tuesday	26/12/2000	December	2000	22:31	JDT_Key Accident	419786	284240
N.155	Slight	Wednesday	27/12/2000	December	2000	12:00	Warwickshire	413256	273525

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
N.156	Slight	Saturday	30/12/2000	December	2000	12:05	JDT_Key Accident	419757	284507
N.157	Slight	Saturday	30/12/2000	December	2000	12:05	JDT_Key Accident	419758	284690
N.158	Slight	Tuesday	02/01/2001	January	2001	08:40	JDT_Key Accident	419782	285064
N.159	Serious	Tuesday	09/01/2001	January	2001	21:35	JDT_Key Accident	414518	275588
N.160	Slight	Saturday	13/01/2001	January	2001	09:15	JDT_Key Accident	419439	281916
N.161	Slight	Saturday	13/01/2001	January	2001	09:40	JDT_Key Accident	419800	285062
N.162	Slight	Saturday	20/01/2001	January	2001	16:10	JDT_Key Accident	414145	274647
N.163	Slight	Monday	22/01/2001	January	2001	00:14	JDT_Key Accident	417470	278701
N.164	Slight	Thursday	25/01/2001	January	2001	08:00	JDT_Key Accident	416819	278437
N.165	Slight	Tuesday	30/01/2001	January	2001	06:59	JDT_Key Accident	419818	284063
N.166	Slight	Tuesday	30/01/2001	January	2001	11:20	JDT_Key Accident	418685	279658
N.167	Slight	Friday	09/02/2001	February	2001	14:30	JDT_Key Accident	414393	275190
N.168	Slight	Monday	12/02/2001	February	2001	13:35	JDT_Key Accident	414339	274996
N.169	Slight	Friday	16/02/2001	February	2001	12:33	JDT_Key Accident	416176	277692
N.170	Slight	Thursday	22/02/2001	February	2001	15:00	JDT_Key Accident	418170	279030
N.171	Slight	Saturday	24/02/2001	February	2001	02:25	Warwickshire	412948	272253
N.172	Slight	Sunday	25/02/2001	February	2001	11:40	JDT_Key Accident	419780	284772
N.173	Slight	Monday	26/02/2001	February	2001	12:45	JDT_Key Accident	419693	282681
N.174	Slight	Friday	09/03/2001	March	2001	16:28	JDT_Key Accident	419812	283073
N.175	Slight	Saturday	10/03/2001	March	2001	15:45	Warwickshire	412810	272155
N.176	Slight	Tuesday	13/03/2001	March	2001	17:00	JDT_Key Accident	417605	278759
N.177	Serious	Wednesday	28/03/2001	March	2001	11:15	JDT_Key Accident	416354	277936
N.178	Serious	Wednesday	28/03/2001	March	2001	15:46	JDT_Key Accident	418887	280100
N.179	Slight	Thursday	29/03/2001	March	2001	13:35	JDT_Key Accident	413571	274062
N.180	Slight	Tuesday	03/04/2001	April	2001	10:17	JDT_Key Accident	414556	275623
N.181	Slight	Tuesday	03/04/2001	April	2001	07:45	Warwickshire	413048	272606
N.182	Slight	Thursday	19/04/2001	April	2001	17:45	JDT_Key Accident	417129	278613
N.183	Slight	Monday	23/04/2001	April	2001	18:00	JDT_Key Accident	413818	274330
N.184	Slight	Thursday	26/04/2001	April	2001	12:41	JDT_Key Accident	419694	282683
N.185	Slight	Thursday	26/04/2001	April	2001	13:00	JDT_Key Accident	418840	279992
N.186	Serious	Sunday	06/05/2001	May	2001	23:04	JDT_Key Accident	418483	279332
N.187	Slight	Tuesday	08/05/2001	May	2001	07:18	JDT_Key Accident	419417	281812
N.188	Slight	Friday	11/05/2001	May	2001	15:56	JDT_Key Accident	419646	282634
N.189	Slight	Wednesday	16/05/2001	May	2001	19:45	JDT_Key Accident	413450	273928
N.190	Slight	Saturday	26/05/2001	May	2001	16:36	JDT_Key Accident	413646	274145
N.191	Slight	Wednesday	13/06/2001	June	2001	12:49	JDT_Key Accident	417743	278802
N.192	Slight	Friday	29/06/2001	June	2001	10:45	JDT_Key Accident	414790	276106
N.193	Slight	Tuesday	17/07/2001	July	2001	17:50	JDT_Key Accident	414428	275286
N.194	Slight	Thursday	02/08/2001	August	2001	07:07	Warwickshire	413215	273397

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
N.207	Serious	Sunday	28/10/2001	October	2001	11:54	JDT_Key Accident	419787	285163
N.195	Slight	Friday	17/08/2001	August	2001	11:40	JDT_Key Accident	418784	279821
N.196	Fatal	Sunday	19/08/2001	August	2001	01:56	JDT_Key Accident	419591	282505
N.197	Slight	Sunday	19/08/2001	August	2001	16:45	JDT_Key Accident	419646	282632
N.198	Slight	Thursday	13/09/2001	September	2001	16:50	JDT_Key Accident	416861	278466
N.199	Slight	Friday	14/09/2001	September	2001	16:28	JDT_Key Accident	414131	274656
N.200	Slight	Saturday	29/09/2001	September	2001	16:50	JDT_Key Accident	417773	278813
N.201	Slight	Sunday	07/10/2001	October	2001	22:45	JDT_Key Accident	419785	284241
N.202	Slight	Thursday	18/10/2001	October	2001	16:30	JDT_Key Accident	417855	278847
N.203	Serious	Tuesday	23/10/2001	October	2001	23:45	JDT_Key Accident	415323	276819
N.204	Slight	Wednesday	24/10/2001	October	2001	15:39	JDT_Key Accident	418728	279743
N.205	Slight	Wednesday	24/10/2001	October	2001	15:40	JDT_Key Accident	417692	278785
N.206	Slight	Wednesday	24/10/2001	October	2001	11:24	JDT_Key Accident	415087	276510
N.207	Serious	Sunday	28/10/2001	October	2001	11:54	JDT_Key Accident	419787	285163
N.208	Slight	Friday	02/11/2001	November	2001	18:16	JDT_Key Accident	416596	278226
N.209	Slight	Friday	02/11/2001	November	2001	18:00	JDT_Key Accident	413852	274360
N.210	Slight	Wednesday	07/11/2001	November	2001	15:10	JDT_Key Accident	419902	283569
N.211	Fatal	Wednesday	14/11/2001	November	2001	06:31	JDT_Key Accident	416828	278416
N.212	Slight	Thursday	15/11/2001	November	2001	17:00	JDT_Key Accident	419328	281426
N.213	Slight	Friday	16/11/2001	November	2001	17:00	JDT_Key Accident	419781	284422
N.214	Slight	Wednesday	21/11/2001	November	2001	09:55	JDT_Key Accident	418593	279488
N.215	Slight	Friday	23/11/2001	November	2001	18:10	JDT_Key Accident	414555	275623
N.216	Slight	Sunday	25/11/2001	November	2001	19:06	JDT_Key Accident	416047	277533
N.217	Slight	Thursday	29/11/2001	November	2001	16:14	JDT_Key Accident	413852	274360
N.218	Serious	Friday	30/11/2001	November	2001	07:25	JDT_Key Accident	418802	279905
N.219	Slight	Monday	03/12/2001	December	2001	07:20	JDT_Key Accident	416595	278225
N.220	Slight	Friday	07/12/2001	December	2001	13:40	JDT_Key Accident	413939	274413
N.221	Slight	Monday	17/12/2001	December	2001	16:30	JDT_Key Accident	418952	280259
N.222	Slight	Tuesday	25/12/2001	December	2001	16:30	JDT_Key Accident	419732	285779
N.223	Slight	Tuesday	25/12/2001	December	2001	08:14	JDT_Key Accident	414339	274996
N.224	Serious	Friday	11/01/2002	January	2002	17:08	JDT_Key Accident	417422	278690
N.225	Slight	Monday	14/01/2002	January	2002	17:03	JDT_Key Accident	419350	281517
N.226	Serious	Tuesday	15/01/2002	January	2002	23:35	Warwickshire	412808	272151
N.227	Serious	Monday	21/01/2002	January	2002	22:31	JDT_Key Accident	417604	278759
N.228	Slight	Tuesday	22/01/2002	January	2002	13:49	JDT_Key Accident	419457	281911
N.229	Slight	Friday	25/01/2002	January	2002	10:36	JDT_RTF	419221	286918
N.230	Slight	Tuesday	29/01/2002	January	2002	09:38	Warwickshire	412850	272267
N.231	Slight	Friday	01/02/2002	February	2002	15:40	JDT_Key Accident	419715	285880
N.232	Slight	Wednesday	06/02/2002	February	2002	11:35	JDT_Key Accident	413466	273920

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
N.233	Slight	Monday	11/02/2002	February	2002	06:55	JDT_Key Accident	419769	285685
N.234	Slight	Friday	15/02/2002	February	2002	13:30	JDT_Key Accident	417519	278737
N.235	Serious	Wednesday	20/02/2002	February	2002	14:25	JDT_Key Accident	419772	284331
N.236	Slight	Friday	22/02/2002	February	2002	15:50	JDT_Key Accident	413852	274360
N.237	Slight	Saturday	23/02/2002	February	2002	11:15	JDT_Key Accident	419527	282310
N.238	Slight	Saturday	02/03/2002	March	2002	11:50	Warwickshire	412565	272180
N.239	Slight	Saturday	09/03/2002	March	2002	00:30	JDT_Key Accident	416455	278099
N.240	Slight	Sunday	10/03/2002	March	2002	10:55	JDT_Key Accident	419628	282594
N.241	Slight	Saturday	16/03/2002	March	2002	15:40	Warwickshire	413137	272890
N.242	Slight	Wednesday	20/03/2002	March	2002	15:30	JDT_Key Accident	418607	279478
N.243	Slight	Thursday	21/03/2002	March	2002	12:55	JDT_Key Accident	419621	286490
N.244	Slight	Sunday	31/03/2002	March	2002	02:05	JDT_Key Accident	414570	275614
N.245	Serious	Thursday	04/04/2002	April	2002	00:01	JDT_Key Accident	413520	273997
N.246	Slight	Saturday	13/04/2002	April	2002	17:25	JDT_Key Accident	414359	275095
N.247	Slight	Tuesday	23/04/2002	April	2002	17:30	JDT_Key Accident	418919	280178
N.248	Slight	Wednesday	24/04/2002	April	2002	16:25	JDT_Key Accident	419527	282311
N.249	Slight	Sunday	28/04/2002	April	2002	16:20	JDT_Key Accident	419278	281230
N.250	Serious	Monday	29/04/2002	April	2002	09:00	JDT_Key Accident	414455	275366
N.251	Slight	Tuesday	30/04/2002	April	2002	18:00	JDT_Key Accident	419876	283571
N.252	Slight	Friday	10/05/2002	May	2002	15:30	JDT_Key Accident	414427	275284
N.253	Slight	Monday	13/05/2002	May	2002	17:05	JDT_Key Accident	418434	279248
N.254	Slight	Friday	24/05/2002	May	2002	15:52	JDT_Key Accident	417944	278890
N.255	Slight	Sunday	09/06/2002	June	2002	13:42	JDT_Key Accident	416770	278401
N.256	Slight	Saturday	15/06/2002	June	2002	18:30	Warwickshire	413190	273204
N.257	Slight	Wednesday	19/06/2002	June	2002	10:15	JDT_Key Accident	415834	277330
N.258	Slight	Tuesday	25/06/2002	June	2002	15:00	JDT_Key Accident	419803	282972
N.259	Slight	Wednesday	10/07/2002	July	2002	16:00	JDT_Key Accident	419873	283499
N.260	Serious	Saturday	13/07/2002	July	2002	20:30	Warwickshire	413231	273391
N.261	Slight	Monday	22/07/2002	July	2002	13:00	JDT_Key Accident	414754	276043
N.262	Slight	Friday	09/08/2002	August	2002	13:40	JDT_Key Accident	419837	284063
N.263	Slight	Sunday	11/08/2002	August	2002	06:50	Warwickshire	419782	285622
N.264	Slight	Monday	12/08/2002	August	2002	00:14	JDT_Key Accident	415682	277183
N.265	Slight	Sunday	18/08/2002	August	2002	16:15	JDT_Key Accident	417519	278737
N.266	Slight	Wednesday	28/08/2002	August	2002	15:10	JDT_Key Accident	419684	286187
N.267	Slight	Saturday	31/08/2002	August	2002	15:50	JDT_Key Accident	417136	278596
N.268	Slight	Sunday	01/09/2002	September	2002	05:50	Warwickshire	412925	272327
N.269	Slight	Thursday	05/09/2002	September	2002	17:00	JDT_Key Accident	414757	276049
N.270	Slight	Friday	06/09/2002	September	2002	12:59	JDT_Key Accident	419642	282625
N.271	Slight	Monday	09/09/2002	September	2002	17:00	JDT_Key Accident	419818	283094

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
N.272	Serious	Wednesday	02/10/2002	October	2002	17:33	JDT_Key Accident	419694	282682
N.273	Slight	Thursday	03/10/2002	October	2002	06:33	Warwickshire	412990	272422
N.274	Slight	Thursday	03/10/2002	October	2002	09:41	JDT_Key Accident	419689	282785
N.275	Slight	Sunday	12/10/2002	October	2002	02:05	Warwickshire	413242	273480
N.276	Slight	Wednesday	16/10/2002	October	2002	12:55	JDT_Key Accident	414897	276276
N.277	Slight	Thursday	17/10/2002	October	2002	20:00	JDT_Key Accident	419152	280748
N.278	Fatal	Friday	18/10/2002	October	2002	01:25	JDT_Key Accident	414535	275529
N.279	Slight	Sunday	20/10/2002	October	2002	16:35	JDT_Key Accident	419375	281624
N.280	Slight	Saturday	26/10/2002	October	2002	21:14	JDT_Key Accident	417394	278672
N.281	Slight	Sunday	03/11/2002	November	2002	17:19	JDT_Key Accident	419756	284593
N.282	Slight	Friday	08/11/2002	November	2002	15:45	JDT_Key Accident	413926	274426
N.283	Serious	Tuesday	12/11/2002	November	2002	17:10	JDT_Key Accident	419819	283235
N.284	Slight	Monday	18/11/2002	November	2002	10:45	JDT_Key Accident	418987	280349
N.285	Slight	Tuesday	19/11/2002	November	2002	08:15	JDT_Key Accident	418783	279821
N.286	Slight	Saturday	23/11/2002	November	2002	13:00	JDT_Key Accident	419397	281720
N.287	Fatal	Sunday	24/11/2002	November	2002	18:58	JDT_Key Accident	417390	278683
N.288	Slight	Thursday	28/11/2002	November	2002	09:15	JDT_Key Accident	419785	284240
N.289	Slight	Saturday	07/12/2002	December	2002	12:45	JDT_Key Accident	414639	275767
N.290	Fatal	Sunday	08/12/2002	December	2002	16:25	JDT_Key Accident	419840	283962
N.291	Slight	Monday	09/12/2002	December	2002	08:30	JDT_Key Accident	419100	280658
N.292	Slight	Monday	16/12/2002	December	2002	08:30	JDT_Key Accident	419802	282972
N.293	Slight	Thursday	09/01/2003	January	2003	17:55	JDT_Key Accident	417421	278690
N.294	Slight	Friday	10/01/2003	January	2003	09:00	JDT_Key Accident	418802	279904
N.295	Slight	Monday	13/01/2003	January	2003	08:15	JDT_Key Accident	419764	282861
N.296	Serious	Thursday	23/01/2003	January	2003	19:32	JDT_Key Accident	415630	277107
N.297	Slight	Monday	27/01/2003	January	2003	02:30	JDT_Key Accident	419460	282014
N.298	Slight	Sunday	02/02/2003	February	2003	08:07	JDT_Key Accident	414412	275187
N.299	Slight	Friday	07/02/2003	February	2003	07:40	JDT_Key Accident	416470	278088
N.300	Slight	Tuesday	18/02/2003	February	2003	16:20	JDT_Key Accident	416672	278296
N.301	Slight	Monday	24/03/2003	March	2003	09:30	JDT_Key Accident	419900	283666
N.302	Slight	Monday	07/04/2003	April	2003	07:15	JDT_Key Accident	414081	274565
N.303	Slight	Friday	25/04/2003	April	2003	00:45	JDT_Key Accident	418744	279735
N.304	Slight	Wednesday	04/06/2003	June	2003	11:15	Warwickshire	413116	272987
N.305	Slight	Friday	06/06/2003	June	2003	12:55	JDT_Key Accident	415199	276678

Table E.1.1: NO-VSL Accidents

E.2 3L-VMSL Accidents

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
3L.1	Slight	Friday	10/02/2006	February	2006	18:34	JDT_Key Accident	419527	282310
3L.2	Slight	Tuesday	21/02/2006	February	2006	17:30	JDT_Key Accident	414801	276081
3L.3	Slight	Wednesday	22/03/2006	March	2006	17:30	JDT_Key Accident	418919	280178
3L.4	Serious	Thursday	30/03/2006	March	2006	11:50	JDT_Key Accident	419414	281716
3L.5	Slight	Saturday	01/04/2006	April	2006	16:53	JDT_Key Accident	417325	278685
3L.6	Slight	Thursday	13/04/2006	April	2006	12:05	JDT_Key Accident	419784	282977
3L.7	Slight	Monday	08/05/2006	May	2006	07:35	JDT_Key Accident	418840	279992
3L.8	Slight	Wednesday	10/05/2006	May	2006	10:15	JDT_Key Accident	419023	280444
3L.9	Slight	Friday	19/05/2006	May	2006	08:50	JDT_Key Accident	419135	280753
3L.10	Slight	Sunday	21/05/2006	May	2006	12:55	JDT_Key Accident	416469	278088
3L.11	Slight	Sunday	21/05/2006	May	2006	18:55	JDT_Key Accident	416801	278424
3L.12	Slight	Friday	26/05/2006	May	2006	12:50	JDT_Key Accident	419902	283164
3L.13	Slight	Tuesday	30/05/2006	May	2006	14:30	JDT_Key Accident	419100	280658
3L.14	Slight	Saturday	10/06/2006	June	2006	06:20	Warwickshire	413289	273575
3L.15	Serious	Saturday	10/06/2006	June	2006	10:30	JDT_Key Accident	418744	279734
3L.16	Serious	Sunday	18/06/2006	June	2006	09:53	JDT_Key Accident	419177	280648
3L.17	Slight	Tuesday	27/06/2006	June	2006	08:45	JDT_Key Accident	419774	284592
3L.18	Slight	Sunday	02/07/2006	July	2006	21:30	JDT_Key Accident	419504	282213
3L.19	Slight	Wednesday	26/07/2006	July	2006	15:30	JDT_Key Accident	419166	280850

Table E.2.1: 3L-VMSL Accidents

E.3 4L-VMSL Accidents

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
4L.1	Slight	Tuesday	24.10.06	October	2006	17:15	DfT	418281	279095
4L.2	Slight	Saturday	28.10.06	October	2006	02:43	DfT	413187	273182
4L.3	Serious	Monday	13.11.06	November	2006	01:50	DfT	418037	278941
4L.4	Slight	Tuesday	28.11.06	November	2006	08:40	DfT	419714	282733
4L.5	Slight	Tuesday	05.12.06	December	2006	18:30	DfT	415455	276958
4L.6	Slight	Thursday	21.12.06	December	2006	11:40	DfT	417216	278648
4L.7	Slight	Thursday	18.01.07	January	2007	08:09	DfT	416658	278309
4L.8	Slight	Friday	19.01.07	January	2007	17:15	DfT	415903	277400
4L.9	Slight	Tuesday	23.01.07	January	2007	13:20	DfT	419776	284509
4L.10	Slight	Saturday	03.03.07	March	2007	22:10	DfT	415262	276751
4L.11	Slight	Wednesday	04.04.07	April	2007	05:58	DfT	418545	279413
4L.12	Slight	Wednesday	23.05.07	May	2007	09:33	DfT	419720	282879
4L.13	Slight	Tuesday	29.05.07	May	2007	08:09	DfT	415682	277183
4L.14	Serious	Wednesday	06.06.07	June	2007	12:01	DfT	419761	284773
4L.15	Slight	Wednesday	27.06.07	June	2007	15:35	DfT	417944	278890
4L.16	Slight	Thursday	19.07.07	July	2007	19:10	DfT	419004	280341
4L.17	Slight	Saturday	28.07.07	July	2007	08:49	DfT	412503	272177
4L.18	Slight	Sunday	02.09.07	September	2007	12:28	DfT	412636	272167
4L.19	Serious	Monday	03.09.07	September	2007	01:18	DfT	413115	272622
4L.20	Slight	Friday	14.09.07	September	2007	20:50	DfT	419555	282410
4L.21	Slight	Saturday	15.09.07	September	2007	19:45	DfT	412931	272342
4L.22	Slight	Thursday	27.09.07	September	2007	13:42	DfT	417064	278563
4L.23	Slight	Friday	05.10.07	October	2007	13:28	DfT	419785	284240
4L.24	Slight	Saturday	20.10.07	October	2007	10:30	DfT	419481	282112
4L.25	Slight	Tuesday	06.11.07	November	2007	14:10	DfT	415773	277246
4L.26	Serious	Wednesday	07.11.07	November	2007	23:50	DfT	419166	280850
4L.27	Slight	Saturday	10.11.07	November	2007	10:30	DfT	417692	278785
4L.28	Slight	Saturday	10.11.07	November	2007	11:55	DfT	419250	281133
4L.29	Slight	Sunday	11.11.07	November	2007	10:00	DfT	419628	282595
4L.30	Slight	Tuesday	13.11.07	November	2007	07:37	DfT	412405	272166
4L.31	Slight	Monday	19.11.07	November	2007	17:30	DfT	413127	272892
4L.32	Slight	Thursday	22.11.07	November	2007	07:10	DfT	417065	278563
4L.33	Slight	Wednesday	28.11.07	November	2007	18:15	DfT	417065	278563
4L.34	Slight	Saturday	08.12.07	December	2007	19:20	DfT	419591	282504
4L.35	Slight	Sunday	09.12.07	December	2007	17:35	DfT	416161	277701
4L.36	Slight	Wednesday	02.01.08	January	2008	09:05	DfT	414182	274733
4L.37	Slight	Monday	14.01.08	January	2008	16:45	DfT	419527	282311
4L.38	Slight	Friday	01.02.08	February	2008	08:50	DfT	417267	278686

No.	Accident Severity	Day of Week	Date	Month	year	Time	Source	East	North
4L.39	Slight	Sunday	10.02.08	February	2008	14:15	DfT	419793	284963
4L.40	Slight	Tuesday	12.02.08	February	2008	17:30	DfT	412897	272305
4L.41	Slight	Tuesday	19.02.08	February	2008	17:30	DfT	419780	284772
4L.42	Slight	Thursday	28.02.08	February	2008	09:09	DfT	419913	283490
4L.43	Slight	Friday	29.02.08	February	2008	20:00	DfT	413130	272892
4L.44	Slight	Wednesday	02.04.08	April	2008	07:51	DfT	418876	280027
4L.45	Slight	Sunday	06.04.08	April	2008	08:25	DfT	419819	284148
4L.46	Slight	Friday	11.04.08	April	2008	14:35	DfT	419775	284690
4L.47	Slight	Wednesday	16.04.08	April	2008	18:37	DfT	418483	279332
4L.48	Slight	Thursday	17.04.08	April	2008	09:30	DfT	414082	274566
4L.49	Slight	Wednesday	07.05.08	May	2008	03:10	DfT	416581	278238
4L.50	Slight	Wednesday	07.05.08	May	2008	12:16	DfT	415468	276946
4L.51	Slight	Friday	09.05.08	May	2008	15:50	DfT	419762	284422
4L.52	Slight	Sunday	06.07.08	July	2008	07:20	DfT	419234	281075
4L.53	Slight	Tuesday	15.07.08	July	2008	16:56	DfT	414235	274821
4L.54	Slight	Friday	01.08.08	August	2008	18:45	DfT	415681	277182
4L.55	Serious	Sunday	03.08.08	August	2008	13:09	DfT	412422	272178
4L.56	Slight	Wednesday	10.09.08	September	2008	08:16	DfT	419720	282879
4L.57	Slight	Monday	15.09.08	September	2008	09:53	DfT	418559	279404
4L.58	Slight	Sunday	05.10.08	October	2008	14:30	DfT	414914	276266
4L.59	Slight	Wednesday	05.11.08	November	2008	01:42	DfT	414553	275624
4L.60	Slight	Tuesday	25.11.08	November	2008	09:24	DfT	412867	272275
4L.61	Slight	Friday	28.11.08	November	2008	08:27	DfT	418840	279992
4L.62	Slight	Saturday	06.12.08	December	2008	10:36	DfT	416582	278238
4L.63	Slight	Thursday	11.12.08	December	2008	17:15	DfT	415847	277317
4L.64	Slight	Monday	09.02.09	February	2009	09:45	DfT	419859	283963
4L.65	Slight	Tuesday	10.02.09	February	2009	09:08	DfT	418169	279029
4L.66	Slight	Saturday	21.03.09	March	2009	02:26	DfT	413184	273188
4L.67	Slight	Thursday	26.03.09	March	2009	08:40	DfT	417233	278609
4L.68	Slight	Thursday	30.04.09	April	2009	18:00	DfT	419744	282869
4L.69	Slight	Thursday	28.05.09	May	2009	16:38	DfT	419785	284240
4L.70	Slight	Thursday	28.05.09	May	2009	19:00	DfT	417691	278785
4L.71	Slight	Monday	08.06.09	June	2009	12:20	DfT	419802	284242
4L.72	Slight	Thursday	11.06.09	June	2009	20:00	DfT	419481	282112
4L.73	Slight	Wednesday	08.07.09	July	2009	17:52	DfT	416735	278375
4L.74	Slight	Friday	17.07.09	July	2009	18:21	DfT	415903	277400
4L.75	Slight	Thursday	23.07.09	July	2009	08:20	DfT	419023	280444
4L.76	Slight	Thursday	23.07.09	July	2009	17:54	DfT	419802	282971
4L.77	Slight	Sunday	02.08.09	August	2009	03:30	DfT	419859	283435

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
4L.78	Slight	Saturday	15.08.09	August	2009	19:10	DfT	419835	283168
4L.79	Serious	Tuesday	01.09.09	September	2009	08:48	DfT	419521	282209
4L.80	Slight	Tuesday	15.09.09	September	2009	16:25	DfT	414791	276107
4L.81	Slight	Wednesday	23.09.09	September	2009	10:50	DfT	419478	282010

Table E.3.1: 4L-VMSL Accidents

Appendix F Accidents by Operation

F.1 4L-VMSL by Operation

No.	Date	Time	Day	Direction	Description	J3A - J4	J4 - J5	J5 - J6	J6 - J7	4L-VMSL in operation
4L.1	24.10.06	17:15	Tue	SB	Rear end shunt			*		Yes
4L.2	28.10.06	02:43	Sat	SB	Single vehicle	*				No
4L.3	13.11.06	01:50	Mon	NB	Rear end shunt			*		No
4L.4	28.11.06	08:40	Tue	SB	Rear end shunt			*		Yes
4L.5	05.12.06	18:30	Tue	NB	Rear end shunt		*			No
4L.6	21.12.06	11:40	Thu	NB	Side impact / merge			*		No
4L.7	18.01.07	08:09	Thu	NB	Side impact / merge		*			No
4L.8	19.01.07	17:15	Fri	NB	Rear end shunt		*			No
4L.9	23.01.07	13:20	Tue	SB	Rear end shunt				*	No
4L.10	03.03.07	22:10	Sat	NB	Rear end shunt		*			No
4L.11	04.04.07	05:58	Wed	NB	Lost control			*		No
4L.12	23.05.07	09:33	Wed	NB	Rear end shunt			*		Yes
4L.13	29.05.07	08:09	Tue	NB	Rear end shunt		*			Yes
4L.14	06.06.07	12:01	Wed	NB	Rear end shunt				*	No
4L.15	27.06.07	15:35	Wed	NB	Side impact / merge			*		No
4L.16	19.07.07	19:10	Thu	SB	Rear end shunt			*		No
4L.17	28.07.07	08:49	Sat	NB	Rear end shunt	*				No
4L.18	02.09.07	12:28	Sun	NB	Rear end shunt	*				No
4L.19	03.09.07	01:18	Mon	SB	Single vehicle	*				No
4L.20	14.09.07	20:50	Fri	NB	Rear end shunt			*		No
4L.21	15.09.07	19:45	Sat	NB	Rear end shunt	*				No
4L.22	27.09.07	13:42	Thu	SB	Rear end shunt		*			No
4L.23	05.10.07	13:28	Fri	NB	Side impact / merge				*	Yes
4L.24	20.10.07	10:30	Sat	NB	Rear end shunt			*		Yes
4L.25	06.11.07	14:10	Tue	SB	Side impact / merge		*			No
4L.26	07.11.07	23:50	Wed	NB	Side impact / merge			*		No
4L.27	10.11.07	10:30	Sat	NB	Rear end shunt			*		Yes
4L.28	10.11.07	11:55	Sat	NB	Rear end shunt			*		Yes
4L.29	11.11.07	10:00	Sun	NB	Rear end shunt			*		Yes
4L.30	13.11.07	07:37	Tue	NB	Rear end shunt	*				No
4L.31	19.11.07	17:30	Mon	SB	Rear end shunt	*				Yes
4L.32	22.11.07	07:10	Thu	SB	Rear end shunt		*			No
4L.33	28.11.07	18:15	Wed	SB	Rear end shunt		*			Yes
4L.34	08.12.07	19:20	Sat	NB	Side impact / merge			*		No
4L.35	09.12.07	17:35	Sun	NB	Side impact / merge		*			No
4L.36	02.01.08	09:05	Wed	NB	Side impact / merge	*				No
4L.37	14.01.08	16:45	Mon	NB	Side impact / merge			*		Yes
4L.38	01.02.08	08:50	Fri	NB	Side impact / merge			*		Yes
4L.39	10.02.08	14:15	Sun	SB	Rear end shunt				*	No
4L.40	12.02.08	17:30	Tue	NB	Rear end shunt	*				No

No.	Date	Time	Day	Direction	Description	J3A - J4	J4 - J5	J5 - J6	J6 - J7	4L-VMSL in operation
4L.41	19.02.08	17:30	Tue	SB	Rear end shunt				*	Yes
4L.42	28.02.08	09:09	Thu	SB	Rear end shunt				*	Yes
4L.43	29.02.08	20:00	Fri	SB	Rear end shunt	*				No
4L.44	02.04.08	07:51	Wed	SB	Rear end shunt			*		No
4L.45	06.04.08	08:25	Sun	SB	Side impact / merge				*	No
4L.46	11.04.08	14:35	Fri	SB	Side impact / merge				*	Yes
4L.47	16.04.08	18:37	Wed	NB	Side impact / merge			*		Yes
4L.48	17.04.08	09:30	Thu	SB	Side impact / merge	*				No
4L.49	07.05.08	03:10	Wed	SB	Side impact / merge		*			No
4L.50	07.05.08	12:16	Wed	NB	Rear end shunt		*			No
4L.51	09.05.08	15:50	Fri	NB	Side impact / merge				*	Yes
4L.52	06.07.08	07:20	Sun	NB	Side impact / merge			*		No
4L.53	15.07.08	16:56	Tue	NB	Side impact / merge	*				No
4L.54	01.08.08	18:45	Fri	NB	Side impact / merge		*			Yes
4L.55	03.08.08	13:09	Sun	NB	Rear end shunt	*				No
4L.56	10.09.08	08:16	Wed	NB	Rear end shunt			*		No
4L.57	15.09.08	09:53	Mon	SB	Side impact / merge			*		No
4L.58	05.10.08	14:30	Sun	SB	Rear end shunt		*			No
4L.59	05.11.08	01:42	Wed	NB	Rear end shunt	*				No
4L.60	25.11.08	09:24	Tue	SB	Unknown / other	*				Yes
4L.61	28.11.08	08:27	Fri	NB	Rear end shunt			*		No
4L.62	06.12.08	10:36	Sat	NB	Rear end shunt		*			Yes
4L.63	11.12.08	17:15	Thu	SB	Rear end shunt		*			Yes
4L.64	09.02.09	09:45	Mon	SB	Rear end shunt				*	No
4L.65	10.02.09	09:08	Tue	NB	Rear end shunt			*		No
4L.66	21.03.09	02:26	Sat	SB	Single vehicle	*				No
4L.67	26.03.09	08:40	Thu	SB	Rear end shunt			*		No
4L.68	30.04.09	18:00	Thu	NB	Rear end shunt			*		No
4L.69	28.05.09	16:38	Thu	NB	Rear end shunt				*	No
4L.70	28.05.09	19:00	Thu	NB	Rear end shunt			*		No
4L.71	08.06.09	12:20	Mon	SB	Side impact / merge				*	No
4L.72	11.06.09	20:00	Thu	NB	Side impact / merge			*		No
4L.73	08.07.09	17:52	Wed	NB	Rear end shunt		*			No
4L.74	17.07.09	18:21	Fri	NB	Rear end shunt		*			No
4L.75	23.07.09	08:20	Thu	NB	Rear end shunt			*		No
4L.76	23.07.09	17:54	Thu	SB	Rear end shunt			*		No
4L.77	02.08.09	03:30	Sun	NB	Rear end shunt				*	No
4L.78	15.08.09	19:10	Sat	NB	Single vehicle				*	No
4L.79	01.09.09	08:48	Tue	SB	Rear end shunt			*		No
4L.80	15.09.09	16:25	Tue	NB	Side impact / merge		*			No
4L.81	23.09.09	10:50	Wed	SB	Side impact / merge			*		No

Note: Highlighted Accidents occurred during 4L-VMSL in operation

Table F.1.1: 4L-VMSL Accidents by 4L-VMSL in operation / not in operation

F.2 NO-VSL Accidents between 0700-0930 and 1600-1830 Monday to Friday

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
N.9	Slight	Wednesday	19/08/1998	August	1998	08:20	JDT_year_one (JSYS)	413852	274360
N.42	Slight	Friday	12/03/1999	March	1999	07:49	JDT_Key Accident	419793	284963
N.62	Slight	Wednesday	11/08/1999	August	1999	07:20	JDT_Key Accident	419481	282113
N.66	Slight	Thursday	16/09/1999	September	1999	08:00	JDT_Key Accident	414473	275354
N.99	Slight	Thursday	27/01/2000	January	2000	08:35	JDT_Key Accident	414555	275622
N.101	Slight	Thursday	24/02/2000	February	2000	08:10	JDT_Key Accident	416176	277692
N.116	Slight	Thursday	11/05/2000	May	2000	08:53	JDT_Key Accident	413852	274360
N.158	Slight	Tuesday	02/01/2001	January	2001	08:40	JDT_Key Accident	419782	285064
N.164	Slight	Thursday	25/01/2001	January	2001	08:00	JDT_Key Accident	416819	278437
N.181	Slight	Tuesday	03/04/2001	April	2001	07:45	Warwickshire	413048	272606
N.187	Slight	Tuesday	08/05/2001	May	2001	07:18	JDT_Key Accident	419417	281812
N.194	Slight	Thursday	02/08/2001	August	2001	07:07	Warwickshire	413215	273397
N.218	Serious	Friday	30/11/2001	November	2001	07:25	JDT_Key Accident	418802	279905
N.219	Slight	Monday	03/12/2001	December	2001	07:20	JDT_Key Accident	416595	278225
N.223	Slight	Tuesday	25/12/2001	December	2001	08:14	JDT_Key Accident	414339	274996
N.250	Serious	Monday	29/04/2002	April	2002	09:00	JDT_Key Accident	414455	275366
N.285	Slight	Tuesday	19/11/2002	November	2002	08:15	JDT_Key Accident	418783	279821
N.288	Slight	Thursday	28/11/2002	November	2002	09:15	JDT_Key Accident	419785	284240
N.291	Slight	Monday	09/12/2002	December	2002	08:30	JDT_Key Accident	419100	280658
N.292	Slight	Monday	16/12/2002	December	2002	08:30	JDT_Key Accident	419802	282972
N.294	Slight	Friday	10/01/2003	January	2003	09:00	JDT_Key Accident	418802	279904
N.295	Slight	Monday	13/01/2003	January	2003	08:15	JDT_Key Accident	419764	282861
N.299	Slight	Friday	07/02/2003	February	2003	07:40	JDT_Key Accident	416470	278088
N.302	Slight	Monday	07/04/2003	April	2003	07:15	JDT_Key Accident	414081	274565

Table F.2.1: NO-VSL Accidents between 0700-0930 Monday to Friday

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
N.6	Slight	Thursday	30/07/1998	July	1998	16:06	JDT_year_one (JSYS)	419713	286111
N.12	Slight	Friday	18/09/1998	September	1998	16:30	JDT_year_one (JSYS)	417065	278563
N.16	Slight	Monday	12/10/1998	October	1998	16:30	JDT_year_one (JSYS)	417604	278759
N.17	Slight	Thursday	15/10/1998	October	1998	18:20	JDT_year_one (JSYS)	414359	275095
N.19	Slight	Friday	23/10/1998	October	1998	17:35	JDT_year_one (JSYS)	419895	283421
N.24	Slight	Friday	13/11/1998	November	1998	17:27	JDT_year_one (JSYS)	416097	277619
N.27	Serious	Friday	20/11/1998	November	1998	16:15	JDT_year_one (JSYS)	419708	282780
N.49	Slight	Tuesday	20/04/1999	April	1999	17:00	JDT_Key Accident	419744	282870
N.54	Slight	Tuesday	15/06/1999	June	1999	17:30	JDT_Key Accident	417421	278690
N.56	Slight	Thursday	01/07/1999	July	1999	16:24	JDT_Key Accident	419549	282306
N.67	Slight	Friday	17/09/1999	September	1999	18:14	JDT_Key Accident	417223	278632

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
N.70	Serious	Wednesday	29/09/1999	September	1999	16:26	JDT_Key Accident	418987	280349
N.71	Slight	Wednesday	29/09/1999	September	1999	16:25	JDT_Key Accident	417604	278759
N.85	Slight	Friday	19/11/1999	November	1999	16:42	JDT_Key Accident	419790	284332
N.86	Slight	Friday	19/11/1999	November	1999	18:19	JDT_Key Accident	419805	285162
N.93	Serious	Thursday	09/12/1999	December	1999	17:10	JDT_Key Accident	417421	278690
N.97	Slight	Friday	14/01/2000	January	2000	16:57	JDT_Key Accident	417518	278737
N.109	Slight	Thursday	23/03/2000	March	2000	17:54	JDT_Key Accident	419278	281230
N.114	Slight	Friday	21/04/2000	April	2000	16:15	JDT_Key Accident	418592	279487
N.119	Slight	Thursday	08/06/2000	June	2000	17:00	JDT_Key Accident	414495	275507
N.121	Slight	Friday	16/06/2000	June	2000	17:57	JDT_Key Accident	416282	277865
N.122	Slight	Wednesday	28/06/2000	June	2000	16:00	JDT_Key Accident	419397	281720
N.124	Slight	Tuesday	04/07/2000	July	2000	17:09	JDT_Key Accident	419876	283571
N.126	Slight	Friday	21/07/2000	July	2000	17:20	JDT_Key Accident	415275	276741
N.128	Slight	Monday	07/08/2000	August	2000	16:10	JDT_Key Accident	419708	282780
N.133	Slight	Friday	25/08/2000	August	2000	17:05	JDT_Key Accident	416111	277610
N.134	Slight	Thursday	07/09/2000	September	2000	16:50	JDT_Key Accident	417944	278890
N.137	Slight	Wednesday	04/10/2000	October	2000	16:18	JDT_Key Accident	416659	278310
N.139	Slight	Thursday	12/10/2000	October	2000	16:42	JDT_Key Accident	417604	278759
N.140	Slight	Wednesday	18/10/2000	October	2000	16:40	JDT_Key Accident	419854	283273
N.143	Slight	Friday	03/11/2000	November	2000	16:43	JDT_Key Accident	415467	276946
N.146	Slight	Thursday	23/11/2000	November	2000	18:05	JDT_Key Accident	415615	277118
N.148	Slight	Monday	27/11/2000	November	2000	18:00	JDT_Key Accident	419860	283853
N.150	Slight	Wednesday	29/11/2000	November	2000	16:45	JDT_Key Accident	415388	276890
N.153	Serious	Thursday	21/12/2000	December	2000	17:45	JDT_Key Accident	419784	282977
N.174	Slight	Friday	09/03/2001	March	2001	16:28	JDT_Key Accident	419812	283073
N.176	Slight	Tuesday	13/03/2001	March	2001	17:00	JDT_Key Accident	417605	278759
N.182	Slight	Thursday	19/04/2001	April	2001	17:45	JDT_Key Accident	417129	278613
N.183	Slight	Monday	23/04/2001	April	2001	18:00	JDT_Key Accident	413818	274330
N.193	Slight	Tuesday	17/07/2001	July	2001	17:50	JDT_Key Accident	414428	275286
N.198	Slight	Thursday	13/09/2001	September	2001	16:50	JDT_Key Accident	416861	278466
N.199	Slight	Friday	14/09/2001	September	2001	16:28	JDT_Key Accident	414131	274656
N.202	Slight	Thursday	18/10/2001	October	2001	16:30	JDT_Key Accident	417855	278847
N.208	Slight	Friday	02/11/2001	November	2001	18:16	JDT_Key Accident	416596	278226
N.209	Slight	Friday	02/11/2001	November	2001	18:00	JDT_Key Accident	413852	274360
N.212	Slight	Thursday	15/11/2001	November	2001	17:00	JDT_Key Accident	419328	281426
N.213	Slight	Friday	16/11/2001	November	2001	17:00	JDT_Key Accident	419781	284422
N.215	Slight	Friday	23/11/2001	November	2001	18:10	JDT_Key Accident	414555	275623
N.217	Slight	Thursday	29/11/2001	November	2001	16:14	JDT_Key Accident	413852	274360
N.221	Slight	Monday	17/12/2001	December	2001	16:30	JDT_Key Accident	418952	280259

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
N.222	Slight	Tuesday	25/12/2001	December	2001	16:30	JDT_Key Accident	419732	285779
N.224	Serious	Friday	11/01/2002	January	2002	17:08	JDT_Key Accident	417422	278690
N.225	Slight	Monday	14/01/2002	January	2002	17:03	JDT_Key Accident	419350	281517
N.247	Slight	Tuesday	23/04/2002	April	2002	17:30	JDT_Key Accident	418919	280178
N.248	Slight	Wednesday	24/04/2002	April	2002	16:25	JDT_Key Accident	419527	282311
N.251	Slight	Tuesday	30/04/2002	April	2002	18:00	JDT_Key Accident	419876	283571
N.253	Slight	Monday	13/05/2002	May	2002	17:05	JDT_Key Accident	418434	279248
N.259	Slight	Wednesday	10/07/2002	July	2002	16:00	JDT_Key Accident	419873	283499
N.269	Slight	Thursday	05/09/2002	September	2002	17:00	JDT_Key Accident	414757	276049
N.271	Slight	Monday	09/09/2002	September	2002	17:00	JDT_Key Accident	419818	283094
N.272	Serious	Wednesday	02/10/2002	October	2002	17:33	JDT_Key Accident	419694	282682
N.283	Serious	Tuesday	12/11/2002	November	2002	17:10	JDT_Key Accident	419819	283235
N.293	Slight	Thursday	09/01/2003	January	2003	17:55	JDT_Key Accident	417421	278690
N.300	Slight	Tuesday	18/02/2003	February	2003	16:20	JDT_Key Accident	416672	278296

Table F.2.2: NO-VSL Accidents between 1600-1830 Monday to Friday

F.3 3L-VMSL Accidents between 0700-0930 and 1600-1830 Monday to Friday

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
3L.7	Slight	Monday	08/05/2006	May	2006	07:35	JDT_Key Accident	418840	279992
3L.9	Slight	Friday	19/05/2006	May	2006	08:50	JDT_Key Accident	419135	280753
3L.17	Slight	Tuesday	27/06/2006	June	2006	08:45	JDT_Key Accident	419774	284592

Table F.3.1: 3L-VMSL Accidents between 0700-0930 Monday to Friday

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
3L.2	Slight	Tuesday	21/02/2006	February	2006	17:30	JDT_Key Accident	414801	276081
3L.3	Slight	Wednesday	22/03/2006	March	2006	17:30	JDT_Key Accident	418919	280178

Table F.3.2: 3L-VMSL Accidents between 1600-1830 Monday to Friday

F.4 4L-VMSL Accidents between 0700-0930 and 1600-1830 Monday to Friday

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
4L.04	Slight	Tuesday	28.11.06	November	2006	08:40	DfT	419714	282733
4L.07	Slight	Thursday	18.01.07	January	2007	08:09	DfT	416658	278309
4L.13	Slight	Tuesday	29.05.07	May	2007	08:09	DfT	415682	277183
4L.30	Slight	Tuesday	13.11.07	November	2007	07:37	DfT	412405	272166
4L.32	Slight	Thursday	22.11.07	November	2007	07:10	DfT	417065	278563
4L.36	Slight	Wednesday	02.01.08	January	2008	09:05	DfT	414182	274733
4L.38	Slight	Friday	01.02.08	February	2008	08:50	DfT	417267	278686
4L.42	Slight	Thursday	28.02.08	February	2008	09:09	DfT	419913	283490
4L.44	Slight	Wednesday	02.04.08	April	2008	07:51	DfT	418876	280027
4L.56	Slight	Wednesday	10.09.08	September	2008	08:16	DfT	419720	282879
4L.60	Slight	Tuesday	25.11.08	November	2008	09:24	DfT	412867	272275
4L.61	Slight	Friday	28.11.08	November	2008	08:27	DfT	418840	279992
4L.65	Slight	Tuesday	10.02.09	February	2009	09:08	DfT	418169	279029
4L.67	Slight	Thursday	26.03.09	March	2009	08:40	DfT	417233	278609
4L.75	Slight	Thursday	23.07.09	July	2009	08:20	DfT	419023	280444
4L.79	Serious	Tuesday	01.09.09	September	2009	08:48	DfT	419521	282209

Table F.4.1: 4L-VMSL Accidents between 0700-0930 Monday to Friday

No.	Accident Severity	Day of Week	Date	Month	Year	Time	Source	East	North
4L.01	Slight	Tuesday	24.10.06	October	2006	17:15	DfT	418281	279095
4L.08	Slight	Friday	19.01.07	January	2007	17:15	DfT	415903	277400
4L.31	Slight	Monday	19.11.07	November	2007	17:30	DfT	413127	272892
4L.33	Slight	Wednesday	28.11.07	November	2007	18:15	DfT	417065	278563
4L.37	Slight	Monday	14.01.08	January	2008	16:45	DfT	419527	282311
4L.40	Slight	Tuesday	12.02.08	February	2008	17:30	DfT	412897	272305
4L.41	Slight	Tuesday	19.02.08	February	2008	17:30	DfT	419780	284772
4L.53	Slight	Tuesday	15.07.08	July	2008	16:56	DfT	414235	274821
4L.63	Slight	Thursday	11.12.08	December	2008	17:15	DfT	415847	277317
4L.68	Slight	Thursday	30.04.09	April	2009	18:00	DfT	419744	282869
4L.69	Slight	Thursday	28.05.09	May	2009	16:38	DfT	419785	284240
4L.73	Slight	Wednesday	08.07.09	July	2009	17:52	DfT	416735	278375
4L.74	Slight	Friday	17.07.09	July	2009	18:21	DfT	415903	277400
4L.76	Slight	Thursday	23.07.09	July	2009	17:54	DfT	419802	282971
4L.80	Slight	Tuesday	15.09.09	September	2009	16:25	DfT	414791	276107

Table F.4.2: 4L-VMSL Accidents between 1600-1830 Monday to Friday

Appendix G NO-VSL Accident Cluster Sites

G.1 No-VSL Accident Cluster Sites

Figure G.1.1: NO-VSL Accident Cluster Sites (6 or more accidents in 50m radius)