A435 Studley HGV Routing Study: Study Report

Warwickshire County Council

October 2017

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Client signoff

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Executive Summary

Project Background and Purpose

Following a stakeholder meeting held in May 2016 at Studley Village Hall, Warwickshire County Council (WCC) commissioned a heavy goods vehicle (HGV) origin and destination survey along the A435 corridor between M42 Junction 3 and Alcester. The survey was undertaken in response to local concerns that traffic problems in Studley are getting worse, particularly in relation to an apparent increase in the volume, noise, speed and vibration caused by HGVs passing through the village.

The survey has established the number and proportion of HGVs passing through the study area via the A435 without stopping as part of a strategic through trip, relative to those with a local purpose serving businesses in the Studley/Alcester/Redditch area.

Survey data provides a robust evidence base from which to gain a more detailed understanding of the nature of the HGV problem, and to inform the development of a range of potential improvement options, which are outlined later in this report.

Atkins Limited (a transport consultancy with previous experience of carrying out studies of a similar nature), was commissioned by WCC to conduct independent analysis of the survey results and produce a list of suggested options for further consideration.

The study has also considered concerns expressed by local residents that the A435 through Studley appears to be increasingly used as an alternative route by longer distance HGVs when there are closures on the Strategic Road Network (SRN) which is managed by Highways England. An example of this occurred during the recent night-time closures on the M5 as part of the Smart Motorways Project between Junctions 4a and 6, despite a signed diversion route being in place via the A38 near Bromsgrove.

Data and Methodology

The surveys took place over a 'typical' 24-hour period commencing at 06:00 on Tuesday 29th November 2016. This period was selected to represent a typical day during a neutral month (in accordance with Department for Transport guidance (TAG Unit M 1.2) Data Sources and Surveys). No road closures due to planned works took place over the survey period nor were there any reported major incidents on the network.

Origin-destination surveys (based on vehicle registration plates) were carried out 19 sites (both directions surveyed) across the study area, together with a series of traffic counts. These sites were positioned along the A435 corridor between the M42 Junction 3 and Alcester. This data was captured using Automatic Number Plate Recognition (ANPR) cameras which recorded the number plate of each vehicle at each of the 19 sites. Each number plate is time-stamped by time and date and enables the identification of vehicle routings through the study area.

Key Findings

The following key findings were drawn from the survey results:

- Over a typical 24-hour period, most HGVs travelling within the study area had a local purpose, serving the local economies of Redditch, Studley and Alcester.
- Strategic through trips (journeys made along the entire length of the A435 without stopping within the local area) accounted for approximately 7% of all HGV trips.
- The number of HGVs that were observed to be making complete through trips (travelling the full length of the A435 between the M42 and Alcester without stopping) was 154 during the 24-hour survey period.
- In excess of 70% of HGVs and 80% of all other vehicles are using the study area for local trips.
- It is appreciated however, that incidents or planned road closures on other roads (A46, M42, M5 and M6) can often increase the volumes of HGVs/other traffic making through trips and routing via the A435 through Studley, Mappleborough Green and other communities along the route.
- The proportion of HGVs to total traffic varies throughout the study area. It ranges from 9% at Site R (to the south of M42 J3) to 5% at Site F (A435 south of Studley) to 1% at Site S (B4092 Station Road, Studley).

Option Development

In the light of the survey findings, Atkins has put together a list of 21 potential options which seek to consider how the impact of HGVs can be minimised (where possible) and/or mitigated for further consideration. These options cover different types of measure (addressing speed, noise, air quality, and volume of HGVs) all of which vary in terms of their likely ease of implementation, cost and time required to implement.

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A435 Studley HGV Routing Study

Overview

In November 2016, Warwickshire County Council (WCC) commissioned a heavy goods vehicle (HGV) origin and destination survey along the A435 corridor between M42 Junction 3 and Alcester. The purpose of the survey was to determine the number and proportion of HGVs passing through the study area via the A435 without stopping as part of a strategic through trip, relative to those which had a local purpose over a 'typical' 24-hour period.

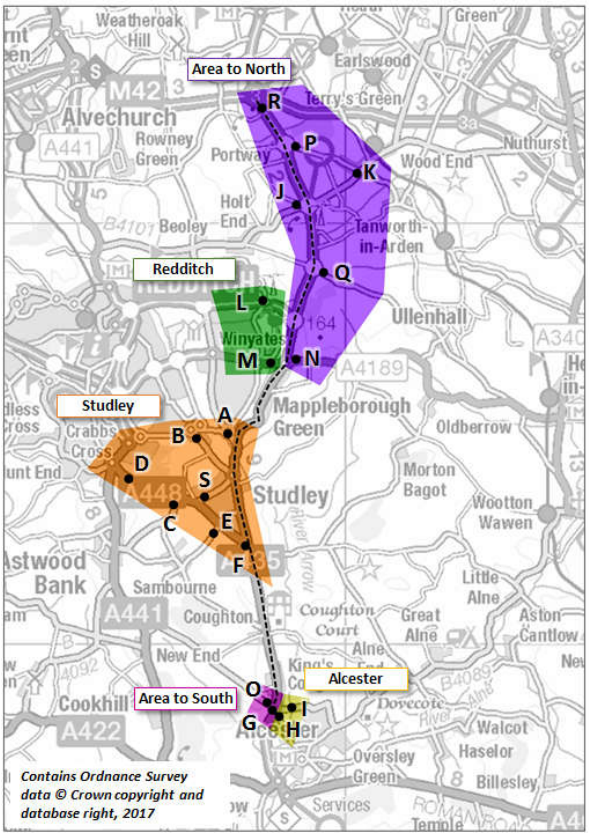
The survey was commissioned in response to concerns from local residents that traffic problems in Studley are getting worse, particularly in relation to an apparent increase in the volume, noise, speed and vibration caused by HGVs using the A435 corridor which passes through the village. These environmental problems are recognised in the Warwickshire Local Transport Plan 2011-2026 and this study has used evidence from the HGV surveys to inform the development of possible options for addressing them.

Atkins was commissioned to analyse the survey results and this report presents the key findings from the data, along with suggested options for reducing HGV impacts for further consideration.

Although there were no reported incidents or planned road closures during the survey period, WCC has been advised by local residents that recent night-time road closures between Junctions 4a and 6 of the M5 as part of the Smart Motorways Project appear to have led to an increase in the number of HGVs using the A435 through Studley, which has adversely affected their quality of life. WCC has requested that this issue be considered during the option development stage of this study.

Data and Methodology

Intelligent Data undertook the surveys on behalf of WCC over a 24-hour period, beginning at 06:00 on Tuesday 29th November 2017. This period was selected to represent a 'typical' day/night during a 'neutral' month. No road closures due to planned works were scheduled to be taking place over that period nor were any major incidents on the network reported. Surveys were undertaken using Automatic Number Plate Recognition (ANPR) cameras and Manual Classified Counts (MCCs) at 19 sites (both directions surveyed) across the study area. These sites, lettered from A to S were positioned along the A435 corridor between M42 Junction 3 and Alcester. In addition, there were a number of sites within the Redditch, Studley and Alcester areas.



For analysis purposes, one of the first stages was to agree a set of principles as to what constitutes a 'through' trip, and assign each observed trip chain accordingly. As part of this step, the sites were grouped into one of five zones, namely the Studley area, Redditch area, Alcester area, 'area to north', and 'area to south'. These zones are illustrated in the image shown left.

It was then necessary to decide which trip purposes would be considered. It was key to understand whether HGVs were travelling through the study area along the A435 without stopping as part of a longer-distance strategic trip or whether they were serving businesses in the local area.

The areas of Studley, Redditch and Alcester have been grouped to determine the proportion of local trips. These have been split into two categories; those travelling within the **local area only** (travelling between sites within these local areas only) and those **servicing the local area** (trips observed travelling in or out of these local areas).

Through trips are also split into two; **strategic through trips** and **other through trips**. Strategic through trips only include those made between Site R and G (via Site F). This is to determine the proportion of trips that travel from the most northerly site on the A435 in the study area (from M42 Junction 3) along the A435 and out of the study area to the south via the A435 Alcester Bypass, and vice versa. 'Other through trips' also show through trips along the A435, but this group includes trips that entered/exited the study area within in any of the 'area to north' or 'area to south' sites (but excluding any that entered the study area at Site G or Site R).

Out of scope trips include those that were observed within the 'area to north' or 'area to south' only and were not observed anywhere else.

The '**other'** category included all other trips that pass between the local study areas. These have not been classed as 'local servicing trips' as this would result in double counting between groups. However, the number within the 'other' category is relatively small.

Key Findings

Trip Purpose

The unique trip chain raw data from the ANPR surveys included around 60,000 trips over a 24-hour period. Of these trips, approximately 2% were OGV1s and less than 1% were OGV2s[1].

Trip Purpose		OGV1	OGV2	All other vehicles[2]
Studley	Local only	5%	1%	12%
	Servicing	21%	9%	17%
Redditch	Local only	<1%	<1%	<1%
	Servicing	42%	52%	40%
Alcester	Local only	<1%	<1%	<1%
	Servicing	8%	8%	5%
Through	Strategic	6%	8%	4%
	Other through trips	3%	<1%	2%
Out of scope	North	6%	10%	9%
	South	2%	9%	4%
Other		6%	5%	6%
Total		**100%**	**100%**	**100%**

Note: purple shading indicates proportions of 10% or greater

Overall, **76% of OGV1s**, **69% of OGV2s** and 80% of all other vehicles are **using the study area for local or Servicing trips** (either moving within one of the three local areas, or entering/exiting one of the three local areas from either the area to the north and/or south). Just 6% of OGV1 and 8% of OGV2 trips are strategic through trips meaning they travelled between the top of the survey area to the north (Site R) and the bottom of the survey area to the south (Site G), via Site F on the A435 (near Spernal Lane). This information suggests that a large proportion of HGVs observed within the study area have a local purpose, with just a small proportion travelling through the study area without stopping in one of the three local zones.

Although these surveys took place within a neutral month with no known road closures due to works taking place, it is recognised that there may be incidents or roadworks which exacerbate environmental problems caused by HGVs on the A435 in Studley, such as those experienced during the recent night-time closures of the M5 between Junctions 4a and 6 as part of the Smart Motorways Project.

[1] OGV1 refers to all larger rigid vehicles with two or three axles. OGV2 contains all rigid vehicles with four or more axles and all articulated vehicles. Further detail is provided in Table 2-2 of the main report

[2] 'All other vehicles' includes all other vehicles (excluding OGVs). This includes, car, LGV, bus/coach, other, and motorcycle

Busiest Sites

Using the MCC data, each of the sites have been analysed to determine the total vehicle flow over a 24-hour period, and the proportion of HGVs. The results show the following:

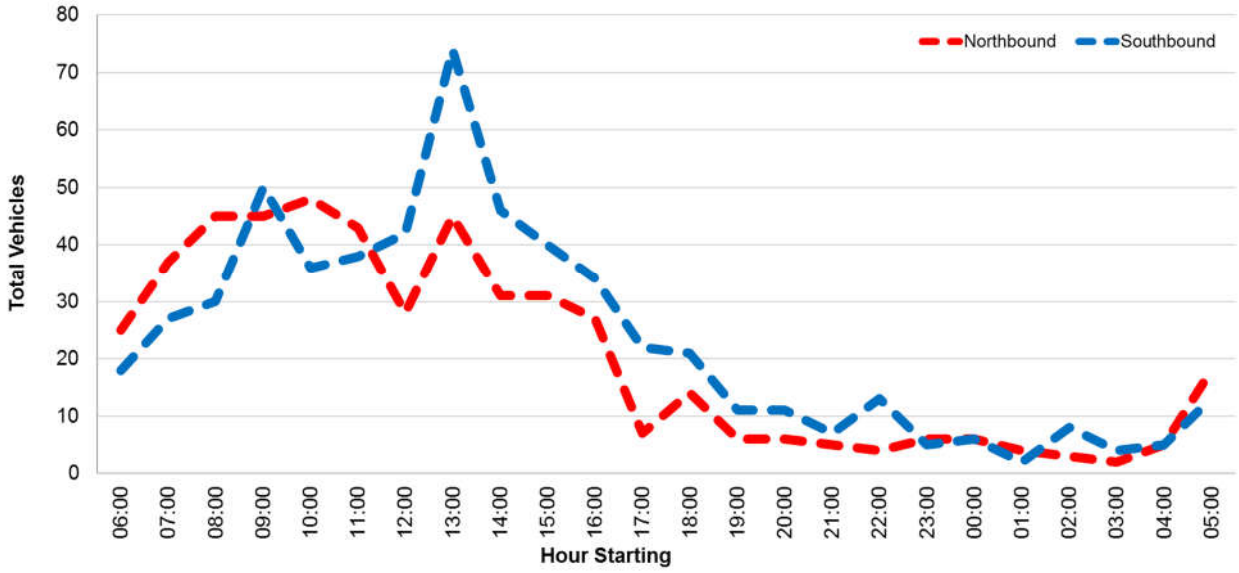
- The most northerly site on the A435, **Site R, is the busiest location** with around 35,000 vehicles observed during the survey period. Of this amount, approximately 3,000 (9%) were OGVs, which is the highest number of OGVs observed at any of the sites. This is considered to be a very high value for a dual carriageway.
- **The second busiest site is Site F** (on the A435 to the south of Studley). In 24 hours, there were approximately 21,000 trips observed, of which ~1,000 (5%) were OGVs. Again, 5% is considered a high proportion for a de-trunked single carriageway route.
- **The next three busiest sites include Site L and Site M** (both within the Redditch local area) and **Site G** (most southerly site within the study area on the A435).

Hourly Traffic Volume Profile (Site F)

Using MCC data, it has been possible to study hourly traffic volume profiles over a 24-hour period. This has been carried out for Site F (on the A435 within the Studley local area) which was one of the busiest sites, and is also one of the areas of concern for residents.

The results show that for all vehicles, the traffic profile is typical for UK traffic with 07:00 – 09:00 and 15:30 – 17:30 the busiest periods. During these times, there are around 1,000 vehicles per hour per direction in the AM peak and between 800-1,000 per hour per direction in the PM peak.

The graph below shows the hourly profile for OGVs across a 24-hour period:



The following points can be observed from this graph:

- The busiest periods in the southbound are between 09:00 and 10:00 (approximately 50 OGVs) and 13:00 and 14:00 (approximately 70 OGVs).
- In the northbound direction, the peak periods are less pronounced with flows between 08:00 and 13:00 relatively consistent at around 40 – 50 vehicles per hour.
- Overnight (22:00 – 06:00) OGV flows are largely less than 10 per direction, however this increases to 20 in the northbound direction between 05:00 – 06:00.

Summary and Options Development

Analysis of the data finds that on a typical day, the majority of HGVs appear to have a reason/purpose for visiting Redditch, Studley or Alcester, and only 7% can be classed as 'strategic through trips' (those travelling between Site R and G via Site F on the A435). This equates to circa 100 HGV trips per day per

direction. As a result, the figures suggest that the main cause of any noise, vibration or safety issues are not predominantly caused by strategic through traffic, but by HGVs which have a local purpose.

A range of options have therefore been considered as to how the impact of HGVs can be reduced or mitigated. Section 4 of the main body of the report includes a table containing full details of the options considered. This option table will provide the basis for further discussion with stakeholders as to which options should be taken forward for further consideration.

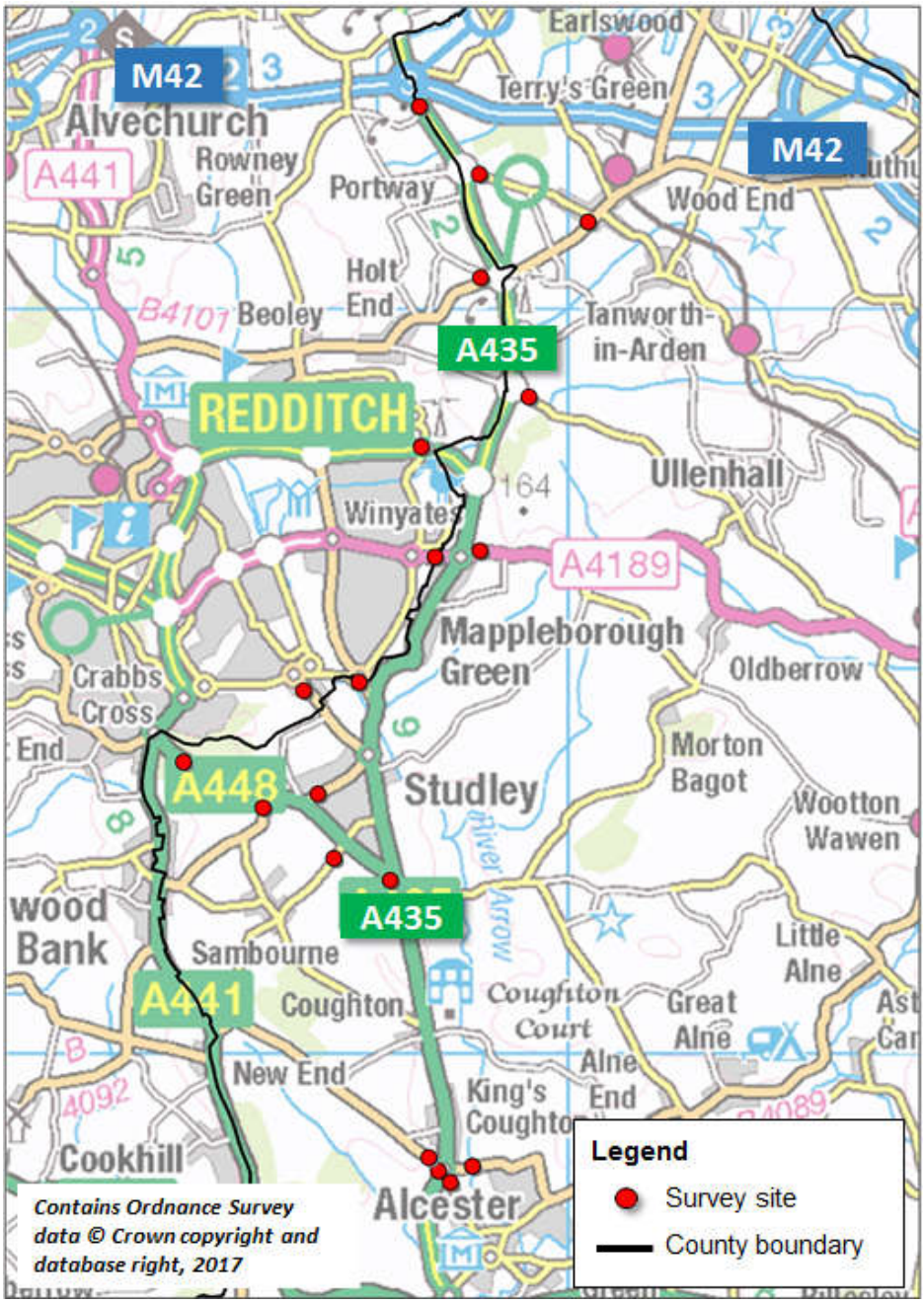
1. Introduction

1.1. Overview

In November 2016, Warwickshire County Council (WCC) commissioned a heavy goods vehicle (HGV) origin and destination survey along the A435 corridor between M42 Junction 3 and Alcester. The purpose of the survey was to determine the number and proportion of HGVs passing through the study area via the A435 without stopping as part of a strategic through trip, relative to those which had a local purpose over a 'typical' 24-hour period. **Figure 1-1** illustrates the extent of the study area and survey sites used (note, the location of the survey sites are shown in more detail in **Table 2-1**).

Atkins has been commissioned to analyse the results from this survey and this report presents the key findings from the data. In addition, Atkins has also conducted a review of current speed limits and has produced a list of potential options for further discussion with stakeholders.

Figure 1-1 Map of Study Area



1.2. Background to the Study

WCC met with key stakeholders[3] in May 2016 to discuss possible options for addressing traffic problems along the A435 corridor. This initial meeting took place within the context of emerging proposals for large-scale employment development at Redditch Eastern Gateway and concerns from local residents that traffic problems in Studley were getting worse, particularly in relation to an apparent increase in the volume, noise, speed and vibration caused by HGVs along the A435 through the village. Local residents have set up the 'Studley Traffic Action Group' with one of their primary concerns being the volume of HGVs passing through the village and the need to address the local environmental impacts this creates.

In Autumn 2016, WCC commissioned a HGV origin and destination survey using Automatic Number Plate Recognition (ANPR) cameras over a 24-hour period, as the basis for investigating HGV movements in more detail.

Whilst it would have been desirable to have undertaken the survey over a longer period of time, there were a number of planned night-time road closures in the area during late 2016 which constrained the available survey 'window'. These closures, which affected various sections of the A46 both before and after the survey, were considered likely to affect normal HGV routing behaviour and may have led to unrepresentative sample data being collected. The survey period selected was unaffected by such planned closures, and there were no reported incidents on the A435 corridor itself or on the surrounding Strategic Road Network (e.g. M40, M42, M5, A46) which may have affected typical traffic behaviour.

Intelligent Data undertook the surveys on behalf of WCC over a 24-hour period, beginning at 06:00 on Tuesday 29th November 2016. This period was selected in accordance with Department for Transport guidance (TAG Unit M 1.2) Data Sources and Surveys. This recommends that surveys should be undertaken within school term time in a 'neutral' month on neutral weekdays (i.e. not on Mondays or Fridays where travel patterns tend to differ from other weekdays). By following the above principles, we are confident that the sample data is valid and likely to be broadly representative of 'typical' HGV routing patterns in the area. Further information about this survey is included in Section 2 of this report.

Following this, Atkins was commissioned to analyse the survey results and produce an independent report of the key findings. More specifically the tasks included:

- Analyse HGV origin and destination data to understand HGV movements and trip purposes.
- Provide commentary around the dominant movements across the study area.
- Analyse traffic counts to understand the proportion of HGVs within the study area as a proportion of total traffic.
- Analyse traffic counts by time period to understand differences in flow across the day/night.
- Summarise HGV data on the B4092 Station Road (Site S) to understand HGV flows on this road.
- Consider the feasibility of introducing a 30mph speed limit (included separately within **Appendix B**).

This report presents the key findings from the data, along with the feasibility of potential options for further consideration.

Although there were no reported incidents or planned road closures during the survey period, WCC has been advised by local residents that recent night-time road closures between Junctions 4a and 6 of the M5 as part of the Smart Motorways Project appear to have led to an increase in the number of HGVs using the A435 through Studley, which has adversely affected their quality of life.

It is worth noting that although the A435 was de-trunked in January 2008 and is no longer part of the Strategic Road Network which is managed by Highways England, it remains a locally strategic 'A' class road which provides a direct link between the M42 and the A46/M5. It therefore provides an attractive alternative route when there are incidents or planned closures on surrounding routes.

It appears likely that drivers with sat navs will tend to be directed onto the quickest alternative routes when there are road closures. This may help to explain why the A435 appears to have been used as a diversion

[3] This meeting was attended by Nadhim Zahawi MP, officers and elected members from Warwickshire and Worcestershire County Councils, Stratford-on-Avon District Council, Highways England and local parish council representatives.

route during the recent works on the M5 despite a signed diversion route being in place via the A38 near Bromsgrove.

WCC has requested that this issue be considered during the option development stage of this study to establish whether a more pro-active multi-agency approach could help to better manage HGV impacts on the A435 in the event of road closures on the wider network.

1.2.1. Development Proposals

At the May 2016 stakeholder meeting, emerging proposals for employment development at Redditch Eastern Gateway were discussed. This and other developments are likely to increase traffic on the A435 corridor.

Table 1-1 provides a summary of the upcoming and committed developments in relation to A435 flows:

Table 1-1 Upcoming and Committed Developments

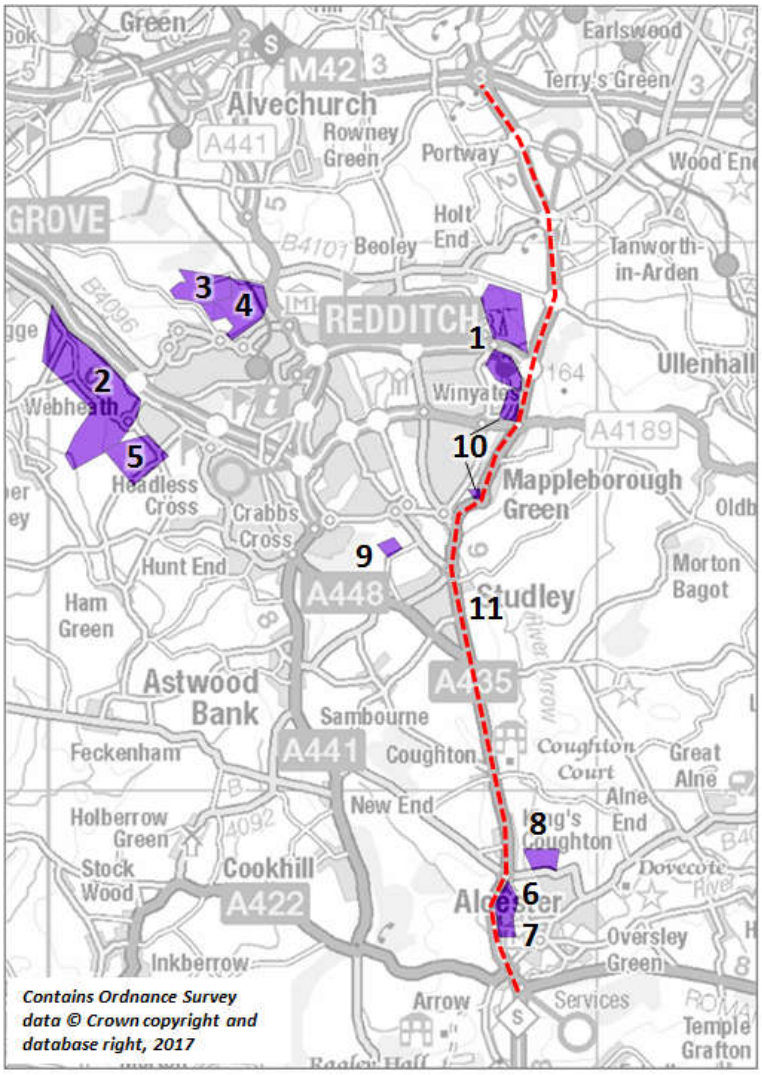
Map ID	Site	Description	Planning Status (as of June 2017)
1	**Redditch Eastern Gateway**	This is an upcoming development comprising two sites situated on the north-eastern side of Redditch, immediately adjacent to the A435 and bisected by the A4023, and within four miles of the M42 Junction 3. The vision for the site is for a range of occupiers, with high quality offices to modern industrial and commercial properties. The net additional employment created by the Redditch Eastern Gateway is estimated as being up to 2,300 additional jobs[4]. WCC is seeking an HGV routing agreement to minimise the number of HGVs associated with this development routing through sensitive areas, particularly the A435 through Studley, and are in ongoing discussions with the site promoter and Worcestershire County Council on this issue.	Outline pre-applications (programme: 2018-2030)
2	**Foxlydiate Housing Development**	One of the largest allocated housing sites within Redditch, as set out in the Local Plan. Proposals include provision for approximately 2,800 dwellings on land to the west of Redditch. The site would also include three-form entry primary school and a local centre.	Planning application submitted in March 2016. Application yet to be determined.
3	**Brockhill East**	Proposal for 600 dwellings	Planning application submitted in March 2016. Application yet to be determined.
4/5	**Development Sites**	Sites outlined in the Local Plan for future development	Future development
6	**Site ALC 1**	190 residential units north of Allimore Lane, Alcester (southern part)	Committed development
7	**Site ALC 2**	160 residential units north of Allimore Lane, Alcester (northern part)	Committed development
8	**Site ALC 3**	Land north of Arden Forest Industrial Estate, Alcester (8.29 hectares net of B1©/B2/B8 employment)	Outline planning permission awarded in April 2017 and included a condition requiring an HGV routing plan to minimise the impact of HGVs associated with the development routing

[4] https://www.gov.uk/government/publications/regeneration-project-redditch-eastern-gateway/regeneration-project-redditch-eastern-gateway

			via the A435 through Studley.
9	**Site No. 210**	Land Off Green Lane (RO Alex Hospital) in Redditch – proposal for 140 dwellings (application ref. 17/00542/OUT)	Proposed development
10	**Site No. 211**	A435 (former Area of Development Restraint) – proposal for 205 dwellings	Proposed development
11	**Development site (Studley)**	The adopted Stratford-on-Avon District Local Plan notes that at least 100 homes are to be provided in Studley village over the plan period 2011-2031	Included within the Stratford-on-Avon District Local Plan.

Figure 1-2 shows the approximate location of the development in relation to the A435, shown by the red dashed line.

Figure 1-2 Location of Development Sites



1.3. Structure

Following this introduction, the remainder of this report is structured as follows:

- **Section 2 – Study Approach:** includes details of the data used and the methodology used to analyse the dataset.
- **Section 3 – Key Findings:** presents the key findings from the data analysis.
- **Section 4 – Options and Next Steps:** following analysis of the data, a series of recommendations are made and a list of the next steps is provided.

2. Approach

2.1. Overview

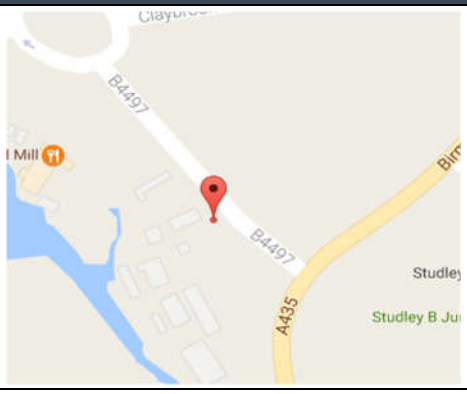
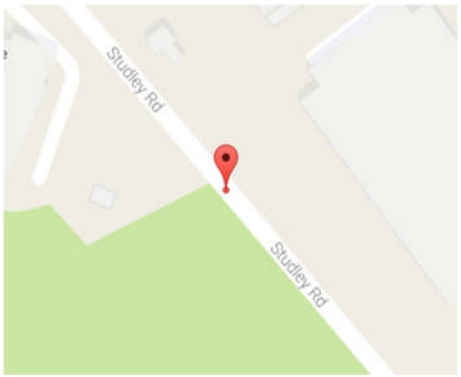
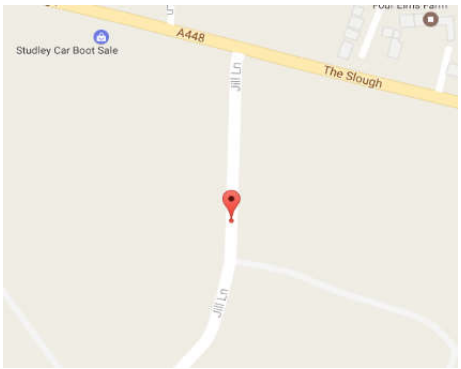
This section provides details of the data that has been used to undertake this study and Atkins' methodology for analysing the information.

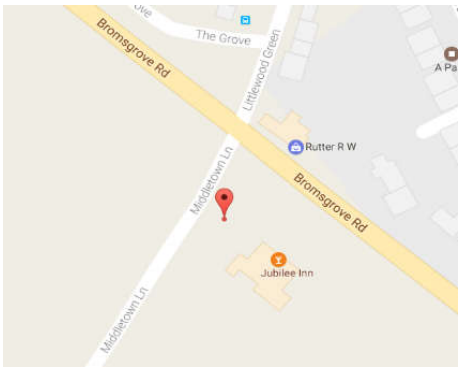
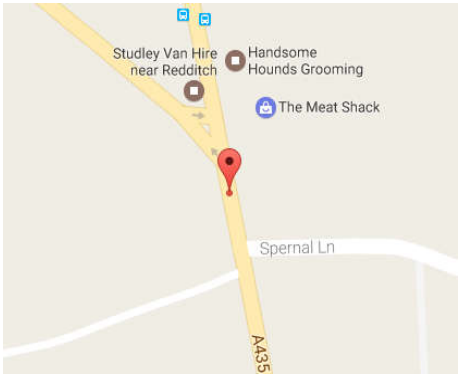
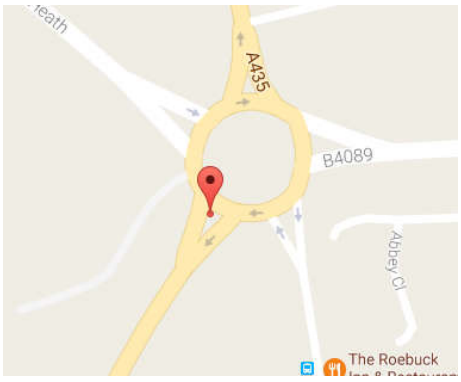
2.2. Data

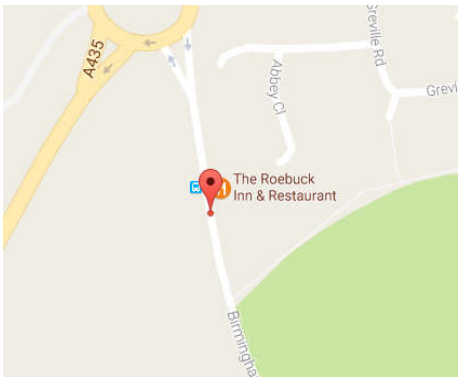
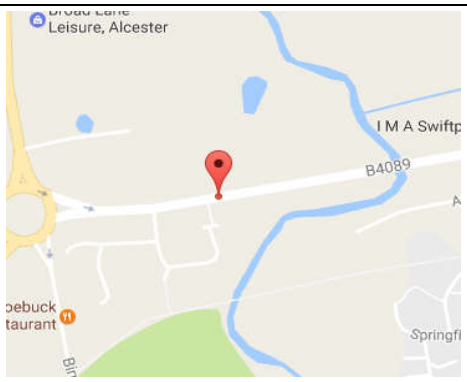
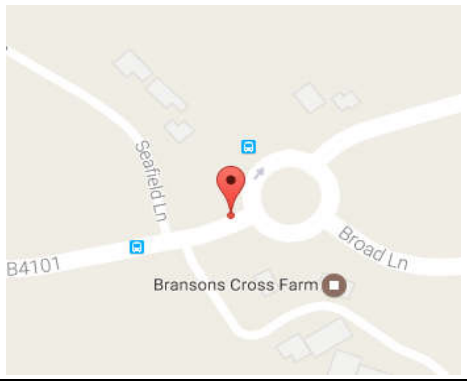
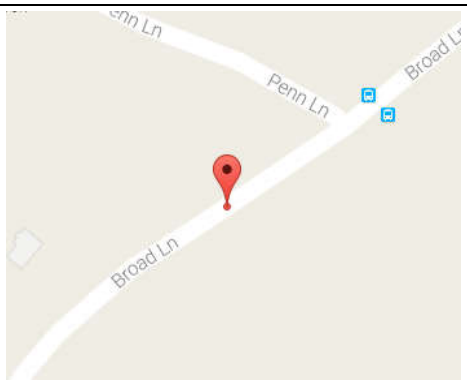
2.2.1. Sites

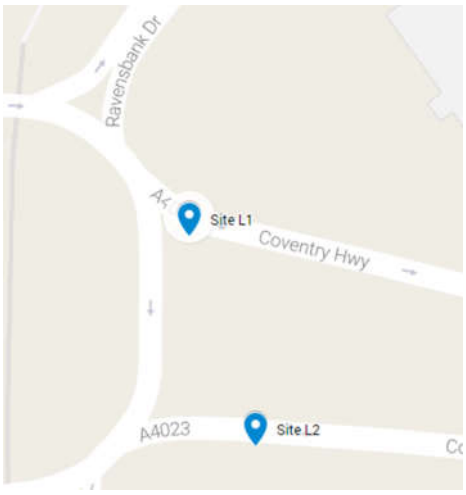
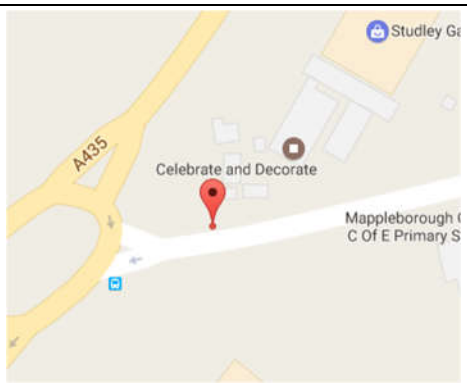
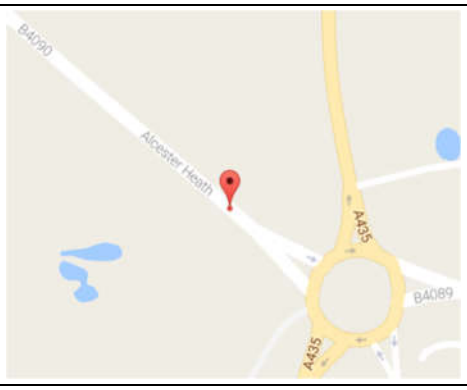
As noted in Section 1, Intelligent Data carried out traffic surveys at 19 sites (both directions surveyed) across the study area (shown in **Figure 1-1**). These sites are lettered from A to S and were positioned along the A435 corridor between the M42 Junction 3 and Alcester. In addition, there were a number of sites within the Redditch, Studley and Alcester areas. The exact positioning of these sites is shown in **Table 2-1**:

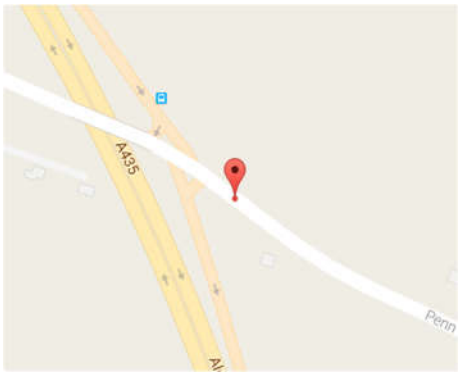
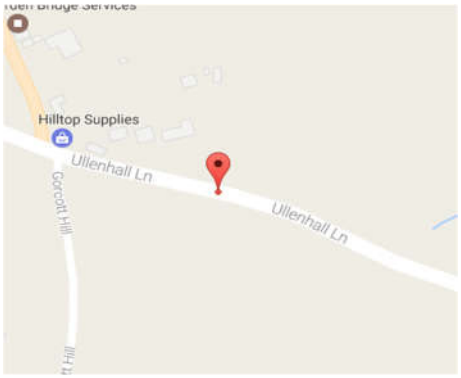
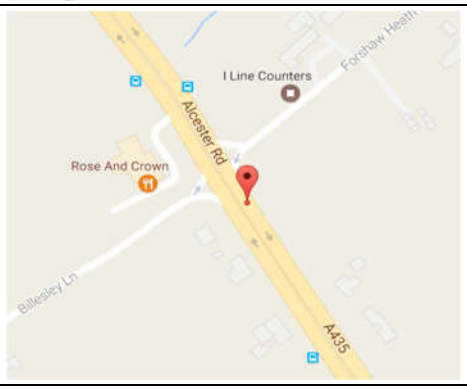
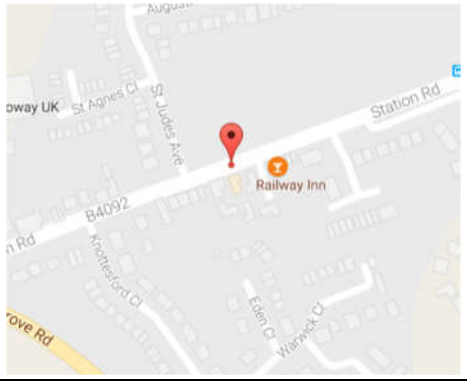
Table 2-1 Detailed location of count sites

Site	Location Name	Map
A	B4497 Icknield Street Drive	
B	B4093 Studley Road	
C	B4092 Jill Lane	

D	A448 The Slough	
E	Middletown Lane	
F	A435 Alcester Road	
G	A435 Alcester Bypass	

H	Birmingham Road	
I	B4089 Arden Road	
J	B4101 Beoley Lane	
K	B4101 Broad Lane	

L	A4023 Coventry Highway	
M	A4189 Warwick Highway	
N	A4189 Henley Road	
O	B4090 Alcester Heath	

P	Penn Lane	
Q	Ullenhall Lane	
R	A435 Alcester Road	
S	B4092 Station Road	

2.2.2. Automatic Number Plate Recognition Survey

Intelligent Data undertook an ANPR survey over 19 sites (details shown in **Table 2-1**), lettered from A to S**.** This data was captured using advanced cameras which record the number plate of each vehicle at each of the 19 sites during day and night-time conditions. Each number plate is time-stamped by time and date and enables the identification of vehicle movements.

This survey was undertaken for a 24-hour period, beginning at 06:00 on Tuesday 29th November 2016. This period was selected to represent a typical day/night during a neutral month[5].

Intelligent Data provided a summary of the unique 'trip chains', which is a list of all routes taken by any vehicle during the surveying period. These have been calculated by Intelligent Data based on vehicles being counted at two or more of the 19 sites up to a maximum journey time of 30 minutes[6].

It should be noted that this study primarily involved analysis of the movements of HGVs across the study area. HGVs fall into two categories within the Department for Transport's Standard UK Vehicle Classification Scheme: OGV1 and OGV2. A definition of these two categories is provided in **Table 2-2**, as follows:

Table 2-2 Definition of OGV1 and OGV2 Classifications

Category	Description	Example[7]
OGV1	Contains all larger rigid vehicles with two or three axles • Includes larger ambulances with double rear wheels • Tractors (without trailers) • Road rollers for tarmac pressing • Large vans • Middle-sized trucks with double rear wheels	
OGV2	Contains all rigid vehicles with four or more axles and all articulated vehicles. Also includes OGV1 goods vehicles towing a caravan or trailer.	

2.2.3. Manual Classified Counts

In addition to an ANPR survey, Manual Classified Counts (MCC) were completed for the 19 sites during same period as the ANPR surveys. This count data was collected through cameras set up at each of the sites and was used to understand typical overall traffic volumes throughout the day, and also to calculate the ANPR capture rates. This information was provided in 15 minute intervals.

2.3. Classification of Trips

One of the key purposes of this study was to understand the movement of HGVs and whether those travelling in the study area are making through trips or are travelling within the local area. With this in mind,

[5] WebTAG Unit M1.2 Data Sources and Surveys (January 2014) states that traffic surveys should be carried out during a neutral month and that November is considered a neutral month.

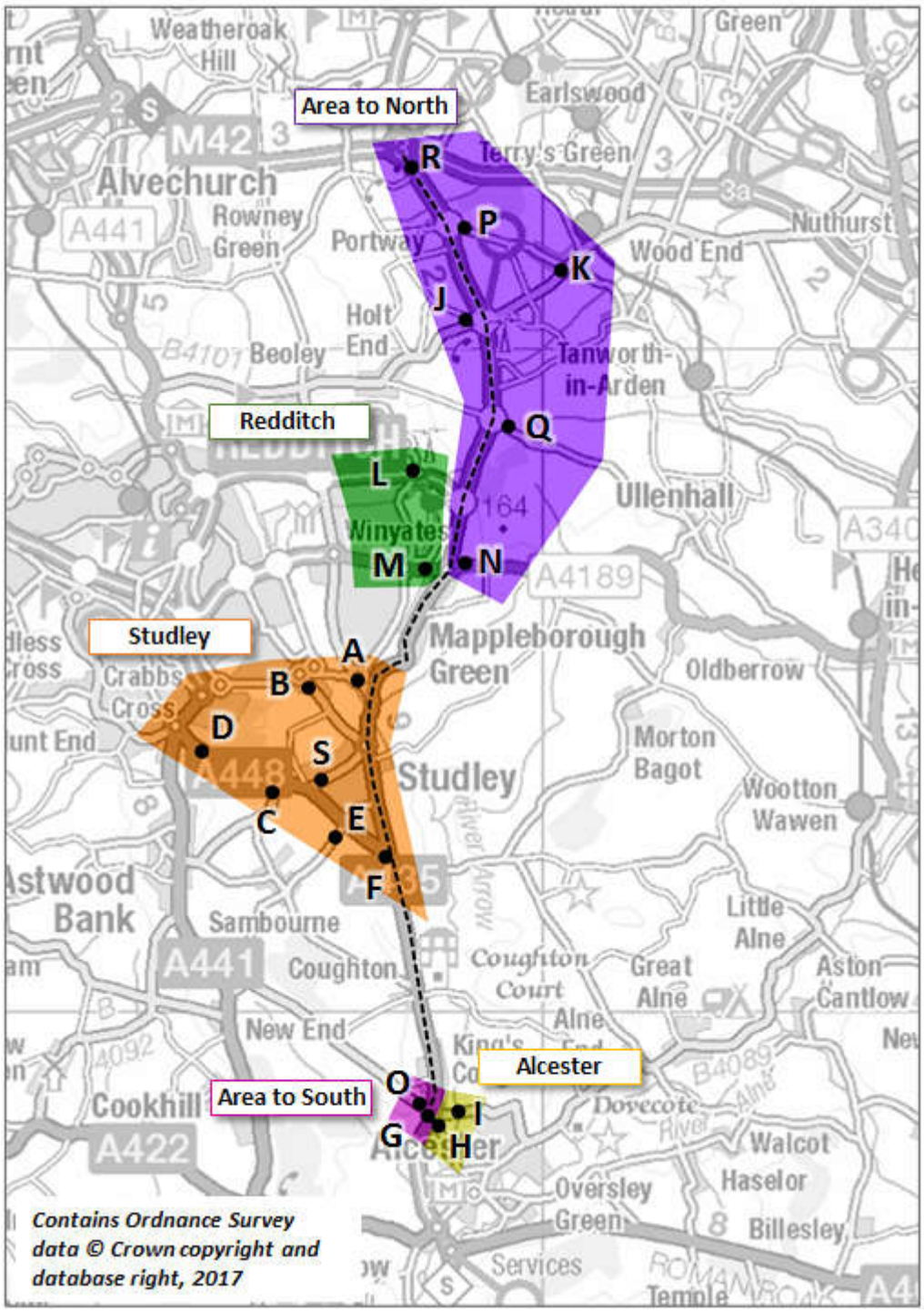
[6] The trip chains included in the summary data provided by Intelligent Data comprised all trips made by any vehicle entering the cordon (area bounded by the sites) and remaining inside the cordon for a maximum time-period of up to 30 minutes. Once the maximum time-period is exceeded, a new trip chain is formed. For instance, if a trip is surveyed moving from site A to B to C, but between the movement from B to C, the total time exceeds 30 minutes, then this trip chain would be split from A to B and then B to C, with the vehicle recorded in both trip chains. The result of setting a maximum time threshold is that the total number of trips contained within the data used in this analysis is less than the overall total number of trips recorded by the ANPR surveys.

[7] Images taken from http://www.videodatapad.com/faq/standard-uk-vehicle-classification

one of the first stages was to agree a set of principles as to what constitutes a ‘through’ trip, and assign each observed trip chain accordingly.

As part of this step, the sites were grouped into one of five zones, namely the Studley area, Redditch area, Alcester area, ‘area to north’, and ‘area to south’. These zones are illustrated in **Figure 2-1**.

Figure 2-1 Zones



It was then necessary to decide which trip purposes would be considered. It was key to understand whether HGVs were travelling through the study area along the A435 or whether they were serving the local area.

The areas of Studley, Redditch and Alcester have been grouped to determine the proportion of local trips. These have been split into two categories; those travelling within the **local area only** (travelling between

sites within these local areas only) and those **servicing the local area** (trips observed travelling in or out of these local areas). It should be noted that although sites A and B lie on the very northern edge of Studley, they have been included within the Studley local area for the purposes of this analysis.

Through trips are also split into two; **strategic through trips** and **other through trips**. Strategic through trips only include those made between site R and G (via site F). This is to determine the proportion of trips that travel from the most northerly point of the study area (from M42 Junction 3) along the A435 and out of the study area to the south via A435 Alcester Bypass, and vice versa. 'Other through trips' also show through trips along the A435, but could have entered/exited the study area within in any of the 'area to north' or 'area to south' sites (excluding trips that entered the study area at Site G or Site R).

Out of scope trips include those that were observed within the **'area to north'** or **'area to south'** only and were not observed anywhere else.

The '**other'** category included all other trips that pass between the local study areas. These have not been classed as 'local servicing trips' as this would result in double counting between groups. However, the number within the 'other' category is relatively small.

Table 2-3 provides a summary of the trip classifications used in this study.

Table 2-3 Definition of trip purposes

Trip Purpose		Description
Through	Strategic	Trips observed at Site R and G, that travel via Site F in either direction
	Other through trips	Trips observed within the 'area to south' (O & G) and the 'area to north' (R, P, J, K, Q, N) that travel via Site F in either direction. This does not include trips that travel from Site R to G via F, which are classified as strategic through trips.
Studley	Local only	Trips observed within the Studley area (A,B,C,D,E,F,S) only
	Servicing	Any trips observed within the Studley area (A,B,C,D,E,F,S), and which are also observed in the 'area to the north' (R, P, J, K, Q, N) and/or the 'area to south' (O and G) but excluding Through Trips.
Redditch	Local only	Trips observed within the Redditch area (L & M) only
	Servicing	Trips observed within the Redditch area (L & M) and which are also observed in the 'area to the north' (R, P, J, K, Q, N) and/or the 'area to south' (O and G) but excluding Through Trips.
Alcester	Local only	Trips observed within the Alcester area (Sites H & I) only
	Servicing	Trips observed within the Alcester area (H & I) and which are also observed in the 'area to the north' (R, P, J, K, Q, N) and/or the 'area to south' (O and G) but excluding Through Trips.
Out of scope	North	Trips observed within the 'area to north' only (R, P, J, K, Q, N)
	South	Trips observed within the 'area to south' only (O & G)
Other		Trips that pass between the local areas of Studley, Redditch and Alcester. For example, trips that pass between Studley and Redditch. These are classed as 'other' trips and not 'servicing' trips as to avoid double counting.

Based on these trip purposes, all trip chains have been classified into one of the above trip purposes. This data has been analysed and is discussed in the following section of this report.

3. Key Findings

3.1. Overview

Numerical analysis of the data sets discussed in Section 2 has been carried out. Having assigned each observed trip chain to a classification, statistics showing the number of local and through trips in the study area has been identified and this is discussed within this section. More specifically, the following analysis has been carried out:

- Total number of local trips, through trips and out of scope trips recorded.
- Busiest sites within the study area.
- Hourly traffic profiles.

3.2. Trip Purpose

The unique trip chain raw data from the ANPR surveys included around 60,000 trips over a 24-hour period. Of these trips, approximately 2% were OGV1s and less than 1% were OGV2s. As discussed earlier, OGV1s are all larger rigid vehicles with two or three axles, whilst OGV2s contain all rigid vehicles with four or more axles (see Table 2-2 for further details).

As discussed in the previous section, each unique trip chain has been assigned a trip purpose. **Table 3-1** presents the results for the ANPR surveys by trip purpose and vehicle classification.

Table 3-1 Flow proportions by vehicle classification and trip purpose

Trip Purpose		OGV1	OGV2	All other vehicles[8]
Studley	Local Only	5%	1%	12%
	Servicing	21%	9%	17%
Redditch	Local	<1%	<1%	<1%
	Servicing	42%	52%	40%
Alcester	Local	<1%	<1%	<1%
	Servicing	8%	8%	5%
Through	Strategic	6%	8%	4%
	Other through trips	3%	<1%	2%
Out of scope	North	6%	10%	9%
	South	2%	9%	4%
Other		6%	5%	6%
Total		**100%**	**100%**	**100%**

Note: green shading indicates proportions of 10% or greater

The key findings to note from this table are:

- The most frequent movement for OGV1s and OGV2s was access to and/or from Redditch with 42% of OGV1s and 52% of OGV2s undertaking this movement. Further consideration of the results demonstrates that the movement from M42 Junction 3 (Site R) to/from Redditch was the most frequent movement for OGV1s and OGV2s as well as the most frequent (40%) movement for all other vehicles.
- The next most common movement for OGV1s was routes servicing the Studley area, accounting for 21% of trips. This was also the second most frequent movement for all other vehicle types.
- For OGV2s, the second most common movement was out of scope trips in the area to the north of Studley.

[8] 'All other vehicles' includes all other vehicles (excluding OGVs). This includes, car, LGV, bus/coach, other, and motorcycle

- Only 6% of OGV1 and 8% of OGV2 trips are strategic through trips meaning they travelled between the top of the survey area (Site R) and the bottom of the survey area (Site G), via Site F on the A435 (near Spernal Lane).

Overall, 76% of OGV1s, 69% of OGV2s and 80% of all other vehicles are using the study area for local trips (either staying within the local area, or entering/exiting one of the three local areas from the area to the north and/or south). In summary, it would appear from the survey evidence that the majority of vehicles travelling within the study area have a local purpose. Although these surveys took place on a typical weekday within a neutral month with no known road closures taking place, it is recognised that there may be incidents or road closures which exacerbate problems caused by HGVs in Studley and other communities along the A435 corridor.

3.3. Busiest Sites

Using the MCC data, each of the sites have been analysed to determine the total vehicle flow over a 24-hour period, and the proportion of HGVs. **Figure 3-1** presents the total traffic flow during the 24-hour survey period.

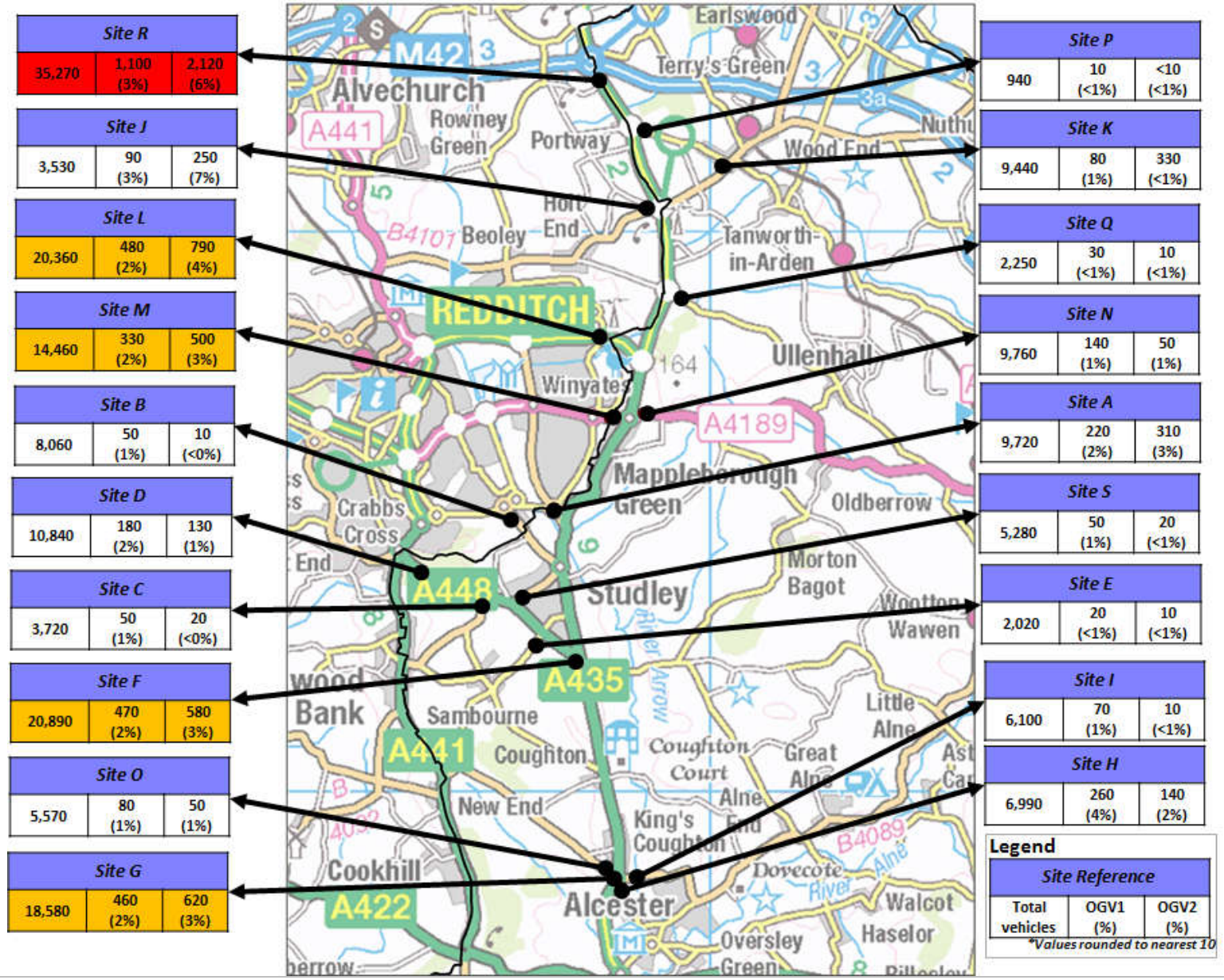
The column on the left shows the total traffic volume observed at the location specified, the second column shows the number and proportion of OGV1s and the column on the right shows the number and proportion of OGV2s. The red shading highlights the busiest location and the orange shading highlights the next four busiest locations based on total traffic volumes.

The results show that Site R (the most northerly site on the A435) is the busiest location with around 35,000 vehicles observed during the survey period of which around 3,000 were OGVs, which is the highest number of OGVs observed at any of the sites. This means 9% of total vehicles were HGVs, which is considered a very high value for a dual carriageway.

The volume and classification of traffic on the A435 to the south of Studley (Site F), which is the second busiest site, is of specific interest to this study. This shows that shows that around 21,000 trips were observed to the south of Studley (Site F), of which ~1,000 (5%) were OGVs. Once again, this is considered a high proportion for a de-trunked single carriageway route.

The next three busiest sites include Site L and Site M (both within the Redditch local area) and Site G (most southerly site within the study area on the A435).

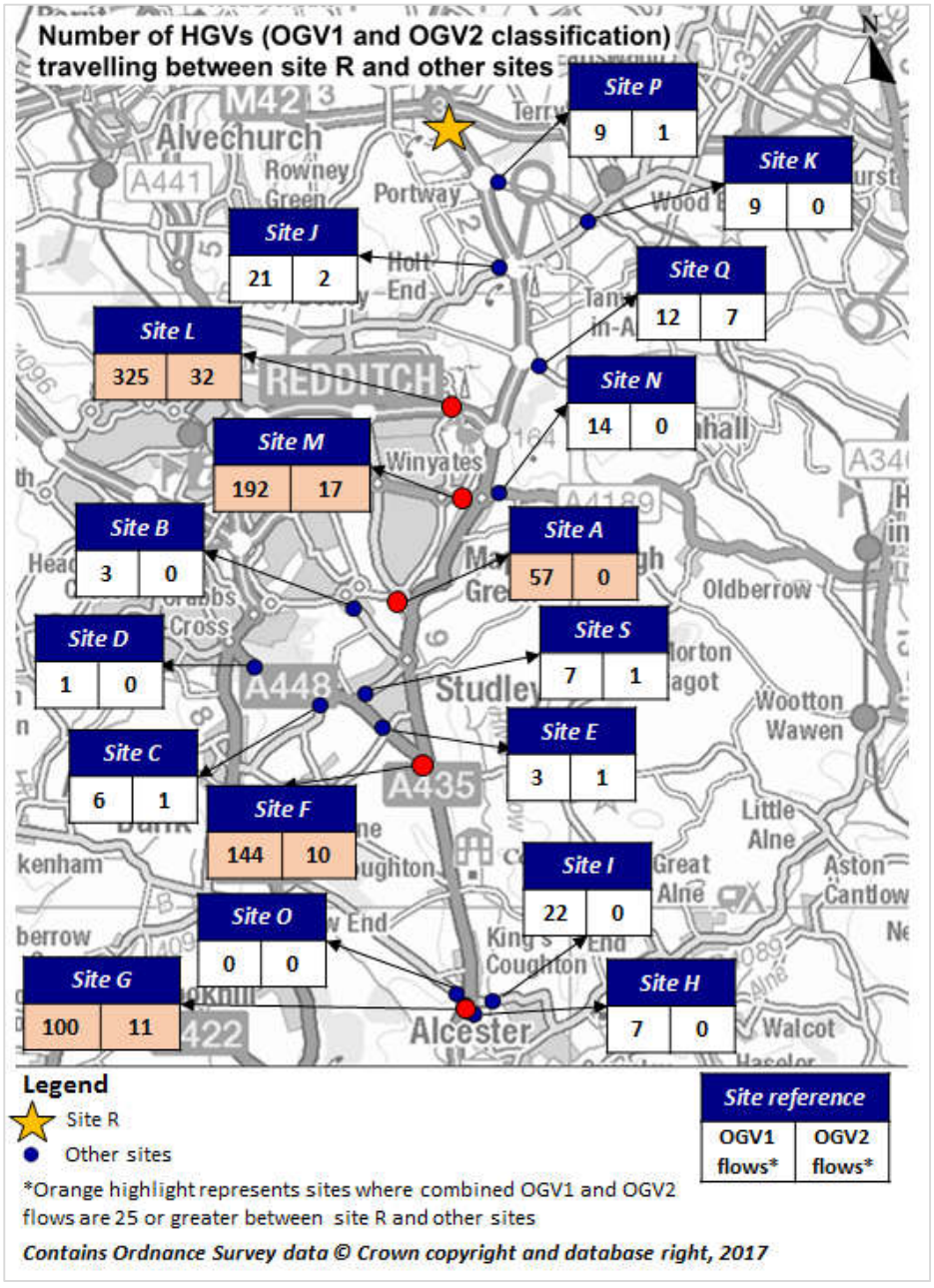
Figure 3-1 Link Count Analysis



Now we know which sites experienced the highest flow over a 24-hour period, it has also been possible to see where else in the study area vehicles were observed having travelled through these sites.

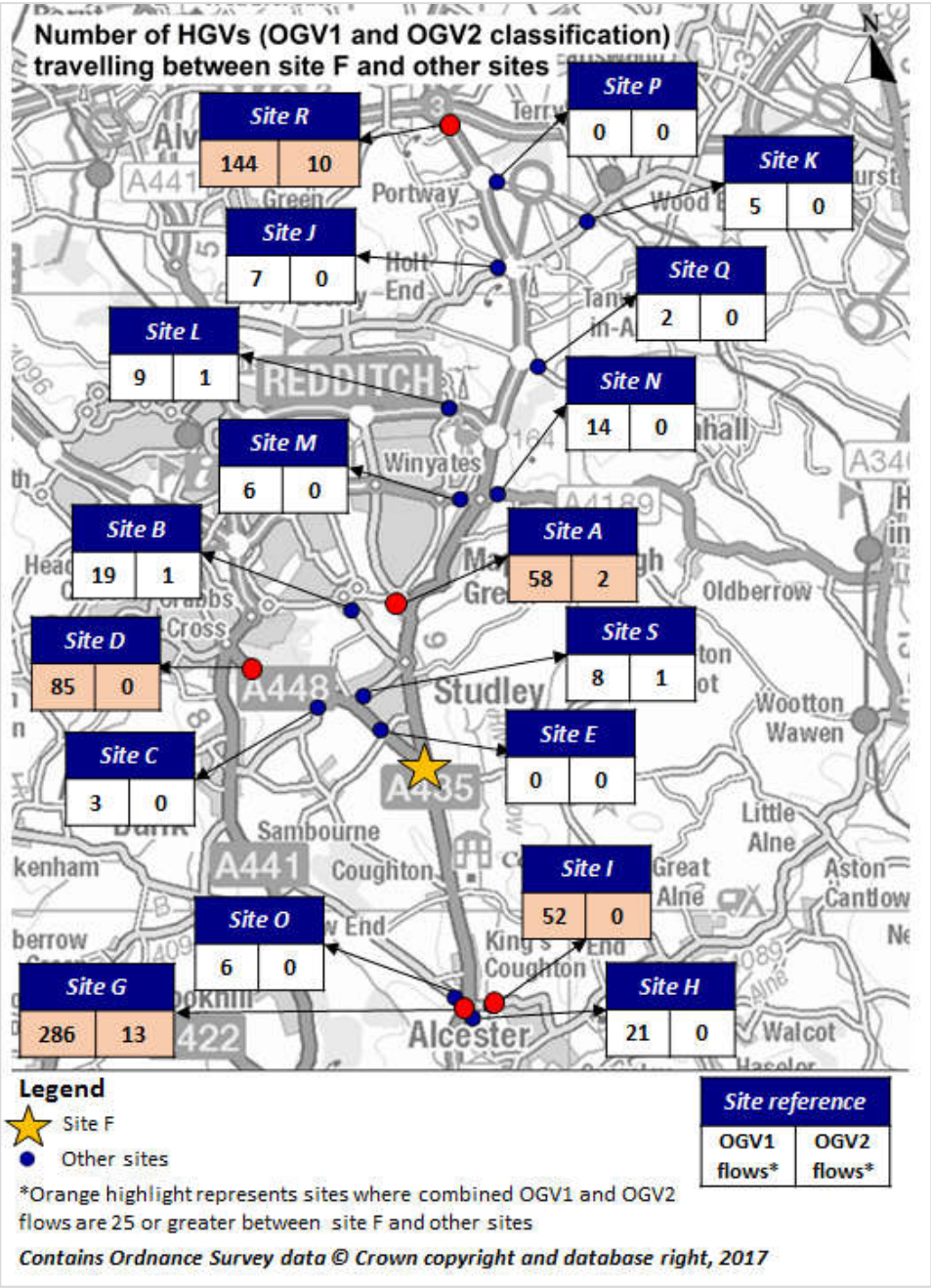
Figure 3-2 illustrates the number of HGVs travelling between Site R (which had the highest flow) and other sites within the study area. Site R is highlighted by the star symbol, with orange highlighting sites where combined OGV1 and OGV2 flows are 25 or greater. This shows that the highest number of HGVs travelling through site R were then observed within the Redditch area (Sites L and M), Studley (Sites A and F) and on the A435 Alcester Bypass (Site G). It is worth noting that these figures represent the number of OGVs observed over a 24 hour period, so for Site L, this relates to an average of 14 OGV1s and 1 OGV2 per hour.

Figure 3-2 Number of HGVs travelling between Site R and other sites over a 24 hour period



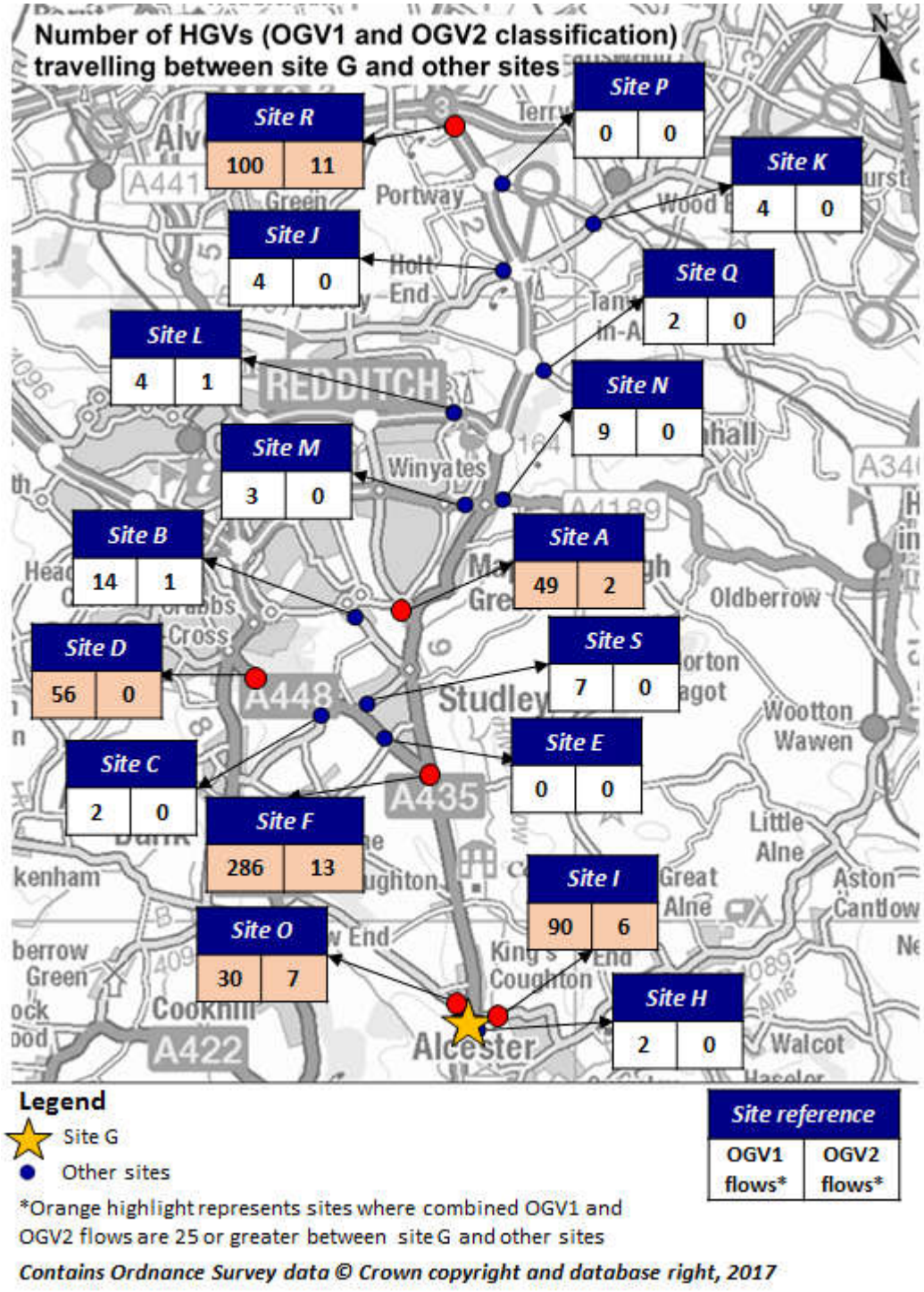
The same analysis has also been carried out for Site F, which lies on the A435 within the Studley local area to the south of its junction with the A448, see **Figure 3-3**. This shows that HGVs passing through Site F were also observed at the south of the study area (Sites G and I) and at the other end in the north (Site R) and within the Studley local area (Site A and D). It also shows that very few are actually accessing Redditch around the A435/Warwick Highway roundabout and Ravensbank. But more are accessing Redditch via the A448 and some via the Washford Mill roundabout (Site A).

Figure 3-3 Number of HGVs travelling between Site F and other sites



For Site G, which lies on the A435 at the south of the study area, the same analysis has also been undertaken, and this is shown in **Figure 3-4**. This shows that HGVs passing through Site G went on to be observed at Site F (286 OGV1s and 13 OGV2s) and within Studley (Site A and D) and in the north at Site R.

Figure 3-4 Number of HGVs travelling between Site G and other sites



Mapping for Sites L and M can be found in **Appendix A.**

WCC also requested that the number and proportion of trips by trip purpose for the B4092 Station Road (Site S) were considered in more detail. The MCC data found that 5,280 trips were observed at this location of which less than 1% were HGVs. Therefore, this data suggests that on a typical day, the volume of HGVs is not significant at this location.

3.4. Hourly Traffic Volume Profiles

Using MCC data, it has been possible to study hourly traffic volume profiles for each site. It was seen previously that Site F (on the A435 within the Studley local area) was one of the busiest sites, and is also

one of the areas of concern for residents. The hourly traffic volume profile has been plotted to show all vehicles and OGVs by direction for this site to determine the busiest times of day. This is displayed in **Figure 3-5** and **Figure 3-6.**

Figure 3-5 Hourly total traffic profile on the A435 to the south of Studley (Site F)

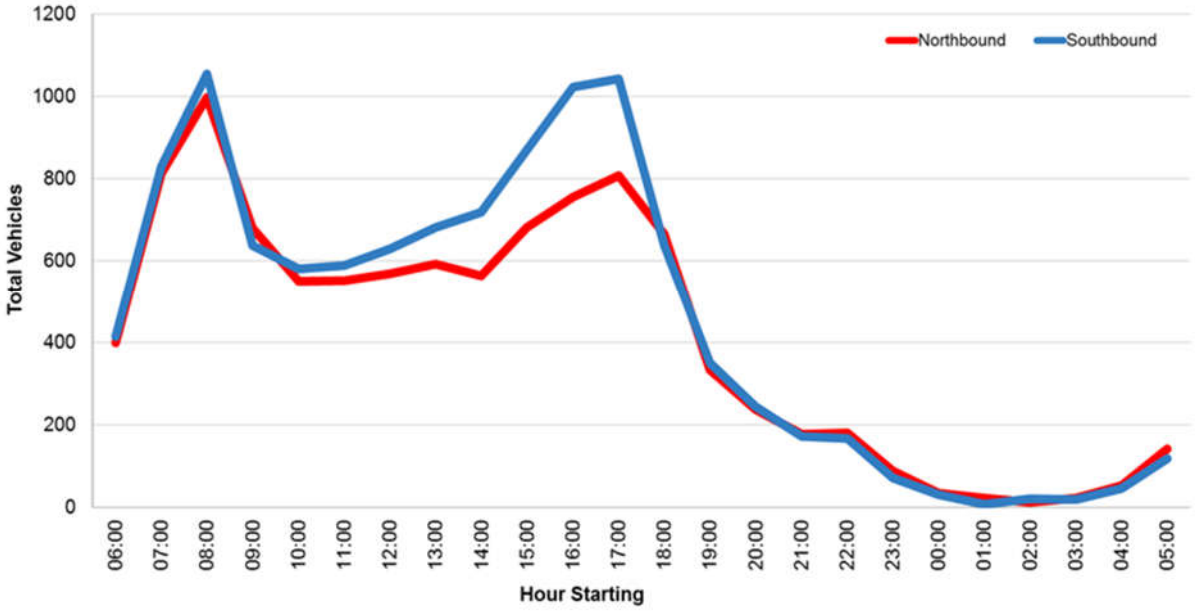


Figure 3-6 Hourly OGV traffic profile on the A435 to the south of Studley (Site F)

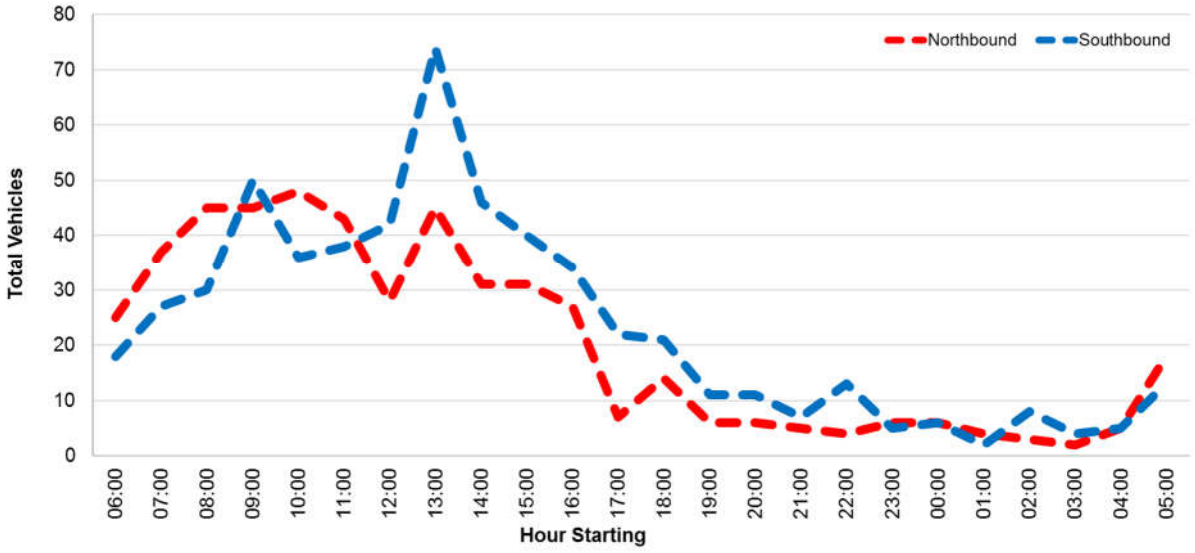


Figure 3-5 and Figure 3-6 show that the peak periods for all vehicles and OGVs are quite different to one another. For all vehicles, the total traffic profile is typical for UK traffic with 07:00 – 09:00 and 15:30 – 17:30 the busiest periods. During these times, there are around 1,000 vehicles per hour per direction in the AM peak and between 800-1,000 per hour per direction in the PM peak. However, while the AM peak sees similar northbound and southbound flows, in the PM peak the northbound flow is approximately 200 vehicles lower than the southbound.

Focusing on OGVs only, the busiest periods in the southbound are between 09:00 and 10:00 (approximately 50 OGVs) and 13:00 and 14:00 (approximately 70 OGVs).

In the northbound direction, the peak periods are less pronounced with flows between 08:00 and 13:00 relatively consistent at around 40 – 50 vehicles per hour.

Overnight (22:00 – 06:00) OGV flows are largely less than 10 per direction, however this increases to 20 in the northbound direction between 05:00 – 06:00.

Overall, this analysis demonstrates that on a typical day, HGVs appear to have a local purpose. Strategic through trips account for approximately 7% of all HGV trips and 3% as other through trips, so it appears that most HGVs within the study area are serving businesses in the local areas (mainly Studley and Redditch). It is acknowledged however, that at times where there are incidents or planned road closures on other roads such as the A46, M42, M5 and M6, the proportion of HGV through trips routing via the A435 in Studley may increase.

4. Options Development

4.1. Overview

Analysis of the data reveals that on a typical day, the majority of HGVs appear to have a local purpose, and only 7% can be classed as 'strategic through trips' (those travelling between Sites R and G via Site F on the A435 without stopping). This equates to circa 100 HGV trips per day per direction. As a result, the figures suggest that the main cause of any HGV-related noise, vibration or safety issues experienced by local residents are created by HGVs serving local businesses and not predominantly by strategic through traffic.

A range of options have therefore been considered as to how the impact of the HGVs can be minimised (where possible) and/or mitigated.

4.2. Options Table

Following the results of the analysis, Atkins has discussed the findings and produced a table of potential options for consideration by WCC and wider stakeholders. These options are presented in **Table 4-1** alongside initial thoughts of the potential advantages and disadvantages of each. Each option is classified into types, including speed, noise, air quality and volume of HGVs. In this high level presentation of options, road safety is assumed to be covered within the speed and volume of HGV categories. In addition, a traffic light colour scheme highlights each option's ease of implementation, cost and time required to implement.

This table will provide the basis for further discussion with stakeholders as to which options should be taken forward for further consideration.

Table 4-1 List of potential options for consideration

Type	Recommendation Name	Recommendation Detail	Advantages	Disadvantages	Timescales	Cost	Ease of Implementation
Speed	**Speed limit location review**	A more in-depth review of the speed limit sign locations is required.	• Builds upon the study already carried out by Atkins – looking at whether the speed limit signs are set in the right place or could be extended/moved	• Does not do anything to address the volume of HGVs			
Speed	**Speed compliance study**	Speed surveys in the sensitive sections would be useful over a 24-hour period. This would help in understanding the average speeds of vehicles travelling through Studley and speed limit compliance.	• A survey would identify whether HGVs are speeding through the village – which would be affecting noise levels. • Would help to identify the magnitude of the issue regarding HGVs speeding overnight.	• Does not do anything to address the number of HGVs			
Speed	**Village Gateways**	Implementation of 'village gateways' comprising either physical or non-physical measures to introduce drivers to the village. These may include road narrowing, speed limit roundels, narrowing of the road (with verges/vegetation, chicane etc.)	• Can be effective at getting drivers / HGVs to slow down. • Would give Studley a 'village' feel which in turn may encourage HGVs to either slow down or avoid the route.	• Physical chicanes may not be appropriate on road safety grounds as the approaches to Studley villages are all on relatively straight sections of road with good forward visibility which may lead to drivers speeding up to avoid giving way to opposing traffic. • Vertical features are also unlikely to be appropriate on a principal 'A' road which is used by HGVs and buses. • Won't remove the issue altogether. • Residents may still experience noise from HGVs.			
Speed	**Average Speed Cameras**	Possible introduction of average speed cameras through the Studley 30mph zone.	• Would address concerns over HGVs speeding through the village. • Ensures drivers keep to the speed limit through the entire 30mph zone, rather than slowing down for the fixed cameras and then speeding up again.	• Would require consultation with and support from Warwickshire Police. • High cost compared to fixed/mobile camera enforcement. • May involve technology issues including the need for back-office support. • Speed compliance study would be required to support the case for intervention. • Maintenance of cameras required.			
Speed	**Public Realm Improvements**	Possible improvements to the public realm within Studley	• Gives the town a more village feel and a visual improvement for residents. • May result in car/HGV drivers giving more consideration to their speeds	• Unlikely to reduce the volume of HGVs travelling through the village			
Noise	**Longitudinal Road Profiling Survey**	Of particular relevance to HGVs travelling from the south towards Studley, is the profile of the road causing HGVs with multiple axles to 'bounce' resulting in additional and unnecessary noise and vibration. A survey would identify whether this is the case.	• A survey would help identify any longitudinal profile issues for the A435 in and on the approaches to Studley.	• Does not do anything to address the number of HGVs			
Noise	**Quieter Road Surface along the key sensitive section (through Studley)**	Consider using low noise surfacing to reduce impacts.	• Could potentially reduce noise of HGVs	• Does not do anything to address the number of HGVs • Surface may have a shorter design life and/or may require more maintenance. • Cost			
Air Quality	**Clean Air Zones (ECO Stars)**	ECO Stars is a voluntary scheme that provides recognition, guidance and advice on operational best practice to operators of goods vehicles, buses, coaches and commercial vehicle fleets. Companies pay for advice and seek to recoup the costs through operational savings. It is being delivered by transport consultants TRL, on behalf of the authorities. Local haulage companies could be encouraged to sign up.	• Encourages efficient and cleaner HGV operations. • Could have a beneficial impact on air quality. • Could link in well with the Studley AQMA.	• Requires buy-in from stakeholders. • May not address other issues such as the overall volume of HGVs and noise.			
Air Quality	**Clean Air Zone or equivalent**	Introduction of a Clean Air Zone around Studley to	• Framework in place for introducing these	• Survey data shows most HGVs have a local			

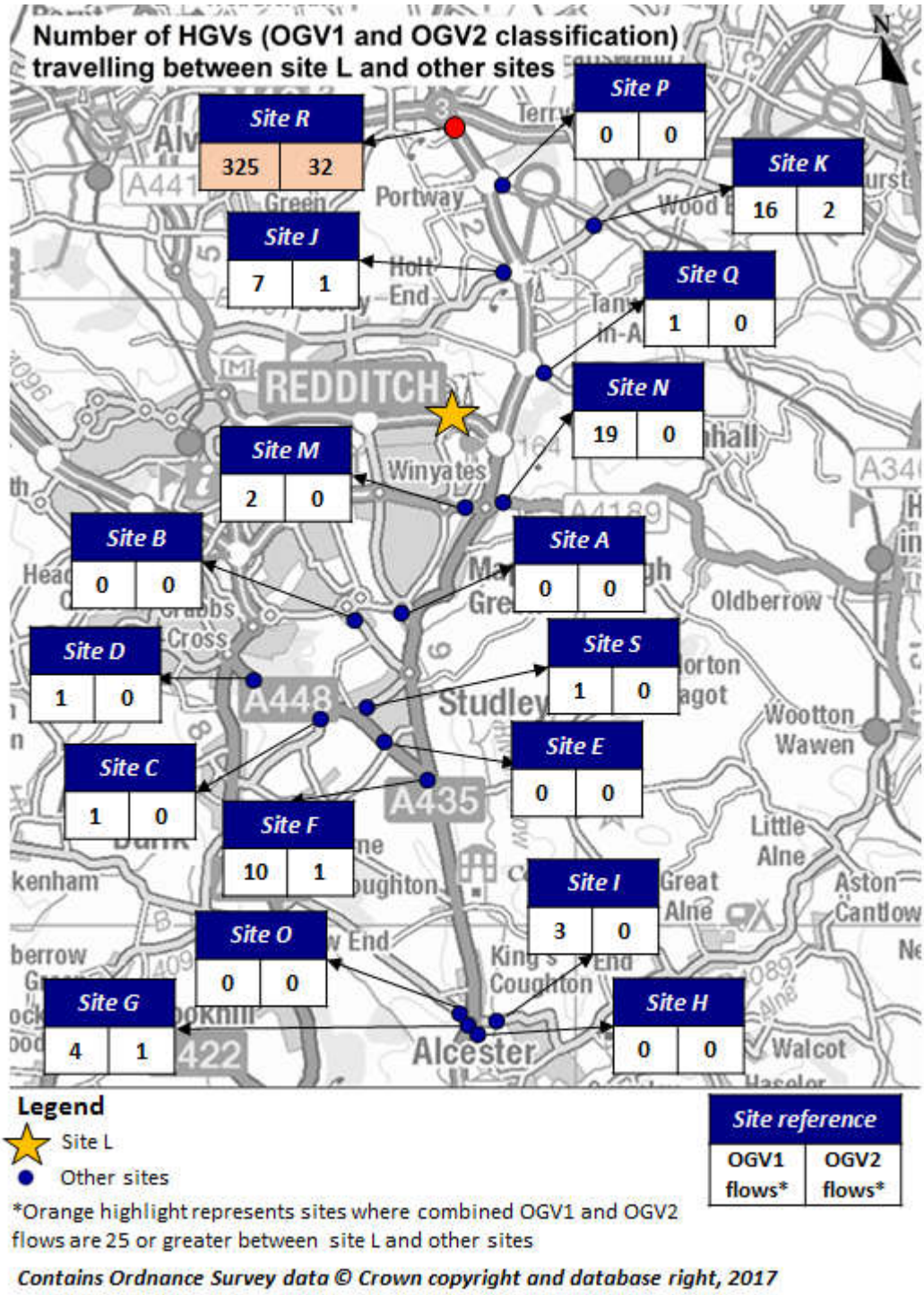
		improve air quality. They fall into two categories – non-charging and charging.	• Cleaner air quality and may help meet AQMA targets.	purpose and as such require access to Redditch and Studley. • Likely to be resisted by commercial freight operators if charging is introduced.			
Air Quality	**Low Emission Zone**	Making Studley a designated Low Emission Zone (LEZ) – charging haulage companies a fee based on number of trips made within the area / type of vehicle etc.	• May discourage HGVs to travel along the A435 and through Studley • Cleaner air quality and may help meet AQMA targets	• Would be very difficult and costly to introduce • Would require extensive consultation and support from a number of organisations (e.g. neighbouring local authorities and Highways England). • Likely to be resisted by commercial freight operators. • Could potentially displace problem onto unsuitable routes or in neighbouring authority areas. • Technology required to enforce the LEZ together with back-office support			
Volume of HGVs	**Working Group with Highways England and Warwickshire Police**	Set up a working group with Highways England, Worcestershire County Council and Warwickshire Police to have a plan in place to deal with incidents and planned road closures on the Strategic Road Network	• Ensures a plan is in place which seeks to minimise HGV impacts on the A435 in Studley when incidents and planned road closures occur • Good working relationship with Highways England, Worcestershire County Council and Warwickshire Police	• Does not reduce HGV volumes on typical days. • Requires cooperation and buy-in from all key stakeholders.			
Volume of HGVs	**Stakeholder Consultation**	Consultation with key-bodies to include Road Haulage Association, CILT, haulage companies as per 'Haulage study' below. Working with them to understand why routes are taken and possible methods of mitigating the impact. Could also work with CILT to show suitable / non-suitable links for HGV via mapping	• Understand what trips are being made, when, and why routes are taken • Would ensure that haulage companies have a say in how they can reduce their impact • Lower cost than some options	• Hauliers may be reluctant to engage – will be looking for the cheapest routes, may not be interested in the issues			
Volume of HGVs	**Motorway Signage**	VMS prior to M42 Jct 3 for westbound traffic and on the M5 prior to Jcts 9 and 7 for northbound traffic	• May be effective in encouraging HGVs on the M42 or M5 to continue to use the M42/M5 rather than taking a 'short-cut'	• Unlikely to be effective as HGV survey data shows limited number of strategic through trips.			
Volume of HGVs	**Advisory Signage**	Marking routes as 'not suitable for HGVs' or having HGV directional signs	• Directional signs may encourage HGVs to use the most appropriate route available • It still allows HGVs to use a particular road if they need to gain access	• Would require an understanding of whether there are suitable alternative routes for HGVs. • As these are advisory signs, they may be ignored and thus have limited effect. • May push impacts on to other unsuitable routes. • Would need to be supported by Highways England and Worcestershire County Council.			
Volume of HGVs	**Mandatory Signage**	Amenity weight restriction of 7.5T on the A435	• Can be effective at diverting HGVs which do not require access to local businesses	• Unlikely to be effective as survey data shows most HGVs require access to local businesses and would therefore be exempt from a weight restriction.			
Volume of HGVs	**Haulage study**	Identification of haulage companies that are using the routes. Working with them to understand where they are going, and look at possible re-timing of routes / re-routing	• Re-timing routes could spread out the flow of traffic and avoid more sensitive times of the day, which may make impacts less noticeable. • Re-routing could lead to lower HGV flows on the A435 by diverting to alternative routes • Identifying haulage companies will create an understanding as to which companies should be consulted with.	• Re-routing may create issues on alternative routes and may not therefore be supported by neighbouring local authorities/Highways England. • Haulage companies may be unwilling to change routes / timings. • Requires dedicated staff and time resources for potentially limited benefit.			
Volume of HGVs	**A46 Strategic Enhancement, M5 Junction 9 (Ashchurch) to M6 Junction 2 (Coventry)**	Future enhancement of the A46 will make this a suitable alternative route for through trips travelling NE to SW and vice versa. A strategic study is due to be progressed shortly on behalf of Midlands Connect to consider long term	• Would reduce HGV through trips along the A435 • Would provide a suitable alternative for the M5 and M42 motorways when there are incidents or closures due to roadworks	• Requires future investment and timescales for implementation will be long-term			

		investment priorities for the wider A46 corridor.					
Volume of HGVs	**Freight Consolidation Centre**	Creating a freight consolidation centre on the edge of Redditch	• Reduce the number of HGVs travelling into Redditch and Studley	• Too large a solution for this particular issue • Costly and difficult to introduce • May not decrease the number of through trips			
Volume of HGVs	**A435 Bypass**	Bypass option to provide traffic relief on the A435 through Mappleborough Green, Studley, Coughton and Kings Coughton	• Improved air quality • Less traffic noise and vibration • Improved local amenity/quality of life for local residents • Reduced traffic flows and community severance	• Formerly proposed scheme withdrawn from Government's roads programme in the 1990s. • Significant cost of construction and land acquisition. • Environmental impacts may be difficult to mitigate. • Funding for large local major road schemes requires a strong business case demonstrating wider economic benefits (proposals would need to unlock significant housing and employment growth). • A funding bid would be assessed against other competing schemes both locally and nationally. • Would require significant financial resources and dedicated officer support to identify a preferred scheme and develop a business case.			
Volume of HGVs	**Local Traffic Management Study**	Investigation of local traffic management options to reduce HGV impacts in local communities on the A435 corridor.	• Options for investigation to be developed in partnership with stakeholder group and the wider public.	• Study funding required to develop and assess feasibility of options. • Requires buy-in from stakeholders.			
Volume of HGVs	**HGV Routing Agreements**	Agreements made with HGV companies which would seek to minimise the impact of HGVs in local communities on the A435 corridor.	• Would be secured as part of new development proposals through the planning process	• Requires agreement with Highways England and Worcestershire County Council if it is likely to have implications for roads under their jurisdiction.			

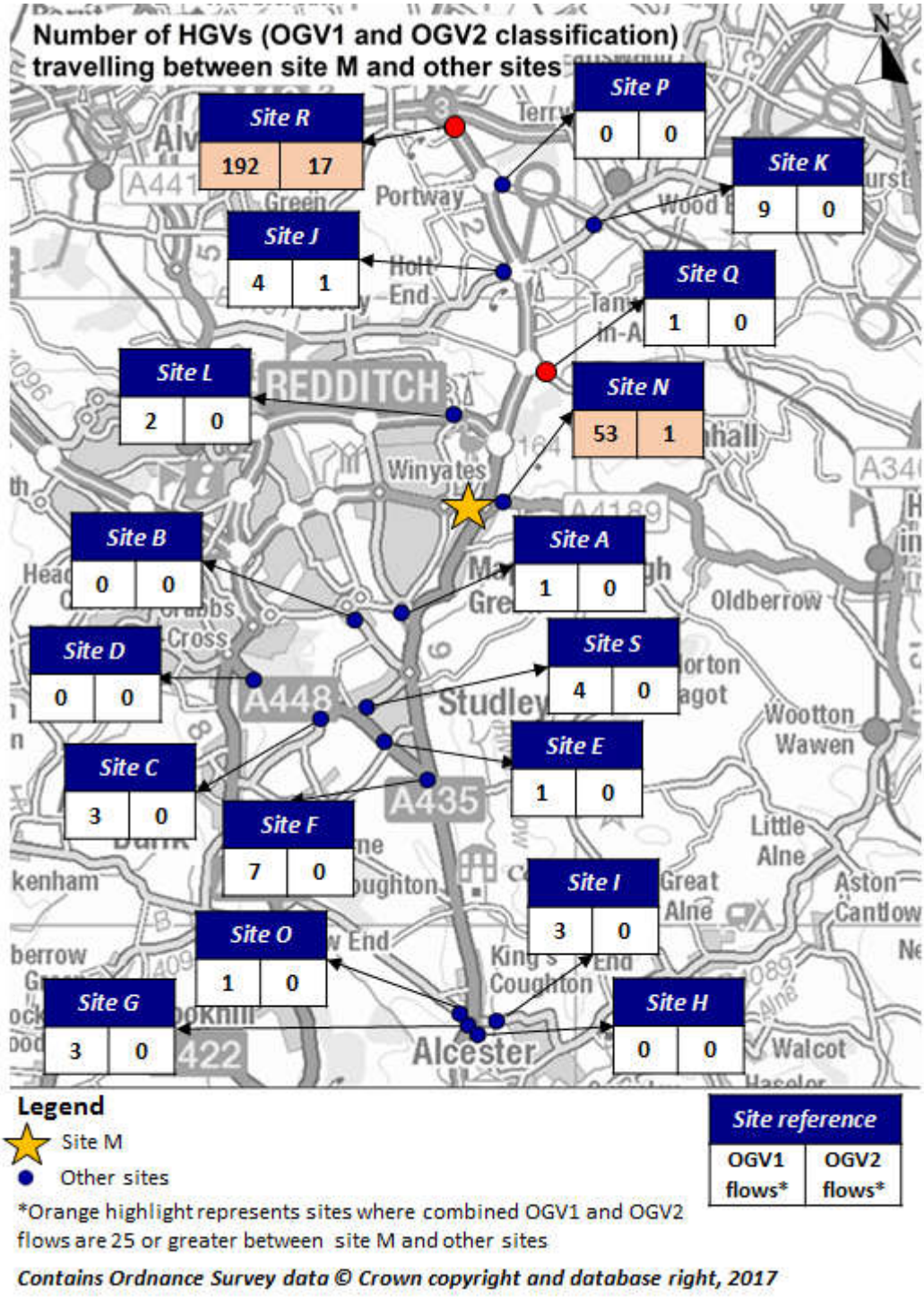
Appendices

Appendix A. Busiest Sites

A.1. Site L



A.2. Site M

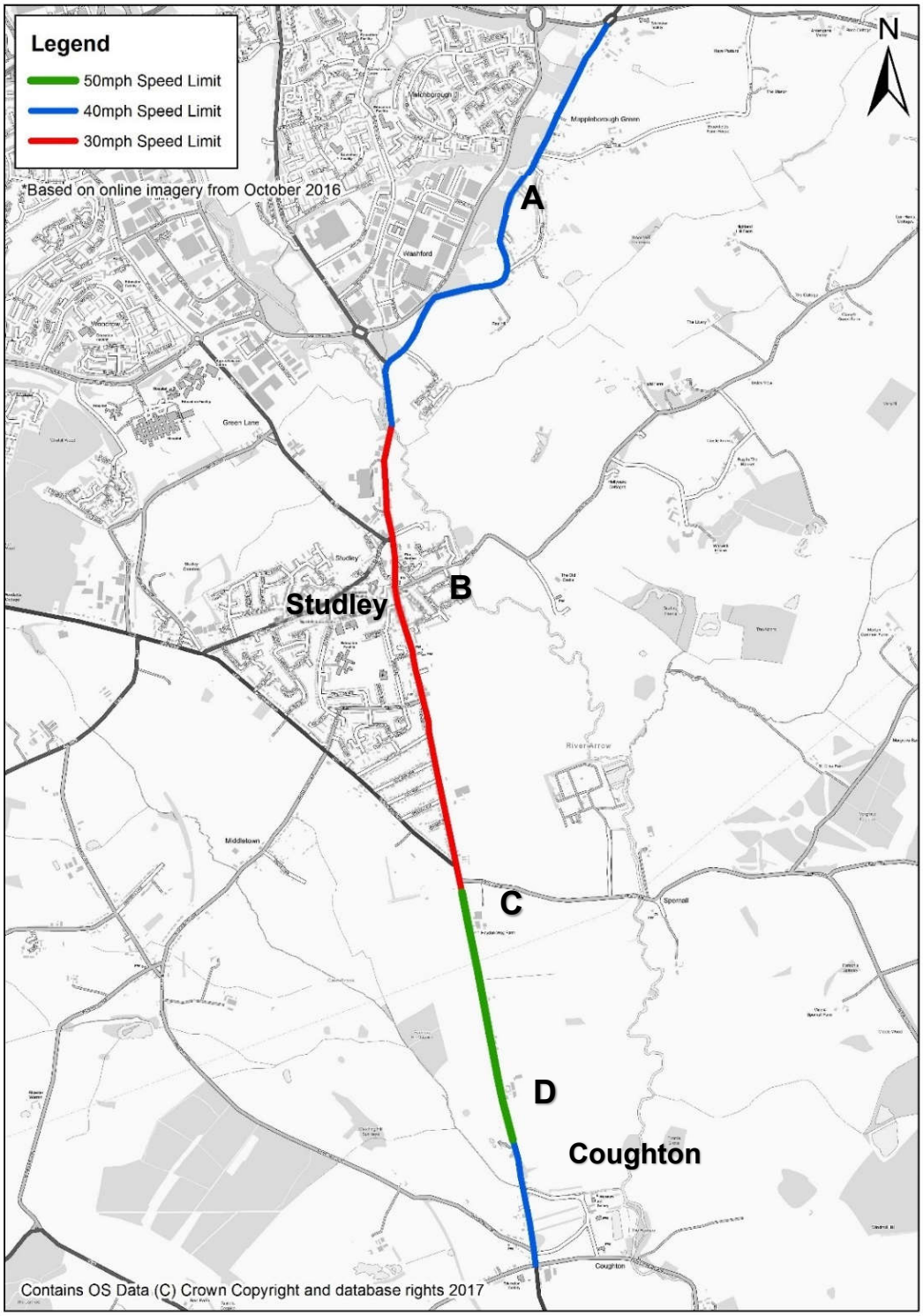

Number of HGVs (OGV1 and OGV2 classification) travelling between site M and other sites
Site R
192
17
Site P
0
0
Site K
9
0
Site J
4
1
Site Q
1
0
Site L
2
0
Site N
53
1
Site B
0
0
Site A
1
0
Site D
0
0
Site S
4
0
Site E
1
0
Site C
3
0
Site F
7
0
Site I
3
0
Site O
1
0
Site G
3
0
Site H
0
0
REDDITCH
Winyates
Studley
Alcester
Oldberrow
Wootton Wawen
Portway
Holt End
A448
A435
A422
Legend
Site M
Other sites
*Orange highlight represents sites where combined OGV1 and OGV2 flows are 25 or greater between site M and other sites
Site reference
OGV1 flows*
OGV2 flows*
Contains Ordnance Survey data © Crown copyright and database right, 2017

Appendix B. Option Feasibility

B.1. 30mph Speed Limit Feasibility

Atkins has investigated the feasibility of introducing a 30mph speed limit on the A435 from Coughton, south of Studley, through to the Dog Island at Mappleborough Green.

The existing speed limits along the A435 study corridor vary from 30mph through Studley, and 40mph north of Studley to the Dog Island. South of Studley, the speed increases to 50mph before decreasing to 40mph on approach to Coughton. The image below summarises the existing speed limits along the study corridor.



The characteristics of the A435 through the study area is predominantly semi-rural in nature with wide verges and limited footway provision, although through Studley, there are footways on both sides of the carriageway and numerous property accesses.

The following table provides an overview of the existing characteristics of the sections of the A435 identified in the speed limit plan.

A435 Section Characteristics and Speed Limits

Route Section	Existing Speed Limit	Characteristics
A	**40mph**	In the vicinity of the Dog Island at Mappleborough Green, the A435 is sided by residential and commercial accesses with footways on both sides. However, further south there are fewer residential accesses and a footway is only provided on the east side of the carriageway. The majority of this section has no street lighting. It has a number of bends, but is of high quality and good width.
B	**30mph**	Section B is urban in nature. It has footways on both sides of the carriageway, it is sided by residential and commercial properties with a number of access junctions. It has street lighting and experiences reasonably high levels of pedestrian movements.
C	**50mph**	Section C, south of Studley, becomes rural in nature. It is sided by agricultural land and hedgerows. A narrow footpath is only provided on the east side of the carriageway. This section has straight alignment, and there is no street lighting
D	**40mph**	On the approach to Coughton, the speed limit reduces to 40mph. The number of accesses junctions increases, and there are a number of residential properties fronting the road. Footways are provided on both sides of the carriageway.

Department for Transport (DfT) guidance on setting speed limits[9] emphasises the importance of speed limits being appropriate to promote compliance and aid enforcement.

"A principal aim in determining appropriate speed limits should, therefore, be to provide a consistent message between speed limit and what the road looks like, and for changes in speed limit to be reflective of changes in the road layout and characteristics."

The tables overleaf present a summary of the DfT guidance in relation to the setting of speed limits in urban areas and for single carriageway roads with a predominant traffic flow function.

[9] DfT (2013), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/63975/circular-01-2013.pdf

Speed Limits in Urban Areas - Summary (DfT Circular, 2013)

Speed Limit (mph)	Where limit should apply
20	In streets that are primarily residential and in other town or city streets where pedestrian and cyclist movements are high, such as around schools, shops, markets, playgrounds and other areas, where vehicle movement is not the primary function.
30	In other built-up areas (where vehicle movement is deemed more important), with development on both sides of the road.
40	On higher quality suburban roads or those on the outskirts of urban areas where there is little development, with few cyclists, pedestrians or equestrians. On roads with good width and layout, parking and waiting restrictions in operation, and buildings set back from the road. On roads that, wherever possible, cater for the needs of non-motorised users through segregation of road space, and have adequate footways and crossing places.
50	On dual carriageway ring or radial routes or bypasses that have become partially built up, with little or no roadside development.

Speed limits for single carriageway roads with a predominant traffic flow function Summary (DfT Circular, 2013)

Speed Limit (mph)	Where limit should apply
60	Recommended for most high quality strategic A and B roads with few bends, junctions or accesses.
50	Should be considered for lower quality A and B roads that may have a relatively high number of bends, junctions or accesses. Can also be considered where mean speeds are below 50 mph, so lower limit does not interfere with traffic flow.
40	Should be considered where there are many bends, junctions or accesses, substantial development, a strong environmental or landscape reason, or where there are considerable numbers of vulnerable road users

B.2. Summary

Following a review of the existing speed limits and characteristics of the A435, it is concluded that the existing speed limits are in-line with the DfT guidance on setting appropriate speed limits. Reducing the speed limit to 30mph on sections that are currently 40mph is not considered to be consistent with the road layout.

The northern part of Section A is the is the most feasible section to apply a 30mph speed limit due to the number of residential and commercial property access junctions and the presents of footways on both sides of the carriageway.

However, the predominant function of the road, outside of Studley, is for vehicle movements, with little pedestrian provision and the geometries of the road are not conducive to lower speeds. 30mph speed limits would be inconsistent and may be difficult to enforce.

If further consideration of reducing speed limits is sought, a more detailed assessment of Personal Injury Accident (PIA) data, and existing speed data would be required, to feed into the DfT Speed Limit Appraisal Tool[10].

[10] DfT (2013) Speed Limit Appraisal Tool User Guidance, https://www.gov.uk/government/publications/speed-limit-appraisal-tool

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