Task 108 - Heavy Goods Vehicle Survey

Professional Framework Services - Transport Planning & Impact Monitoring (PSF - 91311)
Traffic & Travel Research

Transport for London

Project number: PSF - 91311 (60569595)

11 May 2018
Quality information

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Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Revision date</th>
<th>Name</th>
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<tr>
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1. Executive Summary

1.1 Introduction

The primary objective of this project is to more accurately assign the London population of Heavy Goods Vehicles (HGVs) over 12 tonnes gross vehicle weight operating in London by make and model against the proposed Direct Vision Standard (DVS). This study is intended to build on the initial findings from the Transport Research Laboratory (TRL) regarding the cab height profile of HGVs by undertaking 10 roadside HGV surveys. Findings and results from this project will help to provide clarity around the implications of mandating Direct Vision.

1.2 Methodology

As part of this study, a manual vehicle count survey was carried out at 10 sites within Greater London. Data was collected across a range of different locations, ensuring a good geographical spread of sites in both inner and outer London. The varied mix of locations specifically focused on areas that included; high concentrations of N3 HGVs; high concentrations of vulnerable road users (VRUs); and close proximity to construction sites or retail depots. The survey work recorded the vehicle and operation specific information below:

- Vehicle age
- Company name
- Vehicle make
- Vehicle model
- Cab height
- Industry type
- Floor level side window (Y/N)
- FORS sticker displayed (Y/N)
- Time of day

A comprehensive guide to vehicle makes and models by cab height was developed to train and assist surveying teams with categorising cab families by high, medium, low and extra low height.

1.3 Key Findings

The key findings derived from the data collection process are summarised below:

- Vehicle profile by make and model

The site surveys have enabled a vehicle ‘make and model’ profile to be compiled. This data established that DAF, Mercedes, Scania and Volvo were the top four observed manufacturers. This is entirely consistent with the top four makes of new HGVs being registered in the UK in 2016 and 2017. A review of vehicle models data from the surveys established that there are standard configurations widely available and operating in London. These include the DAF CF, DAF LF, Scania P Series, Volvo FM and Mercedes AROCS and ACTROS. Extra low entry cab models such as Dennis Eagle ELITE were also captured and counted for 7 per cent of all models recorded.
- **Vehicle profile by cab family**

AECOM’s freight expertise ensured that all vehicles recorded throughout the survey were assessed in regards to the cab height.

Survey work highlighted that there were different ranges of cab height within the same vehicle model. This is mainly due to the difference in combinations of suspension, engine size, cab type and axle configurations. Data from the 10 surveyed sites indicates that ‘medium’ cab heights at 42 per cent are the most commonly observed height.

- **London wide population estimate by cab family**

TfL provided an extract of processed ANPR records for London between the time periods of January to December 2016. All cameras were included within the database to ensure a representative sample. The data received included weight, body class, wheel plan, year of manufacture, make, model and count of unique individual vehicles.

In total the ANPR cameras recorded 222,278 unique individual N3 vehicles throughout 2016. This, in collaboration with the roadside survey work, gave AECOM an accurate basis to build up a London wide population by cab family.

<table>
<thead>
<tr>
<th>Cab Height</th>
<th>Count of Cab Height from roadside survey</th>
<th>Cab Height by Proportion</th>
<th>London Wide Population from ANPR</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>1867</td>
<td>28%</td>
<td>62,992</td>
</tr>
<tr>
<td>Medium</td>
<td>2770</td>
<td>42%</td>
<td>93,459</td>
</tr>
<tr>
<td>Low</td>
<td>1363</td>
<td>21%</td>
<td>45,987</td>
</tr>
<tr>
<td>Extra Low</td>
<td>432</td>
<td>7%</td>
<td>14,576</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>6432</strong></td>
<td><strong>100%</strong></td>
<td><strong>222,278</strong></td>
</tr>
</tbody>
</table>

- **London wide population by DVS category**

The study estimates that 0-star vehicles represent 29 per cent of the London N3 vehicles population. These would be prevented from entering London from 2020 unless they prove a ‘safe system’ through mitigation measures. This is subject to further consultation but is likely to consist of the requirements under the FORS Silver accreditation (e.g. camera and sensor monitoring systems). Vehicles with a 1-2 star rating represent 43 per cent and will be prevented from entering London from 2024 unless they prove they have a ‘progressive safe system’.

<table>
<thead>
<tr>
<th>DVS star rating by cab family against London wide population</th>
<th>0 Star</th>
<th>1 - 2 Star</th>
<th>3+ Star</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportional split</td>
<td>29%</td>
<td>43%</td>
<td>28%</td>
</tr>
<tr>
<td>London wide population</td>
<td>64,747</td>
<td>95,214</td>
<td>62,317</td>
</tr>
</tbody>
</table>

### 1.4 Observations

A number of observations that are deemed important to be reported were recorded by the survey teams:

- The majority of the floor level windows tended to feature on waste and building related vehicles.
- Surveyors tended to see more medium height vehicles with floor level windows compared with the high ones, which arguably are more in need of the window due to their poor visibility against VRUs. This observation was confirmed by the data recorded.
- Surveyors saw quite a few low level windows with bags obscuring the window. One lorry had vinyl wrapped livery over the window.
- Renault’s model identification was difficult to determine due to it being etched onto a metal plate. Other vehicle features had to be used.
- DAF LF was the most likely model to vary in height depending on the specification of the operator.
The figure below provides a summary of AECOM’s bespoke roadside survey results. The technique used has proven to be effective in capturing vehicles makes and models, and addressing some of the gaps in traditional vehicles counts done by Local Authorities or private companies.

Survey results at a glance

- **Capture rate** - 100 per cent vehicle makes
- **Capture rate** - 95 per cent vehicle model
- **Capture rate** - 92 per cent Euro Engine type
- **8 per cent floor level windows installed**
- **10 per cent vehicles univeried**
- **28 per cent of vehicle in the low/extra low cab family**
- **Most common make** - DAF
- **Most common model** - DAF CF
- **Capture rate** - 89 per cent industry type
- **6,588 vehicles recorded**
- **28 per cent of vehicles scored 3 stars or more according to the DVS scoring**
- **10 per cent vehicles univeried**
- **8 per cent floor level windows installed**

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*Prepared for: Transport for London*
2. Introduction

2.1 Background

London is a growing city experiencing an increase in freight traffic which is required to serve its growing economy. This increase raises concerns about safety as Heavy Goods Vehicles (HGVs) were involved in 70 per cent of cyclist and 20 per cent of pedestrian fatalities in the last three years while only making up 4 per cent of road kms. The recent growth in the number of cyclists and the continuing emphasis on the potential benefits from this activity is resulting in a higher exposure to risk of this group. Lack of vision due to vehicles blind spot and failure to look properly are commonly cited causes of HGVs incidents. In the case of HGVs specifically, drivers have a limited direct visual field due to the design and location of the cab in relation to the road and the rest of the vehicle. One of the significant characteristics of these larger vehicles is the higher driving position.

As part of the Mayor’s Transport Strategy commitments to a Vision Zero approach with the aim of eradicating all deaths and serious injuries from road collisions in London by 2041, Transport for London (TfL) has developed the world’s first and only HGV Direct Vision Standard (DVS) – an objective measurement of the ‘volume of space’ weighted by risk to other road users.

This project has been set up to investigate a more accurate view of the number of vehicles that may be affected by the introduction of the DVS in London. This will help to quantify the benefits and costs of the scheme but also determines the scale of effort required to implement it.

2.2 The Direct Vision Standard

The DVS, launched in 2016, is an important part of a proposed HGV Safety Permit Scheme which would require all HGVs over 12 tonnes to hold a safety permit to operate in Greater London from 2020. DVS is a 5-star rated system aimed at rating HGVs by how much the driver can see directly from the cab, rather than relying on indirect visual aids such as cameras and mirrors. The rating ranges from no stars for vehicles with the least direct vision, three stars for vehicles with good levels of direct vision and five stars for the most levels of direct vision. This aims to ensure that HGV design focuses on increasing the direct vision between the driver and the VRUs. The DVS will only impact those HGVs having a maximum mass exceeding 12 tonnes, formally classified as N3 which includes mobile plant machinery (e.g. volumetric concrete mixers). Zero star rated vehicles will be banned from entering Greater London and therefore will not be granted a HGV Safety Standard Permit (HSSP), unless they prove to operate a ‘safe system’. All HGVs entering London will be required to withhold a HSSP from 2024. DVS will be used to proportion vehicles by how much the driver can see in the area of greatest risk to VRUs.

2.3 Aim of the project

The aim of this TfL commissioned project is to more accurately assign the London population of HGVs operating in London by make and model against the DVS. This study is intended to build on the initial findings from the Transport Research Laboratory (TRL) regarding the cab height profile of HGVs by undertaking 10 roadside HGV surveys. Findings and results from this project will help to provide clarity around the implications of mandating Direct Vision.

The methodology and approach used in this project to achieve the objectives is presented in Chapter 3.

1 Transport for London – Direct Vision Standard for HGVs
2 Transport for London – DVS – Frequently asked questions
3. **Methodology**

The overall project methodology from initiation to data analysis and reporting is presented in Figure 3. As part of the initiation process, it was important to engage with TfL in order to design the survey work and data analysis elements.

![Methodology flowchart](image)

**Figure 3 – Methodology flowchart**

### 3.1 Approach to survey design and collection

AECOM's freight team has developed a new and bespoke type of traffic count that addresses some of the gaps in traditional vehicle counts. The technique, called Specialised Goods Vehicle Counts (SGVC) identifies a wide range of factors relating to the flow of commercial vehicles. It has been used mainly for Heavy Goods Vehicles but has been adapted to collect information on buses and vans. It has required us to identify, count and classify HGVs by size, wheel configuration, body type, haulier name and vehicles which reoccur across the day.

SGVC enables an understanding of the nature of freight along a specific route or within a particular cordon. For this project, the technique has been adapted and applied to collect most types of data including vehicle model, make and cab family. The technique consisted of a Roadside Survey with properly trained staff who have knowledge of freight vehicles and movements and have passed a classroom test on vehicle identification. A comprehensive guide to vehicle makes and models, by cab height was developed to train and assist staff with categorising cab families by high, medium, low and extra low. A snapshot of this can be seen in Appendix A.

The survey work recorded the vehicle and operation specific information below:

- Vehicle age
- Company name
- Vehicle make
- Vehicle model
- Cab height
- Industry type
- Floor level side window (Y/N)
- FORS sticker displayed (Y/N)
- Time of day

### 3.2 Site selection

The survey work covered 10 different locations, ensuring a good geographical spread of sites in both inner and outer London (Figure 4). The varied mix of locations specifically focused on areas that included high concentrations of N3 HGVs, high concentrations of VRU's and in close proximity to construction sites or retail depots. This is to provide a truer representation of vehicle types servicing London. The site categories were:
Arterial route (4)
Waste / recycling facilities (2)
Major building sites (2)
Retail park / distribution centre (2)

### HGV Survey

Figure 4 – Survey site locations ensure a good geographical spread across Greater London

Full health and safety assessments were carried out prior to visiting the sites to ensure the safety of the road side surveying teams. The locations and rationale of the survey sites is detailed in Table 1.

<table>
<thead>
<tr>
<th>Site ID</th>
<th>Site category</th>
<th>Name</th>
<th>Address</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Retail park / distribution centre</td>
<td>Rainsford Road</td>
<td>Rainsford Road, London, NW10 7RX</td>
<td>This site was located on a roundabout based near the distribution centres for various companies such as John Lewis and Ocado. In addition, Gowing and Pursey had a large waste management facility nearby.</td>
</tr>
<tr>
<td>2</td>
<td>Waste / recycling facilities</td>
<td>Transport Avenue</td>
<td>Transport Avenue, Brentford, TW8 9ES</td>
<td>This site was located in close proximity rail freight terminal and a number of waste and construction orientated sites including Day Aggregates, London Concrete and EMR. As a result surveyors recorded a steady flow of vehicles, consisting of a wide range of vehicle makes and models.</td>
</tr>
<tr>
<td>3</td>
<td>Major building site</td>
<td>Battersea Park Road</td>
<td>A3205, London, SW8 4DS</td>
<td>This location was based in the vicinity of several construction sites just south of the River Thames, however both surveyors were based outside one of the entrance to the Battersea power station construction site, one of the biggest sites, in terms of cost, currently taking place across London.</td>
</tr>
<tr>
<td>4</td>
<td>Arterial route</td>
<td>A316</td>
<td>A316, Richmond, TW9 2LL</td>
<td>This site was chosen as a key arterial route into London. Vehicles accessing London from the South West from Southampton typically use the M3 which turns into the A316 at Sunbury on Thames. Surveyors were based in</td>
</tr>
</tbody>
</table>
5 Major building site A1010 A1010, London, N17 8AH This site was chosen due to it being located close to the redevelopment of Tottenham Hotspur’s football stadium as well as other smaller construction sites.

6 Retail park / distribution centre Twelvetrees Crescent/ A12 Twelvetrees Crescent, London, E3 3QW/ A12, London, E3 3NA The road side survey was conducted on Twelvetrees Crescent at the entrance to the Lea Riverside industrial estate. A number of distribution centres are located on the estate, ranging from food retailers to medical supplies companies. There is also a large recycling plant operated by Bywaters.

7 Arterial route New Cross Gate A2, London, SE14 5UL This location was selected due to it being a key arterial route leading from Dover to inner London.

8 Waste / recycling facilities A1206 A1206, London, E14 9QZ This location was selected as it was in close proximity to waste and recycling plants. Tower Hamlets Re-use & Recycling Centre and Northumberland Wharf Waste Transfer Station are located next to the A1206. Furthermore there are retail shops located nearby as well as a major construction site. This ensured a varied mix of vehicles by industry type.

9 Arterial route Purley Way Purley Way, Croydon, CR0 4XL This point was selected due to it being based near a variety of retail stores and supermarkets as well as being based near a Royal Mail distribution centre and Croydon councils waste collection site.

10 Arterial route Euston Road Euston Road, London, NW1 2SA This location was chosen due to strategic importance with regards to traffic movement across the central areas of London. With a wealth of retail and office buildings in close proximity, this leads to high volume of both HGV and vulnerable road user traffic.

AECOM mobilised its surveying teams to carry out 10 road side surveys at the agreed locations, over a period of 5 working days. Three people were present at each site and the count took place between 07:00 and 19:00. Two surveyors counted at any one time over a two hour period allowing the rotation of staff in order to take a break.

To maximise the safety of those involved, a risk assessment was used to identify and evaluate the risks created by human activities during the roadside surveys and pinpoint ways to control them. A specific project risk assessment form was developed for the roadside surveys and all surveyors were required to read and sign to indicate that they adhered to the Health and Safety requirements. In addition to this all project member involved in the survey were provided with the necessary training on how to minimise risk conducting the surveys.
4. Vehicle count profile by make and cab family

The data gathered as part of the twelve hour period has been consolidated, cleaned and analysed to provide an insight into assigning N3 HGVs moving in London by make and model. In total, the data covers 6,588 vehicles across the 10 sites. This total number represents multiple sightings of the same vehicle – for example a truck making a return journey or delivering a second load and is thus not the number of unique vehicles. The trip data therefore represents the level of activity observed by vehicle make and model.

The data analysis process took all available information that related to the 10 sites and the data has been assimilated under a number of headings. In this chapter we show results in mainly graphic form with a short summary of key points.

Graphical data from each site category is provided in Appendix B.

4.1 Vehicle profile by Make and Model

The site surveys have enabled a vehicle “make and model” profile to be compiled. This data established that DAF, Mercedes, Scania and Volvo were the top four observed manufacturers. This is entirely consistent with the top four makes of new HGVs being registered in the UK in 2016 and 2017. A review of vehicle models data from the surveys established that there are standard configurations widely available and operating in London. These include the DAF CF, DAF LF, Scania P Series, Volvo FM and Mercedes AROCS and ACTROS. Extra low entry cab models such as Dennis Eagle ELITE were also captured and counted for 7 per cent of all models recorded.

![N3 HGV Traffic by Make](Image)

Figure 5 – N3 HGVs by make
4.2 Vehicle profile by Cab Family

TfL have provided AECOM with a suggested cab family categorisation based on make and model. Survey work highlighted that there were different ranges of cab height within the same vehicle model. This is mainly due to the difference in combinations of suspension, engine size, cab type and axles configurations. Table 2 presents the predefined cab heights by make and model. It should be noted that this has only been validated against Euro VI engine models. However, broadly speaking the heights are...
unlikely to change dramatically given the development speed of chassis and cabs across the industry. Figure 8 indicates that ‘medium’ cab heights at 42 per cent are the most commonly observed height.

### Table 2 – Cab heights by make and model

<table>
<thead>
<tr>
<th>Make</th>
<th>Cab family</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAF</td>
<td>High, Medium, Low</td>
</tr>
<tr>
<td>Dennis-Eagle</td>
<td>Low</td>
</tr>
<tr>
<td>HINO</td>
<td>High, Medium, Low, Extra Low</td>
</tr>
<tr>
<td>Iveco</td>
<td>High, Medium, Low, Extra Low</td>
</tr>
<tr>
<td>MAN</td>
<td>High, Medium, Low</td>
</tr>
<tr>
<td>Mercedes Benz</td>
<td>High, Medium, Low, Extra Low</td>
</tr>
<tr>
<td>Renault</td>
<td>High, Medium, Low</td>
</tr>
<tr>
<td>Scania</td>
<td>High, Medium, Low, Extra Low</td>
</tr>
<tr>
<td>Volvo</td>
<td>High, Medium, Low</td>
</tr>
</tbody>
</table>

### Figure 8 – N3 HGVs by cab family

4.3 Door window fitment

Direct vision door windows are made so that the HGV driver has much more visibility down low on the left hand side of the vehicle where VRUs often appear. Door windows were recorded on a number of makes such as Scania, DAF, Volvo and Mercedes Benz. Table 3 presents the proportion of industries which featured a floor level window. As expected the building and waste industry are the most likely industries to feature this addition on vehicles to aid with direct vision. Of those that had a floor window fitted 78 per cent featured a FORS ID sticker on the vehicle.
Table 3 – Door window fitment by industry type

<table>
<thead>
<tr>
<th>Industry Type</th>
<th>Yes Percentage of Total</th>
<th>Yes - Percentage of Total</th>
<th>No Percentage of Total</th>
<th>No Total</th>
<th>Total Percentage with a window</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>-</td>
<td>0.0%</td>
<td>14</td>
<td>0.2%</td>
<td>14</td>
</tr>
<tr>
<td>Building</td>
<td>343</td>
<td>64.4%</td>
<td>1,942</td>
<td>32.1%</td>
<td>2,285</td>
</tr>
<tr>
<td>Chemical</td>
<td>-</td>
<td>0.0%</td>
<td>12</td>
<td>0.2%</td>
<td>12</td>
</tr>
<tr>
<td>Container</td>
<td>-</td>
<td>0.0%</td>
<td>56</td>
<td>0.9%</td>
<td>56</td>
</tr>
<tr>
<td>Drink</td>
<td>1</td>
<td>0.2%</td>
<td>40</td>
<td>0.7%</td>
<td>41</td>
</tr>
<tr>
<td>Food</td>
<td>3</td>
<td>0.6%</td>
<td>394</td>
<td>6.5%</td>
<td>397</td>
</tr>
<tr>
<td>Fuel</td>
<td>-</td>
<td>0.0%</td>
<td>47</td>
<td>0.8%</td>
<td>47</td>
</tr>
<tr>
<td>General Haulage</td>
<td>23</td>
<td>4.3%</td>
<td>1,183</td>
<td>19.5%</td>
<td>1,206</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>-</td>
<td>0.0%</td>
<td>30</td>
<td>0.5%</td>
<td>30</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>0.4%</td>
<td>232</td>
<td>3.8%</td>
<td>234</td>
</tr>
<tr>
<td>Parcels</td>
<td>1</td>
<td>0.2%</td>
<td>161</td>
<td>2.7%</td>
<td>162</td>
</tr>
<tr>
<td>Retail</td>
<td>3</td>
<td>0.6%</td>
<td>118</td>
<td>1.9%</td>
<td>121</td>
</tr>
<tr>
<td>Scrap Metal</td>
<td>-</td>
<td>0.0%</td>
<td>18</td>
<td>0.3%</td>
<td>18</td>
</tr>
<tr>
<td>Steel</td>
<td>2</td>
<td>0.4%</td>
<td>3</td>
<td>0.0%</td>
<td>5</td>
</tr>
<tr>
<td>Timber</td>
<td>-</td>
<td>0.0%</td>
<td>7</td>
<td>0.1%</td>
<td>7</td>
</tr>
<tr>
<td>Unidentified</td>
<td>19</td>
<td>3.6%</td>
<td>679</td>
<td>11.2%</td>
<td>698</td>
</tr>
<tr>
<td>Utilities</td>
<td>5</td>
<td>0.9%</td>
<td>16</td>
<td>0.3%</td>
<td>21</td>
</tr>
<tr>
<td>Vehicle</td>
<td>2</td>
<td>0.4%</td>
<td>73</td>
<td>1.2%</td>
<td>75</td>
</tr>
<tr>
<td>Waste</td>
<td>129</td>
<td>24.2%</td>
<td>1,030</td>
<td>17.0%</td>
<td>1,159</td>
</tr>
<tr>
<td>Total</td>
<td>533</td>
<td>100%</td>
<td>6,055</td>
<td>100%</td>
<td>6,588</td>
</tr>
</tbody>
</table>

Figure 9 – Percentage of door window fitment

4.4 Vehicle profile by industry type

A number of the vehicles identified were with no visible livery (10 per cent), with some individual traders operating without branding (and conversely large companies renting unmarked vehicles to cater for high demand or to replace temporarily unavailable vehicles). The top ten identified industry types correspond with industries related to building, general haulage, waste, food
distribution as well as parcels. This composition is reflected in the companies which were identified most frequently by the survey teams, shown in Table 4 below.

Across all sites, building industry vehicles accounted for 35 per cent of the total 6,588 vehicles. This is then followed by general haulage and waste at 18 per cent (Figure 10).

Figure 10 – Vehicle profile by Industry type

Table 4 presents the total number of vehicle sightings by company name. The top 5 include the construction and waste industry. This figure does not include vehicles with no visible livery and unidentified industries.

Table 4 – Most seen companies

<table>
<thead>
<tr>
<th>Rank</th>
<th>Company</th>
<th>Total sightings</th>
<th>Industry type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LONDON CONCRETE LTD</td>
<td>215</td>
<td>Building</td>
</tr>
<tr>
<td>2</td>
<td>BYWATERS</td>
<td>123</td>
<td>Waste</td>
</tr>
<tr>
<td>3</td>
<td>VEOLIA</td>
<td>109</td>
<td>Waste</td>
</tr>
<tr>
<td>4</td>
<td>CEMEX</td>
<td>101</td>
<td>Building</td>
</tr>
<tr>
<td>5</td>
<td>DAY AGGREGATES</td>
<td>89</td>
<td>Building</td>
</tr>
<tr>
<td>6</td>
<td>TARMAC</td>
<td>80</td>
<td>Building</td>
</tr>
<tr>
<td>7</td>
<td>ROYAL MAIL</td>
<td>78</td>
<td>Parcel</td>
</tr>
<tr>
<td>8</td>
<td>GOWING AND PURSEY</td>
<td>75</td>
<td>Waste</td>
</tr>
<tr>
<td>9</td>
<td>HANSON</td>
<td>73</td>
<td>Building</td>
</tr>
<tr>
<td>10</td>
<td>DAFCON</td>
<td>60</td>
<td>Building</td>
</tr>
<tr>
<td>11</td>
<td>TESCO</td>
<td>55</td>
<td>Food</td>
</tr>
<tr>
<td>12</td>
<td>PMC SOIL</td>
<td>43</td>
<td>Building</td>
</tr>
<tr>
<td>13</td>
<td>SAINSBURYS</td>
<td>40</td>
<td>Food</td>
</tr>
<tr>
<td>14</td>
<td>MCGEE GROUP</td>
<td>40</td>
<td>Building</td>
</tr>
<tr>
<td>15</td>
<td>CROYDON COUNCIL</td>
<td>39</td>
<td>Waste</td>
</tr>
<tr>
<td>16</td>
<td>SIVYER</td>
<td>36</td>
<td>Building</td>
</tr>
<tr>
<td>17</td>
<td>MIX IT</td>
<td>35</td>
<td>Building</td>
</tr>
<tr>
<td>18</td>
<td>CONWAY</td>
<td>30</td>
<td>Building</td>
</tr>
<tr>
<td>19</td>
<td>BIFFA</td>
<td>29</td>
<td>Building</td>
</tr>
</tbody>
</table>

This figure does not include vehicles with no visible livery and unidentified industries.
4.5 Euro engine rating

The N3 HGVs recorded at the survey sites were generally modern and of the latest generation of emissions technology being Euro VI. The age of the vehicle has been determined from the registration plate. A small number of vehicles do have personalised number plates and hence their euro engine rating was not determined. The composition is shown in terms of Euro Engine rating, which is determined by the level of CO2, NOx and particulate emissions.

The numbers of pre-Euro III engines were very low. Euro VI engines accounted for over half of the engines identified (57 per cent). Of the total unidentified Euro Engines, 43 per cent were as a result of personalised number plates.
5. London wide population estimate by cab family

5.1 London wide population

In order to accurately ascertain the London wide population of N3 HGVs we need to first understand its definition in relation to the project. For the purposes of this study the London wide population of N3 HGVs means:

- ‘The number of unique individual N3 HGV vehicles operating within the Greater London area’.

Systems such as Automatic Number Plate Recognition (ANPR) are enabled to pick out unique individual vehicles, thus avoiding potential double counting, giving a true representation of the London wide population. Although the road side surveys record repeat sightings of the same vehicle (e.g. a refuse lorry completing a number of round trips to a waste drop off depot), our methodology assumes the same rate of repeated vehicle sighting irrespective of vehicle make and model. Therefore this will not affect the overall proportional split of make and model to be applied to the London wide population.

5.2 Application of cab family to the London wide population

TfL provided an extract of processed ANPR records for London between the time periods of January to December 2016. All cameras were included within the database to ensure a representative sample. The data received included weight, body class, wheel plan, year of manufacture, make, model and count of unique individual vehicles. Upon receiving the data on the 13/04/2018 AECOM completed an initial sense check to ensure anomalies were removed before analytical work commenced.

In total the ANPR cameras recorded 222,278 unique individual N3 vehicles throughout 2016. This, in collaboration with the road side survey work, gives AECOM an accurate basis to build up a London wide population by cab family. Table 5 presents a comparison in the proportion of vehicle makes between the road side survey and the ANPR database. As a result of the methodology used throughout the road side survey process, it has shown that the databases are comparable to each other. This provides the necessary confidence for the proportions to be applied to a London wide population. There is a large discrepancy between the make ‘Other’ due to ANPR data recording a much more varied range of vehicles makes across the entirety of 2016.

Furthermore, AECOM interrogated new registration data from the Society of Motor Manufacturers and Traders (SMMT) to build up an understanding of the national proportion of new registrations HGVs by vehicle make. Whilst the data may not be directly comparable as the age of the vehicle varied throughout the road side survey, it does provide some useful similarities about the current market trend in HGV procurement. It should be noted that vehicles from 6 tonnes and over are included within the SMMT dataset.

Further validation of the data could be made against the number of licenced HGV in Great Britain\(^3\). However, upon review, the data indicates that vans and cars are included within the HGV specific dataset. As a result the data cannot be used for the purposes of this project.

Table 5 – Vehicle profile comparison by make

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DAF</td>
<td>29.74%</td>
<td>21.56%</td>
<td>29.53%</td>
</tr>
<tr>
<td>Mercedes-Benz</td>
<td>17.85%</td>
<td>13.66%</td>
<td>16.94%</td>
</tr>
<tr>
<td>Scania</td>
<td>16.76%</td>
<td>14.52%</td>
<td>15.52%</td>
</tr>
<tr>
<td>Volvo</td>
<td>16.58%</td>
<td>14.99%</td>
<td>12.92%</td>
</tr>
<tr>
<td>MAN</td>
<td>6.13%</td>
<td>7.69%</td>
<td>7.45%</td>
</tr>
<tr>
<td>Iveco</td>
<td>4.58%</td>
<td>8.02%</td>
<td>7.71%</td>
</tr>
<tr>
<td>Dennis-Eagle</td>
<td>4.25%</td>
<td>0.91%</td>
<td>1.69%</td>
</tr>
<tr>
<td>Renault</td>
<td>3.72%</td>
<td>6.19%</td>
<td>4.58%</td>
</tr>
<tr>
<td>Hino</td>
<td>0.36%</td>
<td>0.48%</td>
<td>0.01%</td>
</tr>
<tr>
<td>Other</td>
<td>0.03%</td>
<td>11.99%</td>
<td>3.65%</td>
</tr>
</tbody>
</table>

\(^3\) Department for Transport – Table VEH0120
Further data validation using Annual Average Daily Flows (AADF) was assessed. However, after consultation with the Department for Transport and in accordance with their guidance, the data cannot be summed for methodological reasons.

Table 2 illustrated the cab heights that AECOM applied by model. AECOM’s freight expertise ensured that all vehicles recorded throughout the survey were assessed in regards to the cab height. Where variations from the table were found, AECOM accurately recorded the real-world cab height of the vehicle. From the total number of vehicles recorded, 1.5 per cent of the vehicles did not correspond to the stated cab height category.

Table 6 applies the cab family proportions obtained from the roadside survey to the London wide population.

**Table 6 – London wide population by family cab**

<table>
<thead>
<tr>
<th>Cab Height</th>
<th>Count of Cab Height from road side survey</th>
<th>Cab Height by Proportion</th>
<th>London Wide Population from ANPR</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>1,867</td>
<td>28%</td>
<td>62,992</td>
</tr>
<tr>
<td>Medium</td>
<td>2,770</td>
<td>42%</td>
<td>93,459</td>
</tr>
<tr>
<td>Low</td>
<td>1,363</td>
<td>21%</td>
<td>45,987</td>
</tr>
<tr>
<td>Extra Low</td>
<td>432</td>
<td>7%</td>
<td>14,576</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>6,432</strong></td>
<td><strong>100%</strong></td>
<td><strong>222,278</strong></td>
</tr>
</tbody>
</table>

*does not include vehicles listed as other due to no cab height allocation

---

*Department for Transport – Road Traffic Estimates – Methodology Note*
6. London wide population by DVS category

Prior to applying the DVS category to the London wide population, TfL provided the necessary scorings against the vehicle make and model, where available. These scorings can be found in Appendix C. Where DVS ratings were not available cab heights have been scored against a generic scoring system (Table 7).

Table 7 – Cab height by DVS star rating

<table>
<thead>
<tr>
<th>Cab height</th>
<th>DVS categories/score</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>0</td>
</tr>
<tr>
<td>Medium</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Low/ Extra Low</td>
<td>3+</td>
</tr>
</tbody>
</table>

Table 8 allocates the star rating proportions by vehicle make to the London wide population.

Table 8 – Road side survey proportions by make and star rating category applied to the London wide population

<table>
<thead>
<tr>
<th>MAKE</th>
<th>Road side survey Count</th>
<th>% of Total</th>
<th>ANPR population</th>
<th>Star Allocation % from road side survey</th>
<th>Star Allocation to ANPR population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0 Star</td>
<td>1 - 2 Star</td>
</tr>
<tr>
<td>DAF</td>
<td>1,960</td>
<td>29.75%</td>
<td>66,130</td>
<td>11%</td>
<td>49%</td>
</tr>
<tr>
<td>Mercedes-Benz</td>
<td>1,176</td>
<td>17.85%</td>
<td>39,678</td>
<td>69%</td>
<td>8%</td>
</tr>
<tr>
<td>Scania</td>
<td>1,104</td>
<td>16.76%</td>
<td>37,249</td>
<td>27%</td>
<td>66%</td>
</tr>
<tr>
<td>Volvo</td>
<td>1,091</td>
<td>16.56%</td>
<td>36,810</td>
<td>23%</td>
<td>65%</td>
</tr>
<tr>
<td>MAN</td>
<td>404</td>
<td>6.13%</td>
<td>13,631</td>
<td>51%</td>
<td>31%</td>
</tr>
<tr>
<td>Iveco</td>
<td>302</td>
<td>4.58%</td>
<td>10,189</td>
<td>6%</td>
<td>32%</td>
</tr>
<tr>
<td>Dennis-Eagle</td>
<td>280</td>
<td>4.25%</td>
<td>9,447</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Renault</td>
<td>245</td>
<td>3.72%</td>
<td>8,266</td>
<td>39%</td>
<td>42%</td>
</tr>
<tr>
<td>Hino</td>
<td>24</td>
<td>0.36%</td>
<td>610</td>
<td>79%</td>
<td>17%</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>0.03%</td>
<td>67</td>
<td>33%</td>
<td>33%</td>
</tr>
</tbody>
</table>
Results show that of the total N3 HGVs operating in London, over 60,000 are 0 star rated on the level of vision the driver has from the cab. In accordance with the Mayor’s transport strategy, these would be banned from London’s roads entirely by 2020 unless a mitigation measure is put in place. By 2024, only 3 star plus rated vehicles can enter London (i.e. low and extra low cabs). As a result, potentially 28 per cent of vehicles will be granted permits and 72 per cent will need to implement mitigations to meet the set requirements.

Table 9 – London wide population by DVS star rating

<table>
<thead>
<tr>
<th>DVS star rating by cab family against London wide population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportional split</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>London wide population</td>
</tr>
</tbody>
</table>
7. Summary of findings and conclusion

AECOM roadside survey counts have been conducted to provide additional data to more accurately assign the HGVs operating in London by make and model. Outputs from this work provided a more accurate understanding of the number of vehicles that may be affected by the DVS scheme.

The study estimates that 0 star vehicles represent 29 per cent of the London N3 vehicles population. These would be prevented from entering London from 2020 unless they prove a ‘safe system’ through mitigation measures. This is subject to further consultation but is likely to consist of the requirements under the FORS Silver accreditation (e.g. camera and sensor monitoring systems). Vehicles rated with 1-2 star represent 43 per cent and will be prevented from entering London from 2024 unless they prove a ‘progressive safe system’.

A number of observations that are deemed important to be reported were recorded by the survey teams:

- The majority of the floor level windows tended to feature on waste and building related vehicles.
- Surveyors tended to see more medium height vehicles with floor level windows compared with the high ones, which arguably are more in need of the window due to their poor visibility against VRU’s. This observation was confirmed by the data recorded.
- Surveyors saw quite a few low level windows with bags obscuring the window. One lorry had vinyl wrapped livery over the window.
- Renault’s models were difficult to determine due to it being etched onto a metal plate. Other vehicle features had to be used.
- DAF LF was the most likely model to vary in height depending on the specification of the operator.

The findings from this study will inform the next stages of the scheme implementation, specifically into the likely economic, social and other associated impacts.

Figure 13 – Survey results at a glance
Appendix A Vehicle make/model/cab height guide

**DAF**
- HIGH
- MEDIUM
- LOW
- XF
- CF
- LF

**DENNIS-EAGLE**
- EXTRA LOW
- ELITE

**HINO**
- HIGH
- MEDIUM
- LOW
- 700
- 500
- 300

**IVECO**
- HIGH
- MEDIUM
- LOW
- STRALIS NP
- STRALIS XP

**MAN**
- HIGH
- MEDIUM
- LOW
- TGS/X
- CLA
- TGM
- TGL
MERCEDES-BENZ

HIGH
AXOR
ACTOS
AROCS

MEDIUM

LOW
ATEGO

EXTRA LOW
ECONIC

RENAULT

HIGH

MEDIUM

LOW

K SERIES
M MAGNUM
T SERIES

PREMIUM
C SERIES

SCANIA

HIGH

MEDIUM

LOW

S SERIES
R SERIES

P SERIES

G SERIES

L SERIES

EXTRA LOW

VOLVO

HIGH

MEDIUM

LOW

FH

FMX

FM

FE

FL
Appendix B Road side survey results by site category

B.1 Arterial Routes

Total Count of N3 HGV

<table>
<thead>
<tr>
<th>Total Count of N3 HGV</th>
</tr>
</thead>
<tbody>
<tr>
<td>2602</td>
</tr>
</tbody>
</table>

N3 HGV Traffic by Make

- DAF: 35%
- Mercedes-Benz: 18%
- Scania: 16%
- Volvo: 13%
- MAN: 7%
- Iveco: 4%
- Renault: 1%
- Dennis-Eagle: 1%
- Hino: 16%
- Foden: 0%
MOST COMMON N3 HGV TRAFFIC BY MODEL

- Medium: 41%
- High: 29%
- Low: 25%
- Extra Low: 4%

N3 HGV Traffic by Cab Family

- Medium: 41%
- High: 29%
- Low: 25%
- Extra Low: 4%
- #N/A: 1%
Floor Window fitted?

- Yes: 6%
- No: 94%

Proportion of N3 Vehicles by Industry Type

- Building: 32%
- General Haulage: 22%
- Waste: 13%
- Unidentified: 8%
- Food: 7%
- Other: 4%
- Parcels: 3%
- Retail: 2%
- Vehicles: 1%
- Fuel: 1%
- Drink: 1%
- Container: 0%
- Manufacturing: 0%
- Chemical: 0%
Breakdown of N3 HGV Traffic by Euro Engine Rating

- Euro I: 11%
- Euro II: 9%
- Euro III: 3%
- Euro IV: 0%
- Euro V: 20%
- Euro VI: 57%

Hourly Flow of N3 Vehicles

- 7 - 8: 240
- 8 - 9: 339
- 9 - 10: 273
- 10 - 11: 317
- 11 - 12: 302
- 12 - 13: 240
- 13 - 14: 246
- 14 - 15: 195
- 15 - 16: 194
- 16 - 17: 124
- 17 - 18: 97
- 18 - 19: 35
### B.2 Waste

#### Top 10 Companies Percentage Share

- **ROYAL MAIL**
- **CROYDON COUNCIL**
- **TESCO**
- **HANSON**
- **DAY AGGREGATES**
- **VEOLIA**
- **SIVYER**
- **TARMAC**
- **CONWAY**
- **WESTMINISTER WASTE**
- **EUROMIX**

#### Total Count of N3 HGV

![Bar Chart with Total Count of N3 HGV](chart.png)

- Total Count: 1341
MOST COMMON N3 HGV TRAFFIC BY MODEL

- Volvo FM: 166
- DAF CF: 124
- DAF LF: 97
- Scania P Series: 60
- Scania R Series: 54
- Mercedes-Benz Arocs: 60
- Mercedes-Benz Econic: 54
- Mercedes-Benz Actros: 34
- Iveco Eurocargo: 28
- MAN TGX: 25
- Scania G Series: 25
- Volvo FMX: 23
- DAF XF: 23
- Volvo FE: 22
- Renault C Series: 21
- Seddon Atkinson: 17
N3 HGV Traffic by Cab Family

- Medium: 41%
- High: 23%
- Low: 17%
- Extra Low: 13%
- #N/A: 6%
- No: 86%
- Yes: 14%

Floor Window fitted?
Proportion of N3 Vehicles by Industry Type

- Building: 39%
- Waste: 27%
- General Haulage: 11%
- Unidentified: 10%
- Food: 3%
- Container: 2%
- Other: 1%
- Scrap Metal: 1%
- Manufacturing: 0%
- Parcels: 1%
- Retail: 0%
- Vehicles: 1%
- Fuel: 1%
- Utilities: 1%

Breakdown of N3 HGV Traffic by Euro Engine Rating

- Euro I: 54%
- Euro II: 23%
- Euro III: 9%
- Euro IV: 3%
- Euro V: 1%
- Euro VI: 1%
- UNIDENTIFIED: 10%
**Hourly Flow of N3 Vehicles**

<table>
<thead>
<tr>
<th>Time Window</th>
<th>Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 - 8</td>
<td>84</td>
</tr>
<tr>
<td>8 - 9</td>
<td>120</td>
</tr>
<tr>
<td>9 - 10</td>
<td>167</td>
</tr>
<tr>
<td>10 - 11</td>
<td>153</td>
</tr>
<tr>
<td>11 - 12</td>
<td>170</td>
</tr>
<tr>
<td>12 - 13</td>
<td>172</td>
</tr>
<tr>
<td>13 - 14</td>
<td>151</td>
</tr>
<tr>
<td>14 - 15</td>
<td>123</td>
</tr>
<tr>
<td>15 - 16</td>
<td>93</td>
</tr>
<tr>
<td>16 - 17</td>
<td>52</td>
</tr>
<tr>
<td>17 - 18</td>
<td>46</td>
</tr>
<tr>
<td>18 - 19</td>
<td>10</td>
</tr>
</tbody>
</table>

**Top 10 Companies Percentage Share**

- **LONDON CONCRETE LTD**: 18%
- **CEMEX**: 18%
- **VEOLIA**: 14%
- **DAY AGGREGATES**: 13%
- **BYWATERS**: 6%
- **TARMAC**: 5%
- **EMR**: 6%
- **PRIMAGRANGE**: 13%
- **LAMPTON COUNCIL**: 14%
- **EXPRESS CONCRETE**: 14%
- **TOWER HAMLETS COUNCIL**: 3%
B.3 Construction

Total Count of N3 HGV

N3 HGV Traffic by Make

- DAF: 27%
- Scania: 25%
- Volvo: 19%
- Mercedes-Benz: 13%
- MAN: 6%
- Iveco: 3%
- Dennis-Eagle: 3%
- Renault: 3%
- Hino: 1%

Total Count of N3 HGV: 1204
MOST COMMON N3 HGV TRAFFIC BY MODEL

<table>
<thead>
<tr>
<th>Model Description</th>
<th>Traffic (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium</td>
<td>53%</td>
</tr>
<tr>
<td>High</td>
<td>26%</td>
</tr>
<tr>
<td>Low</td>
<td>16%</td>
</tr>
<tr>
<td>Extra Low</td>
<td>5%</td>
</tr>
<tr>
<td>Low</td>
<td>0%</td>
</tr>
<tr>
<td>#N/A</td>
<td>0%</td>
</tr>
</tbody>
</table>

N3 HGV Traffic by Cab Family

- Medium: 53%
- High: 26%
- Low: 16%
- Extra Low: 5%
- #N/A: 0%
Floor Window fitted?

- Yes: 12%
- No: 88%

Proportion of N3 Vehicles by Industry Type:

- Building: 55%
- General Haulage: 19%
- Waste: 13%
- Food: 3%
- Unidentified: 3%
- Other: 1%
- Vehicles: 1%
- Fuel: 1%
- Parcels: 1%
- Retail: 1%
- Drink: 1%
- Container: 1%
- Chemical: 1%
- Agriculture: 1%
### B.4 Distribution Centre

#### Top 10 Companies Percentage Share

- **LONDON CONCRETE LTD**: 36%
- **DAFCON**: 5%
- **MCGEE GROUP**: 3%
- **HANSON**: 7%
- **MITCHELLSON**: 7%
- **CEMEX**: 7%
- **PMC SOIL**: 7%
- **VEOLIA**: 7%
- **THOMPSONS**: 10%
- **TARMAC**: 15%

#### Total Count of N3 HGV

- **Total Count of N3 HGV**: 1441
N3 HGV Traffic by Make

MOST COMMON N3 HGV TRAFFIC BY MODEL
N3 HGV Traffic by Cab Family

- Medium: 36%
- High: 35%
- Low: 20%
- Extra Low: 6%
- Extra High: 3%
- #N/A: 3%

Floor Window fitted?

- Yes: 3%
- No: 97%
### Proportion of N3 Vehicles by Industry Type

- **Unidentified**: 22%
- **Waste**: 19%
- **Building**: 16%
- **General Haulage**: 12%
- **Food**: 8%
- **Other**: 5%
- **Parcels**: 4%
- **Retail**: 3%
- **Container**: 3%
- **Drink**: 3%
- **Vehicles**: 2%
- **Utilities**: 2%
- **Agriculture**: 2%
- **Manufacturing**: 1%

### Breakdown of N3 HGV Traffic by Euro Engine Rating

- **Euro I**: 59%
- **Euro II**: 21%
- **Euro III**: 8%
- **Euro IV**: 9%
- **Euro V**: 3%
- **Euro VI**: 0%
- **UNIDENTIFIED**: 0%
# Appendix C Vehicle make and model by DVS star rating

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**Iveco**
- ECOSTRALIS
- EUROCARGO
- EUROUTECH
- PACER
- STRALIS
- STRALIS NP
- STRALIS XP

**Hino**
- 300
- 500
- 700