

FAME LGV Methodology Think Piece

By

Ian Williams

For

Department for Transport

<i>Version</i>	<i>Date</i>	<i>Author</i>	<i>Notes</i>
1.0	17/2/2026	Ian Williams	Initial Draft for Department
2.0	09/3/2026	Ian Williams	Final

Contents

1	Introduction	4
2	Background on LGV modelling	4
2.1	Earlier LGV models in the UK	4
2.2	Some considerations on the combined LGV model	5
3	Characteristics of the LGV freight model	6
3.1	Introduction	6
3.2	Base year	7
3.3	Representing LGV purposes	7
3.4	Representing Northern Ireland	10
3.5	Zoning system	10
3.6	Time period	12
3.7	LGV vehicle types and speed limits	14
3.8	Logistic legs	16
4	Existing data sources on LGVs	16
4.1	Overview	16
4.2	DfT national van surveys	17
4.3	Other national LGV data sources	20
5	Improving LGV data sources	22
5.1	Van data definition consistency	22
5.2	Improving LGV data	25
5.3	Consistency review across LGV data sources	27
6	A new trip-based LGV survey	28
6.1	Overview of the survey	28
6.2	The characteristics of the survey	29
7	Estimating zonal trip ends	36
7.1	Import/export and international trips	36
7.2	Grocery trip ends	36
7.3	Parcel trip ends	37
8	LGV spatial distribution model	39
8.1	Aggregate LGV freight demand model structure	39
8.2	Agent-based micro-simulation models	41
9	LGV supply modelling	42

9.1	Vehicle operating cost models	42
9.2	Representing road congestion– Link to NTM	43
10	Forecasting future changes in LGV demand	44
11	Summary of conclusions	45
11.1	LGV freight model characteristics	45
11.2	Freight LGV data improvements	46
12	References	47

Tables

Table 1	Summary of FFR recommendations on NFTM characteristics.....	7
Table 2	Ratio of index of LGV traffic to car traffic, by time of day and week, 2024, GB	13
Table 3	Annual registrations of new light commercial vehicles in UK.....	14
Table 4	Van speed limits (mph) for UK and [built-up areas, Wales]	15

FIGURES

Figure 1	LGV and HGV annual kilometres travelled, by road type, GB.....	11
Figure 2	Co-op’s Starship robot autonomous grocery delivery service in Cambridge	45

1 Introduction

1.1.1 This think piece was commissioned by DfT to provide recommendations for a freight LGV¹ model for use to support the Department in the preparation of specifications for the Freight Analysis and Modelling Environment (FAME), a new cross-modal freight analysis environment.

1.1.2 The Department is considering the creation of a spatially detailed LGV model that would include both freight and non-freight (service) LGVs. This think piece concentrates primarily on the design and implementation details of the freight component within such a model. It explains how this freight LGV model could be integrated within the wider National Freight Transport Model (NFTM) structure that is described separately within the companion FAME: Base OD Matrices think piece. It expands the various LGV related discussion points previously introduced within the Peer Review of the FAME Feasibility Report (Williams, 2024).

1.1.3 To facilitate the implementation and calibration of an LGV model that can provide a detailed level of segmentation and that is suitably founded on behavioural-economic choice mechanisms, it is necessary to provide access to better data on the detailed current observed pattern of LGV movements. This think piece provides recommendations on the most effective approach to designing and carrying out an informative survey of LGV users that could provide the required rich data describing individual LGV movement purposes and characteristics.

1.1.4 In Chapter 11, the main conclusions from this think piece are summarised for the characteristics of the LGV freight model. It also summarises the tasks to be undertaken to improve the availability across datasets of consistent data on LGVs and on their usage, so as to address the various LGV data challenges that have been determined.

2 BACKGROUND ON LGV MODELLING

2.1 EARLIER LGV MODELS IN THE UK

2.1.1 Due particularly to ongoing LGV data limitations, the state of LGV modelling throughout the UK has lagged well behind that of other road vehicle types. For example, the LGV traffic forecasting model component of the NTM for GB, which was created back in 2014 for DfT (WSP, 2014), is an aggregate, panel data based, time-series model. Because this is an econometric model, it is more limited in its ability to represent a wide range of policy measures than the corresponding NTM model components for either cars or HGVs because the latter have been constructed

¹ An LGV here is broadly defined as vehicle designed for the carriage of goods that has a gross vehicle weight (gvw) of no more than 3.5 tonnes – also known as a van.

using richer behavioural-economic databases, such as the National Travel Survey (NTS) and the Continuing Survey of Road Goods Transport (CSRGT).

2.1.2 A more recent initiative (Tolouei et al., 2022) built LGV OD matrices for England to support National Highways five second generation Regional Traffic Models (RTMs). The OD matrix construction drew heavily on the use of

- The DfT's 2019-20 LGV Usage Survey (DfT, 2021a)
- a Teletrac-Navman Trafficmaster GPS-based OD matrix for a non-representative 2% subset of the national LGV fleet,

along with the MOT, DVLA vehicle stock, DfT aggregate LGV traffic estimates, and VOA data sources that are discussed in more detail below in Chapter 4. Although the resulting estimated LGV OD matrices were eventually segmented by three trip purposes, it is correctly stated that there is “a high level of uncertainty associated with the segmented LGV matrices” (page 16). This uncertainty is caused primarily by the inherent limitations in the data available on segmented trip making, rather than arising from the innovative techniques that were used to process and combine the available data sources.

2.1.3 The Freight in London Model (FiLM - Deane et al. 2010) that was an extension of DfT's Base Year Freight Model (BYFM - WSP, 2011), was implemented for TfL in 2010 to cover the study area of London and surrounds. It included a comprehensive detailed network model of LGV movements for London. It made extensive use of the 2003-05 Van Survey dataset to support the segmentation and calibration of the three LGV demand model purposes that were distinguished, while controlling the LGV movements to match to LGV cordon counts across London.

2.1.4 The rapid recent growth in grocery delivery rounds that operate a rather different delivery rounds system to that of parcel delivery logistics, together with the growing sophistication and optimisation of parcel delivery services, suggest the need now for further segmentation of LGV goods movement purposes. Accordingly, the more recent LGV model design specification produced for Transport for the North (Williams, 2021) distinguished those logistic leg segments of LGV goods movements that cluster onto the SRN network, from those delivery rounds that occur primarily on the local road system.

2.2 SOME CONSIDERATIONS ON THE COMBINED LGV MODEL

2.2.1 Before going into detail on the preferred structure for the freight LGV model, it is helpful here to look firstly at the wider picture of the requirements for the complete modelling of all passenger and freight LGV movements. The implications derived from this can then inform the specific LGV freight model design presented below in Chapter 7 onwards.

2.2.2 The modelling of those goods movements and of those passenger movements that occur within LGVs is best represented within distinct freight and passenger demand models. These two distinct demand models may then be integrated with a

common road network assignment/supply model together with other freight and passenger road vehicles.

2.2.3 The modelling of LGV freight purposes, would benefit from being fully integrated within a broader freight and logistics based model. LGVs can be in competition with small rigid HGVs for tertiary logistics (last mile) deliveries of non-bulk goods, while the split between these smaller goods vehicle types could vary in future years due to a range of potential future policy initiatives and of vehicle operating cost changes.

2.2.4 Analogously, the modelling of LGV passenger trip purposes, would benefit from being fully integrated within a broader passenger model. LGVs can be in competition with cars for most trip purposes, though primarily within only a relatively limited sub-group of the population. The future split between a new car or LGV at both purchase and usage could be influenced by policy initiatives, such as vehicle taxes, environmental requirements, etc.

2.2.5 It is critically important to ensure that a future national model of LGVs avoids any inconsistencies, gaps or double counting with respect to the vehicle movements that are represented for both cars and HGVs within the estimation of conventional passenger and freight OD road vehicle matrices, respectively.

3 CHARACTERISTICS OF THE LGV FREIGHT MODEL

3.1 INTRODUCTION

3.1.1 This section focuses on the model characteristics and demand segmentation that will be used in the various stages of the construction of the LGV freight model. To maximise consistency between the LGV model and the NFTM, the majority of these characteristics), as summarised below in Table 1, match broadly to the NFTM segmentation details proposed originally in the FAME Feasibility Report (FFR). They are designed to match closely to the few alternative segmentations or extended approaches that have been proposed for the NFTM within the companion think piece FAME: Base Year OD Matrices. Some of these proposed changes to the NFTM design have an impact on its LGV component, so these changes are discussed further in subsections below to explain why they provide a preferred approach.

TABLE 1 SUMMARY OF FFR RECOMMENDATIONS ON NFTM CHARACTERISTICS

FFR Section	Type	Comments / links to Sections in this report
	Base year	See 3.2
7.2	Exclude LGV non-delivery trips	OK see 3.3
7.4	Modelled area	OK see Northern Ireland discussion in 3.4
7.5	Zoning	OK see 3.5 on the benefits of a fine zoning system for LGVs
7.6	Time period	OK see 3.6
7.7	Road vehicle types	No – model should use 5 HGV types and 1 or perhaps 2 LGV types, see 3.7
9.3	NST 20 commodity types	OK

3.2 BASE YEAR

3.2.1 The base year to adopt should be one where the transport patterns are relatively stable and where the main statistical data sources are not in flux. Accordingly, the COVID period should be ruled out.

3.2.2 As explained in later sections, the absence of good recent data describing the spatial pattern and characteristics of LGV movements by type implies that the most appropriate base year to adopt might be that for which a suitable trip-based survey of LGV movements is next completed.

3.3 REPRESENTING LGV PURPOSES

3.3.1 When discussing the usage of LGVs, it is important to clarify terminology. When the main purpose of an LGV journey is to **deliver or collect** goods, it is termed a **freight journey purpose**. Goods are normally also **carried** in the LGV during passenger journey purposes but if the primary purpose of the journey is **not to deliver or collect these goods for commercial purposes**, the journey should be classified as a **passenger purpose**. For distinct passenger journey purposes the goods carried may be:

- the tools of a construction worker - when **commuting** by LGV to a construction site;
- paint, spares or equipment - for tradesmen or utilities on **service (in course of business)** trips between clients;
- installed furniture and kitchen equipment - within motorhomes or camper vans on **leisure** trips;
- food or groceries - when the LGV is used to collect lunch or on a family **shopping** trip;
- no goods at all - when the LGV is used on **private** trip purposes, such as **personal business or visiting friends and relatives**.

3.3.2 Accordingly, it is the delivery or collection of goods for commercial purposes, rather than the carriage of goods in itself, that for LGVs distinguishes freight journey purposes from passenger purposes.

3.3.3 Within LGV delivery demand, there may be a further segmentation necessary to cater for different types of delivery operation. For example, courier deliveries of small parcels to households and businesses may require the driver on the delivery round to make between 100 and 150 individual drops during a day, with minimum dwell time at each drop. In contrast, supermarket home deliveries of groceries are organised differently and have a much smaller number of drops per day, due to their longer dwell time per drop. These drops may either be concentrated in the locality of a supermarket from which they emanate or may be serviced more remotely from a local distribution centre/depot, depending on the logistics policy of the particular supermarket chain.

3.3.4 The need to include LGV delivery journeys within a freight demand model arises because LGVs may be in active competition with HGVs. For example, some parcel delivery firms, such as Evri and DPD, tend mainly to use LGVs for their local deliveries. Other firms, such as UPS, use vehicles that have van body shapes but because their gross vehicle weight is greater than 3.5 tonnes their vehicles are classified as HGVs rather than as LGVs. For local delivery of white goods (e.g. cookers, fridges, etc.) HGVs are more typically used because of their greater capacity, but much depends on the balance of delivery time and installation time which will govern the maximum daily load that will need to be carried in the vehicle.

3.3.5 The goods delivery and/or collection movements taking place in LGVs can be grouped into two broad categories that should be modelled separately.

- **Grocery deliveries** (e.g. Tesco, Sainsbury, ASDA, Morrisons, etc.) of often substantial sized individual grocery consignments of around 80 individual items per delivery, mainly to private households. These firms often adopt a bush delivery route structure typically with around 10-15 consignment drops (Allen et al, 2016) per vehicle per round trip that are spread from early morning to late evening² on weekdays and for slightly shorter windows during weekends.
- **Parcel collections and/or deliveries** (e.g. Parcelforce, DPD, DHL, UPS, Evri, Amazon, etc.) of mainly smaller individual packages or sets of 2 to 4 packages to a mix of private households and employment locations. These normally adopt a stem and bush delivery route structure that typically undertakes from 50 to 200 consignment drops (Allen et al, 2016) per vehicle route per day. Standard deliveries are spread over the period of the day from around 8AM to 5PM on weekdays and with fewer services over weekends, except in the run up to Christmas.

² For example in 2026, TESCO offers delivery slots between 8AM and 11 PM on weekdays, whereas Ocado offers 5:30 AM through to midnight.

3.3.6 To replicate the **bush** trip type element of the LGV multi-drop delivery trips, the simplest approach is to generate many short trips between all pairs of relatively adjacent zones. The volume of trips attracted to a specific zone is set to be proportional to the number of zonal households for the grocery-style deliveries and to the weighted number of zonal households plus workplace jobs for the parcel-style deliveries.

3.3.7 The **stem** trip type element for the parcel-style routes represents: both the initial outbound trip from the distribution centre to the location within which intensive delivery/collection activities will occur; and the final return trip from that broad location to the distribution centre at the end of the day. The bush trip type legs between successive local deliveries will typically be short trips spread across all of the minor road network, rather than just on the major roads, whereas the stem trip type may often be over a medium distance and may originate from a regional distribution centre constructed at an accessible location. Accordingly, this stem trip is more likely to mainly be routed along motorways or the major road network, rather than on minor roads.

3.3.8 Because the goods for most grocery-style deliveries are currently picked directly from the shelves of a large local supermarket itself³, rather than being carried initially from a more distant specialised customer fulfilment centre, their stem trip would not typically be long enough to merit being explicitly modelled in a form that is distinct from the subsequent bush legs. Instead, these delivery rounds often tend to be focussed within a relatively small local area that is governed by the need to return to the supermarket a few times a day to reload, due to the relatively large average consignment size per delivery, as well as to pick up recently ordered urgent consignments.

3.3.9 The recent rapid expansion within urbanised areas of takeaway food and home meal delivery services, such as Deliveroo, Just Eat and Uber Eats, etc. may sometimes take place in LGVs. However, for most of these time-critical and cost-critical deliveries, their consignments are small enough to be carried in cars, bikes and motorbikes that tend to be easier to manoeuvre and park than LGVs, as well as being cheaper to run. Accordingly, these hot food trip types should mainly be included instead as freight trips (i.e. employer's business purpose) within private cars or active modes, as part of the passenger model, rather than as delivery trips within the LGV model. The movements between selling sites of LGVs that themselves produce food services from the LGV (e.g. burger vans in city centres near entertainment venues) should be classified as commuting or service trip purposes, as appropriate, rather than as goods delivery purpose.

3.3.10 The delivery/collection movements of goods between the local tertiary distribution depots or fulfilment centres and their parent larger centralised

³ Ocado and Amazon Fresh, in contrast, pick from specialised fulfilment centres, rather than from local supermarkets and so can provide lower picking costs, though with longer line haul distances.

secondary distribution centres will normally take place on HGVs, rather than LGVs, because of the large consignment sizes moved. Accordingly, these trips should be part of the freight model for HGVs. Likewise, the deliveries of bulky white or brown goods (e.g. fridges, cookers or furniture) to households tend to require small lorries rather than LGVs so should not be part of the LGV model.

3.3.11 A crucial aspect that needs to be represented by the bush trips is that they will be heavily weighted towards the use of minor urban and rural roads, rather than on the major road network, so that the extent to which this aspect has been successfully captured by the model should be confirmed within the model validation tasks. In contrast, the stem delivery trips, as well as the commuting trips of freight delivery drivers are likely to make substantial use of the major road network.

3.4 REPRESENTING NORTHERN IRELAND

3.4.1 A full representation of internal LGV traffic within NI implies that it would also be necessary to represent adjacent zones within Ireland in considerable detail in order to represent movements between Ireland and NI. It would also be important to represent the Irish domestic LGV movements that transit through NI, particularly along the A5 Western Transport Corridor, for which funding of €600m has in February 2024 been committed by the Dublin Government towards the long awaited A5 55-mile upgrade within NI, though subsequent legal challenges have slowed progress.

3.4.2 The complexity with extending the LGV model to include NI fully within the internal study area, lies in the substantial existing differences in many LGV data sources and data definitions between each of GB, NI and Irl. The effort required to assemble LGV data in a suitably consistent form for the relatively small number of zones in and around NI, may be comparable to the effort required for GB as a whole, rather than being proportional to the number of zones required for the Island of Ireland. As discussed later in Section 9.2, the current passenger NTMv5 does not extend to NI, so a suitable transport supply model for NI and surrounds would need to be adopted to provide the required OD times and LGV costs between companion zone pairs.

3.4.3 Because of the relatively short lengths of most LGV delivery movements, it is not expected that major freight LGV flow volumes occur between GB and NI. Accordingly, building a GB LGV freight model initially and subsequently constructing the NI equivalent model as a separate task, would not generate much wasted resource through duplication of effort.

3.5 ZONING SYSTEM

3.5.1 The FFR recommends adopting a two tier zoning system for the NFTM which seems sound from the viewpoint of achieving reasonable run times. The upper tier 2 is proposed to be at the local authority district level and would also include appended point zones for major freight nodes, such as ports, airports, warehouse concentrations, etc. leading to around 500 upper tier zones in total.

3.5.2 The average trip lengths for LGV goods delivery rounds tend to be shorter than those typical of HGV trips. This is one of the reasons why a substantial proportion of annual LGV mileage, 35% in 2024, takes place on minor roads. The longer trips typical of HGVs, particularly artics, ensure that the major road network is more suitable for HGVs, so that the low 7% proportion of the 2024 HGV mileage that took place on minor roads is way below that of LGVs, and is continuing to decline over time, as illustrated in Figure 1.

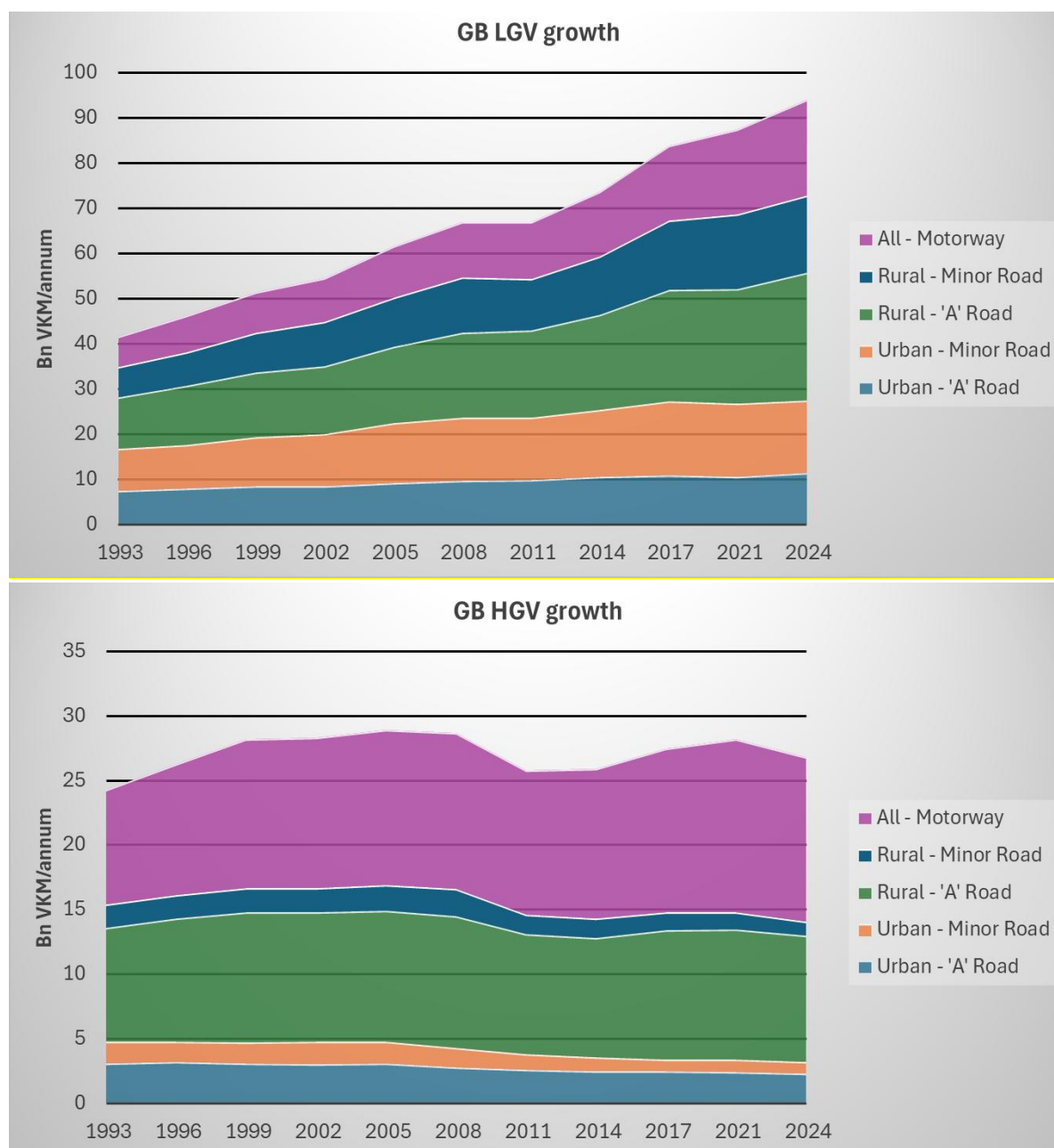


FIGURE 1 LGV AND HGV ANNUAL KILOMETRES TRAVELLED, BY ROAD TYPE, GB

Source: DfT Road Traffic Table TRA0204

3.5.3 In order to ensure that the substantial proportion of LGV traffic that occurs on minor roads can be captured within the assignment stage, it will be preferable to

adopt a zoning system and a road network that operates at a finer more detailed spatial scale than the upper tier 2 level that is adopted for HGVs within the NFTM.

3.5.4 This implies that the LGV modelling stage within the NFTM and the LGV freight model would benefit from being run at the lower tier 1 zoning level of the FFR, that adopts a zoning system based at the MSOA level. The interface between these two levels of zoning system within the NFTM is further discussed at the end of Section 8.1.

3.5.5 This finer zoning system for LGV *freight* demand modelling would have the benefit of being consistent with the zoning level that would be appropriate for LGV *passenger* demand modelling and with that already in use more generally for passenger demand modelling within the NTMv5.

3.6 TIME PERIOD

3.6.1 The basic time unit of yearly LGV freight flows seems appropriate.

3.6.2 However, blanket conversion factors from annual to period in an average day are not appropriate for LGVs because each type of usage may have distinctive characteristics.

3.6.3 The daily pattern of LGV movements for the *parcel delivery* purpose will be spread relatively evenly across the working day. However, these tend to have an earlier start and an earlier finish to the working day than typical car peak trips, while the LGV parcel delivery trips may reduce significantly at weekends. They also tend to exhibit relatively long trips at the start and end of the working day, many of which will use the major road network, whereas the movements between delivery points during the day will have a high usage of the minor road network.

3.6.4 In contrast, *grocery delivery* movements are over two shifts for many grocery chains, continuing from the early morning through into the late evening and across weekends.

3.6.5 Turning to passenger LGV trips, commuter and to a lesser extent in course of business LGV trips will be more concentrated in the morning and evening peaks. Leisure trips in LGVs are more common outside the working day and during weekends, together with a large number of very long trips in holiday periods for camper vans.

3.6.6 It will be important to update the broad descriptions above of the timing differences between LGV usage across trip purposes, with current data that can be obtained via the proposed LGV trip-based survey discussed below in Chapter 6. This data should be used to estimate period factors for conversion of LGV matrices from annual to a specific time of day and day of week. These LGV period factors should be estimated separately for each LGV purpose.

3.6.7 Table 2 based on vehicle traffic count data illustrates the ratio of the index for LGV traffic across the week to the corresponding car traffic index. It indicates

FAME – LGV METHODOLOGY THINK PIECE

that the pattern of spread of LGV traffic across times of day and days of the week differs considerably from the corresponding spread of car traffic.

- On weekdays, from 2 AM until 10 AM, the LGV traffic index is relatively higher than the car traffic index. In particular, LGV traffic ramps up strongly between 6 and 9 AM, whereas the car AM peak traffic does not take off until after 7 AM.
- In the weekday afternoons the LGV evening peak traffic starts to ramp up strongly after 3 PM and is reducing after 5 PM, so again the pattern of LGV peak movements is an hour or more earlier than that for car.
- In the evenings after 5 and throughout weekends, LGV traffic indices are much below those of car.

TABLE 2 RATIO OF INDEX OF LGV TRAFFIC TO CAR TRAFFIC, BY TIME OF DAY AND WEEK, 2024, GB

Time of day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
00:00 to 01:00	0.847	0.931	0.927	0.938	0.961	0.809	0.803
01:00 to 02:00	0.959	1.117	1.113	1.141	1.135	0.877	0.850
02:00 to 03:00	1.089	1.208	1.245	1.255	1.241	0.953	0.890
03:00 to 04:00	1.200	1.286	1.286	1.293	1.277	1.000	0.938
04:00 to 05:00	1.319	1.295	1.272	1.288	1.245	1.067	1.000
05:00 to 06:00	1.263	1.190	1.180	1.187	1.167	1.006	0.912
06:00 to 07:00	1.390	1.353	1.361	1.363	1.374	1.104	0.894
07:00 to 08:00	1.269	1.259	1.269	1.267	1.296	1.110	0.924
08:00 to 09:00	1.200	1.188	1.186	1.185	1.184	0.981	0.923
09:00 to 10:00	1.239	1.241	1.230	1.230	1.191	0.905	0.852
10:00 to 11:00	1.124	1.170	1.166	1.156	1.108	0.852	0.802
11:00 to 12:00	1.083	1.148	1.146	1.135	1.092	0.840	0.801
12:00 to 13:00	1.053	1.107	1.104	1.110	1.072	0.827	0.785
13:00 to 14:00	1.054	1.115	1.122	1.119	1.079	0.815	0.780
14:00 to 15:00	1.073	1.120	1.128	1.130	1.084	0.808	0.778
15:00 to 16:00	1.110	1.145	1.154	1.148	1.078	0.804	0.777
16:00 to 17:00	1.056	1.075	1.081	1.080	0.997	0.794	0.770
17:00 to 18:00	0.922	0.932	0.932	0.939	0.890	0.770	0.773
18:00 to 19:00	0.870	0.880	0.885	0.889	0.836	0.761	0.775
19:00 to 20:00	0.829	0.840	0.846	0.850	0.804	0.752	0.765
20:00 to 21:00	0.782	0.784	0.795	0.802	0.760	0.726	0.741
21:00 to 22:00	0.727	0.732	0.740	0.759	0.727	0.717	0.728
22:00 to 23:00	0.730	0.719	0.736	0.744	0.699	0.722	0.724
23:00 to 00:00	0.823	0.810	0.819	0.825	0.743	0.760	0.774

Source: DfT Road Traffic Table TRA0308

3.6.8 The relatively early weekday start for LGV traffic is particularly affected by: the early starts typically required to arrive to depots to start organising parcels for the subsequent delivery round; as well as for those in the building trade the need to

complete their often quite long commute trips to arrive on site before 8 AM, the typical time at which UK construction activity commences.

3.6.9 The higher LGV traffic relative to car in the mid-morning than in the early afternoon, may relate to deliveries to shops and restaurants that can only commence after the AM peak when parking restrictions are reduced but that are needed early so as to cater for that day’s retail or hospitality customers.

3.7 LGV VEHICLE TYPES AND SPEED LIMITS

3.7.1 An issue to be clarified is which exact vehicles should and should not be included within the LGV category of the LGV demand model.

3.7.2 MPV/Minibus, ambulance, police van, camper van, etc. are not designed to carry goods and most will have windows behind the driver’s row, so according to some vehicle definitions should not be considered as light *goods* vehicles. However, they have characteristics that are not similar to those of a typical car so that within some datasets they may have been accumulated within the LGV category, due perhaps to their vehicle length or chassis design characteristics.

3.7.3 Accordingly, the key early task is to define unambiguously which subset of vehicles and of their associated trips should be included under the heading of “LGV” trips within the demand models for passengers and freight. The next step is to review briefly whether each of the main data sources to be used in the development of the model is consistent with these preferred definitions, or whether some carefully documented data transformation may be required to achieve such consistency prior to introducing a data source into the support for the model development.

3.7.4 The guiding principle for this classification task is that every passenger trip by road should be included consistently within some unique mode, without gaps or double counting, within the passenger demand model. The analogous classification principle should be adopted for goods shipments by road within the freight demand model.

TABLE 3 ANNUAL REGISTRATIONS OF NEW LIGHT COMMERCIAL VEHICLES IN UK

Year	LGVs ≤3.5t	Large vans >3.5 & <6t	Total	% > 3.5t	BEV >3.5 & ≤4.25t	%
2016	375,687	7,685	383,372	2.0%		
2017	362,148	7,075	369,223	1.9%		
2018	357,225	8,722	365,947	2.4%		
2019	365,778	8,965	374,743	2.4%		
2020	292,657	6,757	299,414	2.3%		
2021	365,380	5,988	371,368	1.6%		
2022	282,139	4,787	286,926	1.7%		
2023	341,455	5,800	347,255	1.7%		
2024	351,834	9,259	361,093	2.6%	1,646	0.5%
2025	315,422	15,290	330,712	4.6%	2,380	0.7%

Source: SMMT <https://www.smmt.co.uk/vehicle-data/smmt-vehicle-data/>

3.7.5 Having hovered around the 2% share of all new van sales since 2016, Table 3 indicates that in 2024 the share of the sale of those large vans above the historic LGV weight cut-off of 3.5t gvw started to increase, reaching a 4.6% share in 2025. Within this 4.6% share for 2025, just 0.7 percentage points is due to the accelerating registrations of battery electric (BE) LGVs, weighing >3.5t but <=4.25t, which recently have officially also been reclassified into the LGV category within the UK statistics. However, the bigger component (1.9 percentage points) of this recent increase in large van share is not due to such BE LGVs. If this growth trend continues for the share of large vans within the national fleet, it will complicate the statistical analysis of classified LGV counts, because many such large vans may wrongly be visually misclassified as LGVs, rather than correctly as small rigid HGVs.

3.7.6 The speed limits in place for vans depend on the vehicle's characteristics. Vans under 2 tonnes loaded gross vehicle weight (gvw) may qualify as a 'car-derived van' or a 'dual-purpose vehicle'. These vehicles have the same speed limits as cars, as illustrated in Table 4. Other vans have a lower 50 (or 60) mph speed limit on single (or dual) carriageway non-built-up roads but otherwise have the same speed limits as for cars.

TABLE 4 VAN SPEED LIMITS (MPH) FOR UK AND [BUILT-UP AREAS, WALES]

Type of vehicle	Built-up area	Single carriageway	Dual carriageway	Motor way
Car, motorcycle, car-derived van and dual-purpose vehicle	30 [20]	60	70	70
Goods vehicles (not more than 7.5 tonnes gvw)	30 [20]	50	60	70

Source: <https://www.gov.uk/speed-limits> as of January 2026

3.7.7 Since 2003 the sales of new LGVs of up to 2 tonnes gvw have declined sharply, whereas there has been a major increase in sales for LGVs over 2.8 tonnes gvw. Accordingly, there has been a substantial increase on the roads in average LGV size and length through recent years. This in turn impacts on road capacity and parking capacity requirements, particularly in urban areas.

3.7.8 Because of these differences in speed limits between van types, there may be a benefit to segmenting LGVs into two size categories within the assignment model and then requiring that the free-flow link speed takes appropriate account for the larger LGVs of their reduced speed limit on relevant link types.

3.7.9 The segmentation into two or more sizes of LGV within the supply model would also help in improving estimates of fuel consumption and of pollution emission totals by link.

3.7.10 In the longer term this LGV segmentation requirement will diminish because the proportion of smaller LGVs within the fleet has been reducing significantly in recent years and it is expected that the proportion of the LGV fleet that is in the smaller size category will reduce further through into the future. In particular, the LGV fleet now used for goods delivery purposes is likely to be heavily skewed away from small LGVs, so that there appears to be little benefit within the LGV freight model to distinguishing LGVs into multiple size groups.

3.8 LOGISTIC LEGS

3.8.1 The companion FAME Base Year Matrices Think Piece recommends the representation within the NFTM of three types of logistic legs. These legs occur within a variety of distribution channels that may contain different numbers and combinations of logistic leg types. These three leg types, primary, secondary and tertiary are closely related to the decreasing size of shipments that need to be transported.

3.8.2 Large HGVs are the norm within primary and secondary logistic legs, due to the larger consignment sizes that they normally transport. Tertiary logistic legs typically are used to move relatively small individual consignments from distributors through to final consumers or to small local shops, restaurants or service providers. For simplicity, it is assumed that the competition from LGVs with HGVs only occurs within this tertiary logistic leg category. Parcel delivery activity is a typical example of a tertiary logistic leg.

4 EXISTING DATA SOURCES ON LGVS

4.1 OVERVIEW

4.1.1 This Chapter discusses below the main data sources on LGV movements and stock to outline the context and material available from which to construct an LGV demand model.

4.1.2 Within the UK across the last two decades LGVs have been the fastest growing component of total road traffic. This is true both: for interurban roads where most vehicle types have increased their traffic flows, except in the few years after the economic collapse in 2008 and during the COVID period; and for urban roads where only LGVs have experienced substantial growth since 2002. It is not helpful for analysts that LGV is nevertheless the road vehicle segment for which the least data has been collected systematically across this period, at either the national (DfT/NH) level or for regions or counties at lower spatial levels.

4.1.3 The biggest challenge in LGV model development is not the model design and construction itself. Instead it lies in assembling consistent datasets that cover all LGV movements across all of the UK at a sufficient level of spatial and purpose segmentation detail that could then enable the LGV model to be successfully implemented and calibrated in a cost-effective manner.

Caveats

4.1.4 There are important caveats that should always be considered when analysing the use of current LGV data sources to support model development within the UK.

4.1.5 The most important aspect to consider in all analysis related to LGV movements is that the data sources available to provide an understanding of LGV behaviour are remarkably weak by comparison with the data sources available for other passenger modes (e.g. the National Travel Survey - NTS) or road freight modes (e.g. the Continuing Survey of Road Goods Transport - CSRGT).

4.1.6 In particular, some of the available LGV data sources discussed below tend to adopt different definitions of what constitutes a van/LGV⁴, so that combining data across different data sources requires great attention to definitional detail so as to avoid inconsistencies and inaccuracies. The lack of consistent, reliable time-series plus cross-sectional data on LGVs has a major impact on increasing the effort that is required to create an adequate model of LGV movements, and it can compromise the quality that can be obtained for the OD vehicle matrices that it outputs.

4.1.7 This Chapter examines the current availability of data on LGVs and on LGV movement patterns. Firstly in Section 4.2 the various past national LGV surveys carried out by DfT are discussed, then Section 4.3 discusses the other main data sources that are of potential use at the national scale on LGVs. Chapter 5 then discusses various ways in which LGV data availability could be improved. It starts by discussing a number of issues relating to the consistency across these key data sources in their LGV data definitions, because these issues if unaddressed have the potential to sabotage the data that would be used to support the implementation of LGV models. Sections 5.2 and 5.3 then discuss some individual small scale tasks that could improve the availability and usefulness of future LGV data. Finally Chapter 6 explains the manner in which a suitably designed new national LGV survey could provide a greatly improved basis to underpin LGV models of passenger and freight movements.

4.2 DfT NATIONAL VAN SURVEYS

4.2.1 Unlike the annual NTS covering passenger travel or the annual CSRGT covering HGV movements, national LGV surveys are not a regular annual DfT survey but have only occurred sporadically. Three distinct types of LGV surveys have been carried out since 2003. Each is now briefly outlined in turn and their potential to provide useful sources of data to underpin LGV model development is then assessed.

⁴ There is no standardisation in naming, with a series of different names being used within different reports, including: van, light goods vehicle -LGV, light commercial vehicle - LCV, light duty vehicle - LDV, etc. that across such reports may or may not refer to the same collection of vehicle types.

DfT Van Surveys (2003-05)

4.2.2 A Survey of Privately Owned Vans was carried out for a single year, 2003, for Great Britain by the DfT (2004). This survey of 2,000 owners was interview-based and included a diary where drivers recorded all of their van use for two days. This collected similar information to that in the annual survey of HGV movements (CSRG), including van types, commodities carried, industrial sectors served and time and location of trips. It additionally collected information about the land use type at the origin and destination of the journey which helps to identify the purpose of each individual trip.

4.2.3 The Survey of Company Owned Vans (DfT, 2008) for Great Britain commenced in 2003 and was continued through 2004 and 2005 but not since then. Drivers recorded details of their van use for a period of three days, collecting broadly similar data to the Privately Owned Vans Survey.

4.2.4 Because of the limited sample size, comprising: 8,427 sampled vehicles in total over 2003 to 2005 for company owned; and 2,074 in total for privately owned vans, the potential sampling errors are not trivial. This implies that little spatial differentiation is possible from these van results.

4.2.5 The particular advantage of these surveys lies in providing insights into which industrial sectors generate the most van trips and into the different characteristics of trip length, time of day, etc. associated with different trip purposes in vans.

DfT Van Activity Baseline Survey (2008)

4.2.6 The Van Activity Baseline Survey (DfT, 2009a and b) was carried out in England in 2008 but this was a simpler set of questions that had no daily trip diary request and collected much less information than the 2003-05 surveys. Consequently it did not provide directly comparable data to that from the earlier surveys, so it does not provide clear insights into the different components of van traffic growth over time.

DfT Van Usage Survey (2019-20)

4.2.7 A more recent data source is the Van Survey (DfT, 2021a and b) covering Great Britain from April 2019 to March 2020 which was largely completed prior to the COVID outbreak. The approach taken by DfT in structuring this survey was to match broadly to the content and presentation of the questions used in the earlier 2008 van activity survey so as to enable broad growth trends through time to be ascertained. Helpfully, this 2020 survey has been improved in its design in a number of ways, relative to the 2008 survey

- to increase the number of questions and of topics covered
- to include more discriminating answer classes for some existing questions
- to more than double the sample size.

4.2.8 Through retaining broad compatibility in the survey format between these two surveys, it provides some capability to examine the scale and direction of changes through time in the demand trends of van movements.

4.2.9 It is important to note that the level of detail on LGV travel patterns provided within the 2019-20 survey is quite limited in its coverage because it **does not collect actual van trip data**, but only on the main usages of that LGV. Consequently, it is not directly suited to the production of OD trip matrices or to providing detailed support for developing demand models of van trip making. Accordingly, its greatest usefulness is likely to be

- Through combinations with earlier 2008 and 2003-05 surveys to try to examine the main trends over time
- Through combination with the 2003-05 surveys to try to introduce into the 2020 data some spatial information on trip patterns and on how these patterns differ between LGV types, ownership types, business sectors, etc.

4.2.10 The combination of the 2020 survey data with the earlier 2003-05 van surveys that did collect data for individual van trips, could produce information that would help inform procedures for estimating van OD matrices by trip purpose. However, the small sample sizes for both surveys imply that these OD matrices would necessarily need to be created as synthetic matrices rather than as scaled "observed" matrices. These, synthetic matrices could then be improved through use of LGV traffic count data by road link to ensure that local patterns of movement were represented more accurately.

4.2.11 The work required to carry out such combinations of data across surveys is challenging in nature, due to the requirement to address the substantial set of definitional and other differences between the surveys. The aim should be to minimise the impacts of the various differences across the surveys in their survey design and implementation. This task would include further comparative analysis of the meta-data and questionnaires for each of the surveys in order to ensure that all relevant issues are covered and to identify any approximations, scaling and matches that would mitigate the impact of the differences uncovered between the surveys. Some residual uncertainty will remain regarding the reliability of the results, due to the large number of assumptions and simplifications that are likely to need to be made during the processing and analysis. However, given the absence of detailed regular annual survey data for LGVs these combined surveys should provide the best available data source on which to base LGV models.

4.2.12 Nevertheless, the preferred way ahead would be to carry out a new LGV survey that reverts to the 2003-05 structure of collecting individual trip information over a few days rather than just requesting the main use of an LGV, as in the 2008 and 2020 van surveys. The characteristics of this proposed new LGV survey are discussed below in Chapter 6.

NTS

4.2.13 The NTS for passenger trips does contain some information on the passenger trips made in LGVs. However, this NTS information is partial because it does not set out to capture the trips by those for whom driving is a significant part of their occupation, so that in-course-of-business LGV trips are likely to be significantly underreported, while LGV delivery purpose trips are totally excluded. Moreover, this LGV component data has been shown in the past to be strongly under-reported and biased (Le Vine et al. 2013) and to not be to the high standard of other NTS components.

4.2.14 For these reasons the NTS does **not** provide relevant trip data support to LGV freight model development.

4.3 OTHER NATIONAL LGV DATA SOURCES

AADF / WebTRIS

4.3.1 DfT publishes⁵ roadside vehicle count-based Annual Average Daily Flows (AADF) data for each individual link of the major road network. This dataset covers all 12 vehicle types of traffic, within which “Light Vans” are a single vehicle type, on all major roads in Great Britain. It is created annually based on around 8,000 roadside manual classified counts of vehicles by type. These counts each year are collected for twelve hours, 7AM to 7 PM, of a single typical weekday. Around 300 24-hour permanent DfT automatic traffic counter (ATC) sites (plus other ATC sites of National Highways, Transport for London and Transport Scotland) are used to support the procedure to scale link traffic flows from a single 12-hour weekday to the annual estimate. The resulting AADFs are published annually and have been scaled to represent an average day. This is also the source for the DfT published aggregate Road Traffic Tables that provide annual or quarterly statistics on vehicle flows, segmented by vehicle type, road type, time of day, etc.

4.3.2 National Highways WebTRIS⁶ road traffic count data across its strategic road network is also available which is based on automatic vehicle length count technology, rather than on manual classification of vehicle types. This provides a distinction between 4 sizes of vehicles based on vehicle length cut-offs of 5.2m, 6.6m, 11.6m. These length categories approximate somewhat to car, LGV, rigid HGV, articulated HGV but are likely only to be a very rough approximation to the actual vehicle type categorisation. For example, based only on vehicle length small LGVs will be indistinguishable from cars and small lorries will be indistinguishable from larger LGVs. On a more positive note, the use of automatic counts ensures that it can provide temporal breakdowns by vehicle length by hour of the day or night, day of the week and through the course of the year.

⁵ See <https://roadtraffic.dft.gov.uk/downloads> for downloads

⁶ See <https://webtris.highwaysengland.co.uk/>

4.3.3 Because of their comprehensive spatial coverage these datasets are the only sources that currently have the potential to provide a detailed differentiated spatial pattern of LGV usage across the country. However, the issues that are discussed in Section 5.1 regarding the accuracy of LGV identification in a suitably consistent fashion, imply that significant research may be needed to develop suitable procedures that could combine LGV traffic count data from AADFs and / or WebTRIS with other LGV datasets in an appropriate fashion that could produce solid, consistent foundations for demand model development.

MOT dataset, DVSA

4.3.4 The Driver & Vehicle Standards Agency (DVSA)⁷ administers the MOT scheme for annual road vehicle testing. An electronic record is created for every test conducted. The electronic test records are made available publicly on-line⁸ within the MOT dataset, which could potentially provide useful information for LGV data provision.

4.3.5 It has the potential to provide an estimate of the stock of LGVs by type that are registered in each zone, along with the annual mileage carried out by each vehicle and how this annual mileage differs between vehicle ages and sizes. However, it only covers vehicles of 3 or more years so that a major in-fill estimation would be required to adjust this to cover the total LGV fleet. This adjustment could be based on the DVLA LGV stock data discussed below.

4.3.6 Note that for the reasons discussed in Section 5.1, differences in data definitions may ensure that this MOT estimate of annual LGV mileage cannot match exactly to the estimates derived from other data sources such as the AADFs.

Van stock data, DVLA

4.3.7 Statistics on the stock of currently registered LGVs are compiled by the Driver and Vehicle Licensing Agency (DVLA) and published by the DfT in the Vehicles and Drivers statistics series⁹. These are of potential use to support LGV ownership modelling and to identify the residential location of commuting trips.

4.3.8 Spatially detailed annual vehicle stock data is in Table VEH0105. It contains "Licensed vehicles at the end of the year by body type and upper and lower tier local authority, including diesel cars and vans, Great Britain from 2009; also United Kingdom from 2014".

4.3.9 The table contains an overall Light Goods Vehicles category. The allocation of vehicles to local authorities is based on the address of the registered owner. In the case of privately owned vehicles this would tend to be where the vehicles are

⁷ See <https://www.gov.uk/government/organisations/driver-and-vehicle-standards-agency>

⁸ Available for download at <https://data.gov.uk/dataset/e3939ef8-30c7-4ca8-9c7c-ad9475cc9b2f/anonymised-mot-tests-and-results>

⁹ Available for download at <https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01#licensed-vehicles>

kept overnight and from which commuting or service trips may be initiated in the morning. For company owned LGVs the situation is more complex. In particular, for those companies providing long-term leased LGVs there may be large numbers of LGVs registered at the location of the head office, but very few of these LGVs would be housed at the premises at any point in time. Similar complications may arise for other enterprises such as the large parcel delivery firms, who may register their fleet to one or a small number of central offices but then distribute them to operate from dispersed depots spread widely around the country.

4.3.10 For this set of reasons, unless it is feasible to obtain from DfT statistics an extended version of Table VEH0105 that is further differentiated between private and company owned LGVs, it would not be ideal to adopt this table for the estimation of the zonal LGV trip productions. An alternative approach based on zonal employment data segmented by occupation may be more satisfactory.

4.3.11 The ideal dataset would be an extension of VEH0105 to include:

- segmentation of LGVs between privately and company owned
- spatial disaggregation down to the level currently used in defining the zoning system for the NTMs
- segmentation by LGV size.

5 IMPROVING LGV DATA SOURCES

5.1 VAN DATA DEFINITION CONSISTENCY

5.1.1 Here we examine the consistency of data definitions across the main LGV data sources listed above, because addressing definitional inconsistencies is a key task when assembling sound data on which to support comprehensive, consistent LGV freight and LGV passenger models. We will outline in Section 5.3 an approach to mitigating the impacts of such definitional inconsistencies.

5.1.2 The standard definition of an LGV adopted within many official transport statistics had been “Goods vehicles not exceeding 3.5 tonnes gross vehicle weight”¹⁰. However, for the DfT published¹¹ roadside vehicle count-based Annual Average Daily Flows (AADF) data, the LGV category “Includes all car-based vans and those of the next largest carrying capacity such as transit vans. Also included are ambulances, pickups and milk floats.”

5.1.3 A recent additional complication is that vehicle licensing statistics¹² have recently been changed such that **alternatively fuelled** goods vehicles up to 4.25 tonnes now are also classified as LGVs. As the stock of such **alternatively fuelled** LGVs builds up into the future, it will be necessary to ensure that all future year

¹⁰ <https://storage.googleapis.com/dft-statistics/road-traffic/all-traffic-data-metadata.pdf>

¹¹ See <https://roadtraffic.dft.gov.uk/about>

¹² <https://www.gov.uk/government/statistics/vehicle-licensing-statistics-2024>

statistical sources can provide a similar adjusted LGV classification, so as to ensure definitional consistency.

5.1.4 At the start of any LGV model specification a decision needs to be made defining the exact composition of the mode/vehicle type LGV that is to be adopted. This can then be used to disentangle this subset of vehicles from the actual set of vehicles that may be presented in practice as vans / LGVs or as other vehicle types within each of the individual datasets that are then used to support this model development. For example

- Are minibuses and large people carriers excluded from the LGV category? If yes, are we confident that these vehicles are actually fully and consistently included elsewhere in the passenger model? If they are not to be included within the LGV category, what procedure do we use to remove them from the LGV totals within the Road Traffic Estimates which are used as control totals for LGV model calibration?
- Is the split of LGVs from lorries at the 3.5 gross vehicle weight limit to be used? In which case the larger van type bodies (e.g. UPS delivery vehicles) should be treated as lorries, not as LGVs. The scale of this misallocation of classes is substantial¹³ within the Automated Traffic Counters (ATCs) used by DfT to support the calculation of the expansion factors within the Road Traffic Estimates, as now explained.

“Due to similarities in vehicle body type, 2-axle rigid HGVs may sometimes be classified as either LGVs or buses, and vice versa. While this misclassification does occur in both directions, there is a greater misclassification of LGVs and buses as 2-axle rigids than in the opposite direction. Our current best estimate is that 23% of LGVs and 42% of buses are misclassified as 2-axle rigids.” (DfT, 2011)

- Will the separation of vehicle types be applied consistently at all traffic count data inputs? Alternatively, where ATCs of both DfT or National Highways are used, are there inconsistencies across different individual counters located along the same stretch of road or over the years in the set-up of their individual procedures used to distinguish cars from LGVs and from heavy vehicles?

¹³ “Estimates of ATC misclassification proportions:

		ATC			
		Car	LGV	2-axle Rigid	Bus
Actual	Car	96%	4%	-	-
	LGV	31%	46%	23%	-
	2-axle Rigid	-	46%	53%	1%
	Bus	-	-	442%	58%

The above figures come from an exercise to estimate the proportion of vehicles being misclassified by ATCs circa 2002. The ATC algorithms used to classify vehicles by vehicle type have not changed since this date, although the weight and configuration of vehicles used in the algorithm may have done so” (DfT, 2011)

5.1.5 For the AADF and other classified traffic count-based data sources, most observers counting vehicles will struggle to separate out the 3.5 tonne gvw size cut-off, so that the traffic count may in error exclude some LGVs that are below this size limit as well as including as LGVs some HGVs (with van appearance) that are above this size limit.

5.1.6 Care is also needed when combining link count-based AADF LGV data with any of the van survey-based datasets. This is due to on-going potential inconsistencies in the definition of an LGV between these different data sources. DfT (2008) states that

"comparison with the Department's road traffic estimates suggests that there is still some underestimation of company van activity in the figures in this report".

The 2003 Van Survey estimate of total van kilometres was 50 billion, which is 86% of the corresponding road traffic estimate for van kilometres in that year. Such differences between survey-based vehicle kilometres and roadside count-based vehicle kilometres unfortunately tend to be common to many road vehicle types.

5.1.7 The meta-data supplied within the "Van Statistics 2019-2020: Technical Report" (DfT, 2021b) indicates that its analysis and its comparison with earlier surveys will need to be carried out with great care. This 2020 van survey defines a van as:

"(Light commercial vehicles / light vans) 4-wheel vehicles constructed for transporting goods. Must have a gross weight of 3.5 tonnes or less.

The definition of a van used in this research means that the population covered by this study is smaller than number of licensed vans in Great Britain." (page 1, DfT 2021)

5.1.8 This difference in definitions needs to be accounted for when expanding the survey results to the national fleet. More generally, the definitions of road vehicle types adopted within the statistics on the new and used national licensed vehicle fleets or in the odometer data on vehicle mileage available through the MOT, do not necessarily correspond to those used in traffic count statistics.

5.1.9 DfT (2018) has carried out an Alternative Data Sources project to investigate and determine feasible options for collecting short-term count data, which would replace or supplement the current manual and video count sources that are used to produce these AADF classified traffic count estimates. The conclusion from this investigation of a wide range of alternative technologies was

"that none of the technologies provided detailed and accurate enough vehicle classification counts for DfT's statistical purposes". ...

"The analysis found that some of the technologies were within 1% deviation from the enumerator total, however, none provided the accuracy of vehicle classification required." (page18, DfT, 2018)

5.1.10 This indicates the real danger of inconsistencies when combining any classified vehicle counts from the AADF source, with those from separately designed

local authority or NH WebTRIS traffic classified vehicle counts. As a default, the procedure used to separate out LGVs from cars and HGVs in any such alternatively sourced counts should be assumed to **not** be consistent with the AADF vehicle classification criteria, unless there is direct evidence provided that convincingly demonstrates their equivalence.

5.1.11 Le Vine et al, (2013) have a useful compendium of the differences in the definition of a "van" between various data sources which of course leads to differences in totals and in trends between these data sources. They have analysed how these definitional inconsistencies impact on the sources of van growth in the Road Traffic Estimates.

"In the course of this study it was determined that some caution must also be exercised when interpreting the Road Traffic Estimates. There is no reliable data on trends in van traffic levels in the winter, and across the whole year at weekends and after 7:00 PM at night. Further, minibuses and larger people carriers are classified as vans in the Road Traffic Estimates but are not classified as vans by the NTS or by DVLA's administrative data. Therefore, their growth is contributing to estimated van traffic growth only in the Road Traffic Estimates, but not in other data resources."

5.2 IMPROVING LGV DATA

5.2.1 Data provision on LGV movements could be expanded in a form that would provide improved foundations for LGV modelling, through the following initiatives related to standard statistical datasets.

5.2.2 For the **roadside classified vehicle counts** that underpin DfT's AADF, carry out a small research study to quantify an updated estimate of the consistency between: the identification of the vehicle type "van" in the vehicle count; and the official definition of a van/LGV as a goods vehicle of up to 3.5 tonnes gross vehicle weight, which is in use in a number of other government datasets. Identify and quantify, the main circumstances where LGV counts are being wrongly classified as lorries or as cars, and vice versa. This should help to uncover the sources of the very significant differences that have been found between the road count-based and the vehicle survey-based estimates for each of LGVs, cars and HGVs (DfT 2011 and 2018). Use the improved understanding of the specific causes of biases in vehicle identification to improve the published traffic estimates and to make them more consistent across the various datasets.

5.2.3 Within all **surveys of mode choice in commuting** (e.g. Annual Population Survey, Labour Force Survey, future national Population Census, etc.) and in **other passenger travel surveys**, ensure that their set of modal options that are listed explicitly should distinguish car from van/lorry. This should be a simple adjustment as it would not create any break in series because the two categories could be added together whenever required to provide consistent time-series for backwards compatibility. There is no requirement in such commuter data to add the extra complication of separating between LGV and lorry because the proportion of

passenger commuter travel in lorries will be very small and so can safely be merged with LGVs.

5.2.4 Although it may lie outside the direct remit of this freight LGV think piece, the importance should be noted of checking to ensure that any future demand modelling of LGV non-delivery (i.e. passenger) trips within the NTM maintains a rigorous and consistent foundation. Potential complexities may arise because the representation of LGV trips within the NTS has incurred a number of serious gaps that have been identified by the excellent analysis provided by Le Vine et al. (2013). Offsetting its incomplete representation of LGV trips by purpose and addressing its reducing response rate trends for LGVs through the years within the NTS, are important for the passenger NTM, because the NTS is the data source underpinning the estimated National Trip End Model (NTEM) trip rates, segmented by trip purpose, that support the NTM and other UK passenger models. Hence there is a benefit to **clarifying whether NTEM trip rate estimates** and their usage within the NTM **have been significantly contaminated by past problems relating to the coverage of LGV trips within the NTS.**

5.2.5 It would also be necessary to **quantify the extent** to which the current **NTEM estimates of trip rates**, segmented by passenger trip purpose, **already include all, some or none of the passenger trips made in LGVs.** Any specialised model of LGV passenger flows would need to ensure that the appropriate proportion of trips for each trip purpose are discounted to avoid double counting, with respect to those already included within conventional passenger models, by virtue of the current NTEM trip rate estimates.

5.2.6 Analogous issues arise with respect to the inclusion of LGVs within the National Car Ownership Model (NATCOP) that supports NTEM projections of future passenger trip generation rates. The Rand Europe report (Fox et al., 2017) documenting the NATCOP update so as to reflect a 2011 base year, states that

“The term ‘vehicles’ is used deliberately in this section because in addition to cars motorcycles/scooters/mopeds and Land Rover/Jeep and *light van vehicle types are included*. However, for simplicity these groups are *collectively referred to as ‘cars’* in the remainder of this report.” (page 6, italics added)

5.2.7 This extract clarifies that despite its name, NATCOP actually is a model of growth of cars plus (some) vans. However, because it is estimated based on datasets, such as the NTS and the Expenditure and Food Survey (EFS), there are limitations on the proportion of company owned vans that are likely to be included within its coverage. **The NATCOP documentation needs to be extended to provide greater quantitative clarity on the extent to which LGVs are included or missing from base year estimates and future year forecasts of “car” ownership.**

5.3 Consistency review across LGV data sources

5.3.1 The discussion in the preceding sections has illustrated how inconsistencies in LGV data definitions arise, and the confusion that they can cause for analysts unless they are resolved in a systematic and standardised fashion.

5.3.2 Accordingly, it would be valuable to initiate a small study to examine in detail the meta-data across the complete set of standard statistical LGV data sources that are listed above. This study would systematically identify any existing differences in LGV data definitions and coverage, across all standard LGV data sources. This data consistency review task would have two main aims. Firstly, it would alert analysts to cases where statistics on entities that have the same name in two or more data sources, may, in reality, be measuring either different subsets of, or different characteristics of, the entity in question. Secondly, for those charged with assembling data for use as input to the LGV model, it would provide standardised guidance on how best to assemble the required input data in a form that maximises its internal consistency across the set of data sources from which it is drawn.

5.3.3 The ultimate aim of this task would be to ensure that, if possible, each of their individual data entities should maintain identical data-definitions throughout these combined datasets. Where this commonality proves infeasible, then each differing version of an individual data entity within the dataset should be attributed a distinct variable name that would alert the analyst to the inconsistencies in data definitions. For example for the LGV entity, use the names

- LGV_TC – to denote the definition of the set of LGVs included when carrying out traffic counts for, say, the AADF classified roadside count surveys,
- LGV_Flt – to denote the definition of LGV coverage used in vehicle fleet licensing statistics,
- LGV_Sv – to denote the definition of LGV coverage adopted in the Department's past LGV surveys,
- etc. for any other variant set of LGV coverage within standard datasets.

5.3.4 In summary, the main content of this LGV data consistency review report would comprise

- Coverage of all standard LGV dataset sources
- Listing of all mutual inconsistencies in data definitions and classifications for such sources
- Standard procedures for addressing these inconsistencies when combining distinct data sources together into
- Standard classifications and data definitions that are adopted for universal use across these datasets, as well as in other wider passenger and freight datasets potentially used to underpin the NPTM or NFTM.

5.3.5 This LGV data consistency review study would not be expected to be a very large task. Ideally it should be carried out internally by DfT statisticians. Alternatively, if it is commissioned externally, the study team should proceed in

close liaison with the DfT statisticians in order to ensure that they have full and accurate information on the coverage of individual data items across all the main freight data sources. It should be a high priority to start this study soon so that its results become available early enough to provide constructive support across FAME model development tasks.

6 A NEW TRIP-BASED LGV SURVEY

6.1 OVERVIEW OF THE SURVEY

6.1.1 The most productive initiative to improve the quality of LGV models would be to execute a new LGV survey with coverage that is broadly similar in structure to the set of LGV surveys carried out successfully in 2003-05 for the Department (DfT, 2004 and 2008). These provided the only **trip-based** comprehensive national van dataset that is available in the UK, because the subsequent 2008 and 2019-20 DfT van surveys did not collect information on trip making but only on overall van use. The 2003-05 surveys covered all trip purposes including: commuting; employer's business (mainly service or construction related); private; and delivery (freight) trip purposes. They covered both privately owned and company owned LGVs within distinct surveys. They collected information on the characteristics of each trip made during a few successive days.

6.1.2 The design of this new survey should achieve a very similar coverage through minimal changes to the original questionnaire, other than where is helpful to expand some response categories to take account of updated circumstances (e.g. the rebirth of grocery delivery rounds). This similarity between surveys is needed to facilitate a consistent quantification of the relative growth rates since 2005 across the set of sub-markets for individual van trip purposes. It should cover both privately owned and company owned LGVs within the surveys while adopting a largely common set of questions for both, except where excluding irrelevant questions.

6.1.3 In particular, it **must** retain the questions on the type of industry/activity at the point of pick-up and drop of each consignment or at the start and end of each passenger trip. This information is invaluable in terms of understanding why trips were being made, as well as in the determination of suitable indicators for use in estimating LGV trip production and attraction rates for each LGV freight and non-freight trip purpose. For freight trip purposes this information is crucial for understanding the structure of supply chains for individual industry sectors and for identifying where LGVs fit within them.

6.1.4 The success in capturing and then using this data specifying land use type to improve the foundations for LGV modelling within the Freight in London Model (Deane et al., 2010), indicates why it is equally important to also obtain analogous land use type information for HGV trips. This LGV question on the type of industry/activity should be structured in an identical fashion to that which should also be introduced for HGVs within the CSRG T for each vehicle collection or

delivery stop. As discussed in the companion FAME: Base Year Matrices Think Piece, obtaining this information is central to the implementation of a good representation of supply chains within freight demand modelling and to the integration of LGVs with small HGVs within the choice mechanisms for the vehicle types that carry out the tertiary logistic delivery and collection legs within such chains.

6.1.5 Although there are benefits to modelling trips in LGVs for passenger trip purposes in a separate fashion to that used for freight trip purposes, this does not imply that this should lead to separate LGV surveys between passenger and freight usage. An individual using their LGV for delivery purposes from 8AM to 4PM on weekdays, may use it for various passenger purposes at other times of the week or during their holiday breaks. Alternatively, the LGV may be in use for delivery purposes on a part-time basis only, with other types of usages occurring for most of the week. Consequently, passenger and freight usages could not easily be isolated into separate surveys.

6.1.6 There may be difficulties in successfully implementing a detailed trip-based LGV survey in a traditional paper-based fashion. This is a freight sector where the LGV parcel delivery drivers are under great time pressure to achieve their 100+ deliveries every day. Consequently, they will have minimal ability and inclination to delay their pressurised schedule by recording details about each individual delivery movement. Consequently, DfT should explore technology-led solutions that automate the recording of the movements and stops of the surveyed LGVs, through developing the approach described at the end of the next section. The automated truck trip diary data collection exercise successfully implemented in the Netherlands (de Bok, et al., 2022), may provide some guidance on what could potentially be achieved through automated procedures that are linked into the software tools for managing delivery schedules that are in use by delivery firms.

6.2 THE CHARACTERISTICS OF THE SURVEY

6.2.1 The specific characteristics of the proposed new LGV trip-based survey are listed in this section. The aim is to match closely to the 2003 to 2005 Van Surveys, except where explicitly differentiated below. This matching will simplify the identification of the main trends in LGV usage across the last 20+ years.

Coverage

6.2.2 In 2003 the decision was made to carry out the surveys of company owned and of privately owned vans within separate surveys. An earlier combined survey in 1998/99 had suffered from non-response and under-reporting and so was terminated before completion. A van is defined as company owned if the registered keeper is a company. A van is deemed private if the registered keeper is any other category i.e. Mr, Mrs, Miss, Rev, Dr, between keepers, etc.

6.2.3 The keepership balance has changed over the years because the proportion of company owned LGVs has grown more rapidly and is now almost equal to the

proportion of privately owned LGVs. The privately owned LGVs tend to be older and to travel less distance in a year, and they tend to have significantly different types of usage purposes from the company owned LGVs. For these reasons, it is important to survey both these LGV ownership types in detail.

6.2.4 For leased LGVs, the registered keeper may be the leasing company or the user, depending on the nature of their leasehold agreement (e.g. contract hire or finance lease). This may complicate the determination of the normal location of the LGV, because the office location of a major vehicle leasing company may have associated keeperships of thousands of vehicles that in practice are normally based elsewhere. It will be important to ensure that leased LGVs are not under-represented within the survey response, because there is no guarantee that their pattern of usage will be similar to other respondents.

6.2.5 The survey design should cover both company owned and private vehicles. There may be benefits to some limited differences between their questionnaires, aimed solely to avoid any complexity in response that is caused by needing to skip individual redundant questions. In other respects, the questions on vehicle usage and trips should be common to both keeperships, so as to avoid mutual inconsistencies in coverage and to simplify the expansion of the results from the group surveyed up to the population of LGVs of GB (or ideally of the UK).

Time period of survey

6.2.6 In line with the earlier company-owned van survey, data should be collected covering three successive days' activity from each vehicle within the sample. It should cover all LGV movements within this period, not just those during working hours.

6.2.7 There should be approximately the same number of vehicles allocated to each day of the week in each survey week. The sample should be spread evenly over the year, to ensure that seasonal variations in vehicle usage are captured.

Target sample size across strata

6.2.8 The aim of the survey is to obtain a representative cross-section of LGV usage across the whole country. Accordingly there must be a straightforward procedure for expanding the trip results from the sample up to the parent population of LGV movements.

6.2.9 The main sample can be drawn from vehicle records at the DVLA. The vehicles covered by the survey are those in the light goods vehicle body type. Its current definition is

“Vehicles constructed for transporting goods and must have a gross weight of 3.5 tonnes or less, or 4.25 tonnes or less if zero emission.”¹⁴

¹⁴ As of 2/2/2026 at <https://www.gov.uk/government/publications/vehicles-statistics-guidance/vehicle-licensing-statistics-notes-and-definitions>. Note that this is not the standard

6.2.10 A sample size of around 15k fully completed responses for company owned LGVs would broadly match what had been achieved in 2003-05. This was sufficient to provide constructive insights into the national pattern of LGV usage but was not sufficient for quantifying more localised spatial patterns. It should be coupled with a similar 15k responses for the privately owned LGVs. To achieve this number of completed responses, a significantly larger set of keepers would need to initially be contacted, since experience indicates that a proportion of vehicles may be awaiting repair, not in current active use, scrapped, etc.

6.2.11 The sample should be stratified by region / nation to ensure adequate regional coverage. It should further be stratified by vehicle age and size because different types of LGV usage, tend to have quite different vehicle size and age profiles. A specific stratum for alternatively fuelled LGVs might also be of interest, though this would need a higher than standard sampling rate to take account that these vehicle types currently comprise just a small proportion of the total LGV fleet in the UK.

Meeting the survey's challenges

6.2.12 The firm commissioned to carry out this LGV survey will need to be one that has demonstrable experience in successfully executing challenging surveys for populations that are known to be loath to respond. LGV surveys are known in many countries to be particularly challenging to complete successfully, due in part to the stressful conditions of work of many drivers, to the high staff turnover and poor working conditions at some parcel firms, and to the diverse educational and linguistic backgrounds of LGV drivers.

6.2.13 As part of the design of the survey, close liaison should be maintained with those charged with managing the CSRGT survey, as there are likely to be many lessons to be learned from this CSRGT regarding the pitfalls to be avoided in such surveys and the benefits of maximising consistency between the LGV and CSRGT surveys.

6.2.14 In challenging survey situations, it has often been found that the initial survey response rates may transpire to be quite different between different groups of LGV users. This in turn introduces biases into the data that is collected, that may be difficult to resolve through procedures such as applying differential sample expansion factors.

6.2.15 The standard procedure to identify such differential response rates and to lessen their impacts is to define a set of quotas across segment cross-sections that need to be achieved. For those segment cross-sections that have below quota response rates, the sampling rates would need to be increased so as to offset these low rates. While this is still an imperfect situation, it is likely to provide more

historic definition of an LGV, so future potential inconsistencies between data sources in vehicle coverage need to be guarded against.

informative insights than simply increasing the sample expansion rates to offset the reduced response rate segments.

Surveys of specific sectors

6.2.16 Additional sampling targeted at specific types of companies could be helpful to ensure that certain specific types of LGV usage are well covered. These company surveys would have two parts. Firstly a survey of their fleet size as a whole and of the fleet composition in terms of its vehicle type and age profile, and its split between those owned or contracted by the company in the course of the survey year. There would also be a trip-based survey similar to that described above, of a representative sample of these LGVs over a three day period that ideally is again systematically sampled across the year.

6.2.17 For example, grocery delivery rounds from the major supermarket chains are a source of local LGV traffic, but the detailed approach adopted in terms of shift length, average number of shipments per LGV, etc. may differ across these chains.

6.2.18 Accordingly, a survey of the major supermarket chains may be helpful to underpin analysis that quantifies the characteristics of each chain's pattern of usage of LGVs, including:

- The make, model, gvw and age cross-section of their vehicle fleet
- Number of personnel shifts per vehicle, and of delivery routes completed per day, and the typical working hours on weekdays and on weekends per vehicle
- For the set of delivery routes, quantify the median, upper and lower quartile of:
 - the weight of goods per residential delivery
 - the number of deliveries, the distance covered and the time taken, per delivery route
- The type of delivery route, e.g local from adjacent supermarket, or entailing access leg from a sub-regional hub (stem and bush), etc.
- How these delivery characteristics may vary between urban and regional area types, across regions and over the years. How many LGVs in each of a set of specified size categories have they had in active use in each year up to the present
- Plans for potential future changes in delivery characteristics or of expansions of services
- Number of LGVs mainly in use for purposes other than residential grocery deliveries, plus classification of such purposes.

6.2.19 A similar but distinct survey focused on the larger national and regional parcel delivery / courier companies could also be informative. While many questions may be similar to the topics listed above for grocery delivery, the operation of the parcel delivery market has some distinct characteristics.

6.2.20 Some parcel delivery firms, such as Royal mail, Parcelforce, UPS and DHL, mainly use company owned LGVs that are provided to their employed drivers, though at peak periods these firms may also temporarily contract self-employed

drivers with vehicles. Their LGV fleets may be relatively homogeneous within their liveried small range of vehicle models and makes.

6.2.21 Other parcel delivery firms such as Evri, Yodel and DHL rely mainly on self-employed drivers who own their own LGVs, leading to a much more dispersed set of delivery vehicle types in use.

6.2.22 Note that the standard UPS delivery vehicles are greater than 3.5t gvw, so they are classified as small rigids rather than as LGVs in most official statistical sources. Many courier firms may use vehicle types other than LGVs for deliveries, especially in dense urban areas where cars or cargo bikes may be more suitable. Accordingly, in both the grocery and the parcel delivery survey, it will be necessary to obtain detail on the characteristics of their full set of delivery vehicles so as to avoid subsequent inconsistencies when combining data from different sources.

Geographical scope

6.2.23 The survey could cover Great Britain as previously.

6.2.24 Ideally it could be extended to Northern Ireland because since 2014 the DVLA has provided vehicle registration and licensing services to Northern Ireland¹⁵ in a similar fashion to the rest of GB. However, MOT data for use for expanding the survey mileage up to the annual vehicle mileage, is available from the Driver and Vehicle Agency (DVA) in Northern Ireland, as opposed to from the DVSA for the rest of GB. Accordingly, it may require some effort to obtain full access to DVA MOT data within the same format as that available from DVSA.

6.2.25 Focusing the survey on specific test towns or cities may not be informative because the location of an LGV's main usage may not match the spatial pattern of keeper's addresses. For example, due to the moderate income levels of typical private LGV owners they may struggle to reside in cities with high house and rental prices that have a low availability of affordable housing.

6.2.26 For example, the growth rate¹⁶ in private LGV registrations from 2009 to 2023 was 38% for England overall. In Peterborough, Cambridge and London, their respective LGV registration growth rates for this period were 47%, 17% and -23%, which indicates very different rates despite these three cities all being among the fastest growing English cities in this period. The high house prices and parking difficulties in Cambridge and London are largely unaffordable for typical LGV drivers, whereas Peterborough is attractive due to its lower house prices and attractive road network. A major inflow of LGVs can nowadays be observed on weekdays in the early morning peak crossing the London boundary to provide many of the tradespersons, construction workers and delivery drivers that serve this expensive city.

¹⁵ <https://www.gov.uk/government/speeches/vehicle-registration-and-licensing-in-northern-ireland>

¹⁶ Source DfT Vehicle Statistics Table VEH0105.

Questionnaire design

6.2.27 The data captured in the survey should be collected using questions that are as consistent as possible in their form and coverage with those originally included in the 2003-05 Company-Owned Vans Survey trip diary, for which the questionnaire is listed in DfT (2008). As in 2003, the questions on the characteristics of the keeper will need to be differentiated somewhat between the private LGV keepers and the company owned LGVs, through guiding them to separate paths of questions that are each structured to be relevant to their own distinct situations.

6.2.28 Judgement will need to be applied in some instances as to whether some adjustments to questions or to the choice categories for answers should be applied so as to improve consistency with more recent van surveys and with the current CSRGT. Such adjustments should be applied provided that they do not compromise the consistency of the identification of detailed trends in LGV usage between 2003-05 and the present.

6.2.29 The original 2003-05 surveys were paper based, but nowadays it would be more appropriate to switch the default approach to be online. The paper based survey would continue only as a backup that is available for use on request. This switch in format will also greatly reduce the surveyor's manpower needs for data input and initial cleaning tasks. The 2021 switch of the CSRGT from paper to online has already been seen to be successful in reducing non-response rates.

6.2.30 The information about the keeper or company, plus the characteristics of the LGV and of its typical usage (Questions 1 to 14 of 2003-05 for company owned LGVs and analogous 2003 questions for privately owned LGVs) should be collected by this online survey. In contrast recent technology developments could be used to simplify and improve the collection of the detailed LGV trip diary information over the surveyed days. This improved approach is outlined next, though the paper based trip survey should still be retained as a fallback for respondents, e.g. for those owning LGVs aged 20+ which might not contain an OBD port.

Automated form of trip diary survey

6.2.31 For capturing the trip diary details throughout the survey days, it would make the life of the LGV driver much simpler if the main data capture step was automated, so as to limit their need to spend their time on data input. This should have many benefits also for the surveyor because the quality of the trip data collected should be better and more comprehensive, and the simplification of the recording task for the driver should reduce the known substantial risk of incomplete compliance or of total non-response.

6.2.32 The legal requirement was introduced to the EU (and UK) between 2001 and 2007, depending on fuel type and van size, for all new vans to provide an On-Board Diagnostic (OBD) port for use for connecting to an OBD reader. A suitable plug-and-play dongle that is connected to this OBD port would enable continuous information to be collected and accessed automatically about the vehicle usage, including

- GPS location whenever moving or stopped

- Trip sequence recordings, including start and end locations and times, together with the mileage, route and duration of the trip between successive stops
- Duration at each stop location
- etc.

6.2.33 The required pieces of information that are not automatically collected through the dongle at the end of each trip are:

- the number of people in the vehicle including the driver
- the main reason for the trip – select one of the 14 trip purpose categories
- the subsidiary reason for the trip – select one of the 14 trip purpose categories
- select one of the 14 category types for the destination premises accessed

If it was a freight type purpose

- select the commodity type delivered, if any – NST code
- select the commodity type collected, if any - NST code
- estimate how full the vehicle was at the start of that journey (4 categories)

6.2.34 A suitable app installed on the driver's phone could be designed to ping at each vehicle stop and to query this set of at most 7 questions in an easy to answer fashion for that trip. For each successive question it would list the appropriate set of categories within which one is to be selected. Suitable easy to access help facilities should be made available through simple keystrokes to enable the respondent to get background information about what types of goods movements fall within any specific NST category so as to maximise the accuracy of the response and to minimise the effort required from the respondent. To further minimise the response task for the driver, the first question at each ping stop is whether anything has changed since the previous stop. It is only after responding yes to this question, that they would need to change one or more responses from that given for the previous trip. In this manner, driver response actions are made as simple as possible.

6.2.35 At the start of the first day of the survey (collected once only) it would further request the category type of the origin premises at which the vehicle was parked, prior to its first trip. This information should be available directly from the daily responses at the end of subsequent days.

6.2.36 To avoid driver response overload in situations such as where repeated parcel deliveries are made every few minutes, a sophisticated control system could be devised that enabled the questioning to automatically be suppressed until either there is a long duration between successive stops or a long duration at a stop. This would ease the user response burden for intensive multi-leg delivery routes. However, the automated OBD-based collection of trip leg data on location and movement should continue throughout the survey days, independent of the number of legs per delivery route.

7 ESTIMATING ZONAL TRIP ENDS

7.1 IMPORT/EXPORT AND INTERNATIONAL TRIPS

7.1.1 Comprehensive data sources that quantify the international movements of LGVs have not been located within published statistics but perhaps some such information exists within unpublished sources. The standard published port statistics normally combine LGVs with cars into a single category, both in the DfT statistics and in individual port or Eurotunnel statistics.

7.1.2 The 2019-20 DfT Van Usage Survey (DfT, 2021a) found that the subset of LGVs that were *mainly used for international travel* were predominantly privately owned and were most frequently used for the ‘recreational/leisure and holidays’ purpose, but that there was minimal usage for the international goods delivery purpose.

7.1.3 Undoubtedly, there will be some LGV borne import and export freight movements through international ferries, but such trips are unlikely to comprise a major proportion of LGV freight traffic on most of the road network. Accordingly, until some solid data source becomes available that measures LGV international movements, the LGV freight model should be confined to domestic movements.

7.1.4 For the private trip purpose, LGV camper van movements through ports may be a significant element within the overall mileage of such LGVs, because these vehicles may initially be acquired specifically to facilitate international tourist travel, both inbound and outbound to/from the UK. Consequently, in a passenger LGV model, there is a stronger case for including international travel, even though suitable data sources may be scarce.

7.2 GROCERY TRIP ENDS

7.2.1 The estimation of the spatial pattern of the zonal origins of LGV grocery delivery rounds for most supermarket chains will be determined by the locations of their larger retail premises. The Valuation Office Agency (VOA) data¹⁷ for England and Wales on non-domestic hereditaments identifies within its SCat (Special Category) classification of hereditaments that in 2024 there were 3,000 large food stores, plus 2,200 hypermarkets/superstores, so these sites might provide a suitable general basis for the origins of grocery delivery rounds. Analogous data should be available via the Scottish Assessors¹⁸ in Scotland.

¹⁷ VOA rating lists, including post-code, for all individual non-domestic properties for England and Wales are available for download for 2023 at <https://voaratinglists.blob.core.windows.net/html/rldata.htm>, though some discussion between the Department and the VOA over the conditions of use of the dataset may be required.

¹⁸ <https://www.saa.gov.uk/>

7.2.2 In contrast, Ocado¹⁹ sources its grocery products from just seven automated Customer Fulfilment Centres (CFCs) located at Erith, Purfleet, Dordon, Andover, Bristol, Bicester, and Luton. These CFCs ship goods through a network of spokes to smaller local depots from which the last-mile delivery rounds are based that can deliver to most of England and Wales. The modelling of grocery deliveries for firms²⁰ using the Ocado type approach is best represented using the parcel delivery hub and spoke process described in the next section.

7.2.3 The estimation of the spatial pattern of LGV grocery delivery consumption across zones should be based on the zonal population distribution. Increasing evidence is being assembled (e.g. Hood et al, 2020) that certain age groups, income groups, car ownership groups or different density residential locations within the population may have differential usage rates for grocery deliveries, so such evidence should be further explored and factored into the estimated pattern of zonal consumption.

7.3 PARCEL TRIP ENDS

7.3.1 The estimation of parcel trip ends for delivery by LGV would ideally be an output from the NFTM, since such LGV trips comprise the final logistical leg for the consumption of finished products, within the Production – Consumption matrices for such goods. Moreover for some types of shipments, particularly within the construction sector, there will be competition between large LGVs and small rigid HGVs which would benefit from being explicitly modelled.

7.3.2 Hard evidence on the current total number of parcel deliveries in the UK is not easy to track down but an estimate from the Pitney Bowes Global Parcel Shipping index²¹ for 2023 suggests that 5.1 bn parcels were delivered in the UK in 2022, a 5% volume decline from 2021. It also identified the market volume share of each of the 9 largest carriers, while the combined remaining smaller carrier firms had an overall 11% market share in parcel numbers. This indicates that a successful survey of each of the largest parcel carrier firms in the UK could provide data on a large proportion of all UK parcel deliveries.

7.3.3 The operating characteristics of the parcel delivery system within the UK have been described above in Section 3.3. The parcels typically are transported using HGVs, from where they have been concentrated within a small number of regional distribution centres (RDCs), onwards to a larger number of smaller local distribution hubs/depots located throughout the region surrounding each RDC.

¹⁹ [https://www.ocadogroup.com/about-us/osp-partners/ocado#:~:text=Our%20partnership%20with%20Ocado%20Retail&text=Since%20August%202019%2C%20it%20has,population%20\(22.4m%20households\).](https://www.ocadogroup.com/about-us/osp-partners/ocado#:~:text=Our%20partnership%20with%20Ocado%20Retail&text=Since%20August%202019%2C%20it%20has,population%20(22.4m%20households).)

²⁰ Tesco the UK's largest supermarket chain operates a hybrid system – some parts of the country are supplied from local stores, whereas other areas are supplied from urban fulfilment centres.

²¹ https://www.pitneybowes.com/content/dam/pitneybowes/us/en/shipping-index/23-mktc-03596-2023_global_parcel_shipping_index_ebook-web.pdf

From each parcel depot they are subsequently loaded onto and then delivered by LGVs to households or firms. These delivery rounds typically adopt a stem and bush pattern (see Section 3.3). Parcel collection activity may take place in parallel with delivery or as a distinct stem and bush collection round, depending on the local context and the type of good being collected.

7.3.4 The estimation of the spatial pattern of the zonal origins of LGV parcel delivery rounds will be determined by the locations of their local depots. The most appropriate data source for these depot locations is again likely to be the VOA non-domestic hereditaments dataset, focusing on relevant SCat classes, such as builders' merchants, post office sorting centres, storage depots, etc. Some experimentation will need to be carried out to confirm whether the identification of relevant premises can be based simply on selected SCat classes or whether more detailed analysis of the Primary Descriptor classification and the floorspace size of hereditaments is required.

7.3.5 Guidance on productive methods of analysis of VOA data is available in de Saxe et al. (2024) which assembles a downloadable dataset of the individual factories, warehouses and retail premises covering England and Wales in 2023 at which vehicle loading or unloading activities are likely to take place.

7.3.6 Ideally, this VOA based dataset of potentially relevant depots should be cross-checked against data assembled through trawling through the individual websites of the firms that provide parcel delivery, courier and related services²². Most are likely to provide information on the closest site to the location of the searcher.

7.3.7 The estimation of the spatial pattern of the zonal deliveries of LGV parcel rounds will be determined by the zonal pattern of population and of employment, with the weighting dependent on the commodity sector / NST code. The recommendation in the companion FAME: Base Matrices Think Piece is that consumption rates for each commodity type should be separated between final demand and intermediate consumption categories.

7.3.8 Using the ONS supply and use tables the rate of *intermediate consumption* for a specific type of commodity can be estimated for each production or service sector in a zone based on how much input that sector requires of this specified commodity. This consumption rate can be combined with zonal employment data, segmented by SIC, to estimate the zonal intermediate demand consumption. In the case of these intermediate demand flows, some of the origins of the goods being delivered may be direct from local producers of goods, particularly in sectors such as NST:4, Food products, rather than being from depots that lie at the end of a more complex distribution chain.

²² For example Yodel provide address details of their 45 local depots that cover the UK – see <https://www.yodel.co.uk/our-depots>

7.3.9 The zonal consumption pattern of *final demand* will be mainly determined by the zonal population and employment patterns, as finished goods are mainly consumed by households, whereas some may be likely to be delivered to firms, such as personal parcels delivered to individuals at their workplace during the day for security reasons.

7.3.10 Within each segment combination of NST and consumption type, the observed modal choice for tertiary leg deliveries between the use of LGVs and of HGVs will need to be analysed. The most suitable data are likely to be the proposed new LGV survey and the CSRG, subject to the latter being improved soon so as to include explicit information on the type of land use at the point of pick-up and drop of each delivery.

8 LGV SPATIAL DISTRIBUTION MODEL

8.1 AGGREGATE LGV FREIGHT DEMAND MODEL STRUCTURE

8.1.1 Moving on from the analysis of data provision on LGV freight trips provided in the previous chapters, this chapter outlines some potential approaches to the modelling of flow pattern of the different types of deliveries of goods. It assumes that a suitable national LGV survey has been carried out to provide appropriate LGV trip data on which to support the implementation and calibration of the various model stages.

8.1.2 Once this LGV trip data has been fully analysed and a better quantified understanding has been reached on current LGV freight trip patterns, it may be necessary to increase the number of distinct model components that are listed below here, in order to represent in a realistic fashion the full cross-section of observed LGV freight delivery and collection patterns across the UK.

8.1.3 It has been assumed in the previous discussion within Section 3.3 that most LGV delivery activity involves either a pair of stem type and/or a bush type set of movements. Two alternative approaches to modelling these LGV delivery trips are now discussed. Firstly, a conventional aggregate discrete choice based modelling approach is outlined below within this section. Then an alternative agent-based micro-simulation approach is outlined in Section 8.2.

8.1.4 The spatial distribution model of the stem segment within a parcel delivery trip purpose, adopts the same production-attraction structure as most passenger trip purposes. It should adopt annual LGV trip productions as a control total from which to derive zonal trip productions. It would operate as a logit discrete choice model of the spread across attraction/consumption zones from each production zone. The distance decay functional form and parameters should be estimated to match closely to the trip distribution pattern for that stem purpose, as determined from the LGV survey data.

8.1.5 However, each bush trip purpose segment should instead adopt an origin-destination trip distribution structure. Their main control totals are vehicle kilometres, rather than trips, so that bush type delivery trip purpose segments will differ in this way from the norm, when they are being implemented and calibrated.

8.1.6 Because the bush trips are by their nature over short distances, the majority of them will appear as intrazonal trips within the demand model. This requires that the demand model must accordingly include a suitable intrazonal distance, time and cost in its input supply characteristics for each zone for every LGV trip purpose. The estimation of intrazonal characteristics could be implemented through use of the distance-band approach that was central to DfT's NTMv2 passenger model. The TRIMODE model of freight across Europe (Noekel et al., 2018) adjusted this distance band methodology to enable the supply characteristics of short distance freight movements to be represented coherently, while avoiding excessive computing costs.

8.1.7 It is important that the traffic volumes associated with these intrazonal trips are correctly accounted throughout when comparisons are carried out against national statistics on vehicle usage by road type, even though these intrazonal trips may not need to be included within the assignment procedure itself. Accordingly, some assumptions need to be made regarding, for example, the road types likely to be used for intrazonal trips, which typically would make greater use of urban and rural minor roads rather than of trunk roads.

8.1.8 The stem trips within the *parcel* delivery rounds are modelled as separate demand models from their bush trips. This separation enables their distinct time of day, trip length and trip production location patterns to be represented for each of these trip component types. The stem trips for the parcel delivery segment use the locations of their regional distribution centres and depots to determine the zonal pattern of trip productions.

8.1.9 For *grocery* delivery routes the current relatively short distances of their stem trips and the relatively wide spread of their trip productions across many zones, suggests that there is no major current need for an explicit representation of their modelled stem trips as being distinct from their bush trips. The exception would be the minority of grocery suppliers, such as Ocado, that operate from a more limited number of depots that cover sub-regional deliveries, so needing a stem and bush structure for their representation.

8.1.10 In an ideal world the representation of bush trips would explicitly simulate the route structures developed by the specialised routing optimisation packages that are used by delivery firms. These optimised routes seek to minimise total route distance and/or time for each round. However, adopting this micro-simulation approach to generate a succession of explicit individual rounds may substantially ramp up the complexity and computational burden within a national model, so that a simplified more aggregate conventional spatial distribution modelling approach is likely to be more cost-effective. This would particularly be the case for a national freight model that is primarily focused on trunk roads because only a relatively

small proportion of the mileage of the bush trips would be likely to occur on the strategic road network so that a coarser representation of such trips should have little real impact on their modelling requirements. The alternative agent-based modelling micro-simulation approach is discussed in the next section.

Zoning systems

8.1.11 If LGV freight modelling is carried out as a component within a specific LGV model covering both passengers and freight, then a lower tier 1 zoning system at the MSOA level could be adopted throughout, as specified above in Section 3.5.

8.1.12 However, if LGV freight modelling is carried out as a component within a national freight model that is envisaged to adopt an upper tier 2 zoning system that is predominantly defined at the LA district level, then there will be a need to interface the LGV sub-model operating at the finer tier 1 level to the rest of the freight model operating at this coarser tier 2 level. This interface is not envisaged to be a complex process, as now outlined.

8.1.13 LGV would only compete as a mode within the subset of freight deliveries to final consumption within tertiary logistics leg types. Here they would typically be in competition with small rigid HGVs, but not with other non-road modes. These tertiary logistics model stages of trip distribution and mode choice would initially be carried out at the tier 2 level to output an OD matrix of LGV movements originating from local depots to serve those consumers in adjacent zones.

8.1.14 This tier 2 LGV OD matrix would be the starting point for the stem and bush modelling of individual parcel deliveries, which is designed to operate at the spatially detailed tier 1 level. The spatial disaggregation of the Os and the Ds to the tier 1 MSOA level should be based on the datasets listed above in Section 7.3.

8.2 AGENT-BASED MICRO-SIMULATION MODELS

8.2.1 Agent-based models for large spatial study areas such as the UK are computationally intensive, due to the need to process a large sample of individual movements in order to provide a spatially representative sample throughout the nation, coupled with the need for many repetitions of model runs to mitigate the impact of the stochastic errors inherent within micro-simulation modelling systems.

8.2.2 For modelling LGV freight demand, the major importance of multi-drop tour routes implies that there might be benefits to considering the potential of agent-based micro-simulation models to provide a more natural representation of the bush component of delivery operations. The parcel delivery sector already makes use of specialised routing software to provide effective sequences of deliveries that can minimise total travel time/distance for the delivery driver. The design of these routing packages would provide guidance on the aspects that would need to be represented within an agent-based model of LGV delivery operations.

8.2.3 The bush component of delivery operations will often, though not always, take place within a relatively small area, rather than being dispersed throughout a

region, so that some of the computational challenges that arise when implementing national level agent-based models may be reduced. What is needed is a large set of representative individual models covering sub-areas of the country. Their results could then potentially be scaled up and combined across the country as a whole in order to provide comprehensive results.

8.2.4 This development of an agent-based LGV delivery model and its successful implementation, calibration and validation to cover the national scale would be likely to be a substantial undertaking with significant risks involved. It would also need direct support from a detailed representative trip-based survey of freight delivery trip movements that could provide the required quantified measurement of actual delivery patterns and of how these may differ between different types of areas, different delivery segments (couriers, parcels, groceries, etc.), different times of day or days of the week, etc.

9 LGV SUPPLY MODELLING

9.1 VEHICLE OPERATING COST MODELS

9.1.1 To support the estimation of OD matrix patterns of LGV demand, it is necessary to obtain information on the travel time and cost between zone pairs, from a transport supply model component. This first section reviews the sources for suitable LGV operating cost function characteristics, followed in the subsequent section by discussion on the potential source for the distances, congested costs and times between zone pairs.

9.1.2 Annual vehicle operating cost tables for different sizes of LGVs and other goods vehicles are published by various freight related organisations, including: MotorTransport²³; the RHA²⁴; and Commercialfleet²⁵. They identify the largest cost components to be the driver's wages, followed by overheads, fuel and vehicle depreciation costs. The annual vehicle excise duty tax charge for LGVs differs depending on the vehicle age and characteristics but not on the vehicle size.

9.1.3 There is a relationship between: the LGV type and age; and the transport intensity and trip purposes for which the LGV is used. Analysis of the MOT dataset indicates that the annual vehicle mileage in the first three years of an LGV tends to be much greater than in subsequent years. Many large LGVs having been used intensively for their first 3 or 4 years for delivery activities are then sold on for a less intensive usage for passenger, rather than freight trip purposes. Accordingly, the operating costs characteristics of LGVs of a given size are likely to differ between different categories of LGV users, so that this should be considered when

²³ See <https://motortransport.co.uk/knowledge-zone/cost-tables>

²⁴ See <https://www.rha.uk.net/>

²⁵ See <https://www.commercialfleet.org/tools/van/running-costs/>

assembling the cost function characteristics per kilometre and per minute in transit for each LGV demand segment.

9.1.4 There is also a long-term trend towards the larger LGVs increasing their share within the new vehicle stock purchased each year. This coupled with the pressure to switch to alternative-fuelled LGVs, implies that assumptions of constant real running costs and of constant vehicle operating characteristics through into the future are unlikely to be valid.

9.2 REPRESENTING ROAD CONGESTION– LINK TO NTM

9.2.1 Representing road capacity impacts from LGV freight transport is probably best dealt with outside the freight LGV transport model itself. The greatest influence on the road congestion level on almost all links across the UK is from cars, more than from freight LGVs. Accordingly, congested link times are best supplied to the LGV freight model from a passenger equilibrium assignment model run that has also included suitable OD matrices of HGV and of LGV freight and passenger movements.

9.2.2 The national passenger transport model (NPTMv5) would appear to be the most suitable source for these congested link speeds for England. However, obtaining corresponding congested link speed data for Scotland, Wales and Northern Ireland is likely to require significant effort and resources. There is little detailed coverage of the wholly internal movements within Wales and within Scotland within NPTMv5, while it has no coverage at all within Northern Ireland.

9.2.3 Because the LGV freight model can provide an OD matrix of LGV delivery trips, it will be important to ensure that any companion LGV non-delivery OD matrix that is input to the NPTMv5 does not have gaps or double counting with respect to the LGV delivery OD matrix that is produced by the LGV freight model.

9.2.4 In those relatively few policy analysis instances where changes in the pattern of freight LGVs are a major influence on the congestion levels on a significant number of links, then some iteration of assignment model runs and feedback to the LGV freight demand model might be required, in order to achieve convergence in congested travel times and costs. However, this would not be the norm, so that substantial running time would be saved by not normally requiring the LGV freight model to be iterated through an equilibrium road assignment procedure. Instead a path building step would suffice that derived LGV OD times and costs segmented by LGV type, based on the congested link speeds of cars and on the operating cost parameters discussed above in the previous section. For LGVs the car link speeds could be used directly within this path building, but subject to speed-limit based adjustments on certain road types for LGV speeds, as discussed in Section 3.7.

10 FORECASTING FUTURE CHANGES IN LGV DEMAND

10.1.1 The companion FAME: Base OD Matrices think piece, explains the benefits from providing a formal linkage between: the change in production and consumption levels for individual commodity types that are input to the freight demand model for forecast years; and a UK economic and trade forecasting model that maintains a detailed representation of individual industry types which can be mapped across to the commodity type segmentation in the transport model, and that ideally includes a regional or more detailed spatial disaggregation across the UK. The use of this type of national economic model to guide the future growth trends within the model's inputs of zonal tonnages produced and consumed would provide a coherent mechanism to represent scenarios on future zonal changes in patterns of economic growth for each commodity type segment.

10.1.2 The ideal way ahead would be to interface to some existing national economic model that is already in use across Government Departments, so as to maximise in-house consistency in policy assessments between Transport and these other Departments.

10.1.3 A procedure would then need to be developed, based on the relationships within the base year model, to convert the externally estimated growth in zonal value of production and consumption in monetary value, into suitable growth factors to apply internally to the base year LGV pickup and delivery trip ends, segmented by LGV freight purpose. This economy based growth rate estimate would assume a constant transport technology over time.

10.1.4 Accordingly, there will also be a need to consider how best to represent future technology developments and changes in the relative operating costs of the competing vehicle types that operate within the tertiary logistics / last-mile delivery market. Aspects to consider include the following.

- Future changes that are differentiated by vehicle type to the restrictions in denser urban areas for vehicle entry or parking, that may encourage e.g.
 - further switching from HGV to LGV based delivery, creating associated *increased* congestion (and perhaps increased emissions)
 - further switch from LGV to motorbike or cargo-bike based delivery, creating associated *reduced* congestion and emissions.
- Changes in the balance between the click-and-collect vs LGV home delivery model for parcels – retailers seeking to recover the full costs of delivery services by making these costs explicitly paid by consumers.
- Impact of autonomous LGVs, with associated major LGV operating cost reductions through avoiding drivers' salary costs and enabling longer shifts without breaks.
- Further growth in robot delivery services. The Co-op starting in 2018 has opted to use a fleet of pavement-based autonomous robots (Figure 2), rather than LGVs, for its grocery delivery service in some of the denser neighbourhoods in cities such as, Milton Keynes, Northampton, Leeds and Manchester.



FIGURE 2 CO-OP'S STARSHIP ROBOT AUTONOMOUS GROCERY DELIVERY SERVICE IN CAMBRIDGE

11 Summary of conclusions

11.1 LGV FREIGHT MODEL CHARACTERISTICS

11.1.1 An important theme in this think piece is that a standalone LGV freight demand model should only be considered as a short-term fix that currently arises because LGV demand is not appropriately represented within most current passenger and freight models. As explained in Section 2.2, in the longer term the LGV trips for the purpose of delivery and collection of goods should instead be integrated within a freight demand model, whereas the LGV trips for the movement of people should likewise be integrated within the appropriate passenger trip purposes inside a passenger demand model. The LGV vehicle types for both passenger and freight trips should then be assigned as separate vehicle types from cars or HGVs within the highway assignment stage of an overall road supply model. It is only when **both freight and passenger** LGV OD matrices are together assigned to the road network that any validation of LGV link flows against observed LGV counts can be undertaken.

11.1.2 As a result of the analysis of requirements, the main features that are recommended in Chapter 3 for the LGV freight demand and supply model components can be summarised as follows.

- The study area for the initial LGV freight model version should just cover Great Britain. Appending Northern Ireland could be developed as a separate task due to its rather different data sources and its limited interaction with GB. Due to the current absence of international LGV freight movement data and its assumed small scale of activity, the model should focus only on domestic LGV freight movements.
- The zoning system adopted for the LGV freight model should be at the MSOA level, due to the relatively short distances for many delivery trip legs.

- The minimum level of purpose segmentation to be represented in the LGV freight demand model should be separate parcel-style and grocery supermarket-style delivery routes. The parcel-style movements are further decomposed between: the actual collection/delivery round movements (Bush); and the initial outbound and final return movements of the day (Stem) between the depot and the main delivery round locality.
- Because of the minor current penetration of smaller LGVs within the LGV fleet that is used for goods delivery purposes, it is sufficient to distinguish just one LGV type within the LGV freight demand and supply models. A large LGV should be adopted as the representative vehicle type that accordingly is subject to lower speed limits than cars on rural single and dual carriageway road types.

11.1.3 The modelling of the LGV trip demand pattern for the various freight purpose segments can be implemented through customisations of logit discrete choice spatial allocation models, including the use of a distance-band based representation for the intrazonal movements.

11.1.4 The major importance of multi-drop tour routes for goods delivery purposes implies that the potential of agent-based micro-simulation models should be considered to provide a more natural representation of this segment of LGV traffic. It would first need to be demonstrated that such a model could be run to a stable converged solution across the whole national study area within an acceptable runtime.

11.2 FREIGHT LGV DATA IMPROVEMENTS

11.2.1 The biggest current challenge in LGV model development is not the model design and construction itself. Instead it lies in assembling consistent datasets that cover all LGV movements across all of the UK at a sufficient level of spatial and purpose segmentation detail that could then enable the LGV model to be successfully implemented and calibrated in a cost-effective manner.

11.2.2 The most effective initiative to improve the quality of LGV models would be to rerun the set of DfT 2003 to 2005 van surveys. They still provide the only **trip-based** comprehensive national LGV dataset that is available. The less detailed 2008 and 2019-20 van surveys did not collect information on trip patterns but only on overall typical van usage. The design of this new survey should achieve a very similar coverage through minimal changes to the original questionnaire, other than where updated expansions of some categories is helpful. This similarity between surveys would provide a consistent quantification of the relative growth rates since 2005 in the sub-markets for individual LGV trip purposes. The original survey dataset has been used successfully to produce a detailed LGV model for London (FiLM – Deane et al. 2010). However, the original survey size was small so that a significant increase in the sample size would be of major further benefit, should this increase be feasible.

11.2.3 Without access to a contemporary survey of LGV trip patterns, the development of an LGV freight demand model would need to be built on LGV trip-

based surveys from 20+ years back. This would not be the ideal to represent a rapidly growing and evolving component of the freight industry, which is why this updated survey priority is so high.

11.2.4 Various other initiatives are proposed in Chapter 5 that would improve the quality and coverage of the LGV data that would be available to support LGV model development and analysis.

- a small research study should be initiated to quantify an updated estimate of the consistency between: (i) the identification of the vehicle type “van” in the standard DfT classified vehicle counts as well as in each of the NH, TfL, Transport Scotland, etc counts; and (ii) the official definition of a van/LGV as a goods vehicle of up to 3.5 tonnes gross vehicle weight²⁶, which is in use in a number of other government datasets.
- Major data improvements could be achieved from a simple initiative that ensures that the set of modal options listed in survey questionnaires for vehicle ownership or usage should explicitly distinguish car from LGV/HGV in all future official surveys such as Annual Population Survey, Labour Force Survey, future national Population Census, etc.
- To avoid confusion, gaps and double counting of LGV trips within standard passenger models, both NTEM and NATCOP need extensions to their documentation to clarify the extent to which they already do or do not include LGVs within their various output variables.
- A small study should be initiated to examine in detail the meta-data across the complete set of standard statistical LGV data sources. This study should systematically identify any existing differences in LGV data definitions and coverage, across all standard LGV data sources. It should provide standardised guidance for modellers and analysts on how best to assemble LGV data in a form that maximises its internal consistency across the set of data sources from which it is drawn.

12 References

Allen J, M Piecyk and M Piotrowska (2016) *An Analysis of Online Shopping and Home Delivery in the UK*. University of Westminster, Freight Traffic Control 2050 project.

<http://www.ftc2050.com/project-reports/>

Deane G, I Williams, Y Zhu, J Pharoah, D Kabeizi and B Khan (2010). *FiLM - a Model of Freight and LGV Movements in London*. Paper to the European Transport Conference, 2010, Glasgow.

<http://abstracts.aetransport.org/paper/index/id/3548/confid/16>

²⁶ Taking allowance also for the recent extra inclusion within the LGV class, of battery electric vans of up to 4.25 tonnes gvw.

FAME – LGV METHODOLOGY THINK PIECE

de Bok M, L Tavasszy and S Thoen (2022) Application of an empirical multi-agent model for urban goods transport to analyze impacts of zero emission zones in the Netherlands. *Transport Policy*, vol. 124, August, 119-127.

Department for Transport (2004) *Survey of Privately Owned Vans Results of survey October 2002 - September 2003*. Transport Statistics Bulletin SB (04) 21.
http://webarchive.nationalarchives.gov.uk/20060820162202/http://dft.gov.uk/stellent/groups/dft_transstats/documents/page/dft_transstats_026991.hcsp

Department for Transport (2008) *Road Freight Statistics 2006, Revised August 2008*. Transport Statistics Bulletin SB (06) 23.
<http://webarchive.nationalarchives.gov.uk/20110503144935/http://www.dft.gov.uk/pgr/statistics/datatablespublications/freight/goodsbyroad/>

Department for Transport (2009a) *Road Freight Statistics 2008*. Transport Statistics Bulletin SB (09) 21.
<http://webarchive.nationalarchives.gov.uk/20110503144935/http://www.dft.gov.uk/pgr/statistics/datatablespublications/freight/goodsbyroad/roadfreightstatistics2008>

Department for Transport (2009b) *Van Activity Baseline Survey, 2008*.
<http://webarchive.nationalarchives.gov.uk/20110503144935/http://www.dft.gov.uk/pgr/statistics/datatablespublications/freight/vanactivitybaseline08/>

Department for Transport, UK (2011) *Discrepancies between Road Freight and Road Traffic HGV traffic estimates: Methodology Note*.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/192486/hgv-traffic-statistics-note.pdf

Department for Transport (2018) *Traffic Statistics Methodology Review: Overview*.
<https://www.gov.uk/government/publications/road-traffic-statistics-methodology-review>

Department for Transport (2021a) *Final Van Statistics April 2019 - March 2020*. DfT Statistical Release 15 April 2021. <https://www.gov.uk/government/collections/van-statistics>

Department for Transport (2021b) *Van Statistics 2019-2020: Technical Report*. DfT Release 15 April 2021. <https://www.gov.uk/guidance/van-statistics-information>

De Saxe C, D Ainalis and D Cebon (2024) A dataset of logistics sites in England and Wales: Location, size, type and loading bays. *Data in Brief*, vol 54, June.
<https://www.sciencedirect.com/science/article/pii/S2352340924003688?via%3Dihub>

Fox J, B Patrui, A Daly and H Lu (2017) *Estimation of the National Car Ownership Model for Great Britain*. Report by Rand Europe for DfT.
<https://www.gov.uk/government/publications/estimation-of-the-national-car-ownership-model>

FAME – LGV METHODOLOGY THINK PIECE

Hood N, R Urquhart, A Newing and A Heppenstall (2020) Sociodemographic and spatial disaggregation of e-commerce channel use in the grocery market in Great Britain. *Journal of Retailing and Consumer Services*, Vol. 55, July.

Le Vine S, J Luan and J Polak (2013) *Van travel in Great Britain: What do we know from the National Travel Survey?* Report for the Independent Transport Commission. <http://www.theitc.org.uk/our-research/research-reports-2/>

MDS Transmodal (2024) *DfT FAME: Feasibility Report*. Produced for Department for Transport. <https://www.gov.uk/government/publications/freight-analysis-and-modelling-environment>

Noekel K., I. Williams & D Fiorello (2018) Long-Distance, Multimodal Freight in a Continental Transportation Model. *Transportation Research Record*, vol. 2672, (44), 103-113. <https://journals.sagepub.com/doi/pdf/10.1177/0361198118791910>.

Tolouei R, A Sayegh & M-J Tornton (2022) *A Novel Approach to Developing LGV Trip Matrices for the Second Generation of Regional Traffic Models*. Paper to the European Transport Conference, 2022, Milan. <https://aetransport.org/past-etc-papers/conference-papers-2022?abstractId=7615&state=b>

Williams I (2021) *LGV model of the North (LGVN) Model Design*. Project Note 30, prepared for Transport for the North.

Williams I (2024) *Peer Review of Freight Analysis and Modelling Environment (FAME) – Stage 1*. Produced for Department for Transport. <https://www.gov.uk/government/publications/freight-analysis-and-modelling-environment>

WSP (2011) *Base Year Freight Matrices: Final Report*. For contract no. PPRO 04/03/14 for Department for Transport. <https://www.data.gov.uk/dataset/ad3c0fd4-17e9-4a8a-af5a-0d03954907a0/base-year-freight-matrices>

WSP (2014) *DfT LGV Forecasting Model: Overview of Delivered Model*. Report for DfT. <https://www.gov.uk/government/publications/light-goods-vehicle-lgv-model-overview>