



Wokingham Local and M4 Modelling Assessment

Reference Case – Matrix Development Methodology

On behalf of **Wokingham Borough Council**



**WOKINGHAM
BOROUGH COUNCIL**

Project Ref: 332110634/001 | Rev: A | Date: January 2022

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Document Control Sheet

Project Name: Wokingham Local and M4 Modelling Assessment

Project Ref: 332110634

Report Title: Reference Case – Matrix Development Methodology

Doc Ref: 005

Date: June 2024

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Revision	Date	Description	Prepared	Reviewed	Approved
Rev 1	18/05/2023	Addressed WBC's comments	RD	NL	NL
Rev 2	17/06/2024	Updated to reflect year 2040 (previously 2038)	NL		

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1 Introduction

1.1 Introduction

- 1.1.1 Stantec has been commissioned by Wokingham Borough Council (WBC) to develop a Transport Assessment for the Local Plan Update (LPU). This study is informed by a comprehensive modelling exercise, which is being undertaken using up to date information.
- 1.1.2 The transport impacts of the development are informed by a three – tier modelling approach comprising:
- i. Wokingham Strategic Transport Model 4 (WSTM4) in VISUM
 - ii. A VISSIM microsimulation model, which comprises a section of the M4 between J11 and J10, the A329M between Coppid Beech and Winnersh and Lower Early Way, which run parallel to the M4
 - iii. Individual Local Junction Models (LJMs)
- 1.1.3 The models interact in a way that outputs from the VISUM model will be required to inform the VISSIM and LJMs. The junction models will be used to inform the development of the VISUM and VISSIM models, in providing traffic signal data where applicable. The VISSIM and LJMs have been built using 2021 observed data and forecast models have been created by applying differences in flows between the VISUM base and forecast year models to the agreed base models.
- 1.1.4 The “Wokingham Local Plan Update. Local Highway Network and M4 Corridor - Transport Assessment Report”, June 2024 has summarised the forecast scenarios and described the key assumptions that will inform those. The forecast scenarios incorporate committed developments and changes in the network since 2015 (base year of the original WSTM4) and also include network changes and mitigation considered to support LPU growth.
- 1.1.5 The purpose of this document is to set the methodology for developing the 2040 Reference Case matrices using the refined WSTM4 validated base year model.

1.2 WSTM4 Background

- 1.2.1 The WSTM4 model was originally developed by WSP on behalf of WBC using PTV’s VISUM 17.01-04.
- 1.2.2 The base year of the WSTM4 is 2015. The model was validated to TAG standards, which was reported in the ‘*Wokingham Strategic Transport Model 4 (WSTM4) Local Model Validation Report, WSP, May 2018*’. A copy of the report can be downloaded from the WBC’s website via <https://www.wokingham.gov.uk/resources/assets/attachment/full/0/276581.pdf>.
- 1.2.3 In order to support the assessment of the proposed development the WSTM4 model has undergone a local update and a local revalidation exercise as detailed within the “*Wokingham Local and M4 Modelling Assessment – Homes England Study. Assessment Methodology*”, November 2021 and the “*Wokingham Local Plan Update. Local Highway Network and M4 Corridor - Transport Assessment Report*”, June 2024. The refinement has produced a model validated to November 2021 travel conditions, and an extensive data collection exercise has been completed to inform this. This approach ensures that all three model types, i.e. strategic, microsimulation and local junction models will share the same base year and will be based on the same dataset, thus making forecasting more transparent and straight-forward.
- 1.2.4 The WSTM4 refinement accounts for:
- Any network changes that have taken place since 2015
 - New development built since 2015

- November 2021 roadworks (including the M4 Smart Motorway traffic management)
- Changes in generalised cost parameters to reflect the latest data from DfT TAG Databook November 2021, and

2 Approach to Matrix Development

2.1 Introduction

2.1.1 This section outlines the approach to the creation of the 2040 Reference Case matrices in the WSTM4. Given the purpose of the modelling is to test the impact of the proposed Hall Farm/ Loddon Village development, the Reference Case model excludes this development (and any associated infrastructure). The Reference Case also excludes other Local Plan development (i.e. South Wokingham SDL extension site and other smaller Local Plan site allocations) as detailed in the “Wokingham Local Plan Update. Local Highway Network and M4 Corridor - Transport Assessment Report”, June 2024.

2.2 Overview of the Approach

2.2.1 Figure 2-1 summarises the processes that has been used to create the Reference Case matrices. The starting point for the Reference Case matrix development is the locally validated 2021 base year highway matrices.

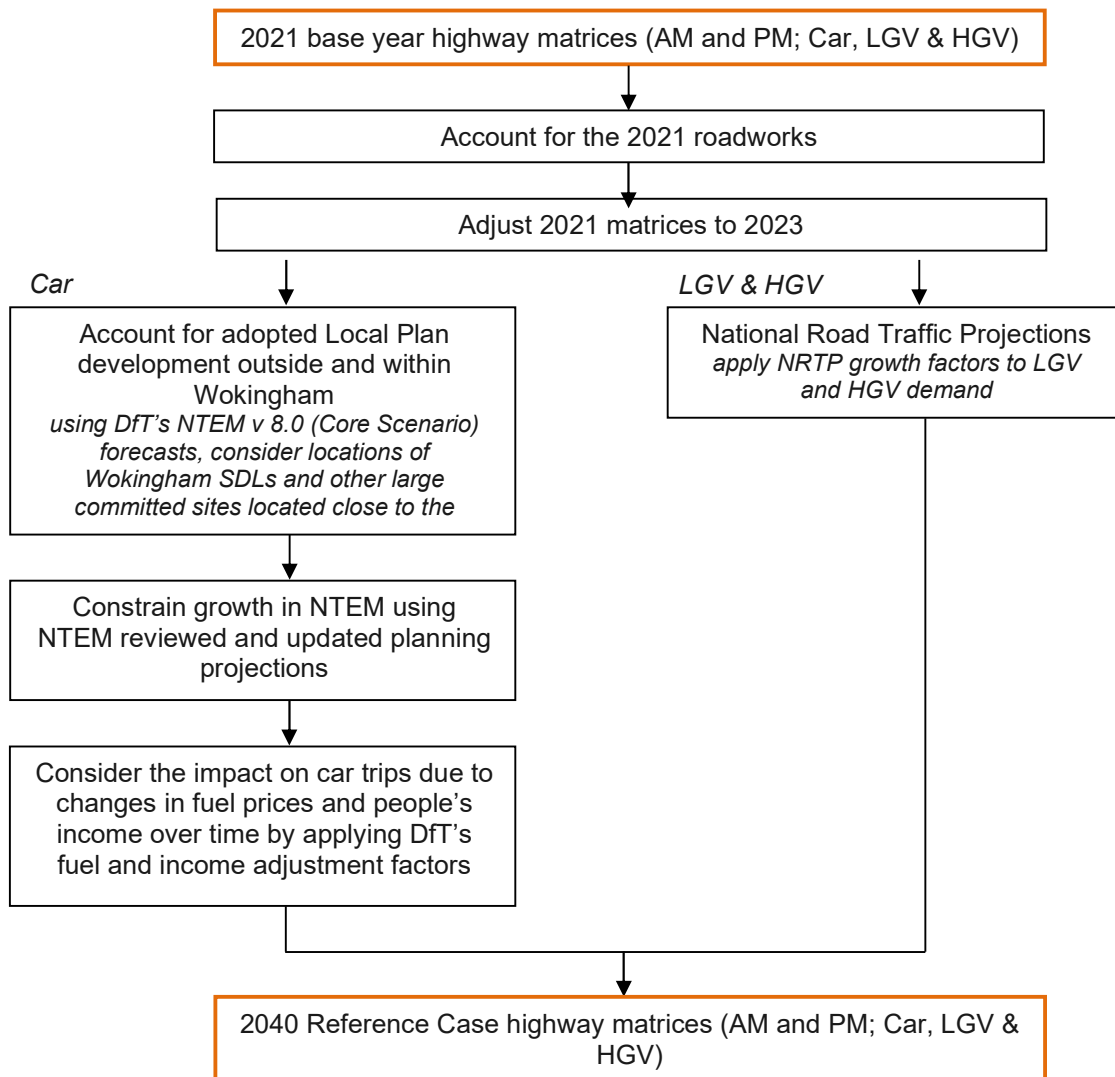


Figure 2-1 Forecast Matrix Development Process

2.2.2 The forecast matrices have utilised data from a number of sources, including:

- a. National Trip End Model (NTEM) forecasts (this data is included within TEMPro and the latest available data included in version 8.0 has been used)
- b. DfT fuel and income adjustments - this has been applied to all car matrices, based on latest data in TAG Databook
- c. National Road Traffic Projections (NRTP) – these have been applied to LGV and HGV matrix levels within the matrices

2.3 Impact of the M4 Smart Motorway Roadworks

2.3.1 In autumn 2018 National Highways commenced works on converting the M4 from Junction 3 to Junction 12 into a smart motorway. At the time of the November 2021 surveys, works were almost complete and during a day there were only minor lane closures and speed limits in place. Nevertheless, analysis has been undertaken that aimed to estimate the impact of the smart motorway roadworks and associated construction traffic management on traffic flows. Results of this analysis are presented in Table 2-1 below.

Table 2-1 Comparison of Traffic Volumes on the M4 between J11 and J9, vehicles

AM

M4 Webtris	2015 WebTRIS	2021 WebTRIS	%Difference	Difference
M4 J10-9 EB	4,684	3,581	-24%	-1,103
M4 J9-10 WB	5,104	2,944	-42%	-2,160
M4 J11-10 EB	4,418	3,753	-15%	-665
M4 J10-11 WB	4,766	3,234	-32%	-1,532
M4 J10 WB Off Slip	1,903	1,235	-35%	-668
Average			-29%	

PM

M4 Webtris	2015 WebTRIS	2021 WebTRIS	%Difference	Difference
J10-9 EB	5,201	3,747	-28%	-1,454
J10-9 WB	5,250	3,552	-32%	-1,698
M4 J11-10 EB	4,809	4,150	-14%	-659
M4 J01-11 WB	5,478	3,598	-34%	-1,880
M4 J10 WB Off Slip	1,793	1,481	-17%	-312
Average			-27%	

2.3.2 The analysis has used 2015 National Highways' WebTris data processed to inform the WSTM4 development and November 2021 data. The results show that the traffic on the M4 has dropped on average by 29% in the AM peak and by 27% in the PM peak, which is far greater than the average fall in traffic of 4.3% across the UK reported by DfT. This suggests that the flow on the M4 might have been reduced as a result of trip suppression or re-routing caused by the M4 smart motorway roadworks.

2.3.3 A test has been completed using the 2015 WSTM4, which looked at the impact of introducing construction traffic management (CTM) on the M4. The flows with and without the CTM have been compared and are presented in Figure 2-2 and Figure 2-3.

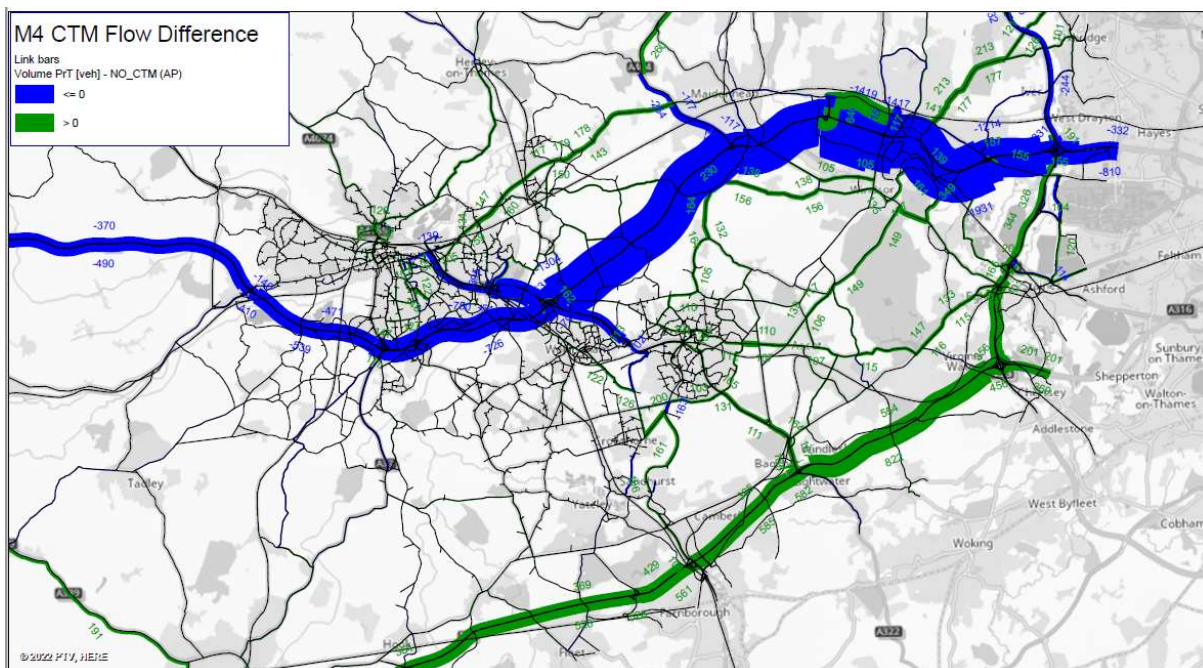


Figure 2-2 2015 WSTM4 with CTM minus 2015 WSTM4 without CTM, vehicles – AM peak

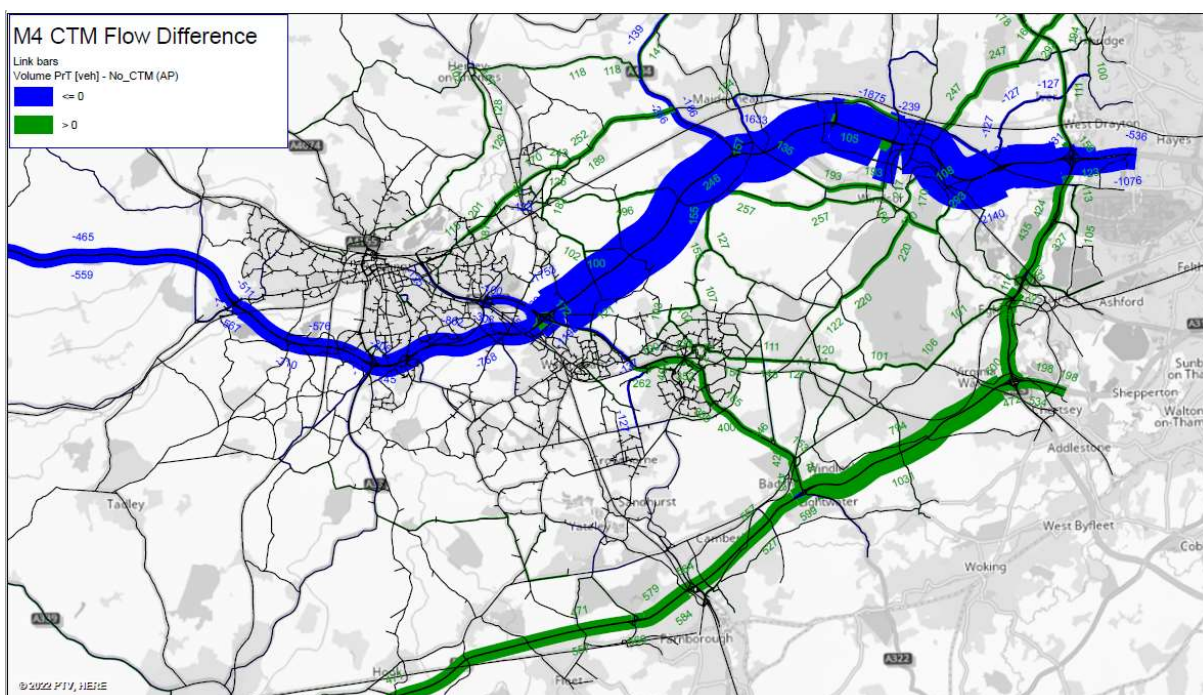


Figure 2-3 2015 WSTM4 with CTM minus 2015 WSTM4 without CTM, vehicles – PM peak

2.3.4 The results show that the higher than average drop in traffic on the M4 is likely to be due to traffic re-assignment to the M3 and local A-roads, which run parallel to the M4, and that the strategic model can generally replicate the impact of the CTM.

2.3.5 The CTM has been included in the network coding in the WSTM4 base year model refinement and therefore has been removed when developing the Reference Case scenario. This 'brings' the traffic back to the M4 thus creating a neutral Reference Case scenario.

2.4 Impact of Covid on Traffic Flows

- 2.4.1 In November 2023, the Department for Transport (DfT) updated their guidance document, TAG Unit M4 'Forecasting and Uncertainty', with an appendix (Appendix B) that addresses 'Adapting the core scenario to large scale changes'. According to paragraph B 2.3 of this guidance "The implication of this advice is that for analysts creating new or future models, basing their models to 2023 onwards, do not need to apply any further adjustment to account for COVID-19. The impact of COVID-19 on trip-making will in general be internalised into the base year trip matrix and vehicle/passenger flows."
- 2.4.2 Given that the WSTM4 has been refined to represent flows from November 2021, which predates the 2023 reference in the DfT guidance, an adjustment to November 2021 flows has been applied to account for changes in traffic between November 2021 and 2023 (the month of March has been chosen as a reasonable and neutral representation of 2023 flows). The adjustment factors are determined using the DfT's statistics on daily domestic transport use by mode and are summarised in the table below:

Table 2-2 Adjustment Factors, Nov 2021 – March 2023

Vehicle type	DfT Analysis	Factor
Car	Between Nov 2021 and March 2023 car traffic increased by 2.0%	1.020
LGV	Between Nov 2021 and March 2023 LGV traffic increased by 2.9%	1.029
HGV	Between Nov 2021 and March 2023 HGV traffic decreased by 6.4%	0.936
TOTAL	Overall traffic increased by 1.7%	-

- 2.4.3 DfT's NTEM factors accessible via TEMPro (as described later in this document) will then be applied to 2023 flows to produce the growth between 2023 and 2040.
- 2.4.4 In addition to changes in traffic volumes we have reviewed national evidence if trip purposes have changed due to the advent of COVID-19. A review of the Our Changing Travel document published by DfT ([our-changing-travel-how-people-s-travel-choices-are-changing.pdf](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/103444/our-changing-travel-how-people-s-travel-choices-are-changing.pdf)) suggests that a "similar proportion of employed people travelled to a place of work at least once a week in November 2022 (78%) as immediately before the pandemic (82%)". Therefore, no additional modifications to the November 2021 demand matrices to alter the distribution of travel purposes within the matrices has been applied.

2.5 NTEM Forecasts – Car Trips

- 2.5.1 To account for planned development outside of Wokingham, national projections included within DfT's National Trip End Model (NTEM dataset 8.0, the latest available at the time of forecast scenario development) have been superseded with Local Plan growth targets adopted by the neighbouring authorities reproduced in Table 2-3.
- 2.5.2 It should be noted that NTEM does not include a yearly breakdown of planning data prior to 2011 and therefore assumptions have been made to provide a direct comparison with the local targets set prior to 2011.
- 2.5.3 From a final year of a local plan period, a trend-based approach has been adopted assuming that average growth rates continue to the time horizon of the Wokingham New Local Plan (2040). This approach is in accordance with the Department for Transport's "NTEM Planning Data Version 7 Guidance Note", July 2016.

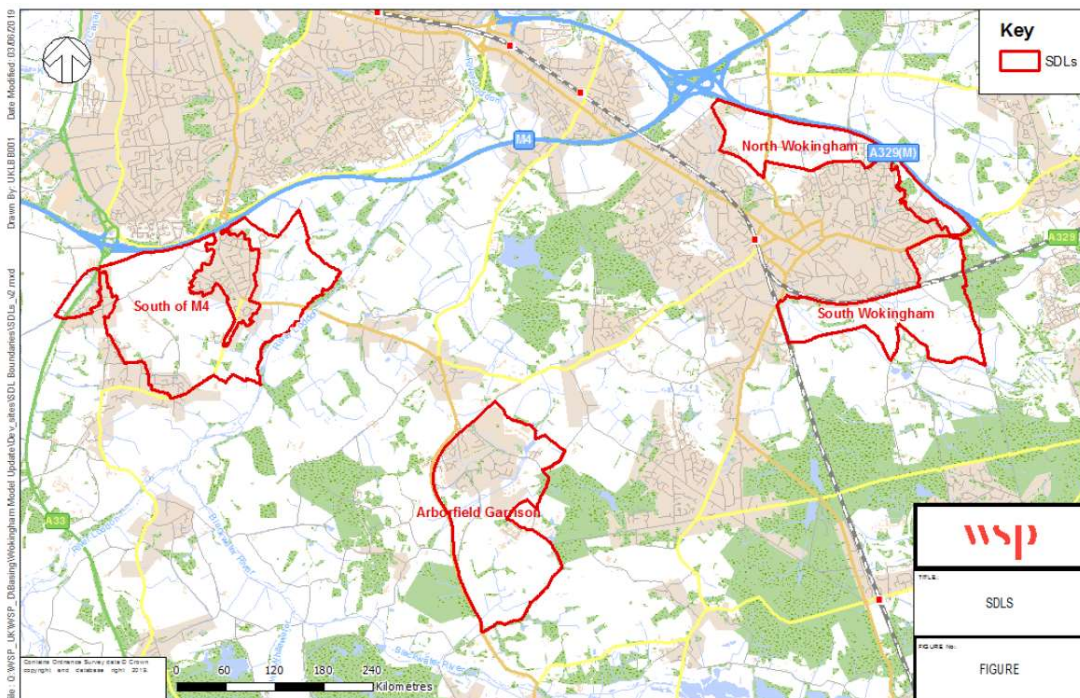
Table 2-3 Neighbouring Authorities – Local Plan Targets. Housing

Authority	Local Targets
Basingstoke and Deane	2011-2029 - 15,300 dwellings

Authority	Local Targets
Bracknell Forest	2006-2026 – 11,139 dwellings*
Hart	2014-2032-7,614 dwellings
Reading	2013-2036 -16,077 dwellings
Slough	2006 - 2026 Core Strategy - 6,250 minimum new dwellings for this LP period
South Oxfordshire	2011-2035 - 11,785 dwellings
West Berkshire	2006-2026-10,500 dwellings
Windsor and Maidenhead	2013-2033-14,240 dwellings

** Since the study commenced, Bracknell Forest had its Local Plan adopted in March 2024. It states that provision will be made in Bracknell Forest for the period 2020/21 to 2036/37 to accommodate at least 10,438 homes (614 dpa) to meet the Borough’s Local Housing Need.*

- 2.5.4 From the information we have received from neighbouring authorities, we have identified large development sites that are close to the Wokingham borough boundary. We have checked these are allocated to the correct NTEM zones prior to the trip ends being generated.
- 2.5.5 The employment planning projections included within NTEM have also been reviewed but have not been updated with local values as the default approach within DfT’s NTEM is to use latest Office for Budget Responsibility (OBR) forecasts of employment, which reflect a long-term trend.
- 2.5.6 It has also been necessary to include demand due to the Strategic Development Locations (SDLs) in Wokingham borough comprising Arborfield Garrison, North Wokingham, South Wokingham and South of the M4 SDL sites. The SDLs provide the majority of the housing provision (10,000 homes) of the 13,230 homes planned for in the adopted Local Plan 2006 - 2026 for Wokingham as follows:
 - Arborfield Garrison (CP18) – 3,500 homes
 - South of M4 (CP19) – 2,500 homes
 - North Wokingham (CP20) – 1,500 homes, and
 - South Wokingham (CP21) – 2,500 homes
- 2.5.7 There four SDLs are shown in Figure 2-4.



Source: “WOKINGHAM STRATEGIC TRANSPORT MODEL 4 (WSTM4). Highway Model Forecasting Methodology”, WSP, August 2019

Figure 2-4 2026 Wokingham BC - Strategic Development Locations

- 2.5.8 Respecting the existing methodology adopted to model the four SDLs, these have been modelled by applying WSTM4 standard trips rates to the SDL development quanta. These rates were derived from the TRICS database and were used to provide the level of trip generation. TRICS is an industry standard software for provision of trip rates for developments. Appendix A reproduces the trip rates.
- 2.5.9 Following the inclusion of the development outside the borough and the four SDLs inside the borough the overall growth within the WSTM4 modelled area has been constrained to the NTEM forecasts, which reflect the alternative planning projections described earlier in this section. The growth constraint has been applied at a regional level thus respecting the fact that most of the peoples’ moves are within the same region as people look to minimise the disruption to their daily working life, school and social routines.

2.6 Fuel and Income Adjustments – Car Trips

- 2.6.1 The wider effect of changes in fuel and income on car trips has been accounted for by applying fuel and income adjustment factors sourced from Table M4.2.1 of the current DfT TAG Databook November 2023 v1.22. The factors are shown in Table 2-4.

Table 2-4 Fuel and income adjustment factors

Adjustment	2023	2040	Growth
Income	1.013	1.045	1.032
Fuel	1.005	1.130	1.125
Combined			1.161

2.7 National Road Traffic Forecasts – LGV and HGV Trips

- 2.7.1 Growth factors for LGV and HGV have been determined from DfT's National Road Traffic Projections 2022 (NRTP22) and these have been applied to the base year LGV and HGV trips. The factors are shown in Table 2-5.
- 2.7.2 The factors are based on NRTP22 core scenario which represents how LGV and HGV traffic may grow in future given the complexities of forecasting future traffic demand. The core scenario was used as it includes 'firm and funded' government policy, for example, where ambitions are supported by published plans or funded policies. It uses the latest government projections of the main drivers of road traffic demand including population, economic growth, employment, households, fuel process and fuel efficiency.

Table 2-5 NRTP22 LGV and HGV growth factors (2021-2040)

Region	LGV	HGV
South East	25.52%	6.78%

Appendix A WSTM4 Standard Trip Rates

Table 2-6 Car & LGV Trip Rates

Development Type	AM Peak Hour (0800-0900)			Av. Inter Peak Hour (1000-1600)			PM Peak Hour (1700-1800)		
	Arrival	Departure	Total	Arrival	Departure	Total	Arrival	Departure	Total
Food Retail (A1) per 100sqm	2.64	2.14	4.77	6.33	6.09	12.43	6.23	6.89	13.11
Non-Food Retail (A1) per 100sqm	0.20	0.04	0.25	2.56	2.51	5.07	1.57	1.62	3.19
Financial and Professional Services (A2) per 100sqm	2.20	0.19	2.39	0.42	0.57	0.99	0.23	1.98	2.22
Restaurant & Café (A3) per 100sqm	0.00	0.00	0.00	1.68	1.51	3.20	2.68	0.83	3.51
Business (B1) per 100sqm	1.53	0.16	1.69	0.30	0.33	0.64	0.17	1.30	1.46
General Industry (B2) per 100sqm	0.51	0.19	0.70	0.22	0.24	0.46	0.10	0.49	0.59
Storage or Distribution (B8) per 100sqm	0.07	0.06	0.13	0.09	0.10	0.19	0.04	0.09	0.14
Hotels (C1) per bed	0.33	0.91	1.24	0.27	0.30	0.57	0.59	0.28	0.86
Dwelling Houses (C3) per unit	0.17	0.41	0.58	0.18	0.18	0.36	0.36	0.16	0.51
Dwelling Flats (C3) per unit	0.06	0.18	0.25	0.11	0.11	0.22	0.19	0.10	0.29
Non-Residential Institutions (D1) per 100sqm	6.75	3.60	10.36	5.22	5.26	10.48	3.47	4.64	8.11
Primary School (D1) per pupil	0.70	0.58	1.28	0.10	0.10	0.20	0.04	0.08	0.11
Secondary School (D1) per pupil	0.11	0.08	0.19	0.02	0.03	0.05	0.02	0.03	0.05
Leisure Centre (D2) per 100sqm	0.25	0.27	0.52	0.35	0.31	0.66	1.01	0.70	1.71
Cinema (D2) per 100sqm	0.00	0.00	0.00	1.11	0.77	1.89	1.10	1.04	2.14
Sports Hub (D2) per pitch	1.30	0.70	2.00	0.58	0.62	1.20	2.30	0.80	3.10

Table 2-7 HGV Trip Rates

Development Type	AM Peak Hour (0800-0900)			Av. Inter Peak Hour (1000-1600)			PM Peak Hour (1700-1800)		
	Arrival	Departure	Total	Arrival	Departure	Total	Arrival	Departure	Total
Food Retail (A1) per 100sqm	0.02	0.06	0.08	0.04	0.03	0.06	0.01	0.02	0.03
Non-Food Retail (A1) per 100sqm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financial and Professional Services (A2) per 100sqm	0.01	0.01	0.01	0.00	0.03	0.03	0.00	0.00	0.00
Restaurant & Café (A3) per 100sqm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Business (B1) per 100sqm	0.02	0.01	0.03	0.01	0.03	0.04	0.00	0.00	0.01
General Industry (B2) per 100sqm	0.02	0.01	0.03	0.02	0.03	0.04	0.01	0.01	0.01

Development Type	AM Peak Hour (0800-0900)			Av. Inter Peak Hour (1000-1600)			PM Peak Hour (1700-1800)		
	Arrival	Departure	Total	Arrival	Departure	Total	Arrival	Departure	Total
Storage or Distribution (B8) per 100sqm	0.01	0.01	0.03	0.02	0.03	0.05	0.02	0.01	0.03
Hotels (C1) per bed	0.01	0.01	0.02	0.01	0.01	0.02	0.00	0.00	0.00
Dwelling Houses (C3) per unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dwelling Flats (C3) per unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-Residential Institutions (D1) per 100sqm	0.00	0.00	0.00	0.02	0.02	0.05	0.00	0.00	0.00
Primary School (D1) per pupil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary School (D1) per pupil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Leisure Centre (D2) per 100sqm	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Cinema (D2) per 100sqm	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Sports Hub (D2) per pitch	0.10	0.10	0.20	0.00	0.00	0.00	0.00	0.00	0.00