TIME	RATE	%	TRIP RATE GRAPH - TOTALS 02 - EMPLOYMENT D - INDUSTRIAL ESTATE LGVS
00:00-01:00			
01:00-02:00			
02:00-03:00			
03:00-04:00			
04:00-05:00			
05:00-06:00			
06:00-07:00			
07:00-08:00	0.084	9.9	9.9 %
08:00-09:00	0.085	10.0	10 %
09:00-10:00	0.088	10.3	10.3 %
10:00-11:00	0.073	8.6	8.6 %
11:00-12:00	0.079	9.3	9.3 %
12:00-13:00	0.049	5.8	5.8 %
13:00-14:00	0.112	13.2	13.2 %
14:00-15:00	0.069	8.1	8.1 %
15:00-16:00	0.074	8.7	8.7 %
16:00-17:00	0.086	10.1	10.1 %
17:00-18:00	0.033	3.9	3.9 %
18:00-19:00	0.019	2.2	2.2 %
19:00-20:00			
20:00-21:00			
21:00-22:00			
22:00-23:00			
23:00-24:00			

Percentage

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

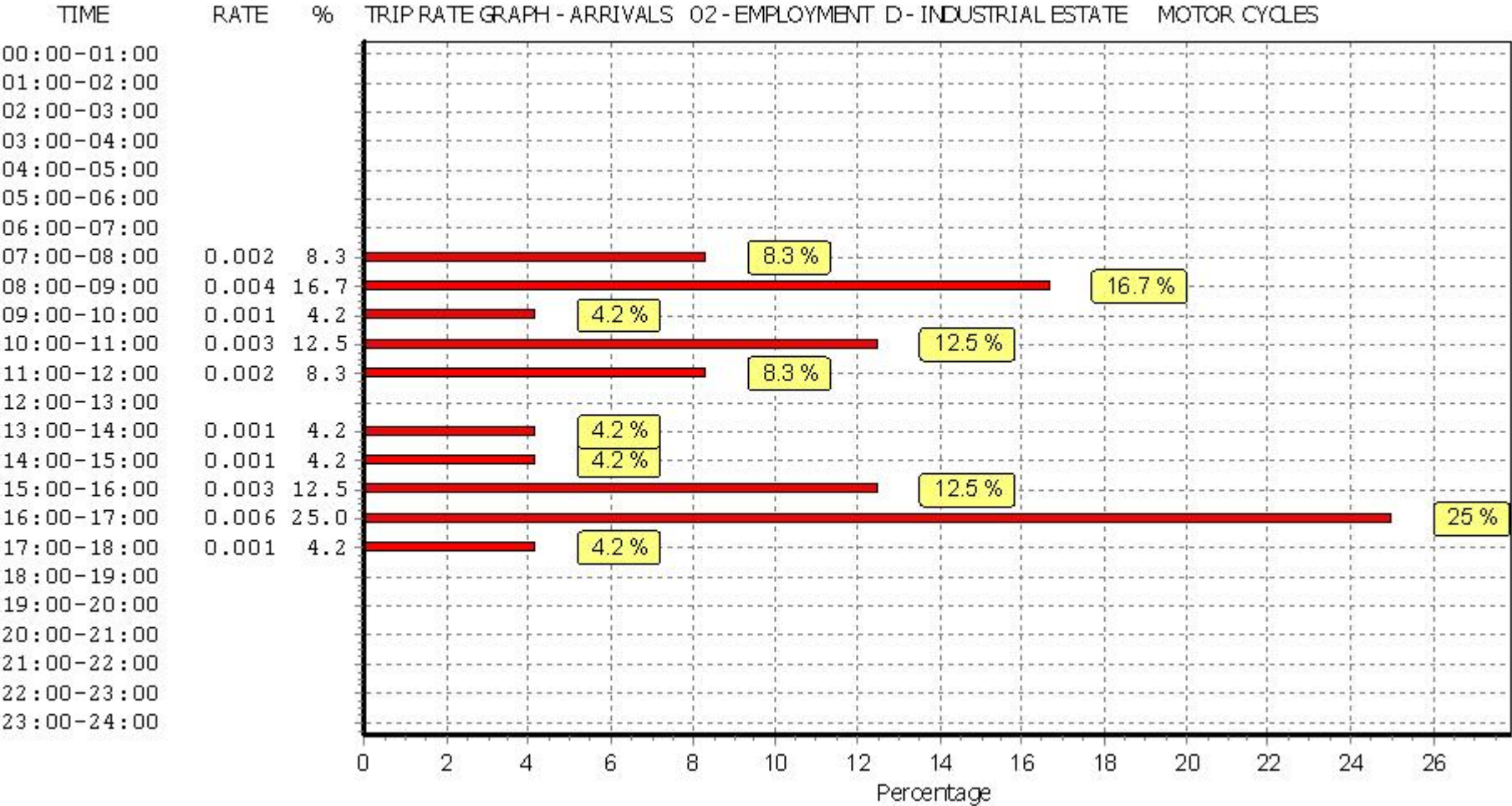TRIP RATE for Land Use 02 - EMPLOYMENT/D - INDUSTRIAL ESTATE
MOTOR CYCLES
Calculation factor: 100 sqm
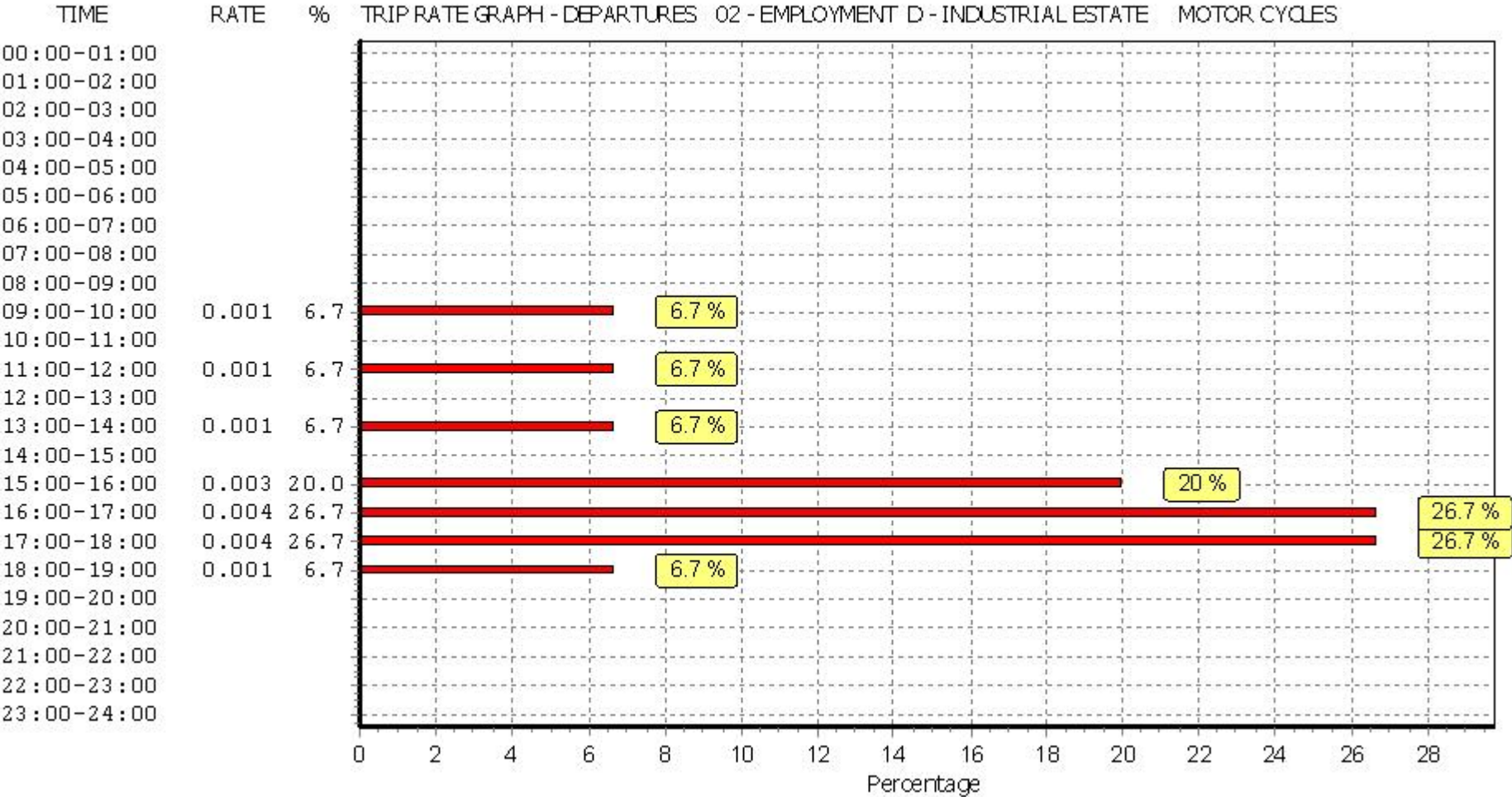BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	3	46980	0.002	3	46980	0.000	3	46980	0.002
08:00 - 09:00	3	46980	0.004	3	46980	0.000	3	46980	0.004
09:00 - 10:00	3	46980	0.001	3	46980	0.001	3	46980	0.002
10:00 - 11:00	3	46980	0.003	3	46980	0.000	3	46980	0.003
11:00 - 12:00	3	46980	0.002	3	46980	0.001	3	46980	0.003
12:00 - 13:00	3	46980	0.000	3	46980	0.000	3	46980	0.000
13:00 - 14:00	3	46980	0.001	3	46980	0.001	3	46980	0.002
14:00 - 15:00	3	46980	0.001	3	46980	0.000	3	46980	0.001
15:00 - 16:00	3	46980	0.003	3	46980	0.003	3	46980	0.006
16:00 - 17:00	**3**	**46980**	**0.006**	**3**	**46980**	**0.004**	**3**	**46980**	**0.010**
17:00 - 18:00	3	46980	0.001	3	46980	0.004	3	46980	0.005
18:00 - 19:00	3	46980	0.000	3	46980	0.001	3	46980	0.001
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.024			0.015			0.039

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.
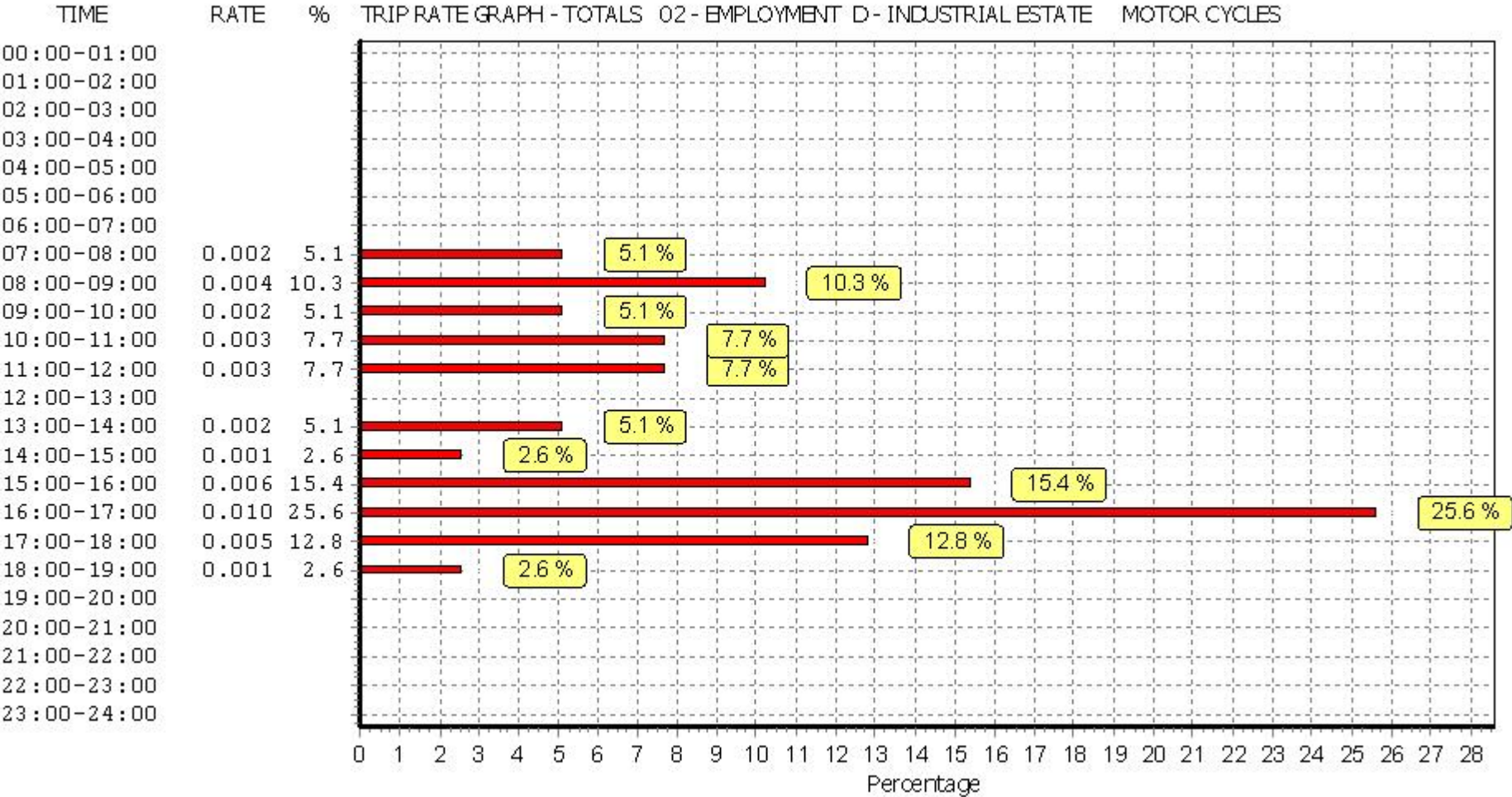
*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

RPS Group   20 Western Avenue, Milton Park   Abingdon

TIME   RATE   %   TRIP RATE GRAPH - ARRIVALS 02 - EMPLOYMENT D - INDUSTRIAL ESTATE   MOTOR CYCLES

TIME	RATE	%
00:00-01:00		
01:00-02:00		
02:00-03:00		
03:00-04:00		
04:00-05:00		
05:00-06:00		
06:00-07:00		
07:00-08:00	0.002	8.3
08:00-09:00	0.004	16.7
09:00-10:00	0.001	4.2
10:00-11:00	0.003	12.5
11:00-12:00	0.002	8.3
12:00-13:00		
13:00-14:00	0.001	4.2
14:00-15:00	0.001	4.2
15:00-16:00	0.003	12.5
16:00-17:00	0.006	25.0
17:00-18:00	0.001	4.2
18:00-19:00		
19:00-20:00		
20:00-21:00		
21:00-22:00		
22:00-23:00		
23:00-24:00		

Percentage

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

TIME	RATE	%	TRIP RATE GRAPH - DEPARTURES 02 - EMPLOYMENT D - INDUSTRIAL ESTATE MOTOR CYCLES
00:00-01:00			
01:00-02:00			
02:00-03:00			
03:00-04:00			
04:00-05:00			
05:00-06:00			
06:00-07:00			
07:00-08:00			
08:00-09:00			
09:00-10:00	0.001	6.7	6.7 %
10:00-11:00			
11:00-12:00	0.001	6.7	6.7 %
12:00-13:00			
13:00-14:00	0.001	6.7	6.7 %
14:00-15:00			
15:00-16:00	0.003	20.0	20 %
16:00-17:00	0.004	26.7	26.7 %
17:00-18:00	0.004	26.7	26.7 %
18:00-19:00	0.001	6.7	6.7 %
19:00-20:00			
20:00-21:00			
21:00-22:00			
22:00-23:00			
23:00-24:00			

Percentage

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

TIME	RATE	%	TRIP RATE GRAPH - TOTALS 02 - EMPLOYMENT D - INDUSTRIAL ESTATE MOTOR CYCLES
00:00-01:00			
01:00-02:00			
02:00-03:00			
03:00-04:00			
04:00-05:00			
05:00-06:00			
06:00-07:00			
07:00-08:00	0.002	5.1	5.1 %
08:00-09:00	0.004	10.3	10.3 %
09:00-10:00	0.002	5.1	5.1 %
10:00-11:00	0.003	7.7	7.7 %
11:00-12:00	0.003	7.7	7.7 %
12:00-13:00			
13:00-14:00	0.002	5.1	5.1 %
14:00-15:00	0.001	2.6	2.6 %
15:00-16:00	0.006	15.4	15.4 %
16:00-17:00	0.010	25.6	25.6 %
17:00-18:00	0.005	12.8	12.8 %
18:00-19:00	0.001	2.6	2.6 %
19:00-20:00			
20:00-21:00			
21:00-22:00			
22:00-23:00			
23:00-24:00			

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

Percentage

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

RPS Group   20 Western Avenue, Milton Park   Abingdon   Licence No: 515501

Calculation Reference: AUDIT-515501-190213-0205

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use   : 02 - EMPLOYMENT
Category   : F - WAREHOUSING (COMMERCIAL)
VEHICLES

Selected regions and areas:
02	SOUTH EAST		
	HF	HERTFORDSHIRE	1 days
	KC	KENT	1 days
05	EAST MIDLANDS		
	LN	LINCOLNSHIRE	1 days
10	WALES		
	WR	WREXHAM	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Secondary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter:	Gross floor area
Actual Range:	9000 to 76000 (units: sqm)
Range Selected by User:	5000 to 80066 (units: sqm)
Parking Spaces Range:	Selected: 4 to 832 Actual: 4 to 832

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/08 to 22/09/17

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:
Monday	1 days
Tuesday	1 days
Thursday	1 days
Friday	1 days

This data displays the number of selected surveys by day of the week.

Selected survey types:
Manual count	4 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaking using machines.

Selected Locations:
Edge of Town	3
Free Standing (PPS6 Out of Town)	1

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:
Industrial Zone	2
Commercial Zone	1
No Sub Category	1

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:

Use Class:
  B8   4 days

*This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005
has been used for this purpose, which can be found within the Library module of TRICS®.*

Population within 1 mile:
1,000 or Less   1 days
1,001 to 5,000   1 days
10,001 to 15,000   1 days
15,001 to 20,000   1 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:
25,001 to 50,000   1 days
50,001 to 75,000   1 days
125,001 to 250,000   2 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:
0.6 to 1.0   1 days
1.1 to 1.5   3 days

*This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling,
within a radius of 5-miles of selected survey sites.*

Travel Plan:
No   4 days

*This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place,
and the number of surveys that were undertaken at sites without Travel Plans.*

PTAL Rating:
No PTAL Present   4 days

This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1   HF-02-F-03   DISTRIBUTION CEN.   HERTFORDSHIRE

    HATFIELD
    HATFIELD BUSINESS CEN.
    Edge of Town
    Commercial Zone
    Total Gross floor area: 80000   sqm
        Survey date: THURSDAY   *10/07/08*   *Survey Type: MANUAL*
2   KC-02-F-02   COMMERCIAL WAREHOUSING   KENT
    MILLS ROAD
    AYLESFORD
    QUARRY WOOD
    Edge of Town
    Industrial Zone
    Total Gross floor area: 11200   sqm
        Survey date: FRIDAY   *22/09/17*   *Survey Type: MANUAL*
3   LN-02-F-01   BOOK SERVICE   LINCOLNSHIRE
    TRENT ROAD
    GRANTHAM

    Edge of Town
    No Sub Category
    Total Gross floor area: 32300   sqm
        Survey date: MONDAY   *29/11/10*   *Survey Type: MANUAL*
4   WR-02-F-01   WAREHOUSE   WREXHAM
    UNIT 1-2 PACIFIC PARK
    NEAR WREXHAM
    WREXHAM IND. ESTATE
    Free Standing (PPS6 Out of Town)
    Industrial Zone
    Total Gross floor area: 9000   sqm
        Survey date: TUESDAY   *18/10/11*   *Survey Type: MANUAL*

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

MANUALLY DESELECTED SITES

Site Ref	Reason for Deselection
TW-02-F-01	HIGH PT

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)
VEHICLES
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	31721	0.110	4	31721	0.080	4	31721	0.190
08:00 - 09:00	4	31721	0.091	4	31721	0.048	4	31721	0.139
09:00 - 10:00	4	31721	0.084	4	31721	0.066	4	31721	0.150
10:00 - 11:00	4	31721	0.065	4	31721	0.065	4	31721	0.130
11:00 - 12:00	4	31721	0.064	4	31721	0.069	4	31721	0.133
12:00 - 13:00	4	31721	0.068	4	31721	0.074	4	31721	0.142
13:00 - 14:00	4	31721	0.095	4	31721	0.085	4	31721	0.180
14:00 - 15:00	4	31721	0.106	4	31721	0.126	4	31721	0.232
15:00 - 16:00	4	31721	0.106	4	31721	0.128	4	31721	0.234
16:00 - 17:00	4	31721	0.080	4	31721	0.125	4	31721	0.205
17:00 - 18:00	4	31721	0.024	4	31721	0.086	4	31721	0.110
18:00 - 19:00	4	31721	0.013	4	31721	0.054	4	31721	0.067
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.906			1.006			1.912

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*
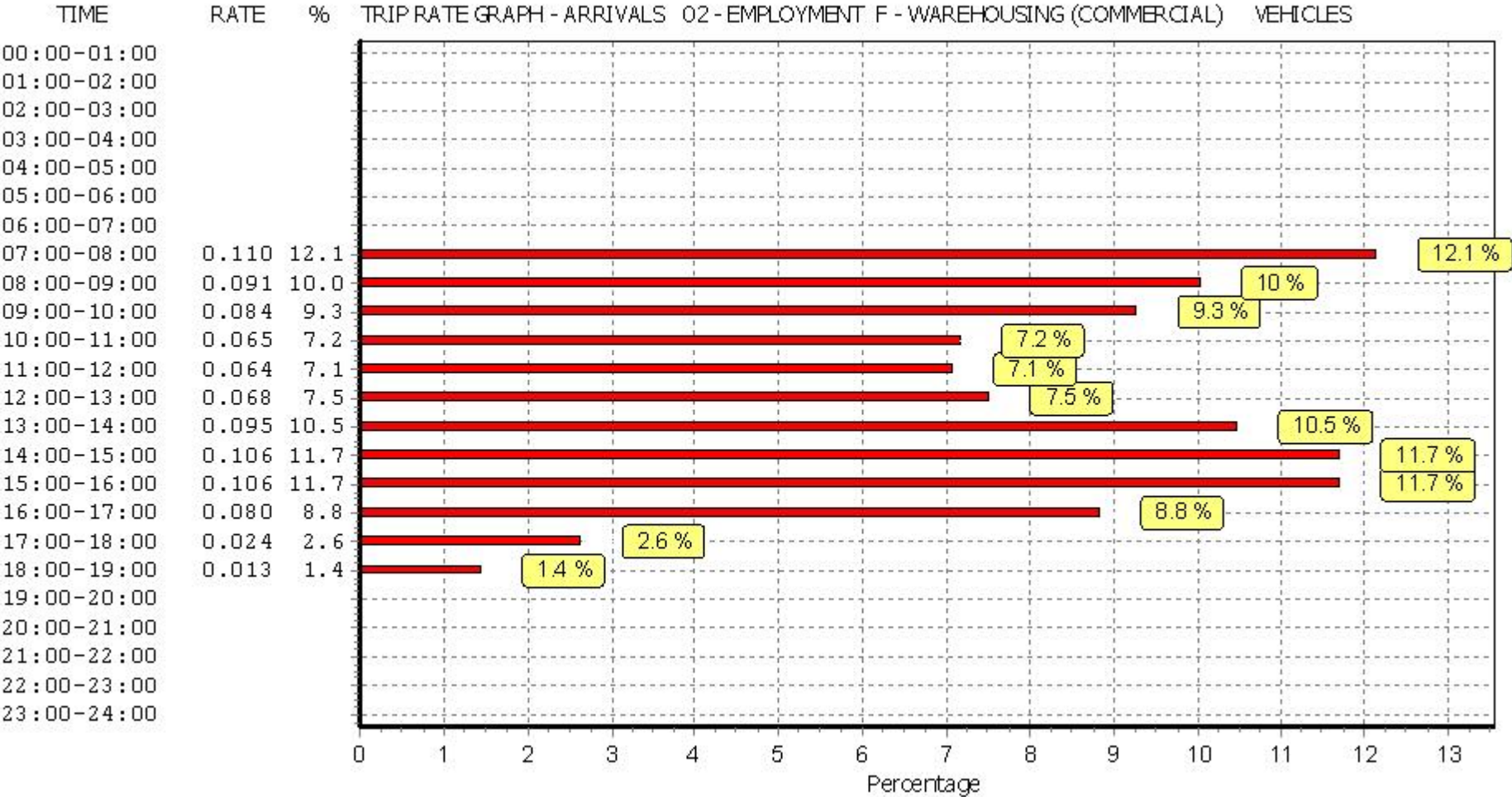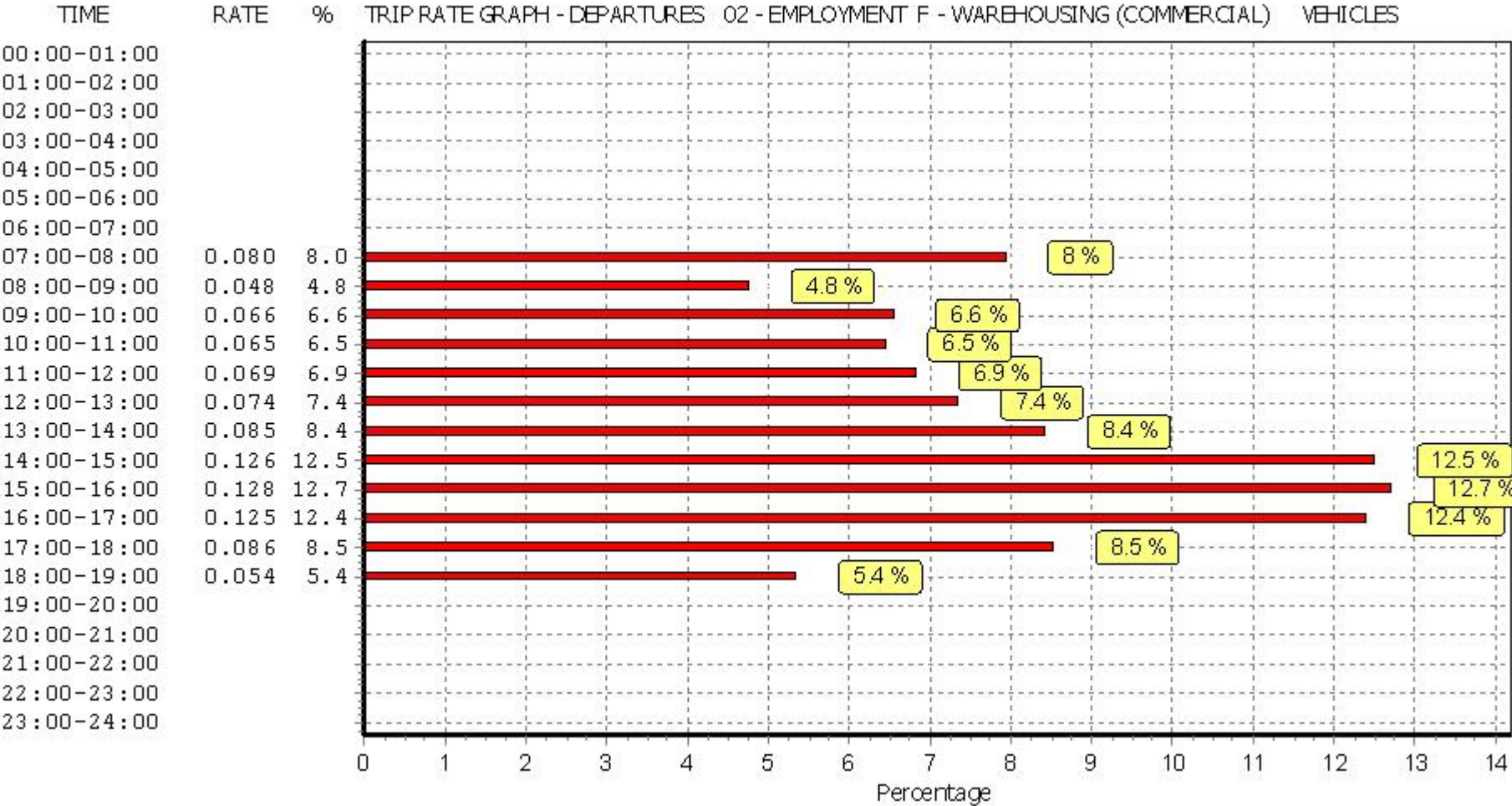
Parameter summary

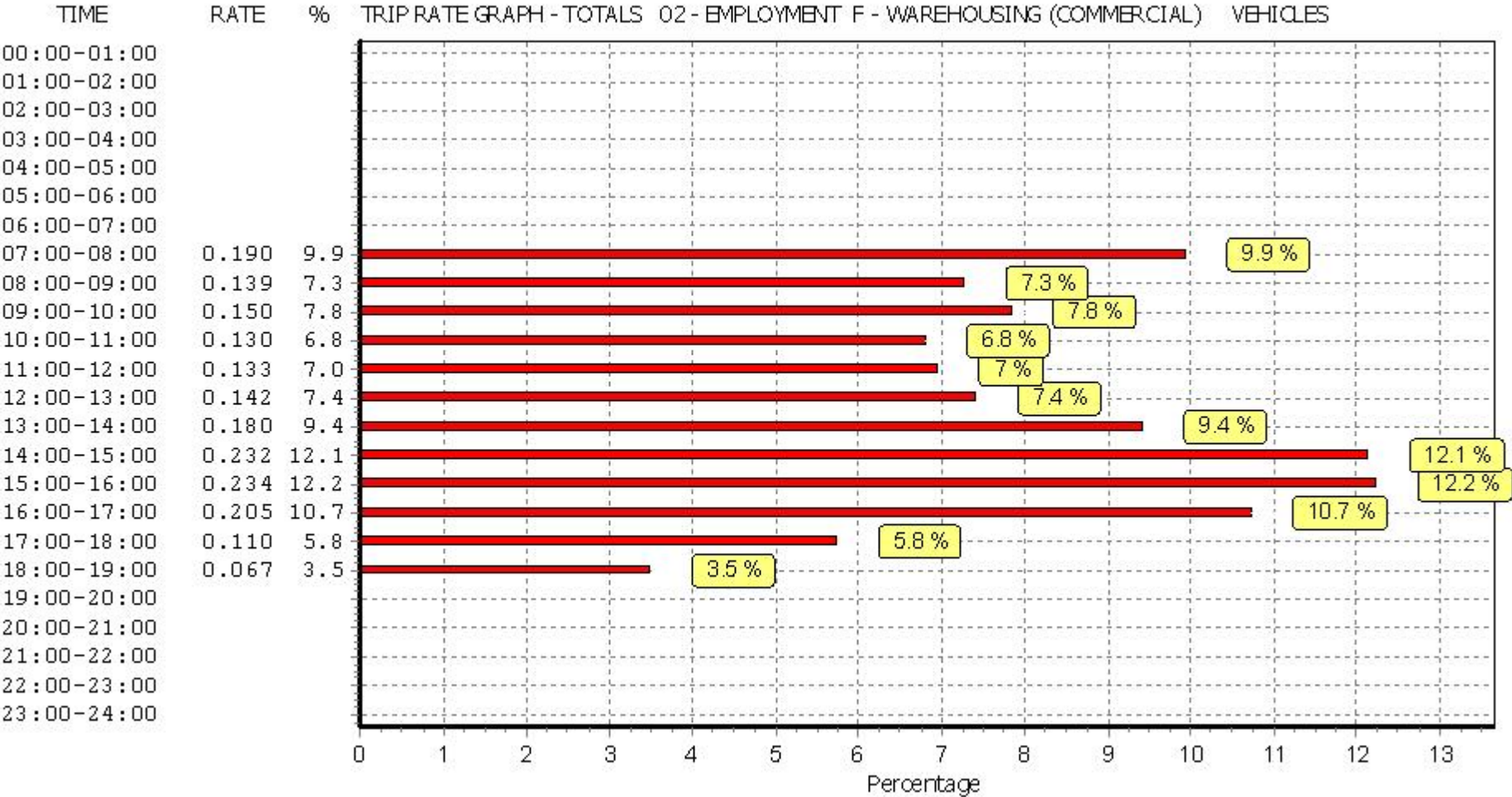|	
Trip rate parameter range selected:	9000 - 76000 (units: sqm)
Survey date date range:	01/01/08 - 22/09/17
Number of weekdays (Monday-Friday):	4
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	1

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TIME	RATE	%	TRIP RATE GRAPH - ARRIVALS 02 - EMPLOYMENT F - WAREHOUSING (COMMERCIAL) VEHICLES
00:00-01:00			
01:00-02:00			
02:00-03:00			
03:00-04:00			
04:00-05:00			
05:00-06:00			
06:00-07:00			
07:00-08:00	0.110	12.1	12.1 %
08:00-09:00	0.091	10.0	10 %
09:00-10:00	0.084	9.3	9.3 %
10:00-11:00	0.065	7.2	7.2 %
11:00-12:00	0.064	7.1	7.1 %
12:00-13:00	0.068	7.5	7.5 %
13:00-14:00	0.095	10.5	10.5 %
14:00-15:00	0.106	11.7	11.7 %
15:00-16:00	0.106	11.7	11.7 %
16:00-17:00	0.080	8.8	8.8 %
17:00-18:00	0.024	2.6	2.6 %
18:00-19:00	0.013	1.4	1.4 %
19:00-20:00			
20:00-21:00			
21:00-22:00			
22:00-23:00			
23:00-24:00			

Percentage

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

TIME	RATE	%	TRIP RATE GRAPH - DEPARTURES 02 - EMPLOYMENT F - WAREHOUSING (COMMERCIAL) VEHICLES
00:00-01:00			
01:00-02:00			
02:00-03:00			
03:00-04:00			
04:00-05:00			
05:00-06:00			
06:00-07:00			
07:00-08:00	0.080	8.0	8 %
08:00-09:00	0.048	4.8	4.8 %
09:00-10:00	0.066	6.6	6.6 %
10:00-11:00	0.065	6.5	6.5 %
11:00-12:00	0.069	6.9	6.9 %
12:00-13:00	0.074	7.4	7.4 %
13:00-14:00	0.085	8.4	8.4 %
14:00-15:00	0.126	12.5	12.5 %
15:00-16:00	0.128	12.7	12.7 %
16:00-17:00	0.125	12.4	12.4 %
17:00-18:00	0.086	8.5	8.5 %
18:00-19:00	0.054	5.4	5.4 %
19:00-20:00			
20:00-21:00			
21:00-22:00			
22:00-23:00			
23:00-24:00			

Percentage

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

TIME	RATE	%	TRIP RATE GRAPH - TOTALS 02 - EMPLOYMENT F - WAREHOUSING (COMMERCIAL) VEHICLES
00:00-01:00			
01:00-02:00			
02:00-03:00			
03:00-04:00			
04:00-05:00			
05:00-06:00			
06:00-07:00			
07:00-08:00	0.190	9.9	9.9 %
08:00-09:00	0.139	7.3	7.3 %
09:00-10:00	0.150	7.8	7.8 %
10:00-11:00	0.130	6.8	6.8 %
11:00-12:00	0.133	7.0	7 %
12:00-13:00	0.142	7.4	7.4 %
13:00-14:00	0.180	9.4	9.4 %
14:00-15:00	0.232	12.1	12.1 %
15:00-16:00	0.234	12.2	12.2 %
16:00-17:00	0.205	10.7	10.7 %
17:00-18:00	0.110	5.8	5.8 %
18:00-19:00	0.067	3.5	3.5 %
19:00-20:00			
20:00-21:00			
21:00-22:00			
22:00-23:00			
23:00-24:00			

Percentage (x-axis: 0 1 2 3 4 5 6 7 8 9 10 11 12 13)

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)
TAXIS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
08:00 - 09:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
09:00 - 10:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
10:00 - 11:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
11:00 - 12:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
12:00 - 13:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
13:00 - 14:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
14:00 - 15:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
15:00 - 16:00	4	31721	0.001	4	31721	0.001	4	31721	0.002
16:00 - 17:00	4	31721	0.002	4	31721	0.002	4	31721	0.004
17:00 - 18:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
18:00 - 19:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.003			0.003			0.006

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.
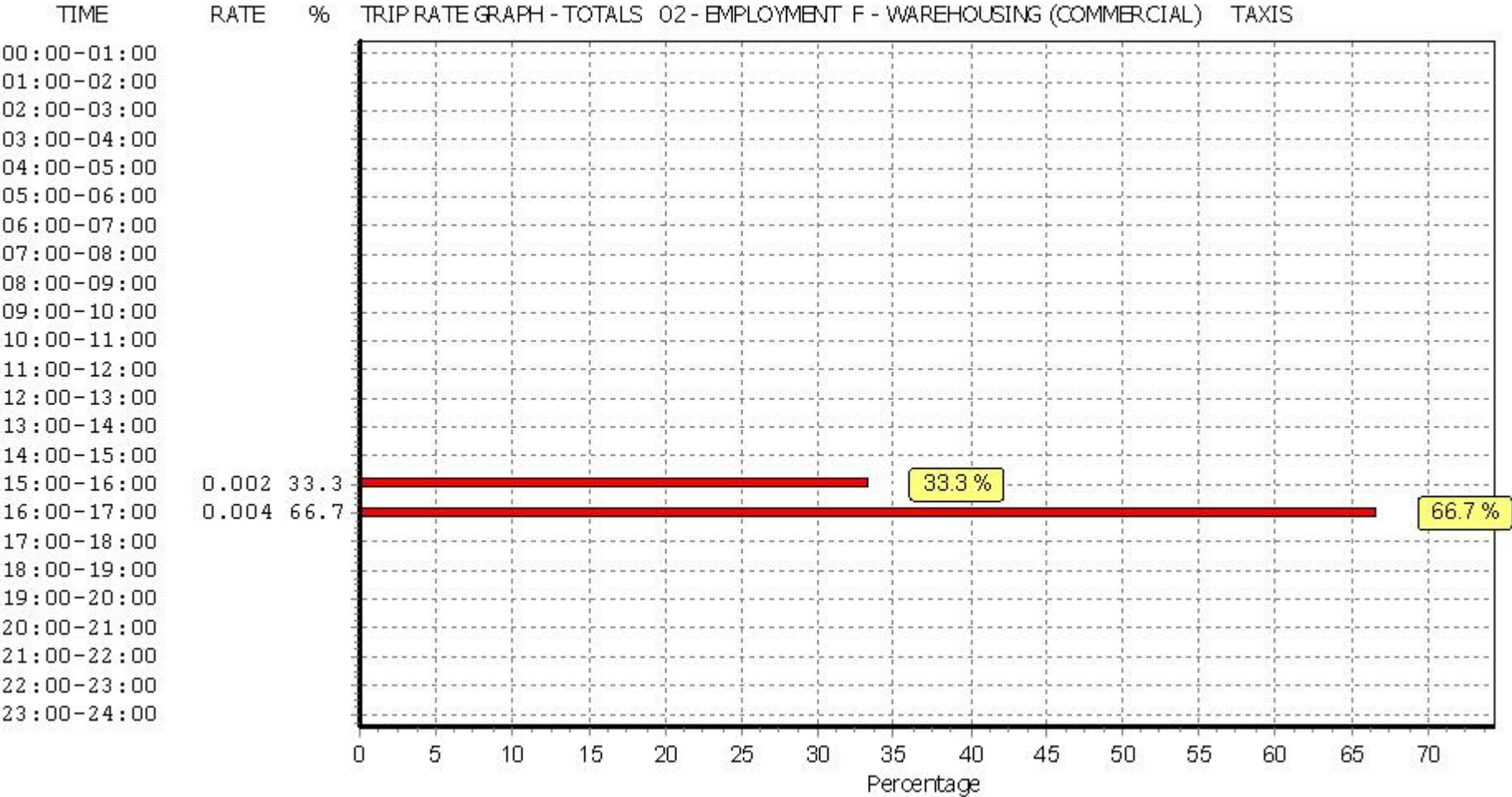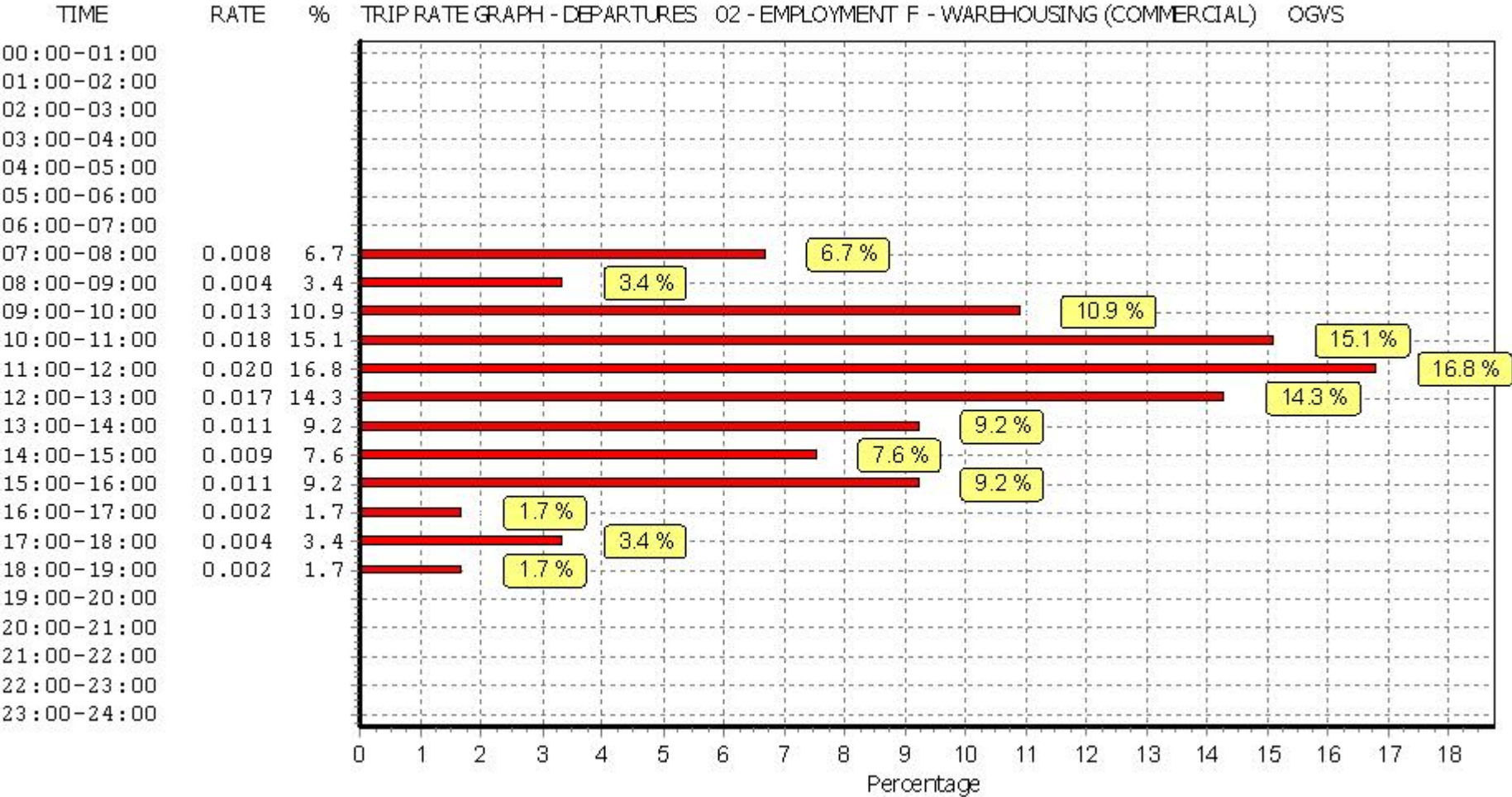
*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

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Model Farm - B8 Final
RPS Group 20 Western Avenue, Milton Park Abingdon

Wednesday 13/02/19
Page 11
Licence No: 515501

TIME   RATE   %   TRIP RATE GRAPH - DEPARTURES 02 - EMPLOYMENT F - WAREHOUSING (COMMERCIAL)   TAXIS

TIME	RATE	%
00:00-01:00		
01:00-02:00		
02:00-03:00		
03:00-04:00		
04:00-05:00		
05:00-06:00		
06:00-07:00		
07:00-08:00		
08:00-09:00		
09:00-10:00		
10:00-11:00		
11:00-12:00		
12:00-13:00		
13:00-14:00		
14:00-15:00		
15:00-16:00	0.001	33.3
16:00-17:00	0.002	66.7
17:00-18:00		
18:00-19:00		
19:00-20:00		
20:00-21:00		
21:00-22:00		
22:00-23:00		
23:00-24:00		

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

TIME   RATE   %   TRIP RATE GRAPH - TOTALS   02 - EMPLOYMENT   F - WAREHOUSING (COMMERCIAL)   TAXIS

TIME	RATE	%
00:00-01:00		
01:00-02:00		
02:00-03:00		
03:00-04:00		
04:00-05:00		
05:00-06:00		
06:00-07:00		
07:00-08:00		
08:00-09:00		
09:00-10:00		
10:00-11:00		
11:00-12:00		
12:00-13:00		
13:00-14:00		
14:00-15:00		
15:00-16:00	0.002	33.3
16:00-17:00	0.004	66.7
17:00-18:00		
18:00-19:00		
19:00-20:00		
20:00-21:00		
21:00-22:00		
22:00-23:00		
23:00-24:00		

*This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates
are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual
time period, allowing peak periods to be easily identified through observation. Note that the type of count and the
selected direction is shown at the top of the graph.*

RPS Group   20 Western Avenue, Milton Park   Abingdon   Licence No: 515501

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)
OGVS
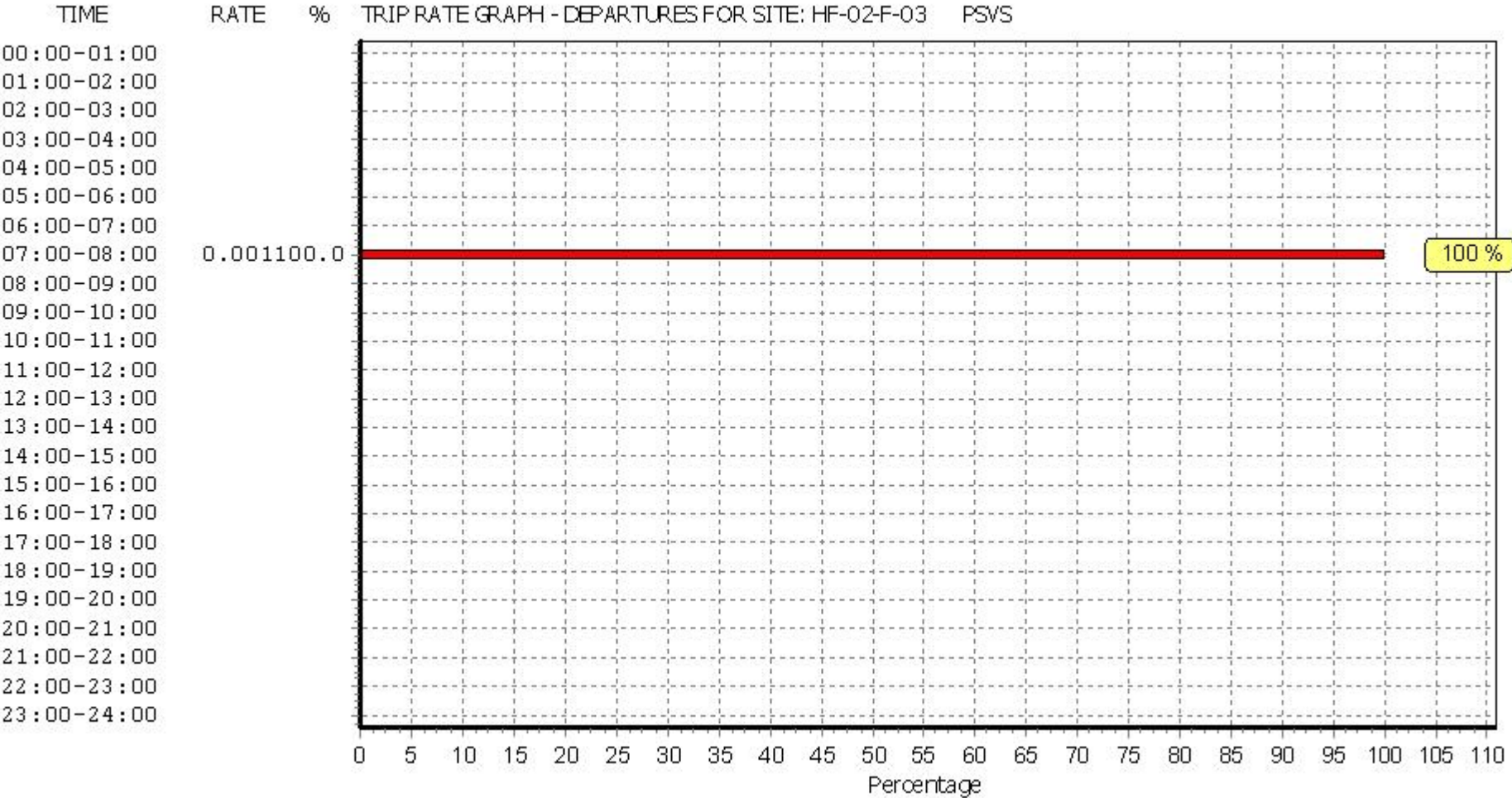Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	31721	0.009	4	31721	0.008	4	31721	0.017
08:00 - 09:00	4	31721	0.008	4	31721	0.004	4	31721	0.012
09:00 - 10:00	4	31721	0.014	4	31721	0.013	4	31721	0.027
10:00 - 11:00	4	31721	0.017	4	31721	0.018	4	31721	0.035
11:00 - 12:00	4	31721	0.011	4	31721	0.020	4	31721	0.031
12:00 - 13:00	4	31721	0.009	4	31721	0.017	4	31721	0.026
13:00 - 14:00	4	31721	0.013	4	31721	0.011	4	31721	0.024
14:00 - 15:00	4	31721	0.014	4	31721	0.009	4	31721	0.023
15:00 - 16:00	4	31721	0.010	4	31721	0.011	4	31721	0.021
16:00 - 17:00	4	31721	0.013	4	31721	0.002	4	31721	0.015
17:00 - 18:00	4	31721	0.004	4	31721	0.004	4	31721	0.008
18:00 - 19:00	4	31721	0.002	4	31721	0.002	4	31721	0.004
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.124			0.119			0.243

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

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Model Farm - B8 Final

RPS Group   20 Western Avenue, Milton Park   Abingdon

Wednesday 13/02/19

Page 14

Licence No: 515501

TIME   RATE   %   TRIP RATE GRAPH - ARRIVALS 02 - EMPLOYMENT F - WAREHOUSING (COMMERCIAL)   OGVS

TIME	RATE	%
00:00-01:00		
01:00-02:00		
02:00-03:00		
03:00-04:00		
04:00-05:00		
05:00-06:00		
06:00-07:00		
07:00-08:00	0.009	7.3
08:00-09:00	0.008	6.5
09:00-10:00	0.014	11.3
10:00-11:00	0.017	13.7
11:00-12:00	0.011	8.9
12:00-13:00	0.009	7.3
13:00-14:00	0.013	10.5
14:00-15:00	0.014	11.3
15:00-16:00	0.010	8.1
16:00-17:00	0.013	10.5
17:00-18:00	0.004	3.2
18:00-19:00	0.002	1.6
19:00-20:00		
20:00-21:00		
21:00-22:00		
22:00-23:00		
23:00-24:00		

Percentage

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

TIME	RATE	%	TRIP RATE GRAPH - DEPARTURES 02 - EMPLOYMENT F - WAREHOUSING (COMMERCIAL) OGVS
00:00-01:00			
01:00-02:00			
02:00-03:00			
03:00-04:00			
04:00-05:00			
05:00-06:00			
06:00-07:00			
07:00-08:00	0.008	6.7	6.7 %
08:00-09:00	0.004	3.4	3.4 %
09:00-10:00	0.013	10.9	10.9 %
10:00-11:00	0.018	15.1	15.1 %
11:00-12:00	0.020	16.8	16.8 %
12:00-13:00	0.017	14.3	14.3 %
13:00-14:00	0.011	9.2	9.2 %
14:00-15:00	0.009	7.6	7.6 %
15:00-16:00	0.011	9.2	9.2 %
16:00-17:00	0.002	1.7	1.7 %
17:00-18:00	0.004	3.4	3.4 %
18:00-19:00	0.002	1.7	1.7 %
19:00-20:00			
20:00-21:00			
21:00-22:00			
22:00-23:00			
23:00-24:00			

Percentage

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

TIME	RATE	%	TRIP RATE GRAPH - TOTALS 02 - EMPLOYMENT F - WAREHOUSING (COMMERCIAL) OGVS
00:00-01:00			
01:00-02:00			
02:00-03:00			
03:00-04:00			
04:00-05:00			
05:00-06:00			
06:00-07:00			
07:00-08:00	0.017	7.0	7 %
08:00-09:00	0.012	4.9	4.9 %
09:00-10:00	0.027	11.1	11.1 %
10:00-11:00	0.035	14.4	14.4 %
11:00-12:00	0.031	12.8	12.8 %
12:00-13:00	0.026	10.7	10.7 %
13:00-14:00	0.024	9.9	9.9 %
14:00-15:00	0.023	9.5	9.5 %
15:00-16:00	0.021	8.6	8.6 %
16:00-17:00	0.015	6.2	6.2 %
17:00-18:00	0.008	3.3	3.3 %
18:00-19:00	0.004	1.6	1.6 %
19:00-20:00			
20:00-21:00			
21:00-22:00			
22:00-23:00			
23:00-24:00			

Percentage
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

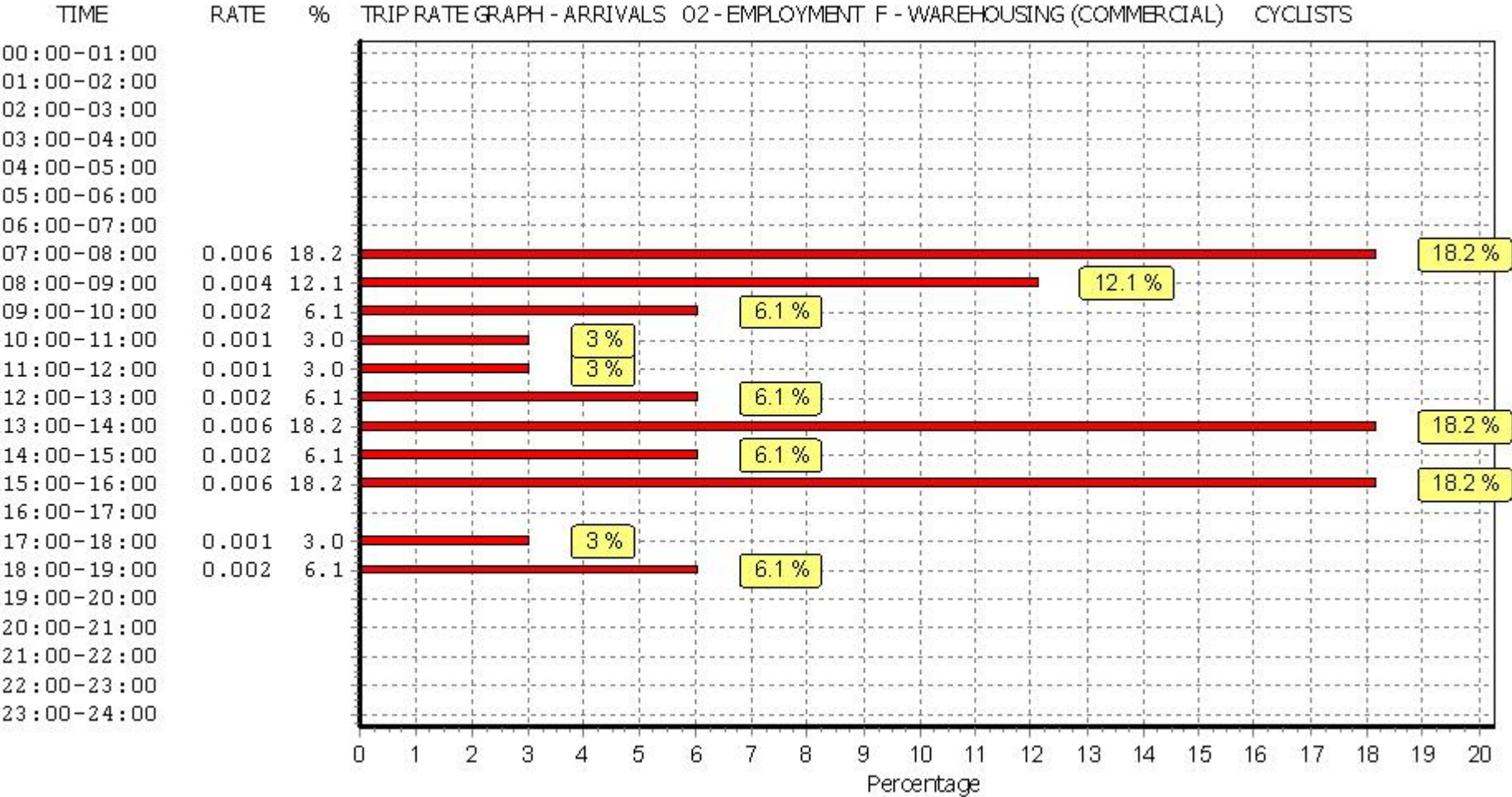TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)
PSVS
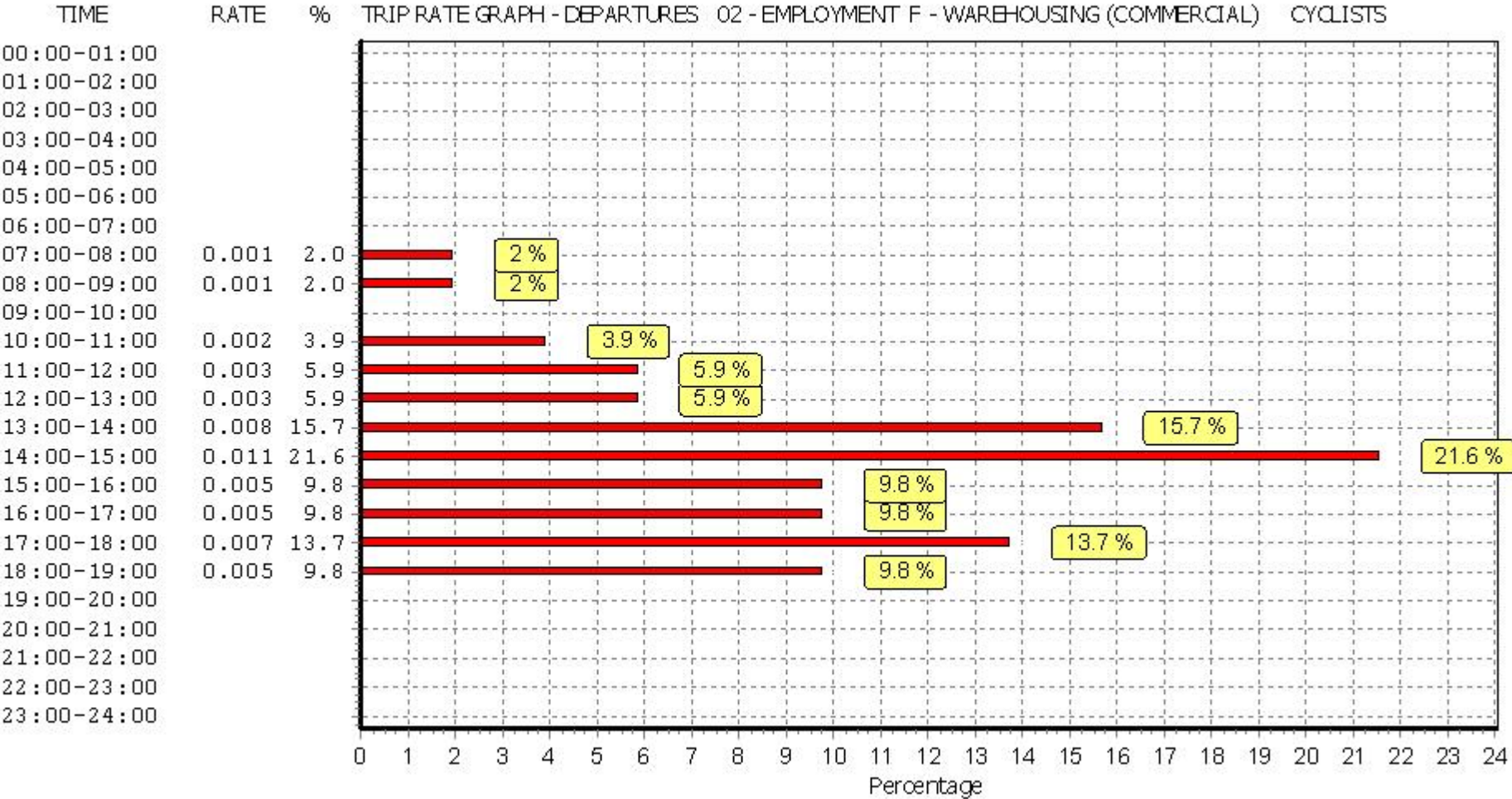Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	31721	0.000	4	31721	0.001	4	31721	0.001
08:00 - 09:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
09:00 - 10:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
10:00 - 11:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
11:00 - 12:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
12:00 - 13:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
13:00 - 14:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
14:00 - 15:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
15:00 - 16:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
16:00 - 17:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
17:00 - 18:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
18:00 - 19:00	4	31721	0.000	4	31721	0.000	4	31721	0.000
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.000			0.001			0.001

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.
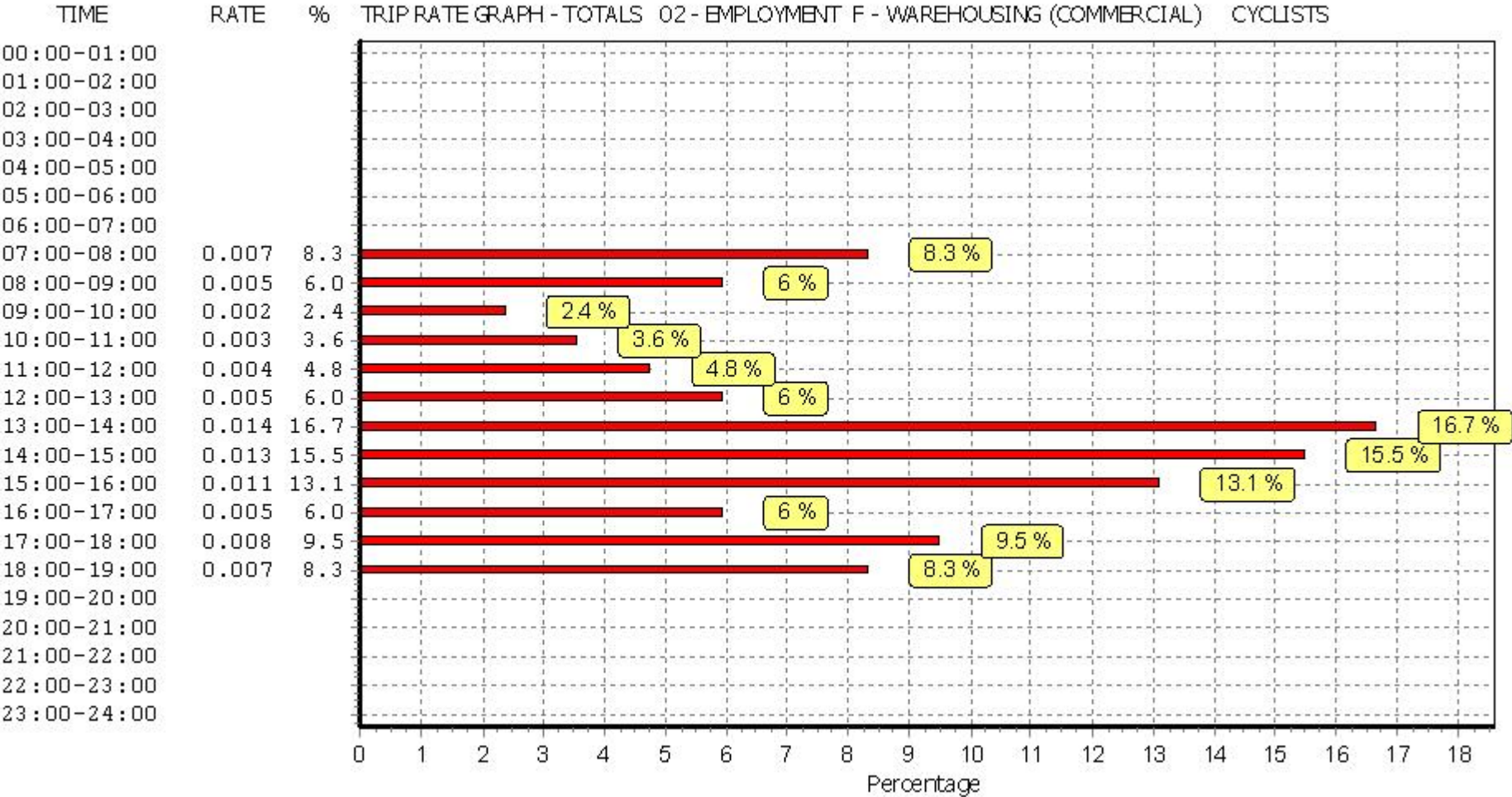
*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TIME	RATE	%	TRIP RATE GRAPH - ARRIVALS FOR SITE: HF-02-F-03 PSVS


```
00:00-01:00
01:00-02:00
02:00-03:00
03:00-04:00
04:00-05:00
05:00-06:00
06:00-07:00
07:00-08:00
08:00-09:00
09:00-10:00
10:00-11:00
11:00-12:00
12:00-13:00
13:00-14:00
14:00-15:00
15:00-16:00
16:00-17:00
17:00-18:00
18:00-19:00
19:00-20:00
20:00-21:00
21:00-22:00
22:00-23:00
23:00-24:00
```

0
Percentage

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)
CYCLISTS
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	31721	0.006	4	31721	0.001	4	31721	0.007
08:00 - 09:00	4	31721	0.004	4	31721	0.001	4	31721	0.005
09:00 - 10:00	4	31721	0.002	4	31721	0.000	4	31721	0.002
10:00 - 11:00	4	31721	0.001	4	31721	0.002	4	31721	0.003
11:00 - 12:00	4	31721	0.001	4	31721	0.003	4	31721	0.004
12:00 - 13:00	4	31721	0.002	4	31721	0.003	4	31721	0.005
13:00 - 14:00	4	31721	0.006	4	31721	0.008	4	31721	0.014
14:00 - 15:00	4	31721	0.002	4	31721	0.011	4	31721	0.013
15:00 - 16:00	4	31721	0.006	4	31721	0.005	4	31721	0.011
16:00 - 17:00	4	31721	0.000	4	31721	0.005	4	31721	0.005
17:00 - 18:00	4	31721	0.001	4	31721	0.007	4	31721	0.008
18:00 - 19:00	4	31721	0.002	4	31721	0.005	4	31721	0.007
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.033			0.051			0.084

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TIME	RATE	%	TRIP RATE GRAPH - ARRIVALS 02 - EMPLOYMENT F - WAREHOUSING (COMMERCIAL) CYCLISTS
00:00-01:00			
01:00-02:00			
02:00-03:00			
03:00-04:00			
04:00-05:00			
05:00-06:00			
06:00-07:00			
07:00-08:00	0.006	18.2	18.2 %
08:00-09:00	0.004	12.1	12.1 %
09:00-10:00	0.002	6.1	6.1 %
10:00-11:00	0.001	3.0	3 %
11:00-12:00	0.001	3.0	3 %
12:00-13:00	0.002	6.1	6.1 %
13:00-14:00	0.006	18.2	18.2 %
14:00-15:00	0.002	6.1	6.1 %
15:00-16:00	0.006	18.2	18.2 %
16:00-17:00			
17:00-18:00	0.001	3.0	3 %
18:00-19:00	0.002	6.1	6.1 %
19:00-20:00			
20:00-21:00			
21:00-22:00			
22:00-23:00			
23:00-24:00			

Percentage

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

TIME	RATE	%	TRIP RATE GRAPH - DEPARTURES 02 - EMPLOYMENT F - WAREHOUSING (COMMERCIAL) CYCLISTS
00:00-01:00			
01:00-02:00			
02:00-03:00			
03:00-04:00			
04:00-05:00			
05:00-06:00			
06:00-07:00			
07:00-08:00	0.001	2.0	2 %
08:00-09:00	0.001	2.0	2 %
09:00-10:00			
10:00-11:00	0.002	3.9	3.9 %
11:00-12:00	0.003	5.9	5.9 %
12:00-13:00	0.003	5.9	5.9 %
13:00-14:00	0.008	15.7	15.7 %
14:00-15:00	0.011	21.6	21.6 %
15:00-16:00	0.005	9.8	9.8 %
16:00-17:00	0.005	9.8	9.8 %
17:00-18:00	0.007	13.7	13.7 %
18:00-19:00	0.005	9.8	9.8 %
19:00-20:00			
20:00-21:00			
21:00-22:00			
22:00-23:00			
23:00-24:00			

Percentage

*This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates
are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual
time period, allowing peak periods to be easily identified through observation. Note that the type of count and the
selected direction is shown at the top of the graph.*

TIME	RATE	%	TRIP RATE GRAPH - TOTALS 02 - EMPLOYMENT F - WAREHOUSING (COMMERCIAL) CYCLISTS

TIME	RATE	%
00:00-01:00		
01:00-02:00		
02:00-03:00		
03:00-04:00		
04:00-05:00		
05:00-06:00		
06:00-07:00		
07:00-08:00	0.007	8.3
08:00-09:00	0.005	6.0
09:00-10:00	0.002	2.4
10:00-11:00	0.003	3.6
11:00-12:00	0.004	4.8
12:00-13:00	0.005	6.0
13:00-14:00	0.014	16.7
14:00-15:00	0.013	15.5
15:00-16:00	0.011	13.1
16:00-17:00	0.005	6.0
17:00-18:00	0.008	9.5
18:00-19:00	0.007	8.3
19:00-20:00		
20:00-21:00		
21:00-22:00		
22:00-23:00		
23:00-24:00		

Percentage

This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

Appendix M – Strategic Modelling Results Report

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traffic and transportation

Strategic Transport Modelling Assessment

Model Farm, Cardiff

Produced for RPS

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CIHT
Corporate Partner

Report

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Strategic Transport Modelling Assessment - Model Farm, Cardiff

1	INTRODUCTION

1.1 This report presents a summary of the assessment of the impact that the Model Farm development is predicted to have on the highway network. The assessment has been undertaken using a computerised transport model that predicts future year conditions based upon a validated and calibrated existing condition (Base) model.

1.2 The Model Farm site is located immediately east of Cardiff Airport as shown in Figure 1.1. The development will consist of 158,982m^2 Gross Floor Area (GFA) of employment floorspace, comprising 63,593 m^2 GFA of B1 land uses, 63,593m2 of B2 land uses and 31,796m^2 of B8 land uses.

Figure 1.1: Development site location

1.1 EVIDENCE BASE

1.1.1 The South East Wales Transport Model (SEWTM), which is a Strategic Highway Model has been used as the basis for the scheme assessment. The base year of the SEWTM is 2015 and the model was developed to represent the average weekday AM peak period (07:45 - 08:45) and PM peak period (16:30 - 17:30).

1.1.2 The model development was guided by the following units of the DfT's WebTAG guidance:

► Unit M1 "Principles of Modelling and Forecasting" (January 2014).

► Unit M1.2 "Data Sources and Surveys" (January 2014).

► Unit M3.1 "Highway Assignment Modelling" (January 2014).

1.1.3 The SEWTM was developed using PTV VISUM, a software program for strategic traffic and transport analyses and forecasts.

1.1.4   The simulation area of the SEWTM is shown in Figure 1.2.

Figure 1.2: Simulation area of SEWTM
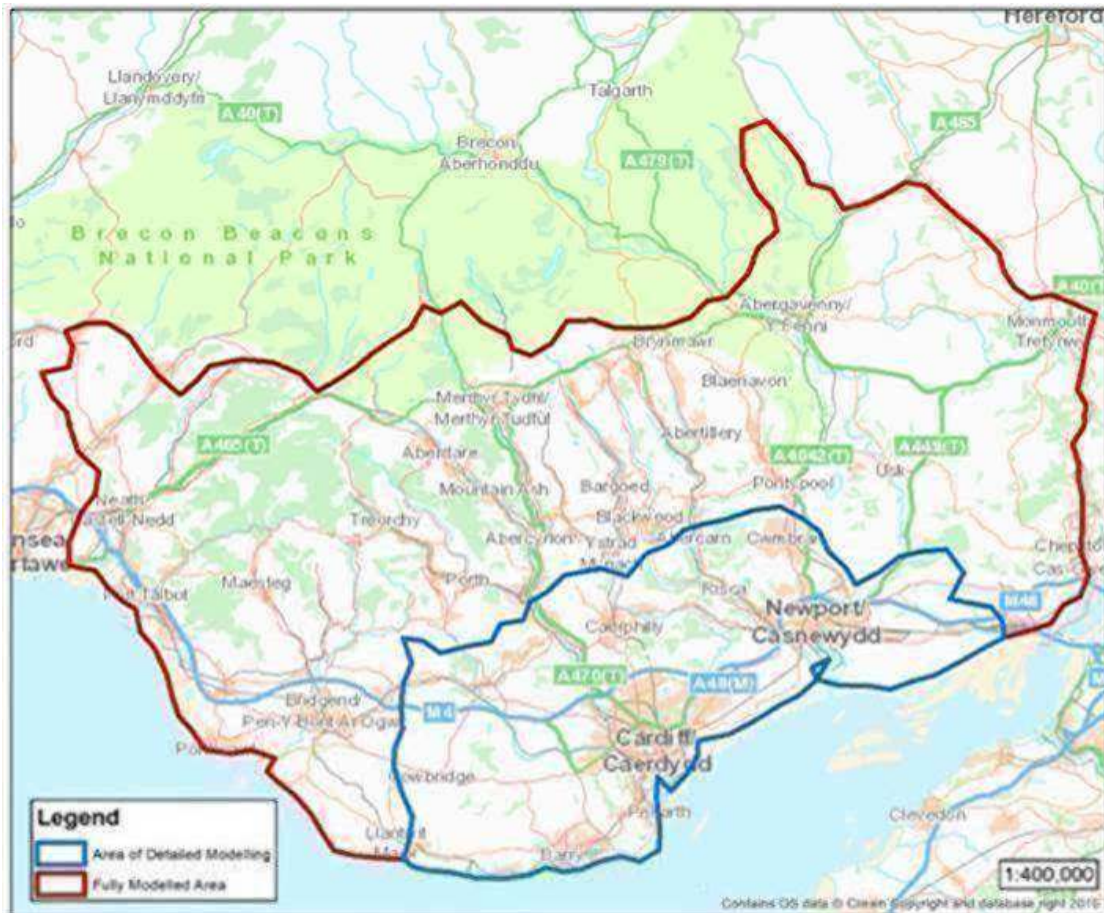
1.1.5   The performance of the base year highway model was examined through comparison of modelled and observed total vehicle counts on links, screenlines and cordons; junction turning counts; journey times along selected routes; and route comparison.

1.2   STRUCTURE OF THE DOCUMENT

1.2.1   This report is intended to form part of a transport assessment methodology technical note in order to support the assessment of the development site in the emerging West Cardiff area. The modelled forecast scenarios will enable the detailed assessment of the impact of this potential commercial development on those parts of the highway most likely to be affected. The strategic modelling will be focusing on where detrimental traffic conditions might exacerbate junction delays and queues and where mitigation may be required in the form of infrastructure improvements, demand management or softer policy measures.

1.2.2   The main body of the report covers the following chapters:

►   Chapter 2. Forecasting Methodology

►   Chapter 3. Evaluation and Results – 2026

►   Chapter 4. Evaluation and Results – 2029

2   FORECASTING METHODOLOGY

2.1   FORECAST SCENARIOS

2.1.1   The strategic transport modelling element of the project consists of the following modelled scenarios and all the associated model runs and model output analysis according to the requirements set by Transport for Wales:

- ► Base Year;
- ► Future Year 2026;
- ► Future Year 2026 + Model Farm;
- ► Future Year 2029; and
- ► Future Year 2029 + Model Farm

2.1.2   Two forecast scenarios have been produced and run through the SEWTM to enable the analysis of impact of this development in the forecast year of 2026 and 2029.

- ► **Scenario A:** will include planned developments outside the local area and committed developments in the local area but does not include the Model Farm development.
- ► **Scenario B:** based on Scenario A but also includes this Local Plan development in the borough.

2.1.3   **Scenario A** has been prepared representing the 2026 and 2029 AM peak and PM peak highway conditions. Scenario A provides a future case with baseline conditions representing the minimum projected development in the intervening years. In this case it represents a scenario devoid of any Local Plan sites and only includes:

- ► Planned development outside the borough;
- ► Committed dwellings within the borough as provided in the housing trajectory; and
- ► Committed jobs within the borough as provided in the job trajectory.

2.1.4   Planned development outside the SWETM was accounted for in the model using national projections. Car growth was obtained from TEMPro version 7.1, a software tool that provides projections of growth over time for use in transport models based on outputs from the National Trip End Model (NTEM). NTEM version 7.1 datasets were used for forecasting future growth. NTEM trip growth projections refer to future trip demand due to changes in demography, land use and changes in car ownership and trip rates. It assumes trip costs at base year levels, and it does not allow for changes in travel times, perceived value of time, cost of fuel, and other car operating costs.

2.1.5   **Scenario B** will apply the same TEMPro v7.1 growth factors (cars) and regional growth traffic (LGV and HGV) forecasts outside the local area and committed development in the local area as Scenario A but also includes the development site as defined in the project specification in accordance with the size and parameters of the Model Farm.

2.1.6   In addition, all the committed highway infrastructure schemes in Scenario A were also considered in Scenario B. Scenario B also includes all development site related highway infrastructure changes or improvements. These changes on the highway network only affect the local highway network by connecting the development site through two entry/exit points as per Figure 2.1. The first site access will be at the Port Road / A4226 roundabout, whilst the second site access is on the western side of Port Road near Cardiff Airport.

Figure 2.1: Model Farm site access points on the local highway network
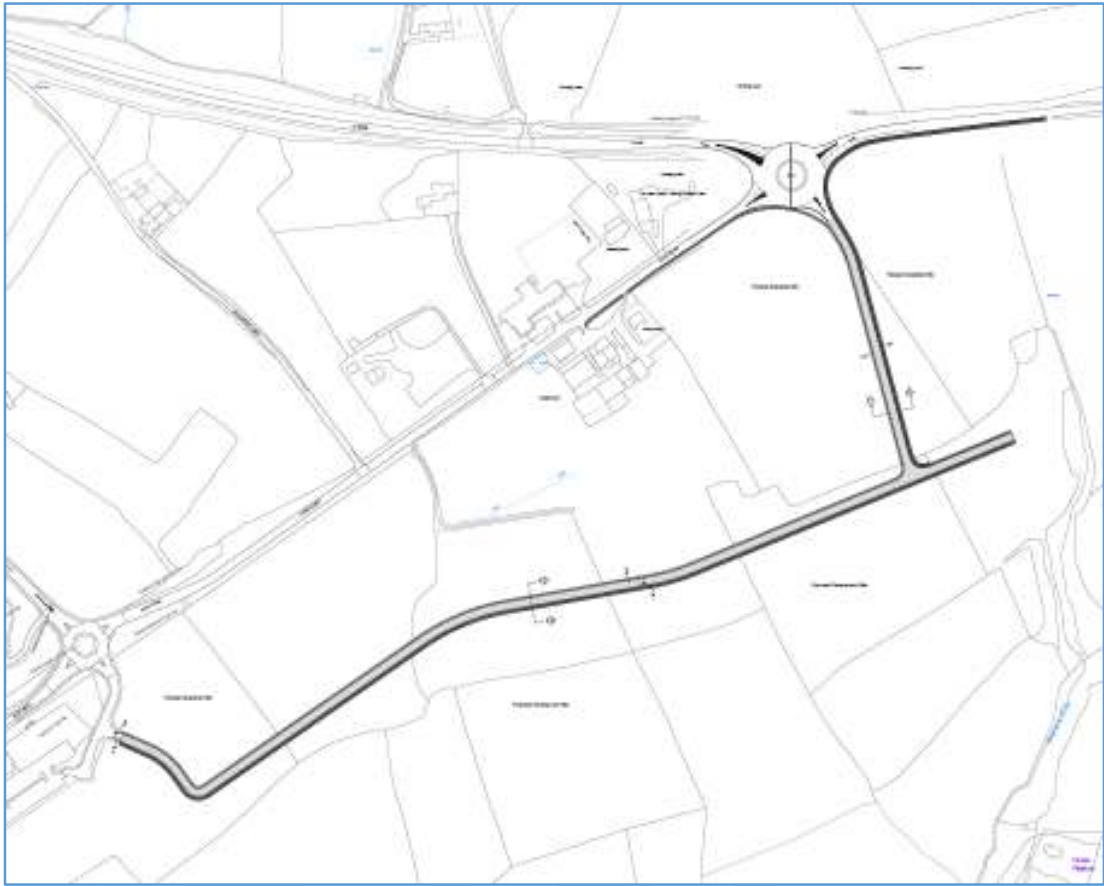
2.1.7 The modelled scenarios of the 2029 forecast year follow the same principles as the 2026 ones. The highway network and entire supply side of the model is identical in the two forecast years as according to Transport for Wales and The Vale of Glamorgan there will be no significant highway infrastructure development implementation during this three-year period that should be considered. The 2029 future year matrices have been constructed by applying zone level growth factors derived from TEMPro 7.1 and RTF18, the forecasting process is described in section 2.10 of this document.

2.2   MODEL REFINEMENT

2.2.1 The refinement of the current territory model (demand zone system) in SEWTM was required in order to ensure that the model can properly accommodate the development site meaning it is suitable and accurate enough to calculate the wider traffic impact.

2.2.2 Traffic zones in the proximity (simulation area) of the development site were disaggregated using Census data 2011 workplace population data.

2.2.3 Disaggregation of traffic zones by using external data sources for weighting the origin, destination and corresponding production and attraction factors respectively, automatically involved the disaggregation of origin-destination (OD) matrices (see Figure 2.2). The number of intrazonal trips in the disaggregated zones was negligible. The Census 2011 output area level workplace population figures are displayed in Table 2.1. The location of the output areas are shown on Figure 2.2.

Table 2.1: Zoning system refinement based on Workplace population

SWETM Zone	New Zone	Workplace Pop	Weight	Output Area
469	10469	98	0.38	oa2011:W00005904
469	10470	158	0.62	oa2011:W00005906
351	10351	168	0.38	oa2011:W00005988
351	10352	273	0.62	oa2011:W00005992

Figure 2.2 Output area level zones, source: Normis
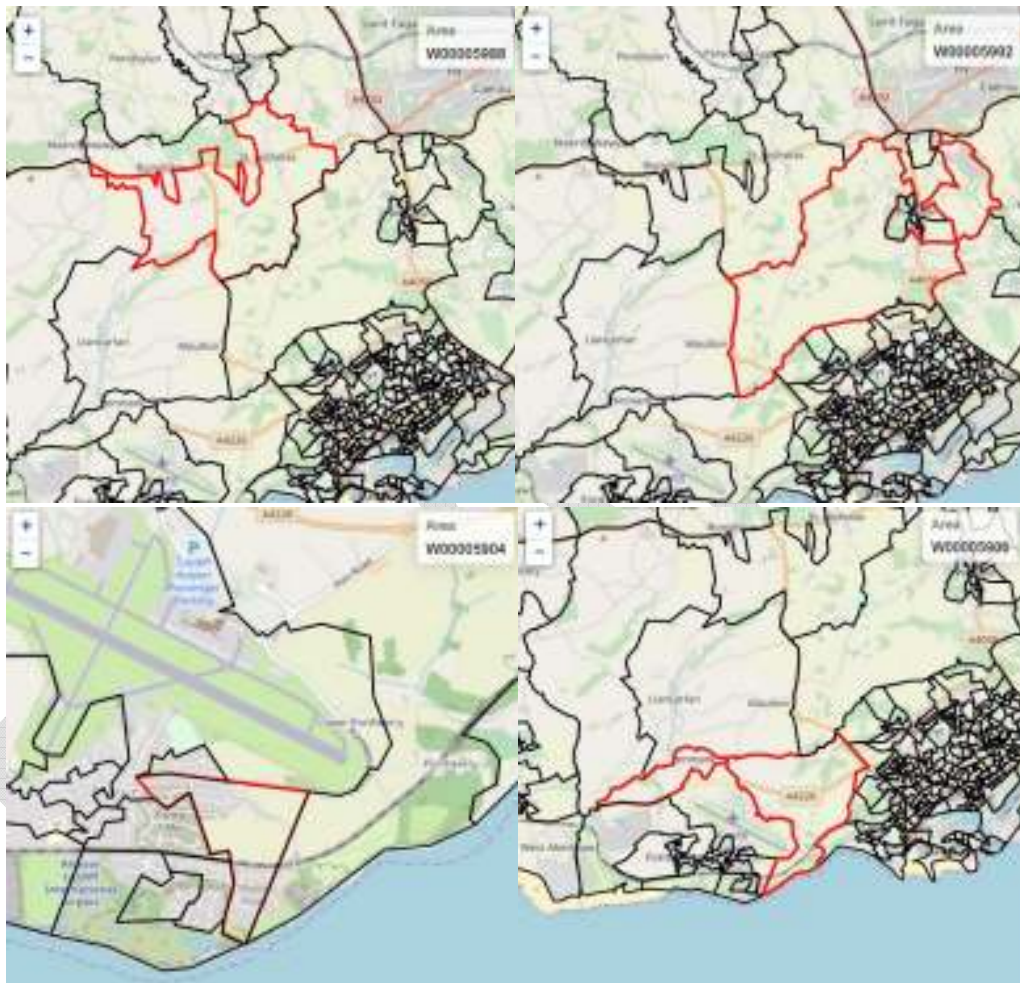
2.2.4   In addition, the highway network has been slightly extended by using OpenStreetMap data to make sure that the network model can accommodate the local / internal traffic of the refined West of Cardiff area. Figure 2.3 shows the new elements of modelled highway network.

Figure 2.3 Extension of the highway network

2.3 MODEL VALIDATION CHECK

2.3.1 After refining the model, it was necessary to do health checks on the model and make sure that it still meets the necessary WebTAG calibration criteria and the model still validates. In general, it can be concluded that both the highway and zone disaggregation changes were relatively insignificant, so the model validation has been maintained very well.

2.4 LINK VALIDATION

2.4.1 The following tables show the link validation results of the refined model compared with the original SEWTM base year model.

Table 2.2: Link Validation of the refined model (AM, Total)

Link	Observed	Modelled 2016	Modelled 2019	Absolute Diff	% Diff	GEH	DfT Criteria	Pass/Fail
21613082	85	111	84	-1	-1%	0.1	5	PASS
21704834	383	369	399	16	4%	0.8	5	PASS
21624437	28	30	30	2	9%	0.4	5	PASS
21613103	917	853	851	-66	-7%	2.2	5	PASS
21616717	291	295	294	3	1%	0.2	5	PASS
1100005	4495	4777	4770	275	6%	4.0	5	PASS
21613082	111	114	102	-9	-8%	0.8	5	PASS
21704834	322	292	296	-26	-8%	1.5	5	PASS
21624437	110	95	95	-15	-14%	1.5	5	PASS
21613103	554	505	522	-32	-6%	1.4	5	PASS
21616717	442	409	408	-34	-8%	1.6	5	PASS
21616723	4022	3686	3695	-327	-8%	5.3	5	FAIL
21612411	2447	2384	2381	-66	-3%	1.3	5	PASS

Link	Observed	Modelled 2016	Modelled 2019	Absolute Diff	% Diff	GEH	DfT Criteria	Pass/Fail
21624769	248	195	197	-51	-21%	3.4	5	PASS
21638337	1592	1522	1540	-52	-3%	1.3	5	PASS
21613111	3217	2972	2992	-225	-7%	4.0	5	PASS
21624769	500	334	340	-160	-32%	7.8	5	FAIL
21638337	869	912	889	20	2%	0.7	5	PASS
21624640	587	571	574	-13	-2%	0.5	5	PASS
21624636	831	825	882	51	6%	1.7	5	PASS
1200271	1264	1464	1461	197	16%	5.3	5	FAIL
21638142	1169	999	1006	-163	-14%	5.0	5	PASS
21613111	3217	2972	2992	-225	-7%	4.0	5	PASS
21624640	405	398	412	7	2%	0.3	5	PASS
21624636	626	501	509	-117	-19%	4.9	5	PASS
1200271	1022	1183	1173	151	15%	4.5	5	PASS
21638142	390	384	428	38	10%	1.9	5	PASS
21612411	2447	2384	2381	-66	-3%	1.3	5	PASS
1100069	3602	3129	3107	-495	-14%	8.5	5	FAIL
21616779	1576	1428	1432	-144	-9%	3.7	5	PASS

2.4.2   Table 2.2 shows that 87% of the links validate to within a GEH of 5, which meets the DfT's TAG criteria of 85%.

Table 2.3: Link Validation of the refined model (AM, Car)

Link	Observed	Modelled 2016	Modelled 2019	Absolute Diff	% Diff	GEH	DfT Criteria	Pass/Fail
21613082	85	93	76	-9	-11%	1.0	5	PASS
21704834	340	346	365	25	6%	1.3	5	PASS
21624437	28	30	30	2	9%	0.4	5	PASS
21613103	805	721	720	-85	-9%	3.1	5	PASS
21616717	244	245	245	1	0%	0.1	5	PASS
1100005	3705	3929	3916	211	5%	3.4	5	PASS
21613082	111	111	99	-12	-11%	1.1	5	PASS
21704834	275	243	255	-20	-6%	1.2	5	PASS
21624437	97	94	94	-3	-2%	0.3	5	PASS
21613103	456	421	427	-29	-5%	1.4	5	PASS
21616717	403	390	390	-13	-3%	0.7	5	PASS

Link	Observed	Modelled 2016	Modelled 2019	Absolute Diff	% Diff	GEH	DfT Criteria	Pass/Fail
21616723	3315	3046	3053	-262	-7%	4.6	5	PASS
21612411	2043	2088	2091	48	2%	1.1	5	PASS
21624769	197	134	134	-63	-26%	4.9	5	PASS
21638337	1430	1343	1363	-67	-4%	1.8	5	PASS
21613111	2621	2585	2602	-19	-1%	0.4	5	PASS
21624769	411	255	261	-150	-30%	8.2	5	FAIL
21638337	767	782	761	-6	-1%	0.2	5	PASS
21624640	546	537	539	-7	-1%	0.3	5	PASS
21624636	707	690	745	38	5%	1.4	5	PASS
1200271	1046	1260	1248	202	16%	6.0	5	FAIL
21638142	1060	893	908	-152	-13%	4.8	5	PASS
21613111	2621	2585	2602	-19	-1%	0.4	5	PASS
21624640	373	369	383	10	2%	0.5	5	PASS
21624636	517	373	379	-138	-22%	6.5	5	FAIL
1200271	763	961	950	187	18%	6.4	5	FAIL
21638142	302	298	342	40	10%	2.2	5	PASS
21612411	2043	2088	2091	48	2%	1.1	5	PASS
1100069	3196	2816	2800	-396	-11%	7.2	5	FAIL
21616779	1295	1151	1153	-142	-9%	4.1	5	PASS

2.4.3   Table 2.3 shows that 87% of the links validate to within a GEH of 5, which meets the DfT's TAG criteria of 85%.

Table 2.4: Link Validation of the refined model (PM, Total)

Link	Observed	Modelled 2016	Modelled 2019	Absolute Diff	% Diff	GEH	DfT Criteria	Pass/Fail
21613082	85	122	107	22	26%	2.2	5	PASS
21704834	340	378	395	55	16%	2.9	5	PASS
21624437	112	93	93	-19	-17%	1.9	5	PASS
21613103	591	515	508	-83	-14%	3.5	5	PASS
21616717	298	283	260	-38	-13%	2.3	5	PASS
1100005	3738	3774	3790	52	1%	0.8	5	PASS
21613082	86	121	88	2	2%	0.2	5	PASS
21704834	369	338	372	4	1%	0.2	5	PASS
21624437	28	40	40	12	43%	2.1	5	PASS

Link	Observed	Modelled 2016	Modelled 2019	Absolute Diff	% Diff	GEH	DfT Criteria	Pass/Fail
21613103	816	772	780	-36	-4%	1.3	5	PASS
21616717	301	303	303	2	1%	0.1	5	PASS
21616723	4878	5105	5090	212	4%	3.0	5	PASS
21612411	3128	3163	3144	16	1%	0.3	5	PASS
21624769	411	350	343	-68	-17%	3.5	5	PASS
21638337	991	1016	1036	45	5%	1.4	5	PASS
21613111	2432	2541	2583	151	6%	3.0	5	PASS
21624769	262	210	209	-53	-20%	3.4	5	PASS
21638337	1825	1668	1666	-159	-9%	3.8	5	PASS
21624640	439	401	399	-40	-9%	2.0	5	PASS
21624636	697	628	640	-57	-8%	2.2	5	PASS
1200271	1009	1155	1174	165	16%	5.0	5	FAIL
21638142	486	623	615	129	27%	5.5	5	FAIL
21613111	2432	2541	2583	151	6%	3.0	5	PASS
21624640	636	544	549	-87	-14%	3.6	5	PASS
21624636	885	813	796	-89	-10%	3.1	5	PASS
1200271	1271	1002	1024	-247	-19%	7.3	5	FAIL
21638142	896	505	553	-343	-38%	12.7	5	FAIL
21612411	3128	3163	3144	16	1%	0.3	5	PASS
1100069	1650	1559	1570	-80	-5%	2.0	5	PASS
21616779	3291	3325	3333	42	1%	0.7	5	PASS

2.4.4   Table 2.4 shows that 87% of the links validate to within a GEH of 5, which meets the DfT's TAG criteria of 85%.

Table 2.5: Link Validation of the refined model (PM, Car)

Link	Observed	Modelled 2016	Modelled 2019	Absolute Diff	% Diff	GEH	DfT Criteria	Pass/Fail
21613082	85	110	96	11	13%	1.1	5	PASS
21704834	306	294	310	4	1%	0.2	5	PASS
21624437	98	94	94	-4	-3%	0.4	5	PASS
21613103	522	437	431	-91	-15%	4.2	5	PASS
21616717	271	263	241	-30	-10%	1.9	5	PASS
1100005	3339	3356	3370	31	1%	0.5	5	PASS
21613082	86	95	78	-8	-9%	0.9	5	PASS

Strategic Transport Modelling Assessment - Model Farm, Cardiff

Link	Observed	Modelled 2016	Modelled 2019	Absolute Diff	% Diff	GEH	DfT Criteria	Pass/Fail
21704834	316	296	316	0	0%	0.0	5	PASS
21624437	28	31	31	3	11%	0.6	5	PASS
21613103	729	687	695	-34	-4%	1.3	5	PASS
21616717	248	252	252	4	1%	0.3	5	PASS
21616723	4361	4541	4526	165	3%	2.5	5	PASS
21612411	2698	2788	2779	81	3%	1.5	5	PASS
21624769	349	293	286	-63	-15%	3.5	5	PASS
21638337	901	874	881	-20	-2%	0.7	5	PASS
21613111	2016	2275	2315	299	12%	6.4	5	FAIL
21624769	214	194	194	-20	-8%	1.4	5	PASS
21638337	1680	1468	1467	-213	-12%	5.4	5	FAIL
21624640	405	392	390	-15	-3%	0.7	5	PASS
21624636	624	551	564	-60	-9%	2.4	5	PASS
1200271	826	963	981	155	15%	5.2	5	FAIL
21638142	424	556	548	124	25%	5.6	5	FAIL
21613111	2016	2275	2315	299	12%	6.4	5	FAIL
21624640	591	517	522	-69	-11%	2.9	5	PASS
21624636	775	694	677	-98	-11%	3.6	5	PASS
1200271	1089	882	904	-185	-15%	5.9	5	FAIL
21638142	811	432	478	-333	-37%	13.1	5	FAIL
21612411	2698	2788	2779	81	3%	1.5	5	PASS
1100069	1459	1382	1394	-65	-4%	1.7	5	PASS
21616779	3037	3067	3075	38	1%	0.7	5	PASS

2.4.5 Table 2.5 shows that 87% of the links validate to within a GEH of 5, which meets the DfT's TAG criteria of 85%.

2.5 SCREENLINE VALIDATION

2.5.1 The following tables show the screenline validation results of the refined model compared with the original SEWTM base year model.

Table 2.6: Screenline Validation of the refined model (AM, Total)

Screenline	Observed	Modelled 2016	Modelled 2019	Absolute Diff	% Diff	GEH	DfT Criteria	Pass/Fail
Cardiff Urban-In-1	3851	3859	3923	72	2%	1.1	5	PASS
Cardiff Urban-In-2	6398	6312	6303	-95	-1%	1.2	5	PASS

Screenline	Observed	Modelled 2016	Modelled 2019	Absolute Diff	% Diff	GEH	DfT Criteria	Pass/Fail
Cardiff Urban-In-3	4969	4798	4802	-167	-3%	2.4	5	PASS
Cardiff Urban-In-4	5141	4668	4698	-443	-9%	6.3	5	FAIL
Cardiff Urban-Out-1	2444	2466	2522	78	3%	1.6	5	PASS
Cardiff Urban-Out-2	5414	5090	5091	-323	-6%	4.5	5	PASS
Cardiff Urban-Out-3	4298	3999	4018	-280	-7%	4.3	5	PASS
Cardiff Urban-Out-4	4310	3866	3819	-491	-11%	7.7	5	FAIL
E/W Mid Valley-In-1	5779	5787	5787	8	0%	0.1	5	PASS
E/W Mid Valley-In-2	2769	3042	3043	274	10%	5.1	5	FAIL
E/W Mid Valley-In-3	2479	2441	2440	-39	-2%	0.8	5	PASS
E/W Mid Valley-Out-1	4650	4704	4703	53	1%	0.8	5	PASS
E/W Mid Valley-Out-2	2907	2805	2806	-101	-3%	1.9	5	PASS
E/W Mid Valley-Out-3	2196	2309	2310	114	5%	2.4	5	PASS
N/S Central - Rural-EB-1	1739	1826	1826	87	5%	2.1	5	PASS
N/S Central - Rural-WB-1	1422	1498	1498	76	5%	2.0	5	PASS
River Usk - Urban-EB-1	7901	7517	7510	-391	-5%	4.5	5	PASS
River Usk - Urban-WB-1	8294	8262	8260	-34	0%	0.4	5	PASS
Cardiff Urban-In-1	3851	3859	3923	72	2%	1.1	5	PASS
Cardiff Urban-In-2	6398	6312	6303	-95	-1%	1.2	5	PASS
Cardiff Urban-In-3	4969	4798	4802	-167	-3%	2.4	5	PASS
Cardiff Urban-In-4	5141	4668	4698	-443	-9%	6.3	5	FAIL

2.5.2   Table 2.6 shows that 86% of the screenlines validate to within a GEH of 5, which meets the DfT's TAG criteria of 85%.

Table 2.7: Screenline Validation of the refined model (AM, Car)

Screenline	Observed	Modelled 2016	Modelled 2019	Absolute Diff	% Diff	GEH	DfT Criteria	Pass/Fail
Cardiff Urban-In-1	3851	3859	3923	72	2%	1.1	5	PASS
Cardiff Urban-In-2	6398	6312	6303	-95	-1%	1.2	5	PASS
Cardiff Urban-In-3	4969	4798	4802	-167	-3%	2.4	5	PASS
Cardiff Urban-In-4	5141	4668	4698	-443	-9%	6.3	5	FAIL
Cardiff Urban-Out-1	2444	2466	2522	78	3%	1.6	5	PASS
Cardiff Urban-Out-2	5414	5090	5091	-323	-6%	4.5	5	PASS
Cardiff Urban-Out-3	4298	3999	4018	-280	-7%	4.3	5	PASS
Cardiff Urban-Out-4	4310	3866	3819	-491	-11%	7.7	5	FAIL
E/W Mid Valley-In-1	5779	5787	5787	8	0%	0.1	5	PASS
E/W Mid Valley-In-2	2769	3042	3043	274	10%	5.1	5	FAIL
E/W Mid Valley-In-3	2479	2441	2440	-39	-2%	0.8	5	PASS
E/W Mid Valley-Out-1	4650	4704	4703	53	1%	0.8	5	PASS
E/W Mid Valley-Out-2	2907	2805	2806	-101	-3%	1.9	5	PASS
E/W Mid Valley-Out-3	2196	2309	2310	114	5%	2.4	5	PASS
N/S Central - Rural-EB-1	1739	1826	1826	87	5%	2.1	5	PASS
N/S Central - Rural-WB-1	1422	1498	1498	76	5%	2.0	5	PASS
River Usk - Urban-EB-1	7901	7517	7510	-391	-5%	4.5	5	PASS
River Usk - Urban-WB-1	8294	8262	8260	-34	0%	0.4	5	PASS
Cardiff Urban-In-1	3851	3859	3923	72	2%	1.1	5	PASS
Cardiff Urban-In-2	6398	6312	6303	-95	-1%	1.2	5	PASS
Cardiff Urban-In-3	4969	4798	4802	-167	-3%	2.4	5	PASS
Cardiff Urban-In-4	5141	4668	4698	-443	-9%	6.3	5	FAIL

2.5.3   Table 2.7 shows that 86% of the screenlines validate to within a GEH of 5, which meets the DfT's TAG criteria of 85%.

Table 2.8: Screenline Validation of the refined model (PM, Total)

Screenline	Observed	Modelled 2016	Modelled 2019	Absolute Diff	% Diff	GEH	DfT Criteria	Pass/Fail
Cardiff Urban-In-1	3851	3859	3923	72	2%	1.1	5	PASS
Cardiff Urban-In-2	6398	6312	6303	-95	-1%	1.2	5	PASS
Cardiff Urban-In-3	4969	4798	4802	-167	-3%	2.4	5	PASS
Cardiff Urban-In-4	5141	4668	4698	-443	-9%	6.3	5	FAIL
Cardiff Urban-Out-1	2444	2466	2522	78	3%	1.6	5	PASS
Cardiff Urban-Out-2	5414	5090	5091	-323	-6%	4.5	5	PASS
Cardiff Urban-Out-3	4298	3999	4018	-280	-7%	4.3	5	PASS
Cardiff Urban-Out-4	4310	3866	3819	-491	-11%	7.7	5	FAIL
E/W Mid Valley-In-1	5779	5787	5787	8	0%	0.1	5	PASS
E/W Mid Valley-In-2	2769	3042	3043	274	10%	5.1	5	FAIL
E/W Mid Valley-In-3	2479	2441	2440	-39	-2%	0.8	5	PASS
E/W Mid Valley-Out-1	4650	4704	4703	53	1%	0.8	5	PASS
E/W Mid Valley-Out-2	2907	2805	2806	-101	-3%	1.9	5	PASS
E/W Mid Valley-Out-3	2196	2309	2310	114	5%	2.4	5	PASS
N/S Central - Rural-EB-1	1739	1826	1826	87	5%	2.1	5	PASS
N/S Central - Rural-WB-1	1422	1498	1498	76	5%	2.0	5	PASS
River Usk - Urban-EB-1	7901	7517	7510	-391	-5%	4.5	5	PASS
River Usk - Urban-WB-1	8294	8262	8260	-34	0%	0.4	5	PASS
Cardiff Urban-In-1	3851	3859	3923	72	2%	1.1	5	PASS
Cardiff Urban-In-2	6398	6312	6303	-95	-1%	1.2	5	PASS
Cardiff Urban-In-3	4969	4798	4802	-167	-3%	2.4	5	PASS

Screenline	Observed	Modelled 2016	Modelled 2019	Absolute Diff	% Diff	GEH	DfT Criteria	Pass/Fail
Cardiff Urban-In-4	5141	4668	4698	-443	-9%	6.3	5	FAIL

2.5.4   Table 2.8 shows that 86% of the screenlines validate to within a GEH of 5, which meets the DfT's TAG criteria of 85%.

Table 2.9: Screenline Validation of the refined model (PM, Car)

Screenline	Observed	Modelled 2016	Modelled 2019	Absolute Diff	% Diff	GEH	DfT Criteria	Pass/Fail
Cardiff Urban-In-1	3851	3859	3923	72	2%	1.1	5	PASS
Cardiff Urban-In-2	6398	6312	6303	-95	-1%	1.2	5	PASS
Cardiff Urban-In-3	4969	4798	4802	-167	-3%	2.4	5	PASS
Cardiff Urban-In-4	5141	4668	4698	-443	-9%	6.3	5	FAIL
Cardiff Urban-Out-1	2444	2466	2522	78	3%	1.6	5	PASS
Cardiff Urban-Out-2	5414	5090	5091	-323	-6%	4.5	5	PASS
Cardiff Urban-Out-3	4298	3999	4018	-280	-7%	4.3	5	PASS
Cardiff Urban-Out-4	4310	3866	3819	-491	-11%	7.7	5	FAIL
E/W Mid Valley-In-1	5779	5787	5787	8	0%	0.1	5	PASS
E/W Mid Valley-In-2	2769	3042	3043	274	10%	5.1	5	FAIL
E/W Mid Valley-In-3	2479	2441	2440	-39	-2%	0.8	5	PASS
E/W Mid Valley-Out-1	4650	4704	4703	53	1%	0.8	5	PASS
E/W Mid Valley-Out-2	2907	2805	2806	-101	-3%	1.9	5	PASS
E/W Mid Valley-Out-3	2196	2309	2310	114	5%	2.4	5	PASS
N/S Central - Rural-EB-1	1739	1826	1826	87	5%	2.1	5	PASS
N/S Central - Rural-WB-1	1422	1498	1498	76	5%	2.0	5	PASS
River Usk - Urban-EB-1	7901	7517	7510	-391	-5%	4.5	5	PASS
River Usk - Urban-WB-1	8294	8262	8260	-34	0%	0.4	5	PASS
Cardiff Urban-In-1	3851	3859	3923	72	2%	1.1	5	PASS

Strategic Transport Modelling Assessment - Model Farm, Cardiff

Screenline	Observed	Modelled 2016	Modelled 2019	Absolute Diff	% Diff	GEH	DfT Criteria	Pass/Fail
Cardiff Urban-In-2	6398	6312	6303	-95	-1%	1.2	5	PASS
Cardiff Urban-In-3	4969	4798	4802	-167	-3%	2.4	5	PASS
Cardiff Urban-In-4	5141	4668	4698	-443	-9%	6.3	5	FAIL

2.5.5   Table 2.9 shows that 86% of the screenlines validate to within a GEH of 5, which meets the DfT's TAG criteria of 85%.

2.6   JOURNEY TIME ROUTE VALIDATION

2.6.1   The following tables show the journey time route validation results of the refined model compared with the original SEWTM base year model. Only journey route 9 and route 20 were relevant from the Model Farm development point of view due to their relative proximity to the site. The difference in journey times caused by model refinement is not significant. It should also be noted that the only journey time to fail (20EB AM) is almost identical in time to that of the previous model and therefore is not considered an issue in this instance.

Figure 2.4: Journey time validation check (09EB AM)

Total Obs JT	00:32:57
Total Mod JT	00:30:19
Total Mod JT 2019	00:29:23
Diff % Mod vs. Obs	-8.0%
PASS / FAIL	PASS

norman rourke pryme
traffic and transportation
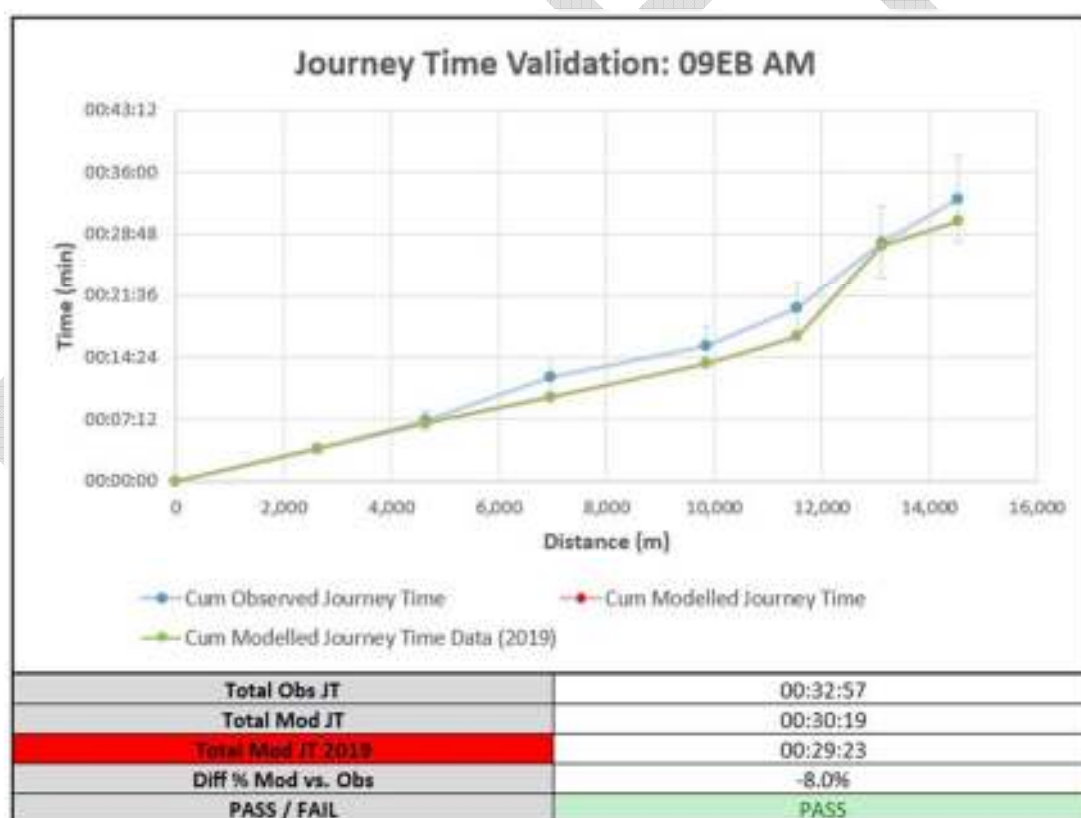
Figure 2.5: Journey time validation check (09EB PM)

Total Obs JT	00:20:05
Total Mod JT	00:22:12
Total Mod JT 2019	00:21:38
Diff % Mod vs. Obs	7.7%
PASS / FAIL	PASS
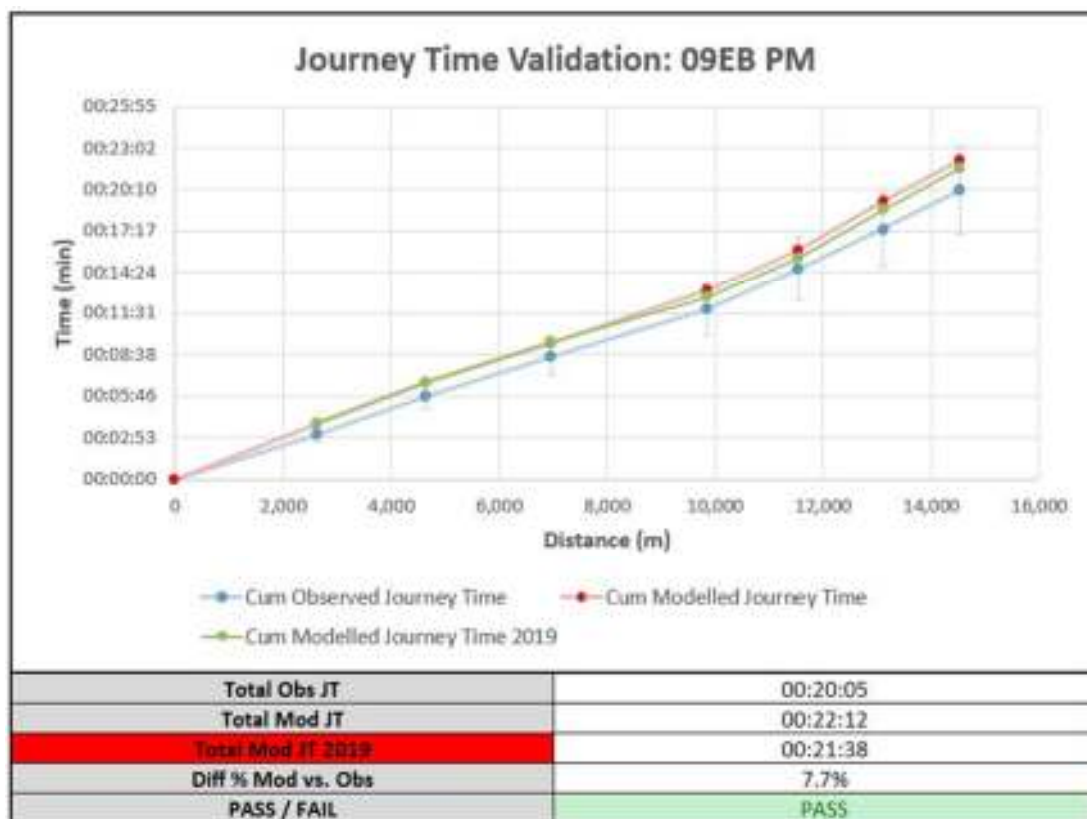
Figure 2.6: Journey time validation check (09WB AM)

Total Obs JT	00:23:18
Total Mod JT	00:23:52
Total Mod JT 2019	00:22:45
Diff % Mod vs. Obs	2.4%
PASS / FAIL	PASS
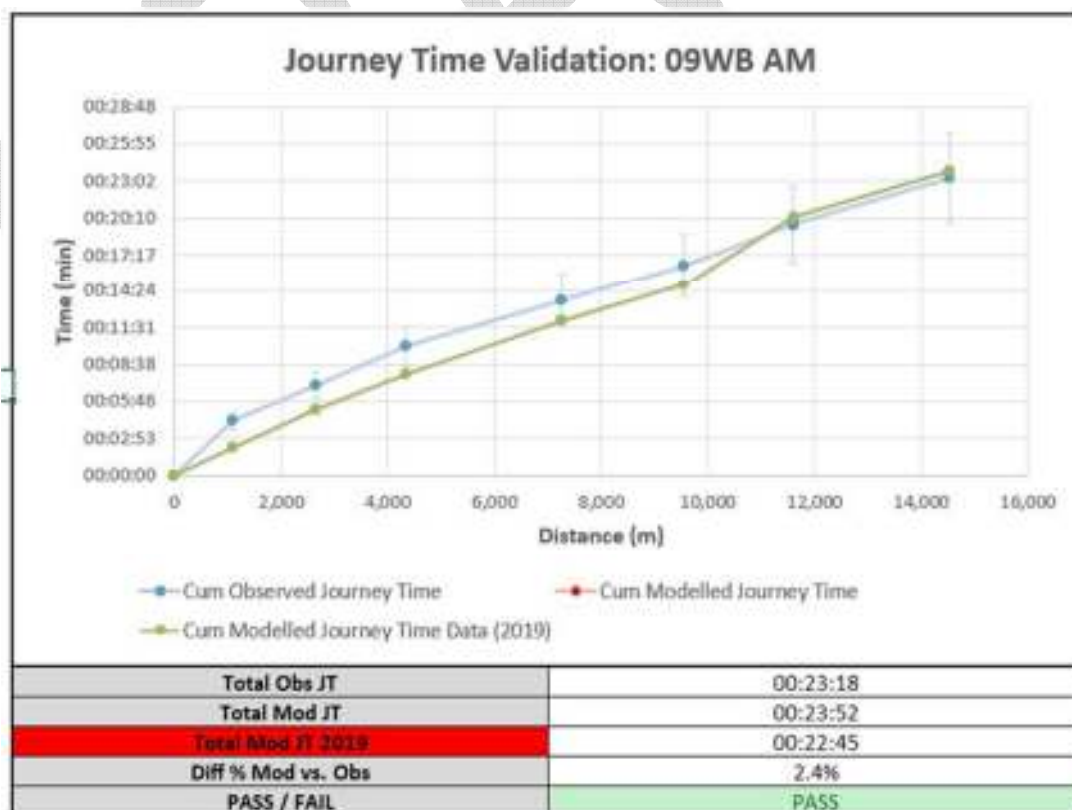
Figure 2.7: Journey time validation check (09WB PM)

Total Obs JT	00:25:12
Total Mod JT	00:27:57
Total Mod JT 2019	00:26:48
Diff % Mod vs. Obs	6.3%
PASS / FAIL	PASS
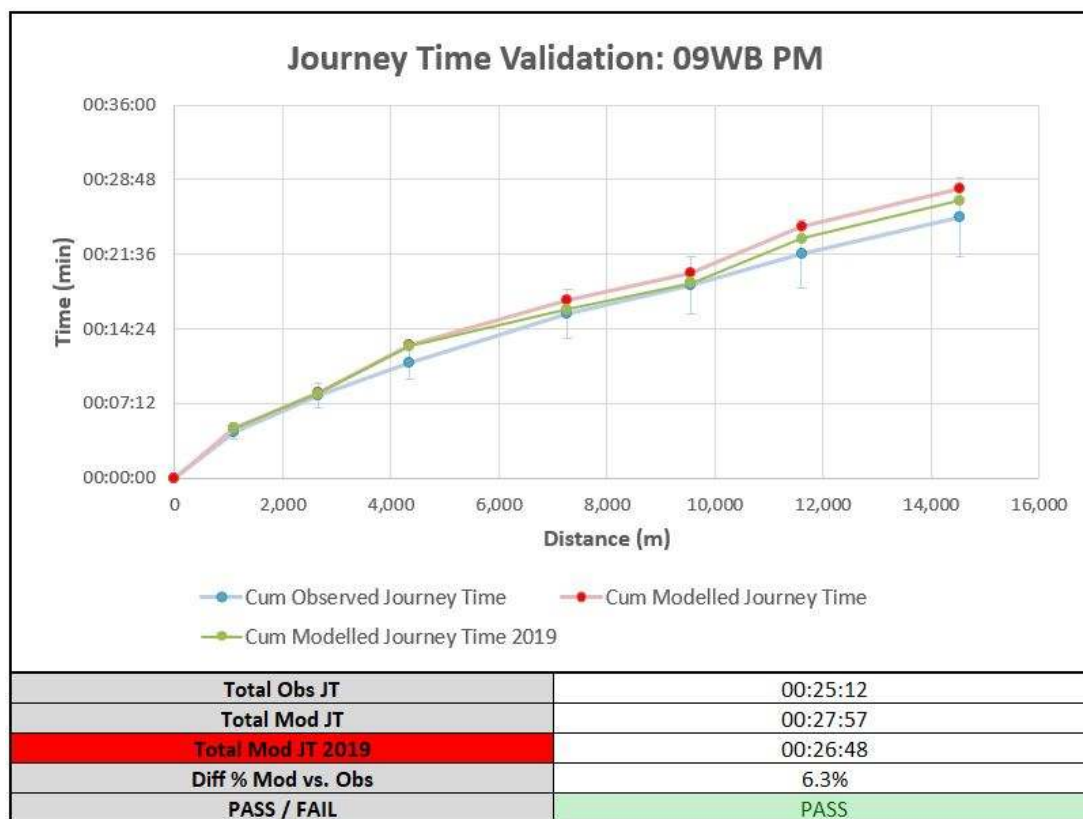
Figure 2.8: Journey time validation check (20EB AM)

Total Obs JT	00:34:31
Total Mod JT	00:28:02
Total Mod JT 2019	00:28:00
Diff % Mod vs. Obs	-18.8%
PASS / FAIL	FAIL
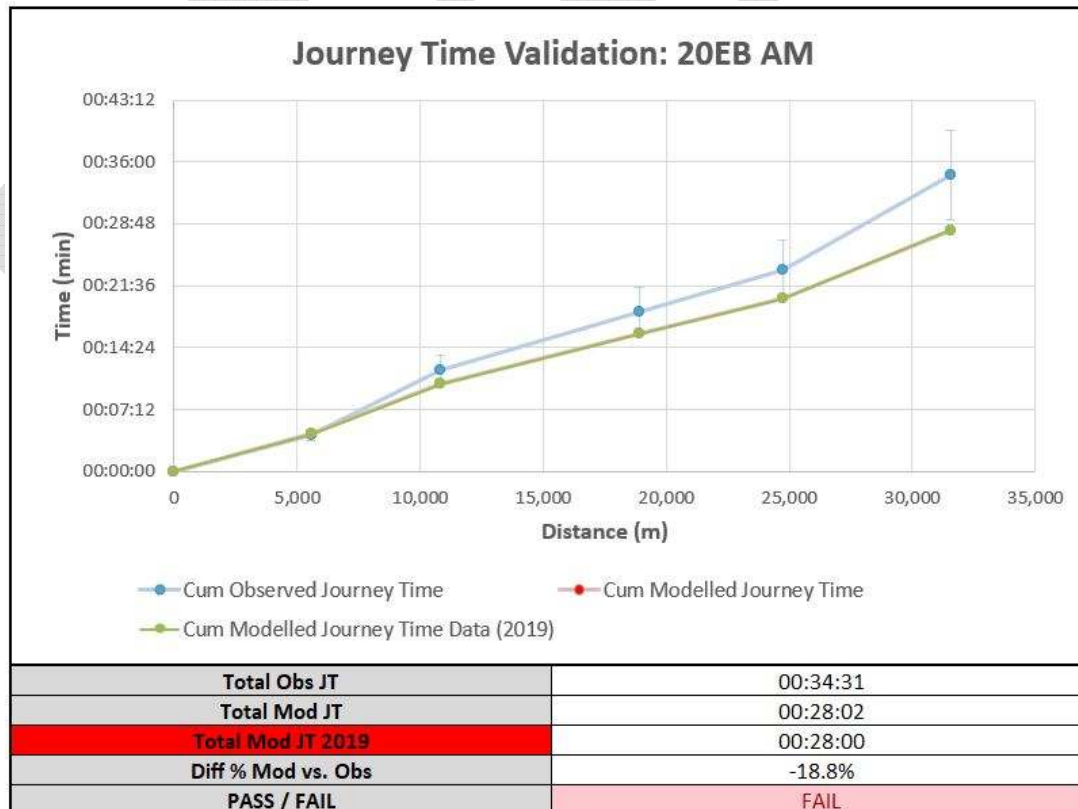
Figure 2.9: Journey time validation check (20EB PM)

Total Obs JT	00:30:13
Total Mod JT	00:26:59
Total Mod JT 2019	00:26:50
Diff % Mod vs. Obs	-11.2%
PASS / FAIL	PASS
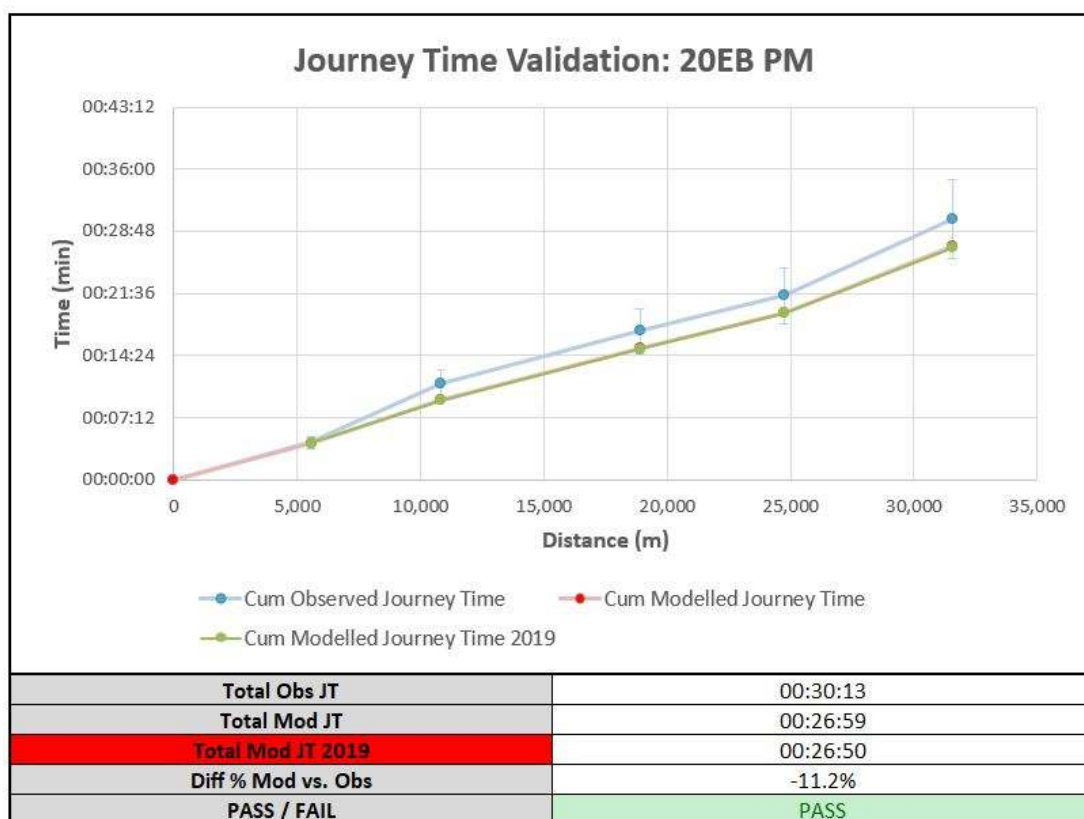
Figure 2.10: Journey time validation check (20WB AM)

Total Obs JT	00:29:54
Total Mod JT	00:26:38
Total Mod JT 2019	00:26:39
Diff % Mod vs. Obs	-10.9%
PASS / FAIL	PASS
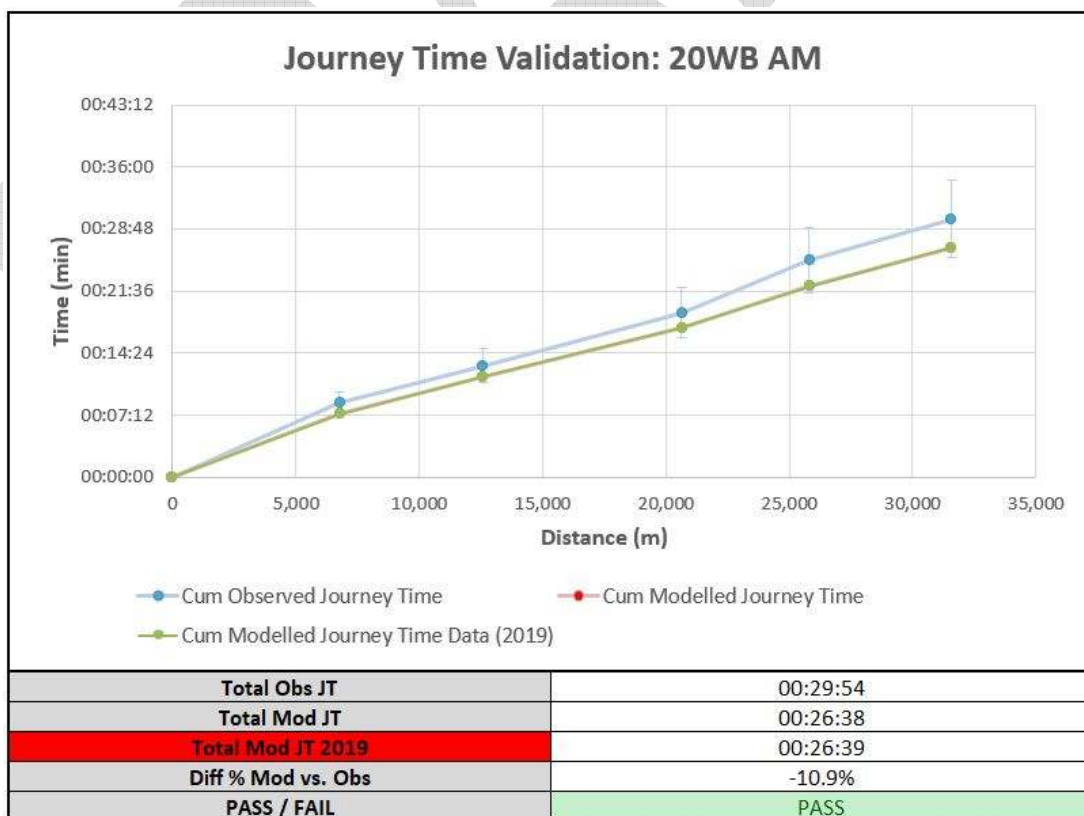
Figure 2.11: Journey time validation check (20WB PM)

Total Obs JT	00:30:22
Total Mod JT	00:27:40
Total Mod JT 2019	00:27:42
Diff % Mod vs. Obs	-8.8%
PASS / FAIL	PASS
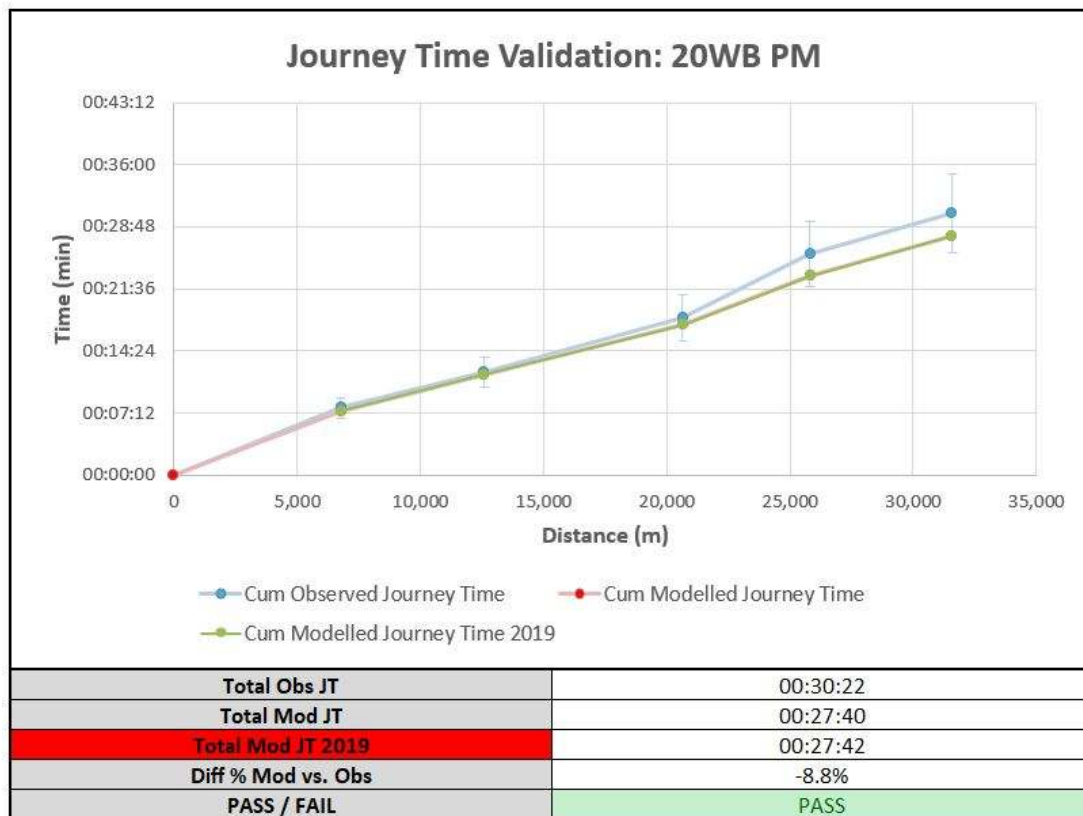
2.6.2   According to the executed checks on journey time and link flow validation, the model performance has been maintained and validation meets DfT's TAG criteria on the same level as the original model provided by Transport for Wales.

2.7   TRIP GENERATION

2.7.1   In order to produce trips from the anticipated development in the SEWTM included within Scenario A and Scenario B a trip rate must be applied to the development quantum. This trip rate has been produced in TRICS®, which is the UK and Ireland's national system of trip generation analysis, containing over 7,150 directional transport surveys at over 110 types of development.

2.7.2   The trip rates have been applied to the site based on the land use and split into all assignment model user classes using the proportions from the base year trip matrix totals.

2.7.3   The final trip generation produces values shown in Table 2.10. Calculations have been undertaken in order to accommodate the exact model peak hours (AM 07:45-08:45, PM 16:30-17:30) of the SEWTM.

Table 2.10: Estimated trip generation of the development site in the peak hour

Optional	Car		HGV		LGV	
	Arr	Dep	Arr	Dep	Arr	Dep
AM	840	183	25	17	15	17
PM	171	724	5	6	3	9

2.7.4 The highway assignment model of SEWTM considers three demand segments for car users, which also had to be reflected by the trip generation numbers. Trip purpose share for the car demand segment has been calculated by using the current trip purpose split of existing zones with similar functionality. The aim was to find nearby zones that, similar to Model Farm, are fully employment zones in order to get the correct share amongst the three trip purpose groups, as shown in Figure 2.12 below.

Figure 2.12: Pure employment zones for car journey trip purpose split

2.7.5 These are not typical in the SEWTM as the demand zones system were constructed based on Census output areas according to the industrial best practice. The majority of the output areas at any level are not homogenous zones and residential units can be found in nearly all of them, especially in the impact area of the Model Development. The identified, purely employment zones in the model are zone 534 and 1185.

2.7.6 The calculated trip purpose share is the following:

- ► Car Commuting Departure - 0.0975
- ► Car Business Departure - 0.1386
- ► Car Other Departure - 0.7639
- ► Car Commuting Arrival - 0.5472
- ► Car Business Arrival - 0.1384
- ► Car Other Arrival - 0.3144

2.7.7 Accordingly, the final trip generation for car user classes is shown in Table 2.11.

Table 2.11: Car trip generation figure by user class

Time Period	User Class	Arrivals	Departures
AM Peak	Commuting	460	18
	Business	116	25
	Other	264	140
PM Peak	Commuting	47	221
	Business	11	42

Time Period	User Class	Arrivals	Departures
	Other	112	461

2.8   TRIP DISTRIBUTION

2.8.1   The new development site distribution was based on the 2015 base and 2026 future year modelled existing zones distribution with similar land use and then averaged before being applied to the committed and local plan sites.

2.8.2   By undertaking the trip distribution exercise, it was possible to directly derive the origin-destination trips associated with the development site for all transport systems and demand segments of the highway assignment model. The same exercise has been performed for all forecast year models and assignment time intervals to ensure the consistency across of all time periods of the highway assignment model. Thus, the generated trips can be directly used in the updated matrices which then need to be revised to meet with all corresponding criteria. See Chapter 2.9 for further details.

2.8.3   For calculating attraction and production weights for distributing the trips generated by the development site, the following zones have been chosen, shown in Figure 2.13, that have similar functionality and relative proximity to the Model Farm.

Figure 2.13: SEWTM demand zones used for Model Farm trip distribution

2.8.4   Zone 27, 351, 469, 471, 653 and 654 are part of the same MSOA level which was used for the matrix development in the original base and future year model. Zone 461, 615, 663, 534 and 579 are similar, significantly employment areas in Barry of West of Cardiff, whilst zone 26 is nearby zone with nearly identical land use category.

2.8.5   Figure 2.14 and Figure 2.15 show the graphical display of the trip distribution results by using the zone flow bundle functionality of PTV VISUM and displaying Model Farm related origin and destination points across model zones in the simulation area and on the local highway network as well.

Figure 2.14: The result of a trip distribution (AM)

Figure 2.15: The result of a trip distribution (PM)

2.9 REVISED 2026 FORECAST YEAR MATRICES

2.9.1 In the updated 2026 matrices, including the trips associated with the Model Farm development, the total number of trips were maintained in accordance with WebTAG Unit 4 – Forecasting and Uncertainty (January 2014). This means a constant value across trip ends in the matrices on the level of the National Transport Model zoning system represented by TEMPro software. Updating the matrices with the Model Farm trips will be consist of three key steps:

► Calculating and adding trips of the development site;

► Checking TEMPro constraint trip end numbers in forecast matrices; and

► Scaling back existing trips in order to meet TEMPro growth rates and corresponding WebTAG criteria.

2.9.2 The exact steps of adjusting matrices with the explicitly coded Model Farm development have been undertaken as follows:

► Taking/calculating the generated trips according to site speciation such as gross floor area.

► Distributing these trip ends based on the trip distribution of existing zones with similar land use.

► Adding the trips to the current 2026 forecast matrices.

► Removing the exact same number of trips from the forecast matrices by checking how they have been incorporated originally as a background growth and working backwards.

2.9.3   This process is the explicit modelling of the trips associated with the development site instead of modelling it as background growth in the area. This process ensures complete WebTAG compliance as no change in total number of trips in the 2026 forecast matrices has been made.

2.9.4   The revised forecast year matrices have been validated and tested against the current 2026 forecast year matrices in terms of the following key validation criteria

► *Matrix totals* – Matrix totals have not changed.

► *Trip end totals* – Trip end total have been maintained on district level.

► *Trip distribution on sector level* – Sector level trip distribution have not been changed, trips have been re-distributed within district level only.

2.10   REFERENCE CASE SCENARIO 2029

2.10.1   The 2029 model scenarios have been created in order to produce a transport assessment for an additional forecast year which can be used to see the mid-term impacts of the proposed development. The 2029 reference case scenario has been built on top of the existing 2026 forecast year scenario by applying growth factors derived from TEMPro 7.1 for car (business, commute, other) demand segments and RTF18 for factoring up LGV and HGV matrices for both AM and PM. This process to create an additional intermediate forecast year is considered an efficient but robust method, considering the small time gap between the 2026 and 2029 modelled years.

2.10.2   Growth rates were extracted from TEMPro for all demand segments, origin and destination, on authority level. These trip end factors then have been applied to the existing 2026 matrices by furnessing both the AM and PM peak matrices. This is a balancing procedure that changes every cell in the matrix to meet the target values for each zone on both origin and destination trip end level.

2.10.3   Table 2.12 and Table 2.13 summarise the growth factors from NTEM.

Table 2.12 Growth factors from TEMPro 7.1 (AM)

Authority	Commuting		Business		Other	
	Origin	Destination	Origin	Destination	Origin	Destination
The Vale of Glamorgan	1.0074	1.0145	1.0101	1.0151	1.0195	1.0213
Rhondda Cynon Taf	1.0088	1.0148	1.0108	1.0152	1.0182	1.0207
Caerphilly	1.0093	1.0148	1.0113	1.0152	1.0199	1.0208
Torfaen	1.0067	1.0147	1.0097	1.0152	1.0186	1.0208
Monmouthshire	0.9925	1.0136	0.9986	1.0145	1.0162	1.0203
Newport	1.0232	1.0159	1.0213	1.0157	1.0249	1.023

Authority	Commuting		Business		Other	
	Origin	Destination	Origin	Destination	Origin	Destination
Cardiff	1.0356	1.0166	1.0303	1.0162	1.0301	1.0247
Neath Port Talbot	1.0089	1.0144	1.011	1.0153	1.0191	1.0205
Bridgend	1.0126	1.0151	1.0144	1.0154	1.0218	1.0219
Merthyr Tydfil	1.0167	1.0154	1.0174	1.0156	1.0238	1.0226
Blaenau Gwent	1.0051	1.0144	1.008	1.015	1.0161	1.0197
Ceredigion	1.013	1.0119	1.0145	1.0135	1.0129	1.0139
Pembrokeshire	1.0113	1.0119	1.0129	1.0134	1.0146	1.014
Swansea	1.021	1.0152	1.0203	1.0157	1.023	1.0221
Carmarthenshire	1.0123	1.0146	1.0135	1.0154	1.0217	1.0218
Powys	0.9985	1.0126	1.0033	1.014	1.0154	1.0175
Denbighshire	1.0155	1.0155	1.0155	1.0155	1.0273	1.0273
Gwynedd	1.0155	1.0155	1.0155	1.0155	1.0273	1.0273
GB	1.0145	1.0148	1.015	1.0152	1.021	1.021

Table 2.13 Growth factors from TEMPro 7.1 (PM)

Authority	Commuting		Business		Other	
	Origin	Destination	Origin	Destination	Origin	Destination
The Vale of Glamorgan	1.0132	1.007	1.0145	1.0106	1.0181	1.0173
Rhondda Cynon Taf	1.0137	1.0083	1.0148	1.0113	1.0178	1.0165
Caerphilly	1.0136	1.009	1.0147	1.0118	1.0179	1.0176
Torfaen	1.0135	1.0063	1.0145	1.0103	1.0173	1.0163
Monmouthshire	1.0122	0.993	1.0131	1.001	1.0154	1.0133
Newport	1.0154	1.022	1.0162	1.0202	1.023	1.0239
Cardiff	1.0166	1.0339	1.0172	1.0281	1.027	1.0295
Neath Port Talbot	1.0138	1.0088	1.0149	1.0117	1.0182	1.0177
Bridgend	1.0144	1.0123	1.0153	1.0144	1.0204	1.0202
Merthyr Tydfil	1.0149	1.0162	1.0157	1.0169	1.0216	1.0217
Blaenau Gwent	1.0132	1.0048	1.0143	1.0089	1.0158	1.0142
Ceredigion	1.0113	1.0121	1.0133	1.014	1.0131	1.0127

Authority	Commuting		Business		Other	
	Origin	Destination	Origin	Destination	Origin	Destination
Pembrokeshire	1.0114	1.0109	1.0132	1.0128	1.0134	1.0136
Swansea	1.015	1.0202	1.016	1.0196	1.0218	1.0224
Carmarthenshire	1.0141	1.012	1.0154	1.0138	1.0204	1.0201
Powys	1.0114	0.9986	1.0128	1.0047	1.0139	1.0129
Denbighshire	1.0144	1.0144	1.0152	1.0152	1.0244	1.0244
Gwynedd	1.0144	1.0144	1.0152	1.0152	1.0244	1.0244
GB	1.0141	1.0139	1.0151	1.015	1.0197	1.0197

2.10.4 RTF does not provide detailed data by local authorities and data is only available for every fifth year, thus a flat rate has been applied that was calculated by interpolating 2025 and 2030 mixed link type data. The derived values are are listed as follows:

► **LGV** 2026-2029 growth rate: **1.031753**

► **HGV** 2026-2029 growth rate: **1.000237**

2.10.5 According to Transport for Wales and The Vale of Glamorgan there will be no significant highway infrastructure development implementation during this three-year period that should be considered, therefore the supply side of the models is identical in all forecast years.

2.11 MODEL FARM SCENARIO 2029

2.11.1 The 2029 Model Farm scenario is identical to the 2026 one in terms of both the highway infrastructure developments to provide site access and the number of trips generated by the development site.

2.11.2 Similarly to the 2026 assessment year, the matrix totals are the same in the reference case scenarios (both AM and PM) and in the Model Farm scenarios.

3 EVALUATION AND RESULTS - 2026

3.1 To determine the impact of the development on the highway network analysis has been undertaken for the 2026 AM peak and PM peak hours and has considered:

► Junction Level of Service (LoS);

► journey times on selected routes, which demonstrate the impact on travel conditions within the modelled area; and

► link flow analysis and creating various traffic flow difference plots.

3.2 To understand the incremental changes associated with development growth outside and inside the simulation area, Scenario B with the Model Farm development has been compared against Scenario A which represents future base conditions.

3.1 JUNCTION LEVEL OF SERVICE

3.1.1 To help understand the impact of the development, select junctions throughout the simulation area will be assessed on their individual Level of Service and monitored in each scenario.

3.1.2 Full analysis of Level of Service (LoS) at junctions and the turns within junctions has been undertaken to form a complete picture of how development in the area would impact on junctions and the traffic network within SEWTM. An explanation of Levels of Service is given in Table 3.1.

Table 3.1: Level of service descriptions

LoS	Interpretation	RFC value
A	Uncongested operations; all queues clear in a single cycle (if junction is signalised).	< 0.60
B	Very light congestion; an occasional approach phase is fully utilised	0.60 – 0.69
C	Light congestion; occasional backups on critical approaches	0.70 – 0.79
D	Significant congestion on critical approaches, but junction is functional. Cars required to wait through more than one cycle during short peaks. No long-standing queues formed.	0.80 – 0.89
E	Severe congestion with some long-standing queues on critical approaches. Blockage of intersection may occur if traffic signal does not provide for protected turning movements (yellow box). Traffic may block back to upstream junctions.	0.90 – 0.99
F	Total breakdown. Stop and go operation.	>=1.00

3.1.3 A direct comparison of junctions with LoS D, E or F for the base year, Scenario A and Scenario B has been carried out to fully understand the step change and impact of the development on the surrounding network. Junctions are highlighted and reported where the node as a whole is performing at a LoS D, LoS E or LoS F. At these junctions, an average LoS will be calculated as weighted averages across all turning movements, which may hide some of the congestion issues.

3.1.4   Figure 3.1 shows the typical output of Level of Service analysis by displaying both the LoS category and the mean travel time loss per ICA junction. Note that by using the so-called Intersection Capacity Analysis for junctions in PTV VISUM, the LoS information is only available for junctions where this calculation has been pre-selected during model development. The rest of the LoS plots can be found in Appendix A of this document.

Figure 3.1: Typical LoS display in PTV VISUM – Junction 9

3.1.5   The following section summarises the LoS calculation results per analysed intersection. In general, despite the increasing traffic in the Model Farm area the level of service at key junctions is very well maintained and the majority of the turn movements do not suffer from significant extra delay.

3.1.6   It is only Junction 5 and Junction 10, where level of service falls to a critical value between 'D' and 'F' either in the AM or PM peak after the Model Farm implementation.

Table 3.2: Level of Service analysis – Junction 1

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	A	2	A	2	A	3	A	2
2	A	3	A	2	A	4	A	7
3					C	21	A	6
4					A	4	A	7

Table 3.3: Level of Service analysis – Junction 2

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	A	1	A	1	A	1	A	1
2	A	3	A	3	A	3	A	3
3	A	4	A	4	A	4	A	4

Table 3.4: Level of Service analysis – Junction 4

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	A	3	A	3	A	3	A	2
2	A	1	A	1	A	1	A	1
3	-	0	-	0	-	0	-	0
4	A	3	A	3	A	3	A	3

Table 3.5: Level of Service analysis – Junction 5

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	A	8	D	26	E	43	E	39
2	A	7	A	5	B	11	E	47
3	A	3	A	3	B	15	A	4
4	A	5	A	5	B	13	A	4

Table 3.6: Level of Service analysis – Junction 6

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	B	15	B	12	B	14	B	11
2	F	123	E	67	F	149	F	111

Table 3.7: Level of Service analysis – Junction 7

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	A	2	A	2	A	2	A	2
2	A	1	A	2	A	1	A	2
3	E	47	C	23	E	47	C	23
4	A	4	E	38	A	4	E	38

Table 3.8: Level of Service analysis – Junction 8

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	D	40	D	48	D	40	D	48
2	F	63	C	22	F	63	C	22
3	A	1	A	1	A	1	A	1

Table 3.9: Level of Service analysis – Junction 9

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	D	45	D	43	D	55	D	44
2	B	15	D	42	B	15	D	41
3	C	24	D	43	C	26	D	43
4	D	39	C	21	D	39	C	21

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
5	B	20	B	19	B	20	B	19
6	C	23	B	20	C	24	C	21
7	D	41	C	23	D	40	C	23
8	B	18	C	35	C	21	C	34

Table 3.10: Level of Service analysis – Junction 10

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	C	19	A	5	C	22	A	10
2	A	4	A	3	A	5	A	3
3	A	9	F	51	B	11	E	48

3.2 JOURNEY TIMES

3.2.1 Travel times provide a representation of network performance that is easier for a wide audience of readers to understand. A series of routes has been identified to assess network performance; these routes are identical to the ones used for model validation.

3.2.2 The results of the journey time routes for both time periods in each of the scenarios as well as comparisons between the different scenarios are presented in graphs and tables in the following section. The tables demonstrate the absolute difference (in seconds) and percentage difference between Scenario B and Scenario A. Graphs comparing the base year, Scenario A and Scenario B for each of the time periods have been also produced. The journey time routes are plotted by distance in the graphs, in order to show where delay can occur and highlight junctions that potentially require mitigation. The two-way journey time routes selected are displayed in Figure 3.2 and Figure 3.3.

3.2.3 The model assignment does not show a significant change in journey times across the whole simulation area of the model. Two relevant journey time routes have been analysed and whilst there is no increase on journey time route 20, journey time route 9 would suffer an 8.3% delay in the PM peak on the eastbound and a 15.5% delay in the AM peak on the westbound direction.

Figure 3.2: Journey time route 9
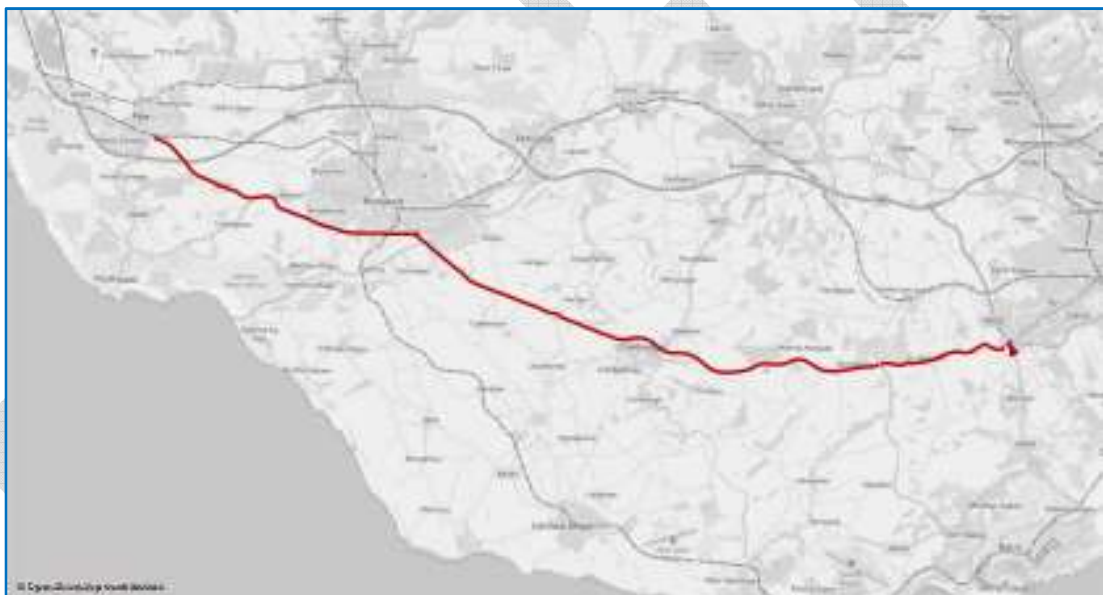

Figure 3.3: Journey time route 20

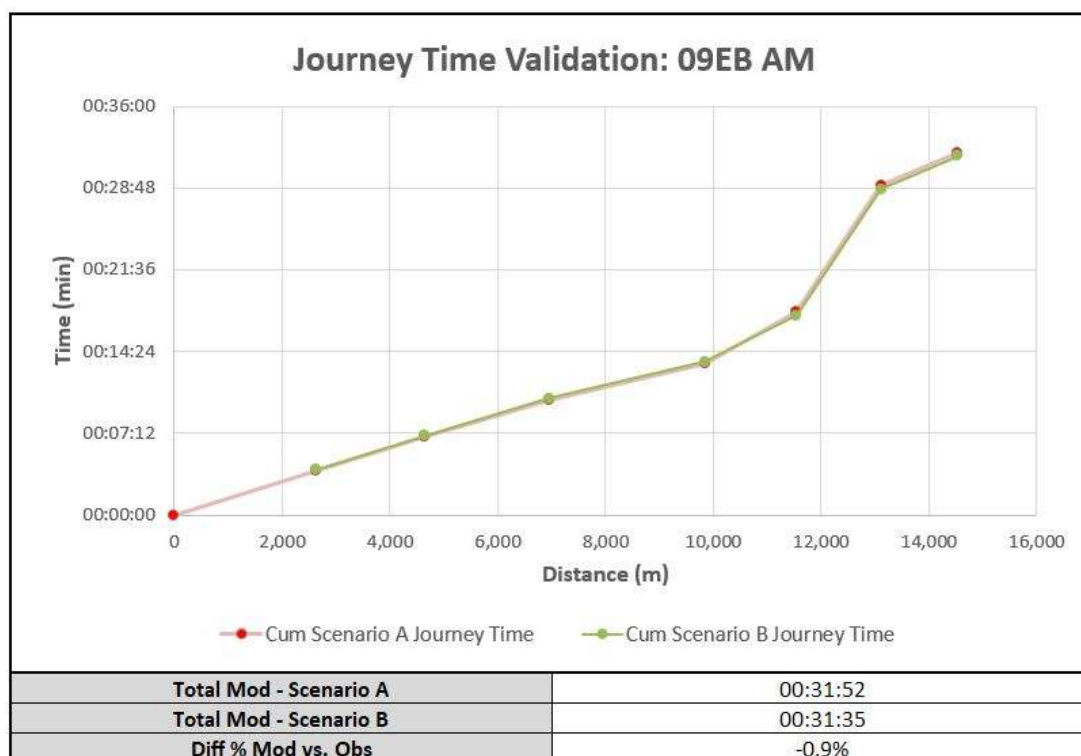**Figure 3.4: Journey time change check (09EB AM)**

Total Mod - Scenario A	00:31:52
Total Mod - Scenario B	00:31:35
Diff % Mod vs. Obs	-0.9%

Figure 3.5: Journey time change check (09EB PM)

Total Mod - Scenario A	00:23:12
Total Mod - Scenario B	00:25:07
Diff % Mod vs. Obs	8.3%
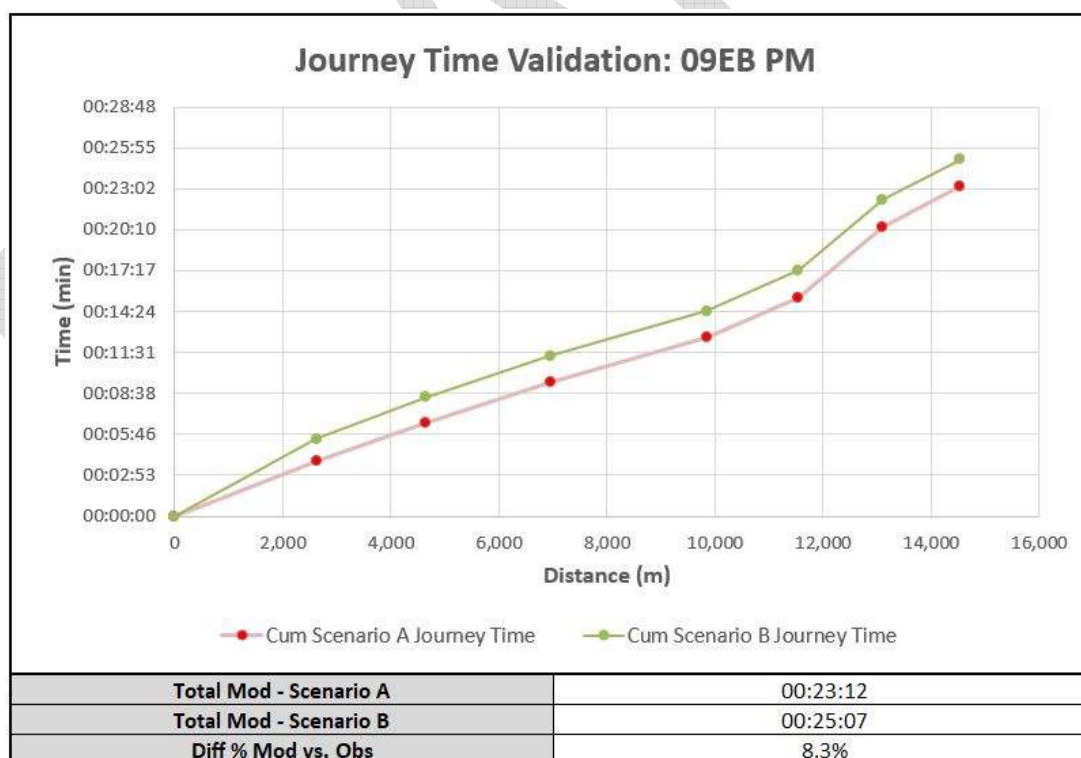
Figure 3.6: Journey time change check (09WB AM)

Total Mod - Scenario A	00:22:23
Total Mod - Scenario B	00:25:51
Diff % Mod vs. Obs	15.5%
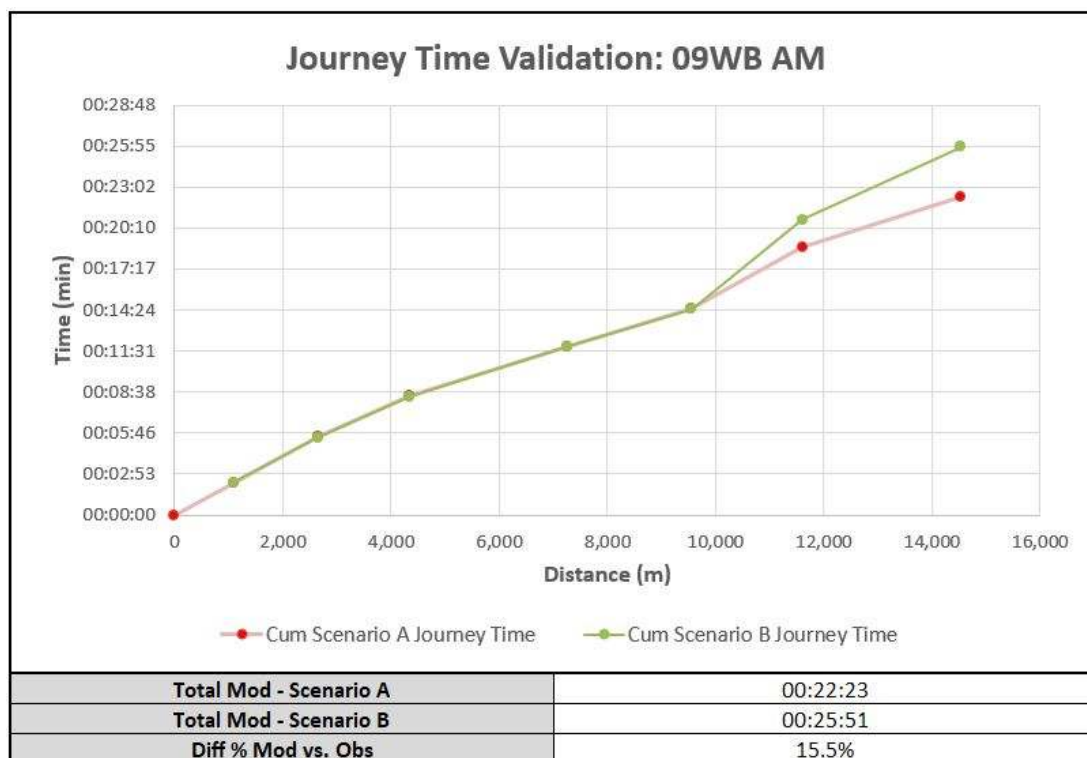
Figure 3.7: Journey time change check (09WB PM)

Total Mod - Scenario A	00:27:21
Total Mod - Scenario B	00:28:23
Diff % Mod vs. Obs	3.8%
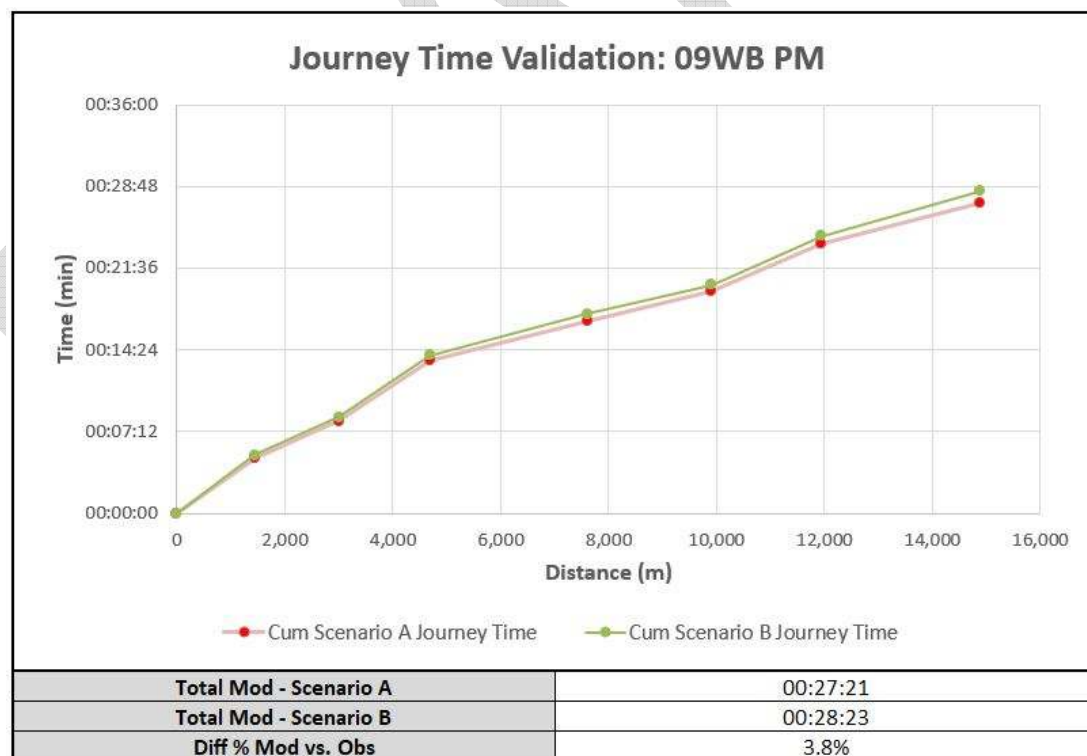
Figure 3.8: Journey time change check (20EB AM)

Total Mod - Scenario A	00:28:51
Total Mod - Scenario B	00:29:07
Diff % Mod vs. Obs	0.9%
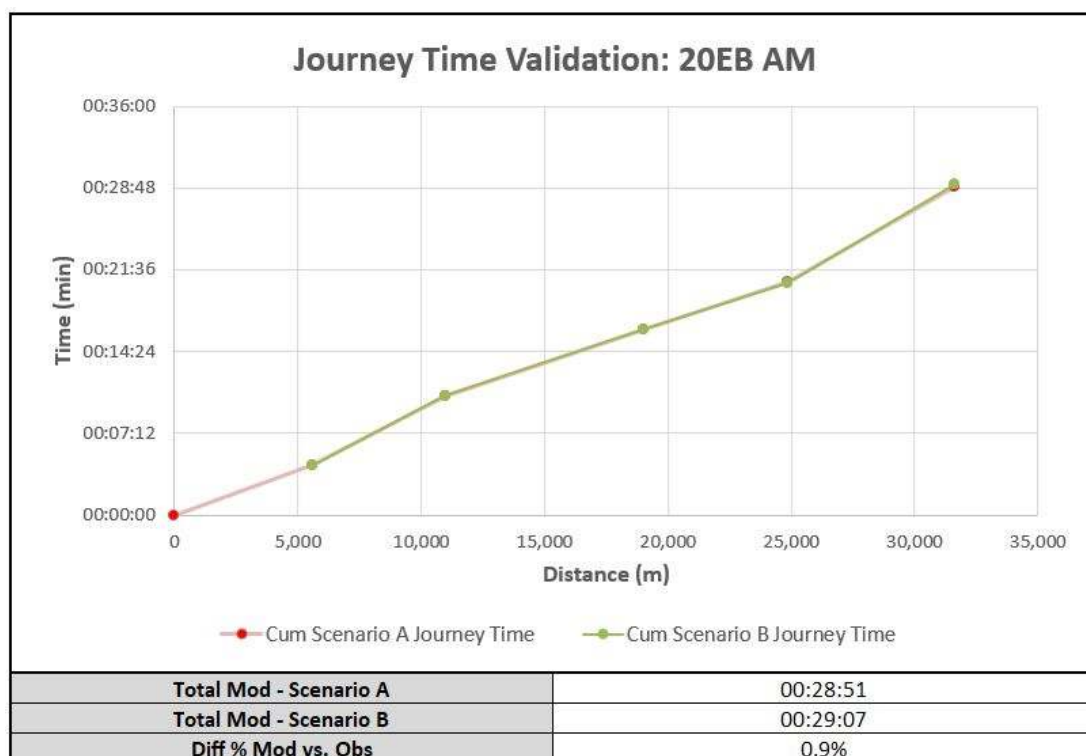
Figure 3.9: Journey time change check (20EB PM)

Total Mod - Scenario A	00:27:33
Total Mod - Scenario B	00:27:38
Diff % Mod vs. Obs	0.3%
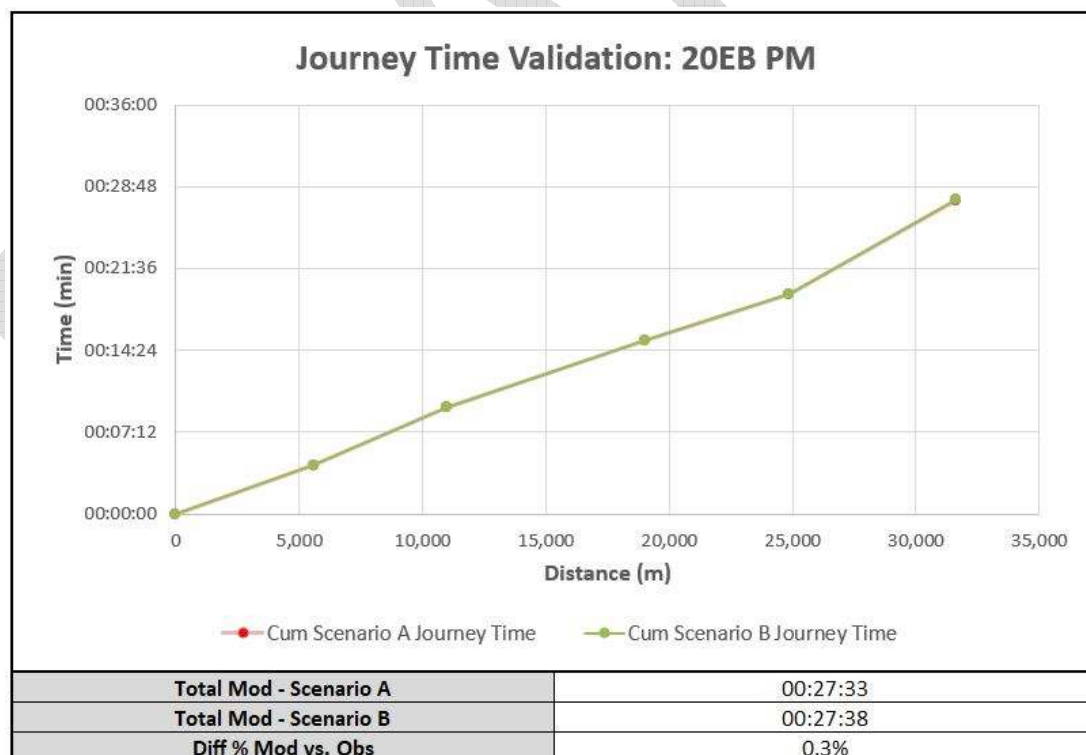
Figure 3.10: Journey time change check (20WB AM)

Total Mod - Scenario A	00:27:35
Total Mod - Scenario B	00:27:37
Diff % Mod vs. Obs	0.1%
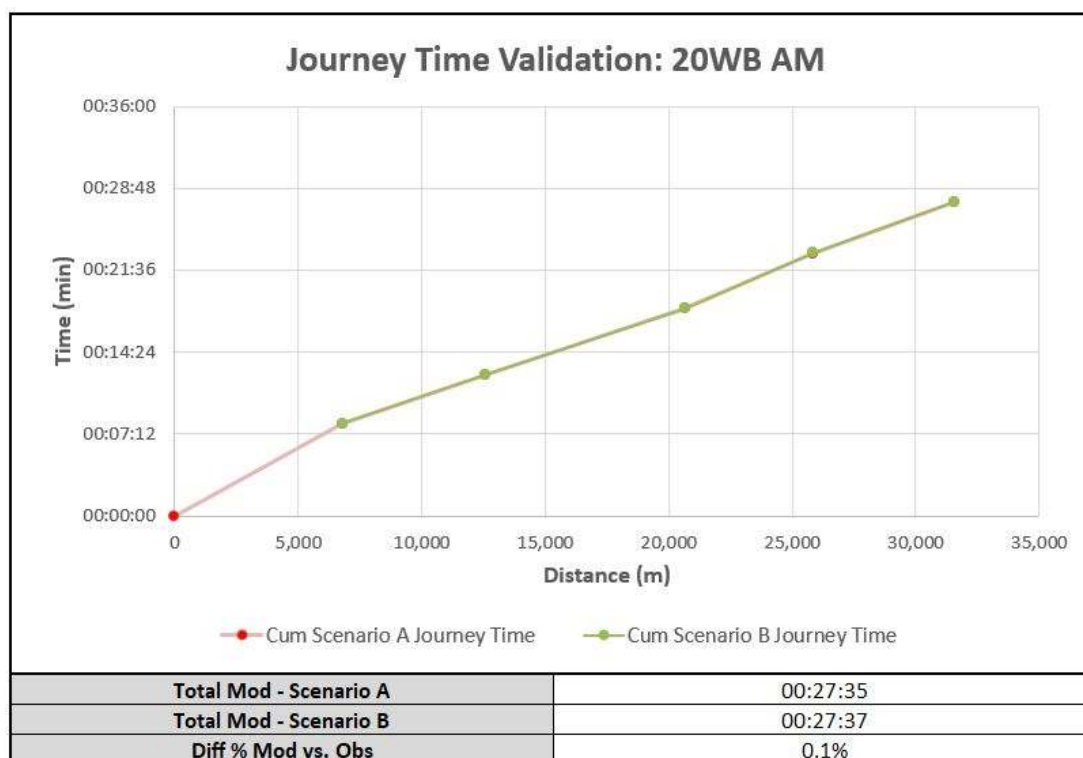
Figure 3.11: Journey time change check (20WB PM)

Total Mod - Scenario A	00:28:34
Total Mod - Scenario B	00:28:38
Diff % Mod vs. Obs	0.2%
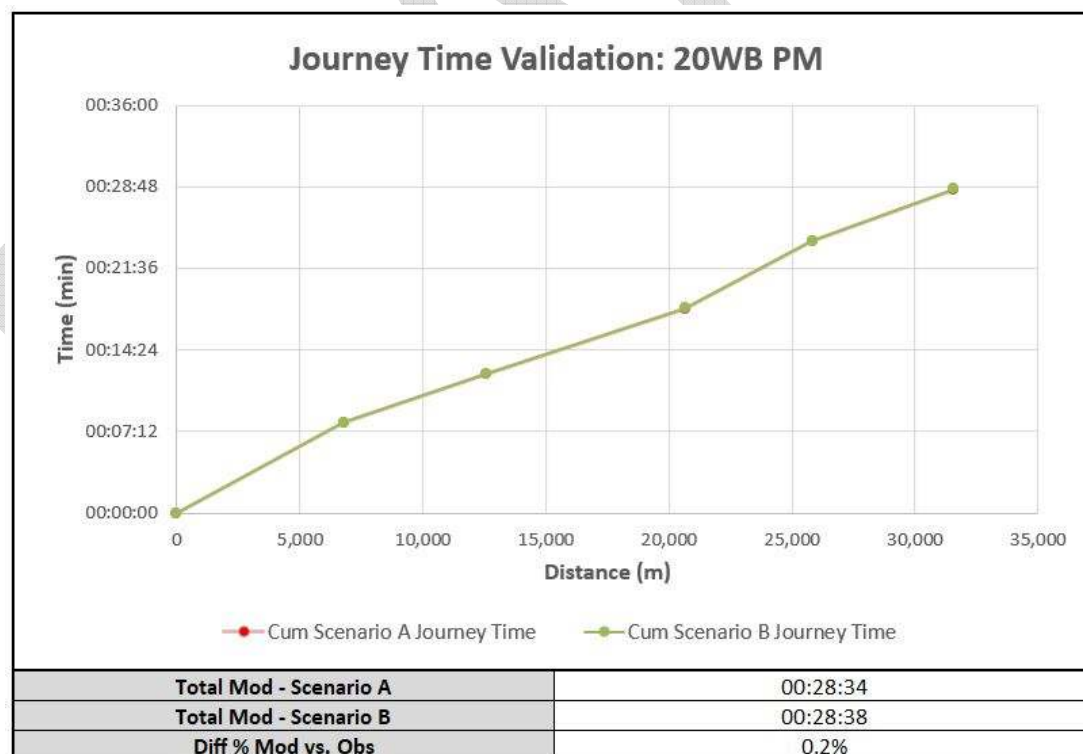
3.3 COMPARISON AND ANALYSIS OF TRAFFIC FLOWS

3.3.1 Traffic flow analysis has been carried out on various levels and comparison plots have been produced in order to be able to examine the relative impact of the development against the future year base network. Data and graphical outputs are extracted for the following network objects:

> ► Link traffic flows;
>
> ► Turning movements; and
>
> ► Link flow bundle analysis.

3.4 LINK TRAFFIC FLOWS

3.4.1 Link traffic flows have been extracted to display and analyse post Model Farm development traffic flows and the absolute changes in traffic volumes across the local and wider highway network respectively as in Figure 3.12to Figure 3.15. The only significant traffic flow change is on the A4226 between the development site and A4050 but according to the level of service and journey time route analysis the impact of the increased traffic flow in the local highway network is within the satisfactory level and queues are likely to not form at the key junctions of the area.

Figure 3.12: Total PrT and HGV traffic volumes (AM)

Figure 3.13: Total PrT and HGV traffic volumes (PM)

Figure 3.14: Total PrT and HGV traffic flow difference (AM)

Figure 3.15: Total PrT and HGV traffic flow difference (PM)

3.5 TURNING MOVEMENTS

3.5.1 Turning movements have been calculated and extracted into tables in order to provide input data for further micro level traffic assessments. For analysing turning movements a series of additional outputs are presented in Appendix C – Turning Movements (as separate package, due to large number of tables and graphics).

3.6 LINK FLOW BUNDLE ANALYSIS

3.6.1 Link flow bundle analysis has been executed to analyse the origin-destination movements of the key sections on the network on A4226 at the western and eastern side of the main site entrance in both directions. The results can be seen in Appendix B – Flow Bundle Plots of this document.

4   EVALUATION AND RESULTS - 2029

4.1   To determine the impact of the development on the highway network the analysis has been
        undertaken for the 2029 AM peak and PM peak hours and has considered:

   ► Junction Level of Service (LoS);

   ► journey times on selected routes, which demonstrate the impact on travel conditions within
     the modelled area; and

   ► link flow analysis and creating various traffic flow difference plots.

4.2   To understand the incremental changes associated with development growth outside and
        inside the simulation area, Scenario B with the Model Farm development has been compared
        against Scenario A which represents future base conditions.

4.1   JUNCTION LEVEL OF SERVICE

4.1.1   Junction level of services assessment has been undertaken according to the same principles
        described in Chapter 3.

4.1.2   Figure 4.1 shows the typical output of Level of Service analysis by displaying both the LoS
        category and the mean travel time loss per ICA junction. Note that by using the so-called
        Intersection Capacity Analysis for junctions in PTV VISUM, the LoS information is only available
        for junctions where this calculation has been pre-selected during model development. The rest
        of the LoS plots can be found in Appendix A – Level of Service Plots of this document.

Figure 4.1 Typical LoS display in PTV Visum – Junction 9

4.1.3   The following section summarises the LoS calculation results per analysed intersection. In
        general, despite the increasing traffic in the Model Farm area the level of service at key
        junctions is very well maintained and the majority of the turn movements do not suffer from
        significant extra delay.

4.1.4   It is only Junction 5 and Junction 10, where level of service falls to a critical value between 'D'
        and 'F' either in the AM or PM peak after the Model Farm implementation.

Table 4.1: Level of Service analysis – Junction 1

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	A	2	A	2	A	3	A	2
2	A	3	A	2	A	4	A	7
3					C	20	A	6
4					A	4	A	7

Table 4.2: Level of Service analysis – Junction 2

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	A	1	A	1	A	1	A	1
2	A	3	A	3	A	3	A	3
3	A	4	A	4	A	4	A	4

Table 4.3: Level of Service analysis – Junction 4

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	A	3	A	3	A	3	A	2
2	A	1	A	1	A	1	A	1
3	-	0	-	0	-	0	-	0
4	A	3	A	3	A	3	A	3

Table 4.4: Level of Service analysis – Junction 5

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	A	9	D	28	E	43	E	39
2	A	7	A	5	B	11	E	47

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
3	A	3	A	3	B	15	A	4
4	A	5	A	5	B	14	A	4

Table 4.5: Level of Service analysis – Junction 6

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	B	15	B	12	B	15	B	12
2	F	126	E	65	F	150	F	118

Table 4.6: Level of Service analysis – Junction 7

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	A	2	A	2	A	2	A	2
2	A	2	A	2	A	1	A	2
3	E	47	D	28	E	47	D	27
4	A	4	E	35	A	4	E	38

Table 4.7: Level of Service analysis – Junction 8

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	D	41	D	48	D	41	D	48
2	F	63	C	22	F	63	C	22
3	A	1	A	1	A	1	A	1

Table 4.8: Level of Service analysis – Junction 9

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	D	46	D	43	E	56	D	44
2	B	15	D	42	B	15	D	41
3	C	24	D	43	C	25	D	43
4	D	39	C	22	D	38	C	22
5	B	20	B	19	C	20	B	19
6	C	23	B	20	C	25	C	20
7	D	41	C	23	D	40	C	23
8	B	19	C	34	C	22	C	34

Table 4.9: Level of Service analysis – Junction 10

Node	Future Base				Model Farm			
	AM		PM		AM		PM	
	LoS	(s)	LoS	(s)	LoS	(s)	LoS	(s)
1	C	20	A	5	C	23	A	10
2	A	5	A	3	A	5	A	3
3	A	9	F	51	B	12	E	49

4.2 JOURNEY TIMES

4.2.1 Travel times provide a representation of network performance that is easier for a wide audience of readers to understand. A series of routes has been identified to assess network performance; these routes are identical to the ones used for model validation.

4.2.2 The results of the journey time routes for both time periods in each of the scenarios as well as comparisons between the different scenarios are presented in graphs and tables in the following section. The tables demonstrate the absolute difference (in seconds) and percentage difference between Scenario B and Scenario A. Graphs comparing the base year, scenario A and Scenario B for each of the time periods have been also produced. The journey time routes are plotted by distance in the graphs, in order to show where delay can occur and highlight junctions that potentially require mitigation.

4.2.3 The journey time analysis shows very similar results to the time differences seen in the 2026 forecast year models. The increase in the future base is also negligible due to the low traffic growth from 2026 to 2029.