Technical Note D

Project:	Wisbech Area Transport Study	**To:**	FDC/CCC
Subject:	Shaping Fenland's Future options	**From:**	Atkins
Date:	8th September 2011	**cc:**	

1. Introduction

This Technical Note summarises the proposed Local Development Framework options as set out by the Shaping Fenland's Future study. In terms of network development, detailed information on PPM and PPK values in the updating of the Future Year network is provided in section 2 as well as the coding of infrastructure for the options.

Section 3 provides background information on Future Year matrix development and describes the process that was used to generate growth factors from TEMPRO (Trip End Model Presentation Program) and how the SFF options have been derived and incorporated into the forecast year demands.

The forecast years to be modelled are 2016, 2021 and 2026. These are consistent with Fenland District Council's Local Development Framework, although the recent 'Shaping Fenlands Future' Stage 2 report looks at growth from 2011 to 2031.

An outline of the level of growth to be applied to the forecast Do-Minimum and Do-Something forecast scenarios, including tests of varying levels of growth, based on the information provided in the following documents:

- 2010 Strategic Housing Land Accessibility Assessment (SHLAA);
- 2007 Employment land review; and
- 'Shaping Fenlands Future' Stage 2 report.

Details associated with overall growth factors for Cambridgeshire, Fenland and Wisbech from TEMPRO 6.1 are provided in section 3.

From the information available from the above sources the following options were undertaken as an initial assessment of the impacts of Shaping Fenland's Future study, which forms the basis of Fenlands Core Strategy and Local Development Framework for Wisbech:

- Do – Minimum scenarios for 2016, 2021 and 2026, to include all committed developments and background growth, controlled to TEMPRO 6.1 growth projections (DM);
- Do – Something 1 scenarios for 2016, 2021 and 2026, to include the DM above, + SFF Option 1 controlled to TEMPRO 6.1 growth projections (DS1); and
- Do –Something 2 scenario's for 2016, 2021 and 2026, to include DS1, + the difference between SFF option 2 and option 1, to form a TEMPRO 6.1 + test (DS2), the SFF preferred option.

2. Local Highway Model – Future Year Network Development

PPM and PPK Values

This technical note provides detail on the Pence per Minute (PPM) and Pence per Kilometer (PPK) parameters used for the Wisbech Area Transport Study (WATS) – Shaping Fenland's Future (SFF) options.

The PPM and PPK parameters represent the travellers' valuation of the time and distance of each journey, and the ratio between the two. The interaction of these parameters has significant effect on route choice. If time is highly valued but distance is not, then the quickest route will be chosen no matter how far it is; conversely, if distance is highly valued but time is not, the shortest route would be chosen no matter how slow it is. Generally, the route choice is a balance between the relative importance of time and distance to the traveller.

These parameters are predicted to change through time: they were calculated for the 2008 base year (as described in the WATS Local Model Validation Report), and the following paragraphs outlines the methodology used for the forecast years.

It should be noted that the WebTAG guidance for PPM/PPK calculation has been updated since the 2008 base year WATS model. The PPM/PPK parameters for the 2008 base year WATS models are based on WebTAG Unit 3.5.6 (dated December 2008), and for the forecast year models, the latest WebTAG guidance (WebTAG Unit 3.5.6 dated April 2011) has been used.

The WebTAG Unit 3.5.6 (dated April 2011) take account of all latest changes such as VAT (from 17.5% to 20%) and 1p per litre reduction in fuel duty from 6pm on 23 March 2011. For more details, please refer to the WebTAG document.

Value of Time Costs: Pence per Minute

The PPM model parameter was calculated based on time costs from WebTAG Unit 3.5.6 (date April 2011). All references to WebTAG in the following paragraphs refer to this version of WebTAG Unit 3.5.6.

WebTAG Table 1 provides the latest Values of Working Time per Person, recommended by the Department for Transport (DfT), expressed in 2002 values and prices in pounds per hour. These values are given in Table 2.1. These have been applied to the Employers' Business (EB) trip purpose for cars and LGV (i.e. UC3), and to OGV1 and OGV2 (i.e. UC5 and UC6).

Table 2.1 – Values of Working Time per Person (2002 prices and values, £/hour)

Vehicle Occupant	Resource Cost	Perceived Cost	Market Price
Car driver	21.86	21.86	26.43
Car passenger	15.66	15.66	18.94
LGV (driver or passenger)	8.42	8.42	10.18
OGV1/OGV2 (driver or passenger)	8.42	8.42	10.18

WebTAG Table 2 provides the latest Values of Non-Working Time per Person, expressed in 2002 values and prices in pounds per hour. These values are given in

Table 2.2. 'Commuting' values have been applied to the Home Based Work (HBW) (i.e. UC1) and Home Based Education (HBEd) (i.e. UC2) trip purposes; 'other' values have been applied to the other trip purposes (OTP) (i.e. UC4).

Table 2.2 – Values of Non-Working Time per Person (2002 prices and values, £/hour)

Purpose	Resource Cost	Perceived Cost	Market Price
Commuting	4.17	5.04	5.04
Other	3.68	4.46	4.46

Vehicle occupancies for the 2008 base year (Table 2.5), proportion of travel for each purpose (Table 2.9) and proportions of vehicles making up each user class (Table 2.10) have all been calculated from the Roadside Interview (RSI) data that was collected for the 2008 WATS base year model.

Vehicle occupancies for the forecast years (Table 2.6 to Table 2.8) have been calculated from these base year values using the annual percentage change given in WebTAG Table 6 (reproduced in Table 2.3). The change in vehicle occupancies from 2008 to 2016, 2021 and 2026 are given in Table 2.4.

Proportion of travel for each purpose and proportions of vehicles making up each user class are assumed to remain constant from 2008 to 2026.

Table 2.3 – Annual Percentage Change in Car Passenger Occupancy (%pa) up to 2036

Journey Purpose	Weekday AM	Weekday IP	Weekday PM
Work	-0.48	-0.4	-0.62
Non-Work (commuting and other)	-0.67	-0.65	-0.53

Table 2.4 – Change in Car Passenger Occupancy (2008 to 2016, 2021 and 2026)

Journey Purpose	2008 to 2016	2008 to 2021	2008 to 2026
Work – AM	0.962	0.939	0.917
Work – IP	0.968	0.949	0.930
Work – PM	0.951	0.922	0.894
Non-Work – AM	0.948	0.916	0.886
Non-Work – IP	0.949	0.919	0.889
Non-Work – PM	0.958	0.933	0.909

Table 2.5 – 2008 Vehicle Occupancy per Trip (including driver)

Vehicle Type / Journey	RSI Data

Purpose	AM	IP	PM
Car / HBW (UC1)	1.09	1.26	1.18
Car / HBEd (UC2)	2.16	1.40	1.50
Car / EB (UC3)	1.33	1.23	1.45
Car / OTP (UC4)	1.48	1.67	1.72
LGV / HBW (UC1)	1.23	1.44	1.25
LGV / HBEd (UC2)	1.50	-	-
LGV / EB (UC3)	1.55	1.09	1.47
LGV / OTP (UC4)	1.75	2.00	1.38
OGV1 / Work (UC5)	1.21	1.22	1.00
OGV2 / Work (UC6)	1.06	1.09	1.00

Table 2.6 – 2016 Vehicle Occupancy per Trip (including driver)

Vehicle Type / Journey Purpose	RSI Data		
	AM	IP	PM
Car / HBW (UC1)	1.09	1.25	1.17
Car / HBEd (UC2)	2.10	1.38	1.48
Car / EB (UC3)	1.32	1.22	1.43
Car / OTP (UC4)	1.45	1.64	1.69
LGV / HBW (UC1)	1.22	1.42	1.24
LGV / HBEd (UC2)	1.47	-	-
LGV / EB (UC3)	1.53	1.09	1.45
LGV / OTP (UC4)	1.71	1.95	1.36
OGV1 / Work (UC5)	1.20	1.21	1.00
OGV2 / Work (UC6)	1.06	1.09	1.00

Table 2.7 – 2021 Vehicle Occupancy per Trip (including driver)

Vehicle Type / Journey Purpose	RSI Data		
	AM	IP	PM
Car / HBW (UC1)	1.08	1.24	1.17
Car / HBEd (UC2)	2.06	1.37	1.47
Car / EB (UC3)	1.31	1.22	1.42
Car / OTP (UC4)	1.44	1.62	1.67
LGV / HBW (UC1)	1.21	1.40	1.23
LGV / HBEd (UC2)	1.46	-	-
LGV / EB (UC3)	1.52	1.09	1.43
LGV / OTP (UC4)	1.69	1.92	1.35
OGV1 / Work (UC5)	1.20	1.21	1.00
OGV2 / Work (UC6)	1.06	1.08	1.00

Table 2.8 – 2026 Vehicle Occupancy per Trip (including driver)

Vehicle Type / Journey	RSI Data

Purpose	AM	IP	PM
Car / HBW (UC1)	1.08	1.23	1.16
Car / HBEd (UC2)	2.03	1.36	1.45
Car / EB (UC3)	1.30	1.21	1.40
Car / OTP (UC4)	1.43	1.60	1.65
LGV / HBW (UC1)	1.20	1.39	1.23
LGV / HBEd (UC2)	1.44	-	-
LGV / EB (UC3)	1.50	1.08	1.42
LGV / OTP (UC4)	1.66	1.89	1.35
OGV1 / Work (UC5)	1.19	1.20	1.00
OGV2 / Work (UC6)	1.06	1.08	1.00

Table 2.9 – Proportion of Trip Purpose in Each Vehicle Type (2008, 2016. 2021 and 2026)

Vehicle Type / Journey Purpose	AM	IP	PM
Car / HBW (UC1)	60%	21%	52%
Car / HBEd (UC2)	14%	6%	1%
Car / EB (UC3)	4%	12%	5%
Car / OTP (UC4)	22%	62%	41%
Car / All Purposes (UC1 to UC4)	100%	100%	100%
LGV / HBW (UC1)	47%	35%	62%
LGV / HBEd (UC2)	4%	0%	0%
LGV / EB (UC3)	40%	61%	22%
LGV / OTP (UC4)	8%	16%	17%
LGV / All Purposes (UC1 to UC4)	100%	100%	100%
OGV1 / Work (UC5)	100%	100%	100%
OGV2 / Work (UC6)	100%	100%	100%

Table 2.10 – Proportion of Vehicle Type in Each User Class (2008, 2016, 2021 and 2026)

User Class	Vehicle Type	AM	IP	PM
UC1	Car	87%	84%	86%
	LGV	13%	16%	14%
UC2	Car	95%	100%	97%
	LGV	5%	0%	0%
UC3	Car	38%	55%	63%
	LGV	63%	45%	40%
UC4	Car	94%	96%	95%
	LGV	6%	4%	5%
UC5	OGV1	100%	100%	100%
UC6	OGV2	100%	100%	100%

The 2002 value of time costs for each type and journey purposes (car, LGV, OGV1 and OGV2; HGV, HBEd, EB and OTP) were combined in the relevant proportions of occupancy (Table 2.5) and purpose (Table 2.9) to derive the values of time cost in 2002 prices, given in Table 2.11.

Table 2.11 – 2002 Perceived Values of Time (2002 prices, £/hour)

User Class	Vehicle Type	AM	IP	PM
Car	HBW	5.49	6.35	5.95
	HBEd	10.89	7.06	7.56
	EB	27.03	25.46	28.91
	OTP	6.60	7.45	7.67
LGV	HBW	6.20	7.26	6.30
	HBEd	7.56	-	-
	EB	13.05	9.18	12.38
	OTP	7.81	8.92	6.15
OGV1	Work	10.19	10.27	8.42
OGV2	Work	8.93	9.18	8.42

WebTAG Table 3 provides the forecast growth in the values of time for 2002 onwards, which have been used to calculate growth factors from 2002 to 2016, 2021 and 2026. These figures are shown in Table 2.12.

Table 2.12 – Forecast Growth in Working and Non-Working Values of Time

Year	GDP Growth (%pa)	Population Growth (%pa)	Work VOT Growth (%pa)	Non-Work VOT Growth (%pa)
2002-2003	2.81	0.36	2.44	1.95
2003-2004	2.95	0.39	2.55	2.04
2004-2005	2.17	0.49	1.67	1.34
2005-2006	2.85	0.66	2.18	1.74
2006-2007	2.56	0.58	1.97	1.57
2007-2008	0.55	0.64	-0.09	-0.07
2008-2009	-4.90	0.67	-5.38	-4.31
2009-2010	1.30	0.73	0.57	0.45
2010-2011	1.70	0.73	0.96	0.77
2011-2012	2.50	0.71	1.78	1.42
2012-2013	2.90	0.70	2.18	1.75
2013-2014	2.90	0.69	2.19	1.76
2014-2015	2.80	0.69	2.10	1.68
2015-2016	2.75	0.69	2.05	1.64
2016-2021	2.35	0.67	1.67	1.34
2021-2031	2.25	0.57	1.67	1.34
2002-2016	-	-	1.18	1.14
2002-2021	-	-	1.28	1.22
2002-2026	-	-	1.40	1.31

The 2002 values of time (Table 2.11) were combined with the forecast growth (Table 2.12) to give the 2016, 2021 and 2026 values of time, at 2002 prices in pounds per hour (Table 2.13 to Table 2.15).

Table 2.13 – 2016 Perceived Values of Time (2002 prices, £/hour)

User Class	Vehicle Type	AM	IP	PM
Car	HBW	6.29	7.27	6.81
	HBEd	12.46	8.07	8.65
	EB	31.97	30.12	34.19
	OTP	7.55	8.52	8.78
LGV	HBW	7.09	8.31	7.21
	HBEd	8.65	-	-
	EB	15.44	10.86	14.64
	OTP	8.93	10.21	7.04
OGV1	Work	12.05	12.15	9.96
OGV2	Work	10.56	10.86	9.96

Table 2.14 – 2021 Perceived Values of Time (2002 prices, £/hour)

User Class	Vehicle Type	AM	IP	PM
Car	HBW	6.72	7.77	7.27
	HBEd	13.32	8.63	9.25
	EB	34.73	32.72	37.14
	OTP	8.07	9.11	9.38
LGV	HBW	7.58	8.88	7.71
	HBEd	9.25	-	-
	EB	16.77	11.79	15.90
	OTP	9.55	10.91	7.53
OGV1	Work	13.09	13.20	10.82
OGV2	Work	11.47	11.79	10.82

Table 2.15 – 2026 Perceived Values of Time (2002 prices, £/hour)

User Class	Vehicle Type	AM	IP	PM
Car	HBW	7.18	8.30	7.77
	HBEd	14.23	9.22	9.88
	EB	37.73	35.54	40.35
	OTP	8.63	9.74	10.03
LGV	HBW	8.10	9.49	8.24
	HBEd	9.88	-	-
	EB	18.22	12.81	17.28
	OTP	10.20	11.66	8.05
OGV1	Work	14.22	14.34	11.75
OGV2	Work	12.46	12.81	11.75

The 2016, 2021 and 2026 values of time were converted from vehicle type to user classes using the proportions given in Table 2.10. The PPM parameter was established by converting these values of time in pounds per hour to pence per minute. The values used within the forecast year models are shown in Table 2.16 to Table 2.18.

Table 2.16 – 2016 Perceived Values of Time (2002 prices, £/hour)

User Class	Value of Time	AM	IP	PM
UC1	£/hour	6.39	7.43	6.86
	PPM	10.65	12.38	11.44
UC2	£/hour	12.26	8.07	8.41
	PPM	20.43	13.46	14.02
UC3	£/hour	21.64	21.51	27.40
	PPM	36.06	35.85	45.67
UC4	£/hour	7.64	8.59	8.69
	PPM	12.74	14.32	14.48
UC5	£/hour	12.05	12.15	9.96
	PPM	20.08	20.25	16.60
UC6	£/hour	10.56	10.86	9.96
	PPM	17.59	18.09	16.60

Table 2.17 – 2021 Perceived Values of Time (2002 prices, £/hour)

User Class	Value of Time	AM	IP	PM
UC1	£/hour	6.83	7.94	7.33
	PPM	11.38	13.24	12.22
UC2	£/hour	13.10	8.63	8.99
	PPM	21.84	14.38	14.98
UC3	£/hour	23.50	23.37	29.77
	PPM	39.17	38.94	49.62
UC4	£/hour	8.17	9.18	9.28
	PPM	13.61	15.30	15.47
UC5	£/hour	13.09	13.20	10.82
	PPM	21.82	22.00	18.03
UC6	£/hour	11.47	11.79	10.82
	PPM	19.11	19.65	18.03

Table 2.18 – 2026 Perceived Values of Time (2002 prices, £/hour)

User Class	Value of Time	AM	IP	PM
UC1	£/hour	7.30	8.49	7.84
	PPM	12.17	14.15	13.07
UC2	£/hour	14.01	9.22	9.61
	PPM	23.34	15.37	16.01
UC3	£/hour	25.53	25.38	32.34
	PPM	42.56	42.30	53.90
UC4	£/hour	8.73	9.81	9.92
	PPM	14.55	16.35	16.54
UC5	£/hour	14.22	14.34	11.75
	PPM	23.70	23.90	19.59
UC6	£/hour	12.46	12.81	11.75
	PPM	20.76	21.35	19.59

Distance Costs: Pence per Kilometer

The PPK value (also known as the Vehicle Operation Cost (VOC)) is partially based on the speed within the model. Although for the forecast year, the network speed is likely to be slightly lower than the base year, the network speed from the 2008 base year model has been used for the forecast year PPK calculation as from previous experience, the PPK values is not very sensitive to small drop in the network speed.

The network speeds used for the PPK calculations are 60, 65 and 59 kph for AM, inter and PM peak respectively.

WebTAG 3.5.6 gives details on the calculations required to produce the VOC, which are composed of a fuel and non-fuel element.

Fuel Element

WebTAG Table 10 gives the values of the four parameters that are used to calculate the fuel consumption. The parameters are expressed in average 2002 values and prices and these have been reproduced in Table 2.19 below.

Table 2.19 – 2002 Fuel VOC Formulae Parameter Values (2002 prices, litre/kilometre)

Vehicle Category	Parameters			
	a	b	c	d
Average Car	0.9574479	0.04782644	-0.00012946	2.53734E-06
Average LGV	1.162824392	0.061032451	-0.00049695	8.63611E-06
OGV1	1.564481329	0.260097879	-0.00378306	3.24446E-05
OGV2	3.613294863	0.42026914	-0.00494704	3.82806E-05

These parameters, along with the average speed (v) for each time period, are used to calculate the fuel consumption for each forecast year model using the following formula. The results are shown in Table 2.20.

$$L = (a + bv + cv^2 + dv^3)/v$$

$$Where:$$

$$L = fuel\ consumption, expressed\ in\ litres\ per\ kilometre;$$

$$v = average\ speed\ in\ kilometres\ per\ hour; and$$

$$a, b, c, d\ are\ parameters\ defined\ for\ each\ vehicle\ category.$$

Table 2.20 – 2002 Fuel Consumption Values (2002 prices, litres/kilometre)

Vehicle Category	AM Speed (kph)	AM Fuel Consumption (litre/km)	IP Speed (kph)	IP Fuel Consumption (litre/km)	PM Speed (kph)	PM Fuel Consumption (litre/km)
2016						
Average Car	60	0.07	65	0.06	59	0.07
Average LGV	60	0.08	65	0.08	59	0.08
OGV1	60	0.18	65	0.18	59	0.18
OGV2	60	0.32	65	0.32	59	0.32
2021						
Average Car	60	0.07	65	0.06	59	0.07
Average LGV	60	0.08	65	0.08	59	0.08
OGV1	60	0.18	65	0.18	59	0.18
OGV2	60	0.32	65	0.32	59	0.32
2026						
Average Car	60	0.07	65	0.06	59	0.07
Average LGV	60	0.08	65	0.08	59	0.08
OGV1	60	0.18	65	0.18	59	0.18
OGV2	60	0.32	65	0.32	59	0.32

In order to factor these 2002 fuel consumption values to 2016, 2021 and 2026 levels, WebTAG Table 13 was used (reproduced in Table 2.21).

Table 2.21 – Fuel Efficiency Improvements

Year	Change in Vehicle Efficiency (%pa)			
	Average Car	Average LGV	OGV1	OGV2
2002-2003	-1.23	0.65	0.46	-0.17
2003-2004	-1.21	-1.44	0	0
2004-2005	-1.07	-1.79	0	0
2005-2006	-1.04	-1.50	-1.23	-1.23
2006-2007	-0.48	-1.50	-1.23	-1.23
2007-2008	-1.48	-1.50	-1.23	-1.23
2008-2010	-1.66	-1.25	-1.23	-1.23
2010-2015	-187	-1.72	0	0
2015-2020	-2.71	-1.70	0	0
2020-2025	-3.13	-0.96	0	0
2025-2030	-2.33	-0.26	0	0
2002-2016	0.8019	0.8183	0.9443	0.9384
2002-2021	0.6959	0.7568	0.9443	0.9384
2002-2026	0.5985	0.7262	0.9443	0.9384

Multiplying these factors (Table 2.21) by the 2002 fuel consumption values (Table 2.20) gives the 2016, 2021 and 2026 fuel consumption values which is provided in Table 2.22 below.

Table 2.22 – 2016, 2021 and 2026 Fuel Consumption Values (litre/kilometre)

Vehicle Category	AM	IP	PM
2016			
Average Car	0.052	0.052	0.052
Average LGV	0.067	0.068	0.067
OGV1	0.166	0.166	0.167
OGV2	0.302	0.297	0.303
2021			
Average Car	0.045	0.045	0.045
Average LGV	0.062	0.063	0.062
OGV1	0.166	0.166	0.167
OGV2	0.302	0.297	0.303
2026			
Average Car	0.039	0.039	0.039
Average LGV	0.059	0.060	0.059
OGV1	0.166	0.166	0.167
OGV2	0.302	0.297	0.303

WebTAG Table 11 gives the fuel costs, fuel duty and VAT rates for up to 2020 and Table 14 gives the forecast growth for years after 2020. These tables have been used to give the 2016, 2021 and 2026 resource costs, in 2002 prices, shown in Table 2.23 below.

Table 2.23 – 2016, 2021 and 2026 Fuel Costs (2002 prices, pence/litre)

Vehicle Category	Fuel	Duty	Tax	Pence/litre
2016				
Car (work)	35.30	49.88	-	85.18
Car (non-work)	35.30	49.88	20.00	102.22
LGV (work)	37.10	49.88	-	86.98
LGV (non-work)	37.10	49.88	20.00	104.38
OGV1	37.20	49.88	-	87.08
OGV2	37.20	49.88	-	87.08
2021				
Car (work)	36.53	50.63	-	87.16
Car (non-work)	36.53	50.63	20.00	104.59
LGV (work)	39.47	50.63	-	90.10
LGV (non-work)	39.47	50.63	20.00	108.12
OGV1	38.80	50.63	-	89.43
OGV2	38.80	50.63	-	89.43
2026				
Car (work)	33.34	50.63	-	83.97
Car (non-work)	33.34	50.63	20.00	100.76
LGV (work)	40.59	50.63	-	91.22
LGV (non-work)	40.59	50.63	20.00	109.47
OGV1	36.86	50.63	-	87.49
OGV2	36.86	50.63	-	87.49

These fuel costs (Table 2.23) can be multiplied by the fuel consumption values (Table 2.22) to produce the fuel element of the VOC, which is provided in Table 2.24 below.

Table 2.24 – 2016, 2021 and 2026 Fuel Element of VOC (2002 prices, pence/kilometre)

Vehicle Category	AM litre/km	AM pence/km	IP litre/km	IP pence/km	PM litre/km	PM pence/km
2016						
Car (work)	0.052	4.453	0.052	4.431	0.052	4.457
Car (non-work)	0.052	5.343	0.052	5.317	0.052	5.349
LGV (work)	0.067	5.808	0.068	5.906	0.067	5.799
LGV (non-work)	0.067	6.970	0.068	7.087	0.067	6.958
OGV1	0.166	14.483	0.166	14.417	0.167	14.505
OGV2	0.302	26.315	0.297	25.853	0.303	26.397
2021						
Car (work)	0.045	3.954	0.045	3.935	0.045	3.958
Car (non-work)	0.045	4.745	0.045	4.722	0.045	4.750
LGV (work)	0.062	5.564	0.063	5.657	0.062	5.555
LGV (non-work)	0.062	6.677	0.063	6.789	0.062	6.666
OGV1	0.166	14.874	0.166	14.806	0.167	14.897
OGV2	0.302	27.025	0.297	26.550	0.303	27.110
2026						
Car (work)	0.039	3.276	0.039	3.260	0.039	3.280
Car (non-work)	0.039	3.931	0.039	3.912	0.039	3.936
LGV (work)	0.059	5.406	0.060	5.496	0.059	5.397
LGV (non-work)	0.059	6.487	0.060	6.596	0.059	6.476
OGV1	0.166	14.551	0.166	14.485	0.167	14.573
OGV2	0.302	26.439	0.297	25.974	0.303	26.522

Non-Fuel Element

WebTAG Paragraph 1.3.16 gives a formula for calculating the non-fuel element of VOC (in pence per kilometre), which includes expense such as oil, tyres, maintenance and depreciation for all vehicles, along with a vehicle capital saving for vehicles in working time only. The formula is:

$$C = a1 + \frac{b1}{v}$$

$$Where:$$

$$C = cost\ in\ pence\ per\ kilometre\ travelled; and$$

$$v = average\ link\ speed\ in\ kilometres\ per\ hour$$

WebTAG Table 15 gives the values of parameters $a1$ and $b1$ for input to the above formula, reproduced in Table 2.25.

Table 2.25 – Non-Fuel Element Formula Parameter Values

Vehicle Category	Parameter Values	Parameter Values
	$a1$ (pence/km)	$a1$ (pence/km)
Car (work)	4.069	111.391
Car (non-work)	3.151	-
LGV (work)	5.910	38.603
LGV (non-work)	5.910	-
OGV1	5.501	216.165
OGV2	10.702	416.672

Using the average speed (v) for each time period, the non-fuel element of the VOC can be calculated (Table 2.26).

Table 2.26 – Non-Fuel Element of VOC (2002 prices, pence/kilometre)

Vehicle Category	AM Speed (kph)	AM Non-Fuel VOC (pence/km)	IP Speed (kph)	IP Non-Fuel VOC (pence/km)	PM Speed (kph)	PM Non-Fuel VOC (pence/km)
2016						
Car (work)	60	5.94	65	5.79	59	5.96
Car (non-work)	60	3.15	65	3.15	59	3.15
LGV (work)	60	6.56	65	6.51	59	6.57
LGV (non-work)	60	5.91	65	5.91	59	5.91
OGV1	60	9.13	65	8.85	59	9.17
OGV2	60	17.69	65	17.15	59	17.78
2021						
Car (work)	60	5.94	65	5.79	59	5.96
Car (non-work)	60	3.15	65	3.15	59	3.15
LGV (work)	60	6.56	65	6.51	59	6.57
LGV (non-work)	60	5.91	65	5.91	59	5.91
OGV1	60	9.13	65	8.85	59	9.17
OGV2	60	17.69	65	17.15	59	17.78
2026						
Car (work)	60	5.94	65	5.79	59	5.96
Car (non-work)	60	3.15	65	3.15	59	3.15
LGV (work)	60	6.56	65	6.51	59	6.57
LGV (non-work)	60	5.91	65	5.91	59	5.91
OGV1	60	9.13	65	8.85	59	9.17
OGV2	60	17.69	65	17.15	59	17.78

Total Vehicle Operating Cost

The fuel and non-fuel elements of VOC are summed to give the total VOC for each vehicle category for each time period, shown in Table 2.27.

Table 2.27 – Total VOC for Each Vehicle Category (2002 prices, pence/kilometre)

Vehicle Category	AM			IP			PM		
	Fuel VOC	Non-Fuel VOC	Total VOC	Fuel VOC	Non-Fuel VOC	Total VOC	Fuel VOC	Non-Fuel VOC	Total VOC
2016									
Car (work)	4.45	5.94	10.39	4.43	5.79	10.22	4.46	5.96	10.42
Car (non-work)	5.34	3.15	8.49	5.32	3.15	8.47	5.35	3.15	8.50
LGV (work)	5.81	6.56	12.37	5.91	6.51	12.41	5.80	6.57	12.36
LGV (non-work)	6.97	5.91	12.88	7.09	5.91	13.00	6.96	5.91	12.87
OGV1	14.48	9.13	23.61	14.42	8.85	23.26	14.51	9.17	23.68
OGV2	26.31	17.69	44.01	25.85	17.15	43.00	26.40	17.78	44.17
2021									
Car (work)	3.95	5.94	9.89	3.94	5.79	9.73	3.96	5.96	9.92
Car (non-work)	4.74	3.15	7.90	4.72	3.15	7.87	4.75	3.15	7.90
LGV (work)	5.56	6.56	12.12	5.66	6.51	12.17	5.55	6.57	12.12
LGV (non-work)	6.68	5.91	12.59	6.79	5.91	12.70	6.67	5.91	12.58
OGV1	14.87	9.13	24.00	14.81	8.85	23.65	14.90	9.17	24.07
OGV2	27.03	17.69	44.72	26.55	17.15	43.70	27.11	17.78	44.89
2026									
Car (work)	3.28	5.94	9.21	3.26	5.79	9.05	3.28	5.96	9.24
Car (non-work)	3.93	3.15	7.08	3.91	3.15	7.06	3.94	3.15	7.09
LGV (work)	5.41	6.56	11.96	5.50	6.51	12.00	5.40	6.57	11.96
LGV (non-work)	6.49	5.91	12.40	6.60	5.91	12.51	6.48	5.91	12.39
OGV1	14.55	9.13	23.68	14.49	8.85	23.33	14.57	9.17	23.74
OGV2	26.44	17.69	44.13	25.97	17.15	43.13	26.52	17.78	44.30

Using the proportions of vehicles given in Table 2.10, the PPK values for each user class can be derived – these are shown in Table 2.28.

Table 2.28 – 2016, 2021 and 2026 Vehicle Operating Costs (PPK) (2002 prices)

User Class	AM	IP	PM
2016			
UC1	9.05	9.18	9.11
UC2	8.72	8.47	8.26
UC3	11.63	11.19	11.51
UC4	8.78	8.65	8.73
UC5	23.61	23.26	23.68
UC6	44.01	43.00	44.17
2021			
UC1	8.49	8.63	8.56
UC2	8.14	7.87	7.68
UC3	11.29	10.81	11.10
UC4	8.20	8.06	8.15
UC5	24.00	23.65	24.07
UC6	44.72	43.70	44.89
2026			
UC1	7.76	7.92	7.83
UC2	7.36	7.06	6.89
UC3	10.93	10.36	10.60
UC4	7.43	7.28	7.37
UC5	23.68	23.33	23.74
UC6	44.13	43.13	44.30

PPM and PPK Parameters: Final Values

When input into the SATURN models, the PPM and PPK values are given as a ratio, rather than absolute values. The final parameters for the 2016, 2021 and 2026 models are given in Table 2.29, Table 2.30 and Table 2.31 respectively.

Table 2.29 – 2016 PPM and PPK Parameters

User Class	Absolute Values (2002 prices)						Model Parameters					
	AM		IP		PM		AM		IP		PM	
	PPM	PPK	PPM	PPK	PPM	PPK	PPM	PPK	PPM	PPK	PPM	PPK
UC1	10.65	9.05	12.38	9.18	11.44	9.11	1.00	0.85	1.00	0.74	1.00	0.80
UC2	20.43	8.72	13.46	8.47	14.02	8.26	1.00	0.43	1.00	0.63	1.00	0.59
UC3	36.06	11.63	35.85	11.19	45.67	11.51	1.00	0.32	1.00	0.31	1.00	0.25
UC4	12.74	8.78	14.32	8.65	14.48	8.73	1.00	0.69	1.00	0.60	1.00	0.60
UC5	20.08	23.61	20.25	23.26	16.60	23.68	1.00	1.18	1.00	1.15	1.00	1.43
UC6	17.59	44.01	18.09	43.00	16.60	44.17	1.00	2.50	1.00	2.38	1.00	2.66

Table 2.30 – 2021 PPM and PPK Parameters

User Class	Absolute Values (2002 prices)						Model Parameters					
	AM		IP		PM		AM		IP		PM	
	PPM	PPK	PPM	PPK	PPM	PPK	PPM	PPK	PPM	PPK	PPM	PPK
UC1	11.38	8.49	13.24	8.63	12.22	8.56	1.00	0.75	1.00	0.65	1.00	0.70
UC2	21.84	8.14	14.38	7.87	14.98	7.68	1.00	0.37	1.00	0.55	1.00	0.51
UC3	39.17	11.29	38.94	10.81	49.62	11.10	1.00	0.29	1.00	0.28	1.00	0.22
UC4	13.61	8.20	15.30	8.06	15.47	8.15	1.00	0.60	1.00	0.53	1.00	0.53
UC5	21.82	24.00	22.00	23.65	18.03	24.07	1.00	1.10	1.00	1.08	1.00	1.33
UC6	19.11	44.72	19.65	43.70	18.03	44.89	1.00	2.34	1.00	2.22	1.00	2.49

Table 2.31 – 2026 PPM and PPK Parameters

User Class	Absolute Values (2002 prices)						Model Parameters					
	AM		IP		PM		AM		IP		PM	
	PPM	PPK	PPM	PPK	PPM	PPK	PPM	PPK	PPM	PPK	PPM	PPK
UC1	12.17	7.76	14.15	7.92	13.07	7.83	1.00	0.64	1.00	0.56	1.00	0.60
UC2	23.34	7.36	15.37	7.06	16.01	6.89	1.00	0.32	1.00	0.46	1.00	0.43
UC3	42.56	10.93	42.30	10.36	53.90	10.60	1.00	0.26	1.00	0.24	1.00	0.20
UC4	14.55	7.43	16.35	7.28	16.54	7.37	1.00	0.51	1.00	0.44	1.00	0.45
UC5	23.70	23.68	23.90	23.33	19.59	23.74	1.00	1.00	1.00	0.98	1.00	1.21
UC6	20.76	44.13	21.35	43.13	19.59	44.30	1.00	2.13	1.00	2.02	1.00	2.26

3. Forecast Year Scenario Definitions

The forecast years for this study are 2016, 2021 and 2026; and the forecast scenarios for this study are Do Minimum (DM), Do Something 1 (DS1) and Do Something 2 (DS2). The definitions of these forecast year scenarios are given in the sections below.

Do Minimum

The DM scenario consists of all committed developments within Wisbech. For light vehicles, the total growth level is controlled to the levels as defined by TEMPRO 6.1 (Trip End Model PROjections) growth forecasts. For heavy vehicles, the total growth level is controlled to the levels as defined by National Transport Model (NTM) 2009 Revision 1.1. Table 3.1 to

Table 3.3 below shows the growth factors for 2008 to 2016, 2021 and 2026 respectively.

Table 3.1 – Growth Factors (TEMPRO 6.1 & NTM 2009) (2008 to 2016)

Vehicle Type	Area	Time Period	Trip End Growth	Fuel and Income Factor	Composite Factor
Light	Wisbech	AM	1.076	1.100	1.184
		IP	1.105	1.100	1.216
		PM	1.083	1.100	1.192
	Fenland	AM	1.079	1.100	1.188
		IP	1.109	1.100	1.220
		PM	1.087	1.100	1.196
	Cambridgeshire	AM	1.098	1.100	1.209
		IP	1.118	1.100	1.230
		PM	1.103	1.100	1.214
	Rest of Country	AM	1.068	1.100	1.175
		IP	1.084	1.100	1.192
		PM	1.071	1.100	1.179
Heavy (OGV1)	March	All	1.113	1.100	1.225
	Fenland	All	1.113	1.100	1.225
	Cambridgeshire	All	1.113	1.100	1.225
	Rest of Country	All	1.096	1.100	1.206

Heavy (OGV2)	March	All	1.013	1.100	1.115
	Fenland	All	1.013	1.100	1.115
	Cambridgeshire	All	1.013	1.100	1.115
	Rest of Country	All	0.987	1.100	1.086

Table 3.2 – Growth Factors (TEMPRO 6.1 & NTM 2009) (2008 to 2021)

Vehicle Type	Area	Time Period	Trip End Growth	Fuel and Income Factor	Composite Factor
Light	Wisbech	AM	1.120	1.126	1.260
		IP	1.171	1.126	1.318
		PM	1.131	1.126	1.273
	Fenland	AM	1.126	1.126	1.268
		IP	1.179	1.126	1.327
		PM	1.139	1.126	1.282
	Cambridgeshire	AM	1.157	1.126	1.302
		IP	1.190	1.126	1.339
		PM	1.163	1.126	1.309
	Rest of Country	AM	1.113	1.126	1.253
		IP	1.133	1.126	1.275
		PM	1.116	1.126	1.256
Heavy (OGV1)	March	All	1.145	1.126	1.289
	Fenland	All	1.145	1.126	1.289
	Cambridgeshire	All	1.145	1.126	1.289
	Rest of Country	All	1.124	1.126	1.265
Heavy (OGV2)	March	All	1.082	1.126	1.218
	Fenland	All	1.082	1.126	1.218
	Cambridgeshire	All	1.082	1.126	1.218
	Rest of Country	All	1.042	1.126	1.173

Table 3.3 – Growth Factors (TEMPRO 6.1 & NTM 2009) (2008 to 2026)

Vehicle Type	Area	Time Period	Trip End Growth	Fuel and Income Factor	Composite Factor
Light	Wisbech	AM	1.171	1.144	1.340
		IP	1.251	1.144	1.432
		PM	1.189	1.144	1.360
	Fenland	AM	1.181	1.144	1.351
		IP	1.264	1.144	1.447
		PM	1.200	1.144	1.373
	Cambridgeshire	AM	1.221	1.144	1.398
		IP	1.276	1.144	1.460
		PM	1.232	1.144	1.409
	Rest of Country	AM	1.160	1.144	1.328
		IP	1.186	1.144	1.358
		PM	1.164	1.144	1.332
Heavy (OGV1)	March	All	1.177	1.144	1.347
	Fenland	All	1.177	1.144	1.347
	Cambridgeshire	All	1.177	1.144	1.347
	Rest of Country	All	1.152	1.144	1.318
Heavy (OGV2)	March	All	1.153	1.144	1.319
	Fenland	All	1.153	1.144	1.319
	Cambridgeshire	All	1.153	1.144	1.319
	Rest of Country	All	1.099	1.144	1.257

Housing and Employment Developments

The DM scenario consists of all committed housing and employment developments as outlined in the WATS Forecasting Methodology Note.

Table 3.4 shows the committed housing developments within Wisbech that have been defined in the Shaping Fenland's Future Stage 2 Report.

Table 3.4 – SFF Housing Growth Figures

Wisbech	Number of Dwellings
Extant	812
Urban Capacity Sites	411
Extra Urban Capacity Sites	482
Windfall	594
Affordable Exceptions	29
Urban Sub-Total	2327
Table extracted from Page 68, Chapter 7, Shaping Fenland's Future, Stage 2 Report V0.1	

Where known housing development sites have been identified, the trips associated with the developments have been distributed into specific zones, representative of the geographical location of the sites. For employment developments, existing planning application documents for all committed employment developments have been reviewed. Similar to the housing developments, trips associated with known employment development sites have been distributed into specific

zones. The remaining growth was then distributed amongst the remaining zones in Wisbech, and the overall growth has been controlled to the TEMPRO 6.1 levels.

It was assumed that all committed developments will be completed by 2016, and would therefore be included in all forecast year DM scenarios.

Model Network

There are no additional infrastructure changes included as part of this scenario, with the exception of some additional zone connection locations to facilitate the large committed developments. Zone connections for all SFF Opportunity Zones have also been included, such that the networks do not differ between the DM and DS scenarios.

Do Something 1

The DS1 scenario includes all the committed developments included in the DM scenario and developments from the SFF Opportunity Zone 1. The locations of the site are shown in Figure 3.1, and the size of development for Zone 1 is approximately twice the size of Zone 2 (Do Something 2).

The level of housing and employment developments in the SFF Opportunity Zone 1 (for 2010 to 2016, 2016 to 2021 and 2021 and 2026 as well as cumulative totals) are described in Table 3.5.

Similar to the DM scenario, the overall growth for DS1 scenario has been controlled to the TEMPRO 6.1 levels (Table 3.1 to

Table 3.3), and as such the total level of traffic for DS1 is the same as for the DM. However, the distribution will be altered such that there is a larger proportion of traffic coming from the areas of the SFF Opportunity Zones.

Figure 3.1 – Do Something Test 1 SFF Opportunity Zone Locations

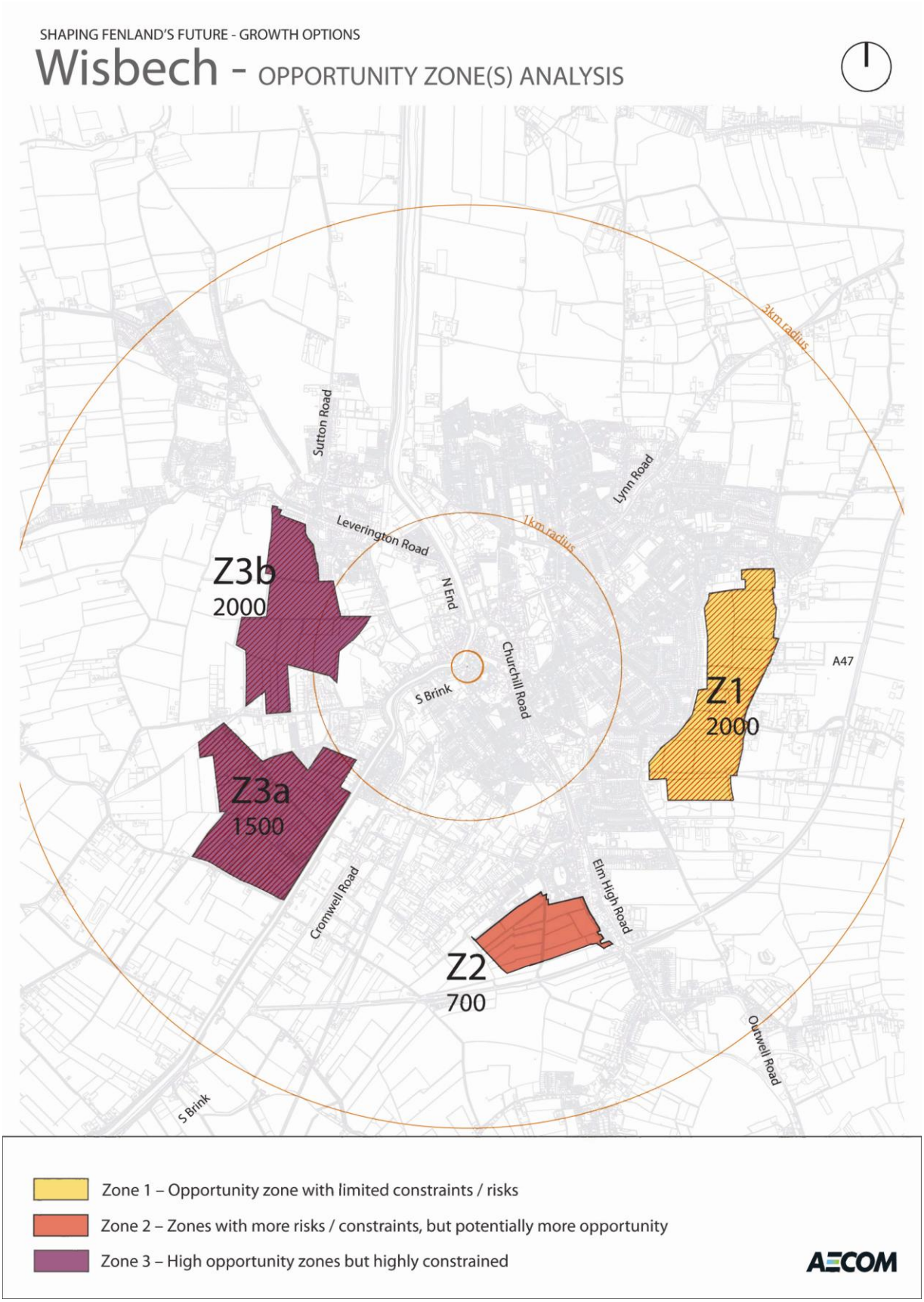


Table 3.5 – SFF Opportunity Zone 1 Development Profile

Development type	2009 – 2016		2016 - 2021		2021 - 2026	
	Z1	Tot	Z1	Tot	Z1	Tot
Number of houses	375	375	775	775	650	650
Cumulative Total	-	-	*1150*	*1150*	*1800*	*1800*
Hectares of Employment	8.1	8.1	16.6	16.6	22.0	22.0
Cumulative Total	-	-	*24.7*	*24.7*	*38.6*	*38.6*
Development profile based on trajectory data from Page 78, Chapter 7, Shaping Fenland's Future, Stage 2 Report V0.1						

Model Network

There are no network changes between the DS1 and DM scenario.

Do Something 2

The DS2 scenario includes the developments included in the DS1 scenario and the developments from Opportunity Zone 2. The locations of the site are shown in Figure 3.1.

The level of housing development in the SFF Opportunity Zone 2 (for 2009 to 2016, 2016 to 2021 and 2021 to 2026 as well as cumulative totals) are described in Table 3.6. There are no employment developments in Opportunity Zone 2.

It should be noted that there are no developments for Opportunity Zone 2 in 2016 or 2021, and as such there are no 2016 or 2021 DS2 models.

The demand for the developments in Opportunity Zone 2 have been applied to the DS1 demand matrices directly and as such the growth for DS2 scenario is in excess of the TEMPRO 6.1 growth and is greater than for the DM or DS1 scenarios.

Table 3.6 – SFF Opportunity Zone 2a and 2b Development Profile

Development type	2009 – 2016		2016 - 2021		2021 - 2026	
	Z1	Tot	Z1	Tot	Z1	Tot
Number of houses	375	375	775	775	775	775
Cumulative Total	-	-	*1150*	*1150*	*1925*	*1925*
Hectares of Employment	0	0	0	0	0	0
Cumulative Total	-	-	*0*	*0*	*0*	*0*
Development profile based on trajectory data from Page 78, Chapter 7, Shaping Fenland's Future, Stage 2 Report V0.1						

Model Network

There are no network changes between the DS2 and DM scenario.

Forecast Year Demand

The methodology to produce the forecast year demands for 2016, 2021 and 2026 demand matrices for the WATS SATURN model are set out below. The process uses several different growth sources:

- TEMPRO 6.1 provides projections of growth over time for use in local and regional transport models. It presents projections of growth in planning data, car ownership, and resultant growth in trip-making by different modes of transport under a constant cost assumption. The information is provided for over 2,500 zones, and can be aggregated into towns, districts or counties. For this study, trip end growth data for Wisbech, Fenland, Cambridgeshire and Rest of Country has been extracted (as shown in Table 3.1 to Table 3.3) from TEMPRO and is used to provide forecasts of all light vehicle user classes (i.e. UC1 to UC4).
- For the heavy vehicle user classes (i.e. UC5 & UC6), trip end growth factors from NTM 2009 was used. The NTM 2009 published by Department for Transport (DfT) provides forecasts of road traffic growth by region and by vehicle type.
- The SHLAA document, 2007 Employment Land Review document and other planning application data provide information on the committed housing and employment developments in and around Wisbech which are included in all forecast year scenarios (i.e. DM, DS1 & DS2).
- The Shaping Fenland's Future document provides housing and employment information to be included in the DS1 and DS2 scenarios.
- TRICS (Trip Rate Information Computer System) is a database of surveys from developments across the county, which can be interrogated to provide an estimate of the number of trips that will be generated by a new development. The information can be tailored to suit the individual development, taking into account trends in that area of the country, and/or location of the development within or outside a town, and/or its size etc.

The forecast year demand matrices were calculated separately for each user class, time period, forecast year and scenario.

Do Minimum

As discussed above, where known housing and employment development sites have been identified, the trips associated with the developments have been distributed into specific zones, representative of the geographical location of the sites. The remaining growth was then distributed amongst the remaining zones in Wisbech, and the overall growth has been controlled to the TEMPRO 6.1 levels.

To calculate the trip generation/attraction for the known developments, trip rates from TRICS were used. Table 3.7 below shows the trip rates used for this study. Where available, Transport Assessment (TA) documents were examined, and trip generation/attraction data from the TA was used.

Table 3.7 – TRICS Trip Rates

Development	Unit	AM Peak			Inter Peak			PM Peak		
		Arr	Dep	TOT	Arr	Dep	TOT	Arr	Dep	TOT
Housing	Per dwelling	0.37	0.18	0.55	0.22	0.20	0.42	0.34	0.22	0.56
Employment (office)	Per 100 sqm GFA	2.12	0.30	2.42	0.54	0.55	1.09	0.18	1.85	2.03
Employment (industrial)	Per 100 sqm GFA	0.55	0.14	0.69	0.21	0.20	0.41	0.02	0.50	0.52
Employment (Retail Park)	Per 100 sqm GFA	0.62	0.43	1.05	1.46	1.51	2.97	0.66	0.63	1.29
Employment (Warehousing)	Per 100 sqm GFA	0.28	0.15	0.43	0.14	0.15	0.29	0.11	0.29	0.40
Employment (Retail Food)	Per 100 sqm GFA	0.38	0.82	1.20	0.35	0.35	0.70	1.11	1.26	2.37
Arr = Arrival; Dep = Departure; TOT = Total; GFA = Gross Floor Area.										

After applying the trip end growth for the known developments, the remaining growth has been distributed amongst the remaining zones and finally controlled to the TEMPRO 6.1 levels. At the end of this process, a set of forecast year DM trip ends were generated. To distribute the trip ends, a gravity model and the Furness process (similar to the process used to generate the synthetic parts of the base year matrices, as discussed in the WATS LMVR) was used to produce the full DM demand matrices.

It should be noted that all DM known developments are expected to be completed by 2016, therefore the difference between the 2016, 2021 and 2026 is the background growth controlled by TEMPRO 6.1 only.

Do Something 1

Using the same trip rates as the DM scenario, the trips associated with the developments for SFF Opportunity Zone 1 (as shown in Table 3.5) were calculated as well as for the known developments (included in the DM scenario). Similar to the DM trip ends, the overall growth was controlled to TEMPRO 6.1 levels. The forecast year DS1 trip ends were then distributed using a gravity model the Furness process to produce a set of forecast year DS1 demand matrices.

As discussed previously, as both DM and DS1 scenarios are controlled to the TEMPRO 6.1 levels, the overall demand matrix totals for these two scenarios are the same but with different demand distribution.

Do Something 2

Using the same trip rates as the DM scenario, the trips associated with the developments for SFF Opportunity Zone 2 (as shown in Table 3.6) were calculated. These trips were then added to the DS1 matrices by distributing them based on the DS1 trip ends. The demand matrices for this scenario are in excess of the TEMPRO 6.1 level, and as such, the matrix totals for DS2 scenario is greater than both DM and DS1 scenarios.

Final Forecast Year Matrices

Matrix Totals

Table 3.8 to Table 3.10 below show the demand matrix totals for all forecast years, time periods and modelled scenarios.

As discussed above, the matrix totals for the DM and DS1 scenarios are controlled to the same levels (i.e. TEMPRO 6.1), and the matrix totals for these two scenarios are almost identical, except for very small difference due to rounding.

The demand for DS2 is higher than DM and DS1, as it includes the SFF Opportunity Zone 2 developments which have been added to the DS1 matrices, in excess of the TEMPRO 6.1 growth levels. It should also be noted that there are no 2016 and 2021 DS2 models as there are no developments for SFF Opportunity Zone 2 for 2016 and 2021.

Table 3.8 – Matrix Totals (DM)

Scenario		AM	IP	PM
2008 Base		10,459	9,830	11,289
2016 DM		12,300	11,684	13,315
2016 DM – 2010 Base	*Difference*	*1841*	*825*	*2,026*
	% Difference	*17.6%*	*18.9%*	*17.9%*
2021 DM		13,118	12,566	14,210
2021 DM – 2010 Base	*Difference*	*2,659*	*2,736*	*2,921*
	% Difference	*25.4%*	*27.8%*	*25.9%*
2026 DM		13,942	13,489	15,122
2026 DM – 2010 Base	*Difference*	*3,843*	*3,659*	*3,833*
	% Difference	*33.3%*	*37.2%*	*33.9%*

Table 3.9 – Matrix Totals (DS1)

Scenario		AM	IP	PM
2008 Base		10,459	9,830	11,289
2016 DS1		12,300	11,684	13,315
2016 DS1 – 2010 Base	*Difference*	*1841*	*825*	*2,026*
	% Difference	*17.6%*	*18.9%*	*17.9%*
2021 DS1		13,118	12,566	14,210
2021 DS1 – 2010 Base	*Difference*	*2,659*	*2,736*	*2,921*
	% Difference	*25.4%*	*27.8%*	*25.9%*
2026 DS1		13,942	13,489	15,122
2026 DS1 – 2010 Base	*Difference*	*3,843*	*3,659*	*3,833*
	% Difference	*33.3%*	*37.2%*	*33.9%*

Table 3.10 – Matrix Total (DS2)

Scenario		AM	IP	PM
2008 Base		10,459	9,830	11,289
2026 DS2		14,011	13,541	15,192
2021 DS2 – 2010 Base	*Difference*	*3,552*	*3,711*	*3,903*
	% Difference	*34.0%*	*37.7%*	*34.6%*

4. Forecasting Results

Do-Minimum

The results from each forecast year and time period vary in terms of the level of congestion, delay and overall journey time in and around Wisbech, therefore each value has been taken from the AM, IP and PM time periods, with the worse performing time period highlighted.

Table 4.1 below summarises the key SATURN statistics as set out in paragraph 2.2 of Technical Note 17 and repeated here for clarity.

- Transient Queues (in PCU hours) – For example, at traffic signals the transient queue corresponds to the queue that develops during the red phase and then dissipates during the subsequent green phase.
- Over-Capacity Queues (in PCU hours) – These occur only for turning movements in excess of capacity where a permanent queue builds up which in unable to clear in a single cycle.
- Link Cruise Time (in PCU hours) – This is the time spent travelling on links within the model, as distinct from time spent in queues at junctions.
- Total Travel Time (in PCU hours) – This is the sum of Transient Queue time, Over-Capacity Queue time and Link Cruise time.
- Total Distance (in km) – This is the total distance travelled by all vehicles in the network.
- Average Speed (in kph) – This is the average speed of vehicles in the network. (It is simply the Total Distance divided by the Total Travel Time).
- Average Trip Time (in PCU hours) – This is the average length of time taken for each trip. (It is calculated as the Total Travel Time divided by the number of trips.)
- Average Trip Distance (in km) – This is the average distance covered by each trip. (It is calculated as the Total Distance divided by the number of trips.)

Table 4.1 – Summary of Do-Minimum SATURN Statistics

Indicator	Time Period	2008	2016	2021	2026
Transient Queues (PCU hrs)	Am	282.5	475	586.1	660
	IP	232.2	398.8	468.6	516.1
	Pm	318.2	515.7	650.4	739.8
Over-Capacity Queues (PCU hrs)	Am	20.1	116	229.9	452.8
	IP	1.1	239.1	317.9	455.6
	Pm	3.5	231.9	427.9	664.3
Link Cruise Time (PCU hrs)	Am	1432.4	1747	1900.5	2052.2
	IP	1341.8	1617	1763	1917.6
	Pm	1582.2	1915.7	2077.2	2268.5
Total Travel Time (PCU hrs)	Am	1734.9	2338	2716.5	3164.9
	IP	1575	2255	2549.5	2927.5
	Pm	1903	2663.3	3155.6	3672.6
Total Distance (km)	Am	92224	108982	116851	124626
	IP	87129	103787	111738	120039
	Pm	100980	119406	127668	136996
Average Speed (kph)	Am	53.2	46.6	43.0	39.4
	IP	55.3	46.0	43.8	41.0
	Pm	53.0	44.8	40.5	37.3
Average Trip Time (PCU hrs)	Am	0.166	0.190	0.207	0.147
	IP	0.160	0.193	0.203	0.217
	Pm	0.168	0.200	0.222	0.243
Average Trip Distance (km)	Am	8.818	8.860	8.908	8.939
	IP	8.863	8.883	8.892	8.899
	Pm	8.945	8.968	8.984	9.060

The SATURN summary statistics from Table 4.1 clearly show that as demand increases on the Do-Minimum network from the 2008 base to the forecast years, the level of congestion and delay increases over time as expected. This is reflected in the increase of the Total Travel Time, Transient and Over-Capacity queues, along with the decrease in Average Speed across the network from 55.3 kph in 2008 Inter-Peak to 37.5 kph in 2026 Pm peak..

Key Junctions:

Key junctions within the study area have been identified and have been monitored in terms of delays and flows to provide an indication of the stress at each junction under each scenario. The ten key junctions are set out in paragraph 2.3 of Technical Note 17, but are repeated here for convenience.

- A47/A141 Roundabout
- A47 / B198 Cromwell Road Roundabout
- A47 / A1101 Elm High Road Roundabout
- A47 / B198 Lynn Road Roundabout
- A1101 Leverington Road / B1169 Dowgate Road traffic signals
- Town Bridge traffic signals

- Freedom Bridge Roundabout
- B198 Lynn Road / Mount Pleasant Road traffic signals
- A1101 Elm High Road / Ramnoth Road traffic signals
- B198 Cromwell Road / Weasenham Lane junction.

Tables 4.2 to 4.4 provide Junction delay (in seconds) and traffic flow (PCU's) for the ten key junctions for the Do-Minimum Am, IP and Pm peak time periods for 2008 base, and 2016, 2021 and 2026 forecast years.

Table 4.2 – Am Peak - Summary of Do-Minimum Key Junction Delay and Flow

Junction		2008	2016	2021	2026
A47 / A141 rnd'bt	Delay	17	20	22	26
	Flow	2757	3082	3256	3385
A47 / B198 Cromwell Road rnd'bt	Delay	19	17	17	18
	Flow	2496	2583	2738	2857
A47 A1101 Elm High Road rnd'bt	Delay	20	58	92	149
	Flow	2894	3140	3321	3438
A47 / B198 Lynn Road rnd'bt	Delay	16	16	16	16
	Flow	2201	2306	2454	2580
A1101 Leverington Road / B1169 Dowgate Road traffic signals	Delay	40	52	87	170
	Flow	1351	1650	1746	1840
Town Bridge Traffic signals	Delay	98	79	98	106
	Flow	1516	1555	1614	1677
Freedom Bridge rnd'bt	Delay	22	21	30	49
	Flow	3128	3223	3430	3520
B198 Lynn Road / Mount Pleasant Road traffic signals	Delay	39	20	22	23
	Flow	1664	830	901	946
A1101 Elm High Road / Ramnoth Road traffic signals	Delay	65	70	81	85
	Flow	1848	2434	2565	2611
B198 Cromwell Road / Weasenham Lane junction	Delay	5	135	186	224
	Flow	1459	1673	1751	1823

Table 4.3 – IP Peak - Summary of Do-Minimum Key Junction Delay and Flow

Junction		2008	2016	2021	2026
A47 / A141 rnd'bt	Delay	17	17	18	19
	Flow	2757	2631	2821	2982
A47 / B198 Cromwell Road rnd'bt	Delay	19	17	17	18
	Flow	2496	2489	2671	2835
A47 A1101 Elm High Road rnd'bt	Delay	20	20	27	57
	Flow	2894	2967	3228	3393
A47 / B198 Lynn Road rnd'bt	Delay	16	15	15	16
	Flow	2201	1906	2036	2169
A1101 Leverington Road / B1169 Dowgate Road traffic signals	Delay	40	47	63	98
	Flow	1351	1540	1640	1725
Town Bridge Traffic signals	Delay	98	51	56	56
	Flow	1516	1550	1653	1724
Freedom Bridge rnd'bt	Delay	22	20	23	30
	Flow	3128	3213	3439	3593
B198 Lynn Road / Mount Pleasant Road traffic signals	Delay	39	13	18	19
	Flow	1664	754	711	718
A1101 Elm High Road / Ramnoth Road traffic signals	Delay	65	53	57	60
	Flow	1848	1858	2062	2128
B198 Cromwell Road / Weasenham Lane junction	Delay	5	85	108	134
	Flow	1459	1582	1614	1692

Table 4.4 – Pm Peak - Summary of Do-Minimum Key Junction Delay and Flow

Junction		2008	2016	2021	2026
A47 / A141 rnd'bt	Delay	17	18	20	22
	Flow	2757	3134	3293	3446
A47 / B198 Cromwell Road rnd'bt	Delay	19	93	114	119
	Flow	2496	2990	3137	3259
A47 A1101 Elm High Road rnd'bt	Delay	20	76	136	189
	Flow	2894	3510	3703	3812
A47 / B198 Lynn Road rnd'bt	Delay	16	16	17	18
	Flow	2201	2577	2736	2973
A1101 Leverington Road / B1169 Dowgate Road traffic signals	Delay	40	44	70	132
	Flow	1351	1513	1598	1682
Town Bridge Traffic signals	Delay	98	47	65	72
	Flow	1516	1664	1705	1758
Freedom Bridge rnd'bt	Delay	22	26	35	41
	Flow	3128	3347	3508	3661
B198 Lynn Road / Mount Pleasant Road traffic signals	Delay	39	16	18	21
	Flow	1664	924	1000	1162
A1101 Elm High Road / Ramnoth Road traffic signals	Delay	65	67	76	90
	Flow	1848	2212	2417	2444
B198 Cromwell Road / Weasenham Lane junction	Delay	5	48	50	49
	Flow	1459	1389	1427	1408

As in Table 4.1 with increased demand across the Do-Minimum network the increase in Transient and Over-Capacity queues is evident in Table 4.2, particularly at the junction of B198 Cromwell Road / Weasenham Lane junction with increased Delay in all time periods, the A47 / B198 Cromwell Road roundabout, in Pm peak and A47 / A1101 Elm High Road Roundabout in the Am and Pm peaks.

The A1101 Leverington Road / B1169 Dowgate Road traffic signal's shows an increased level of delay in all time periods in 2026, with less impact in the earlier years.

Conclusion: The Do-Minimum test is the reference case against which each of the Shaping Fenland's Future options have been compared in this technical note. The Do-Minimum test does not include any additional infrastructure other than minor junction changes that are proposed in the future years. As such with the additional demand from both background growth and other proposed developments excluding the LDF allocations the results compared to the existing 2008 base year are as expected.

Do-Something 1

Table 4.5 summarises the SATRUN statistics from the Do-Something 1 SSF option1.

Table 4.5 – Summary of Do-Something 1 SATURN Statistics

Indicator	Time Period	2008	2016	2021	2026
Transient Queues (PCU hrs)	Am	282.5	460.6	527.9	605.2
	IP	232.2	393.3	457	530.7
	Pm	318.2	507.1	622.3	717.1
Over-Capacity Queues (PCU hrs)	Am	20.1	100.8	157.7	298.3
	IP	1.1	227.7	283.9	392.5
	Pm	3.5	203.2	385.1	548.2
Link Cruise Time (PCU hrs)	Am	1432.4	1744.7	1898	2051.7
	IP	1341.8	1616.8	1760.8	1913.9
	Pm	1582.2	1914.1	2074.1	2267.1
Total Travel Time (PCU hrs)	Am	1734.9	2306.2	2583.6	2955.2
	IP	1575	2237.8	2501.7	2837.1
	Pm	1903	2624.4	3081.5	3532.4
Total Distance (km)	Am	92224	108828	116602	124355
	IP	87129	103771	111688	119995
	Pm	100980	119293	127569	136951
Average Speed (kph)	Am	53.2	47.2	45.1	42.1
	IP	55.3	46.4	44.6	42.3
	Pm	53.0	45.5	41.4	38.8
Average Trip Time (PCU hrs)	Am	0.166	0.187	0.197	0.212
	IP	0.160	0.191	0.199	0.203
	Pm	0.168	0.197	0.217	0.233
Average Trip Distance (km)	Am	8.818	8.848	8.888	8.919
	IP	8.863	8.881	8.888	8.606
	Pm	8.945	8.959	8.977	9.056

The SATURN summary statistics from Table 4.5 clearly show that as demand increases on the Do-Something network from the 2008 base to the forecast years, the level of congestion and delay increases over time as expected. This is reflected in the increase of the Total Travel Time, Transient and Over-Capacity queues, along with the decrease in Average Speed across the network from 55.3 kph in 2008 to 38.8 kph in 2026.

The Average speed across the network in the Do-Something 1 are fairly consistent when compared to those in Do-Minimum, although the average speeds in DS1 are generally lower in 2021 and 2026 when compared to the DM.

Key Junctions:

Key junctions within the study area have been identified and have been monitored in terms of delays and flows to provide an indication of the stress at each junction under each scenario. The ten key junctions are set out in paragraph 2.3 of Technical Note 17, but are repeated here for convenience.

- A47/A141 Roundabout
- A47 / B198 Cromwell Road Roundabout

- A47 / A1101 Elm High Road Roundabout
- A47 / B198 Lynn Road Roundabout
- A1101 Leverington Road / B1169 Dowgate Road traffic signals
- Town Bridge traffic signals
- Freedom Bridge Roundabout
- B198 Lynn Road / Mount Pleasant Road traffic signals
- A1101 Elm High Road / Ramnoth Road traffic signals
- B198 Cromwell Road / Weasenham Lane junction.

Tables 4.6 to 4.8 provide Junction delay (in seconds) and traffic flow (PCU's) for the ten key junctions for the Do-Something 1 Am, IP and Pm peak time periods for 2008 base, and 2016, 2021 and 2026 forecast years.

Table 4.6 – Am Peak - Summary of Do-Something 1 Key Junction Delay and Flow

Junction		2008	2016	2021	2026
A47 / A141 rnd'bt	Delay	17	20	23	37
	Flow	2757	3088	3274	3426
A47 / B198 Cromwell Road rnd'bt	Delay	19	17	18	18
	Flow	2496	2603	2788	2940
A47 A1101 Elm High Road rnd'bt	Delay	20	56	83	124
	Flow	2894	3129	3297	3440
A47 / B198 Lynn Road rnd'bt	Delay	16	16	16	16
	Flow	2201	2305	2456	2593
A1101 Leverington Road / B1169 Dowgate Road traffic signals	Delay	40	51	70	146
	Flow	1351	1652	1749	1847
Town Bridge Traffic signals	Delay	98	77	80	90
	Flow	1516	1530	1569	1589
Freedom Bridge rnd'bt	Delay	22	20	24	29
	Flow	3128	3182	3360	3457
B198 Lynn Road / Mount Pleasant Road traffic signals	Delay	39	19	19	20
	Flow	1664	829	844	850
A1101 Elm High Road / Ramnoth Road traffic signals	Delay	65	72	77	82
	Flow	1848	2428	2502	2530
B198 Cromwell Road / Weasenham Lane junction	Delay	5	114	127	157
	Flow	1459	1636	1656	1691

Table 4.7 – IP Peak - Summary of Do-Something 1 Key Junction Delay and Flow

Junction		2008	2016	2021	2026
A47 / A141 rnd'bt	Delay	17	17	18	19
	Flow	2757	2636	2830	2991
A47 / B198 Cromwell Road rnd'bt	Delay	19	17	18	19
	Flow	2496	2519	2726	2903
A47 A1101 Elm High Road rnd'bt	Delay	20	21	30	64
	Flow	2894	2984	3252	3442
A47 / B198 Lynn Road rnd'bt	Delay	16	15	15	16
	Flow	2201	1908	2041	2178
A1101 Leverington Road / B1169 Dowgate Road traffic signals	Delay	40	46	62	95
	Flow	1351	1538	1637	1725
Town Bridge Traffic signals	Delay	98	50	54	57
	Flow	1516	1539	1602	1667
Freedom Bridge rnd'bt	Delay	22	20	22	26
	Flow	3128	3189	3369	3531
B198 Lynn Road / Mount Pleasant Road traffic signals	Delay	39	13	13	14
	Flow	1664	750	799	813
A1101 Elm High Road / Ramnoth Road traffic signals	Delay	65	53	57	60
	Flow	1848	1878	2064	2106
B198 Cromwell Road / Weasenham Lane junction	Delay	5	85	100	133
	Flow	1459	1569	1585	1642

Table 4.8 – Pm Peak - Summary of Do-Something 1 Key Junction Delay and Flow

Junction		2008	2016	2021	2026
A47 / A141 rnd'bt	Delay	17	19	20	23
	Flow	2757	3137	3306	3459
A47 / B198 Cromwell Road rnd'bt	Delay	19	90	115	120
	Flow	2496	2976	3124	3261
A47 A1101 Elm High Road rnd'bt	Delay	20	68	132	179
	Flow	2894	3492	3706	3815
A47 / B198 Lynn Road rnd'bt	Delay	16	16	17	18
	Flow	2201	2588	2761	3037
A1101 Leverington Road / B1169 Dowgate Road traffic signals	Delay	40	45	74	123
	Flow	1351	1519	1604	1695
Town Bridge Traffic signals	Delay	98	41	59	67
	Flow	1516	1705	1649	1686
Freedom Bridge rnd'bt	Delay	22	26	36	40
	Flow	3128	3353	3500	3622
B198 Lynn Road / Mount Pleasant Road traffic signals	Delay	39	15	18	22
	Flow	1664	922	1000	1139
A1101 Elm High Road / Ramnoth Road traffic signals	Delay	65	68	80	89
	Flow	1848	2187	2430	2441
B198 Cromwell Road / Weasenham Lane junction	Delay	5	48	52	54
	Flow	1459	1411	1453	1486

Table's 4.6 to 4.8, show a similar pattern as the DM with increased delay particularly at the junction of B198 Cromwell Road / Weasenham Lane junction with increased Delay in all time periods, the A47 / B198 Cromwell Road roundabout, in Pm peak and A47 / A1101 Elm High Road Roundabout in the Am and Pm peaks.

The A1101 Leverington Road / B1169 Dowgate Road traffic signal's shows an increased level of delay in all time periods in 2026, with less impact in the earlier years.

Conclusion: The Do-Something 1 option shows a similar pattern in increased delay at the same junctions when compared to the DM. However, the level of delay in the Am peak for DS1 is generally less than in the DM, suggesting that the DS1 option has slightly less of an impact in terms of junction delay than the DM, particularly in the Am peak.

Do-Something 2

Table 4.9 summarises the SATRUN statistics from the Do-Something 2 SSF option2.

Table 4.9 – Summary of Do-Something 2 SATURN Statistics

Indicator	Time Period	2008	2026
Transient Queues (PCU hrs)	Am	282.5	610.5
	IP	232.2	533.2
	Pm	318.2	724
Over-Capacity Queues (PCU hrs)	Am	20.1	307.6
	IP	1.1	396.7
	Pm	3.5	557.4
Link Cruise Time (PCU hrs)	Am	1432.4	2058.9
	IP	1341.8	1919.2
	Pm	1582.2	2275
Total Travel Time (PCU hrs)	Am	1734.9	2976.9
	IP	1575	2849.1
	Pm	1903	3556.4
Total Distance (km)	Am	92224	124722
	IP	87129	120273
	Pm	100980	137370
Average Speed (kph)	Am	53.2	41.9
	IP	55.3	42.2
	Pm	53.0	38.6
Average Trip Time (PCU hrs)	Am	0.166	0.212
	IP	0.160	0.210
	Pm	0.168	0.234
Average Trip Distance (km)	Am	8.818	8.902
	IP	8.863	8.882
	Pm	8.945	9.042

The SATURN summary statistics from Table 4.9 clearly show that as demand increases on the Do-Something 2 network from the 2008 base to the forecast year 2026, the level of congestion and delay increases over time as expected. This is reflected in the increase of the Total Travel Time, Transient and Over-Capacity queues, along with the decrease in Average Speed across the network from 55.3 kph in 2008 to 38.6 kph in 2026.

The Average speed across the network in the Do-Something 2 option are fairly consistent when compared to those in Do-Minimum, although the average speeds in DS2 are generally lower in 2026 when compared to the DM.

Key Junctions:

Key junctions within the study area have been identified and have been monitored in terms of delays and flows to provide an indication of the stress at each junction under each scenario. The ten key junctions are set out in paragraph 2.3 of Technical Note 17, but are repeated here for convenience.

- A47/A141 Roundabout
- A47 / B198 Cromwell Road Roundabout

- A47 / A1101 Elm High Road Roundabout
- A47 / B198 Lynn Road Roundabout
- A1101 Leverington Road / B1169 Dowgate Road traffic signals
- Town Bridge traffic signals
- Freedom Bridge Roundabout
- B198 Lynn Road / Mount Pleasant Road traffic signals
- A1101 Elm High Road / Ramnoth Road traffic signals
- B198 Cromwell Road / Weasenham Lane junction.

Tables 4.10 to 4.12 provide Junction delay (in seconds) and traffic flow (PCU's) for the ten key junctions for the Do-Something 2 Am, IP and Pm peak time periods for 2008 base, and 2016, 2021 and 2026 forecast years.

Table 4.10 – Am Peak - Summary of Do-Something 2 Key Junction Delay and Flow

Junction		2008	2026
A47 / A141 rnd'bt	Delay	17	37
	Flow	2757	3427
A47 / B198 Cromwell Road rnd'bt	Delay	19	18
	Flow	2496	2941
A47 A1101 Elm High Road rnd'bt	Delay	20	128
	Flow	2894	3442
A47 / B198 Lynn Road rnd'bt	Delay	16	16
	Flow	2201	2599
A1101 Leverington Road / B1169 Dowgate Road traffic signals	Delay	40	149
	Flow	1351	1852
Town Bridge Traffic signals	Delay	98	91
	Flow	1516	1597
Freedom Bridge rnd'bt	Delay	22	30
	Flow	3128	3463
B198 Lynn Road / Mount Pleasant Road traffic signals	Delay	39	22
	Flow	1664	855
A1101 Elm High Road / Ramnoth Road traffic signals	Delay	65	83
	Flow	1848	2537
B198 Cromwell Road / Weasenham Lane junction	Delay	5	158
	Flow	1459	1695

Table 4.11 – IP Peak - Summary of Do-Something 2 Key Junction Delay and Flow

Junction		2008	2026
A47 / A141 rnd'bt	Delay	17	19
	Flow	2757	2993
A47 / B198 Cromwell Road rnd'bt	Delay	19	19
	Flow	2496	2906
A47 A1101 Elm High Road rnd'bt	Delay	20	66
	Flow	2894	3450
A47 / B198 Lynn Road rnd'bt	Delay	16	16
	Flow	2201	2180
A1101 Leverington Road / B1169 Dowgate Road traffic signals	Delay	40	95
	Flow	1351	1728
Town Bridge Traffic signals	Delay	98	58
	Flow	1516	1659
Freedom Bridge rnd'bt	Delay	22	26
	Flow	3128	3542
B198 Lynn Road / Mount Pleasant Road traffic signals	Delay	39	14
	Flow	1664	814
A1101 Elm High Road / Ramnoth Road traffic signals	Delay	65	61
	Flow	1848	2128
B198 Cromwell Road / Weasenham Lane junction	Delay	5	136
	Flow	1459	1648

Table 4.12 – Pm Peak - Summary of Do-Something 2 Key Junction Delay and Flow

Junction		2008	2026
A47 / A141 rnd'bt	Delay	17	23
	Flow	2757	3463
A47 / B198 Cromwell Road rnd'bt	Delay	19	123
	Flow	2496	3261
A47 A1101 Elm High Road rnd'bt	Delay	20	181
	Flow	2894	3818
A47 / B198 Lynn Road rnd'bt	Delay	16	18
	Flow	2201	3040
A1101 Leverington Road / B1169 Dowgate Road traffic signals	Delay	40	127
	Flow	1351	1703
Town Bridge Traffic signals	Delay	98	70
	Flow	1516	1699
Freedom Bridge rnd'bt	Delay	22	41
	Flow	3128	3629
B198 Lynn Road / Mount Pleasant Road traffic signals	Delay	39	22
	Flow	1664	1142
A1101 Elm High Road / Ramnoth Road traffic signals	Delay	65	89
	Flow	1848	2450
B198 Cromwell Road / Weasenham Lane junction	Delay	5	54
	Flow	1459	1490

Table's 4.10 to 4.12, for the Do-Something 2, show a similar pattern as the DM and DS1 with increased delay particularly at the junction of B198 Cromwell Road / Weasenham Lane junction with increased Delay in all time periods, the A47 / B198 Cromwell Road roundabout, in Pm peak and A47 / A1101 Elm High Road Roundabout in the Am and Pm peaks.

The A1101 Leverington Road / B1169 Dowgate Road traffic signal's shows an increased level of delay in all time periods in 2026, with less impact in the earlier years.

Conclusion: The Do-Something 2 option shows a similar pattern in increased delay at the same junctions when compared to the DM. However, the level of delay in the Am peak for DS2 is generally less than in the DM, suggesting that the DS2 option has slightly less of an impact in terms of junction delay than the DM, particularly in the Am peak.

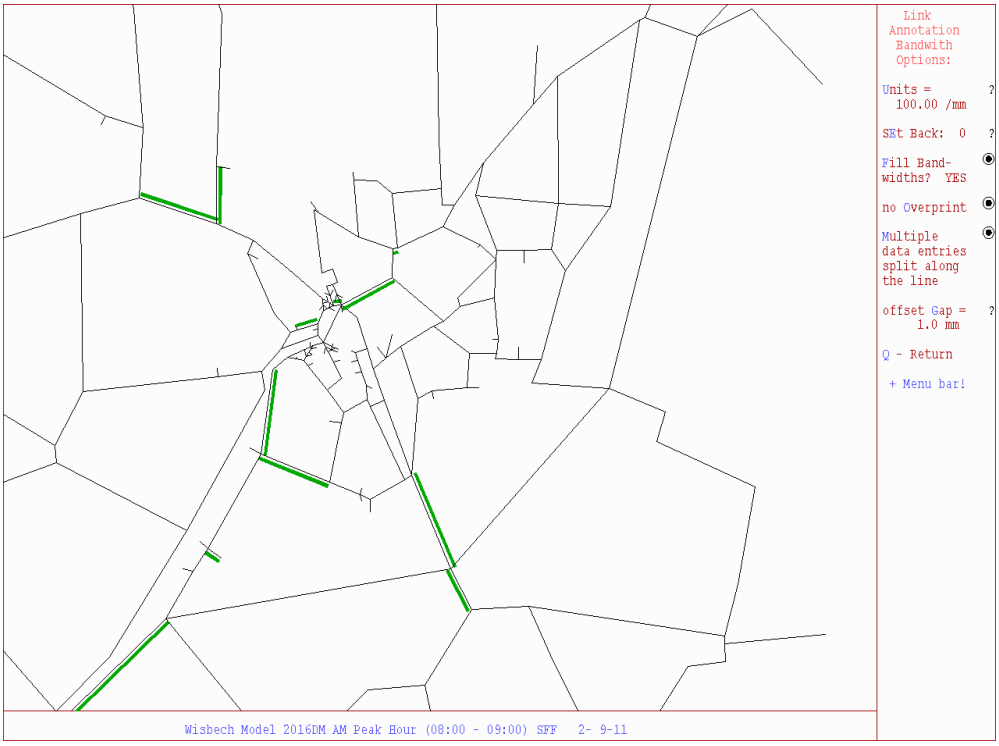
VoverC

As part of the analysis of results a series of SATURN plots were produced highlighting all network links with a VoverC value above 85%, this is determined as the point at which queuing occurs and a link will become over capacity.

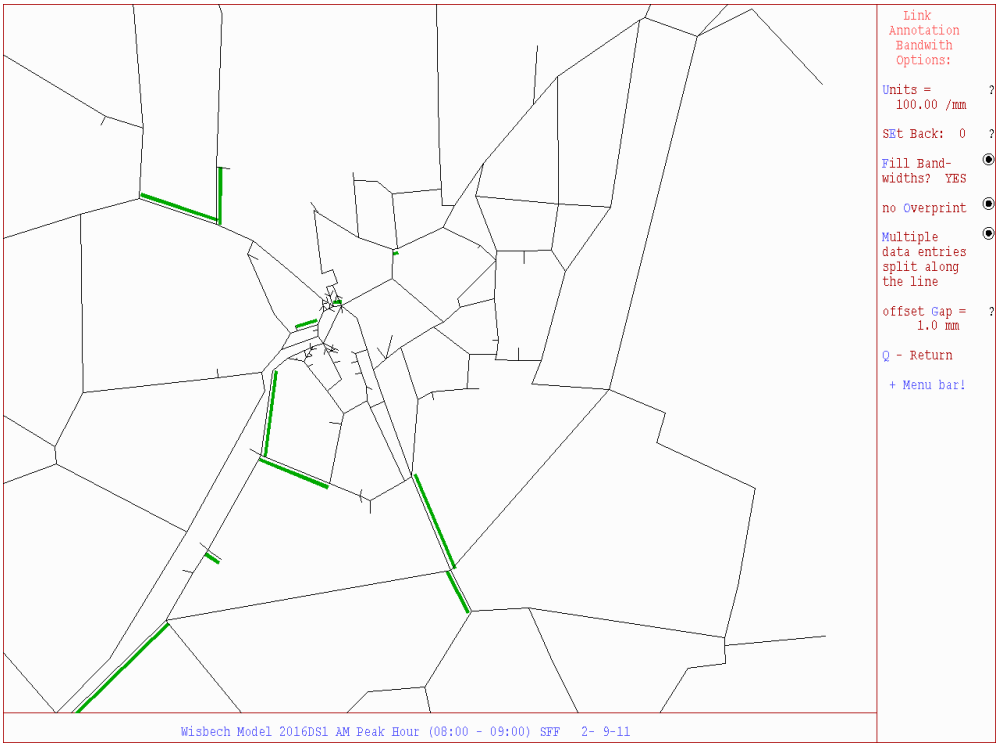
Comparing the DM, DS1 and DS2 plots shows that similar areas of the network are showing signs of stress in all cases, with the 2026 networks showing the highest number of links with a VoverC value in excess of 85%, with the same links being highlighted in the DS1 and DS2 options, with the worst time period being Pm peak.

The plots below show the 2016 DM, DS1 and DS2 Am peak links with VoverC values greater than 85%.

2016 DM Am peak links with VoverC >85%

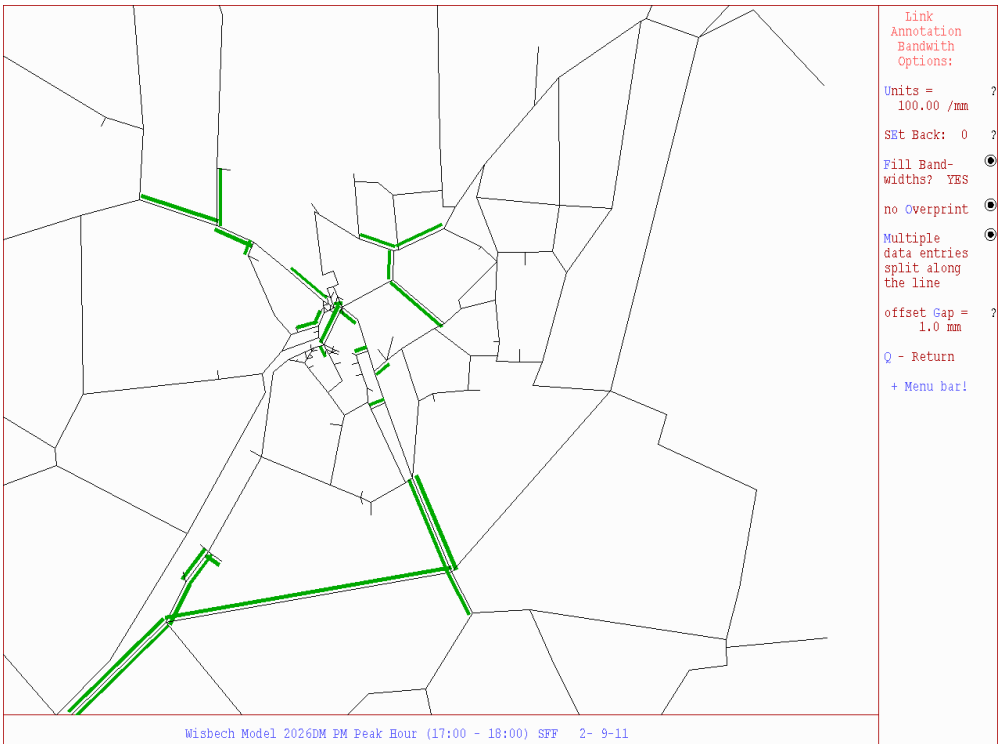


2016 DS1 and DS2 Am peak links with VoverC >85%

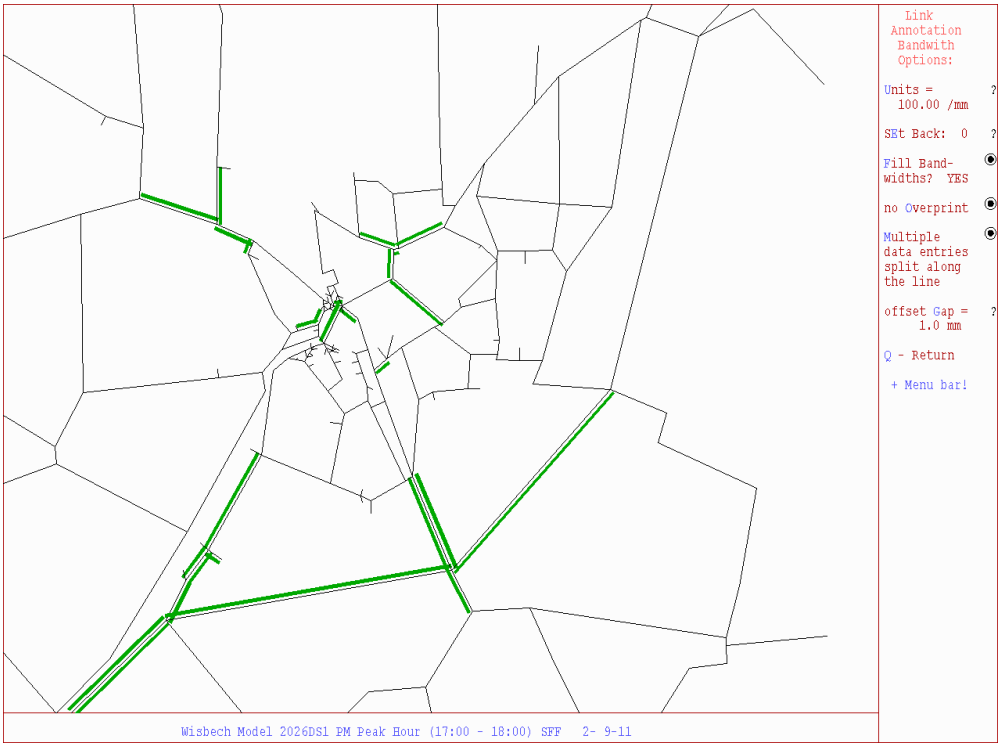


The plots below show the 2026 DM, DS1 and DS2 Pm peak links with VoverC values greater than 85%.

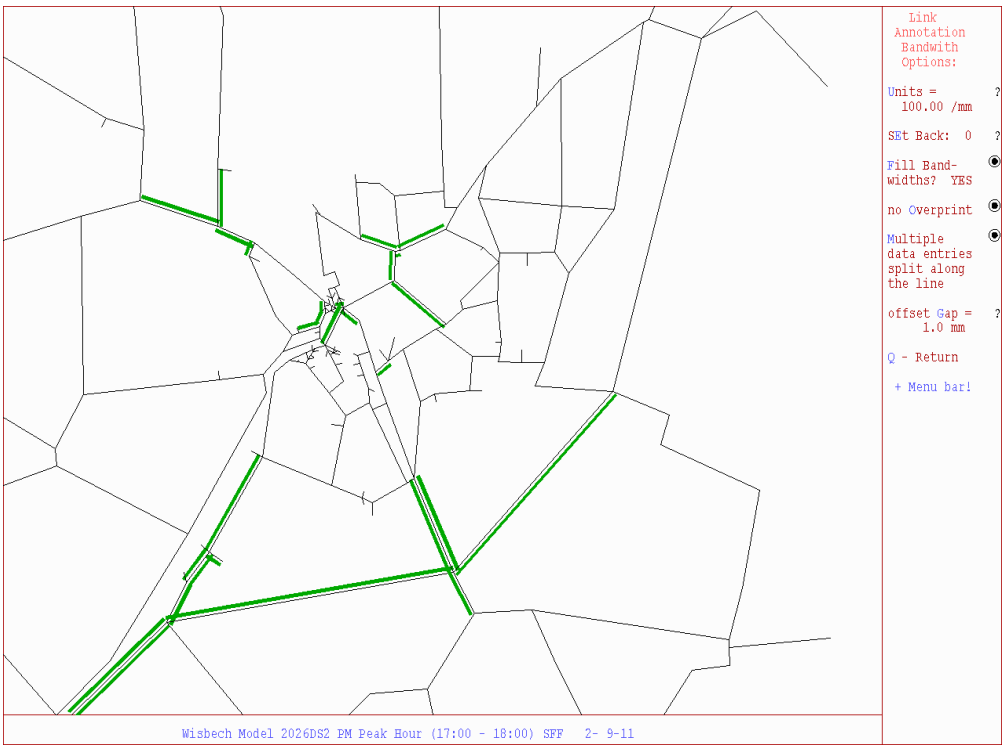
2026 DM Pm peak links with VoverC >85%



2026 DS1 Pm peak links with VoverC >85%



2026 DS2 Pm peak links with VoverC >85%



5. Conclusion

The Shaping Fenland's Future report identified three locations in support of the Local Development Framework, two of those options have been appraised for forecast years 2016, 2021 and 2026, it should be noted that the SFF study reports to 2031.

The option referred to as DS1 in this technical note is based on TEMPRO 6.1 growth, where as DS2 is a sensitivity test around DS1, but with growth only taken forward to 2026. This results in a small increase in dwellings only between the DS1 and DS2 options (growth profiles based on data in the Shaping Fenland's Future report).

From the analysis undertaken on the SATURN Summary statistics, junction delay and traffic flow of the ten key junctions in the Wisbech Urban area, it can be seen that the performance of the network overall is very similar when comparing DM, DS1 and DS2. However, the DS1 and DS2 assessments show a very small decrease in overall network average speeds by 2026, indicating that compared to the DM they have the potential to cause increased journey times and junction delays.

Comparing the DM, DS1 and DS2 plots shows that similar areas of the network are showing signs of stress in all cases, with the 2026 networks showing the highest number of links with a VoverC value in excess of 85%, with the same links being highlighted in the DS1 and DS2 options, with the worst time period being Pm peak.

From the analysis undertaken it is clear that a number of links and junctions in the Wisbech area will present capacity issues under a Do-Minimum scenario particularly in 2026, applying the Shaping Fenland's Future options produces similar results to the DM situation, but with a greater number of links approaching capacity, increased junction delays and lower average speeds across the network.

It should be stressed that no major infrastructure improvements have been modelled, and that localised junction improvements may result in reducing the level of delays and link capacities observed in the options assessed so far.