



Suffolk County Council

IPSWICH NORTHERN ROUTE

Model Forecasting Report





Suffolk County **Council**

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WSP

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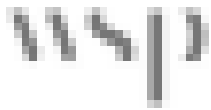
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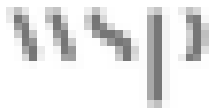


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APPENDIX A

UNCERTAINTY LOG



1. INTRODUCTION

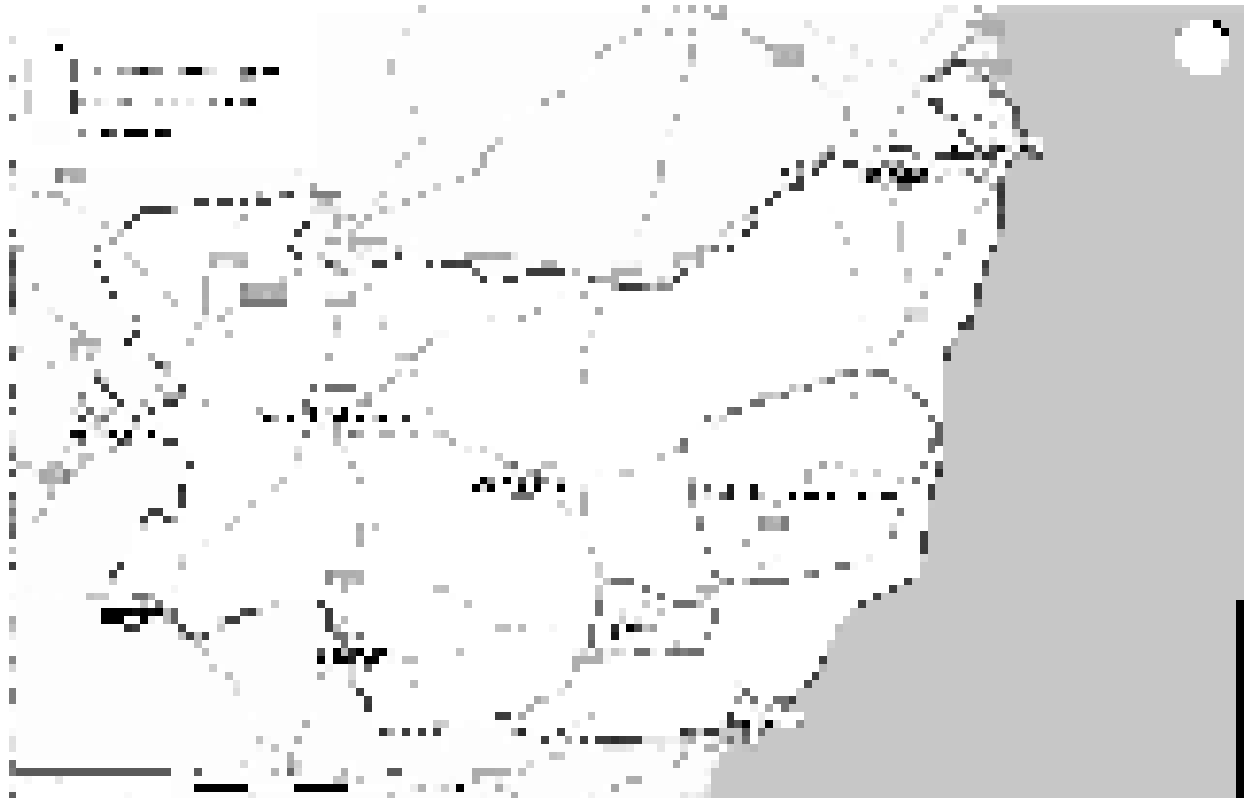
1.1. BACKGROUND

- 1.1.1. WSP has been commissioned by Suffolk County Council (SCC) to undertake strategic modelling of proposals for Ipswich Northern Route. The modelling is based upon the Suffolk County Transport Model (SCTM) that was developed in 2017 with the aim that it would become a multi-purpose transport modelling tool for SCC to test a range of potential transport schemes and policies.
- 1.1.2. The Ipswich Northern Route Local Model Validation Report (LMVR) (August 2019) details a review of the SCTM with regards to its fitness for purpose as a base for testing of Ipswich Northern Route proposals. It was developed following the principles set out within WebTAG guidance to ensure that the model can provide a suitable appraisal of the proposed scheme and stand up to scrutiny.
- 1.1.3. The LMVR report concluded that following the localised calibration and validation of the SCTM, the model provides a robust basis from which to create forecast models and assignment for the Ipswich Northern Route proposals.
- 1.1.4. In this forecasting report, the model is being used solely to test the impact of the Ipswich Northern Route, for the purposes of forecasting, economics and environmental assessment. The assessment is currently at an early stage and more detailed modelling may be required at a subsequent stage.

1.2. MODEL EXTENT

- 1.2.1. The SCTM has a base year of 2016 based on an average Monday to Thursday for neutral months. The following three time periods have been modelled:
 - AM peak hour (0800-0900)
 - Inter peak average hour (1000-1600)
 - PM peak hour (1700-1800)
- 1.2.2. The model covers the county of Suffolk, with three levels of detail in the model. The modelled area is shown in Figure 1-1.

Figure 1-1 - SCTM Model Area



1.3. PURPOSE OF THIS REPORT

- 1.3.1. The purpose of this report is to document the details of the forecast modelling process used to assess the Ipswich Northern Route proposals. The report outlines the methodology used for the development of the forecast matrices and forecast networks, describes the details of the options tested and the results of the modelling.

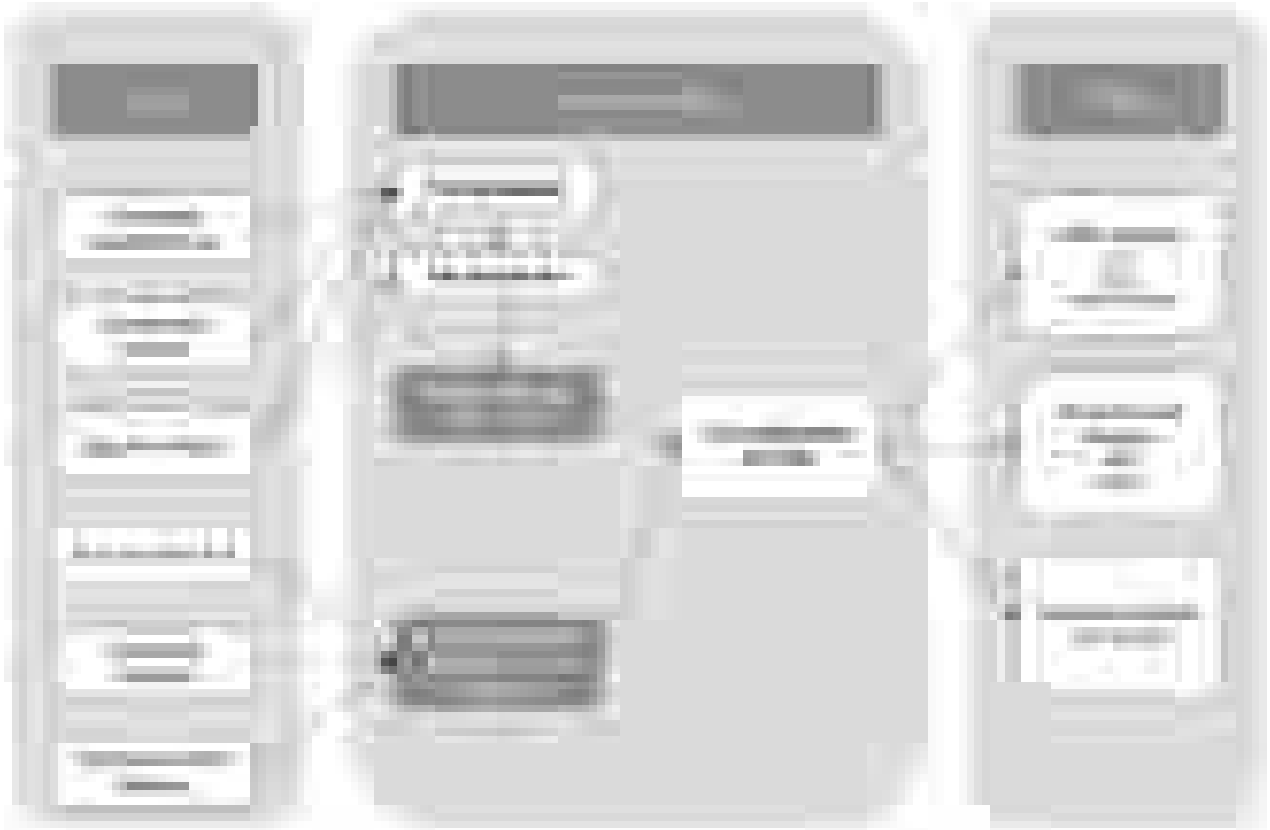
1.4. REPORT STRUCTURE

- 1.4.1. The report is structured as follows:
- Chapter 2 outlines the methodology followed to develop the forecast model;
 - Chapter 3 outlines the forecast matrix development process;
 - Chapter 4 outlines the forecast network development process;
 - Chapter 5 outlines the results of the scheme options;
 - Chapter 6 outlines the overnight period sensitivity test;
 - Chapter 7 outlines the Orwell Bridge closure sensitivity tests; and
 - Chapter 8 provides a conclusion.

2. METHODOLOGY

- 2.1.1. In order to assess the proposals for the Ipswich Northern Route (INR) scheme, the validated 2016 base model was used to create future scenario models.
- 2.1.2. Models have been created for the forecast years of 2027 (earliest scheme opening year) and 2042 (scheme opening year + 15 years).
- 2.1.3. The methodology for creating the forecast models can be split into two parts – the future demand and the future network.
- 2.1.4. In order to model the future demand, matrices have been developed for the two forecast years. The matrices are based on a combination of data about committed developments and background growth. Details of the process used to create these matrices is described in Chapter 3.
- 2.1.5. The forecast highway network needs to take account of committed highway improvements and changes associated with committed developments and the network changes associated with the INR proposals. Details of the forecast network changes are outlined in Chapter 4.
- 2.1.6. The resulting forecast matrices have been assigned to the forecast network in SATURN and results have been output for analysis. Chapter 5 provides a summary and analysis of the traffic outputs. The model also provides outputs that have been used for environmental and economic analysis, but these are not considered in this report.
- 2.1.7. A diagram summarising the model forecasting process is shown below in Figure 2-1.

Figure 2-1 - Model Forecasting Process

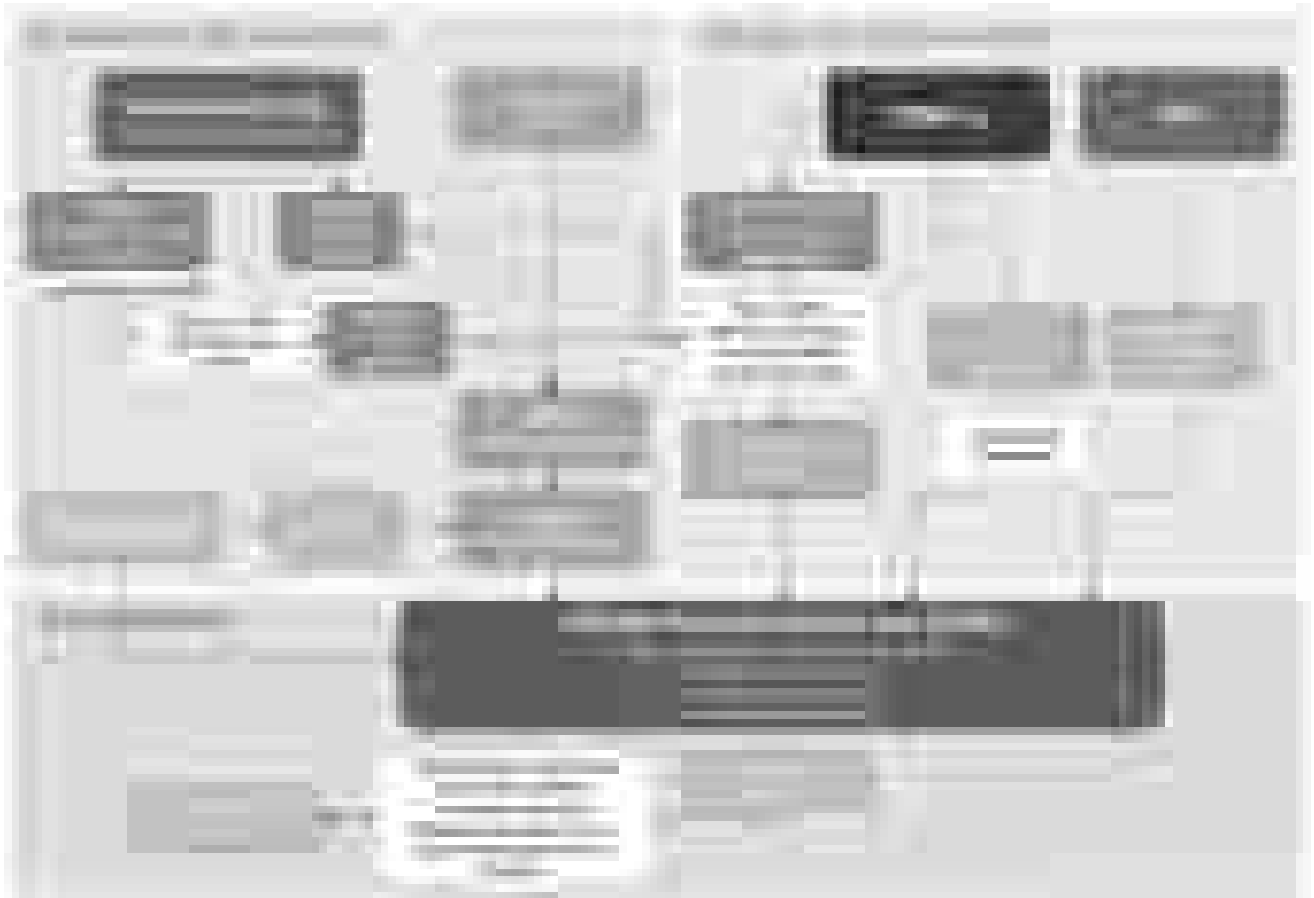


3. MATRIX DEVELOPMENT

3.1. MATRIX DEVELOPMENT METHOD

- 3.1.1. In order to assess the Ipswich Northern Route scheme, it was necessary to build demand trip matrices in relation to the forecast years 2027 (scheme opening year) and 2042 (scheme opening year + 15 years).
- 3.1.2. The methodology in deriving the forecast trip matrices can be split into three main parts, as described below:
- **Development Trip Generation** – Establish the forecast trips that will be generated by explicit known developments.
 - Uncertainty Log - Establish an uncertainty log of site specific developments within the study area, whereby the term development refers to either residential or commercial site use;
 - Allocation to Model Zones - Allocate these site-specific developments a corresponding SATURN zone;
 - Trip Rates - Calculate trip rates to convert the number of dwellings/jobs into peak hour trips in the forecast years;
 - Proportion of Trips Amongst Car User Classes - Proportion out these development trips across the 8 car based user classes;
 - **Background Trip Generation** – Establish the forecast trips that will be generated by background growth.
 - Car Growth Factors – Obtain the unadjusted growth factors (constraint) from TEMPro. Determine the adjusted growth factors via the application of alternative planning assumptions;
 - LGV and HGV Growth factors - Apply RTF (National Road Traffic Forecast) factors to account for UC9 (LGV) and UC10 (HGV) growth in a respective forecast year model; and
 - **Trip Distribution** – Combine the development and background growth trip ends and distribute them using the Furness method.
 - Distribute trips based on the Furness method to produce a set of forecast year matrices for the respective model years and peak periods. Apply the constraint to cap the total number of forecast trips.
- 3.1.3. Figure 3-1 shows a diagram of the matrix forecasting process.

Figure 3-1 - Matrix Forecasting Process



3.2. DEVELOPMENT TRIP GENERATION

UNCERTAINTY LOG

- 3.2.1. An uncertainty log has been produced using information obtained from the local authorities in the scheme area. Development data was collected from the following local authorities:
- Babergh and Mid Suffolk (combined)
 - Ipswich
 - Suffolk Coastal (now East Suffolk Council)
- 3.2.2. Each local authority provided a list with all developments considered in the local plan, together with the following attributes:
- Location Details;
 - Development type (residential / employment). Those developments which contain both types were divided into two elements;
 - Land use. Employment developments which contained several land uses were broken down into single land use types;
 - Number of dwellings (for residential developments);
 - Site area (for employment developments); and
 - Uncertainty assumption.

- 3.2.3. Only developments for which the uncertainty is defined as ‘Near certain’ or ‘More than likely’ have been considered to reflect what is henceforth known as the ‘Core’ scenario. This is in line with WebTAG criteria.
- 3.2.4. For residential developments, the local authority housing trajectories provided the projected year of delivery for each of the developments. These were used to calculate the number of dwellings complete in each of the two forecast years of 2027 and 2042. Some developments were projected to be complete by 2027, whilst others are phased developments, with only a proportion complete by 2027. All developments in the core scenario are predicted to be complete by 2042.
- 3.2.5. For employment developments, a predicted year of completion was provided for each development by the local authority. Based on knowledge in 2018 these were classified as complete either within 0-5 years or within 6-15 years. For those classed as 0-5 years, it has been assumed that the development will be complete by 2027. For those classed as 6-15 years, it implies that the development will be complete between 2024 and 2033. A linear rate of development has been assumed, thus 33% of the total predicted jobs is included in the 2027 forecast. This only applies to a relatively small number of developments.
- 3.2.6. The total site area of the employment developments was converted to effective area by assuming a site area conversion factor agreed by the council of 0.4. The net area was then converted to jobs by using the employment density matrix contained in the Employment Density Guide¹ and the Employment Land Needs Assessment²
- 3.2.7. The resulting number of explicitly modelled committed development dwellings and jobs from the uncertainty log is summarised in Table 3-1.

Table 3-1 – Committed Development Dwellings and Jobs

	2027		2042	
	Dwellings	Jobs	Dwellings	Jobs
Babergh	2,034	4,137	2,755	5,877
Ipswich	2,138	1,271	3,183	1,302
Mid Suffolk	2,809	5,392	2,919	5,392
Suffolk Coastal	6,181	5,091	6,766	5,091
Total	13,162	15,891	15,623	17,663

¹ Homes & Communities Agency. Employment Density Guide, 3rd edition. November 2015.

² Ipswich and Waveney Economic Areas ELNA. Employment Land Needs Assessment Final Report. March 2016

3.2.8. Figure 3-2 and Figure 3-3 show the locations of the explicit dwellings growth in 2042. They show that the main areas of dwellings growth are around Ipswich whilst jobs growth is more evenly spread between the main towns in the area.

Figure 3-2 - 2016 - 2042 Explicit Dwellings Growth

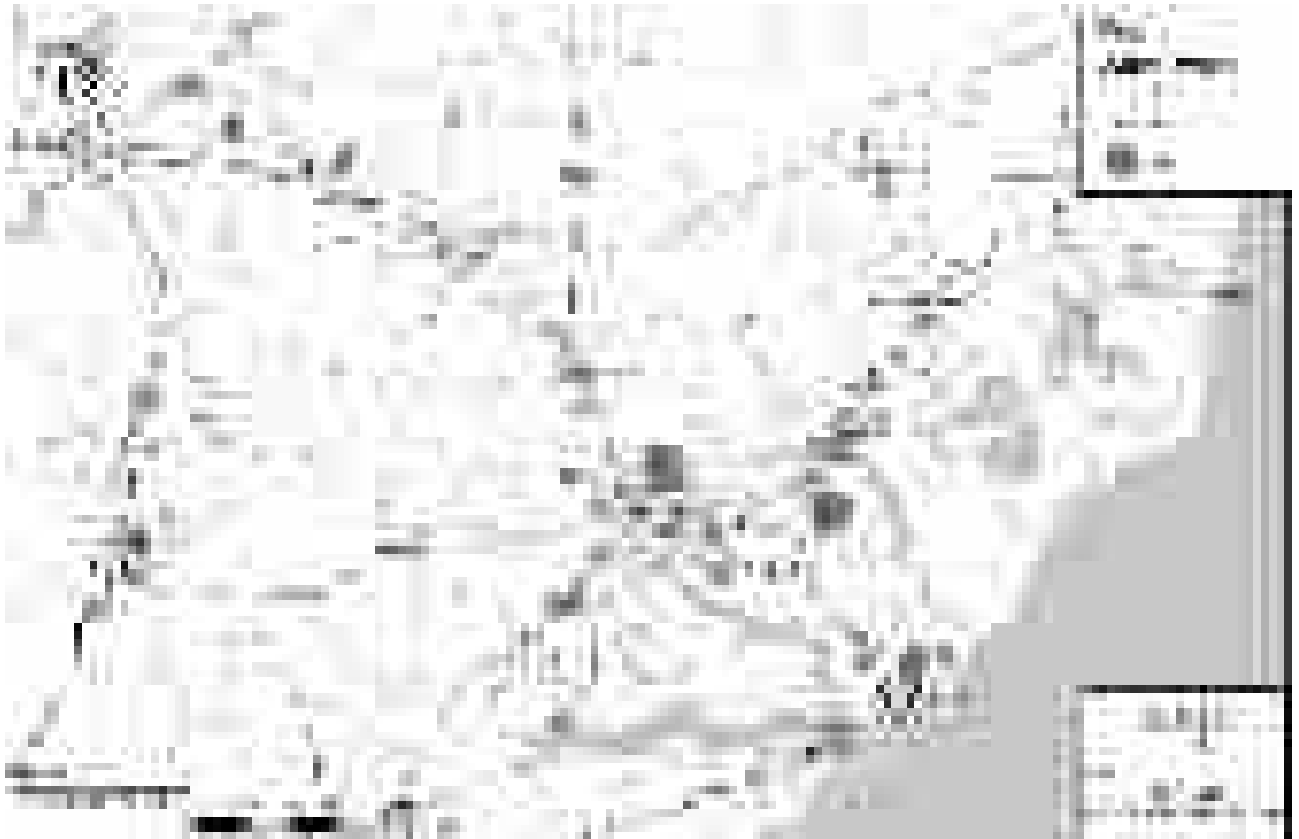
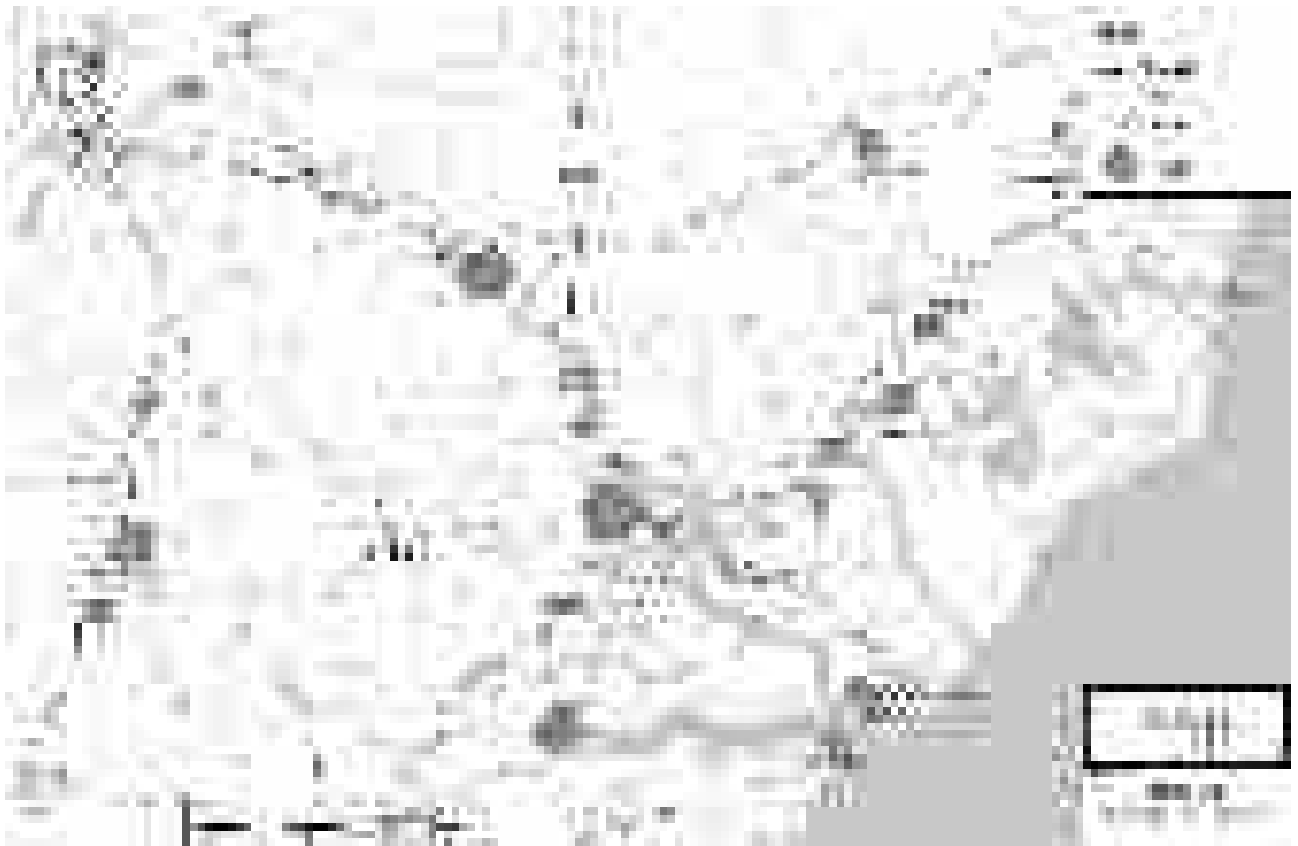


Figure 3-3 - 2016 - 2042 Explicit Jobs Growth



ALLOCATION TO MODEL ZONES

- 3.2.9. Each of the developments in the core scenario was allocated to an appropriate SATURN zone, based on its location in the network. For the majority of developments, an existing zone in the base network has been used.
- 3.2.10. However, there are a number of larger committed developments that due to their size will require one or more new model zones. Table 3-2 contains a list of all these developments (those with more than 500 jobs or dwellings), together with the new forecast zones they have been assigned and the number of dwellings and jobs created by 2042. Figure 3-4 shows the location of these new forecast zones.

Table 3-2 – Larger explicitly modelled developments with a new SATURN zone

Development	Local Authority	Saturn Zone(s)	Dwellings	Jobs
Chilton Woods, Sudbury	Babergh	941, 942	1,150	1,508
Brantham Industrial Estate, Manningtree	Babergh	943, 944	320	1,670
Former Sugar Beet Factory Site, Sproughton Road	Babergh	1050	-	2,610
Ipswich Garden Suburb	Ipswich	912, 913	1,955	-
Land at Blackacre Hill, Bramford Road	Mid Suffolk	940	-	600
Mill Lane, Stowmarket	Mid Suffolk	947, 989	-	3,674
Brightwell Lakes, Martlesham	Suffolk Coastal	907, 908, 909	2,000	-
Land at Candlet Road, Felixstowe	Suffolk Coastal	932	560	-

Figure 3-4 - New SATURN Forecast Zones



3.2.11. These forecast zones were already contained in the base model as empty zones for this purpose, and as such the zones have been moved to the correct location and the relevant developments allocated.

TRIP RATES

3.2.12. For each of the developments, the number of dwellings and jobs needed to be converted into the number of trips generated in each of the peak periods. This can be done either by obtaining trip rates from TRICS or TEMPro. Due to uncertainties regarding the exact type of development, levels

of sustainability and the absence of detailed appraisal that would be found within a transport assessment, TEMPro is considered the most appropriate basis for the trip generation. TEMPro has therefore been used for all sites without a Transport Assessment within this appraisal.

Trip Rates from Transport Assessments

- 3.2.13. For a number of the larger developments that have already obtained planning permission, it was decided that the trip rates in the associated transport assessment would provide the best trip generation prediction. The transport assessment reports were interrogated for these rates and applied appropriately. Most of the transport assessments only covered the AM and PM peak, so the trip rates for the interpeak were obtained using TEMPro trip rates.
- 3.2.14. It is worth noting that the trip rates for the employment developments in this category are based on 100sqm rather than per job. Table 3-3 shows the trip rates obtained from transport assessments.

Table 3-3 – Transport Assessment trip rates

Development	Unit	AM Peak		PM Peak	
		Origin	Dest	Origin	Dest
Former Sugar Beet Factory (B1)	trip/ 100 sqm	0.248	1.273	1.139	0.182
Former Sugar Beet Factory (B2)	trip/ 100 sqm	0.279	0.541	0.435	0.113
Ipswich Garden Suburb (Henley Gate)	trip/ dwelling	0.410	0.154	0.212	0.371
Ipswich Garden Suburb (Fonnereau)	trip/ dwelling	0.330	0.080	0.140	0.230
Mill Lane (B8)	trip/ 100 sqm	0.054	0.084	0.103	0.038
Brightwell Lakes	trip/ dwelling	0.419	0.236	0.221	0.341
Land at Candlet Road	trip/ dwelling	0.498	0.154	0.246	0.409

TEMPro Trip Rates

- 3.2.15. For other developments, where the development is small or the transport assessment was not available, TEMPro trip rates were used.
- 3.2.16. Trip rates were derived using the NTEM 7.2 dataset, obtaining trip rates at a district level, for the AM, IP and PM peak and for both housing and employment developments. Trip rates were calculated as the growth in origin and destination trips as a result of increasing the number of dwellings or jobs in the alternative assumptions. The trip rates used are shown in Table 3-4 and Table 3-5 below.

Table 3-4 – Forecast Model Housing Trip Rates for Site Specific Developments

		Trip Rate per Household					
		AM Peak		Inter Peak		PM Peak	
		Origin	Dest	Origin	Dest	Origin	Dest
2027	Babergh	0.168	0.027	0.077	0.082	0.066	0.166
	Ipswich	0.151	0.023	0.065	0.068	0.061	0.149
	Mid Suffolk	0.193	0.029	0.082	0.085	0.070	0.174
	Suffolk Coastal	0.175	0.024	0.078	0.082	0.061	0.159
2042	Babergh	0.160	0.023	0.077	0.080	0.062	0.155
	Ipswich	0.147	0.023	0.065	0.068	0.057	0.145
	Mid Suffolk	0.181	0.025	0.082	0.083	0.062	0.166
	Suffolk Coastal	0.163	0.024	0.077	0.080	0.061	0.152

Table 3-5 - Forecast Model Employment Trip Rates for Site Specific Developments

		Trip rate per job					
		AM Peak		Inter Peak		PM Peak	
		Origin	Dest	Origin	Dest	Origin	Dest
2027	Babergh	0.042	0.187	0.093	0.090	0.166	0.066
	Ipswich	0.042	0.170	0.087	0.083	0.149	0.061
	Mid Suffolk	0.041	0.189	0.082	0.075	0.155	0.054
	Suffolk Coastal	0.048	0.199	0.098	0.095	0.171	0.072
2042	Babergh	0.050	0.198	0.103	0.097	0.178	0.070
	Ipswich	0.042	0.178	0.095	0.092	0.157	0.065
	Mid Suffolk	0.041	0.201	0.088	0.082	0.163	0.058
	Suffolk Coastal	0.052	0.211	0.107	0.103	0.186	0.076

- 3.2.17. These trip rates were applied to the developments in the uncertainty log to obtain the total trip generation of each development, in each of the forecast years.
- 3.2.18. A list with all the developments considered in the uncertainty log together with the assigned SATURN zone, trip rates and total trips by year and time period is included in Appendix A.

PROPORTIONING OF TRIPS BETWEEN CAR USER CLASSES

- 3.2.19. The trips generated by the developments have no associated user class so therefore needed to be distributed between the 8 car specific user classes (as TEMPro only considers car trips). The user class proportions in the equivalent time periods in the modelled 2016 base year were used as a guide to decide the distribution. The trips were distributed as shown in Table 3-6. “Inbound” refers to trips originating from home and “outbound” refers to trips terminating at home.

Table 3-6 – User class split used for distribution of development traffic

User Class		% Split		
Number	Name	AM Peak	Inter peak	PM Peak
1	Car home-based work (inbound) (Car HBW IB)	0	8	46
2	Car home-based work (outbound) (Car HBW OB)	49	6	0
3	Car home-based employers' business (inbound) (Car HBEB IB)	0	0	2
4	Car home-based employers' business (outbound) (Car HBEB OB)	3	0	0
5	Car non-home-based employers' business (both directions) (Car NHEB)	0	4	0
6	Car home-based other (inbound) (Car HBO IB)	8	40	34
7	Car home-based other (outbound) (Car HBO OB)	40	29	18
8	Car non-home-based other (both directions) (Car NHBO)	0	13	0

3.3. BACKGROUND TRIP GENERATION

CAR GROWTH FACTORS

- 3.3.1. Upon determining the number of development trips in the scheme area, it was necessary to derive growth factors in the surrounding area to account for background growth. NTEM 7.2 dataset TEMPro growth factors were obtained for Suffolk and for the rest of the East region (excluding Suffolk).
- 3.3.2. The planning data within TEMPro was obtained for 2016, 2027 and 2042 showing household and job projections and is detailed in Table 3-7.

Table 3-7 – Unadjusted TEMPro planning data

		2016	2027	2027 - 2016	2042	2042 - 2016
Households	East (without Suffolk)	2,252,951	2,569,386	316,435	2,937,043	684,092
	Suffolk	328,816	368,352	39,536	412,422	83,606
Jobs	East (without Suffolk)	2,579,303	2,698,796	119,493	2,818,172	238,869



	Suffolk	376,702	395,327	18,625	412,816	36,114
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3.3.3. Table 3-8 shows the unadjusted growth factors for the modelled years and time periods. These growth factors are based on the planning data above and will be used to constrain the matrix, representing the maximum trip end growth that can be achieved in a zone.

Table 3-8 – Unadjusted TEMPro growth factors

		AM		IP		PM	
		Origin	Destination	Origin	Destination	Origin	Destination
2016 - 2027	East (without Suffolk)	1.1121	1.1151	1.1555	1.1554	1.1154	1.1139
	Suffolk	1.0819	1.1082	1.1373	1.1361	1.1039	1.0873
2016 - 2042	East (without Suffolk)	1.2292	1.2368	1.3173	1.3171	1.2377	1.2337
	Suffolk	1.1665	1.2288	1.2790	1.2763	1.2178	1.1788

3.3.4. Alternative assumptions were then applied to the TEMPro planning data to exclude the site-specific development dwellings and jobs, as obtained in Table 3-1. This is done to avoid double-counting of the trips as the development trips are added separately. The adjusted planning data is detailed in Table 3-9.

Table 3-9 - Adjusted TEMPro planning data

		2016	2027	2027 - 2016	2042	2042 - 2016
Households	East (without Suffolk)	2,252,951	2,569,386	316,435	2,937,043	684,092
	Suffolk	328,816	355,190	26,374	396,799	67,983
Jobs	East (without Suffolk)	2,579,303	2,698,796	119,493	2,818,172	238,869
	Suffolk	376,702	379,435	2,733	395,153	18,451

3.3.5. The resulting adjusted TEMPro growth factors are shown in Table 3-10. These growth factors will be used to generate the background growth.

Table 3-10 – Adjusted TEMPro growth factors

		AM		IP		PM	
		Origin	Destination	Origin	Destination	Origin	Destination
2016 - 2027	East (without Suffolk)	1.1121	1.1151	1.1556	1.1555	1.1155	1.1139
	Suffolk	1.0422	1.0643	1.0938	1.0928	1.0609	1.0470

2016 - 2042	East (without Suffolk)	1.2292	1.2369	1.3174	1.3171	1.2377	1.2338
	Suffolk	1.1210	1.1769	1.2269	1.2244	1.1673	1.1323

3.3.6. Since all the explicit developments that have been taken into account for the model forecasting are located in Suffolk, the adjusted and unadjusted factors for the East region are the same. This means that all the growth in this area is background growth and thus is more equally spread than in Suffolk, where growth will be more concentrated in the zones with large explicit developments.

LGV AND HGV GROWTH FACTORS

3.3.7. RTF18 factors were applied to UC9 (LGV) and UC10 (HGV) to account for background growth in these user classes. These factors are shown below in Table 3-11.

Table 3-11 – RFT18 growth factors

	2016 – 2027	2016 - 2042
LGV	1.1518	1.3795
HGV	1.0364	1.1275

3.3.8. These factors have been used both for the background growth and as a constraint, since LGV and HGV trips have not been considered for explicit developments. This means that all LGV and HGV growth is background growth and is equally spread over the study area.

3.4. TRIP DISTRIBUTION

MATRIX FURNESSING (TRIP DISTRIBUTION)

3.4.1. The existing trip distributions from the 2016 base year matrices were used as the starting point for the forecast trip distribution process. Scaling via a Furness methodology was carried out to distribute the forecast trips between origins and destinations while controlling the trip end totals and this process is detailed below:

- **Background Growth:** The adjusted growth factors have been applied to the row and column totals of the base year matrix to obtain the background trip ends and then have been distributed using the Furness method to generate the background growth matrix.
- **Development Growth:** The location of the explicitly modelled development sites was reviewed and SATURN zones with similar land use and location where assigned as the source for its distribution. As with the background growth, the trip ends obtained in the trip generation process have been distributed using a Furness method to generate the development growth matrix.
- **Unconstrained Matrix:** The background growth and development trip matrices have been added to generate the unconstrained matrix.
- **TEMPro Constraint Matrix:** As with the background growth, the unadjusted growth factors have been applied to the base year trip ends and distributed using the Furness method to generate the constraint matrix.
- **Final Forecast Matrix:** A final forecast matrix has been produced by capping the unconstrained matrix OD values where they exceed those of the TEMPRO constraint matrix. The explicit development trips were not capped,

3.4.2. Table 3-12 and Table 3-13 show the trip matrix totals during the different steps of the matrix forecasting process. The Total Trips column shows the total trips in the matrix after adding the base year, adjusted background growth and development trips and constraining to TEMPRO growth.

Table 3-12 – 2027 Matrix Totals (PCU)

	Base Matrix	Base Matrix + Adjusted Background Growth	Development Trips	2027 Total Trips (capped)	% increase (compared to 2016)
AM	137,646	147,760	7,338	151,410	10.0%
IP	113,338	125,356	4,624	128,465	13.3%
PM	137,227	147,340	7,294	151,114	10.1%

Table 3-13 – 2042 Matrix Totals (PCU)

	Base Matrix	Base Matrix + Adjusted Background Growth	Development Trips	2042 Total Trips (capped)	% increase (compared to 2016)
AM	137,646	163,177	8,866	167,423	21.6%
IP	113,338	141,628	5,352	145,353	28.2%
PM	137,227	162,538	8,749	166,932	21.6%

3.4.3. The following maps show the trip growth between 2016 and 2042. Each dot on the map represents a SATURN zone and its size indicates the growth in number of trips. The zone labels show where the new forecast zones have been created.

3.4.4. Figure 3-5 and Figure 3-6 show the zone trip growth during the AM Peak by origin and destination respectively. The maps show that the origin trip growth increases the most where the main housing developments are located (Ipswich Garden Suburb, Brightwell Lakes and Candlet Road), while the destination trip growth is most notable around the main employment developments (Mill Lane, Former Sugar Beet Factory and Chilton Woods).

Figure 3-5 - 2016 – 2042 AM Trip Growth by Zone (Origin Trips)

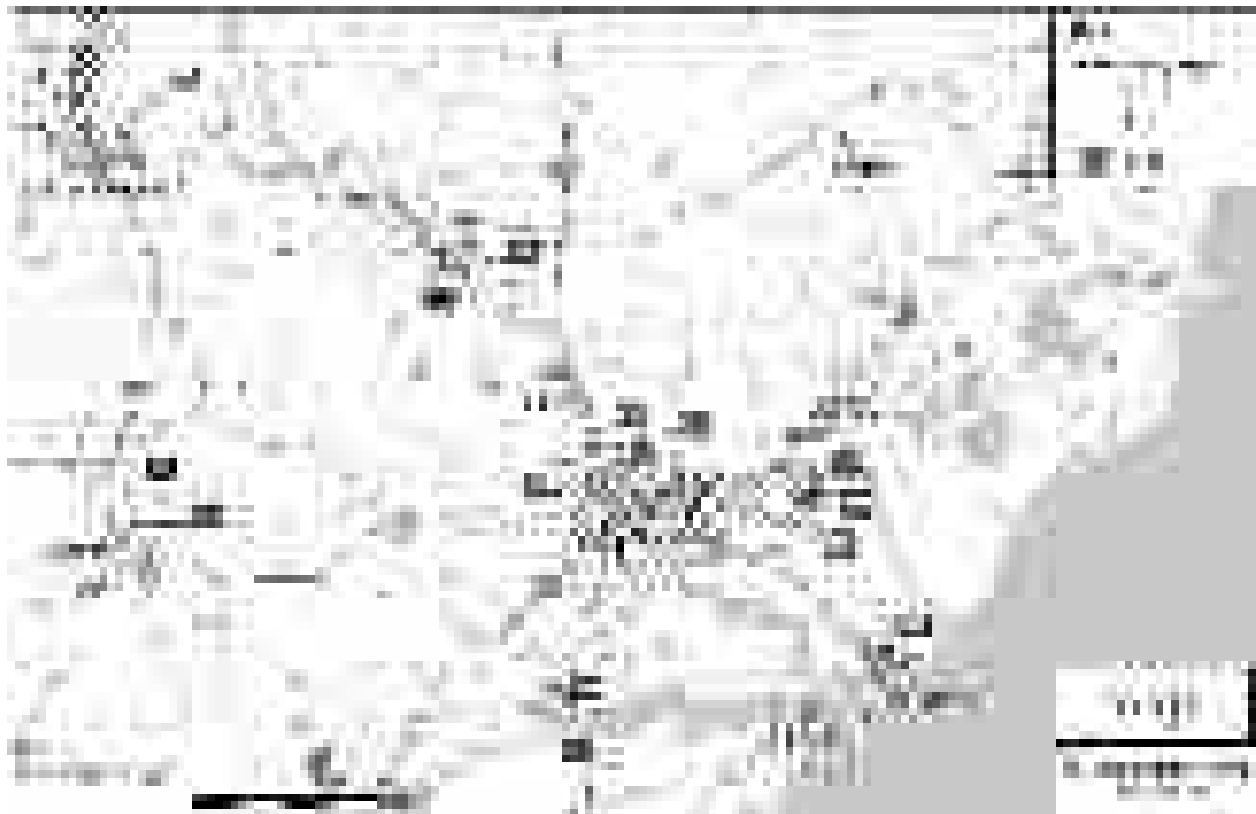
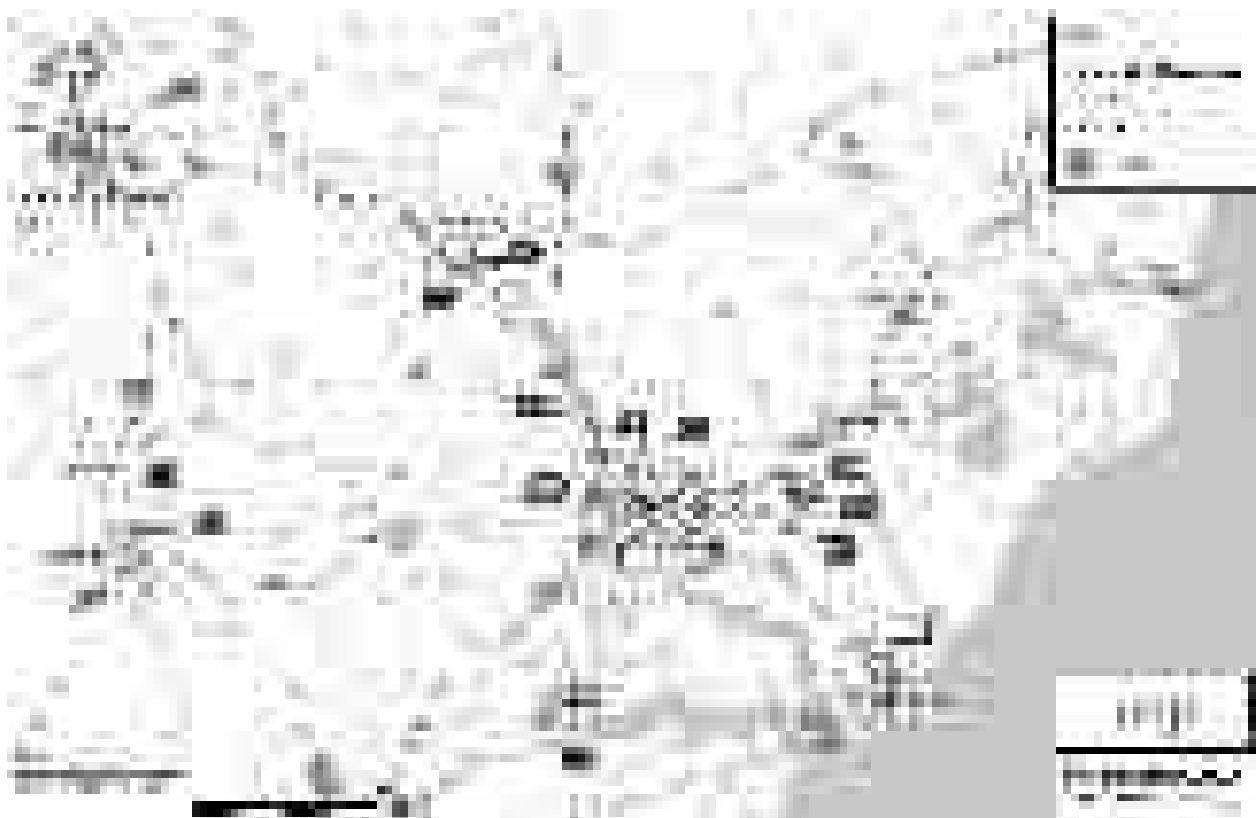


Figure 3-6 - 2016 – 2042 AM Trip Growth by Zone (Destination Trips)



3.4.5. Figure 3-7 and Figure 3-8 show the zone trip growth during the PM Peak by origin and destination respectively. Unlike the AM peak, the maps show that the origin trip growth now increases the most where the main employment developments are located, while the destination trip growth is most notable around the main housing developments.

Figure 3-7 - 2016 – 2042 PM Trip Growth by Zone (Origin Trips)



Figure 3-8 - 2016 – 2042 PM Trip Growth by Zone (Destination Trips)



4. SATURN NETWORK CODING

4.1. GENERALISED COST PARAMETERS

- 4.1.1. The generalised cost parameters used in the forecast models are from the latest version of the WebTAG databook – November 2018 v1.11. Value of time is calculated in pence per minute (PPM) and vehicle operating cost is calculated in pence per kilometre (PPK). As in the base model, the value of time (PPM) for the HGVs was doubled from the value provided in the TAG databook. This is in line with TAG Unit A1.3 which advises for HGV that the driver's time does not take account of the influence of owners on the routing of these vehicles.
- 4.1.2. The generalised cost parameters adopted for the 2027 and 2042 forecast years are shown in Table 4-1 and Table 4-2. For the HGV class, the existing base model was used to determine the split of vehicles which could be classified as OGV1 and OGV2 by peak hour. This split was used to calculate average generalised cost parameters for HGVs. Average simulation network speeds were also used to derive the generalised cost parameters. These values were the same as for the base year.

Table 4-1 – Generalised Cost Parameters 2027

User Class	AM		IP		PM	
	PPM	PPK	PPM	PPK	PPM	PPK
Car Home Based Work	22.94	9.05	23.31	9.00	23.02	9.06
Car Employers Business	34.21	11.58	35.05	11.41	34.70	11.63
Car Other	15.83	9.05	16.86	9.00	16.57	9.06
LGV	24.18	14.55	24.18	14.60	24.18	14.55
HGV	49.09	51.40	49.09	51.60	49.09	55.23

Table 4-2 – Generalised Cost Parameters 2042

User Class	AM		IP		PM	
	PPM	PPK	PPM	PPK	PPM	PPK
Car Home Based Work	30.47	8.70	30.97	8.66	30.58	8.71
Car Employers Business	45.44	11.10	46.56	10.93	46.09	11.14
Car Other	21.02	8.70	22.39	8.66	22.01	8.71
LGV	32.12	14.89	32.12	14.94	32.12	14.89
HGV	65.21	55.32	65.21	55.54	65.21	59.42

- 4.1.3. It should be noted that these values are coded as a ratio (PPM/PPK) in the SATURN model, rather than the actual values in the table to maintain consistency with the base model.

4.2. COMMITTED SCHEMES

4.2.1. The forecast network includes a number of committed highways schemes that have either been built since the base year of 2016 or are due to be built by the forecast years, as advised by Suffolk County Council. Therefore, any schemes that have been built between 2016 and the current day are included below. The forecast SATURN network includes the highway improvements shown below in Table 4-3. This includes all the schemes for which information was available at the time of producing the network coding.

Table 4-3 – Committed Highways Schemes

District	Ref.	Location	Description
Ipswich	1	Bixley Road / Heath Road / Foxhall Road	Additional lane NB for Bixley Road / Additional lane SB for Heath Road.
Ipswich	2	Nacton Road / Maryon Road	Turn WB Nacton to two lanes, and EB Nacton to one lane.
Ipswich	3	Ipswich Radial Corridor Route improvements - Felixstowe Road	Capacity increase to Felixstowe Road & Bixley Road arms of roundabout with A1156 Bucklesham Road. Capacity increase at Bixley Road / Ashdown Way junction. Now built but included in forecast model only as base year model represents 2016 which was prior to this scheme opening.
Ipswich	4	Ipswich Radial Corridor Route improvements - Spring Road	Increased capacity at A1156 Grimwade Street / St Helen's Street. Upper Orwell Street reverted to one-way SB only.
Ipswich	5	Ipswich Radial Corridor Route improvements - Kesgrave	Ban of right turn from A1214 onto Dr Watson Lane. Signalised junction of A1214 / Bell Lane changed to priority controlled roundabout.
St Edmundsbury	6	Bury St Edmunds Eastern Relief Road	Now built and open, but included in forecast only as base year model is 2016 prior to opening.
St Edmundsbury	7	Haverhill NW Relief Road	Relief Road between A1307 and A143.
St Edmundsbury	8	Bury St Edmunds South Eastern Relief Road	Link road south of A14 Junction 44.
Suffolk Coastal	9	Adastral Park - A12 corridor improvement	A12 / Eagle Way / Anson Road roundabout signalisation.
Suffolk Coastal	10	Adastral Park - A12 corridor improvement	A12 / Eagle Way / Gloster Road roundabout signalisation.
Suffolk Coastal	11	Adastral Park - A12 corridor improvement	A12 / Foxhall Road / Newbourne Road roundabout signalisation.
Suffolk Coastal	12	Adastral Park – A14 J58 signalisation	Signalisation of A12 north approach, WB off-slip and A12 south approach.
Suffolk Coastal	13	Walton Link Road	Link road between A154 Candlet Road & Walton High Street, east of A14.
Waveney	14	Lake Lothing Third Crossing, Lowestoft	Additional crossing within Lowestoft, priority controlled roundabouts at both ends.
Waveney	15	Beccles Southern Relief Road	Relief Road between A145 and Ellough Road.

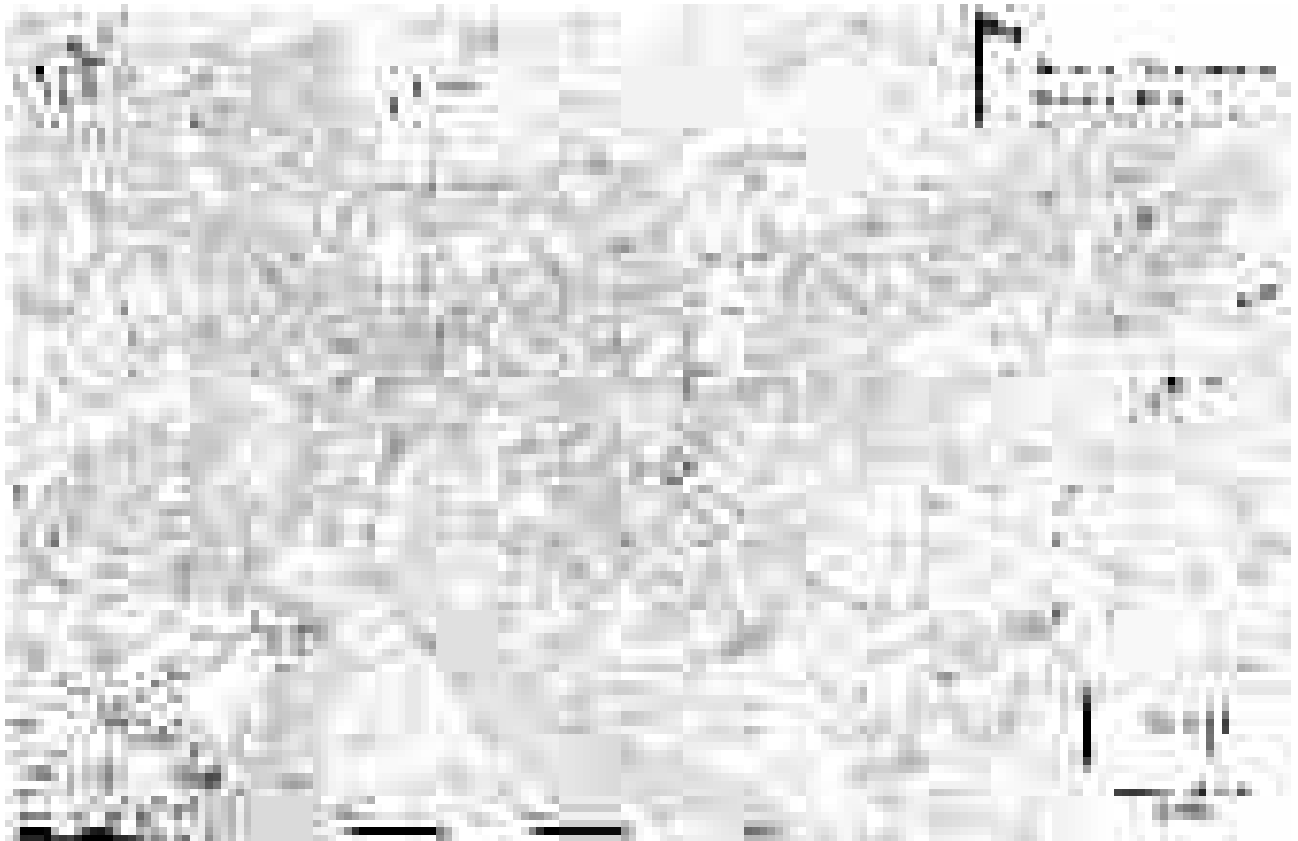
4.2.2. In addition to highway schemes there are a number of changes to the network associated with the committed developments listed in Table 4-4.

Table 4-4 – Committed Development Site accesses

District	Ref.	Development
Babergh	16	Chilton Woods, Sudbury
Babergh	17	Brantham Industrial Estate, Manningtree
Babergh	18	Former Sugar Beet Factory, Sproughton Road
Ipswich	19	Ipswich Garden Suburb
Mid Suffolk	20	Land at Blackacre Hill, Bramford Road
Mid Suffolk	21	Mill Lane, Stowmarket
Suffolk Coastal	22	Adastral Park

4.2.3. Figure 4-1 shows the location of all committed highway improvements and development site accesses that have been included in the forecast year network.

Figure 4-1 - Highway Network Changes



- 4.2.4. All the schemes defined in the lists above were included in both the 2027 and 2042 scenarios. There are no known network changes forecast after 2027 so the network coding for the 2027 and 2042 models is the same.
- 4.2.5. The schemes and changes to the network that are described above are all changes that have no relation to the Ipswich Northern Route Scheme – they are changes that were made to the network before the forecast year regardless. Together these schemes provide the basis of a Do Minimum network i.e. the highway network in the future without the INR scheme. The Do Minimum scenario will be used to analyse the specific impact of the INR proposals.

4.3. PROPOSED SCHEME

- 4.3.1. Four initial highway options have been tested for the Ipswich Northern Route scheme in the SATURN model. These options are shown in Figure 4-2 and summarised in Table 4-5 below. The route alignments were developed further following this modelling assessment and therefore these alignments differ slightly from those presented during the public consultation. The subsequent amendments to the alignments are not significant and are unlikely to affect the results of the modelling. A more refined modelling assessment is likely to be required at a later stage of the project.

Figure 4-2 – Modelled Alignment Options for Ipswich Northern Route Scheme

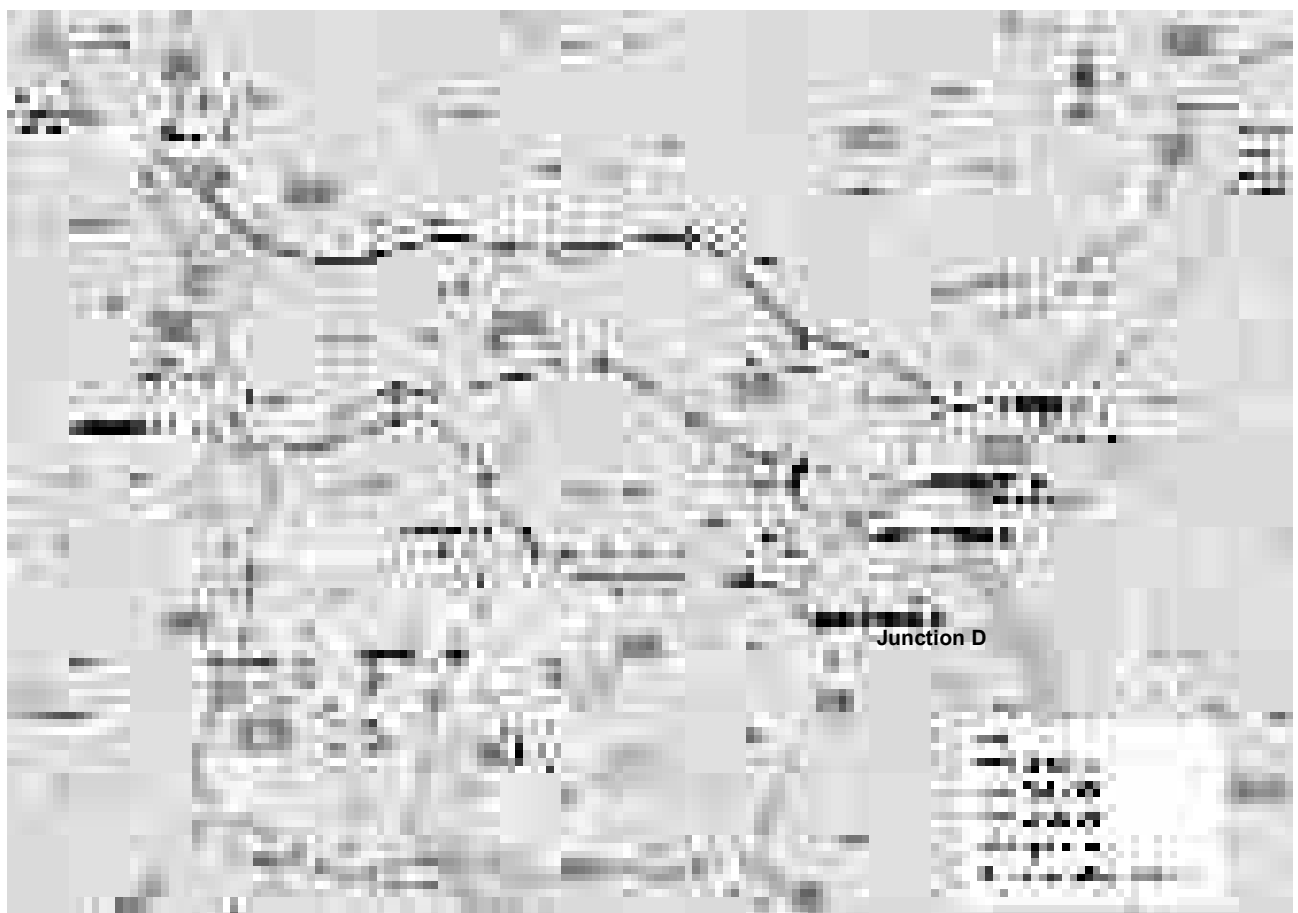


Table 4-5 – Summary of Proposed Options

Option	Tie in junction west	Tie in junction east	Length (km)	Intermediate Junctions
1A	A140 / B1078 (Needham Road) / Coddenham Road (Junction 1)	A12 / A1152 (Woods Lane) (Junction A)	17.2	Main Road/Henley Road B1077 B1079
2B	B1113 (Bramford Road) / Bramford Road (Junction 2)	New junction on A12 between B1438 and B1079 (Junction B)	14.9	Main Road/Henley Road B1077 Clopton Road Grundisburgh Road (Culpho) Hill Farm Road (Great Bealings)
2C	B1113 (Bramford Road) / Bramford Road (Junction 2)	A12 / B1438 (Ipswich Road) (Junction C)	15.1	Main Road/Henley Road B1077 Clopton Road Grundisburgh Road (Culpho) Hill Farm Road (Great Bealings)
2D	B1113 (Bramford Road) / Bramford Road (Junction 2)	A12 / A1214 (Main Road) (Junction D)	13.7	Henley Road B1077 Main Road /Tuddenham Road Playford Road Hall Road

- 4.3.2. The alignment of the route between the A12 and A14 has been chosen based on initial work to identify environmental constraints, minimising impact on the local environment and avoiding possible designated sensitive sites.
- 4.3.3. An initial design for the junctions at each end of the INR was produced and this provided a basis for the modelling of these junctions, providing the junction size, location and number of lanes. A summary of each of the junctions that were considered during the modelling assessment is shown in Figure 4-3 to Figure 4-8 below.

Figure 4-3 - Junction 1 Modelled Option


<p>Junction 1: A140 / B1077 (Needham Rd) / Coddenham Rd <i>Used in Option 1A</i></p>	
Existing layout	Two priority controlled T- junctions
Modelled option for junction 1	<p>Five arm priority controlled roundabout with two lanes on the circulatory</p> <p>Two lane entries from A140 and INR</p> <p>Single lane entry from Needham Road and Coddenham Road</p> 

Figure 4-4 - Junction 2 Modelled Option

<p>Junction 2: B1113 (Bramford Road) / Bramford Road <i>Used in Options 2B, 2C 2D</i></p>	
Existing layout	Three arm signal controlled junction
Modelled option for junction 2	<p>Four arm priority controlled roundabout with three lanes on the circulatory Two lane entries on all arms</p>

Figure 4-5 - Junction A Modelled Option

<p>Junction A: A12 / A1152 (Woods Lane) <i>Used in Option 1A</i></p>	
Existing layout	Three arm priority controlled roundabout with two lanes on the circulatory
Modelled option for junction A	<p>Four arm priority controlled roundabout with three lanes on the circulatory</p> <p>By-pass lane from INR to A12 north</p> <p>By-pass lane from A12 south to INR</p> <p>Two lanes which flares to three lanes from A12 north</p> <p>Two lane entries from INR and A12 south</p> <p>Single lane which flares to two lanes from A1152</p>

Figure 4-6 - Junction B Modelled Option


<p>Junction B: A12 / INR <i>Used in Option 2B</i></p>	
Existing layout	No junction on the A12
Modelled option for junction B	<p>Three arm priority controlled roundabout with two lanes on the circulatory</p> <p>By-pass lane from INR to A12 north</p> <p>By-pass lane from A12 south to INR</p> <p>By-pass from A12 north to A12 south</p> <p>Two lane entries on all arms of the roundabout</p> 

Figure 4-7 - Junction C Modelled Option



<p>Junction C: A12 / B1438 (Ipswich Road) <i>Used in Option 2C</i></p>	
Existing layout	Three arm priority controlled roundabout with one/two lanes on the circulatory
Modelled option for junction C	<p>Four arm priority controlled roundabout with two lanes on the circulatory</p> <p>By-pass lane from A12 south to INR</p> <p>By-pass lane from INR to A12 north</p> <p>Two lane entries from A12 south, A12 north and INR</p> <p>Single lane which flares to two lanes from A1438</p> 

Figure 4-8 - Junction D Modelled Option

<p>Junction D: A12 / A1214 (Main Road) <i>Used in Option 2D</i></p>	
Existing layout	Four arm signal controlled roundabout with two/three lanes on the circulatory
Modelled option for junction D	<p>Four arm signal controlled elongated roundabout with three lanes on the circulatory</p> <p>Two lanes which flares to three lanes from A12 north, A12 south and INR</p> <p>Single lane which flares to two lanes from Main Road</p> <p>Single lane which flares to three lanes from A1214</p> 

4.3.4. At this stage of the scheme, no detailed drawings have been produced for the exact alignment and design of the Ipswich Northern Route carriageway and the intermediate junctions along it. A set of general coding conventions has therefore been adopted to model the proposed schemes, with an aim to ensure consistency in the modelling of the various alignments. Standard default parameters have been used as far as possible. In summary these are:

- INR is modelled as a dual carriageway with two lanes per direction, with the national speed limit and with the same speed flow curve as used on the A12 (where it is a dual carriageway);
- The roundabouts at the ends of the INR, where it joins the A14, A140 or A12, have been modelled explicitly;
- The saturation flow for each of the entry arms has been calculated using the geometries in the preliminary designs, using the formulae in the TRL RR67 report;
- The saturation flow on the roundabouts is modelled as 1,600 PCU/hr per lane on the circulatory and 1,980 PCU/hr per lane on exiting lanes;
- Intermediate junctions with the existing road network are modelled as two-lane priority roundabouts, with a circulation time of 17 seconds and gap time of 1.2 seconds;

- The modelled saturation flow of the INR at the intermediate roundabouts is 2,200 PCU/hr to represent the two lane approach with two lanes at the give way line; and
- The modelled saturation flow of the radial roads at the intermediate roundabouts is 1,670 PCU/hr to represent the one lane approach which flares to two lanes at the give way line.

5. RESULTS

5.1. ASSIGNMENT AND CONVERGENCE

- 5.1.1. The forecast demand matrices have been assigned onto the forecast networks, for each of the peak periods (AM Peak, Inter Peak and PM Peak) and network options (Do Minimum, Option 1A, Option 2B, Option 2C and Option 2D). In this chapter, only the results of the AM and PM peak 2042 models will be presented and discussed. These scenarios represent the time periods when the traffic flows are highest and therefore when congestion is most likely.
- 5.1.2. The assignment of the forecast matrices onto the forecast network was carried out in SATURN version v11.4.07H.
- 5.1.3. Model convergence is needed to ensure results remain stable between successive iterations of the model assignments. This is particularly important when model outputs are used to inform the economic benefits of scheme appraisal, as it is critical that calculated benefits arise from the impact of the scheme and not as a result of difference in convergence.
- 5.1.4. In accordance with criteria set out in TAG Unit M3.1 (January 2014), the parameters %Flow, %GAP and Delta (δ) have been monitored to determine the level of convergence. %Flow measures the proportion of links in the network with flows changing by less than 1% from the previous iteration. δ is the difference between costs on chosen routes and costs on minimum cost paths. %GAP is a generalisation of the δ function to include the interaction effects within the simulation.
- 5.1.5. The convergence criteria used to assess when a model is considered to have converged is shown in TAG Unit M3.1 (January 2014) and indicates that delta (δ) and %GAP values of less than 0.1% is the most fundamental indicator of model convergence and should be achieved as a minimum. In addition, assignment models should continue until at least four successive values of %Flow in excess of 98% have been obtained.
- 5.1.6. Table 5-1 and Table 5-2 below show the parameters for the last four iterations of the assignment for each of the models. All the models have converged to the criteria set out above in both AM and PM peak periods in the 2042 forecast year.

Table 5-1 – Convergence Statistics AM Peak 2042

Option	Iteration	Delta	%Flow	%Gap
1A	47	0.0134	98.8	0.017
	48	0.009	98.3	0.02
	49	0.0091	98.5	0.015
	50	0.0092	98.4	0.018
2B	44	0.0085	98	0.014
	45	0.01	98.1	0.013
	46	0.0079	98.2	0.013
	47	0.008	98.2	0.012
2C	39	0.0072	98.2	0.01
	40	0.0083	98.4	0.011
	41	0.0092	98.3	0.011
	42	0.0086	98.3	0.015
2D	40	0.0087	98.3	0.019
	41	0.0136	98.2	0.012
	42	0.0082	98.7	0.018
	43	0.0126	98.2	0.017

Table 5-2 – Convergence Statistics PM Peak 2042

Option	Iteration	Delta	%Flow	%Gap
1A	27	0.0108	98.2	0.018
	28	0.0116	98.5	0.016
	29	0.0129	98.3	0.016
	30	0.008	98.3	0.017
2B	27	0.0126	98.6	0.016
	28	0.0096	98.4	0.014
	29	0.0078	98.9	0.018
	30	0.0127	98.3	0.01
2C	40	0.0068	99	0.015
	41	0.0063	98.7	0.011
	42	0.0051	99	0.012
	43	0.0058	99	0.011
2D	26	0.0127	98.3	0.014
	27	0.0095	98.5	0.018
	28	0.0094	98.3	0.015
	29	0.0088	98.8	0.015

5.2. NETWORK STATISTICS

- 5.2.1. A summary of the model network statistics in the AM and PM Peak 2042 models is shown in Table 5-3 and Table 5-4. These statistics provide an overall view of how the model has performed.
- 5.2.2. The transient queues correspond to the time spent queuing, for example queueing during the red phase at traffic signals by vehicles which then depart during the green phase, whereas the over-capacity queues represent the extra time spent in queues at over capacity junctions waiting for the cycle in which the vehicle exits. The link cruise time is the time spent travelling on links between junctions and the total travel time is the sum of both link and junction times. The total travel distance is the distance travelled by all vehicles on all links, and the average speed is defined as total distance divided by total time.

Table 5-3 – Network Statistics AM Peak 2042

Option	Transient Queues (PCU - Hrs)	Over-capacity Queues (PCU - Hrs)	Link Cruise Time (PCU - Hrs)	Total Travel Time (PCU - Hrs)	Total Travel Distance (PCU - Km)	Average Speed (kph)
Average DM	6,342	1,743	37,640	45,726	2,433,592	53
1A	6,080	1,606	37,517	45,202	2,440,990	54
2B	5,797	1,454	37,506	44,757	2,447,166	55
2C	5,805	1,436	37,542	44,783	2,446,669	55
2D	5,848	1,415	37,499	44,762	2,444,535	55

Table 5-4 – Network Statistics PM Peak 2042

Option	Transient Queues (PCU - Hrs)	Over-capacity Queues (PCU - Hrs)	Link Cruise Time (PCU - Hrs)	Total Travel Time (PCU - Hrs)	Total Travel Distance (PCU - Km)	Average Speed (kph)
Average DM	6,705	1,706	38,774	47,185	2,499,324	53
1A	6,365	1,447	38,558	46,369	2,506,131	54
2B	6,221	1,351	38,536	46,108	2,510,650	54
2C	6,326	1,373	38,696	46,395	2,515,370	54
2D	6,251	1,355	38,654	46,260	2,514,257	54

5.2.3. The network statistics illustrate that all the proposed options modelled decrease the total travel time and increase the total distance travelled, when compared to the Do Minimum. The average speed of the network increases marginally. This shows that although the INR creates longer routes for vehicles, the routes are faster so time is saved by using them.

5.3. DEMAND FOR A NORTHERN ROUTE

5.3.1. To provide a comparison of the predicted traffic flows using the INR between the different proposed options, a predicted 24hr AADT (Average Annual Daily Traffic) has been calculated for each option. The AADT has been produced by factoring the model peak hour flows using factors calculated from Suffolk wide link count data. The flow on each part of the route has been distance weighted to gain an average for the whole route. The flows predicted in 2042 are shown in Table 5-5.

Table 5-5 – Average distance weighted 24hr AADT in 2042

	Eastbound	Westbound	Two-way
Option 1A	8,200	8,800	17,000
Option 2B	12,300	11,500	23,800
Option 2C	10,700	10,600	21,300
Option 2D	14,200	12,900	27,100

5.3.2. The table above shows that Option D is predicted to attract the highest traffic flow. Since this option is the shortest and closest to Ipswich town centre it provides the most attractive option both for vehicles travelling east-west around Ipswich and those travelling into the town centre.

5.4. OPTION 1A

5.4.1. The change in the traffic flow associated with Option 1A in 2042 (compared to the DM scenario) is shown in Figure 5-1 and Figure 5-2 below.

Figure 5-1 - Change in flow Option 1A AM Peak 2042

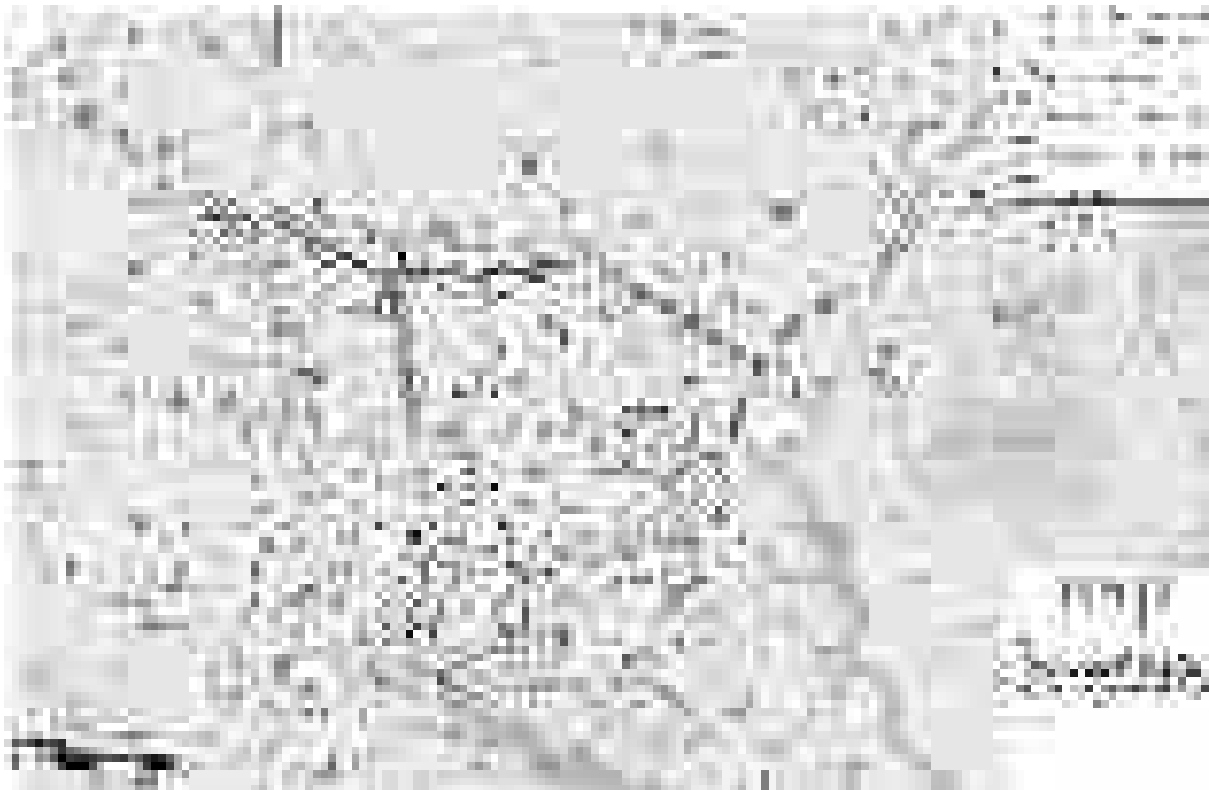


Figure 5-2 - Change in flow Option 1A PM Peak 2042



- 5.4.2. The traffic flow along the INR with Option 1A is forecast to be up to around 1,000 PCU/hr eastbound and around 1,200 PCU/hr westbound in the AM Peak and up to around 1,200 PCU/hr in each direction in the PM Peak. The traffic flow is highest along the western part of the route, becoming lower further east.
- 5.4.3. Traffic flows on the A14 and A12 south of Ipswich and along the B1078 just north of the INR are reduced with this option as vehicles use the INR instead to travel east-west around Ipswich. Flow is predicted to increase along the radial route of Main Road/Henley Road as vehicles travelling from the north-west choose to leave the A14 earlier and travel into Ipswich town centre along Henley Road. Flows also increase along the A12 east of Ipswich as a result of rerouting of trips to the INR from the A14 and B1078.
- 5.4.4. This indicates that vehicles are using the INR as an alternative to the B1078 and A14 in an east-west direction to the north of Ipswich.

5.5. OPTION 2B

- 5.5.1. The change in the traffic flow associated with Option 2B in 2042 (compared to the DM scenario) is shown in Figure 5-3 and Figure 5-4 below.

Figure 5-3 - Change in flow Option 2B AM Peak 2042

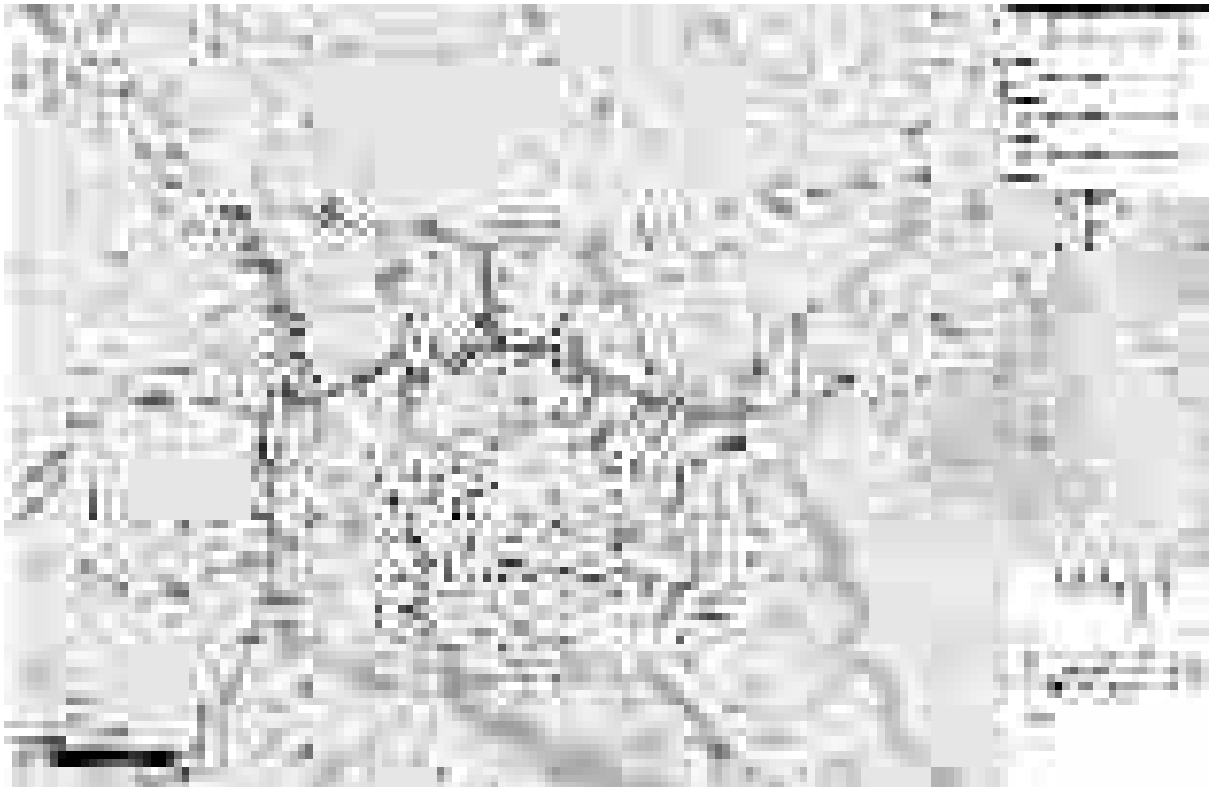
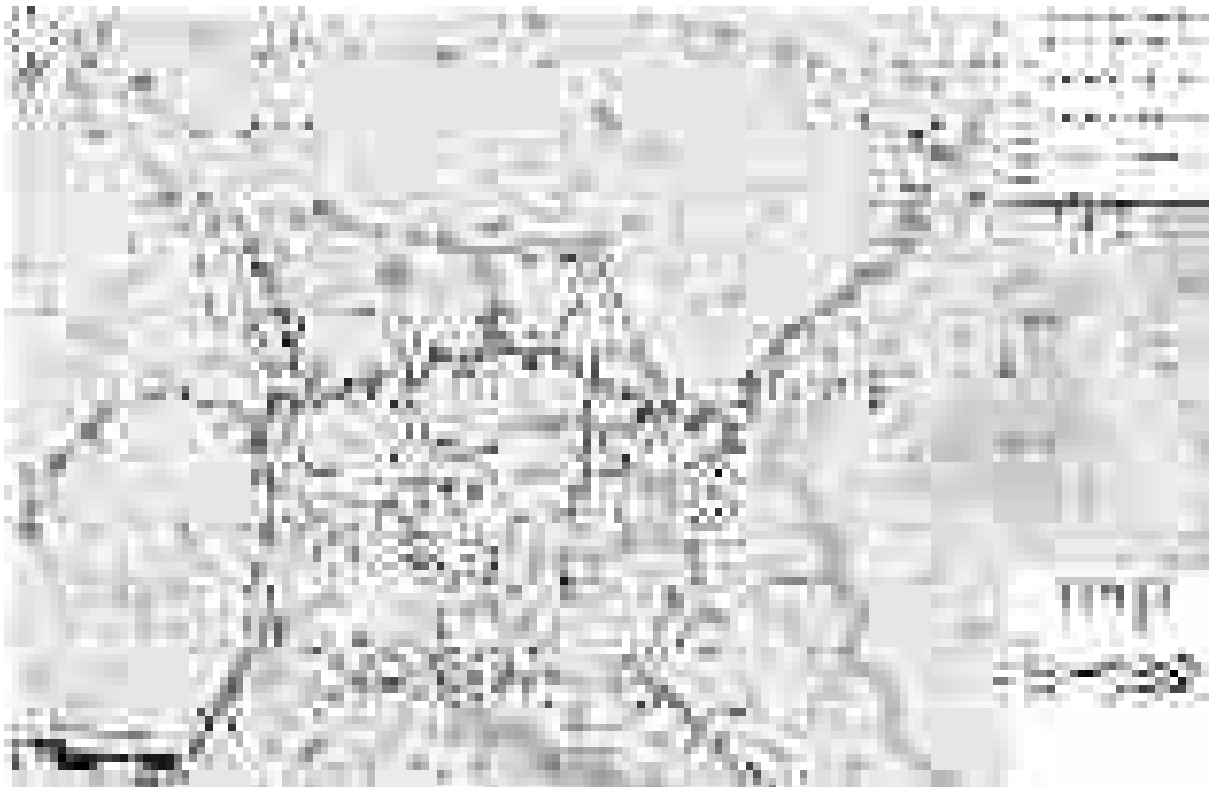


Figure 5-4 - Change in flow Option 2B PM Peak 2042



- 5.5.2. The traffic flow along the INR with Option 2B is forecast to be up to around 1,600 PCU/hr in each direction in both the AM and PM peak periods. This is a higher flow than along the INR in Option 1A, although the trend for flows being higher towards the western end of the route remains.
- 5.5.3. Traffic flows are reduced on the A14 and A12 south of Ipswich, along the B1078 and along Main Road/Grundisburgh Road/Boot Street (to the south of the INR) with this option. Traffic flow is predicted to increase along the B1077 radial route to the north of the INR, along Main Road/Henley Road south of the INR, and along the A12 north of Martlesham Heath.
- 5.5.4. This indicates that vehicles are using the INR as an alternative to the B1078 and A14 in an east-west direction to the north of Ipswich. Vehicles travelling to/from the north west of Ipswich also choose to use Main Road/Henley Road to access the town centre instead of other radial routes further south.
- 5.5.5. As a consequence of connecting the INR at Bramford Road (Junction 2), the model indicates an increased traffic flow along the B1113 through Sproughton and Bramford, as vehicles use this route as an alternative the A14. As this is a local road, traffic calming measures could be considered to discourage this.

5.6. OPTION 2C

- 5.6.1. The change in the traffic flow associated with Option 2C in 2042 (compared to the DM scenario) is shown in Figure 5-5 and Figure 5-6 below.

Figure 5-5 - Change in flow Option 2C AM Peak 2042

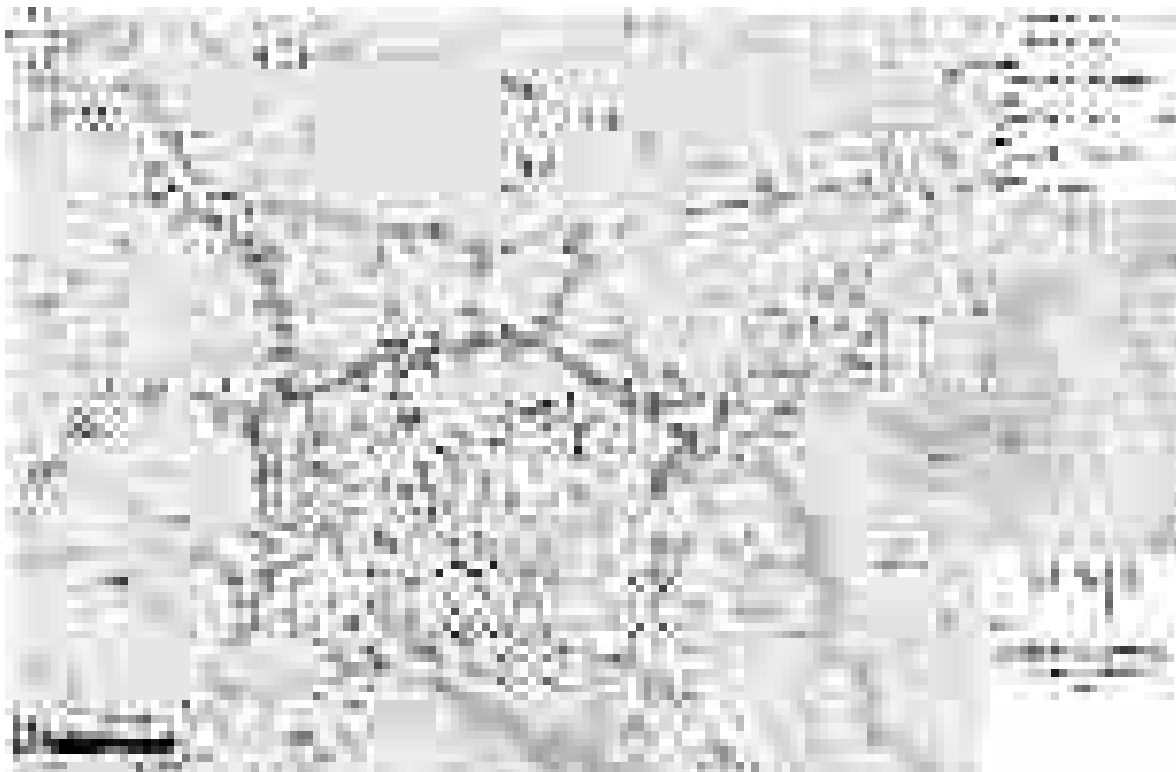


Figure 5-6 - Change in flow Option 2C PM Peak 2042



- 5.6.2. The traffic flow along the INR with Option 2C is forecast to be up to around 1,600 PCU/hr in each direction, in both AM and PM peak periods, which is similar to Option 2B. Again, the traffic flow is highest along the western part of the route, becoming lower further east.
- 5.6.3. Traffic flow is reduced along the A14 and A12 south of Ipswich, along the B1078 east of Clopton and on the B1079 south of Clopton. Traffic flow is predicted to increase on the other radial connections to the INR as vehicles choose to reroute.
- 5.6.4. As with Option 2B, as a consequence of connecting the INR at Bramford Road (Junction 2), the model indicates an increased traffic flow along the B1113 through Sproughton and Bramford, as vehicles use this route as an alternative the A14.

5.7. OPTION 2D

- 5.7.1. The change in the traffic flow associated with Option 2C in 2042 (compared to the DM scenario) is shown in Figure 5-7 and Figure 5-8 below.

Figure 5-7 - Change in flow Option 2D AM Peak 2042

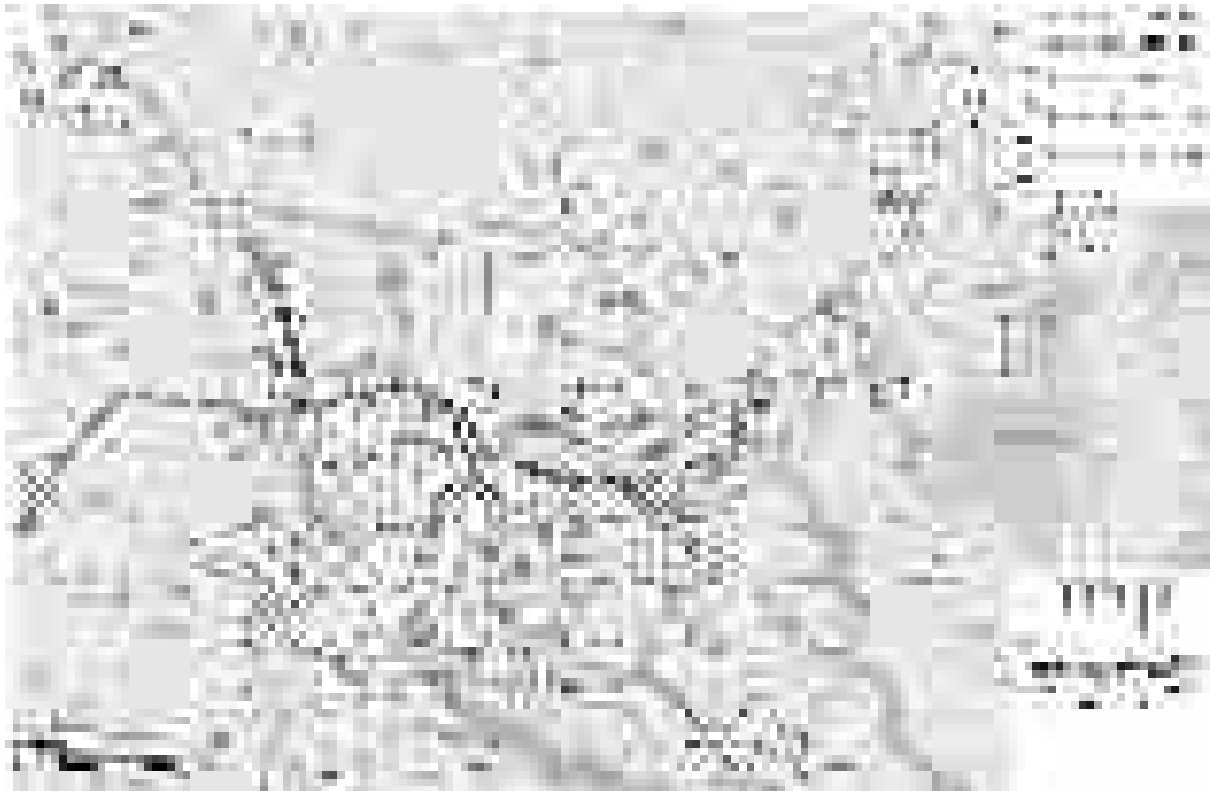
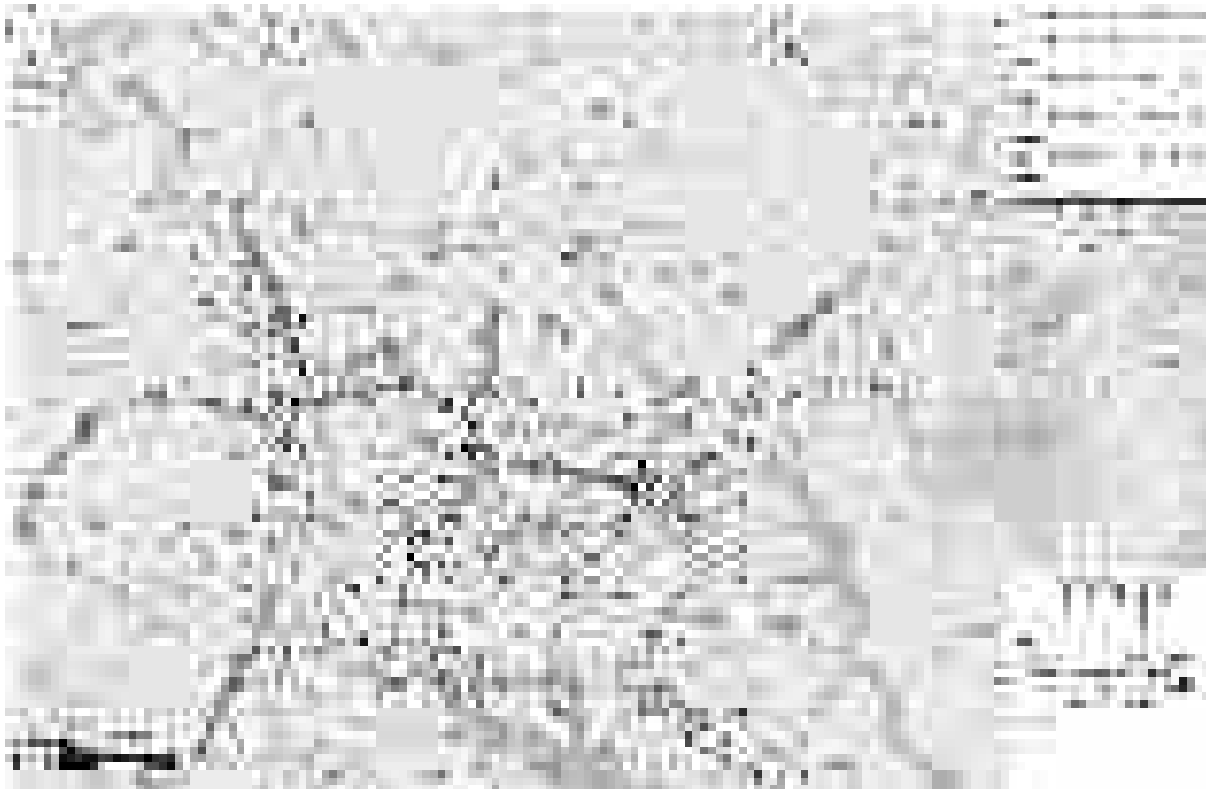


Figure 5-8 - Change in flow Option 2D PM Peak 2042



- 5.7.2. The traffic flow along the INR with Option 2D is forecast to be up to 1,600 PCU/hr in each direction in the AM Peak and up to 1,700 PCU/hr eastbound and 1,600 PCU/hr westbound in the PM Peak. As with the other options, traffic flow is highest on the western part of the route.
- 5.7.3. Traffic flow is predicted to decrease on the A14 and A12 south of Ipswich, to a higher degree than in the other options. Traffic flow is also predicted to reduce along the B1078 east of Clopton and on the B1079 south of Clopton, but to a slightly lesser degree than with the other options. Instead there is a significant reduction of flow along the A1214 Main Road, Kesgrave as vehicles opt to use Option 2D instead.
- 5.7.4. Traffic flow along Henley Road south of the INR is reduced with this option, as vehicles use the INR and Tuddenham Road instead to travel to/from Ipswich town centre. Since the INR is located further south with this option, it provides an attractive alternative way for vehicles to reach the town centre.
- 5.7.5. Flow is predicted to increase along the A12 north east of Ipswich as vehicles reroute from the B1078 to the INR. There is also a flow increase on Somersham Road, to the west of Ipswich, as vehicles from the south west of Ipswich use this route to reach Ipswich and the INR instead of the A1071.

5.8. IMPACT OF THE SCHEME ON KEY ROADS AROUND IPSWICH

WESTERFIELD ROAD

- 5.8.1. Flows on Westerfield Road (B1077) would be expected to decrease if the Options 1A, 2B or 2C were implemented. This is largely because the new route would provide better access to Henley Road which may attract drivers to use Henley Road to access Ipswich from the north instead of Westerfield Road. Option 2D would also be expected to result in a decrease in flows on Westerfield

Road as it would provide fast access to Ipswich via Tuddenham Road meaning drivers could take advantage of the higher-speed northern route for longer instead.

HENLEY ROAD

- 5.8.2. Flows on Henley Road would be expected to increase if the Options 1A, 2B or 2C were implemented. This is largely because the new route would provide better access to Henley Road which may attract drivers to leave the A14 earlier and use Henley Road to access Ipswich from the north. Option 2D would be expected to decrease flows on Henley Road as it would provide fast access to Ipswich via Tuddenham Road meaning drivers could take advantage of the higher-speed northern route for longer.

VALLEY ROAD (A1214)

- 5.8.3. Flows on Valley Road (A1214) are expected to decrease slightly if any of the northern route options were implemented. This is because the northern route would provide fast east-west connectivity meaning fewer trips would rely on the Ring Road (Valley Road) to travel east-west, particularly in the case of the Options 1A, 2B or 2C and less so for the Option 2D.

LONDON ROAD (A1214)

- 5.8.4. Flows on London Road (A1214) are predicted to remain stable if any of the northern route options were implemented. There may be a small reduction as traffic in this area, particularly on the A14 to the south and west of Ipswich is predicted to reduce slightly.

STAR LANE / KEY STREET

- 5.8.5. Flows on the Star Lane / Key Street one-way system are expected to reduce slightly if any of the northern route options were implemented. Vehicles wishing to travel east-west are able to do so using the northern route so demand for the one-way system is slightly reduced, particularly for the inner and middle routes.

B1078

- 5.8.6. Flows on the B1078 are predicted to reduce significantly as a result of the northern route. This reduction is most prominent for the outer route which most closely follows the alignment of the B1078 whilst offering a higher speed alternative. The impact becomes less significant for Options 2B, 2C and 2D which are less attractive to drivers wishing to travel east-west further north of Ipswich.

A12 NEAR LITTLE BEALINGS

- 5.8.7. Option 2D is expected to increase flows on the A12 near Little Bealings as access is immediately south of this location (~1km) and the A12 near Little Bealings therefore provides direct access to the Inner Route. Trips previously using the Orwell Bridge are also attracted to use the Inner route and A12 which results in increased A12 flows. Options 1A, 2B and 2C are expected to have less impact on the A12 near Little Bealings as flows diverting these routes are generally those that would have been using the B1078 and Bealings Road to travel east-west and therefore continue to use the A12 at Little Bealings paired with the new route.

KESGRAVE ROAD (A1214)

- 5.8.8. Option 2D is most closely aligned to Kesgrave Road (A1214) and therefore is best at attracting trips away from the A1214 corridor. The other routes are located much further north and therefore don't offer such an attractive alternative to Kesgrave Road.

ORWELL BRIDGE (A14)

- 5.8.9. All of the northern route options result in a reduction in flow on the Orwell Bridge. Option 2D results in the greatest reduction as it provides an 18km route around Ipswich (A14/A140 junction to A14/A12 junction) compared to the 25km route using the A14. Options 2B and 2C create a journey around Ipswich of 22km which is also shorter than the 25km route via the A14 which results in an A14 flow reduction. Option 1A is the longest option and also requires significantly more travel on the A12 to reach its origin near Melton. The outer route provides a 29km route around Ipswich which is longer than the alternative route via the A14 and it therefore provides a smaller reduction in flow on the Orwell bridge.

5.9. ECONOMIC APPRAISAL

- 5.9.1. The SATURN modelling has been used as an input to a TUBA model, to form the basis of the calculation of the economic benefits of the INR scheme.
- 5.9.2. The TUBA has been run using the results of the 2027 and 2042 models. The opening year for the scheme has been assumed to be 2027, and benefits have been calculated with a horizon year of 2086. The annualisation factors used for each peak period are shown in Table 5-6.

Table 5-6 – Annualisation Factors used in TUBA

AM Peak	658
Inter Peak	1518
PM Peak	668

- 5.9.3. The results of the TUBA model indicate that Option 2D would provide the greatest economic benefits and Option 1A the least. This is consistent with the results analysis above.

6. ADDITIONAL SCHEME ASSESSMENT

6.1. OVERNIGHT PERIOD

MODELLING

- 6.1.1. It is recognised that the INR scheme will provide benefits not just during the peak hours but during the overnight period as well. A validated overnight base SCTM model does not exist so an approximation was needed to calculate these benefits.
- 6.1.2. An approximate overnight model has been created by applying a conversion factor to the inter peak matrices and assigning them to the inter peak networks.
- 6.1.3. An appropriate inter-peak to overnight conversion factor was established using county wide ATC data. The ATC data in an average interpeak hour (10:00 – 16:00, Monday to Thursday) was compared to an average overnight hour (19:00 – 07:00, Monday to Thursday) and an average conversion factor was calculated. The calculated conversion factor that was used is 0.21331, indicating that an overnight hour is expected to contain approximately 20% of the flow in an interpeak hour.
- 6.1.4. This factor has been applied to the 2027 and 2042 IP matrices to obtain the respective overnight matrices. The factor has been applied as a blanket to all zones, all user classes and Origin/Destinations.
- 6.1.5. New generalised cost values have been obtained for the overnight period from WebTAG databook – November 2018 v1.11.
- 6.1.6. All other parameters are the same as the interpeak network - signal timings and bus timetables, for example, have not been modified as this was unlikely to affect the level of benefit being estimated.

RESULTS

- 6.1.7. The results of the modelling of the overnight period were used to calculate economic benefits for the scheme. As the overnight period was modelled predominantly to estimate benefits, analysis of the operation of this time period has not been a focus.
- 6.1.8. The model indicates that the INR would be used by vehicles during the overnight period, principally reducing the flow on the A12/A14 to the south of Ipswich. The traffic flow would be highest with Option 2D and lowest with Option 1A (approximately 45% of the flow in Option 2D). The main benefit comes from the fact that the INR would provide a faster route east-west, as opposed to relieving congestion in Ipswich which is one of the core daytime benefits.
- 6.1.9. Overnight period models were run through TUBA and benefits from this process have informed the Strategic Outline Business Case for the scheme.

6.2. ORWELL BRIDGE CLOSURE SCENARIOS

- 6.2.1. The Orwell Bridge on the A14 is a major strategic route to the south of Ipswich, used by both local and strategic traffic. During strong winds the bridge has to be closed to traffic for safety reasons and according to historic data this occurs approximately three times per year. Partial closures of the bridge also occur, for example closing a single lane following a road traffic accident. Although the impact of such a closure on the road network is generally smaller, it does happen more frequently.
- 6.2.2. When the Orwell Bridge is closed, significant additional delay is created within and around Ipswich with A14 traffic forced to route through the town and on local roads. The introduction of the proposed INR scheme could therefore offer significant benefit to the local and strategic transport network and it is important to capture the potential economic benefit of the scheme in these circumstances.

FULL BRIDGE CLOSURE MODELLING

- 6.2.3. The potential benefit of the INR during a full closure of the Orwell Bridge in both directions during peak hours has been assessed. A full closure was modelled by banning all vehicles on the links at either end of the Orwell Bridge in the model.
- 6.2.4. The model takes no account of traffic management plans, signed diversion routes or possible change in signalised junction timings.
- 6.2.5. The model assumes the same demand during the closure period as in the average peak periods. This is likely to be an over estimation as the demand would probably change – for example, drivers may choose to travel at a different time or not at all if they know that driving conditions will be difficult due to the weather or congested due to the bridge closure.
- 6.2.6. The model assumes that all drivers have full knowledge of the bridge closure before they start their journey and re-route accordingly. In reality there are likely to be some drivers that do not know about the closure until they are on their way, or have reached the bridge – these vehicles are thus unlikely to take the most effective route to their destination.
- 6.2.7. When the model is run it aims to find the lowest cost routes (shortest distance and time) for all trips in the network. When the full bridge closure was tested in the model the model struggled to do identify the best routes which was apparent as it was unable to reach a state of convergence. This reflects the situation on street where motorists struggle to complete their journeys. In order to produce a full bridge closure model run, the convergence parameters were relaxed. An iterative process of relaxing the parameters was used in order to find those needed to achieve convergence in all the models. It was found that the parameters ISTOP and RSTOP (% of links where flows are consistent between iterations) needed to be reduced to 95 from 98, MASL and NITA (maximum number of iterations permitted) increased to 150 from 99 and STPGAP (a measure of the change in the cost of routes between iterations) increased to 0.2 from 0.1.

PARTIAL BRIDGE CLOSURE MODELLING

- 6.2.8. As the scheme could also offer benefits when there is a partial closure of the Orwell Bridge, for example following a road traffic accident, the benefit has been assessed by modelling a single lane closure in the eastbound direction on the Orwell Bridge during peak hours. The eastbound direction was chosen as it has the highest traffic flow.
- 6.2.9. A single lane closure was modelled by halving the saturation flow on the link that represents the bridge.

- 6.2.10. Historic data shows that there is an average of 28 partial closures of the bridge due to road traffic accidents per year.
- 6.2.11. No changes have been made to account for any traffic management plans, signed diversion routes, possible change in signalised junction timings or change in demand. The model assumes that all drivers have full knowledge of the closure and choose their route accordingly.

6.3. RESULTS

- 6.3.1. The results of the modelling of the Orwell Bridge closure were used to calculate economic benefits for the scheme. As the closures were modelled predominantly to estimate benefits, analysis of the operation of this time period has not been a focus.
- 6.3.2. The results show that in the event of a full closure of the Orwell Bridge, the traffic flows and delay in the centre of Ipswich would be reduced with the proposed INR scheme in place (compared to the Do Minimum scenario). With all options, traffic uses the INR as an alternative to the Orwell Bridge, instead of rerouting through Ipswich town centre or along the B1078 or A1120. Since it provides the shortest alternative route, Option 2D would provide more benefit than Option 1A.
- 6.3.3. A summary of the model network statistics in the AM and PM Peak 2042, with the bridge closure in place, is shown in Table 6-1 Table 6-2. These statistics provide an overall view of how the model has performed and can be compared to Table 5-3 and Table 5-4, which show the equivalent statistics for the model without a bridge closure. The statistics show that the overcapacity queues in the network increase significantly when the Orwell Bridge is closed and the average speed of the network is reduced. The Northern Route scheme would however lessen the impact of the closure, as seen by comparing the results of the INR Options with the Do-Minimum.

Table 6-1 – Network Statistics for Orwell Bridge Full Closure Model AM Peak 2042

Option	Transient Queues (PCU - Hrs)	Over-capacity Queues (PCU - Hrs)	Link Cruise Time (PCU - Hrs)	Total Travel Time (PCU - Hrs)	Total Travel Distance (PCU - Km)	Average Speed (kph)
Average DM	7,601	5,422	37,017	50,040	2,353,922	47
1A	7,610	4,530	37,157	49,298	2,393,037	49
2B	7,486	3,487	37,514	48,487	2,419,280	50
2C	7,519	3,458	37,521	48,497	2,417,694	50
2D	7,290	3,265	37,379	47,934	2,410,454	50

Table 6-2 – Network Statistics for Orwell Bridge Full Closure Model PM Peak 2042

Option	Transient Queues (PCU - Hrs)	Over-capacity Queues (PCU - Hrs)	Link Cruise Time (PCU - Hrs)	Total Travel Time (PCU - Hrs)	Total Travel Distance (PCU - Km)	Average Speed (kph)
Average DM	8,104	5,277	38,255	51,635	2,422,565	47
1A	7,948	4,382	38,099	50,429	2,446,372	49
2B	7,830	3,480	38,335	49,645	2,472,344	50
2C	7,881	3,674	38,414	49,969	2,471,536	49
2D	7,684	3,309	38,403	49,395	2,471,907	50

- 6.3.4. In the event of a partial closure eastbound, the INR would also be used as an alternative route to the Orwell Bridge with all the proposed options. Traffic flows and delays in the centre of Ipswich would be reduced. Option 2D would again provide the most benefit.
- 6.3.5. Overnight period models were run through TUBA and benefits from this process have informed the Strategic Outline Business Case for the scheme.

7. CONCLUSION

- 7.1.1. This report outlines the forecast modelling process used to assess the Ipswich Northern Route (INR) proposals. The report outlines the methodology used for the development of the forecast matrices and forecast networks, describes the details of the options tested and a summary of the results of the modelling.
- 7.1.2. Forecast models for the years 2027 and 2042 have been created from the validated 2016 base model. The Suffolk County Transport Model (SCTM) base model covers the county of Suffolk, with three time periods modelled – AM Peak, Inter peak and PM Peak.
- 7.1.3. Forecast demand matrices have been developed using information about specific known developments and background trip generation. The forecast trips have been combined and distributed to the matrices using the Furness method.
- 7.1.4. The forecast highway network has been changed to take account of committed development highway improvements/changes, as well as the network changes associated with the INR scheme proposals.
- 7.1.5. There are four different options for the INR route, named Option 1A, 2B, 2C and 2D, each with different alignments and connection points to the existing network. Models for each of the options have been produced, together with a Do Minimum option for each of the forecast years.
- 7.1.6. The forecast matrices have been assigned to the forecast networks and convergence has been attained in accordance with WebTAG criteria.
- 7.1.7. The model network statistics show that all of the proposed options decrease the total travel time and increase the total distance travelled in the network, when compared to the Do Minimum. This shows that although the INR creates longer routes for vehicles, the routes are faster so time is saved by using them.
- 7.1.8. A comparison of the traffic flows along the INR with the different proposed options shows that Option 2D is predicted to have the highest flow. This option is closest to Ipswich town centre and provides the most attractive option both for vehicles travelling east-west around Ipswich and those travelling into the town centre.
- 7.1.9. The INR is forecast to reduce flows on the A14 south of Ipswich, the B1078 and in some options the B1079. Some options would increase traffic on the radial routes such as B1077 and Main Road/Henley Road. Option D would also provide a significant flow reduction on A1214 Main Road/Kesgrave Road.
- 7.1.10. An additional model has been created to model the impact of the INR during the overnight period. A conversion factor was applied to the interpeak model in order to do this. The results of this model were used to measure the economic benefits.
- 7.1.11. The impact of a full and partial closure of the Orwell Bridge have also been modelled. When the bridge is closed during high winds or following a road traffic accident, there is currently significant delay caused in the town of Ipswich. The situation has been modelled so that the economic benefits of the INR as an alternative route for vehicles could be calculated.

Appendix A

UNCERTAINTY LOG

WSP

SCM Lookup	Site Address	Source	LPA	Dev Type	Uncertainty status	Year of completion	Final SCM Zone	Proportion complete by 2027	Jobs by 2027	Employment Area (sqm) by 2027	2027 information		2042 information		2027 Trip Rates										2042 Trip Rates										2027 Trips										2042 Trips									
											Dwellings by 2027	Dwellings by 2042	2027 Trip Rates					2042 Trip Rates					2027 Trips					2042 Trips																										
													AM (Origins) (Departures) - Trip Rate	AM (Destinations) (Arrivals) - Trip Rate	AM Two-Way - Trip Rate	PM (Origins) (Departures) - Trip Rate	PM (Destinations) (Arrivals) - Trip Rate	PM Two-Way - Trip Rate	AM (Origins) (Departures) - Trip Rate	AM (Destinations) (Arrivals) - Trip Rate	AM Two-Way - Trip Rate	PM (Origins) (Departures) - Trip Rate	PM (Destinations) (Arrivals) - Trip Rate	PM Two-Way - Trip Rate	AM (Origins) (Departures) - Trips	AM (Destinations) (Arrivals) - Trips	AM Two-Way - Trips	PM (Origins) (Departures) - Trips	PM (Destinations) (Arrivals) - Trips	PM Two-Way - Trips	AM (Origins) (Departures) - Trips	AM (Destinations) (Arrivals) - Trips	AM Two-Way - Trips	PM (Origins) (Departures) - Trips	PM (Destinations) (Arrivals) - Trips	PM Two-Way - Trips																		
MDC2_31	Gr Warehouse (Site, Old Station Rd)	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	218	1			43	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	8	1	10	4	7	3	7	10	8	1	9	4	7	3	7	10									
MDC2_31	Wade House (Former Care Home), Violet Hill Road	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	230	1			38	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	7	1	8	3	6	3	7	9	7	1	8	3	6	2	6	9									
MDC2_23	Land W of Anderson Close, Hill House Lane	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	237	1			37	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	7	1	8	3	6	3	7	9	7	1	8	3	6	2	6	9									
MDC2_35	151 Ipswich Street (Site's Night Club, 111 Ipswich Street)	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	238	1			37	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	7	1	8	3	6	3	7	9	7	1	8	3	6	2	6	9									
MDC2_22	Land to North West of Mason Court (Known as Old Engine)	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	238	1			37	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	7	1	8	3	6	3	7	9	7	1	8	3	6	2	6	9									
MDC2_22	Meridian	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	238	1			37	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	7	1	8	3	6	3	7	9	7	1	8	3	6	2	6	9									
MDC2_35	Kernon Conference & Training Centre, Stoke Ash Road	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	238	1			37	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	7	1	8	3	6	3	7	9	7	1	8	3	6	2	6	9									
MDC2_35	Phase 6C, Cedar Park (Final Phase), Nth of Wagtail Drive & 5th of	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	238	1			37	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	7	1	8	3	6	3	7	9	7	1	8	3	6	2	6	9									
MDC2_29	Stourland Rd	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	241	1			26	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	5	1	6	2	2	4	2	5	6	5	1	5	2	2	4	2	4	6							
MDC2_29	111 Ipswich Street (Site's Night Club, 111 Ipswich Street)	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	241	1			26	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	5	1	6	2	2	4	2	5	6	5	1	5	2	2	4	2	4	6							
MDC2_4	Land rear of De Saumarez Drive	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	252	1			23	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	4	1	5	2	2	4	2	4	2	4	1	5	2	2	4	2	4	6							
MDC2_25	Land south east of Lion Road	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	200	1			21	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	4	1	5	2	2	4	2	4	1	4	5	4	1	4	2	3	1	3	5						
MDC2_9	By-pass Nurseries, Bramford Road	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	200	1			21	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	4	1	5	2	2	4	2	4	1	4	2	2	3	1	3	5									
MDC2_39	Whiton Park Retirement Home, Thurleston Lane	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	251	1			19	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	4	1	4	2	2	3	1	3	5	4	0	4	2	2	3	1	3	5							
MDC2_3	Land add to Bonard, Back Lane	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	211	1			17	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	3	0	4	1	1	3	1	3	3	0	3	1	3	1	3	4									
MDC2_38	Land east of Norton Road (south of Fiddlers Creek, north of	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	212	1			14	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	3	0	4	1	1	3	1	3	3	0	3	1	3	1	3	1	3	4							
MDC2_38	Tostock Village Hall	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	212	1			14	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	3	0	4	1	1	3	1	3	3	0	3	1	3	1	3	1	3	1	3	4					
MDC2_18	Land adjacent to Mill Road (south side of 13 Noyes Avenue)	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	209	1			12	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	2	0	3	1	1	2	1	2	3	2	0	2	1	2	1	2	1	2	3						
MDC2_40	Land south of Bury Road	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	203	1			12	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	2	0	3	1	1	2	1	2	3	2	0	2	1	2	1	2	1	2	3						
MDC2_24	Land at Red Willows near Estate, Finborough Rd	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	203	1			11	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	2	0	2	1	1	2	1	2	3	2	0	2	1	2	1	2	1	2	3						
MDC2_5	Land at Norwich Road (adjacent to Henry VIII Farmhouse)	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	203	1			10	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	2	0	2	1	1	2	1	2	2	0	2	1	2	1	2	1	2	3							
MDC2_19	Land on west side of Beckers Hill Road	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	209	1			10	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	2	0	2	1	1	2	1	2	2	0	2	1	2	1	2	1	2	3							
MDC2_20	Land at Bullocks Farm, Earlford Road	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	209	1			10	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	2	0	2	1	1	2	1	2	2	0	2	1	2	1	2	1	2	3							
MDC2_26	Land at Rectory Way	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	206	1			10	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	2	0	2	1	1	2	1	2	2	0	2	1	2	1	2	1	2	3							
MDC2_27	Land to the rear of Willmore, Garden House Lane	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	206	1			10	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	2	0	2	1	1	2	1	2	2	0	2	1	2	1	2	1	2	3							
MDC2_28	Green Farm, Crowfield Road	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	227	1			10	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174	0.244	0.181	0.025	0.205	0.082	0.083	0.165	0.062	0.166	0.228	2	0	2	1	1	2	1	2	2	0	2	1	2	1	2	1	2	3							
MDC2_34	Land at Church Road	BDC / MSCD Core	Mid Suffolk	Housing	All to be included	2016-2018	219	1			10	0.193	0.029	0.222	0.082	0.085	0.167	0.070	0.174																																			

SCM Lookup	Site Address	Source	LPA	Dev Type	Uncertainty status	Year of completion	Final SCM	2027 information		2042 information		2027 Trip Rates						2042 Trip Rates						2027 Trips						2042 Trips																				
								Proposed complete by 2027	Jobs by 2027	Employment Area (sqm) by 2027	Dwellings by 2027	Jobs by 2042	Employment Area (sqm) by 2042	Dwellings by 2042	AM Origins (Departures) - Trip Rate	AM Destinations (Arrivals) - Trip Rate	AM Two-Way - Trip Rate	PM Origins (Departures) - Trip Rate	PM Destinations (Arrivals) - Trip Rate	PM Two-Way - Trip Rate	AM Origins (Departures) - Trip Rate	AM Destinations (Arrivals) - Trip Rate	AM Two-Way - Trip Rate	PM Origins (Departures) - Trip Rate	PM Destinations (Arrivals) - Trip Rate	PM Two-Way - Trip Rate	AM Origins (Departures) - Trips	AM Destinations (Arrivals) - Trips	AM Two-Way - Trips	PM Origins (Departures) - Trips	PM Destinations (Arrivals) - Trips	PM Two-Way - Trips	AM Origins (Departures) - Trips	AM Destinations (Arrivals) - Trips	AM Two-Way - Trips	PM Origins (Departures) - Trips	PM Destinations (Arrivals) - Trips	PM Two-Way - Trips												
SCDC_154	Quayside Mill Quay Side Woodbridge IP12 1BN	Suffolk Coastal Core	Suffolk Coastal	Housing	Completed	Calculate dwellings	364	Housing Trajectory			11	0.175	0.024	0.199	0.078	0.082	0.160	0.061	0.159	0.220	0.163	0.024	0.187	0.077	0.080	0.157	0.061	0.152	0.213	2	0	2	1	1	2	1	2	2	2	2	0	2	1	1	2	1	2	1	2	2
SCDC_60	Land at Mill Road, Woodbridge	Suffolk Coastal Core	Suffolk Coastal	Housing	Near certain	Calculate dwellings	336	Housing Trajectory			10	0.175	0.024	0.199	0.078	0.082	0.160	0.061	0.159	0.220	0.163	0.024	0.187	0.077	0.080	0.157	0.061	0.152	0.213	2	0	2	1	1	2	1	2	2	2	0	2	1	1	2	1	2	1	2	2	
SCDC_65	Land south of Solomons's Hea, The Street, Hacheston	Suffolk Coastal Core	Suffolk Coastal	Housing	Near certain	Calculate dwellings	889	Housing Trajectory			10	0.175	0.024	0.199	0.078	0.082	0.160	0.061	0.159	0.220	0.163	0.024	0.187	0.077	0.080	0.157	0.061	0.152	0.213	2	0	2	1	1	2	1	2	2	2	0	2	1	1	2	1	2	1	2	2	
SCDC_70	Land fronting Old Homers Road	Suffolk Coastal Core	Suffolk Coastal	Housing	Near certain	Calculate dwellings	943	Housing Trajectory			10	0.175	0.024	0.199	0.078	0.082	0.160	0.061	0.159	0.220	0.163	0.024	0.187	0.077	0.080	0.157	0.061	0.152	0.213	2	0	2	1	1	2	1	2	2	2	0	2	1	1	2	1	2	1	2	2	
SCDC_87	Land adj. to 45 & 50 Watson Way, Alderton	Suffolk Coastal Core	Suffolk Coastal	Housing	Near certain	Calculate dwellings	859	Housing Trajectory			10	0.175	0.024	0.199	0.078	0.082	0.160	0.061	0.159	0.220	0.163	0.024	0.187	0.077	0.080	0.157	0.061	0.152	0.213	2	0	2	1	1	2	1	2	2	2	0	2	1	1	2	1	2	1	2	2	
SCDC_106	Land at Junction of Garrison Lane and High Road West Felstowe	Suffolk Coastal Core	Suffolk Coastal	Housing	Near certain	Calculate dwellings	544	Housing Trajectory			10	0.175	0.024	0.199	0.078	0.082	0.160	0.061	0.159	0.220	0.163	0.024	0.187	0.077	0.080	0.157	0.061	0.152	0.213	2	0	2	1	1	2	1	2	2	2	0	2	1	1	2	1	2	1	2	2	
SCDC_111	Land South East of Rawings Cottage, Saxstead Road, Framlingham	Suffolk Coastal Core	Suffolk Coastal	Housing	Near certain	Calculate dwellings	575	Housing Trajectory			10	0.175	0.024	0.199	0.078	0.082	0.160	0.061	0.159	0.220	0.163	0.024	0.187	0.077	0.080	0.157	0.061	0.152	0.213	2	0	2	1	1	2	1	2	2	2	0	2	1	1	2	1	2	1	2	2	
SCDC_117	Glebe House Residential Care Home, Rectory Road, Holfordley	Suffolk Coastal Core	Suffolk Coastal	Housing	Near certain	Calculate dwellings	335	Housing Trajectory			10	0.175	0.024	0.199	0.078	0.082	0.160	0.061	0.159	0.220	0.163	0.024	0.187	0.077	0.080	0.157	0.061	0.152	0.213	2	0	2	1	1	2	1	2	2	2	0	2	1	1	2	1	2	1	2	2	
SCDC_122	Colonial House, Station Road, Linton	Suffolk Coastal Core	Suffolk Coastal	Housing	Completed	Calculate dwellings	898	Housing Trajectory			10	0.175	0.024	0.199	0.078	0.082	0.160	0.061	0.159	0.220	0.163	0.024	0.187	0.077	0.080	0.157	0.061	0.152	0.213	2	0	2	1	1	2	1	2	2	2	0	2	1	1	2	1	2	1	2	2	
SCDC_129	Land to rear of Cedar House, Pyches Road, Melton	Suffolk Coastal Core	Suffolk Coastal	Housing	Completed	Calculate dwellings	892	Housing Trajectory			10	0.175	0.024	0.199	0.078	0.082	0.160	0.061	0.159	0.220	0.163	0.024	0.187	0.077	0.080	0.157	0.061	0.152	0.213	2	0	2	1	1	2	1	2	2	2	0	2	1	1	2	1	2	1	2	2	
SCDC_142	Land to the rear of 7 Church Road, Saxage	Suffolk Coastal Core	Suffolk Coastal	Housing	Completed	Calculate dwellings	879	Housing Trajectory			10	0.175	0.024	0.199	0.078	0.082	0.160	0.061	0.159	0.220	0.163	0.024	0.187	0.077	0.080	0.157	0.061	0.152	0.213	2	0	2	1	1	2	1	2	2	2	0	2	1	1	2	1	2	1	2	2	
SCDC_143	Former Wallat Gardens, Southbourne Park, Southbourne	Suffolk Coastal Core	Suffolk Coastal	Housing	Near certain	Calculate dwellings	91	Housing Trajectory			10	0.175	0.024	0.199	0.078	0.082	0.160	0.061	0.159	0.220	0.163	0.024	0.187	0.077	0.080	0.157	0.061	0.152	0.213	2	0	2	1	1	2	1	2	2	2	0	2	1	1	2	1	2	1	2	2	
SCDC_78	Station Terrace, Framlingham	Suffolk Coastal Core	Suffolk Coastal	Housing	Near certain	Calculate dwellings	895	Housing Trajectory			4	0.175	0.024	0.199	0.078	0.082	0.160	0.061	0.159	0.220	0.163	0.024	0.187	0.077	0.080	0.157	0.061	0.152	0.213	1	0	1	0	1	1	1	1	1	0	1	0	1	0	1	0	1	0	1		
SCDC_115	Brook Lane, Framlingham	Suffolk Coastal Core	Suffolk Coastal	Housing	Near certain	Calculate dwellings	894	Housing Trajectory			0	0.175	0.024	0.199	0.078	0.082	0.160	0.061	0.159	0.220	0.163	0.024	0.187	0.077	0.080	0.157	0.061	0.152	0.213	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
SCDC_153	Land at Netcotts Garden Centre, Ipswich Road, Woodbridge	Suffolk Coastal Core	Suffolk Coastal	Housing	Near certain	Calculate dwellings	863	Housing Trajectory			0	0.175	0.024	0.199	0.078	0.082	0.160	0.061	0.159	0.220	0.163	0.024	0.187	0.077	0.080	0.157	0.061	0.152	0.213	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
SCDC_330	Road Trimley St Mary Suffolk	Suffolk Coastal Core	Suffolk Coastal	Employment	Near certain	Deliverable D-5	541			490	46450	0.048	0.199	0.247	0.098	0.095	0.193	0.171	0.072	0.243	0.052	0.211	0.263	0.107	0.103	0.210	0.186	0.076	0.262	23	88	121	48	47	95	84	35	119	25	104	129	52	91	103	91	37	128			
SCDC_48a	Newnam Business Park, Saxstead Road, Framlingham	Suffolk Coastal Core	Suffolk Coastal	Employment	Near certain	Deliverable D-5	325			477	5959	0.048	0.199	0.247	0.098	0.095	0.193	0.171	0.072	0.243	0.052	0.211	0.263	0.107	0.103	0.210	0.186	0.076	0.262	23	95	138	47	46	95	84	35	119	25	104	129	52	91	103	91	37	128			
SCDC_36a	Os 1854 Peppers Wash Lane Framlingham	Suffolk Coastal Core	Suffolk Coastal	Employment	Near certain	Deliverable D-5	335			132	1500	0.048	0.199	0.247	0.098	0.095	0.193	0.171	0.072	0.243	0.052	0.211	0.263	0.107	0.103	0.210	0.186	0.076	0.262	6	26	33	13	12	25	22	9	32	7	28	35	14	14	28	24	10	34			
SCDC_36b	Os 1854 Peppers Wash Lane Framlingham	Suffolk Coastal Core	Suffolk Coastal	Employment	Near certain	Deliverable D-5	335			132	1500	0.048	0.199	0.247	0.098	0.095	0.193	0.171	0.072	0.243	0.052	0.211	0.263	0.107	0.103	0.210	0.186	0.076	0.262	6	26	33	13	12	25	22	9	32	7	28	35	14	14	28	24	10	34			
SCDC_36c	Os 1854 Peppers Wash Lane Framlingham	Suffolk Coastal Core	Suffolk Coastal	Employment	Near certain	Deliverable D-5	335			132	1500	0.048	0.199	0.247	0.098	0.095	0.193	0.171	0.072	0.243	0.052	0.211	0.263	0.107	0.103	0.210	0.186	0.076	0.262	6	26	33	13	12	25	22	9	32	7	28	35	14	14	28	24	10	34			
SCDC_36d	Os 1854 Peppers Wash Lane Framlingham	Suffolk Coastal Core	Suffolk Coastal	Employment	Near certain	Deliverable D-5	335			132	1500	0.048	0.199	0.247	0.098	0.095	0.193	0.171	0.072	0.243	0.052	0.211	0.263	0.107	0.103	0.210	0.186	0.076	0.262	6	26	33	13	12	25	22	9	32	7	28	35	14	14	28	24	10	34			
SCDC_46a	Benwaters Business Park, Rendisham	Suffolk Coastal Core	Suffolk Coastal	Employment	Near certain	Deliverable D-5	357			112	1400	0.048	0.199	0.247	0.098	0.095	0.193	0.171	0.072	0.243	0.052	0.211	0.263	0.107	0.103	0.210	0.186	0.076	0.262	5	22	28	11	11	22	19	8	27	6	24	29	12	12	24	21	9	29			
SCDC_41a	Unit 34-36, Ronald Lane, Carlton Park Industrial Estate, Kelke cum Carlton	Suffolk Coastal Core	Suffolk Coastal	Employment	Near certain	Deliverable D-5	576			100	1250	0.048	0.199	0.247	0.098	0.095	0.193	0.171	0.072	0.243	0.052	0.211	0.263	0.107	0.103	0.210	0.186	0.076	0.262	5	20	25	10	10	19	17	7	24	5	21	26	11	10	21	19	8	26			
SCDC_72b	Land at Old Station Works, Main Road, Westfield	Suffolk Coastal Core	Suffolk Coastal	Employment	Near certain	Deliverable D-5	863	#N/A		90	1130	0.048	0.199	0.247	0.098	0.095	0.193	0.171	0.072	0.243	0.052	0.211	0.263	0.107	0.103	0.210	0.186	0.076	0.262	0	0	0	0	0	0	0	0	0	5	19	24	10	9	19	17	7	23			
SCDC_50	Old Jet 567, Benwaters Parks, Rendisham	Suffolk Coastal Core	Suffolk Coastal	Employment	Completed	Deliverable D-5	358			89	1115	0.048	0.199	0.247	0.098	0.095	0.193	0.171	0.072	0.243	0.052	0.211	0.263	0.107	0.103	0.210	0.186	0.076	0.262	4	18	22	9	8	17	15	6	22	5	19	23	10	9	19	17	7	23			
SCDC_177	Snape Millings, Snage Bridge, Tunstall	Suffolk Coastal Core	Suffolk Coastal	Employment	Near certain	Deliverable D-5	870			75	935	0.048	0.199	0.247	0.098	0.095	0.																																	



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