Buro Happold

023422 - North and north East Dorset Transport Study

Transport Modelling Report

March 2010

Revision 01

North Dorset District Council

East Dorset District Council So much to offer

DORSET County Council

HIGHWAYS AGENCY

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Foreword

1. The North & north East Dorset Transport Study (N&nETS) is one of 3 transport studies currently being undertaken by Buro Happold for Dorset County Council. The other 2 are the West Dorset Transport Study (WTS) and the Weymouth & Portland Transport Study (W&PTS). A further study is being undertaken by Atkins covering the South East Dorset area.

2. These studies provide what is called "front loading evidence" into the current Local Development Framework (LDF) (replacement of Local Plans) processes being undertaken by all District Local Planning Authorities (LPAs) across Dorset.

3. Buro Happold's preparation of the N&nETS has been overseen and guided by a Steering Group that provides for representation of the responsible LPAs - North Dorset District Council and East Dorset District Council together with various County Council disciplines, the Highways Agency (HA), the Dorset AONB (DAONB), the Cranborne Chase and West Wiltshire Downs AONB (CC&WWDAONB), and Dorset Association of Parish and Town Councils (DAPTC).The partnership basis of the Steering Group is reflected by the front cover of this document. The studies included opportunity for input in the early stages by local communities and other key stakeholders

4. The LDF process, the input to them of the transport studies and their inter-relationship with Dorset's Local Transport Plans, highway network management and improvement has been explained on numerous occasions within the county since 2004. The Autumn/Winter 2090 round of consultation liaison meetings between District and County Council Elected Members gave the opportunity for an updating explanation. The N&nETS was specifically explained through PowerPoint presentation at the North Dorset Liaison meeting on 06th November 2oo9.

   Pertinent points of that presentation included:

   - The 3 Buro Happold transport studies are confined to providing evidence documents supporting preparation of the LDF Core Strategies. The work has also informed the preparation of the second generation Management Plans of both the Dorset AONB and the Cranborne & West Wiltshire Downs AONB's They will also will provide input into and influence on the evolution of the next generation Dorset Local Transport Plan (LTP 3) which is currently in early stages of preparation.

   - The District LPA's are each assembling a raft of evidence studies covering all relevant subject areas necessary to inform their LDF Core Strategy preparations. All but the transportation evidence is being assembled by the LPA's themselves. The County Council's lead on the transport evidence underlines the special relationship that exists in the county between the County Council and it partner District Councils..

   - These Core Strategies are subjected to Examination in Public by the Planning Inspectorate for conformity with Government Planning Policy – notably Planning Policy Statement 12:Local Spatial Planning (PPS 12. 2008)

   - As evidence documents the transport studies are intended to provide the LPA's with information about the repercussive effects of the development that is proposed to be brought forward in the LDF's. They therefore only provide information on the current state of the transport infrastructure and the projected effects that any proposed development in a District would have on that infrastructure within the plan (time) period of that LDF. In conformity with PPS 12 the studies will, by the time of Public Examination, be extended to propose strategies for mitigating any effect on the infrastructure network that can be directly attributable to the proposed development. This strategy will then form the foundation of the transport element of any financial contributions policy that is prepared by LPA's to demonstrate certainty of deliverability of infrastructure – again in conformity with PPS 12.

   - The Buro Happold transport studies are **not** an all encompassing review of the existing network leading to a long term plan for future management and improvement of the overall highway infrastructure. This duty falls to the County Council's Highways & Transportation Division and its established asset management processes.

5. Fundamental to the role of Transport Studies as an evidence base is that they draw on

   - Office for National Statistics (ONS) data
   - Traffic flow data collected by Dorset County Council as a local highway authority
   - Other data prepared by Dorset County Council's Research and Information Team.

Some readers may feel that data validation dates, such as that of current census information, appear "out dated". However the data sets are, in all cases, the latest, consistent and recognised sets available. They provide an adequate information base from which to study the patterns and trends that are appropriate to the strategic nature of the transport study. The "coarseness" or strategic level modelling upon which the study is based is discussed further in the Transport Modelling Report. The benefit of using recognised "standard" data sets such as ONS information allows the models built for the study to by upgraded (repopulated) when new data, such as the next census, becomes available. The studies do not therefore provide a fast track source of detailed information for potential developers in respect of specific sites. Any development proposal will still need the transport aspects analysed and promoted by the recognised and established processes of masterplanning with supporting movement framework planning and full impact assessments.

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Chair of the N&nETS Steering Group
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00	Draft Transport Modelling Report	FK	June 2009	JDW
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Author	Francis King
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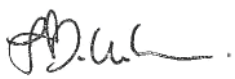
Signature	
Date	March 2010

Contents

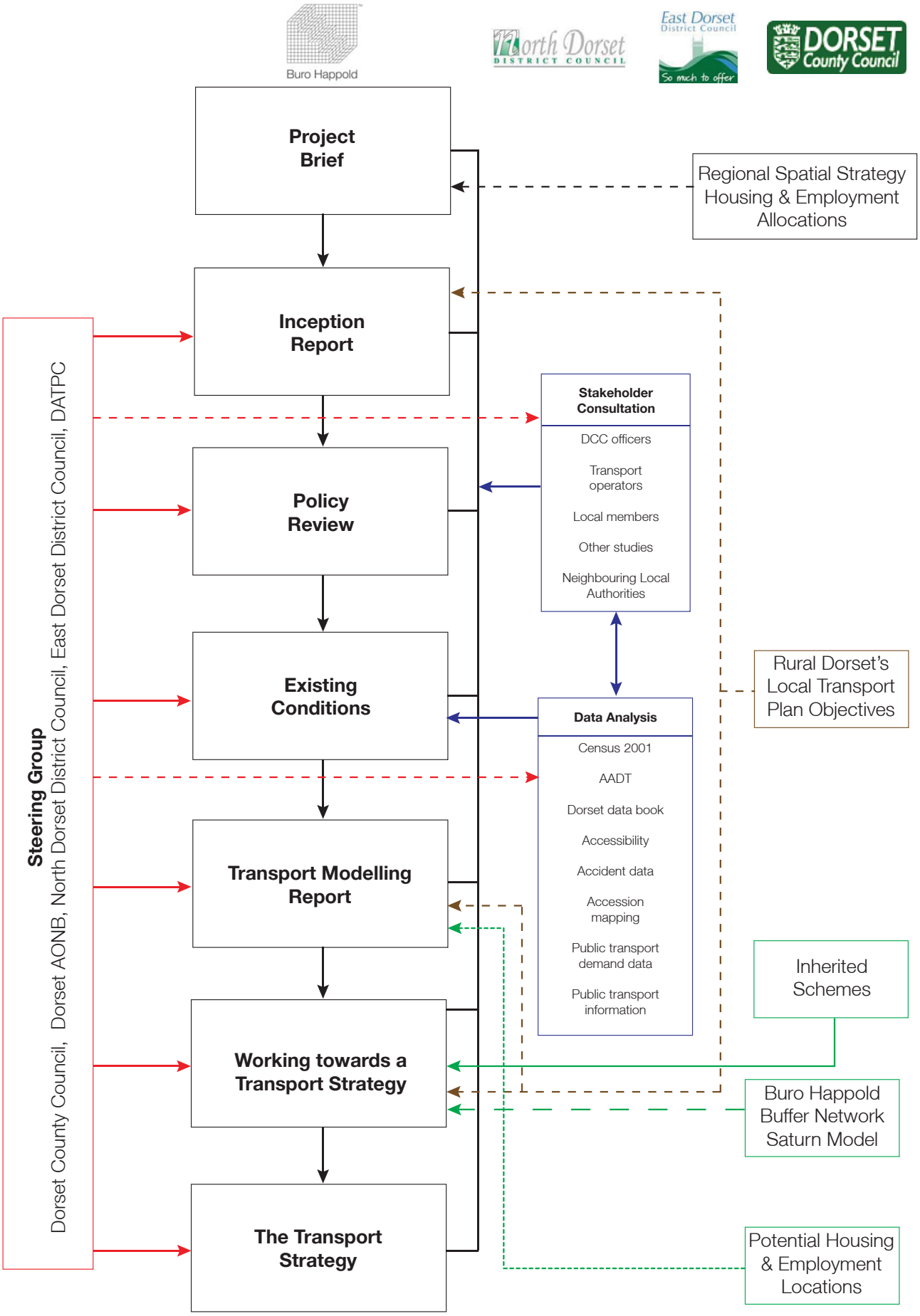


Figure 1-1 *Structure of North and north East Dorset Transport Study*

1 Introduction

1.1 Background

Central Government requires that planning authorities produce a Local Development Framework (LDF) to identify how planning issues will be managed within their area. The LDF will consist of a suite of Development Plan Documents (DPDs). Within the South West region LDF's need to respond to the direction of the South West Regional Assembly (the regional planning body) contained within the Regional Spatial Strategy (RSS). North Dorset District Council (NDDC) and East Dorset District Council (EDDC), as the planning authority will produce the LDF for the area. Dorset County Council, as the highway authority, is working closely with both NDDC and EDDC to provide a transportation evidence base to the LDF process.

Dorset County Council has commissioned Buro Happold to work in partnership with the County to produce a Transportation Evidence Report to support NDDC and EDDC in the Options Consultation. The Evidence Report will be informed by the following Background Papers:

- Policy Review;
- Existing Conditions; and
- Transport Modelling

Upon adoption of a preferred Option, Buro Happold will produce a Transport Strategy to support the Option and a Delivery Strategy which will inform a development Contributions Strategy. The structure of documents output from the study is illustrated in Figure 1-1.

This report sets out the Transport Modelling and is intended to report on the technical work that has been undertaken to support the development of the transport strategy.

2 Methodology

At an early stage in the development of Transport Strategy it was recognised by the stakeholder group that the rural nature of the road network in Dorset means that it is important to understand the impact of development on the highway links. To achieve this, a 'coarse' traffic model has been developed using the SATURN traffic modelling program. The model's sole purpose is to inform this report and provide a comparison of the traffic flow on the various roads in and around the study area for the various scenarios. The SATURN traffic model does therefore not consider the impact of the additional traffic flow on individual junctions (it is known as a 'buffer' network model).

This report provides a technical overview of the SATURN model:

- Chapter 3 reports the development of the Baseline Model;
- Chapter 4 reports on the development of the Future Year Model; and
- Chapter 5 provides a Summary and Conclusion.

3 The Baseline Model

3.1 The Model

A SATURN model requires three main components:

- A network (containing roads, known as links, and areas of the study area called zones)
- A prior matrix (the best estimate of trips between zones that can be calculated)
- Observed data which can be used to improve the traffic flows that the SATURN model constructs from the network and prior matrix

Two prior matrix files were required, one for the AM peak (08:00-09:00) and one for the PM peak (17:00-18:00). The SATURN model was built in the standard manner. The network file was built using SATNET, the prior matrix files were built using MX, and then the prior matrices were assigned to the network using SATALL.

3.2 The Model Area

The model area is shown in Figure 3-1 The modelled area consists of the geographic area within the boundary of Dorset, including Bridport, Poole and Bournemouth, but also including Yeovil (within Somerset), Salisbury (within Wiltshire), Ringwood (within Hampshire) and the A303.

Figure 3-1 *The model area*

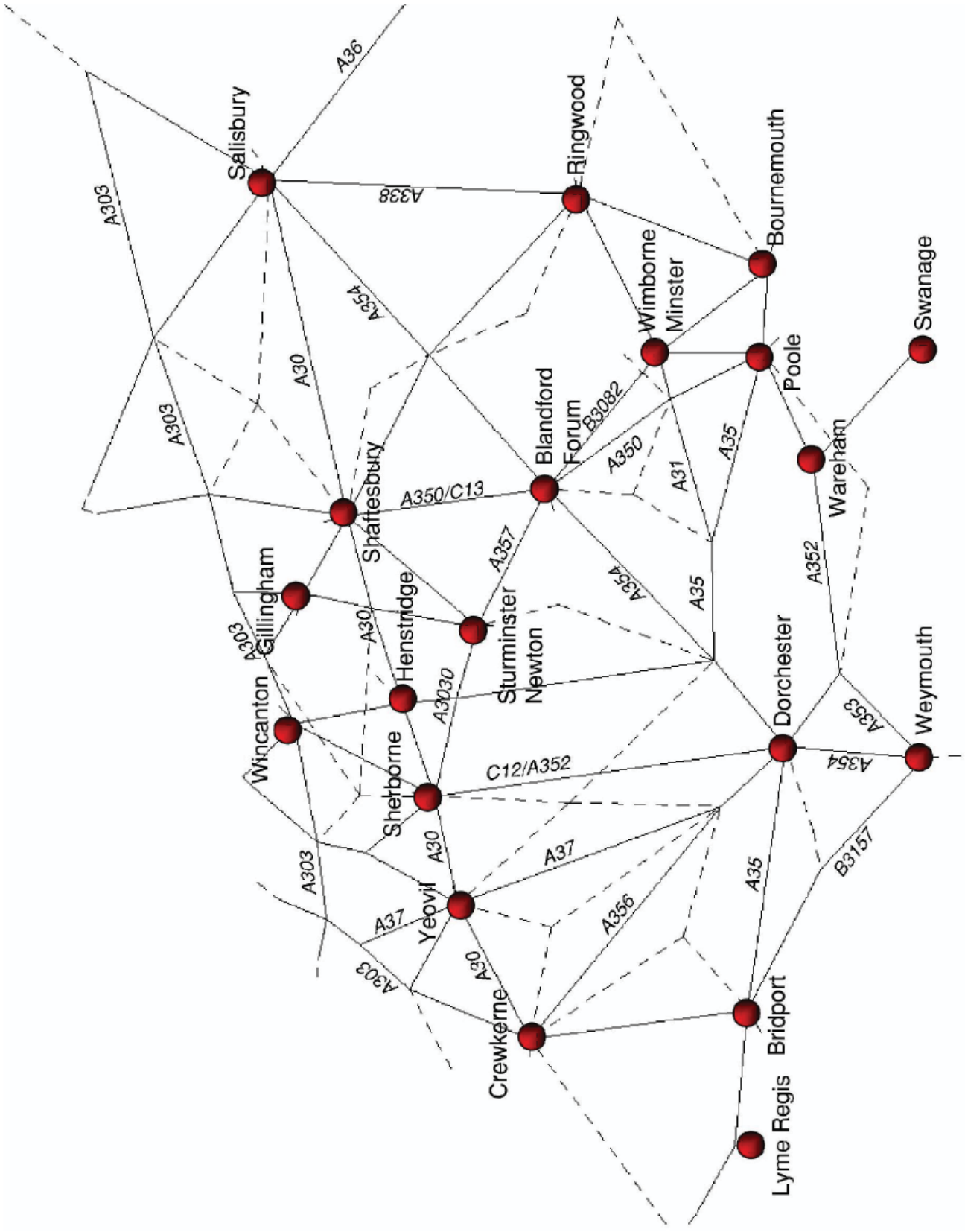


Figure 3-2 *The SATURN road network*

3.3 The Network

The network for the SATURN model was designed to include all of the major conurbations and the major roads within the road network. Inevitably, some smaller built-up areas couldn't be distinctly shown, and these were incorporated into rural areas. Equally, some of the minor roads were not reproduced as part of the model, as it was intended that only A roads and significant B roads should be represented.

The network was built from KML data, produced by defining the network using satellite mapping. The Excel spreadsheet interpreted the KML file into location points in the SATURN network file. A data table in the spreadsheet was used to define the network connections.

The network for the SATURN model is shown in Figure 3-2. In the first version of the model, the B3082 between Wimborne Minster and Blandford Forum was not included, as it is only a B-road, however it was found to be necessary in order to correctly reproduce the flows on the A350 between Blandford Forum and Poole. The B3157 was also added to the model, since it is an important road in the southwest of Dorset. One link between Blandford Forum and Shaftesbury is used to represent the parallel A350 and C13 roads.

The network was built as a buffer network, that is to say, without consideration for the nature of the road junctions. The model was built this way because, given the distances between nodes, the link delays are much greater than the node delays. The nodes were labelled starting with 1001.

3.4 The Prior Matrix

The predicted trips in the existing situation are contained within a 'prior matrix', which is the first estimate of the trips between zones. The prior matrix has to be reasonably accurate; however, any inaccuracies are corrected by the calibration process later in the model building.

The zoning was defined by the SATURN network. Zones fell into three categories:

- The main towns and cities
- Other rural areas within the study area
- Other rural areas outside the study area

Each zone was given a numbered label, starting from 2001. In total 41 zones were selected, as detailed in Table 3-1 Many of the zones are linked directly to equivalent nodes, so that Weymouth, for example, is represented by node 1001 and zone 2001. The Northing values are the actual latitude, the Easting values are longitude values relative to the smallest value (this is done for technical reasons related to SATURN).

Zone	Name	# Homes	Easting	Northing
2001	Weymouth	33,282	46565	5058448
2002	Rural	2,741	34143	5067796
2003	Rural	4,452	24302	5077710
2004	Bridport	6,202	13380	5072275
2005	External	22,597	0	5077874
2006	External	7,529	36543	5100798
2007	Rural	1,675	24857	5086884
2008	Yeovil	23,983	29351	5093624
2009	Rural	5,384	39591	5085633
2010	Sherborne	5,342	40415	5095869
2011	Rural	4,611	59702	5088672
2012	Shaftesbury	4,654	71534	5102028
2013	External	6,098	85888	5111012
2014	Rural	1,692	83171	5098153
2015	Salisbury	51,425	114187	5107589
2016	Rural	17,929	100318	5091016
2017	New Forest	69,007	131352	5085988
2018	Wimborne Minster	17,190	94744	5080431
2019	Bournemouth	104,744	106276	5071410
2020	Poole	70,752	94877	5071101
2021	Dorchester	10,002	50717	5070378
2022	Rural	5,368	77754	5066862
2023	Rural	2,319	76029	5081183
2024	Gillingham	13,043	62661	5104006
2025	Ringwood	6,785	113150	5085226
2026	Crewkerne	10,680	9499	5088383
2027	Blandford Forum	4,485	73951	5086669
2028	Sturminster Newton	2,164	45669	5090879
2029	Wareham	4,128	58678	5068333
2030	Swanage	5,011	66141	5060070
2031	North of A303 - A372	4,101	22354	5107124
2032	External	10,606	12794	5093811
2033	External	13,758	54330	5119427
2034	External	13,146	95745	5129393
2035	External	15,113	94804	5094869
2036	Lyme Regis	2,023	7629	5072160
2037	Henstridge	550	42001	5099010
2038	External	2,315	34485	5108334
2039	Wincaton	2,472	39662	5105704
2040	North of A303 - A37	3,111	39662	5105704
2041	Mere	600	39662	5105704

Table 3-1 SATURN Model Zones

To distribute trips around the zones, Buro Happold had interrogated the Census 2001 data, showing the number of occupied households in each region of Dorset and the surrounding counties, for the year 2001. This is shown in Appendix A. Buro Happold was able to up-scale the number of households by region to 2007, on the basis that the total number of households in Dorset in 2001 and 2007 were known. The number of households in all regions was up-scaled by the ratio given by the number of Dorset households in 2007 divided by the number of number of Dorset households in 2001.

The trips then needed to be distributed across the network. The method chosen was the gravity model. Thus the number of trips between zones 'i' and 'j' were given by the following equation:

$$T_{ij} = A\frac{H_i H_j}{d^2}$$

Where:

- H is the number of occupied homes in the zone
- d is the distance between the two zones, as the crow flies
- A is a constant, needed to make the sum of Tij equal to Ti

In the morning peak, people leave their house for a variety of destinations. In the evening, they leave a variety of origins towards their houses. Therefore, in the morning peak hour, the trips from zone 'i' to zone 'j' was calculated as the proportion of the departures from zone 'i'. In the evening peak, the trips from zone 'i' to zone 'j' was calculated as the proportion of arrivals at zone 'j'.

More advanced trip distribution algorithms are available, but this was considered sufficient for the construction of a prior matrix.

The trip matrices from this process were processed in data files acceptable to SATURN, and were converted by SATURN into binary data files. The trip matrices were unlikely to be very accurate (taking into account assumptions made in trip generation, the discounts applied to each zone, and the trip distribution), but were considered to be good enough for use as prior matrices.

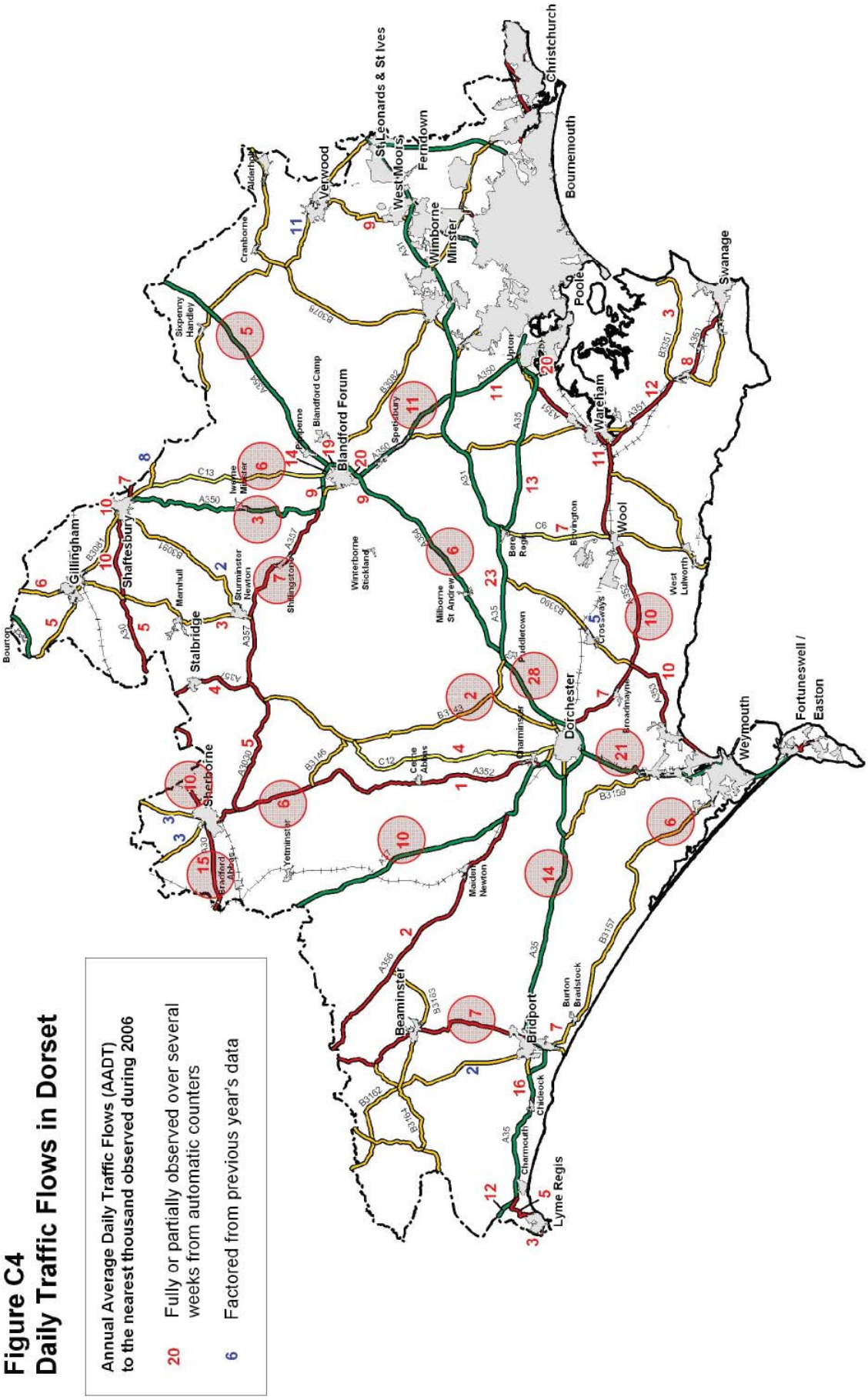


Figure 3-1 *Locations of observed traffic counts (shaded circles) - Original drawing, DCC*

3.5 Calibrating the Model

Dorset County Council, Somerset County Council, and Wiltshire County Council, supplied the observed flows as detailed in Table 3-2 andTable 3-3, with the count locations within Dorset shown in Figure 3-1. The observations were made at different times within a two year period, but generally in neutral months.

		From	To	Observed AM peak	Observed PM peak
A	A30, E of Sherborne	1007	1037	300	650
		1037	1007	650	400
B	A30, W of Sherborne	1007	1006	750	650
		1006	1007	650	800
C	A352, Longburton	1002	1007	400	300
		1007	1002	300	300
D	A37, Staggs Folly	1004	1006	500	450
		1006	1004	450	550
E	A3066, N of Bridport	1003	1005	300	300
		1005	1003	300	300
F	A35, W of W. Abbas	1002	1010	650	550
		1010	1002	450	750
G	B3157, W. Chickerell	1001	1022	300	250
		1022	1001	350	450
H	A354, Monkton Hill	1002	1001	600	850
		1001	1002	950	700
I	A352, W of Owermoigne	1023	1025	600	300
		1025	1023	300	550
J	A35, Yellowham Hill	1003	1002	583	743
		1002	1003	522	657
K	B3143, S. Piddletrenthide	1010	1024	100	130
		1024	1010	140	70
L	A354, Milborne St. Andrew	1010	1009	300	350
		1009	1010	300	300
M	A350, Spetisbury	1021	1009	500	600
		1009	1021	550	500
N	A354, Canada Farm	1009	1018	250	200
		1018	1009	200	300
O/P	C13, Stourpaine Down - A350, S of Iwerne Minster	1009	1008	400	450
		1008	1009	500	450
Q	A357, W of New Gate Cross	1009	1016	300	400
		1016	1009	400	350
T	A30,East of Shaftesbury	1008	1015	447	300
		1015	1008	311	399

Table 3-2 Observed flows at locations in the Dorset road network (Source: DCC)

		From	To	Observed AM peak	Observed PM peak
New Dorset and HA Data	N(E) of Sherborne	1007	1031	146	194
		1031	1007	221	162
	NW of Sherborne	1007	1039	139	137
		1039	1007	179	114
	N of Shaftesbury (A350)	1009	1034	234	272
		1034	1009	205	299
	W of Bridport	1003	1038	471	617
		1038	1003	558	523
	W of Lyme Regis	1038	1040	361	475
		1040	1038	344	468
	NW of Gillingham	1020	1032	230	219
		1032	1020	228	304
	NE of Gillingham	1020	1033	260	260
		1033	1020	220	340
	SE of Gillingham	1020	1008	547	414
		1008	1020	357	556
	SW of Gillingham	1020	1017	189	237
		1017	1020	266	231
	A303 - 5246	1030	1031	1,469	1,944
		1031	1030	702	954
	A303 - 3206	1033	1034	667	742
		1034	1033	478	804
	A303 - 3091	1035	1036	924	839
		1036	1035	743	981
	NW of Salisbury - 3512	1015	1035	286	483
		1035	1015	465	339
	SE of Salisbury - 3500	1015	1047	634	805
		1047	1015	807	584
New Somerset Data	A3088 Gaundle Farm	1006	1027	582	1,116
		1027	1006	1,142	597
	A37 Yeovil Marsh	1006	1028	587	714
		1028	1006	713	660
	North of A303 / Yeovil - A372	1029	1041	337	297
		1041	1029	270	261
	Sparkford to Castle Cary	1030	1043	188	230
		1043	1030	219	230
New Wiltshire Data	A338 Winterborne Gunner (site B2)	1015	1036	396	320
		1036	1015	347	373
	A350 north of A303 (site M1)	1034	1045	310	382
		1045	1034	327	384
	A36 north of A303	1035	1046	340	490
		1046	1035	507	371

Table 3-3 Observed flows at locations in the road network (Source: DCC, SCC, WCC)

3.6 Calibration Methodology

The observed flows were added into the model, using the Matrix Estimation by Maximum Entropy tool built into SATURN (SATPIJA and SATME2). All of the observed data was assumed to be equally valid, and so was specified in the order shown in Table 4 (as opposed to specifying it in increasing order of reliability).

The quality of the model was measured by comparing how close the flows along the links specified in Table 4 were to those observed. The GEH statistic was used to determine how close the observed flows were to the modelled flows.

The GEH statistic is defined as follows:

$$GEH = \sqrt{\frac{(V_1 - V_2)^2}{\frac{1}{2}(V_1 + V_2)}}$$

Effectively, it is measuring how far the two values are apart, relative to their average value. This is better measure than just examining their difference.

Table 3-4 and Table 3-5 show the results of this calculation, for the final model. Most of the links have GEH values much less than 5.0. An overall GEH statistic was calculated by taking the Root-Mean-Square (RMS) of all GEH values calculated. This was used to determine if, on balance each modification made to the network was having a beneficial effect or not. The RMS-GEH value was calculated to be 2.34, which is a good value for a model.

		Observed	AM		Observed	PM	
		AM peak	Model	GEH	PM peak	Model	GEH
A	A30, E of Sherborne	300	291	0.5	650	670	0.8
		650	683	1.3	400	418	0.9
B	A30, W of Sherborne	750	780	1.1	650	663	0.5
		650	654	0.2	800	854	1.9
C	A352, Longburton	400	385	0.8	300	278	1.3
		300	283	1.0	300	286	0.8
D	A37, Staggs Folly	500	539	1.7	450	488	1.8
		450	455	0.2	550	541	0.4
E	A3066, N of Bridport	300	322	1.2	300	345	2.5
		300	321	1.2	300	300	0.0
F	A35, W of W. Abbas	650	550	4.1	550	504	2.0
		450	445	0.2	750	681	2.6
G	B3157, W. Chickerell	300	308	0.5	250	263	0.8
		350	307	2.4	450	377	3.6
H	A354, Monkton Hill	600	641	1.6	850	904	1.8
		950	921	0.9	700	687	0.5
I	A352, W of Owermoigne	600	693	3.7	300	323	1.3
		300	308	0.5	550	636	3.5
J	A35, Yellowham Hill	583	571	0.5	743	625	4.5
		522	493	1.3	657	649	0.3
K	B3143, S. Piddletrenthide	100	82	1.9	130	95	3.3
		140	99	3.8	70	60	1.2
L	A354, Milborne St. Andrew	300	318	1.0	350	286	3.6
		300	248	3.1	300	330	1.7
M	A350, Spetisbury	500	508	0.4	600	727	4.9
		550	780	8.9	500	568	2.9
N	A354, Canada Farm	250	316	3.9	200	289	5.7
		200	292	5.9	300	419	6.3
O/P	C13, Stourpaine Down - A350, S of Iwerne Minster	400	364	1.8	450	439	0.5
		500	364	6.5	450	361	4.4
Q	A357, W of New Gate Cross	300	280	1.2	400	385	0.8
		400	480	3.8	350	396	2.4
T	A30, East of Shaftesbury	447	409	1.8	300	293	0.4
		311	246	3.9	399	393	0.3

Table 3-4 GEH Statistic for the AM and PM peak periods

		Observed	AM		Observed	PM	
		AM peak	Model	GEH	PM peak	Model	GEH
New Dorset and HA Data	N(E) of Sherborne	146	157	0.9	194	235	2.8
		221	217	0.3	162	146	1.3
	NW of Sherborne	139	112	2.4	137	106	2.8
		179	194	1.1	114	132	1.6
	N of Shaftesbury (A350)	234	217	1.1	272	278	0.4
		205	182	1.7	299	250	3.0
	W of Bridport	471	468	0.1	617	614	0.1
		558	555	0.1	523	514	0.4
	W of Lyme Regis	361	358	0.2	475	472	0.1
		344	340	0.2	468	459	0.4
	NW of Gillingham	239	237	0.1	219	227	0.5
		228	236	0.5	304	309	0.3
	NE of Gillingham	268	242	1.6	268	251	1.1
		220	217	0.2	348	312	2.0
	SE of Gillingham	547	560	0.6	414	419	0.2
		357	355	0.1	556	609	2.2
	SW of Gillingham	189	200	0.8	237	241	0.3
		256	244	0.8	231	212	1.3
	A303 - 5246	1,469	1288	4.9	1,944	1852	2.1
		702	676	1.0	954	939	0.5
	A303 - 3206	667	597	2.8	742	691	1.9
		478	430	2.3	804	699	3.8
	A303 - 3091	924	890	1.1	839	812	0.9
		743	635	4.1	981	822	5.3
	NW of Salisbury - 3512	286	228	3.6	483	475	0.4
		465	468	0.1	338	291	2.7
	SE of Salisbury - 3500	634	634	0.0	805	805	0.0
		807	807	0.0	584	584	0.0
New Somerset Data	A3088 Gaundle Farm	582	584	0.1	1,116	1129	0.4
		1,142	1125	0.5	597	592	0.2
	A37 Yeovil Marsh	587	606	0.8	714	639	2.9
		713	591	4.8	660	663	0.1
	North of A303 / Yeovil - A372	337	337	0.0	297	297	0.0
		270	270	0.0	261	261	0.0
	Sparkford to Castle Cary	188	190	0.1	230	231	0.1
		219	219	0.0	230	230	0.0
New Wiltshire Data	A338 Winterborne Gunner (site B2)	396	432	1.8	320	347	1.5
		347	445	4.9	373	531	7.4
	A350 north of A303 (site M1)	310	303	0.4	383	379	0.2
		327	327	0.0	364	362	0.1
	A36 north of A303	340	347	0.4	490	494	0.2
		587	587	0.0	371	373	0.1

Table 3-5 GEH Statistic for the AM and PM peak periods

Figure 3 4 and Figure 3 5 show the two-way traffic flows, observed and modelled, for the AM and PM peak hours. The model is clearly a good fit to the observed data.

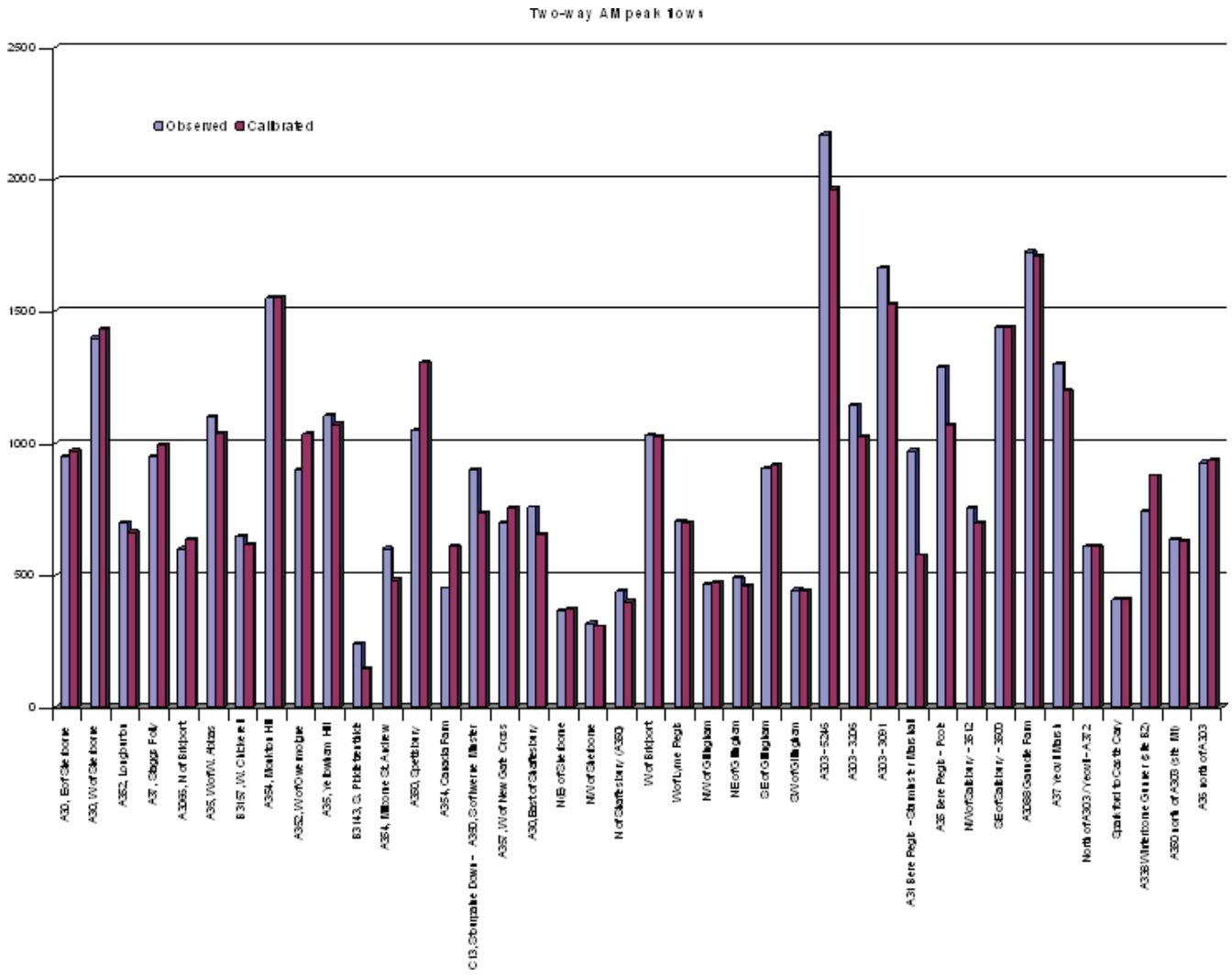


Figure 3 4 *AM peak two-way flows comparison*

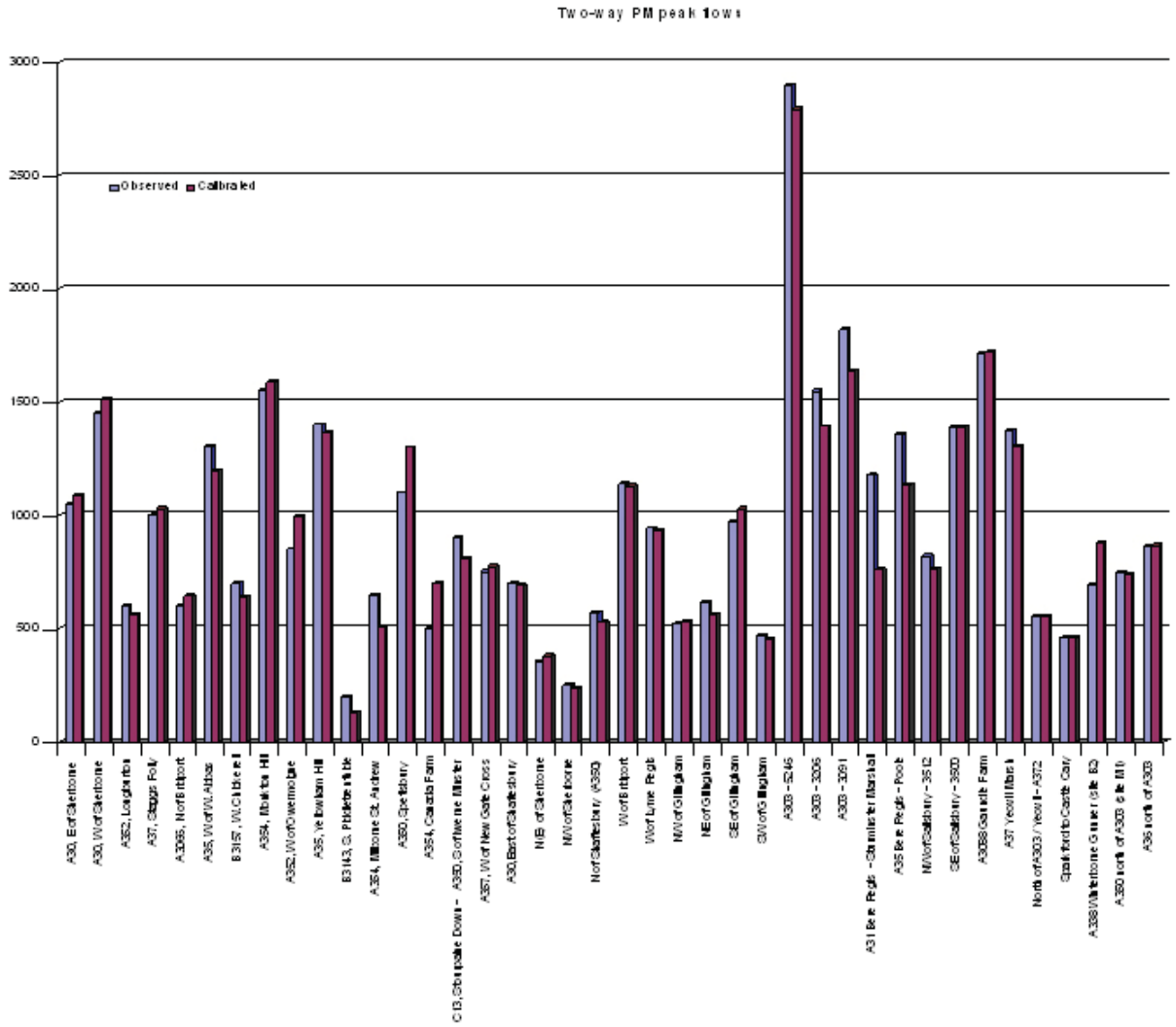


Figure 3 5 *PM peak two-way flows comparison*

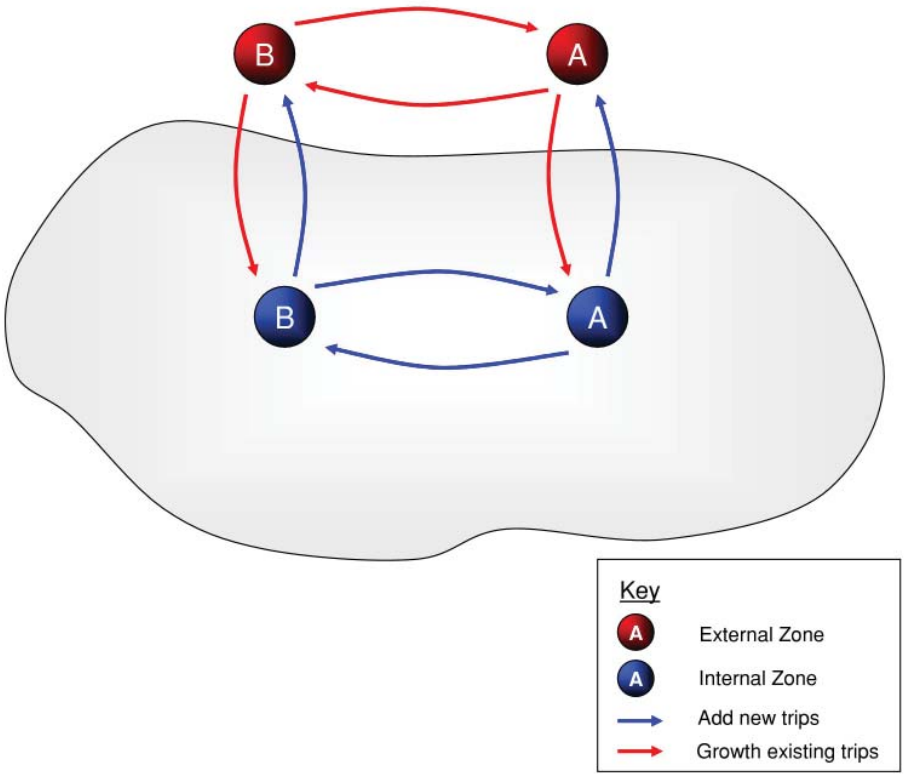


Figure 4-1 *Methodology applied to different zone types*

4 Future Year Models

4.1 Building The Future Year Models

The construction of Dorset SATURN models for the 2008 AM and 2008 PM periods provided the base models for the prediction of future conditions. A substantial quantity of observed data was added to the build of the AM and PM base models, so that matrix estimation could be used to modify the prior matrices. These modified prior matrices were taken to be an accurate account of the existing conditions, and were labelled as the 2008 base year matrices. Future trips from additional housing were predicted, and were applied directly to the base year matrices in order to create future year models for the AM and PM peaks of 2016 and 2026.

The zones in the SATURN model were divided into two types; internal zones, which are within the modelled area, and externals zones which represent the area beyond the modelled area.

The extra future trips between zones, due to the increase in housing provision, were predicted in one of two ways:

1) For departures from an internal zone to any other zone, census data was used and added onto the base matrix

2) For departures from an external zone to any other zone, the O-D pair in the base matrix was scaled up by the growth factor from TEMPRO for that external zone

In the case of traffic flows between internal and external zones, the departures from the internal zone to the external zone were predicted using the census data and trip rates approach; and the departures from the external zone to the internal zone were predicted using the TEMPRO approach.

This is shown in Figure 4 1.

This approach was adopted because the internal zones contain a known predicted number of extra houses, and therefore appropriate trip rates could be used to predict the number of trips due to the extra housing, which could then be distributed according to the employment trip distribution in the 2001 census data. External zones consist of a large area, containing an unknown amount of extra housing in the future years, of which an unknown proportion of trips are to and from the model area. Therefore, growth factors from TEMPRO needed to be applied instead.

4.2 Trip Rates

Vehicular trips generated by development in each zone were calculated using the TRICs (2008b) database. TRICS is a national (UK and Ireland) trip generation and analysis database that contains trip generation data for over 2800 sites. Based on the observed numbers of trips to/from these sites TRICS creates trip rates which allow for the number of trips generated by similar developments to be calculated.

Different trip rates are generated for arrivals and departures for each hour during the day. In this study it is the impact of traffic on the network during the peak hours that is of interest. There are generally assumed to be two peaks during the day, the morning (AM) peak at 8:00-9:00 and the evening (PM) peak at 17:00-18:00. Trip rates for arrivals and departures were generated for each of these periods.

TRICS can generate trip rates for a number of independent variables: floor area, employees etc. In this case information on the number of dwellings to be constructed was provided. The trip rates used in this assessment are, therefore, per dwelling. Different trip rates have been applied to rural and urban areas to reflect the different travel patterns:

The characteristics chosen using TRICs to select suitable survey sites for each category are shown in Table 4 1.

Parameter	Urban	Rural
TRICS Land Use Category	3A – Residential – Houses privately owned	3A – Residential – Houses privately owned
Locations Included	Town Centre,	
Edge of Town Centre,		
Suburban Area,		
Edge of Town,		
Neighbourhood Centre	Edge of Town,	
Neighbourhood Centre,		
Free Standing		
Days	Mon-Fri	Mon-Fri
Population within 1 mile	1,001 to 25,000	1,001 to 15,000
Population within 5 miles	5,001 to 250,000	5,001 to 75,000
No. Surveys included	55	14

Table 4 1 Trip Rate Categories and their Assumed Characteristics

4.3 Vehicle Trips

By multiplying the derived trip rates by the number of dwellings potentially located in each zone in North and north East Dorset, West Dorset and Weymouth and Portland, the numbers of trips (arrivals and departures for AM and PM peaks) that will be generated was calculated. The Trip Rate Calculation Selection Parameters from TRICs are presented in Appendix B. Trip generation was carried out for development up to the years 2008, 2016 and 2026.

The trip rates (per household) for developments in rural and urban zones are given in Table 4 2

Location	Period	Arrivals	Departures	Totals
Urban Zone	AM	0.147	0.426	0.573
	PM	0.396	0.234	0.630
	Daily	3.630	3.613	7.243
Rural Zone	AM	0.176	0.437	0.613
	PM	0.424	0.243	0.667
	Daily	4.046	4.074	8.120

Table 4 2 Vehicle Trip Rates

4.4 Vehicle Trip Distribution

Trips were distributed across the SATURN network using the 2001 National Census origin and destination survey dataset. This is a record of where people aged between 16 and 74, in employment, live and work, including full time students. These locations are defined in the dataset by ward, as set out by the 2003 administrative hierarchy. Each ward in the study area and the neighbouring areas were reconciled to fit into the 41 zones used in the traffic model as shown in Table 3 1. Trips generated and attracted to wards outside of the study area were assumed to travel to zones on the periphery of the buffer network. For example, people who live in Gillingham and work in Andover are assumed to travel from zone 2024 to zone 2034 using the A303.

The census origin and destination dataset was interrogated to find out where people living in each ward work. Where fewer than 10 people travel between two particular wards, for example between Gillingham Town Centre and Dorchester North, the trips were discounted. This is because the census data was used to identify only the main patterns of movements. The percentage of people travelling between each zone was calculated and the total number of trips generated by development in each zone was then distributed across the model to generate the trip matrix.

Table 4 3 Predicted trips by zone

Zone	Name	Internal Reduction	External AM peak trips		External PM peak trips	
			Arrivals	Departures	Arrivals	Departures
2001	Weymouth	70%	1108	2446	2456	1468
2002	Rural	0%	304	671	674	403
2003	Rural	0%	494	1091	1095	654
2004	Bridport	70%	207	456	458	274
2005	External	90%	251	554	556	332
2006	External	50%	418	922	926	553
2007	Rural	0%	186	410	412	246
2008	Yeovil	70%	799	1763	1770	1058
2009	Rural	0%	598	1319	1325	791
2010	Sherborne	55%	267	589	591	353
2011	Rural	0%	512	1130	1134	678
2012	Shaftesbury	70%	155	342	343	205
2013	External	0%	677	1494	1500	896
2014	Rural	0%	188	415	416	249
2015	Salisbury	70%	1712	3780	3795	2268
2016	Rural	0%	1990	4392	4410	2635
2017	New Forest	70%	2298	5072	5093	3043
2018	Wimborne Minster	70%	572	1263	1269	758
2019	Bournemouth	70%	3488	7699	7730	4619
2020	Poole	70%	2356	5200	5221	3120
2021	Dorchester	73%	300	662	664	397
2022	Rural	0%	596	1315	1321	789
2023	Rural	0%	257	568	571	341
2024	Gillingham	53%	680	1502	1508	901
2025	Ringwood	70%	226	499	501	299
2026	Crewkerne	70%	356	785	788	471
2027	Blandford Forum	51%	244	538	541	323
2028	Sturminster Newton	51%	118	260	261	156
2029	Wareham	51%	225	496	498	297
2030	Swanage	51%	273	602	604	361
2031	North of A303 - A372	50%	434	348	401	353
2032	External	50%	589	1299	1305	780
2033	External	80%	305	674	677	404
2034	External	50%	1320	1090	1159	1354
2035	External	50%	1268	1614	1610	1168
2036	Lyme Regis	20%	180	397	398	238
2037	Henstridge	0%	61	135	135	81
2038	External	50%	188	219	230	230
2039	Wincaton	20%	219	484	486	291
2040	North of A303 - A37	50%	337	270	297	261
2041	Mere	0%	67	147	148	88
			26,821	54,911	55,278	34,188

5 Summary and Conclusions

5.1 Summary

Buro Happold has built a SATURN model of the whole of Dorset. This model covers Dorset, and locations around the county's boundary, including Yeovil (within Somerset), (within Wiltshire) and Ringwood (within Hampshire). A prior matrix was constructed from census data and using TRICS trip rates. The traffic was distributed using a gravity model, and was assigned using SATURN. A calibration process led to a SATURN model which had predicted traffic flows which are very close to the observed traffic flows.

5.2 Conclusions

The SATURN model uses a limited variety of existing traffic count data to calibrate the baseline model and this same data is used to validate it. This represents a limitation within the accuracy of the model. It is also acknowledged that the impact of traffic growth on the Trunk Road network is not reflected well and significant developments on the periphery of the internal zone will not be captured. However, for the purposes of an assessment of the likely increase in traffic on links on the road network within the internal zones it is considered appropriate.

The output from the baseline Dorset SATURN model is reproduced in Appendix C, showing realistic flow patterns on the major roads within Dorset. The model accurately fits the observed data.

The predicted traffic flows for the future year are reported in the North and north East Dorset Emerging Transport Strategy report.

Appendix A – Census Data

		Ward	Total Households	
			Total Households 2001	Total Households 2007
	Zone	*Eg*	*All households with residents*	*All households with residents (calculated from 2001 %)*
		19UE North Dorset	**25248**	
	2023	Abbey	1501	1594
	2011	Blackmore	1428	1552
	2027	Blandford Damory Down	779	787
	2027	Blandford Hilltop	486	805
	2027	Blandford Langton St Leonards	745	780
	2027	Blandford Old Town	931	1072
	2027	Blandford Station	937	1041
		Blandford Combined	**3878**	**4485**
	2024	Bourton and District	760	785
	2011	Bulbarrow	788	800
	2014	Cranborne Chase	827	889
	2024	Gillingham Town	841	1251
		Gillingham Combined	**3772**	**4508**
	2011	Hill Forts	1776	1914
	2024	Lodbourne	814	866
	2011	Lydden Vale	687	769
	2011	Marnhull	884	908
	2024	Milton	701	917
	2024	Motcombe and Ham	712	1160
	2028	Portman	668	800
	2023	Riversdale	699	726
	2012	Shaftesbury Central	912	1006
	2012	Shaftesbury Christy's	673	1376
	2012	Shaftesbury Grosvenor	694	783
	2012	Shaftesbury Underhill	718	769
		Shaftesbury Combined	**2997**	**3933**
	2028	Stour Valley	1588	2164
	2014	The Beacon	783	803
	2028	The Lower Tarrants	774	848
	2012	The Stours	726	720
	2024	Wyke	1416	1473
		19UD East Dorset	**35668**	
	2016	Alderholt	1106	1141
	2018	Ameysford	1132	1137
	2018	Colehill East	1910	1937
	2018	Colehill West	936	952
	2020	Corfe Mullen Central	2015	2053
	2020	Corfe Mullen North	948	954
	2020	Corfe Mullen South	1095	1116
		Corfe Mullen Combined		
	2016	Crane	840	828
	2018	Ferndown Central	1957	2322
	2018	Ferndown Links	2086	2260
	2016	Handley Vale	1031	1103
	2016	Holt	873	891
	2018	Longham	791	1019
	2018	Parley	1970	2011
	2016	St Leonards and St Ives East	1922	1984
	2016	St Leonards and St Ives West	1020	1070
	2018	Stapehill	954	1042
	2018	Stour	957	989
	2016	Three Cross and Potterne	926	1047
	2016	Verwood Dewlands	1737	2039
	2016	Verwood Newtown	1125	1136
	2016	Verwood Stephen's Castle	1806	2061
	2016	West Moors	3262	3512
	2018	Wimborne Minster	3269	3522
		19UH West Dorset	**40510**	
	2003	Beaminster	1819	1946
	2009	Bradford Abbas	809	814
	2004	Bradpole	924	968
	2004	Bridport North	1925	2121
	2004	Bridport South and Bothenhampton	2485	3113
	2022	Broadmayne	791	810
	2003	Broadwindsor	705	802
	2002	Burton Bradstock	886	922
	2011	Cam Vale	819	831
	2009	Charminster and Cerne Valley	1608	1959
		Charmouth	777	839
	2002	Chesil Bank	915	934
	2001	Chickerell	2262	2638
	2005	Chideock and Symondsbury	792	776
	2021	Dorchester East	2033	2232
	2021	Dorchester North	1747	4133
	2021	Dorchester South	1656	1669
	2021	Dorchester West	1656	1969
	2207	Frome Valley	837	924
	2007	Halstock	739	815
	2003	Loders	767	773
	2036	Lyme Regis	1660	2023
	2007	Maiden Newton	799	860
	2005	Marshwood Vale	746	709
	2003	Netherbury	788	931
	2022	Owermoigne	1461	1617
	2009	Piddle Valley	830	852

		Ward	Total Households	
			Total Households 2001	Total Households 2007
	Zone	*Eg*	*All households with residents*	*All households with residents (calculated from 2001 %)*
	2009	Puddletown	924	1045
	2010	Queen Thorne	856	879
	2010	Sherborne East	1935	2145
	2010	Sherborne West	1999	2319
	2002	Winterborne St Martin	858	884
	2009	Yetminster	702	715
S Somerset	2026	Blackdown	959	1082
	2006	Blackmoor Vale	2135	2409
	2024	Bruton	1044	1178
	2008	Brympton	2147	2423
	2032	Burrow Hill	885	999
		Camelot	1069	1206
	2006	Cary	2280	2573
	2026	Chard Avishayes	959	1082
	2026	Chard Combe	934	1054
	2026	Chard Crimchard	1121	1265
	2026	Chard Holyrood	1131	1276
	2026	Chard Jocelyn	1047	1181
	2008	Coker	2310	2607
	2026	Crewkerne	3314	3740
	2031	Curry Rivel	1025	1157
	2032	Eggwood	1072	1210
	2008	Hamdon	1138	1284
	2032	Ilminster	2110	2381
	2031	Islemoor	1131	1276
	2031	Ivelchester	1289	1455
	2031	Langport and Huish	1183	1335
	2032	Martock	2311	2608
	2006	Milborne Port	1123	1267
	2032	Neroche	960	1083
	2006	Northstone	1134	1280
	2031	Parrett	992	1119
	2005	St Michael's	966	1090
	2032	South Petherton	2061	2326
	2005	Tatworth and Forton	1061	1197
	2005	Tower	970	1095
	2031	Turn Hill	1014	1144
	2005	Wessex	2266	2557
	2024	Wincanton	2040	2302
	2005	Windwhistle	929	1048
	2008	Yeovil Central	3256	3674
	2008	Yeovil East	3079	3474
	2008	Yeovil South	3351	3781
	2008	Yeovil West	2975	3357
	2008	Yeovil Without	2998	3383
Bournemouth	2019	Boscombe East	4143	4675
	2019	Boscombe West	4010	4525
	2019	Central	4184	4721
	2019	East Cliff and Springbourne	4701	5305
	2019	East Southbourne and Tuckton	4105	4632
	2019	Kinson North	4141	4673
	2019	Kinson South	4117	4646
	2019	Littledown and Iford	3795	4282
	2019	Moordown	3863	4359
	2019	Queen's Park	4286	4836
	2019	Redhill and Northbourne	3914	4417
	2019	Strouden Park	3796	4283
	2019	Talbot and Branksome Woods	3656	4125
	2019	Throop and Muscliff	3619	4084
	2019	Wallisdown and Winton West	3847	4341
	2019	West Southbourne	3504	3954
	2019	Westbourne and West Cliff	4826	5446
	2019	Winton East	3705	4181
Weymouth & Portland	2001	Littlemoor	1507	1701
	2001	Melcombe Regis	2720	3069
	2001	Preston	2203	2486
	2001	Radipole	1559	1759
	2001	Tophill East	1337	1509
	2001	Tophill West	2017	2276
	2001	Underhill	1568	1769
	2001	Upwey and Broadwey	1553	1752
	2001	Westham East	1586	1790
	2001	Westham North	2114	2385
	2001	Westham West	1460	1647
	2001	Wey Valley	1394	1573
	2001	Weymouth East	1758	1984
	2001	Weymouth West	2071	2337
	2001	Wyke Regis	2309	2606
Poole	2020	Alderney	4512	5091
	2020	Branksome East	2466	2783
	2020	Branksome West	3004	3390
	2020	Broadstone	4114	4642
	2020	Canford Cliffs	3837	4330
	2020	Canford Heath East	2887	3258
	2020	Canford Heath West	2791	3149
	2020	Creekmoor	3988	4500
	2020	Hamworthy East	2281	2574
	2020	Hamworthy West	2684	3029
	2020	Merley and Bearwood	4079	4603

		Ward	Total Households	
			Total Households 2001	Total Households 2007
	Zone	*Eg*	*All households with residents*	*All households with residents (calculated from 2001 %)*
	2020	Newtown	4775	5388
	2020	Oakdale	4488	5064
	2020	Parkstone	4691	5293
	2020	Penn Hill	4528	5109
	2020	Poole Town	3922	4426
Purbeck	2022	Bere Regis	850	959
	2022	Castle	842	950
	2022	Creech Barrow	784	885
	2022	Langton	685	773
	2022	Lytchett Matravers	1475	1664
	2022	Lytchett Minster and Upton East	1648	1860
	2022	Lytchett Minster and Upton West	1518	1713
	2029	St. Martin	1113	1256
	2030	Swanage North	1859	2098
	2030	Swanage South	2582	2914
	2029	Wareham	2545	2872
	2022	West Purbeck	590	666
	2022	Winfrith	685	773
	2022	Wool	1628	1837
East Devon	2005	Axminster Rural	964	1088
	2005	Axminster Town	1837	2073
	2005	Beer and Branscombe	830	937
		Broadclyst	1861	2100
		Budleigh	2735	3086
		Clyst Valley	946	1067
	2005	Coly Valley	1884	2126
	2005	Dunkeswell	854	964
		Exe Valley	840	948
		Exmouth Brixington	2562	2891
		Exmouth Halsdon	2772	3128
		Exmouth Littleham	2925	3301
		Exmouth Town	2967	3348
		Exmouth Withycombe Raleigh	2987	3371
		Feniton and Buckerell	925	1044
		Honiton St Michael's	3003	3389
		Honiton St Paul's	1992	2248
		Newbridges	1011	1141
		Newton Poppleford and Harpford	888	1002
		Otterhead	864	975
		Ottery St Mary Rural	1628	1837
		Ottery St Mary Town	1934	2182
		Raleigh	804	907
	2005	Seaton	3304	3728
		Sidmouth Rural	907	1023
		Sidmouth Sidford	2805	3165
		Sidmouth Town	2552	2880
	2005	Tale Vale	936	1056
	2005	Trinity	941	1062
		Whimple	865	976
		Woodbury and Lympstone	1720	1941
	2005	Yarty	968	1092
New Forest	2017	Ashurst, Copythorne South and Netley Marsh	2228	2514
	2017	Barton	2472	2789
	2017	Bashley	1171	1321
		Becton	2062	2327
	2017	Boldre and Sway	2185	2466
	2017	Bramshaw, Copythorne North and Minstead	998	1126
	2017	Bransgore and Burley	2341	2642
	2017	Brockenhurst and Forest South East	2299	2594
	2017	Buckland	1432	1616
	2017	Butts Ash and Dibden Purlieu	2446	2760
	2017	Dibden and Hythe East	2504	2826
	2017	Downlands and Forest	1196	1350
	2017	Fawley, Blackfield and Langley	2446	2760
	2017	Fernhill	2521	2845
	2017	Fordingbridge	2691	3037
	2017	Forest North West	1071	1209
	2017	Furzedown and Hardley	1284	1449
	2017	Holbury and North Blackfield	2642	2981
	2017	Hordle	2286	2580
	2017	Hythe West and Langdown	2647	2987
	2017	Lymington Town	2713	3061
	2017	Lyndhurst	1365	1540
	2017	Marchwood	2053	2317
	2017	Milford	2264	2555
	2024	Milton	2756	3110
	2017	Pennington	2535	2861
	2025	Ringwood East and Sopley	1018	1149
	2025	Ringwood North	2431	2743
	2025	Ringwood South	2564	2893
	2017	Totton Central	2051	2314
	2017	Totton East	2478	2796
	2017	Totton North	2226	2512
	2017	Totton South	2499	2820
	2017	Totton West	2110	2381
Salisbury	2015	Alderbury and Whiteparish	2352	2654
	2015	Amesbury East	2762	3117
	2015	Amesbury West	861	972
	2015	Bemerton	2456	2771

		Ward	Total Households	
			Total Households 2001	Total Households 2007
	Zone	*Eg*	*All households with residents*	*All households with residents (calculated from 2001 %)*
	2015	Bishopdown	1682	1898
	2015	Bulford	1631	1840
	2015	Chalke Valley	799	902
	2015	Donhead	850	959
	2015	Downton and Redlynch	2415	2725
	2015	Durrington	2456	2771
	2015	Ebble	745	841
	2015	Fisherton and Bemerton Village	1954	2205
	2015	Fonthill and Nadder	956	1079
	2015	Harnham East	1562	1763
	2015	Harnham West	1582	1785
	2015	Knoyle	949	1071
	2015	Laverstock	1429	1613
	2015	Lower Wylye and Woodford Valley	812	916
	2015	St Edmund and Milford	2177	2457
	2015	St Mark and Stratford	2558	2886
	2015	St Martin and Milford	2399	2707
	2015	St Paul	1603	1809
	2015	Till Valley and Wylye	1720	1941
	2015	Tisbury and Fovant	1720	1941
		Upper Bourne, Idmiston and Winterbourne	1835	2071
	2015	Western and Mere	1865	2104
	2015	Wilton	1845	2082
	2015	Winterslow	1433	1617
West Wiltshire		Atworth and Whitley	1033	1166
		Bradford-on-Avon North	1917	2163
		Bradford-on-Avon South	2240	2528
	2013	Dilton Marsh	2225	2511
	2013	Ethandune	1063	1200
	2016	Holt	988	1115
		Manor Vale	1935	2183
		Melksham North	2368	2672
		Melksham Spa	2439	2752
		Melksham Without	1947	2197
		Melksham Woodrow	1090	1230
	2013	Mid Wylye Valley	1046	1180
		Paxcroft	2259	2549
	2013	Shearwater	1070	1207
		Southwick and Wingfield	857	967
		Summerham	932	1052
		Trowbridge Adcroft	2284	2577
		Trowbridge College	2318	2616
		Trowbridge Drynham	2599	2933
		Trowbridge John of Gaunt	2020	2279
		Trowbridge Park	2585	2917
	2033	Warminster East	3663	4133
Appendix A	2033	Warminster West	3633	4100
	2033	Westbury Ham	2685	3030
	2033	Westbury Laverton	2211	2495
Southampton		Bargate	4772	5385
		Bassett	5114	5771
		Bevois	5243	5916
		Bitterne	5771	6512
		Bitterne Park	5804	6549
		Coxford	5844	6594
		Freemantle	6510	7346
		Harefield	5964	6730
		Millbrook	6299	7108
		Peartree	5664	6391
		Portswood	6040	6816
		Redbridge	6197	6993
		Shirley	5688	6418
		Sholing	5759	6499
		Swaythling	4727	5334
		Woolston	5821	6569
Christchurch	2019	Burton and Winkton	1712	1932
	2019	Grange	2071	2337
	2019	Highcliffe	1782	2011
	2019	Jumpers	1612	1819
	2019	Mudeford and Friars Cliff	2398	2706
	2019	North Highcliffe and Walkford	1510	1704
	2019	Portfield	1694	1912
	2019	Purewell and Stanpit	1880	2121
	2019	St Catherine's and Hurn	1582	1785
	2019	Town Centre	1856	2094
	2019	West Highcliffe	2515	2838

	Total households with re	Total households with residen	**Growth factor=**
total (for external ward growth factor):	101426	114451	**1.1284172**

NB//
This spreadsheet is used to calculate trips for households with residents.

The Dorset area 2001 and 2007 housing figures are used to establish external housing figures for 2007.

Appendix B – TRICs Output

TRICS

AM peak rate		PM peak rate	
Arrivals	Departures	Arrivals	Departures
0.111	0.245	0.246	0.147

Selected all mixed housing, post January 1999.
TRICS 2008 (a)
Weekdays only

AM peak is 08:00-09:00
PM peak is 17:00-18:00

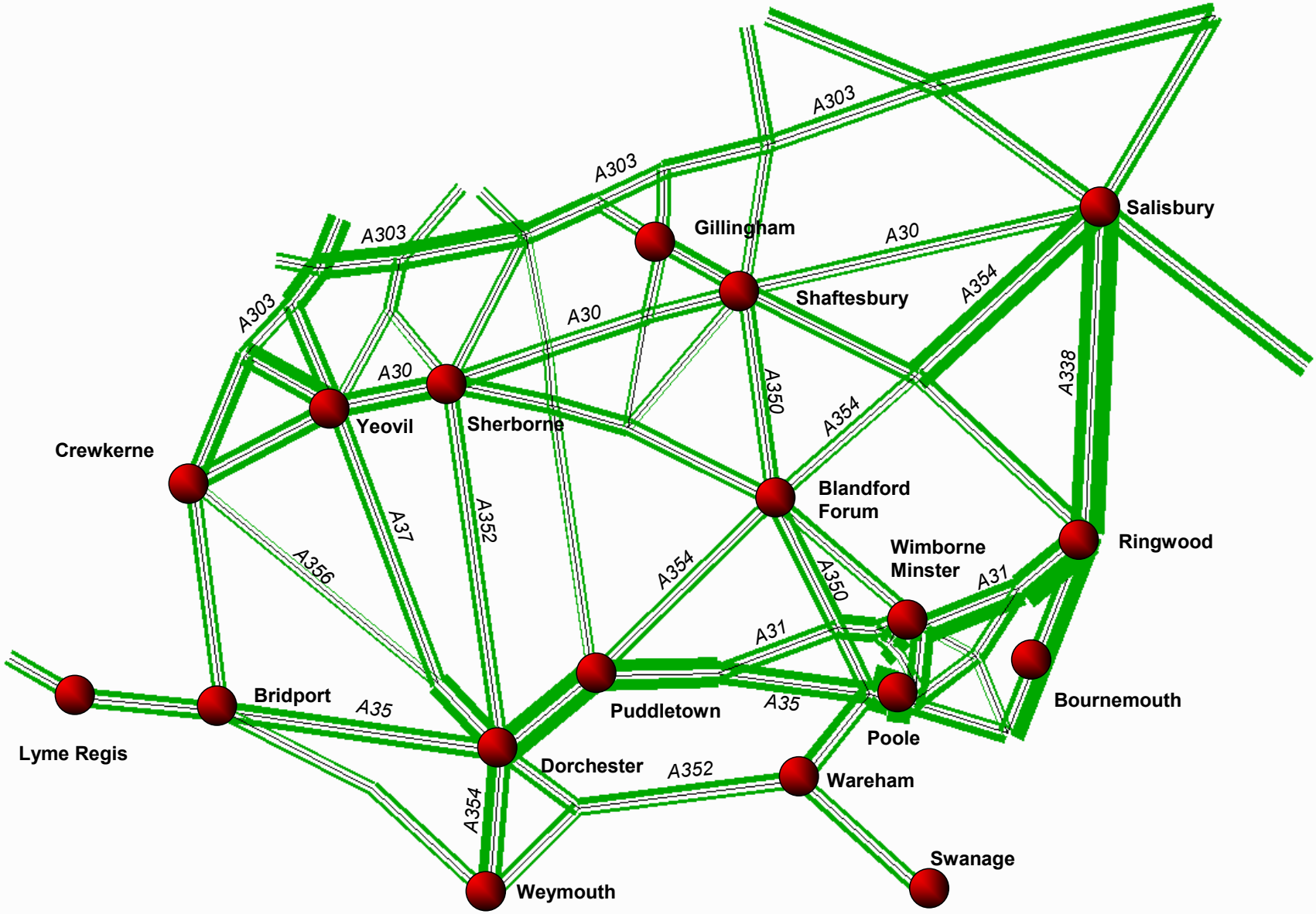
Zones 2034, 2035, 2038 are supplied directly from observed traffic counts
Wincanton homes estimated as 1/2 of population (which corresponds to ratio of L.Regis)

TRIP RATE for Land Use 03 - RESIDENTIAL/M - MIXED PRIVATE/NON-PRIVATE HOUSING
Calculation Factor: 1 HHOLDS

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. HHOLDS	Trip Rate	No. Days	Ave. HHOLDS	Trip Rate	No. Days	Ave. HHOLDS	Trip Rate
00:00-01:00	0	0	0	0	0	0	0	0	0
01:00-02:00	0	0	0	0	0	0	0	0	0
02:00-03:00	0	0	0	0	0	0	0	0	0
03:00-04:00	0	0	0	0	0	0	0	0	0
04:00-05:00	0	0	0	0	0	0	0	0	0
05:00-06:00	0	0	0	0	0	0	0	0	0
06:00-07:00	0	0	0	0	0	0	0	0	0
07:00-08:00	21	187	0.053	21	187	0.159	21	187	0.212
08:00-09:00	21	187	0.111	21	187	0.245	21	187	0.356
09:00-10:00	21	187	0.111	21	187	0.134	21	187	0.245
10:00-11:00	21	187	0.084	21	187	0.106	21	187	0.19
11:00-12:00	21	187	0.102	21	187	0.1	21	187	0.202
12:00-13:00	21	187	0.126	21	187	0.114	21	187	0.24
13:00-14:00	21	187	0.117	21	187	0.118	21	187	0.235
14:00-15:00	21	187	0.12	21	187	0.12	21	187	0.24
15:00-16:00	21	187	0.184	21	187	0.143	21	187	0.327
16:00-17:00	21	187	0.199	21	187	0.146	21	187	0.345
17:00-18:00	21	187	0.246	21	187	0.147	21	187	0.393
18:00-19:00	21	187	0.193	21	187	0.166	21	187	0.359
19:00-20:00	0	0	0	0	0	0	0	0	0
20:00-21:00	0	0	0	0	0	0	0	0	0
21:00-22:00	0	0	0	0	0	0	0	0	0
22:00-23:00	0	0	0	0	0	0	0	0	0
23:00-24:00	0	0	0	0	0	0	0	0	0
Daily Trip Rates:			1.646			1.698			3.344

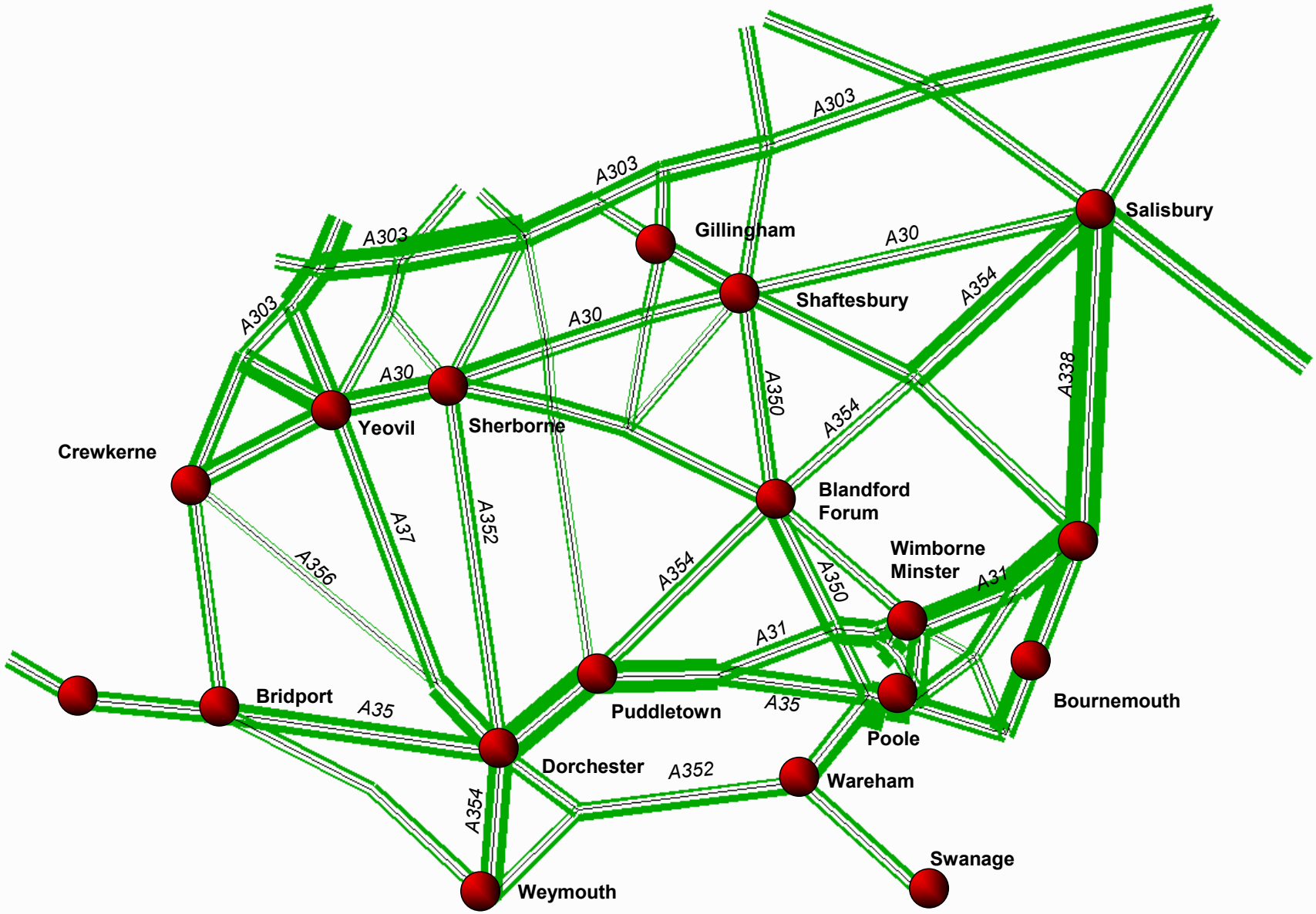
Appendix C – SATURN Model Output

Baseline SATURN Model
AM Peak Outputs

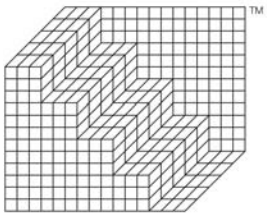


Buro Happold

Baseline SATURN Model
PM Peak Outputs



Buro Happold



Buro Happold