Formby SATURN Traffic Model Update

Local Model Validation Report

Sefton MBC

4 March 2013

ATKINS

Plan Design Enable

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1. Introduction

In December 2011, Sefton Metropolitan Borough Council (SMBC) requested that Atkins and Mott MacDonald (MM) provide a joint scoping note to set out how a suitable transport model could be developed that would assist the council in determining the impacts of major land-use developments that are proposed for key locations within the district area.

Following on from this element of work Atkins have been requested by Sefton Council to update and enhance the Thornton Switch Island Link (TSIL) SATURN traffic models by incorporating the Formby area to which is currently coded within the 'buffer' area of this model.

The purpose of the update to the model is to test further major development sites in and around the Formby area which are expected to be submitted by land use developers.

SATURN has two different levels of detail for network coding:

- Simulation coding – this is a detailed level of coding where junctions are represented in detail along with information on the links between each junction; and
- Buffer coding – a less detailed level of coding where data is provided only for the links between junctions and not for the junctions themselves

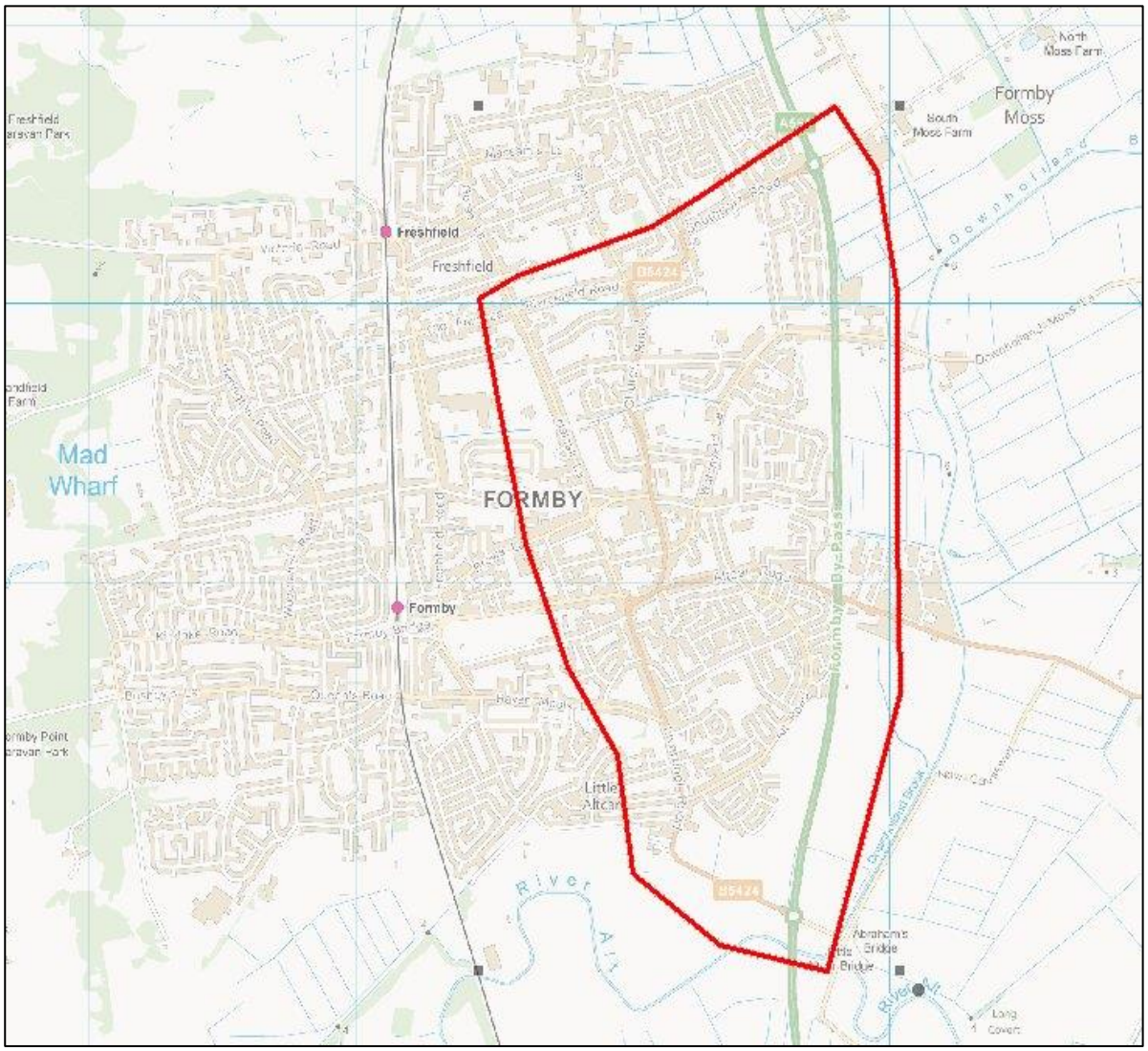
This Local Model Validation report documents the process undertaken to develop the traffic model highway network, the derivation of the SATURN trip matrices and the analysis / reporting of the results obtained from the modelling process.

2. Model Development

2.1. Geographic Coverage

Formby is a coastal town situated between Southport (to the North) and Liverpool (to the South). It is situated within the Metropolitan Borough of Sefton and is a significant population centre within the borough. In December 2012, Sefton Council requested that the existing TSIL traffic model was updated to include Formby within the detailed 'simulation' area of this model. Following meetings with the council, the geographic extent of this update area was determined and Figure 2-1 below provides details of the area that was considered suitable to include.

Figure 2–1 Study Area



2.2. Temporal Coverage

In order to robustly assess traffic conditions at different times of day, the following average weekday time periods have been modelled:

- Morning or AM peak hour (0800-0900);
- Average inter-peak hour (1000-1600); and

- Evening or PM peak hour (1700-1800).

2.3. User Classes

User classes (UCs) are used to depict the differing characteristics of vehicle users within the model.

There are five user classes within the Formby update model, these are shown in Table 2-1.

Table 2–1 User Classes Definition

User Class	Vehicle Type	Purpose
1	Car	Employer's Business
2	Car	Home Based Work (Commute)
3	Car	Other (Discretionary)
4	Light Goods Vehicle (LGV)	-
5	Heavy Goods Vehicle (HGV)	-

2.3.1. Passenger Car Units

Passenger Car Units (PCUs) are a unit used to assess traffic flow rate. PCUs are used to allow for differences in the degree of interference to other traffic by the addition of one extra vehicle to the traffic, according to the type of the vehicle. There are established conversion factors that can be applied to convert any type of vehicle to the equivalent number of passenger car units. This allows mixed traffic streams to be assessed more accurately than if it was assumed that all vehicles have an equal impact on the highway network. The following PCU values were used:

- Light vehicles (Cars and LGV's) = 1.0 pcu;
- Heavy Goods Vehicles (HGV) = 2.3 pcu;

2.4. Summary of Data Collection

Two different forms of traffic data have been used to develop the Formby model update, which are.

- Manual Classified Count (MCC) Data, and
- Automatic Traffic Count (ATC) data from Sefton MBC's permanent monitoring sites.

Manual Classified Turning Counts were undertaken at 3 junctions along the A565 Formby By-Pass at the following locations

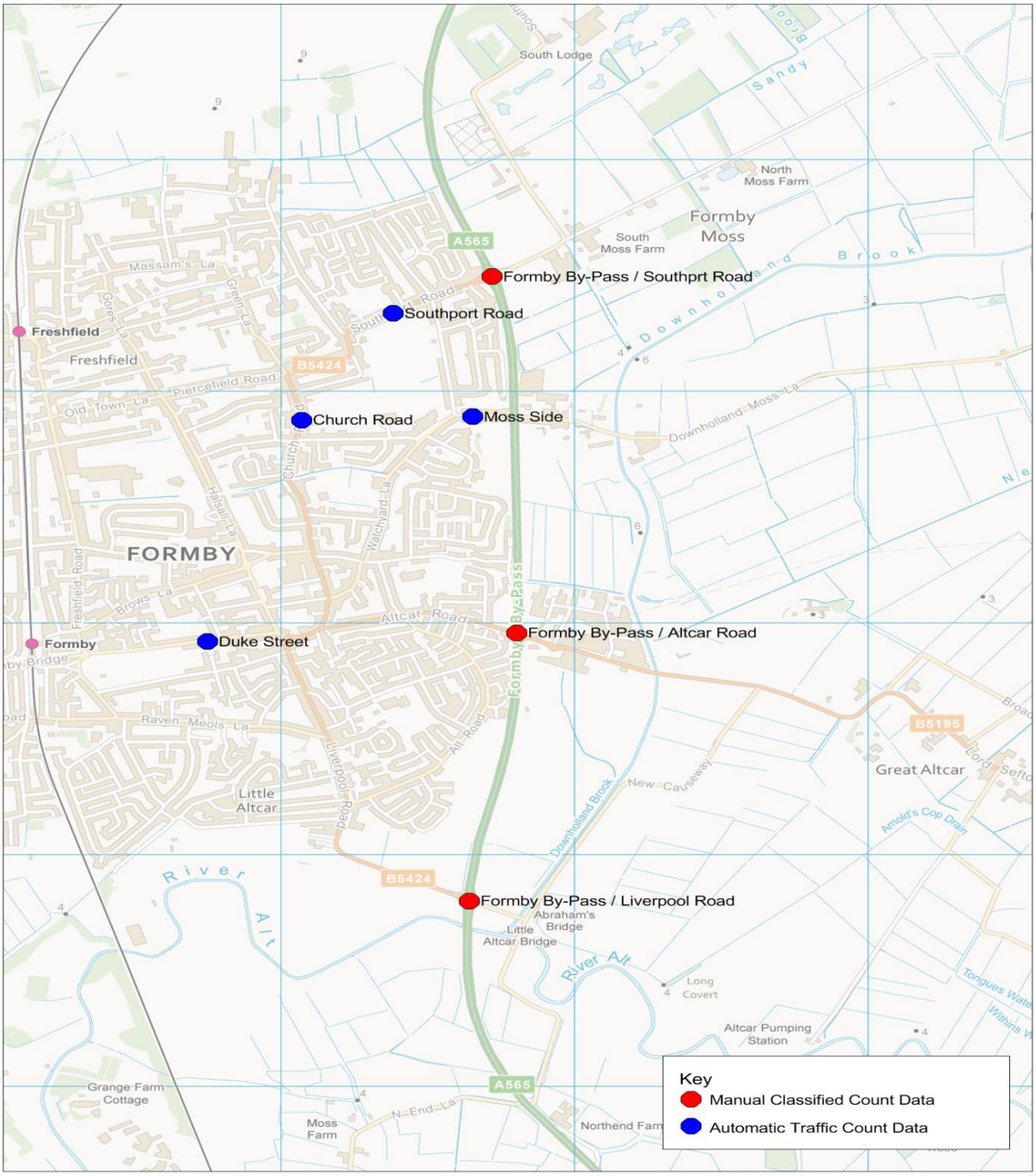
- Liverpool Road,
- Altcar Road, and
- Southport Road.

Automatic Traffic Count data has been provided by SMBC. Not all of the ATC was suitable to use to calibrate the traffic model as there were some discrepancies between the ATC and MCC data, or the ATC location was outside of the modelled area, the ATC data which was used for validation purposes is listed below.

- Duke Street,
- Church Road,
- Southport Road, and
- Moss Side.

Figure 2-2 shows the location of the traffic count sites graphically.

Figure 2–2 Traffic Count Data Locations



2.5. Network Development

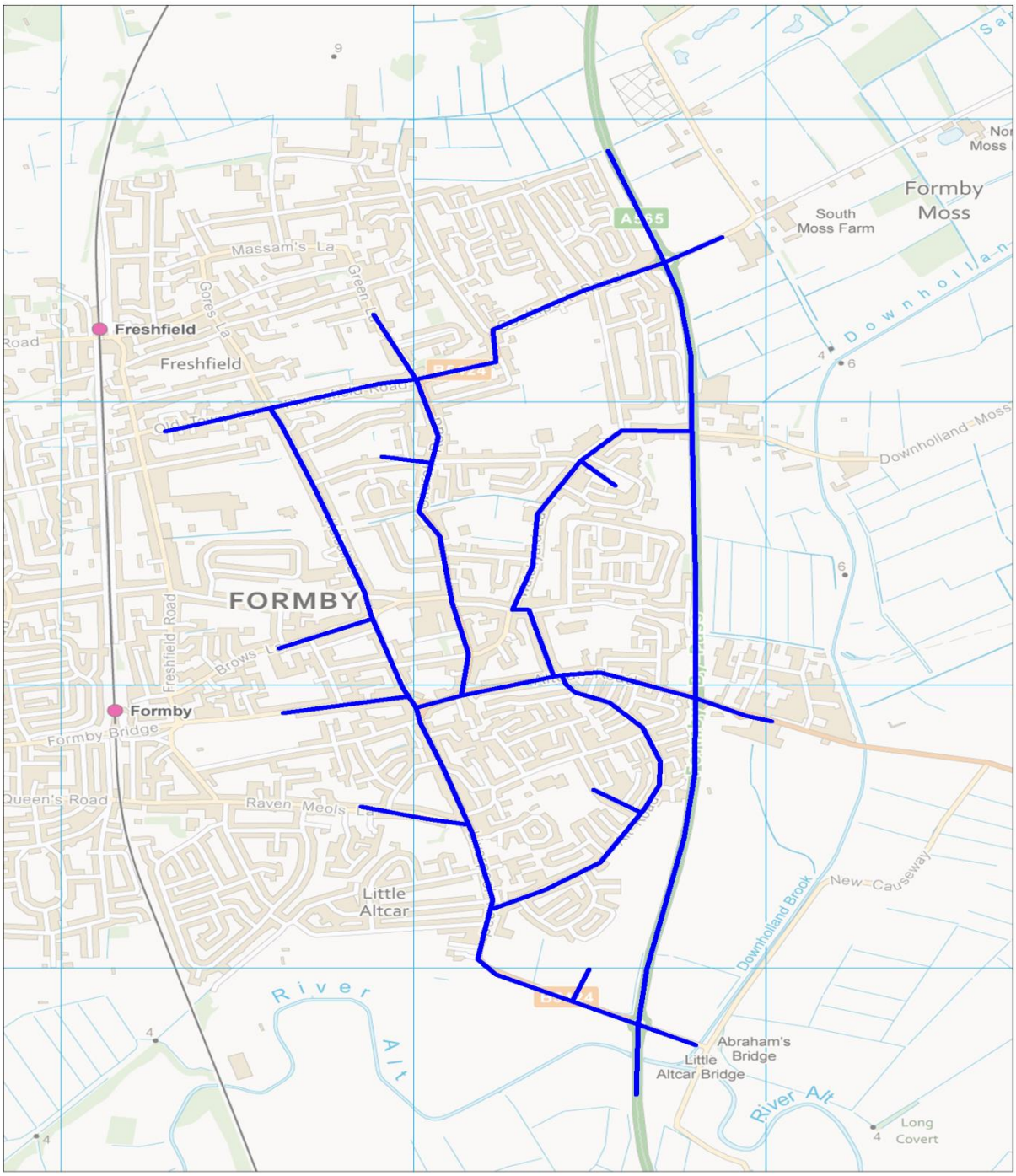
This section of the report describes the process of developing the highway network to add further detail to, and update the existing TSIL traffic model.

2.5.1. Extension of Simulation Area Coding

The area of Formby was represented by ‘buffer’ network coding in the existing TSIL traffic model and was notionally represented by 5 zones.

As part of this model update the area of Formby has been converted into simulation network coding and the zoning around the study area has been expanded. This allows the routing of traffic through the study area to be accurately represented, as well as allowing the performance and operational capacity of the simulated junctions in the study area to be assessed. Figure 2-3 shows the extent of the network that has been developed and converted to simulation coding.

Figure 2–3 Extent of Simulation Coding Network



2.5.1.1. Traffic Signals

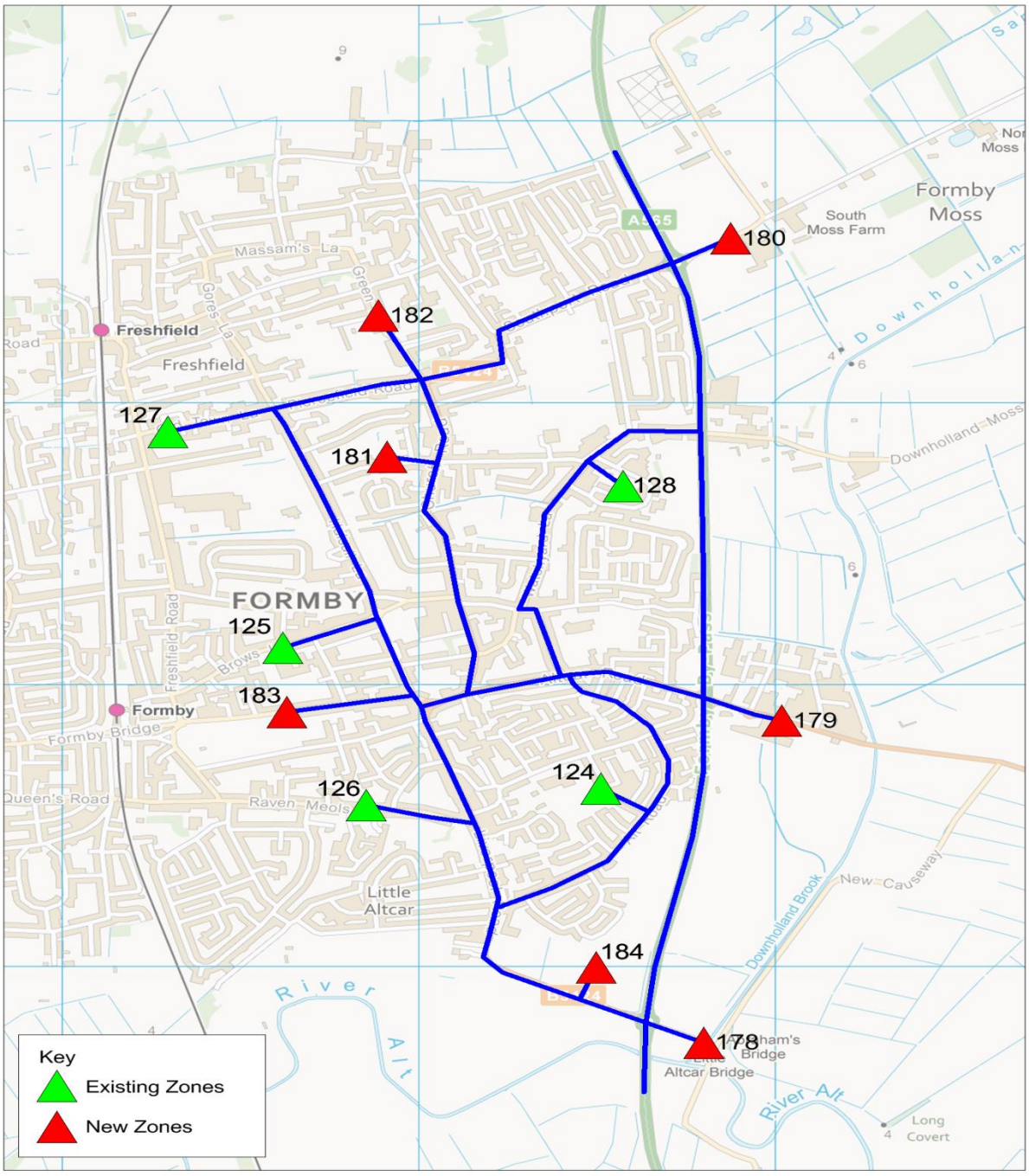
There is one signalised junction within the Formby study area, which is the junction of A565 Formby By-Pass and Altcar Road. Signal staging and phasing arrangements were provided by SMBC and this has been coded into the model to accurately represent the operation of the signals at this junction.

2.5.2. Zone Definition

Formby was previously represented by 5 zones in the buffer network of the existing TSIL SATURN traffic model. The zoning structure around the Formby area has been expanded to better represent traffic routing through the study area.

A total of 7 new zones have been coded into the model to represent the Formby area. Zone 184 is left empty to accommodate a possible future development site. The distribution of trips to and from the new zones has been taken from the existing zones in the TSIL model that represented the Formby area. The trip generation for the 7 new zones has been controlled to the traffic count data which is described in earlier sections of this report. There are now a total of 184 zones in the TSIL model. Figure 2-4 shows the location of the existing and new zones around the Formby study area.

Figure 2–4 Formby Area Zoning Structure.



2.6. Matrix Development

2009 TSIL matrices have been used as the basis for developing the Formby 2013 base model update, seven new zones around the Formby area have been added to the existing TSIL matrices.

Trip distribution patterns have been extracted from the existing zones representing the Formby area in the TSIL matrices, these trip patterns have been applied to the new zones. The number of trips associated with each new zone have been controlled to traffic count data obtained from both the MCC and ATC data provided by SMBC.

2.6.1. Matrix Calibration

The trip matrices for the base year extended TSIL SATURN highway model were calibrated to observed traffic counts in the Formby area using Matrix Estimation. The matrix estimation process employed as part of the calibration process is designed to modify the travel patterns using the observed traffic counts. The basic function of matrix estimation is to produce an updated matrix using traffic counts. Trips are adjusted in the matrix to produce the estimated matrix, which is most likely to be consistent with the traffic counts. The matrix of trips input to matrix estimation is known as the 'prior' matrix, while the output matrix from matrix estimation is known as the 'post' matrix. This iterative process runs for 6 loops.

2.6.2. Frozen Cells

Trip movements not associated with the calibration of the Formby area, which comprises most of the existing TSIL model have been frozen during the matrix estimation process, this ensures that the existing zone to zone movements outside of the Formby study area were not altered during the estimation process.

This methodology ensures that the matrix estimation process only makes changes to the trips to and from Formby and to trips passing through the Formby study area using the A565 Formby By-Pass.

2.6.3. Seeded Cells

The new zones incorporated into the SATURN highway model do not have any trips between one another, if it was deemed that there would be inter-zonal trips between the new zones, then the cell in the prior matrix representing these zones was seeded to allow the matrix estimation process to introduce trips between the new zones. The magnitude of trips between the new zones were controlled using the observed count data in the matrix estimation process.

2.6.4. Matrix Estimation Convergence

The matrix estimation process was monitored to ensure that the estimated matrix was converged to a stable solution. The total trips for each iteration of the process for the AM peak, inter-peak and PM peak models are shown in Tables 2-2 to 2-4

Table 2–2 Matrix Estimation Convergence AM Peak

Iteration	Total PCUs	Difference	% Change
Prior	66,853	-	-
Post – 1	65,546	-1307	-1.2%
Post – 2	65,089	-457	-0.67%
Post – 3	65,193	104	0.16%
Post – 4	65,201	8	0.01%
Post – 5	65,202	1	0%
Post – 6	65,206	4	0%

Table 2–3 Matrix Estimation Convergence Inter Peak

Iteration	Total PCUs	Difference	% Change
Prior	48,872	-	-
Post – 1	47,520	-1352	-2.8%
Post – 2	47,709	189	0.4%
Post – 3	47,795	86	0.18%
Post – 4	47,806	11	0.02%
Post – 5	47,821	15	0.03%
Post – 6	47,828	7	0.01%

Table 2–4 Matrix Estimation Convergence PM Peak

Iteration	Total PCUs	Difference	% Change
Prior	63,585	-	-
Post – 1	62,804	-781	-1.2%
Post – 2	62,440	-364	-0.58%
Post – 3	62,445	5	0%
Post – 4	62,447	2	0%
Post – 5	62,439	-8	-0.01%
Post – 6	62,430	-9	0.01%

Tables 2-2 to 2-4 show that for all three time periods the matrix estimation process converges to a stable solution rapidly, the change in trips between iteration 1 and iteration 6 was less than 1% for all three models, indicating that the matrix estimation process had reached an equilibrium state.

3. Model Validation

3.1. Overview

Model validation is a comparison of model output data with observed data to assess the accuracy of the traffic model and establish its suitability as a basis from which to prepare forecasts. The following sections give details of the validation guidelines used and the closeness of fit of the SATURN traffic model around the Formby study area.

3.2. Model Validation Criteria

3.2.1. Flow Validation Criteria

There are guidelines set by the Design Manual for Roads and Bridges (DMRB) in Volume 12 specifying the criteria that determine whether the traffic model is considered to be a valid representation of reality or not. It is stressed that these values are guidelines only. DMRB Volume 12 Part 1 emphasises that:

“A model that does not meet these guidelines may still be acceptable for appraisal of a given scheme if the discrepancies are within survey accuracies and the larger discrepancies are concentrated away from the area of greatest importance to that scheme.”

A summary of these guidelines has been provided in Table 3-1 of this report.

Table 3–1 DMRB Guidelines

Criteria & Measure		Guideline	
DMRB Flow Criteria			
1	Observed flow < 700vph	Modelled flow within ± 100vph	> 85% of links
	Observed flow 700 to 2700vph	Modelled flow within ± 15%	
	Observed flow > 2700vph	Modelled flow within ± 400vph	
DMRB GEH Criteria			
2	GEH statistic for individual links <5	> 85% of links	

3.2.2. GEH Statistic Criteria

The GEH statistic is a generally accepted value used as an indicator of 'goodness of fit', i.e. the extent to which the modelled flows match the corresponding observed flows. This is recommended in the guidelines contained in the Design Manual for Roads and Bridges (DMRB) Volume 12 and is defined as:

$$GEH = \sqrt{\frac{(M-C)^2}{0.5 \times (M + C)}}$$

Where: M = modelled flow;
C = observed flow (or count).

3.3. Flow Validation Results.

Flow validation is based on a comparison of observed counts and modelled traffic flows. The aim of the comparison is to establish a good fit, to ensure that the model represents both travel demand and traffic patterns in a robust fashion

A summary of the flow validation information around the Formby area for the AM, Inter and PM Peak periods is contained in table 3-2

The detailed link by link flow validation tables are presented in Appendix A of this document.

Table 3–2 AM Peak Flow Validation Summary

Criteria	AM Peak	Inter-Peak	PM Peak
Counts: Flow <700	37	43	38
Counts: Flow 700 to 2700	6	0	5
Total Counts	**43**	**43**	**43**
Counts: Flow <700 within DMRB Criteria	100%	100%	100%
Counts: Flow 700 to 2700 within DMRB Criteria	100%	100%	100%
Total Counts: % Within DMRB Flow Criteria	**100%**	**100%**	**100%**
Total Counts: % Within GEH Flow Criteria	**93%**	**95%**	**93%**

The results in Table 3-2 clearly demonstrate that an excellent overall level of fit has been achieved in terms of both the DMRB and GEH criteria between the observed counts and modelled flows in all three time periods.

4. Conclusion

This report has provided an overview of the development of the 2013 base year model developed to support developer testing in and around the Formby area of Sefton. Three models have been developed to represent the AM peak hour (0800-0900), an average inter-peak hour (1000-1600) and PM peak hour (1700-1800) traffic conditions.

The indicators of model performance set out within the report demonstrate that the models robustly represent base year 2013 AM peak, inter-peak and PM peak hour traffic levels and patterns in Formby. Matrix estimation was employed to adjust the prior trip matrices to observed traffic counts within the study area.

The model achieves an excellent level of flow validation, with 100% DMRB flow criteria achieved in all three time periods and 93% GEH criteria achieved in the AM and PM peaks and 95% achieved in the Inter Peak period.

It is the conclusion of this report, therefore, that the base year models provide a very good representation of current traffic patterns in the study area, and form a robust basis upon which future year forecasts can be developed to assess the highway traffic effects and network performance of any proposed developer testing options required by Sefton Borough Council.

Appendices

Appendix A. Detailed Flow Validation Results

A.1. AM Peak Flow Validation Results

Location	Observed	Modelled	Difference	%Diff	DMRB	GEH	GEH <5	GEH <7.5	
Formby By-Pass (N) left to Liverpool Rd (E)	2	3	1	27%	OK	0.36	OK	OK	
Formby By-Pass (N) straight to Formby By-Pass (S)	1220	1221	1	0%	OK	0.03	OK	OK	
Formby By-Pass (N) right to Liverpool Rd (W)	15	0	-15	-100%	OK	5.47	Fail	OK	
Liverpool Rd (E) right to Formby By-Pass (N)	1	3	2	202%	OK	1.42	OK	OK	
Liverpool Rd (E) left to Formby By-Pass (S)	5	4	-1	-24%	OK	0.58	OK	OK	
Liverpool Rd (E) straight to Liverpool Rd (W)	0	0	0	0%	OK	0.00	OK	OK	
Formby By-Pass (S) Straight to Formby By-Pass (N)	721	755	34	5%	OK	1.24	OK	OK	
Formby By-Pass (S) right to Liverpool Rd (E)	5	7	2	36%	OK	0.74	OK	OK	
Formby By-Pass (S) left to Liverpool Rd (W)	508	507	-1	0%	OK	0.06	OK	OK	
Liverpool Rd (W) left to Formby By-Pass (N)	17	0	-17	-100%	OK	5.82	Fail	OK	
Liverpool Rd (W) straight to Liverpool Rd (E)	9	9	0	-1%	OK	0.03	OK	OK	
Liverpool Rd (W) right to Formby By-Pass (S)	706	709	3	0%	OK	0.12	OK	OK	
Formby By-Pass (N) left to Altcar Rd (E)	230	197	-33	-14%	OK	2.28	OK	OK	
Formby By-Pass (N) straight to Formby By-Pass (S)	960	924	-36	-4%	OK	1.19	OK	OK	
Formby By-Pass (N) right to Altcar Rd (W)	112	112	0	0%	OK	0.02	OK	OK	
Altcar Rd (E) right to Formby By-Pass (N)	90	63	-27	-30%	OK	3.06	OK	OK	
Altcar Rd (E) left to Formby By-Pass (S)	104	116	12	11%	OK	1.11	OK	OK	
Altcar Rd (E) straight to Altcar Rd (W)	166	169	3	2%	OK	0.20	OK	OK	
Formby By-Pass (S) straight to Formby By-Pass (N)	591	599	8	1%	OK	0.31	OK	OK	
Formby By-Pass (S) right to Altcar Rd (E)	126	125	-1	-1%	OK	0.10	OK	OK	
Formby By-Pass (S) left to Altcar Rd (W)	16	34	18	115%	OK	3.66	OK	OK	
Altcar Rd (W) left to Formby By-Pass (N)	96	99	3	3%	OK	0.32	OK	OK	
Altcar Rd (W) straight to Altcar Rd (E)	290	275	-15	-5%	OK	0.90	OK	OK	
Altcar Rd (W) right to Formby By-Pass (S)	127	184	57	45%	OK	4.60	OK	OK	
Formby By-Pass (N) left to Southport Old Rd	8	8	0	6%	OK	0.17	OK	OK	
Formby By-Pass (N) straight to Formby By-Pass (S)	969	974	5	1%	OK	0.17	OK	OK	
Formby By-Pass (N) right to Southport Rd	415	383	-32	-8%	OK	1.59	OK	OK	
Southport Old Rd right to Formby By-Pass (N)	3	9	6	199%	OK	2.44	OK	OK	
Southport Old Rd left to Formby By-Pass (S)	31	56	25	82%	OK	3.85	OK	OK	
Southport Old Rd straight to Southport Rd	10	15	5	46%	OK	1.32	OK	OK	
Formby By-Pass (S) Straight to Formby By-Pass (N)	718	754	36	5%	OK	1.31	OK	OK	
Formby By-Pass (S) right toSouthport Old Rd	25	31	6	24%	OK	1.12	OK	OK	
Formby By-Pass (S) left to Southport Rd	99	34	-65	-66%	OK	8.03	Fail	Fail	
Southport Rd left to Formby By-Pass (N)	378	360	-18	-5%	OK	0.96	OK	OK	
Southport Rd straight to Southport Old Rd	14	11	-3	-21%	OK	0.84	OK	OK	
Southport Rd right to Formby By-Pass (S)	251	202	-50	-20%	OK	3.29	OK	OK	
Church Rd (NB)	382	386	4	1%	OK	0.20	OK	OK	
Church Rd (SB)	327	342	15	5%	OK	0.83	OK	OK	
Southport Rd (EB)	639	572	-67	-10%	OK	2.71	OK	OK	
Southport Rd (WB)	511	431	-80	-16%	OK	3.68	OK	OK	
Duke Street (EB)	462	462	0	0%	OK	0.01	OK	OK	
Duke Street (WB)	423	426	3	1%	OK	0.14	OK	OK	
Moss Side (EB)	69	57	-12	-17%	OK	1.50	OK	OK	
	11850.783	11625.02							
			OK	43	100%	40	93%	42	98%
			Fail	0		3		1	
			Total	43		43		43	

A.2. Inter Peak Flow Validation Results

Location	Observed	Modelled	Difference	%Diff	DMRB	GEH	GEH <5	GEH <7.5	
Formby By-Pass (N) left to Liverpool Rd (E)	4	5	1	16%	OK	0.31	OK	OK	
Formby By-Pass (N) straight to Formby By-Pass (S)	658	744	86	13%	OK	3.24	OK	OK	
Formby By-Pass (N) right to Liverpool Rd (W)	30	1	-29	-97%	OK	7.39	Fail	OK	
Liverpool Rd (E) right to Formby By-Pass (N)	4	2	-2	-45%	OK	0.99	OK	OK	
Liverpool Rd (E) left to Formby By-Pass (S)	6	4	-2	-33%	OK	0.86	OK	OK	
Liverpool Rd (E) straight to Liverpool Rd (W)	3	0	-3	0%	OK	0.00	OK	OK	
Formby By-Pass (S) Straight to Formby By-Pass (N)	629	693	64	10%	OK	2.49	OK	OK	
Formby By-Pass (S) right to Liverpool Rd (E)	6	7	1	9%	OK	0.23	OK	OK	
Formby By-Pass (S) left to Liverpool Rd (W)	412	433	21	5%	OK	1.01	OK	OK	
Liverpool Rd (W) left to Formby By-Pass (N)	28	1	-26	-96%	OK	6.97	Fail	OK	
Liverpool Rd (W) straight to Liverpool Rd (E)	4	7	3	79%	OK	1.28	OK	OK	
Liverpool Rd (W) right to Formby By-Pass (S)	395	416	21	5%	OK	1.05	OK	OK	
Formby By-Pass (N) left to Altcar Rd (E)	214	203	-11	-5%	OK	0.78	OK	OK	
Formby By-Pass (N) straight to Formby By-Pass (S)	479	531	52	11%	OK	2.33	OK	OK	
Formby By-Pass (N) right to Altcar Rd (W)	86	100	14	17%	OK	1.50	OK	OK	
Altcar Rd (E) right to Formby By-Pass (N)	152	150	-2	-1%	OK	0.14	OK	OK	
Altcar Rd (E) left to Formby By-Pass (S)	184	185	1	1%	OK	0.07	OK	OK	
Altcar Rd (E) straight to Altcar Rd (W)	289	290	1	0%	OK	0.06	OK	OK	
Formby By-Pass (S) straight to Formby By-Pass (N)	487	525	38	8%	OK	1.70	OK	OK	
Formby By-Pass (S) right to Altcar Rd (E)	147	144	-3	-2%	OK	0.25	OK	OK	
Formby By-Pass (S) left to Altcar Rd (W)	26	26	1	4%	OK	0.19	OK	OK	
Altcar Rd (W) left to Formby By-Pass (N)	88	87	-1	-1%	OK	0.07	OK	OK	
Altcar Rd (W) straight to Altcar Rd (E)	268	254	-15	-6%	OK	0.92	OK	OK	
Altcar Rd (W) right to Formby By-Pass (S)	35	34	-1	-3%	OK	0.19	OK	OK	
Formby By-Pass (N) left to Southport Old Rd	3	8	5	168%	OK	2.14	OK	OK	
Formby By-Pass (N) straight to Formby By-Pass (S)	572	665	92	16%	OK	3.72	OK	OK	
Formby By-Pass (N) right to Southport Rd	311	280	-32	-10%	OK	1.84	OK	OK	
Southport Old Rd right to Formby By-Pass (N)	5	6	1	21%	OK	0.43	OK	OK	
Southport Old Rd left to Formby By-Pass (S)	31	31	0	-1%	OK	0.04	OK	OK	
Southport Old Rd straight to Southport Rd	29	29	0	0%	OK	0.02	OK	OK	
Formby By-Pass (S) Straight to Formby By-Pass (N)	598	672	74	12%	OK	2.93	OK	OK	
Formby By-Pass (S) right toSouthport Old Rd	31	31	0	1%	OK	0.06	OK	OK	
Formby By-Pass (S) left to Southport Rd	98	100	3	3%	OK	0.25	OK	OK	
Southport Rd left to Formby By-Pass (N)	317	282	-35	-11%	OK	2.02	OK	OK	
Southport Rd straight to Southport Old Rd	22	19	-4	-17%	OK	0.84	OK	OK	
Southport Rd right to Formby By-Pass (S)	133	139	6	5%	OK	0.56	OK	OK	
Church Rd (NB)	354	359	5	1%	OK	0.26	OK	OK	
Church Rd (SB)	329	318	-11	-3%	OK	0.62	OK	OK	
Southport Rd (EB)	451	440	-11	-2%	OK	0.52	OK	OK	
Southport Rd (WB)	418	408	-10	-2%	OK	0.48	OK	OK	
Duke Street (EB)	377	377	0	0%	OK	0.00	OK	OK	
Duke Street (WB)	395	396	0	0%	OK	0.01	OK	OK	
Moss Side (EB)	40	40	0	0%	OK	0.00	OK	OK	
	9145.681	9439.01							
			OK	43	100%	41	95%	43	100%
			Fail	0		2		0	
			Total	43		43		43	

A.3. PM Peak Flow Validation Results

Location	Observed	Modelled	Difference	%Diff	DMRB	GEH	GEH <5	GEH <7.5	
Formby By-Pass (N) left to Liverpool Rd (E)	2	4	2	97%	OK	1.12	OK	OK	
Formby By-Pass (N) straight to Formby By-Pass (S)	716	728	12	2%	OK	0.43	OK	OK	
Formby By-Pass (N) right to Liverpool Rd (W)	48	1	-47	-99%	OK	9.62	Fail	Fail	
Liverpool Rd (E) right to Formby By-Pass (N)	2	10	8	413%	OK	3.29	OK	OK	
Liverpool Rd (E) left to Formby By-Pass (S)	5	16	11	211%	OK	3.29	OK	OK	
Liverpool Rd (E) straight to Liverpool Rd (W)	7	0	-7	10%	OK	0.00	OK	OK	
Formby By-Pass (S) Straight to Formby By-Pass (N)	1012	1102	90	9%	OK	2.78	OK	OK	
Formby By-Pass (S) right to Liverpool Rd (E)	3	3	0	15%	OK	0.26	OK	OK	
Formby By-Pass (S) left to Liverpool Rd (W)	869	850	-19	-2%	OK	0.66	OK	OK	
Liverpool Rd (W) left to Formby By-Pass (N)	21	0	-21	-100%	OK	6.48	Fail	OK	
Liverpool Rd (W) straight to Liverpool Rd (E)	2	3	1	40%	OK	0.51	OK	OK	
Liverpool Rd (W) right to Formby By-Pass (S)	373	374	1	0%	OK	0.08	OK	OK	
Formby By-Pass (N) left to Altcar Rd (E)	151	151	0	0%	OK	0.00	OK	OK	
Formby By-Pass (N) straight to Formby By-Pass (S)	537	558	21	4%	OK	0.89	OK	OK	
Formby By-Pass (N) right to Altcar Rd (W)	96	95	-1	-1%	OK	0.10	OK	OK	
Altcar Rd (E) right to Formby By-Pass (N)	212	198	-14	-6%	OK	0.95	OK	OK	
Altcar Rd (E) left to Formby By-Pass (S)	185	140	-45	-24%	OK	3.49	OK	OK	
Altcar Rd (E) straight to Altcar Rd (W)	367	368	1	0%	OK	0.07	OK	OK	
Formby By-Pass (S) straight to Formby By-Pass (N)	875	855	-20	-2%	OK	0.68	OK	OK	
Formby By-Pass (S) right to Altcar Rd (E)	144	140	-4	-3%	OK	0.32	OK	OK	
Formby By-Pass (S) left to Altcar Rd (W)	43	117	74	173%	OK	8.30	Fail	Fail	
Altcar Rd (W) left to Formby By-Pass (N)	94	94	0	0%	OK	0.02	OK	OK	
Altcar Rd (W) straight to Altcar Rd (E)	200	185	-15	-7%	OK	1.05	OK	OK	
Altcar Rd (W) right to Formby By-Pass (S)	33	34	1	3%	OK	0.16	OK	OK	
Formby By-Pass (N) left to Southport Old Rd	2	16	14	684%	OK	4.60	OK	OK	
Formby By-Pass (N) straight to Formby By-Pass (S)	647	730	83	13%	OK	3.18	OK	OK	
Formby By-Pass (N) right to Southport Rd	413	396	-17	-4%	OK	0.85	OK	OK	
Southport Old Rd right to Formby By-Pass (N)	9	12	3	34%	OK	0.95	OK	OK	
Southport Old Rd left to Formby By-Pass (S)	25	26	1	4%	OK	0.19	OK	OK	
Southport Old Rd straight to Southport Rd	28	28	0	2%	OK	0.08	OK	OK	
Formby By-Pass (S) Straight to Formby By-Pass (N)	925	953	28	3%	OK	0.92	OK	OK	
Formby By-Pass (S) right toSouthport Old Rd	22	22	0	0%	OK	0.02	OK	OK	
Formby By-Pass (S) left to Southport Rd	192	188	-4	-2%	OK	0.30	OK	OK	
Southport Rd left to Formby By-Pass (N)	346	321	-25	-7%	OK	1.36	OK	OK	
Southport Rd straight to Southport Old Rd	16	13	-3	-20%	OK	0.83	OK	OK	
Southport Rd right to Formby By-Pass (S)	88	48	-40	-46%	OK	4.92	OK	OK	
Church Rd (NB)	444	389	-55	-12%	OK	2.68	OK	OK	
Church Rd (SB)	393	346	-47	-12%	OK	2.45	OK	OK	
Southport Rd (EB)	474	382	-93	-20%	OK	4.48	OK	OK	
Southport Rd (WB)	596	612	16	3%	OK	0.65	OK	OK	
Duke Street (EB)	545	514	-31	-6%	OK	1.36	OK	OK	
Duke Street (WB)	425	425	0	0%	OK	0.02	OK	OK	
Moss Side (EB)	29	16	-13	-46%	OK	2.82	OK	OK	
	11616.03	11463.95							
			OK	43	100%	40	93%	41	95%
			Fail	0		3		2	
			Total	43		43		43	

Contact name
Atkins company name
Office address

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