



Blyth Traffic Model Report of Traffic Surveys

Northumberland County Council

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1. Introduction

1.1 Introduction

Northumberland County Council understand that the efficient operation of transport networks is an important factor in helping deliver and sustain a thriving and competitive economy. They also recognise that traffic congestion in the town of Blyth is resulting in key routes into and out of the town not operating as efficiently as they could. This will hinder development in the town, and economic growth across the wider North of Tyne area, unless transport improvement measures are put in place.

In 2015, Northumberland County Council commissioned a study to identify transport problems in Blyth and develop a long list of options, which could be implemented to address these problems. The study looked at not just the current issues, but also the likely future issues if all of the proposed development in the area is realised. As part of a long term strategy for investment, the study concluded that a new road into Blyth would address many of the problems.

Northumberland County Council identified five potential alignments for a new road into Blyth to improve connectivity and facilitate growth. The list of five was distilled into a list of three for further review and appraisal; the two options ruled out had a number of constraints, which made them unfeasible within the current environment.

Alongside the development of the five highway options, AECOM was commissioned to develop a SATURN traffic model of the study area, which could be used to forecast the traffic impacts and economic benefits of any proposed scheme. The traffic model needs to be sufficient in scope to capture all rerouting impacts of the proposed schemes and should be informed by up to date traffic information. Given that no recent traffic models exist in the study area, the model needs to be constructed from scratch and a large scale data collection exercise undertaken to collect traffic data to inform the model development. The purpose of this report is to detail the data collection exercise, which was undertaken in order to obtain the relevant data to carry out the task.

1.2 Traffic Model

AECOM was commissioned by Northumberland County Council (NCC) to conduct a traffic survey programme during September 2016 in order to inform the creation of a SATURN traffic model of Blyth and the surrounding area to a base year of 2016; this included the compilation of a new set of detailed trip matrices for the area.

The traffic survey programme was conducted in the neutral month of September 2016 by an appointed sub-contractor and consisted of a range of traffic surveys as detailed below:

- Roadside interview surveys at four sites in and around Blyth;
- Manual classified turning counts;
- Manual classified link counts.

In addition to the surveys identified above, ATC data for two weeks within September 2016 was also collected to assist with the calibration and validation of the SATURN model. Journey time data for the key road routes into and around Blyth was analysed from TrafficMaster data.

1.3 Location

A general location plan of the study area is shown in Appendix A. Plans of survey locations are shown in Appendix B.

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1.4 Programme of Surveys

Having determined the range of surveys within the programme, it was necessary to appoint a specialist traffic survey sub-contractor to carry out the management and conduction of the data collection exercise. Following a tender appraisal, North East Traffic Data Collection was appointed.

1.5 Report Structure

Following this introductory section, the document has been prepared with the following structure:

- Section 2 of this report discusses the RSI sites including conditions on the day of survey and the results at each site;
- Section 3 discusses the manual classified counts;
- Section 4 considers the ATC data;
- Section 5 discusses the journey time surveys; and
- Section 6 provides a summary and conclusions.

Detailed supporting information is contained within the appendices.

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2. Road Side Interviews

2.1 Introduction

It is essential in any traffic model to replicate traffic flows on links within the network and mirror the origin and destination routes of these vehicles. This allows for the identification of existing vehicle journeys that may benefit from any proposed future year scheme.

In order to identify the origin and destination of vehicles on links, a programme of road side interview surveys (RSIs) was undertaken in September 2016. This survey programme was medium in scale and undertaken at four sites in and around Blyth. The locations of the survey sites are shown in Table 2-1 below; the information is also displayed in Appendix B. RSIs were conducted on traffic travelling inbound towards Blyth on the main routes into the town centre at three of the survey locations; in the case of site 2, the survey had to be conducted for traffic travelling outbound from the area as the survey was undertaken on carriageway and this would ensure queuing was contained within a residential area.

Table 2-1: Roadside Interview Survey Locations

Site	Location	Survey Date
1	Cowpen Road	Tuesday 27 September 2016
2	Chase Farm Drive	Wednesday 28 September 2016
3	Links Road	Wednesday 28 September 2016
4	Laverock Hall Road	Tuesday 27 September 2016

2.2 Survey Process

All RSI surveys were undertaken over 12 hour periods (0700–1900hrs) and completed in accordance with standard RSI survey guidance (including analysis of vehicle occupancy, vehicle type and specific journey purpose). The vehicles were classified as follows:

- Car/Taxi;
- LGV;
- OGV1;
- OGV2; and
- Motorcycle/Moped.

At each RSI site a two-way classified count was also undertaken on the day of the survey in accordance with standard procedures.

Summary Site Observations

Site 1 – Cowpen Road

Date: 27 September 2016

Weather: Windy, Sunny & Dry

Road Type: Single Carriageway

On-site observations or occurrences: None.

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Site 2 – Chase Farm Drive

Date: 28 September 2016

Weather: Warm, Sunny & Dry

Road Type: Single Carriageway

On-site observations or occurrences: None.

Site 3 – Links Road

Date: 28 September 2016

Weather: Cold, Overcast but Dry

Road Type: Dual Carriageway

On-site observations or occurrences: Lane change on Links Road NB to ensure the safety of the survey company staff.

Site 4 – Laverock Hall Road

Date: 27 September 2016

Weather: Windy, Overcast but Dry

Road Type: Single Carriageway

On-site observations or occurrences: None.

2.3 Road Side Interview Sample Rates

The absolute sampling rate required to achieve an acceptable degree of accuracy when developing a traffic model depends on a number of factors, which are in turn dependent on the characteristics of the traffic stream. However, sample rates in excess of 20% are desirable, and an absolute minimum of 10% is required to produce a reliable model. Furthermore, surveyors should ensure that sample rates are consistent for all vehicle types. It is common for heavy goods vehicles to be under-represented in surveys and it is good practice to obtain a good sample of these vehicles.

In order to maximise the sample rate for each model hour, records were extracted from the following periods to make up the dataset for each hour:

- AM Peak Hour – 0700-0900;
- PM Peak Hour – 1600-1900; and
- Inter-Peak Hour – 1000-1600.

Sample rates have been assessed for each peak period and are shown in the following tables.

The sampled number of vehicles at any RSI site must be factored up to represent the total traffic passing through the site by use of expansion factors. These are linked directly to the sample rate and are calculated separately for each user class. As such, expansion factors have been calculated for each survey site, peak period and user class and are also summarised in the following tables. RSI desire line plots are included in **Appendix C**.

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Table 2-2: RSI Summary Site 1 Cowpen Road

Survey Direction	Count (veh)				Clean Records				Sample Rate				RSI Expansion Factors				Deletion Rate
	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	
0700-0800	127	13	2	142	117	13	2	132	18%	7%	13%	16%	5.74	14.42	7.81	6.63	0.07
0800-0900	132	17	1	150	121	14	1	136	18%	10%	3%	16%	5.66	11.80	28.01	6.45	0.09
0900-1000	63	16	5	84	51	15	4	70	11%	9%	16%	10%	13.27	12.99	9.07	12.97	0.17
1000-1100	82	9	3	94	74	9	3	86	12%	6%	12%	11%	9.28	18.04	8.79	10.18	0.09
1100-1200	91	17	4	112	78	15	3	96	12%	12%	12%	12%	9.24	9.26	10.69	9.29	0.14
1200-1300	98	11	3	112	82	7	3	92	13%	8%	11%	12%	9.32	19.27	9.19	10.08	0.18
1300-1400	92	9	1	102	79	9	1	89	13%	6%	3%	11%	9.10	17.08	32.52	10.17	0.13
1400-1500	74	17	4	95	63	12	4	79	10%	12%	13%	11%	11.62	12.13	7.84	11.51	0.17
1500-1600	97	19	1	117	76	16	1	93	13%	13%	5%	13%	8.74	8.29	16.69	8.74	0.21
1600-1700	111	17	2	130	101	15	2	118	12%	11%	8%	12%	7.72	8.74	10.93	7.89	0.09
1700-1800	126	15	2	143	117	13	2	132	12%	18%	22%	13%	7.18	5.37	3.74	6.95	0.08
1800-1900	120	5	2	127	118	5	2	125	17%	8%	67%	16%	6.75	14.55	1.65	6.98	0.02

Reverse Direction	Count (veh)				Clean Records				Sample Rate				RSI Expansion Factors				Deletion Rate
	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	
0700-0800	111	17	2	130	101	15	2	118	17%	14%	13%	16%	6.63	8.17	7.97	6.84	0.09
0800-0900	126	15	2	143	117	13	2	132	17%	13%	10%	17%	5.50	8.15	9.34	5.82	0.08
0900-1000	120	5	2	127	118	5	2	125	18%	4%	7%	15%	5.05	21.87	13.33	5.86	0.02
1000-1100	82	9	3	94	74	9	3	86	13%	6%	11%	12%	9.50	18.11	10.26	10.43	0.09
1100-1200	91	17	4	112	78	15	3	96	14%	14%	10%	13%	8.91	8.61	13.43	9.00	0.14
1200-1300	98	11	3	112	82	7	3	92	15%	9%	9%	14%	8.55	18.27	11.42	9.37	0.18
1300-1400	92	9	1	102	79	9	1	89	13%	8%	4%	12%	9.34	13.59	29.21	9.99	0.13
1400-1500	74	17	4	95	63	12	4	79	10%	15%	12%	11%	11.59	9.89	8.70	11.19	0.17
1500-1600	97	19	1	117	76	16	1	93	15%	12%	4%	14%	8.41	10.16	27.57	8.92	0.21
1600-1700	127	13	2	142	117	13	2	132	18%	8%	12%	16%	6.40	13.14	8.91	7.10	0.07
1700-1800	132	17	1	150	121	14	1	136	18%	20%	13%	18%	6.72	6.86	8.93	6.75	0.09
1800-1900	63	16	5	84	51	15	4	70	7%	23%	100%	8%	13.84	3.49	0.92	10.88	0.17

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Table 2-3: RSI Summary Site 2 Chase Farm Drive

Survey Direction	Count (vehs)				Clean Records				Sample Rate				RSI Expansion Factors				Deletion Rate
	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	
0700-0800	143	18	2	163	140	17	2	159	38%	46%	50%	39%	2.76	2.36	2.06	2.71	0.02
0800-0900	127	9	2	138	116	9	2	127	27%	23%	75%	27%	3.96	4.27	1.31	3.95	0.08
0900-1000	87	9	1	97	80	9	1	90	28%	27%	33%	28%	4.19	3.99	3.26	4.16	0.07
1000-1100	106	7	1	114	101	6	1	108	28%	21%	25%	27%	3.84	5.71	4.03	3.95	0.05
1100-1200	81	5	2	88	79	5	2	86	23%	20%	25%	23%	5.51	6.26	5.01	5.54	0.02
1200-1300	110	14	4	128	106	14	4	124	27%	38%	67%	28%	3.81	2.59	1.47	3.59	0.03
1300-1400	62	2	2	66	61	2	2	65	16%	6%	40%	15%	6.52	15.95	2.49	6.69	0.02
1400-1500	84	8	1	93	75	7	1	83	19%	22%	10%	19%	5.40	4.70	9.15	5.39	0.11
1500-1600	96	8	1	105	92	7	1	100	23%	17%	33%	23%	4.03	6.09	2.72	4.16	0.05
1600-1700	77	9	1	87	76	9	1	86	17%	23%	100%	18%	5.33	3.97	0.89	5.14	0.01
1700-1800	117	7	1	125	116	7	1	124	23%	28%	50%	24%	3.78	3.14	1.76	3.73	0.01
1800-1900	124	5	1	130	120	5	1	126	22%	20%	100%	22%	3.77	4.08	0.82	3.76	0.03

Reverse Direction	Count (vehs)				Clean Records				Sample Rate				RSI Expansion Factors				Deletion Rate
	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	
0700-0800	77	9	1	87	76	9	1	86	36%	22%	50%	34%	2.90	4.70	2.06	3.08	0.01
0800-0900	117	7	1	125	116	7	1	124	36%	27%	33%	35%	2.98	3.96	3.20	3.04	0.01
0900-1000	124	5	1	130	120	5	1	126	35%	19%	17%	34%	3.24	5.69	6.57	3.36	0.03
1000-1100	106	7	1	114	101	6	1	108	27%	24%	10%	27%	4.10	5.16	10.68	4.22	0.05
1100-1200	81	5	2	88	79	5	2	86	21%	9%	25%	19%	5.27	11.66	4.24	5.62	0.02
1200-1300	110	14	4	128	106	14	4	124	27%	44%	67%	29%	4.09	2.42	1.59	3.82	0.03
1300-1400	62	2	2	66	61	2	2	65	16%	6%	29%	15%	6.90	16.31	3.68	7.09	0.02
1400-1500	84	8	1	93	75	7	1	83	22%	30%	10%	23%	5.22	4.04	10.47	5.19	0.11
1500-1600	96	8	1	105	92	7	1	100	21%	24%	100%	21%	5.23	4.87	0.00	5.16	0.05
1600-1700	143	18	2	163	140	17	2	159	28%	50%	50%	30%	3.78	2.21	2.09	3.59	0.02
1700-1800	127	9	2	138	116	9	2	127	19%	28%	75%	19%	5.29	3.20	1.20	5.10	0.08
1800-1900	87	9	1	97	80	9	1	90	15%	38%	100%	16%	6.74	2.49	0.93	6.25	0.07

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Table 2-4: RSI Summary Site 3 Links Road

Survey Direction	Count (Vehs)				Clean Records				Sample Rates				RSI Expansion Factors				Deletion Rate
	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	
0700-0800	87	11	1	99	79	9	1	89	35%	28%	50%	34%	3.28	4.62	2.08	3.40	10.10%
0800-0900	100	17	4	121	89	17	3	109	23%	33%	80%	24%	4.82	3.00	1.63	4.45	9.92%
0900-1000	69	7	1	77	63	7	0	70	26%	16%	33%	24%	5.21	7.49	1.00	5.49	9.09%
1000-1100	59	17	1	77	53	16	1	70	21%	31%	25%	23%	5.39	3.43	4.07	4.93	9.09%
1100-1200	64	11	1	76	58	9	1	68	24%	29%	50%	25%	5.70	5.26	2.49	5.59	10.53%
1200-1300	56	9	7	72	42	7	7	56	20%	24%	100%	22%	8.41	6.50	1.23	7.27	22.22%
1300-1400	69	7	1	77	56	7	1	64	23%	18%	50%	22%	6.86	7.00	2.51	6.81	16.88%
1400-1500	67	11	2	80	58	10	1	69	20%	24%	29%	21%	6.93	5.48	8.52	6.74	13.75%
1500-1600	81	15	1	97	75	13	1	89	19%	25%	33%	20%	6.28	5.09	3.36	6.07	8.25%
1600-1700	99	20	2	121	93	18	2	113	22%	29%	67%	23%	6.01	4.84	1.87	5.75	6.61%
1700-1800	107	8	3	118	98	8	3	109	17%	14%	150%	17%	6.77	7.32	0.68	6.64	7.63%
1800-1900	79	7	1	87	74	6	1	81	19%	21%	33%	19%	6.37	6.14	3.35	6.32	6.90%

Reverse Direction	Count (Vehs)				Clean Records				Sample Rates				RSI Expansion Factors				Deletion Rate
	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	
0700-0800	99	20	2	121	93	18	2	113	19%	22%	29%	20%	5.47	5.00	3.50	5.36	6.61%
0800-0900	107	8	3	118	98	8	3	109	20%	10%	50%	19%	5.60	9.88	2.05	5.82	7.63%
0900-1000	79	7	1	87	74	6	1	81	27%	18%	50%	26%	4.28	6.89	2.18	4.45	6.90%
1000-1100	59	17	1	77	53	16	1	70	23%	41%	20%	25%	5.54	2.90	5.67	4.94	9.09%
1100-1200	64	11	1	76	58	9	1	68	19%	24%	25%	20%	6.14	5.38	4.31	6.02	10.53%
1200-1300	56	9	7	72	42	7	7	56	17%	18%	140%	19%	8.70	7.91	0.79	7.61	22.22%
1300-1400	69	7	1	77	56	7	1	64	19%	14%	14%	18%	6.32	6.81	6.81	6.38	16.88%
1400-1500	67	11	2	80	58	10	1	69	20%	22%	67%	20%	6.28	5.31	3.18	6.09	13.75%
1500-1600	81	15	1	97	75	13	1	89	21%	27%	50%	22%	5.56	4.54	2.15	5.37	8.25%
1600-1700	87	11	1	99	79	9	1	89	20%	18%	33%	20%	5.65	7.12	3.15	5.77	10.10%
1700-1800	100	17	4	121	89	17	3	109	22%	36%	200%	24%	5.39	2.98	0.72	4.89	9.92%
1800-1900	69	7	1	77	63	7	0	70	21%	21%	100%	21%	5.49	4.86	0.00	5.42	9.09%

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Table 2-5: RSI Summary Inter-Peak Period Laverock Hall Road

Survey Direction	Count (Vehs)				Clean Records				Sample Rate				RSI Expansion Factors				Deletion Rate
	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	
0700-0800	77	24	3	104	69	24	3	96	20%	24%	23%	21%	5.43	4.17	4.25	5.08	7.69%
0800-0900	111	12	1	124	98	7	1	106	15%	9%	6%	14%	6.53	15.45	13.52	7.18	14.52%
0900-1000	64	16	1	81	57	11	1	69	15%	14%	6%	15%	7.52	10.06	16.95	8.06	14.81%
1000-1100	65	12	1	78	58	11	1	70	19%	15%	5%	18%	6.80	8.37	21.85	7.26	10.26%
1100-1200	95	19	1	115	89	16	1	106	19%	20%	8%	19%	5.46	5.77	11.43	5.56	7.83%
1200-1300	85	19	3	107	77	19	2	98	16%	20%	27%	17%	6.86	5.10	5.55	6.49	8.41%
1300-1400	72	13	2	87	69	13	2	84	16%	19%	13%	17%	8.03	6.57	9.42	7.84	3.45%
1400-1500	74	12	2	88	71	12	2	85	13%	12%	15%	13%	9.53	9.84	7.73	9.54	3.42%
1500-1600	76	15	2	93	72	12	2	86	10%	10%	14%	10%	11.26	12.97	7.70	11.43	7.56%
1600-1700	111	22	2	135	100	20	2	122	14%	19%	58%	15%	10.42	7.59	2.31	9.84	9.65%
1700-1800	122	9	2	133	119	9	2	130	13%	10%	38%	12%	9.60	11.98	3.05	9.69	2.26%
1800-1900	117	6	2	125	110	6	2	118	14%	9%	179%	14%	7.24	10.94	0.55	7.33	5.61%

Reverse Direction	Count (Vehs)				Clean Records				Sample Rate				RSI Expansion Factors				Deletion Rate
	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	
0700-0800	111	22	2	135	100	20	2	122	11%	13%	25%	11%	9.57	7.56	3.72	9.15	9.65%
0800-0900	122	9	2	133	119	9	2	130	15%	12%	15%	15%	7.54	9.60	7.30	7.68	2.26%
0900-1000	117	6	2	125	110	6	2	118	20%	9%	11%	19%	5.75	12.57	9.76	6.15	5.61%
1000-1100	65	12	1	78	58	11	1	70	14%	17%	6%	14%	10.01	7.93	20.60	9.83	10.26%
1100-1200	95	19	1	115	89	16	1	106	21%	24%	6%	21%	5.85	5.59	20.37	5.95	7.83%
1200-1300	85	19	3	107	77	19	2	98	17%	25%	23%	18%	6.96	4.30	7.08	6.44	8.41%
1300-1400	72	13	2	87	69	13	2	84	15%	18%	13%	16%	8.09	6.67	8.91	7.89	3.45%
1400-1500	74	12	2	88	71	12	2	85	16%	15%	15%	15%	7.94	7.78	7.73	7.91	3.42%
1500-1600	76	15	2	93	72	12	2	86	13%	14%	12%	14%	8.90	9.96	9.72	9.06	7.56%
1600-1700	77	24	3	104	69	24	3	96	12%	26%	27%	14%	10.22	4.13	3.99	8.50	7.69%
1700-1800	111	12	1	124	98	7	1	106	17%	29%	50%	18%	7.59	6.80	2.27	7.48	14.52%
1800-1900	64	16	1	81	57	11	1	69	12%	33%	50%	14%	10.19	4.93	2.26	9.24	14.81%

Final

3. Manual Classified Counts

3.1 Introduction

Manual Classified Counts (MCC) give an indication of the turning movements observed at key junctions in the network. An audit of existing data revealed that a number of counts had been collected on the A193 Cowpen Road that would be useful. However, a number of turning counts were needed across the rest of the highway network and were commissioned at the location shown in the table below.

Table 3-1: Manual Classified Turning Count Locations

Site	Location	Survey Date
A	A189 at A1147	Thursday 22 September 2016
B	A193 Cowpen Road at Hodgsons Road	Thursday 22 September 2016
C	B1329 Regent Street at Quay Road	Thursday 22 September 2016
D	A193 Renwick Road at Waterloo Road	Thursday 22 September 2016
E	A193 at Princess Road, Blyth	Thursday 22 September 2016
F	The Broadway at Plessey Road	Thursday 22 September 2016
G	Rotary Way at Links Road	Thursday 22 September 2016
H	Plessey Road West	Thursday 22 September 2016
I	Newcastle Road at Laverock Hall Road	Thursday 22 September 2016
J	A192 at Laverock Hall Road	Thursday 22 September 2016
K	B1505 at A1061 Durham Road	Thursday 22 September 2016
L	A189/A192/B1505	Thursday 22 September 2016
M	A1061 at B1505	Thursday 22 September 2016
N	A1061 at The South Slip on	Thursday 22 September 2016

The locations of these sites are shown in Appendix B, alongside the sites which were already available on the A193 Cowpen Road.

3.2 Survey Specification

The following vehicles classification system was used for the manual classified turning count surveys:

- Car;
- Light Goods Vehicles (LGV);
- Other Goods Vehicle 1 (OGV1);
- Other Goods Vehicle 2 (OGV2);
- Public Service Vehicle (PSV);
- Motorcycles (MCL); and
- Pedal Cycles (PCL).

Final**3.3 12 Hour Turning Counts**

The total 12-hour turning counts (expressed in number of vehicles) obtained at each survey location is contained the following tables.

Table 3-2: Site A - 12-Hour turning counts

Location: A189 at A1147

Date: Thursday 22 September 2016

	From	To	12-Hour Total (veh)
Arm 1	A1147	A189 North	541
Arm 1	A1147	A189 South	4806
Arm 1	A1147	Stead Lane	153
Arm 2	A189 North	A189 South	0
Arm 2	A189 North	Stead Lane	1418
Arm 2	A189 North	A1147	177
Arm 3	A189 South	Stead Lane	802
Arm 3	A189 South	A1147	4875
Arm 3	A189 South	A189 North	0
Arm 4	Stead Lane	A1147	413
Arm 4	Stead Lane	A189 North	1113
Arm 4	Stead Lane	A189 South	1117

Table 3-3: Site B - 12-Hour turning counts

Location: A193 Cowpen Road at Hodgsons Road

Date: Thursday 22 September 2016

	From	To	12-Hour Total (veh)
Arm 1	Cowpen Road North	Hodgson Road	3447
Arm 1	Cowpen Road North	Cowpen Road South	4891
Arm 2	Hodgson Road	Cowpen Road South	1023
Arm 2	Hodgson Road	Cowpen Road North	3418
Arm 3	Cowpen Road South	Cowpen Road North	5655
Arm 3	Cowpen Road South	Hodgson Road	791

Final**Table 3-4: Site C - 12-Hour turning counts**

Location: B1329 Regent Street at Quay Road

Date: Thursday 22 September 2016

	From	To	12-Hour Total (veh)
Arm 1	B1329 North	Quay Road	534
Arm 1	B1329 North	Bridge Street South	2611
Arm 1	B1329 North	Bridge Street West	1548
Arm 1	B1329 North	Bus Depot	0
Arm 2	Quay Road	Bridge Street South	93
Arm 2	Quay Road	Bridge Street West	231
Arm 2	Quay Road	Bus Depot	1
Arm 2	Quay Road	B1329 North	351
Arm 3	Bridge Street South	Bridge Street West	730
Arm 3	Bridge Street South	Bus Depot	4
Arm 3	Bridge Street South	B1329 North	2476
Arm 3	Bridge Street South	Quay Road	108
Arm 4	Bridge Street West	Bus Depot	0
Arm 4	Bridge Street West	B1329 North	1346
Arm 4	Bridge Street West	Quay Road	319
Arm 4	Bridge Street West	Bridge Street South	581
Arm 5	Bus Depot	B1329 North	10
Arm 5	Bus Depot	Quay Road	1
Arm 5	Bus Depot	Bridge Street South	10
Arm 5	Bus Depot	Bridge Street West	8

Table 3-5: Site D - 12-Hour turning counts

Location: A193 Renwick Road at Waterloo Road

Date: Thursday 22 September 2016

	From	To	12-Hour Total (veh)
Arm 1	Renwick Road North	Waterloo Road	2315
Arm 1	Renwick Road North	Renwick Road South	4780
Arm 2	Waterloo Road	Renwick Road South	2066
Arm 2	Renwick Road South	Renwick Road North	2268
Arm 3	Renwick Road South	Renwick Road North	5165
Arm 3	Renwick Road South	Renwick Road South	2480

Final**Table 3-6: Site E - 12-Hour turning counts**

Location: A193 at Princess Road, Blyth

Date: Thursday 22 September 2016

	From	To	12-Hour Total (veh)
Arm 1	Renwick Road	Princess Louise Road East	166
Arm 1	Renwick Road	Broadway	4680
Arm 1	Renwick Road	Princess Louise Road West	2146
Arm 2	Princess Louise Road East	Broadway	298
Arm 2	Princess Louise Road East	Princess Louise Road West	429
Arm 2	Princess Louise Road East	Renwick Road	356
Arm 3	Broadway	Princess Louise Road West	771
Arm 3	Broadway	Renwick Road	4910
Arm 3	Broadway	Princess Louise Road East	407
Arm 4	Princess Louise Road West	Renwick Road	2443
Arm 4	Princess Louise Road West	Princess Louise Road East	267
Arm 4	Princess Louise Road West	Broadway	1061

Table 3-7: Site F - 12-Hour turning counts

Location: The Broadway at Plessey Road

Date: Thursday 22 September 2016

	From	To	12-Hour Total (veh)
Arm 1	Broadway	Plessey Road East	482
Arm 1	Broadway	Rotary Way	3928
Arm 1	Broadway	Plessey Road West	1350
Arm 2	Plessey Road East	Rotary Way	1257
Arm 2	Plessey Road East	Plessey Road West	1516
Arm 2	Plessey Road East	Broadway	585
Arm 3	Rotary Way	Plessey Road West	1034
Arm 3	Rotary Way	Broadway	4423
Arm 3	Rotary Way	Plessey Road East	1277
Arm 4	Plessey Road West	Broadway	1459
Arm 4	Plessey Road West	Plessey Road East	1343
Arm 4	Plessey Road West	Rotary Way	936

Final**Table 3-8: Site G - 12-Hour turning counts**

Location: Rotary Way at Links Road

Date: Thursday 22 September 2016

	From	To	12-Hour Total (veh)
Arm 1	Rotary Way	Links Road North	791
Arm 1	Rotary Way	Links Road South	2681
Arm 1	Rotary Way	South Newsham Road	2817
Arm 2	Links Road North	Links Road South	1844
Arm 2	Links Road North	South Newsham Road	2241
Arm 2	Links Road North	Rotary Way	877
Arm 3	Links Road South	South Newsham Road	1303
Arm 3	Links Road South	Rotary Way	2968
Arm 3	Links Road South	Links Road North	1806
Arm 4	South Newsham Road	Rotary Way	3122
Arm 4	South Newsham Road	Links Road North	2315
Arm 4	South Newsham Road	Links Road South	1213

Table 3-9: Site H - 12-Hour turning counts

Location: Plessey Road West

Date: Thursday 22 September 2016

	From	To	12-Hour Total (veh)
Arm 1	Plessey Road West	Carr Street	2591
Arm 1	Plessey Road West	Plessey Road East	2317
Arm 2	Carr Street	Plessey Road East	629
Arm 2	Carr Street	Plessey Road West	2147
Arm 3	Plessey Road East	Plessey Road West	2457
Arm 3	Plessey Road East	Carr Street	679

Table 3-10: Site I - 12-Hour turning counts

Location: Newcastle Road at Laverock Hall Road

Date: Thursday 22 September 2016

	From	To	12-Hour Total (veh)
Arm 1	Laverock Hall Road	Newcastle Road	3420
Arm 1	Laverock Hall Road	South Newsham Road	5687
Arm 2	Newcastle Road	South Newsham Road	600
Arm 2	Newcastle Road	Laverock Hall Road	3409
Arm 3	South Newsham Road	Laverock Hall Road	5518
Arm 3	South Newsham Road	Newcastle Road	519

Final**Table 3-11: Site J - 12-Hour turning count**

Location: A192 at Laverock Hall Road

Date: Thursday 22 September 2016

	From	To	12-Hour Total (veh)
Arm 1	A192 North	Laverock Hall Road	2708
Arm 1	A192 North	A192 South	1714
Arm 1	A192 North	A1061 West	1749
Arm 2	Laverock Hall Road	A192 South	572
Arm 2	Laverock Hall Road	A1061 West	5915
Arm 2	Laverock Hall Road	A192 North	2688
Arm 3	A192 South	A1061 West	855
Arm 3	A192 South	A192 North	2750
Arm 3	A192 South	Laverock Hall Road	673
Arm 4	A1061 West	A192 North	207
Arm 4	A1061 West	Laverock Hall Road	5840
Arm 4	A1061 West	A192 South	1570

Table 3-12: Site K - 12-Hour turning counts

Location: B1505 at A1061 Durham Road

Date: Thursday 22 September 2016

	From	To	12-Hour Total (veh)
Arm 1	B1505	A1061 East	291
Arm 1	B1505	B1505 South	503
Arm 1	B1505	Durham Road	749
Arm 2	A1061 East	B1505 South	1025
Arm 2	A1061 East	Durham Road	3206
Arm 2	A1061 East	B1505	165
Arm 3	B1505 South	Durham Road	1835
Arm 3	B1505 South	B1505	440
Arm 3	B1505 South	A1061 East	4076
Arm 4	Durham Road	B1505	678
Arm 4	Durham Road	A1061 East	3756
Arm 4	Durham Road	B1505 South	1765

Final**Table 3-13: Site L - 12-Hour turning counts**

Location: A189/A192/B1505

Date: Thursday 22 September 2016

	From	To	12-Hour Total (veh)
Arm 1	A189 North	A192 East	4039
Arm 1	A189 North	A189 South	0
Arm 1	A189 North	A192 West	3245
Arm 1	A189 North	B1505	145
Arm 2	A192 East	A189 South	21
Arm 2	A192 East	A192 West	1842
Arm 2	A192 East	B1505	810
Arm 2	A192 East	A189 North	2950
Arm 3	A189 South	A192 West	798
Arm 3	A189 South	B1505	975
Arm 3	A189 South	A189 North	0
Arm 3	A189 South	A192 East	45
Arm 4	A192 West	B1505	48
Arm 4	A192 West	A189 North	3003
Arm 4	A192 West	A192 East	1059
Arm 4	A192 West	A189 South	1315
Arm 5	B1505	A189 North	127
Arm 5	B1505	A192 East	773
Arm 5	B1505	A189 South	1103
Arm 5	B1505	A192 West	232

Table 18: Site M - 12-Hour turning counts

Location: A1061 at B1505

Date: Thursday 22 September 2016

	From	To	12-Hour Total (veh)
Arm 1	A189	B1505	126
Arm 1	A189	A1061	4358
Arm 2	B1505	A1061	1994
Arm 2	B1505	A189	451
Arm 3	A1061	A189	1105
Arm 3	A1061	B1505	2227

Final**Table 19: Site N - 12-Hour turning counts**

Location: A1061 at B1505

Date: Thursday 22 September 2016

	From	To	12-Hour Total (veh)
Arm 1	A1061	A189	4751
Arm 1	A189	A1061	0

3.4 Link Counts

MCCs were also taken at the location of the RSI sites identified in the preceding chapter. These surveys were undertaken on the same date as the RSI surveys so that the data collected was comparable. The total 12-hour link volume (also expressed in number of vehicles) obtained at each location is detailed in the following tables

Table 3-14: RSI Site A - 12-Hour Link Flow Counts

Location: A192 Peacock Gap

Date: Monday 18 June 2007

	From	To	12-Hour Total (veh)
Arm 1	A192 North	A192 South	3673
Arm 2	A192 South	A192 North	4052

Table 3-15: RSI Site B - 12-Hour Link Flow Counts

Location: A197 Whorral Bank

Date: Monday 18 June 2007

	From	To	12-Hour Total (veh)
Arm 1	A197 North	A197 South	5267
Arm 2	A197 South	A197 North	5078

Table 3-16: RSI Site C - 12-Hour Link Flow Counts

Location: A196 Stobhill

Date: Tuesday 19 June 2007

	From	To	12-Hour Total (veh)
Arm 1	A196 West	A197 East	3211
Arm 2	A197 East	A196 West	2997

Final**Table 3-17: RSI Site D - 12-Hour Link Flow Counts**

Location: A192

Date: Tuesday 19 June 2007

	From	To	12-Hour Total (veh)
Arm 1	A192 North	A192 South	4423
Arm 2	A192 South	A192 North	4327

Table 3-18: RSI Site E - 12-Hour Link Flow Counts

Location: A197

Date: Tuesday 19 June 2007

	From	To	12-Hour Total (veh)
Arm 1	A197 North	A197 South	4902
Arm 2	A197 South	A197 North	4591

Table 3-19: RSI Site F - 12-Hour Link Flow Counts

Location: A1068

Date: Monday 21 June 2007

	From	To	12-Hour Total (veh)
Arm 1	A1068 North	A1068 South	4061
Arm 2	A1068 South	A1068 North	4002

Table 3-20: RSI Site G - 12-Hour Link Flow Counts

Location: A189

Date: Monday 21 June 2007

	From	To	12-Hour Total (veh)
Arm 1	A189 North	A189 South	17780
Arm 2	A189 South	A189 North	13824

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4. ATC Data

4.1 Introduction

The primary purpose of the Blyth SATURN model is to appraise the impacts of a Blyth relief road on the highway network. Therefore, it is essential to represent, as accurately as possible, observed base year traffic flows on the core road network within the study area. This data is available from Automatic Traffic Counters (ATC).

4.2 ATC Data

ATC Data can provide detailed link count information throughout the year and smoothes out any day to day variations that may not be picked up by a single day count. Recent ATC data for the Blyth area was obtained at the following locations (also displayed in **Appendix B**) for a two week period in September 2016:

- Bebside Road;
- Horton Road;
- A192 East Bound;
- A192 West Bound;
- A192;
- Laverock Hall Road;
- South Newsham Road;
- A193 Links Road North Bound;
- A193 Links Road South Bound;
- B1329 Links Road;
- A1147;
- B1331 Furnace Bank;
- Chase Farm Drive;
- Cowpen Road (West);
- Cowpen Road (Middle);
- Cowpen Roadm(East);
- A193 Cowpen Road South;
- B1329;
- A193;
- Deneview Drive;
- Newsham Road ;
- and Plessey Road.

The data for each of the ATC sites was analysed to remove any significant outliers or spurious data. Observed traffic flows for each of the hours are contained in Appendix D and Appendix E. The peak hours at each of the sites are shown in the following table and have informed the selection of the modelled peak hours of 0800-0900 and 1700-1800.

Final

Table 4-1: Peak Hours by ATC Site

	Direction	AM	PM
Site 1 - Bebside Road	EB	0900 – 1000	1600 – 1700
	WB	0800 – 0900	1700 – 1800
Site 2 - Horton Road	NB	0800 – 0900	1600 – 1700
	SB	0800 – 0900	1600 – 1700
Site 3 - A192 EB	EB	0800 – 0900	1600 – 1700
	WB	0700 – 0800	1600 – 1700
Site 4 - A192 WB	NB	0800 – 0900	1600 – 1700
	SB	0700 – 0800	1600 – 1700
Site 5 - A192	EB	0800 – 0900	1600 – 1700
	WB	0700 – 0800	1600 – 1700
Site 6 – Laverock Hall Road	EB	0800 – 0900	1600 – 1700
	WB	0700 – 0800	1600 – 1700
Site 7 – South Newsham Road	EB	0800 – 0900	1700 – 1800
	WB	0800 – 0900	1700 – 1800
Site 8 – A193 Links Road South Bound	SB	0800 – 0900	1700 – 1800
	NB	0800 – 0900	1700 – 1800
Site 9 – A193 Links Road North Bound	NB	0800 – 0900	1700 – 1800
	SB	0800 – 0900	1600 – 1700
Site 10 – B1329 Links Road	NB	0800 – 0900	1700 – 1800
	SB	0800 – 0900	1600 – 1700
Site 11 – A1147	NB	0800 – 0900	1700 – 1800
	SB	0700 – 0800	1600 – 1700
Site 12 – B1331 Furnace Bank	EB	0800 – 0900	1700 – 1800
	WB	0800 – 0900	1600 – 1700
Site 13 – Chase Farm Drive	NB	0800 – 0900	1800 – 1900
	SB	0900 – 1000	1700 – 1800
Site 14 – Cowpen Road (W)	EB	0900 – 1000	1600 – 1700
	WB	0700 – 0800	1600 – 1700
Site 15 – Cowpen Road (Mid)	EB	0900 – 1000	1600 – 1700
	WB	0800 – 0900	1600 – 1700
Site 16 – Cowpen Road (E)	EB	0900 – 1000	1600 – 1700
	WB	0800 – 0900	1600 – 1700
Site 17 – A193 Cowpen Road South	NB	0800 – 0900	1600 – 1700
	SB	0900 – 1000	1600 – 1700
Site 18 – B1329	NB	0900 – 1000	1600 – 1700
	SB	0900 – 1000	1600 – 1700
Site 19 – A193	NB	0800 – 0900	1600 – 1700
	SB	0800 – 0900	1700 – 1800
Site 20 – Deneview Drive	EB	0800 – 0900	1700 – 1800
	WB	0800 – 0900	1700 – 1800
Site 21 – Newsham Road	NB	0800 – 0900	1700 – 1800
	SB	0800 – 0900	1700 – 1800
Site 22 – Plessey Road	EB	0800 – 0900	1700 – 1800
	WB	0800 – 0900	1700 – 1800

Final

5. Journey Time Data

5.1 Introduction

Journey time information was extracted from TrafficMaster for the key routes into and around Blyth. TrafficMaster data is provided by DfT to local authorities and contains global positioning system (GPS) derived journey times of vehicles. Travel times for particular routes can be derived from the data based on a specification of links in the Integrated Transport Network (ITN). Journey times along a defined route are produced based on a collation and aggregation of data for individual ITN links along the route. This data set is recorded continuously, and is available for all primary and secondary road links across the UK. This data provides a large vehicle sample, which can help to provide a statistically accurate representation of existing journey time conditions. The data available for the purpose of this study covers the 2016 information available at the time of traffic survey data collection. It was processed on behalf of the North East Combined Authority team for an average weekday of neutral months and provided to AECOM. The routes used in the development of the model and the observed journey times are shown below. The location of these routes is shown in the Appendix F.

Table 5-1: TrafficMaster Journey Time Route

Routes	Observed Journey Times (minutes)		
	AM	IP	PM
A193 NB From Horton Road to Fountain Head Bank roundabout	00:14:28	00:13:28	00:14:30
A193 SB From Fountain Head Bank roundabout to Horton Road	00:13:41	00:13:32	00:14:21
A189 NB From A189 South to A189 North	00:04:18	00:04:11	00:04:10
A189 SB From A189 North to A189 South	00:04:52	00:04:31	00:04:43
Laverock Hall Road SB From Cowpen Road to A1061 roundabout	00:11:39	00:11:15	00:11:21
Laverock Hall Road NB From A1061 roundabout to Cowpen Road	00:11:14	00:11:31	00:12:21
Plessey Road NB From Carr Street roundabout to Union Street/Bridge Street	00:04:46	00:04:44	00:04:44
Plessey Road SB From Union Street/Bridge Street to Carr Street roundabout	00:04:07	00:04:20	00:04:12
A192 NB From Seaton Delaval to A193 junction	00:06:45	00:06:30	00:06:41
A192 SB From A193 junction to Seaton Delaval	00:06:20	00:06:28	00:08:13

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6. Summary

This report has identified and described the methodology employed to collect the necessary data to develop a traffic model of Blyth, Northumberland. The survey programme was adequately completed within required timescales. The data derived from the surveys has been successfully applied in the developed of the base year trip matrices for the Blyth model prior to the commencement of option testing using SATURN modelling software.

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Appendix A - Location Plan of Study Area

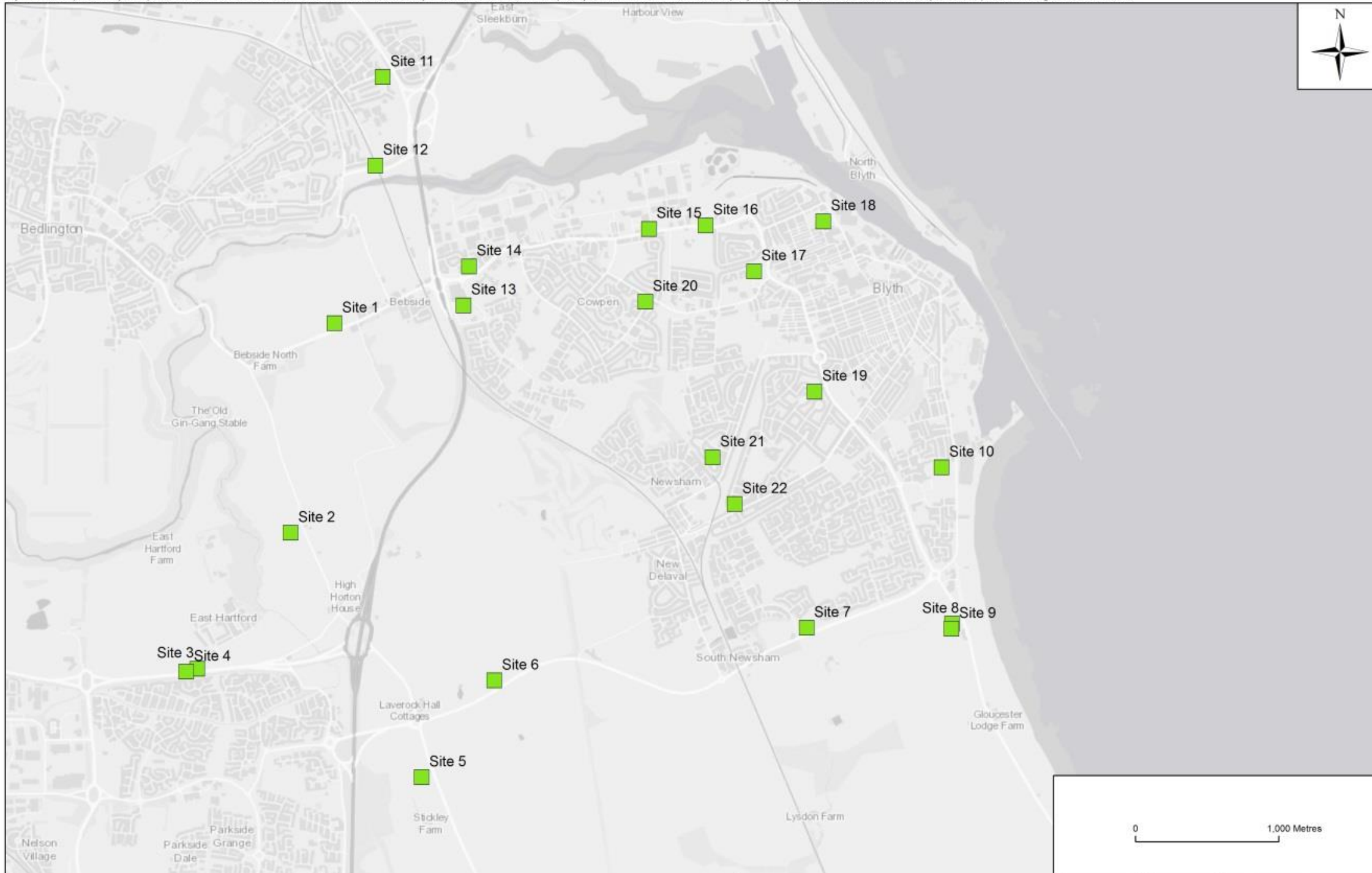
This document has been prepared by AECOM for the sole use of our Client (the "Client") and in accordance with generally accepted consultancy principles, the budget for fees and terms of reference agreed between AECOM and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of AECOM.



Client: Northumberland County Council	Title: Blyth Location Plan	AECOM One Trinity Gardens Quayside Newcastle, NE1 2HF Tel +44 (0) 191 224 6500 Fax +44 (0) 191 224 6599 www.aecom.com	Drawn: MW	Checked: CW
Project: Blyth Transport Model			Verified: GP	Approved: SD
			Date: DECEMBER 2017	Scale at A3: 1:20,000
			Drawing Number: 60514724-019	A3

Appendix B – Traffic Survey Site Locations

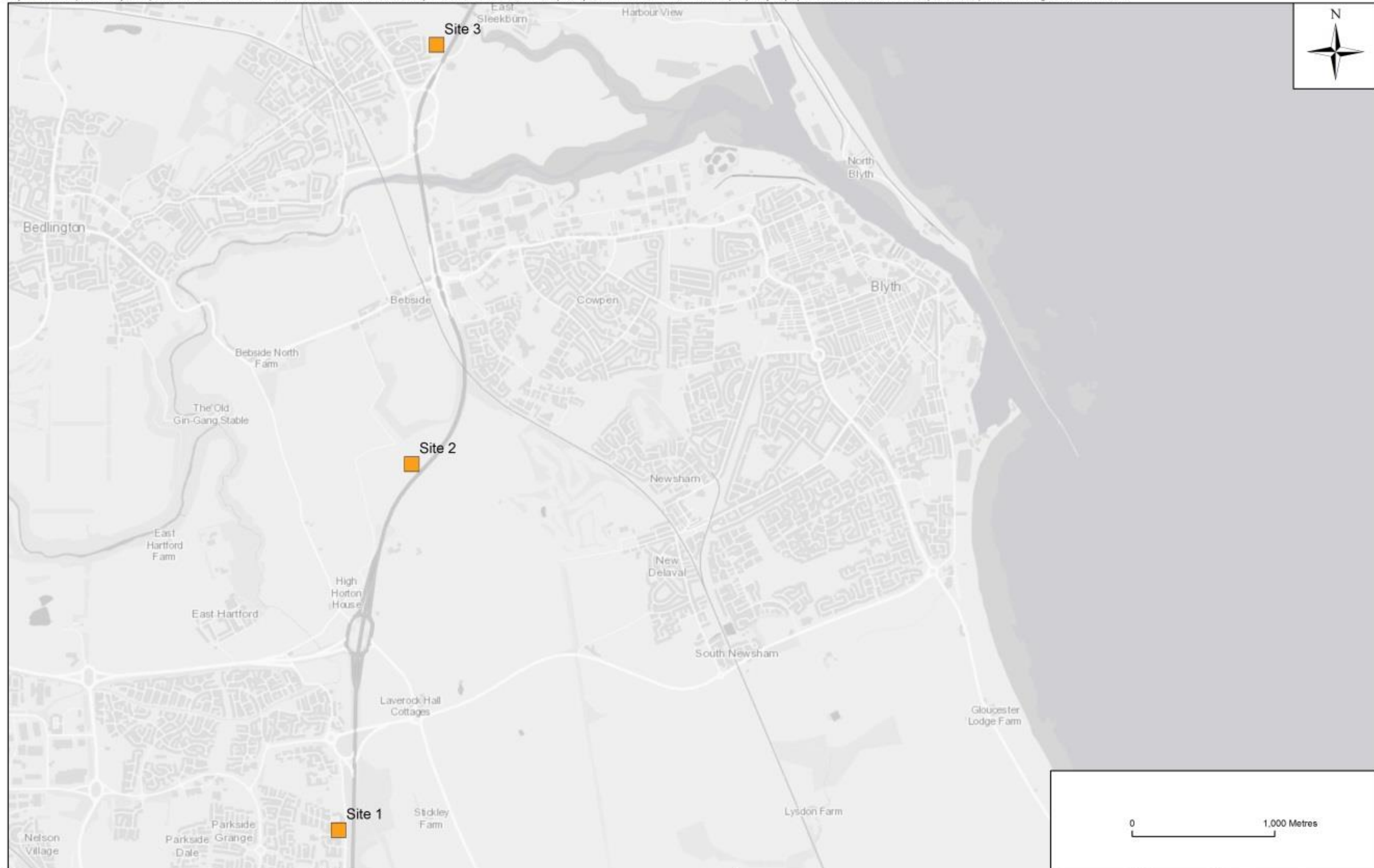
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Client: Northumberland County Council	Title: Blyth Survey Automatic Traffic Counter (ATC) Sites	 One Trinity Gardens Quayside Newcastle, NE1 2HF Tel +44 (0) 191 224 6500 Fax +44 (0) 191 224 6599 www.aecom.com	Drawn: MW	Checked: CW
Project: Blyth Transport Model			Verified: GP	Approved: SD
			Date: DECEMBER 2016	Scale at A3: 1:24,000
			Drawing Number: 60514724-005	A3

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Client:	Northumberland County Council
Project:	Blyth Transport Model

Title:	Blyth Survey Manual Classified Counts (MCC) Sites
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AECOM	Tel +44 (0) 191 224 6500
One Trinity Gardens	Fax +44 (0) 191 224 6599
Quayside	www.aecom.com
Newcastle, NE1 2HF	

Drawn:	MW	Checked:	CW
Verified:	GP	Approved:	SD
Date:	DECEMBER 2016	Scale at A3:	1:24,000
Drawing Number:	60514724-018		A3

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Client: Northumberland County Council	Title: Blyth Survey Manual Classified Turning Counts (MCC) 2016 Sites	One Trinity Gardens Quayside Newcastle, NE1 2HF Tel +44 (0) 191 224 6500 Fax +44 (0) 191 224 6599 www.aecom.com	Drawn: MW	Checked: CW
Project: Blyth Transport Model			Verified: GP	Approved: SD
			Date: DECEMBER 2016	Scale at A3: 1:24,000
			Drawing Number: 60514724-003	A3

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Client:	Northumberland County Council
Project:	Blyth Transport Model

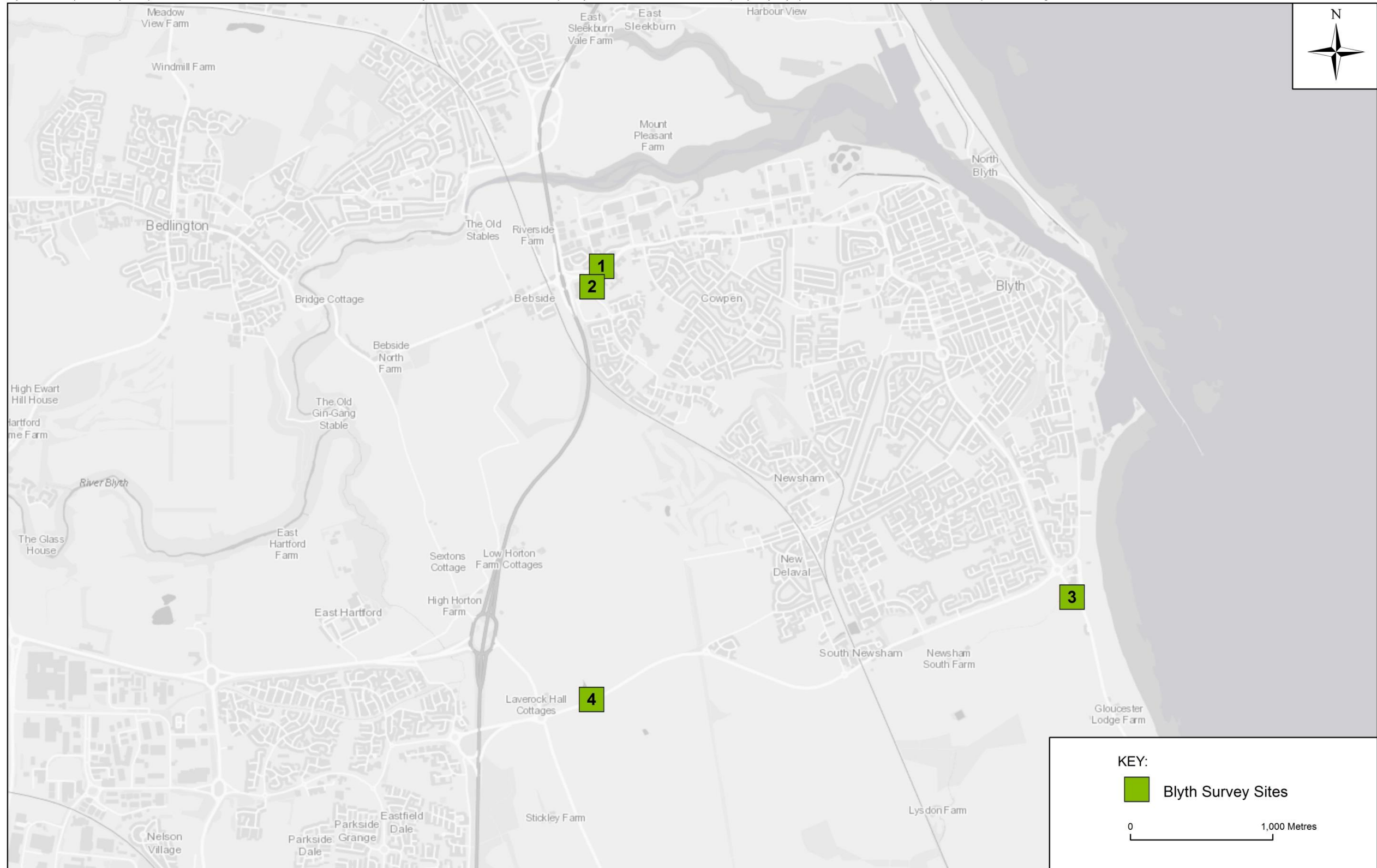
Title:	Blyth Survey Manual Classified Turning Counts (MCC) 2015 Sites
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Drawing Number:	60514724-004		A3

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KEY:

Blyth Survey Sites

0 1,000 Metres

Client:	Northumberland County Council
Project:	Blyth Relief Road

Title:	Blyth Roadside Interview (RSI) Sites
--------	---

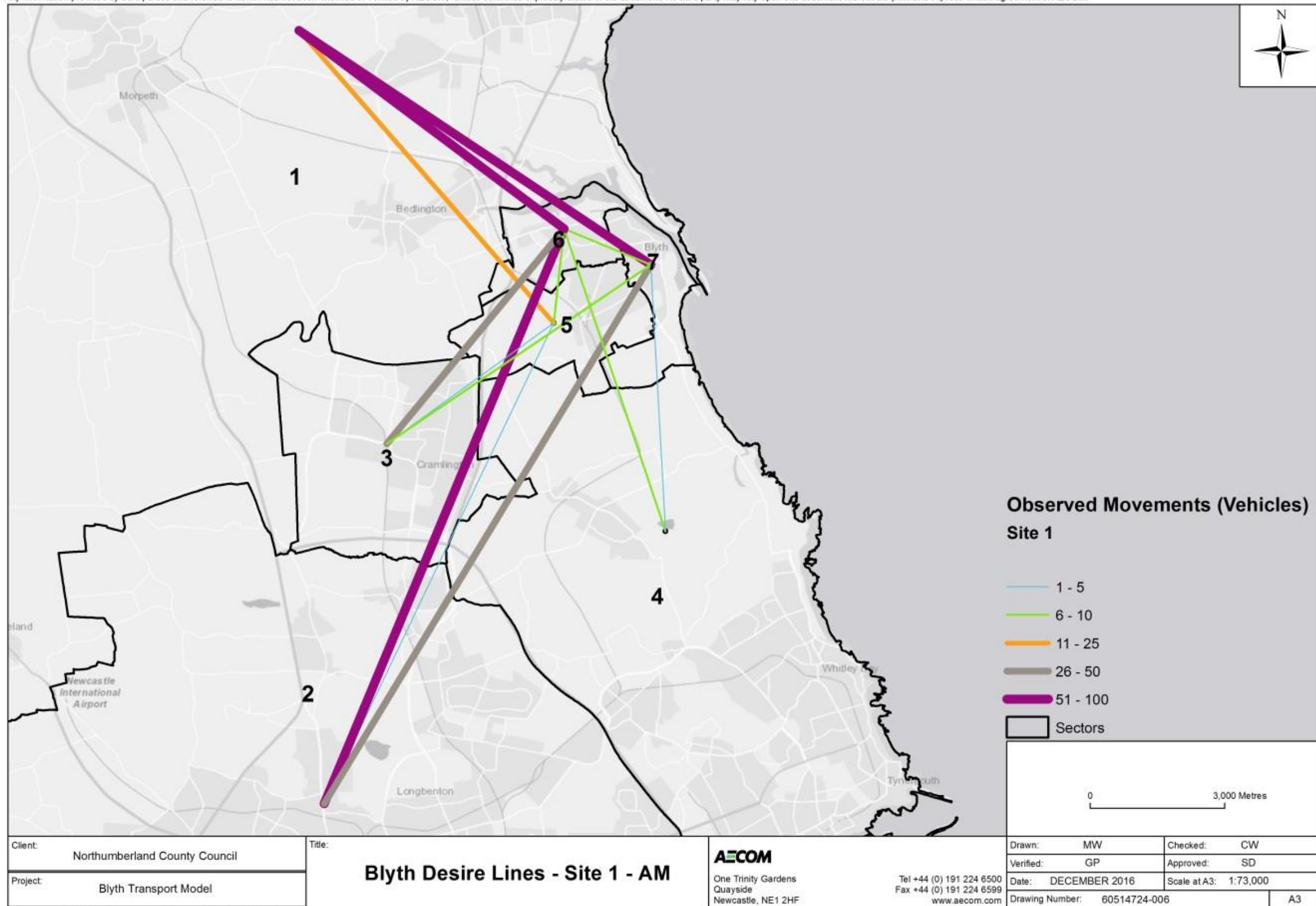
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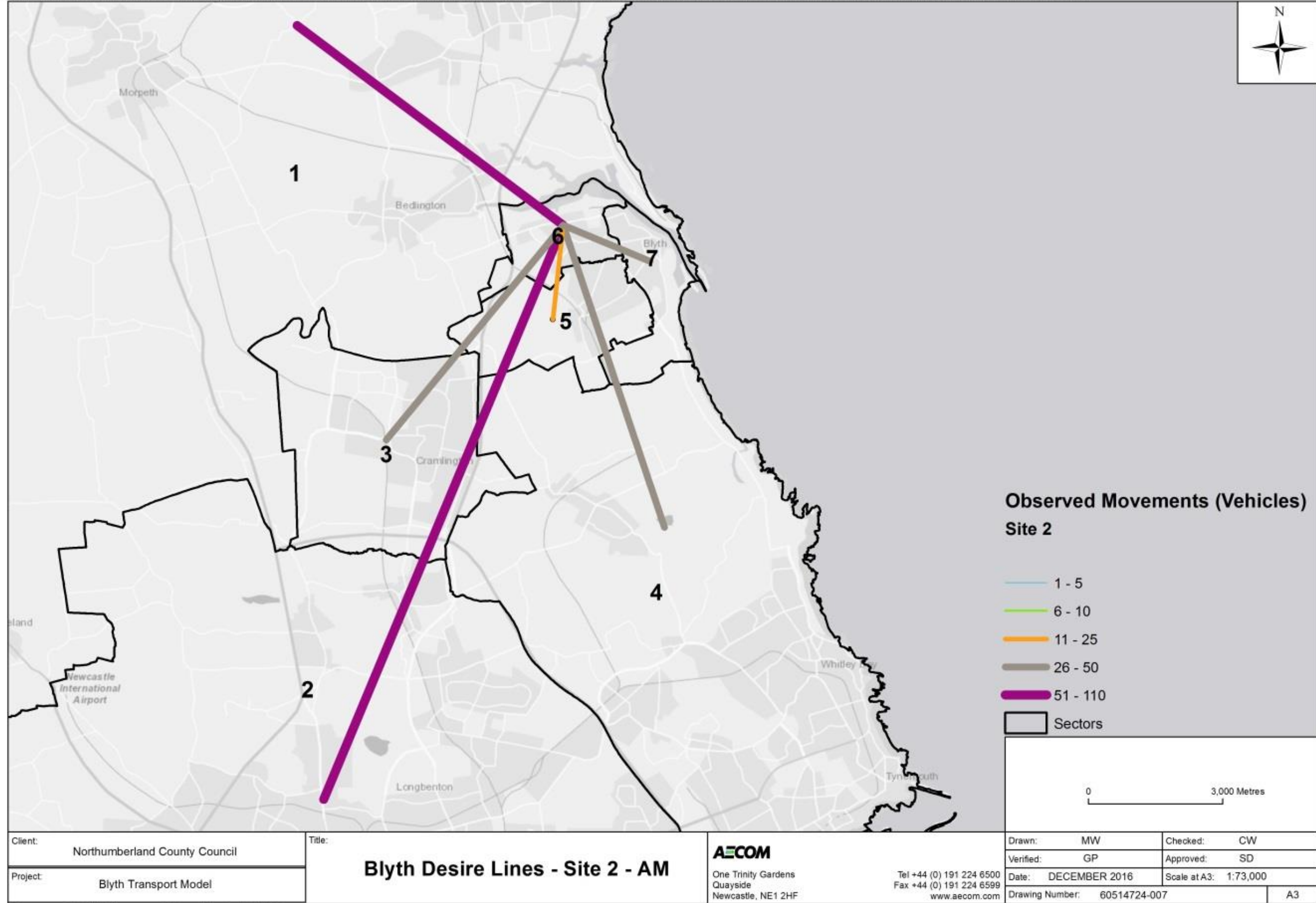
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Date:	DECEMBER 2017	Scale at A3:	1:24,000
Drawing Number:	60514727-001		A3

Appendix C – RSI Desire Line Plots

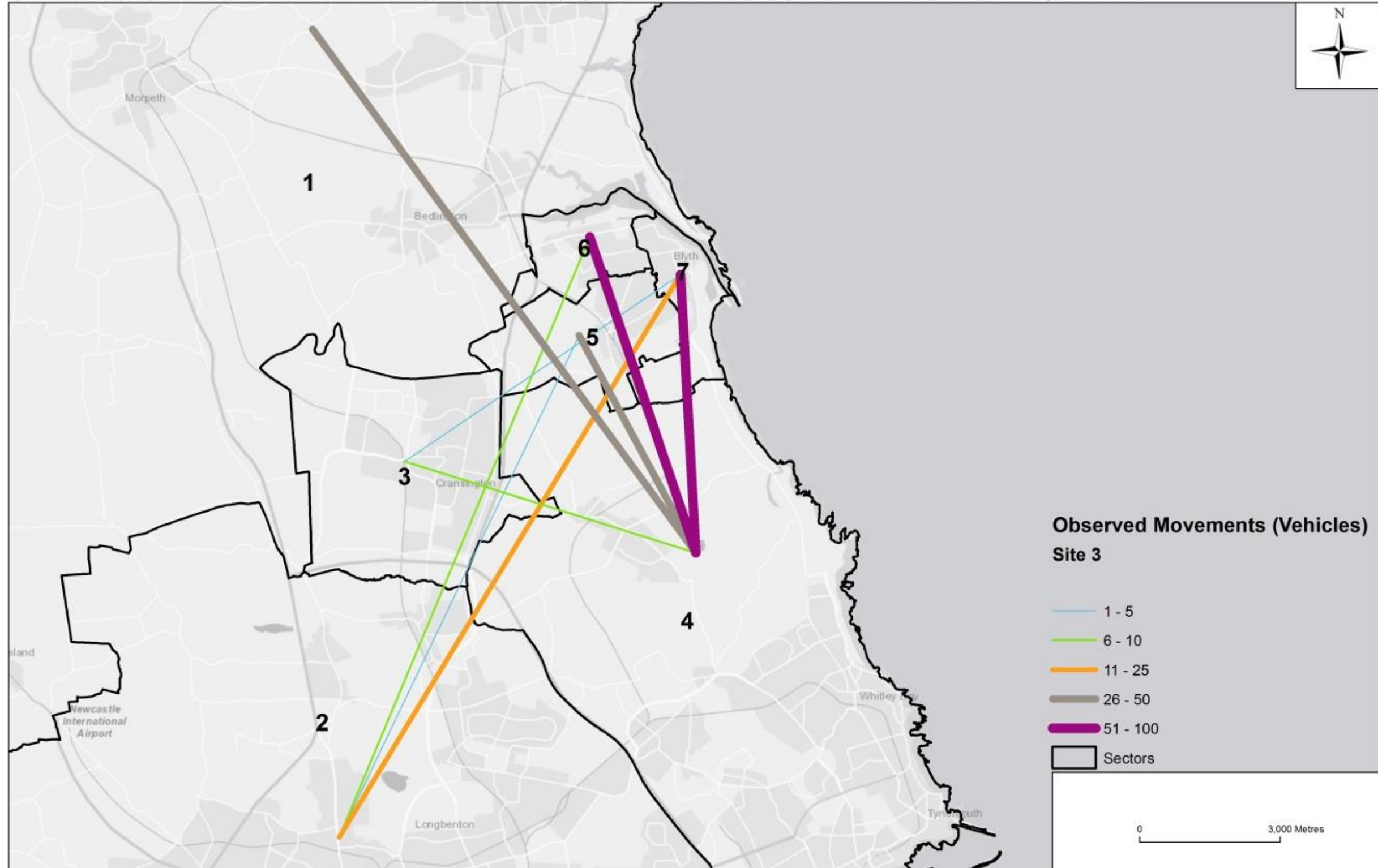
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Client:	Northumberland County Council
Project:	Blyth Transport Model

Title:	Blyth Desire Lines - Site 3 - AM
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Date:	DECEMBER 2016	Scale at A3:	1:73,000
Drawing Number:	60514724-008		A3

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Client:	Northumberland County Council
Project:	Blyth Transport Model

Title:	Blyth Desire Lines - Site 4 - AM
--------	---

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Verified:	GP	Approved:	SD
Date:	DECEMBER 2016	Scale at A3:	1:73,000
Drawing Number:	60514724-009		A3

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Client:	Northumberland County Council
Project:	Blyth Transport Model

Title:	Blyth Desire Lines - Site 1 - IP
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Verified:	GP	Approved:	SD
Date:	DECEMBER 2016	Scale at A3:	1:73,000
Drawing Number:	60514724-010		A3

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Client:	Northumberland County Council
Project:	Blyth Transport Model

Title:	Blyth Desire Lines - Site 2 - IP
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Drawing Number:	60514724-011		A3

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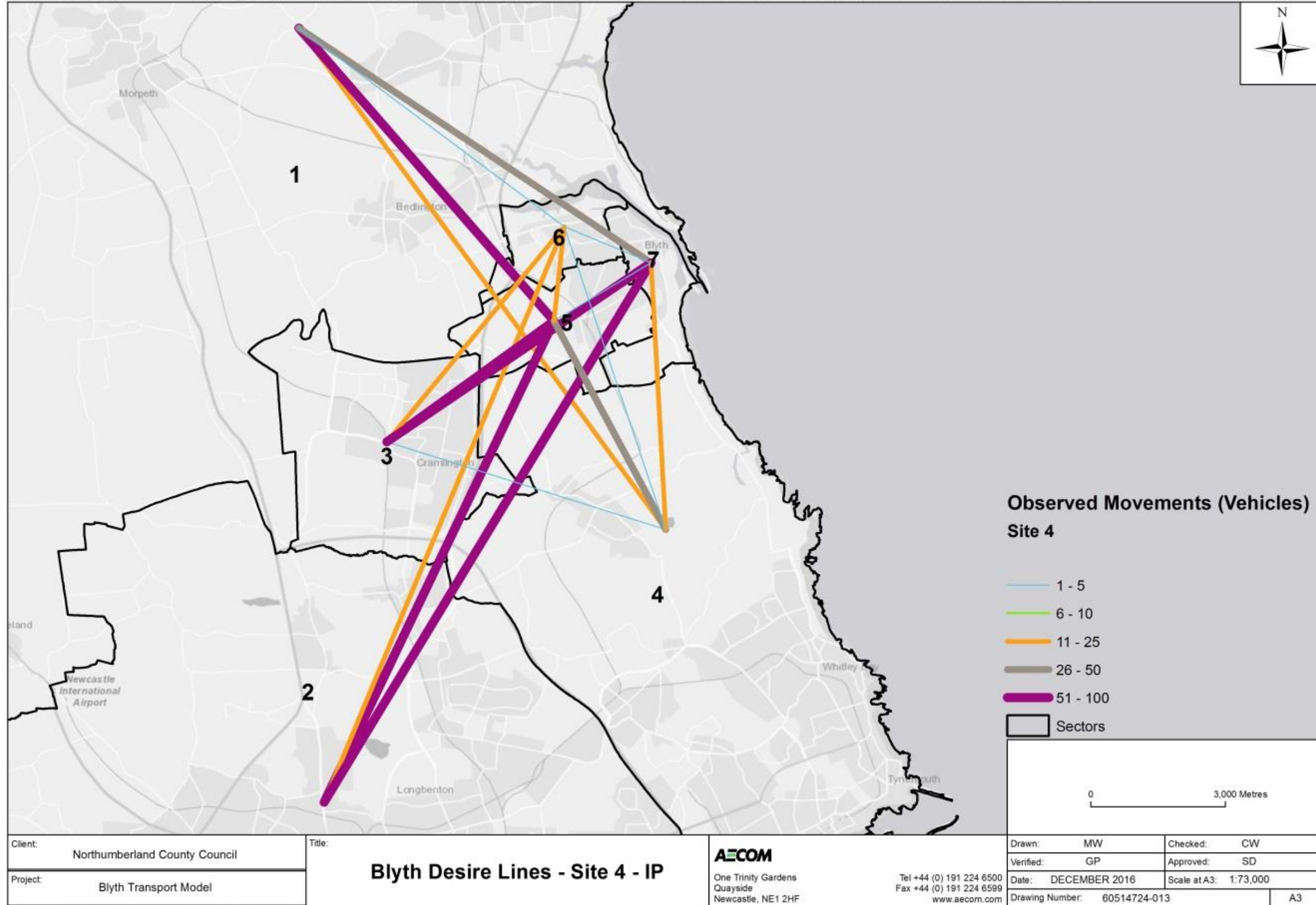
Client:	Northumberland County Council
Project:	Blyth Transport Model

Title: **Blyth Desire Lines - Site 3 - IP**

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Client:	Northumberland County Council
Project:	Blyth Transport Model

Title:	Blyth Desire Lines - Site 1 - PM
--------	---

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Client:	Northumberland County Council
Project:	Blyth Transport Model

Title:	Blyth Desire Lines - Site 2 - PM
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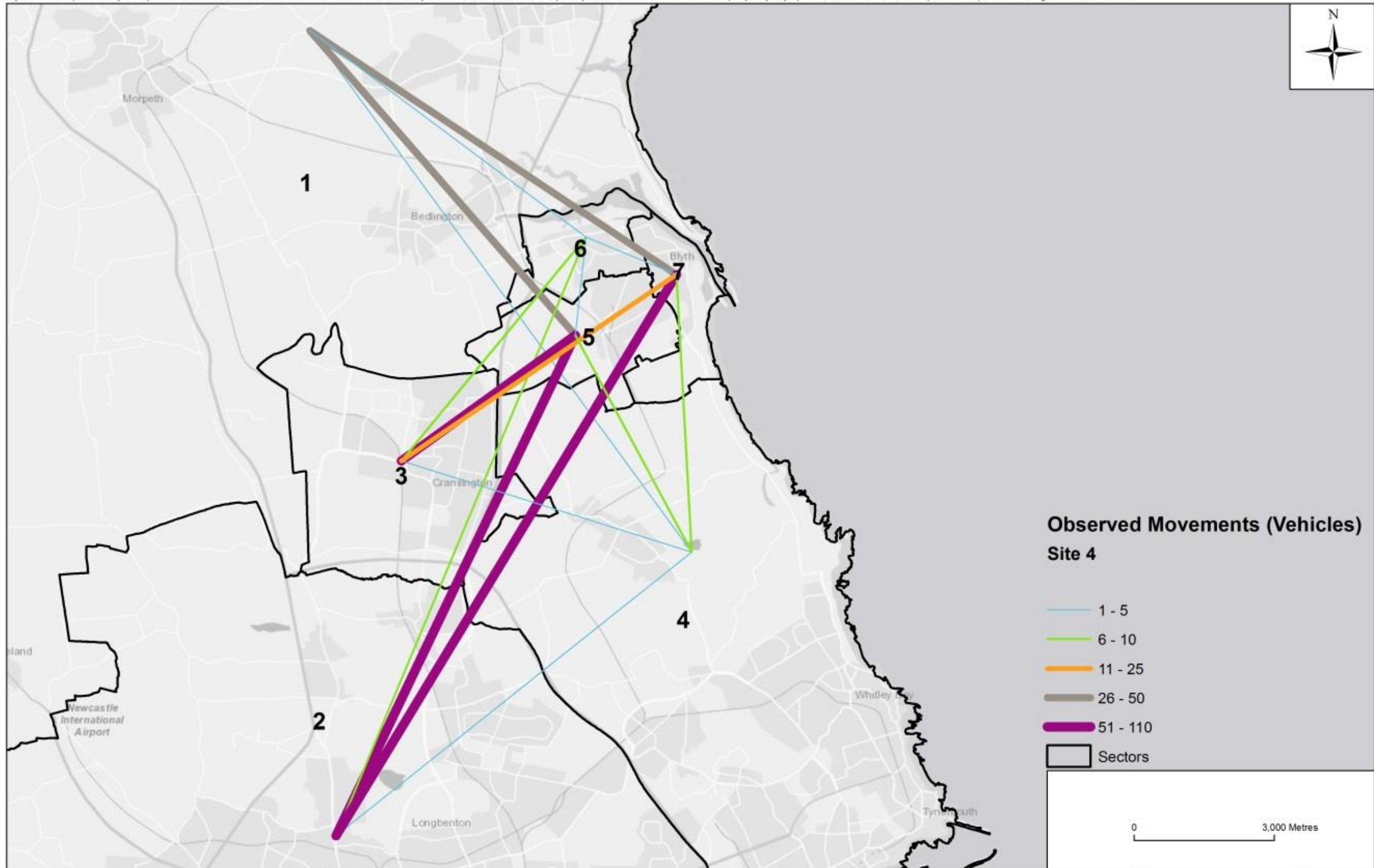
Client:	Northumberland County Council
Project:	Blyth Transport Model

Title:	Blyth Desire Lines - Site 3 - PM
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Client:	Northumberland County Council
Project:	Blyth Transport Model

Title:	Blyth Desire Lines - Site 4 - PM
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Verified:	GP	Approved:	SD
Date:	DECEMBER 2016	Scale at A3:	1:73,000
Drawing Number:	60514724-017		A3

Final

Appendix D ATC Tables

Two-Way Summary - 5-Day Average

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Site 16	Site 17	Site 18	Site 19	Site 20	Site 21	Site 22	A189_Site 1	A189_Site 2	A189_Site 3	Average
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0300-0400	7	7	8	7	9	31	16	3	4	8	20	8	22	48	28	26	17	7	11	6	5	9	107	85	69	23
0400-0500	8	10	7	14	10	59	27	7	4	13	30	10	29	66	39	36	24	14	13	11	13	14	184	144	106	36
0500-0600	27	44	24	185	58	235	113	31	18	45	121	38	97	230	148	143	89	42	69	39	42	58	646	574	411	141
0600-0700	86	182	116	347	237	761	402	167	76	186	431	125	280	637	372	355	266	95	257	135	134	165	2295	1978	1385	459
0700-0800	317	478	318	936	843	1602	921	606	302	428	999	357	695	1679	1118	1063	806	258	753	351	296	415	4471	4453	3179	1106
0800-0900	383	620	450	909	921	1755	1222	634	485	694	1021	510	876	1646	1314	1255	1051	419	1060	635	525	536	3750	4137	3291	1204
0900-1000	370	393	342	473	544	1281	926	360	384	606	779	364	798	1640	1353	1321	980	622	904	464	362	414	2719	2870	2335	944
1000-1100	403	345	341	387	524	1197	844	346	345	631	724	336	883	1773	1499	1455	1044	734	919	440	340	404	2351	2587	2149	920
1100-1200	418	366	392	424	524	1220	882	409	380	652	734	330	960	1756	1534	1471	1057	748	940	435	360	417	2389	2698	2235	949
1200-1300	427	381	440	401	559	1268	893	426	407	662	732	335	920	1780	1582	1518	1071	748	931	474	360	422	2480	2716	2257	967
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Final

Direction 1 Summary - 5-Day Average

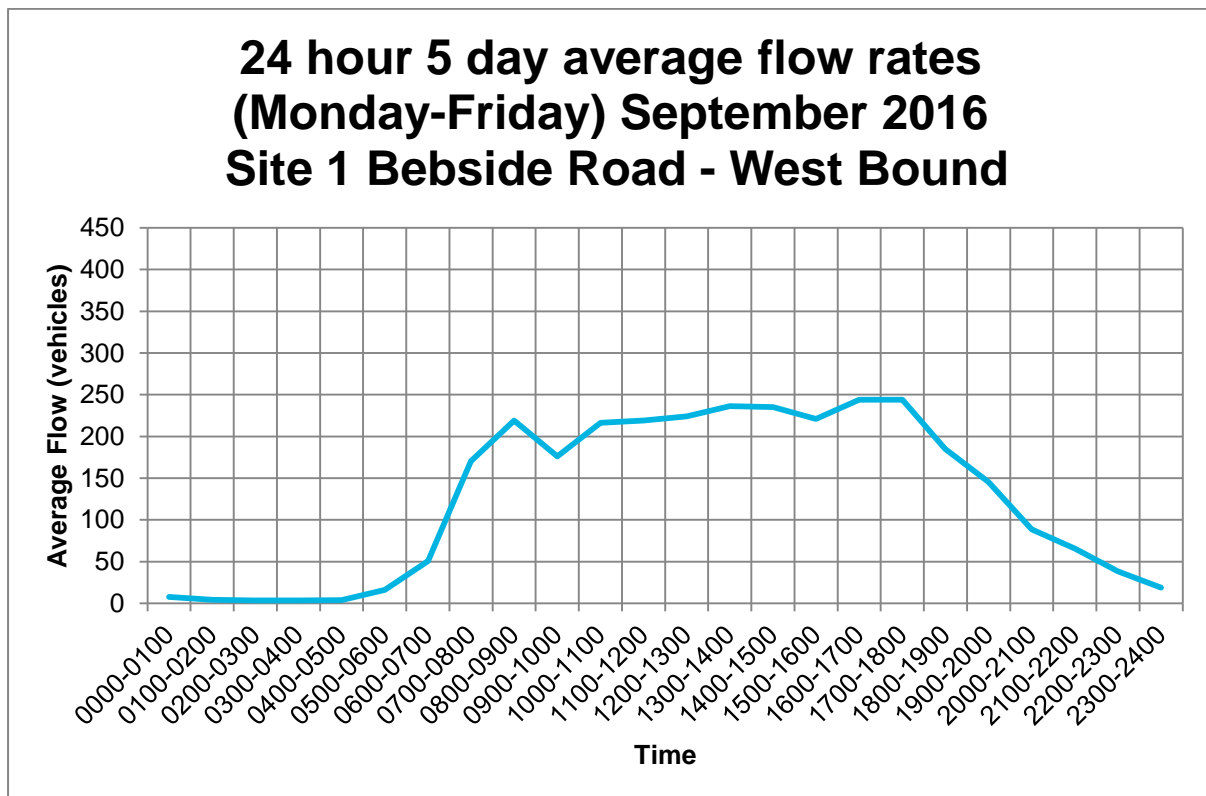
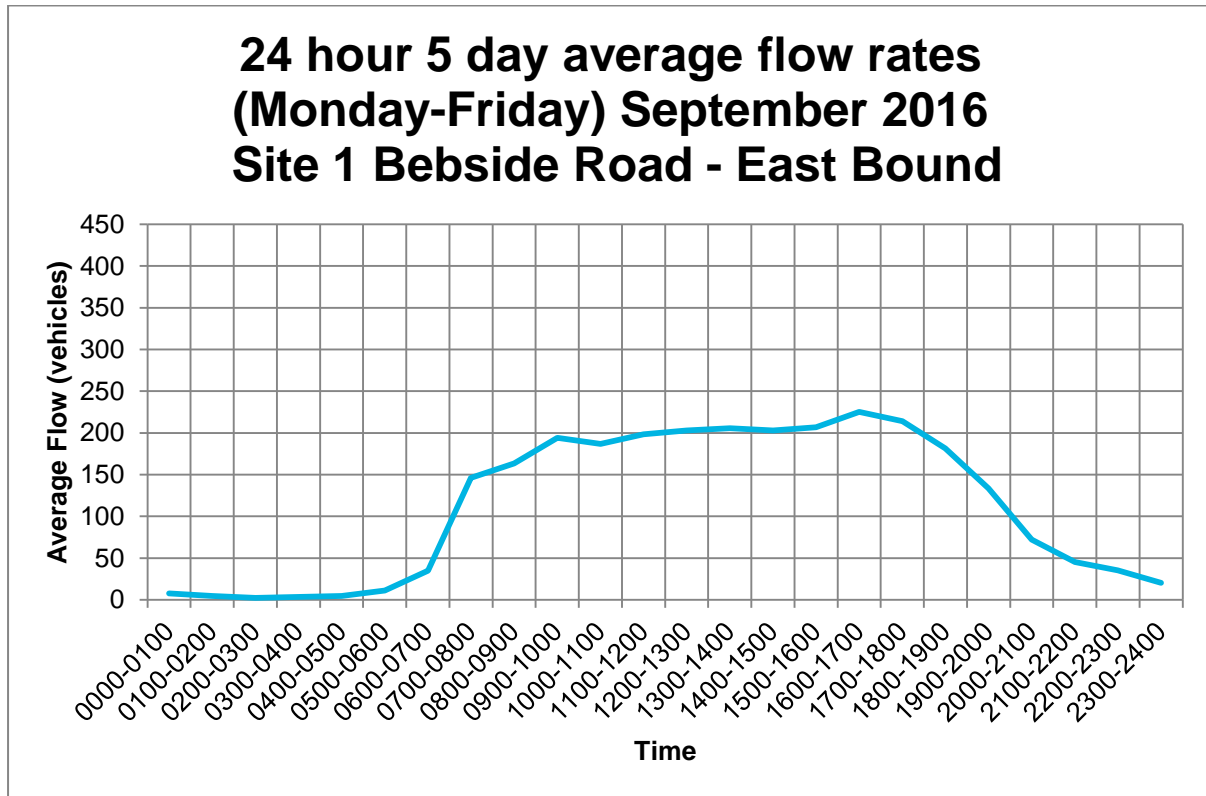
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1900-2000	133	167	261	208	208	563	396	278	331	198	314	125	399	658	545	483	404	168	391	201	189	210	1133	1068	784
2000-2100	72	112	170	111	144	396	239	166	217	122	246	79	242	435	354	314	273	113	244	127	121	137	875	829	592
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2200-2300	35	60	106	51	64	245	129	79	129	59	126	39	105	201	150	131	121	48	112	63	58	65	511	442	302
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Final

Direction 2 Summary - 5-Day Average

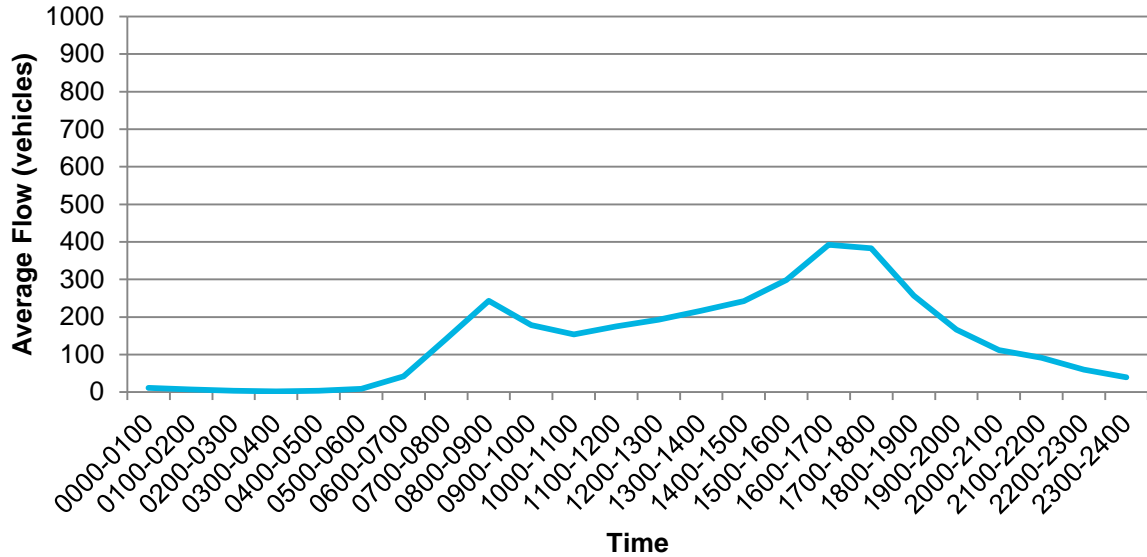
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1900-2000	145	118	0	0	178	440	352	0	0	199	253	147	413	607	445	459	419	159	385	230	182	216	793	854	675
2000-2100	89	72	0	0	113	258	209	0	0	118	134	98	271	436	300	305	270	96	241	166	127	131	462	481	395
2100-2200	66	55	0	0	67	213	172	0	0	80	97	66	177	333	260	263	177	65	179	125	87	97	372	354	290
2200-2300	38	42	0	0	55	133	106	0	0	61	58	45	108	189	129	126	113	44	108	82	54	61	253	244	189
2300-2400	19	24	0	0	25	67	50	0	0	32	42	25	71	113	83	80	62	25	49	45	23	32	160	148	110

Appendix E – ATC Tables

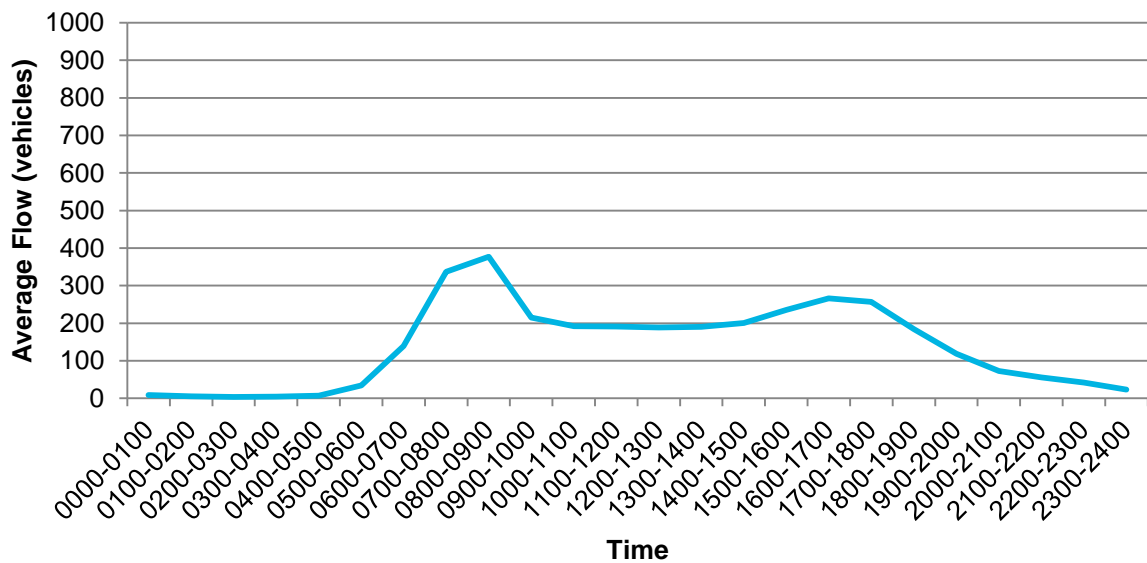


Final

**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 2 Horton Road - North Bound**

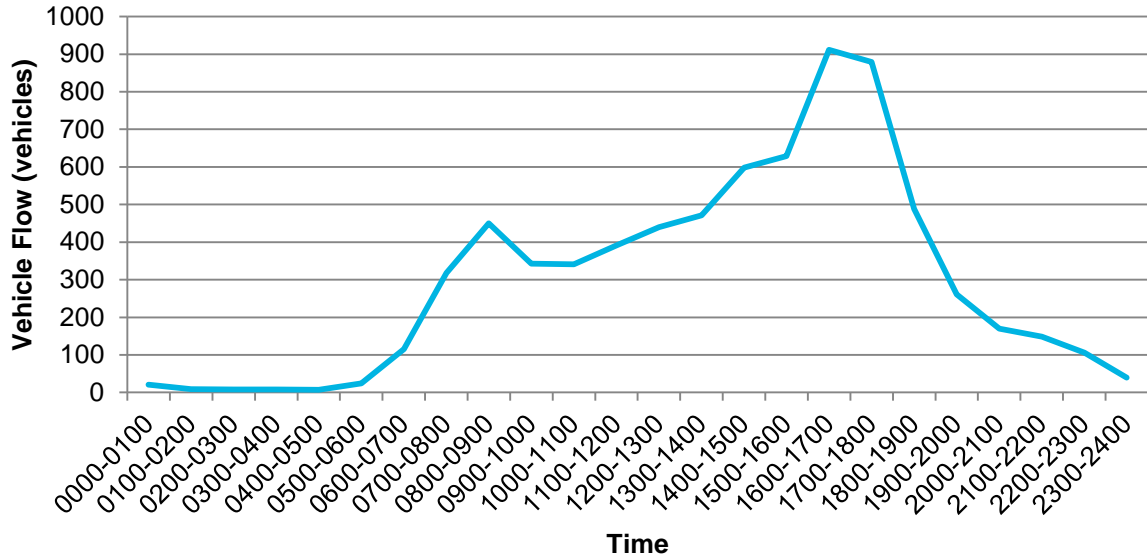


**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 2 Horton Road - South Bound**

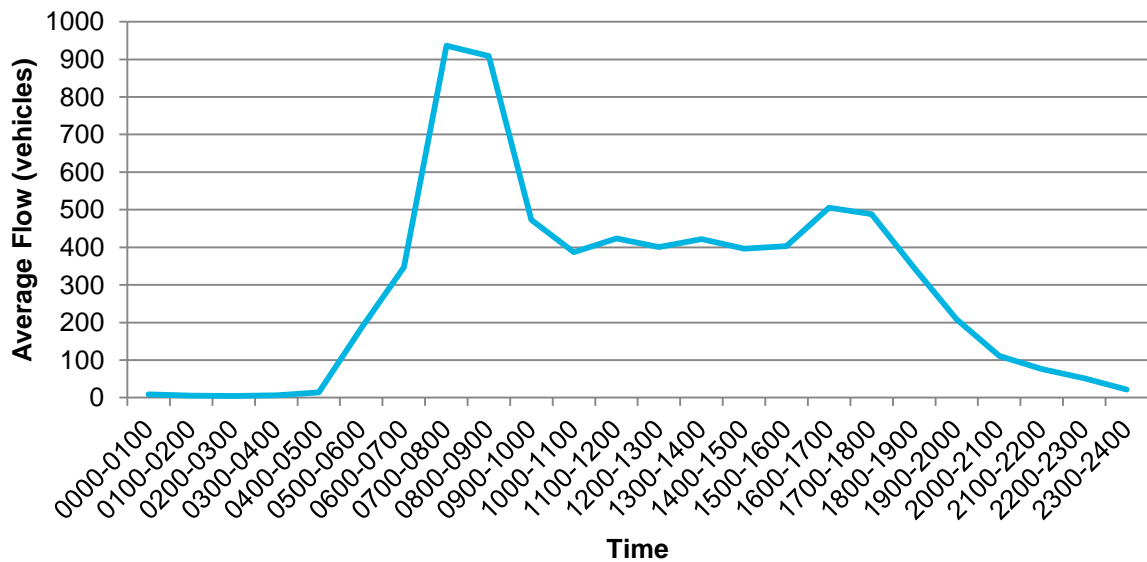


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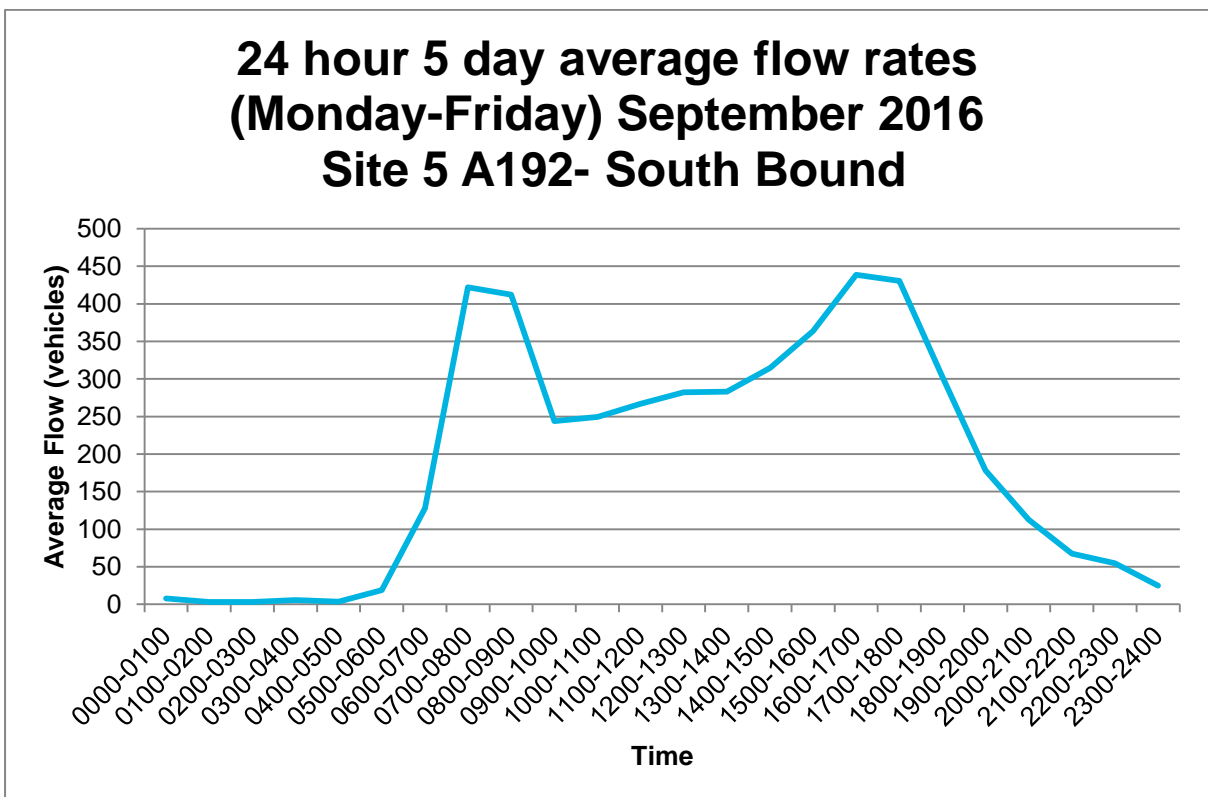
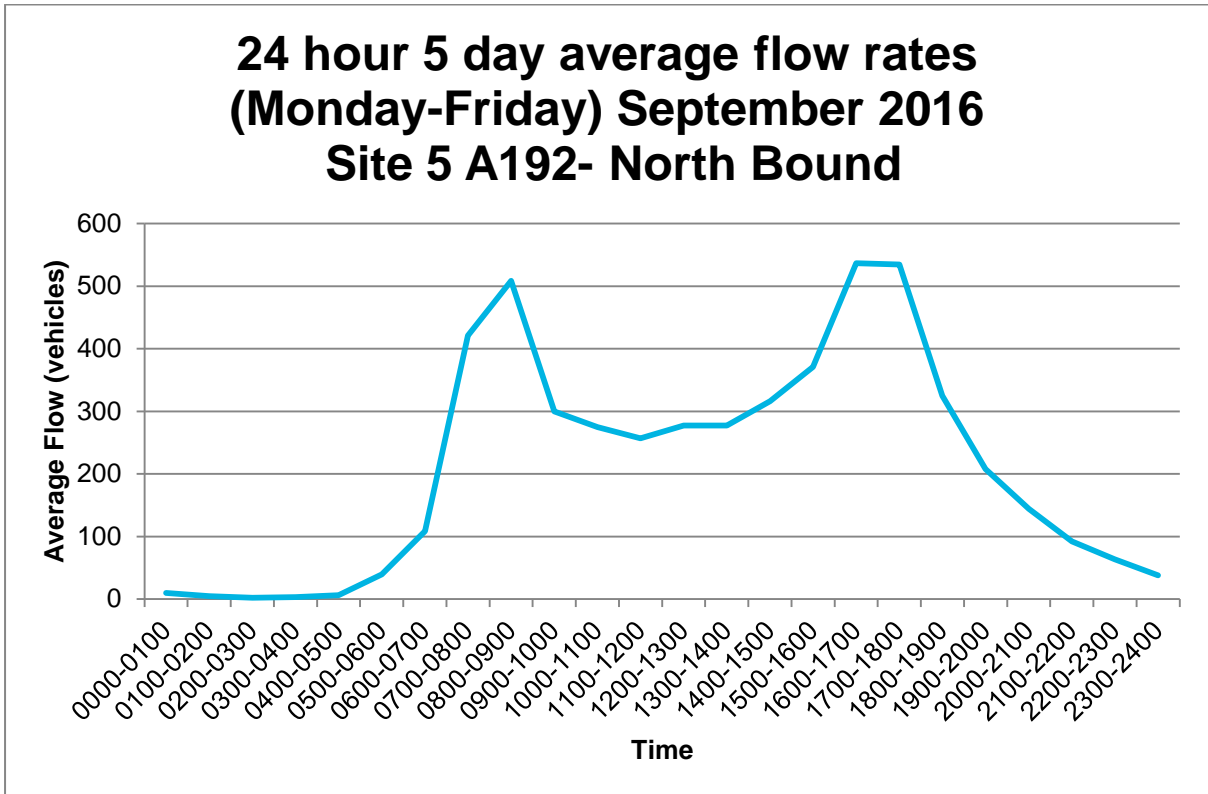
**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 4 A192 - East Bound**



**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 4 Horton Road - West Bound**

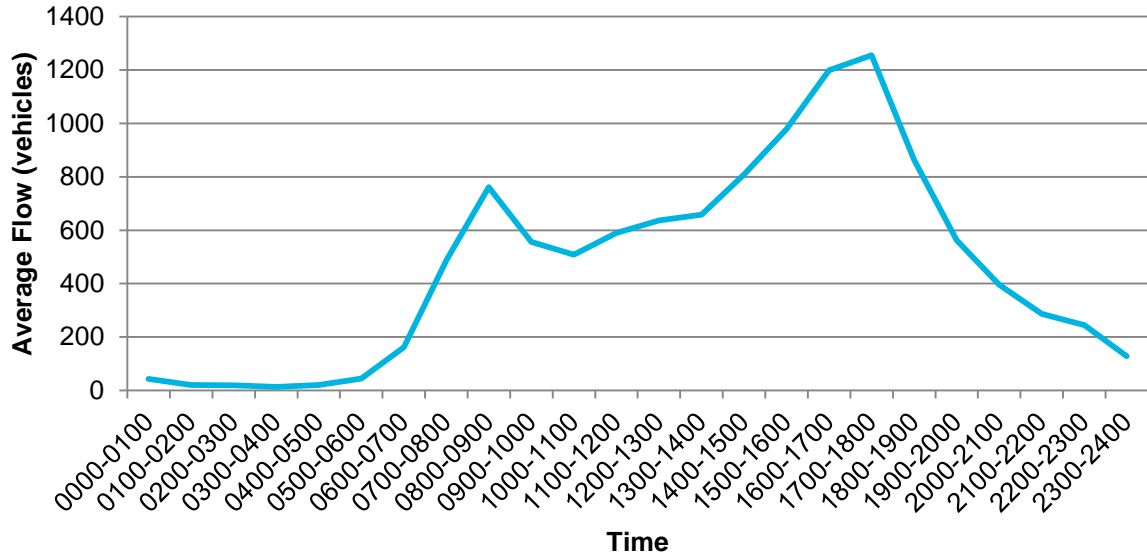


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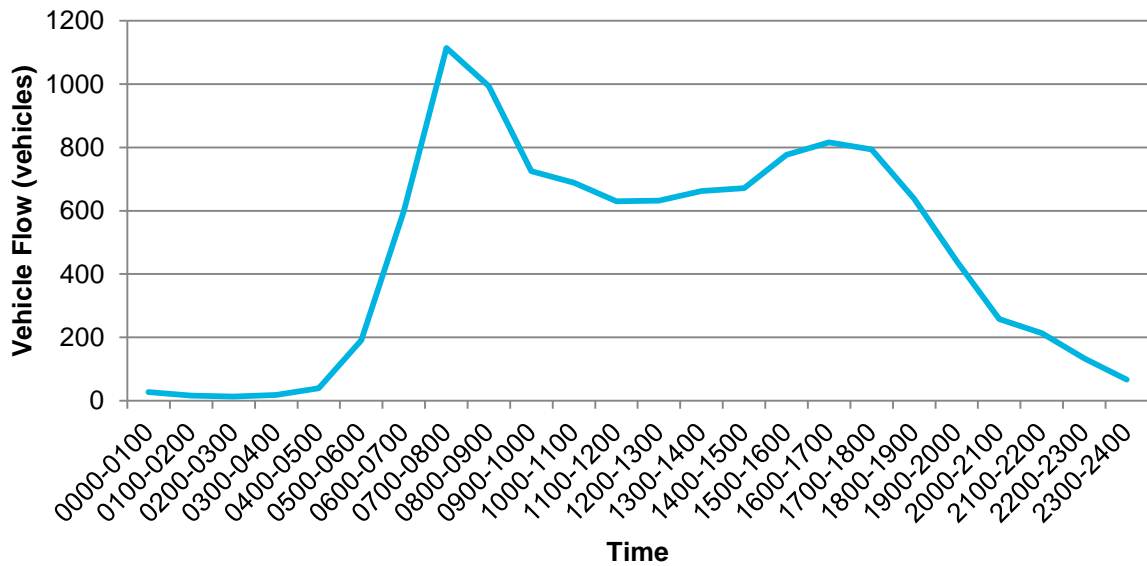


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**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 6 Laverock Hall Road - East Bound**

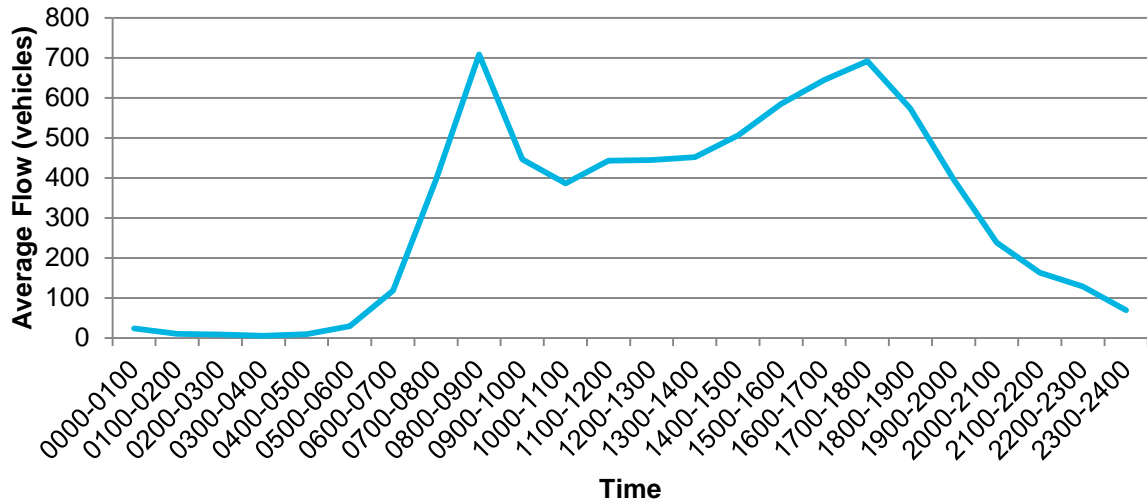


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(Monday-Friday) September 2016
Site 6 Laverock Hall Road - West Bound**

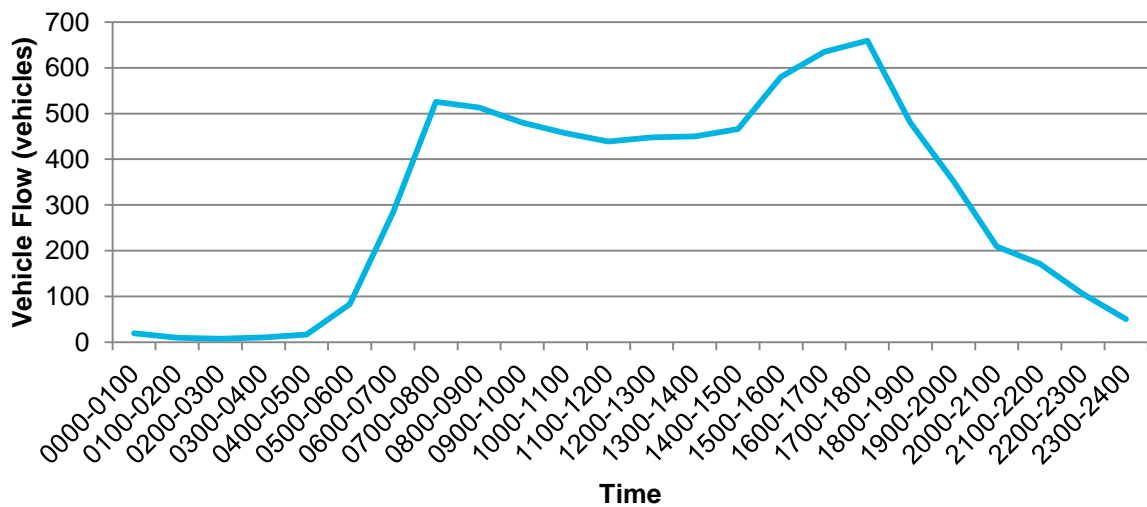


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**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 7 South Newsham Road - East
Bound**

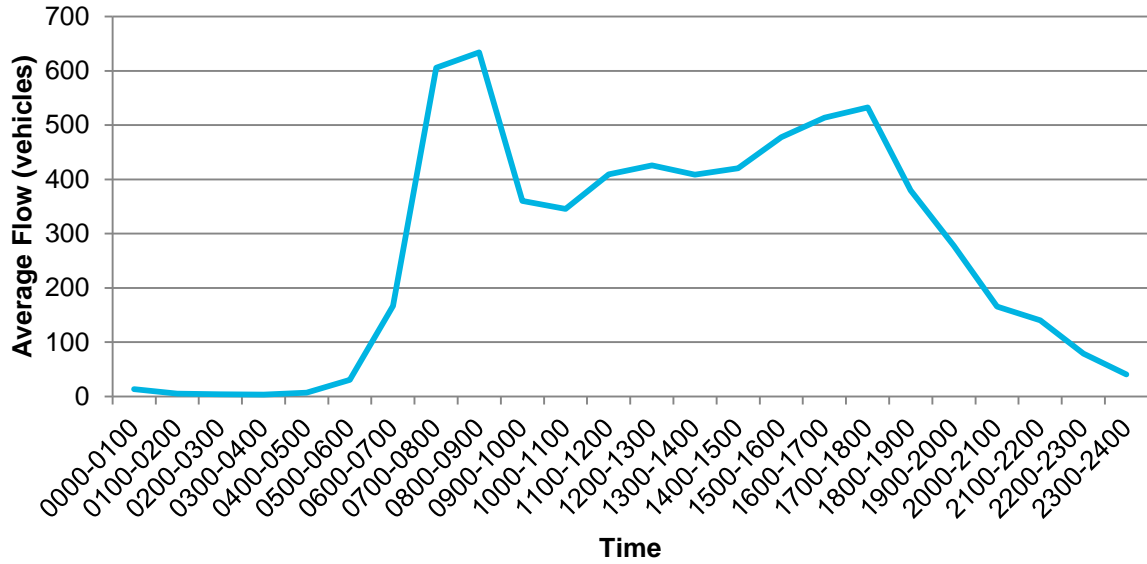


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(Monday-Friday) September 2016
Site 7 South Newsham Road - West
Bound**

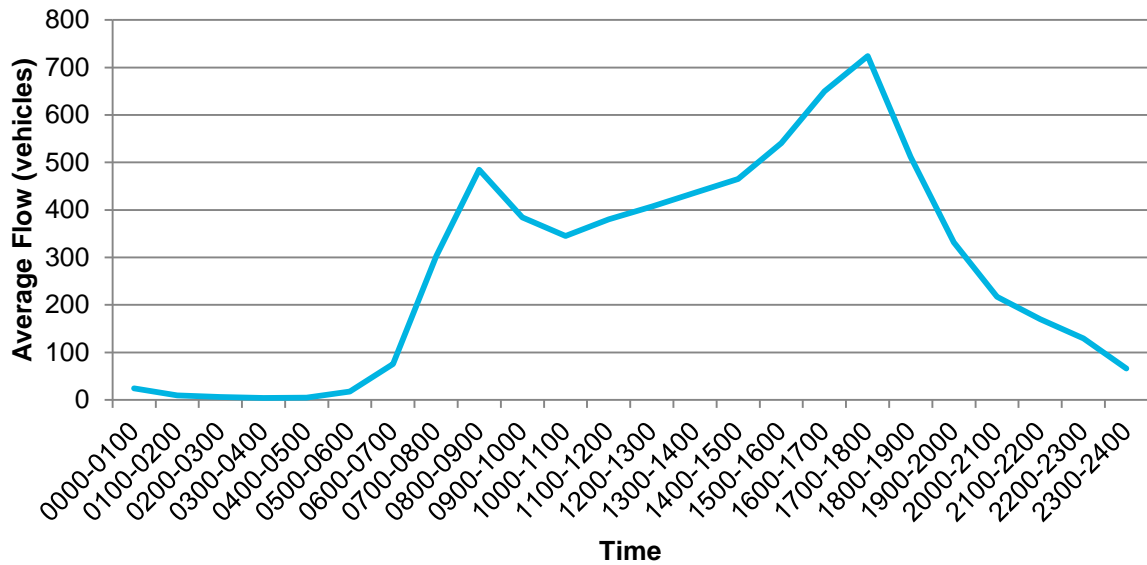


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**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 8 Links Road - South Bound**

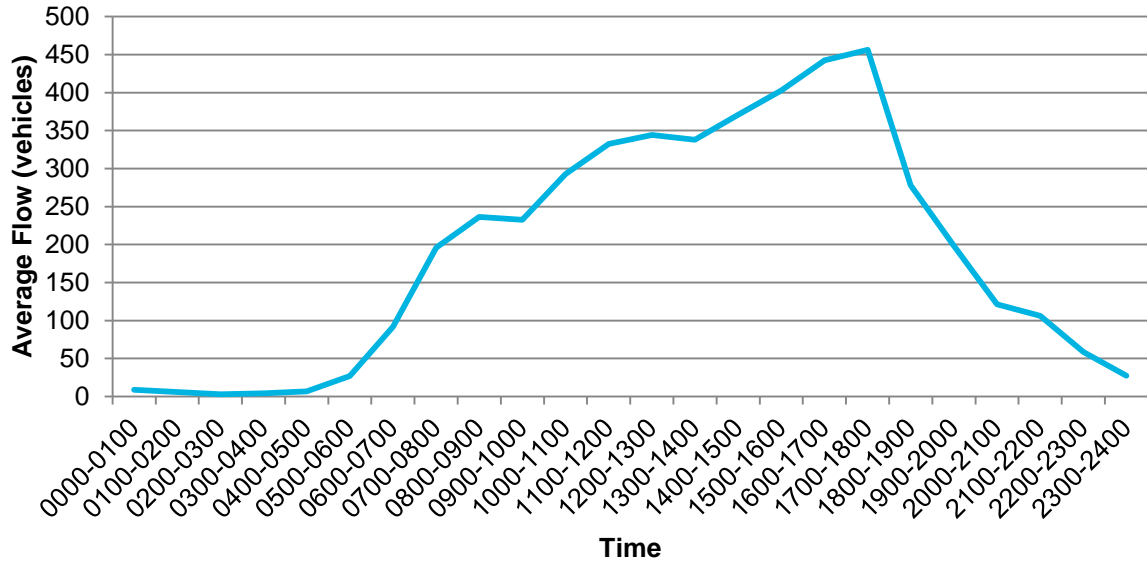


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(Monday-Friday) September 2016
Site 9 Links Road - North Bound**

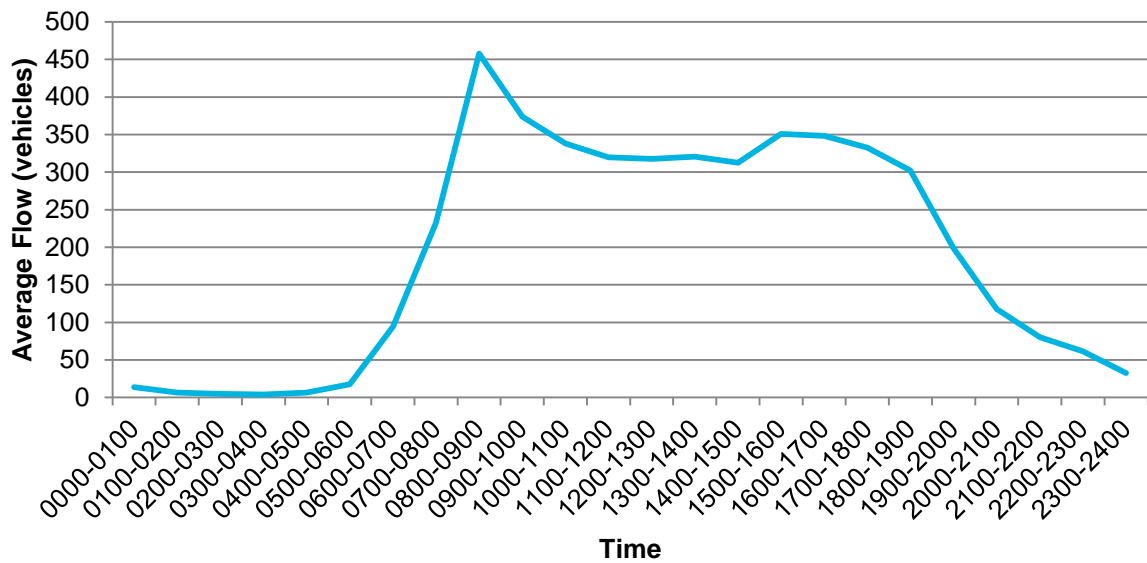


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**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 10 B1329 Links Road - North Bound**

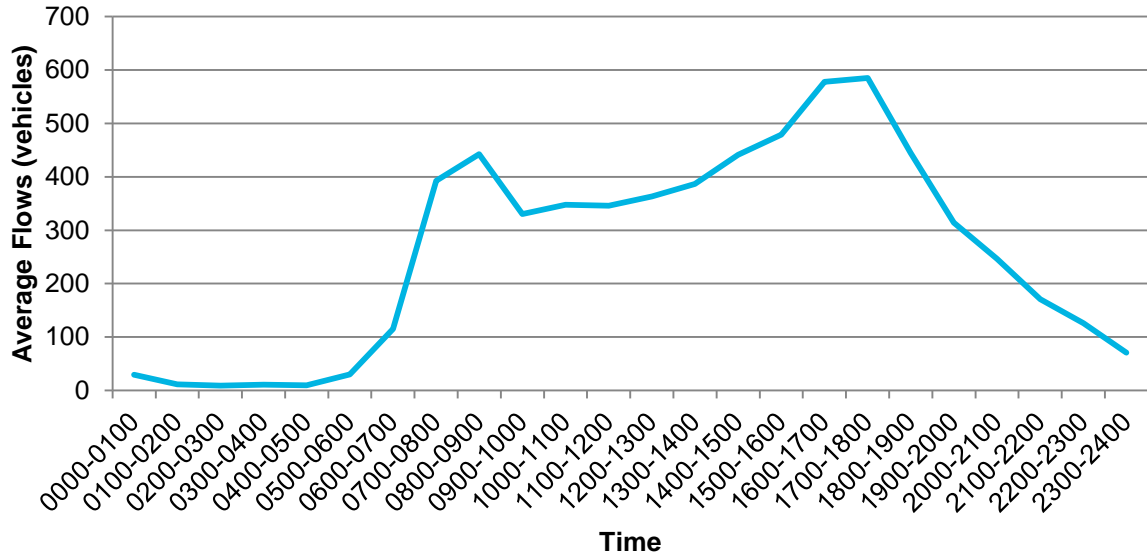


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(Monday-Friday) September 2016
Site 10 B1329 Links Road - South Bound**

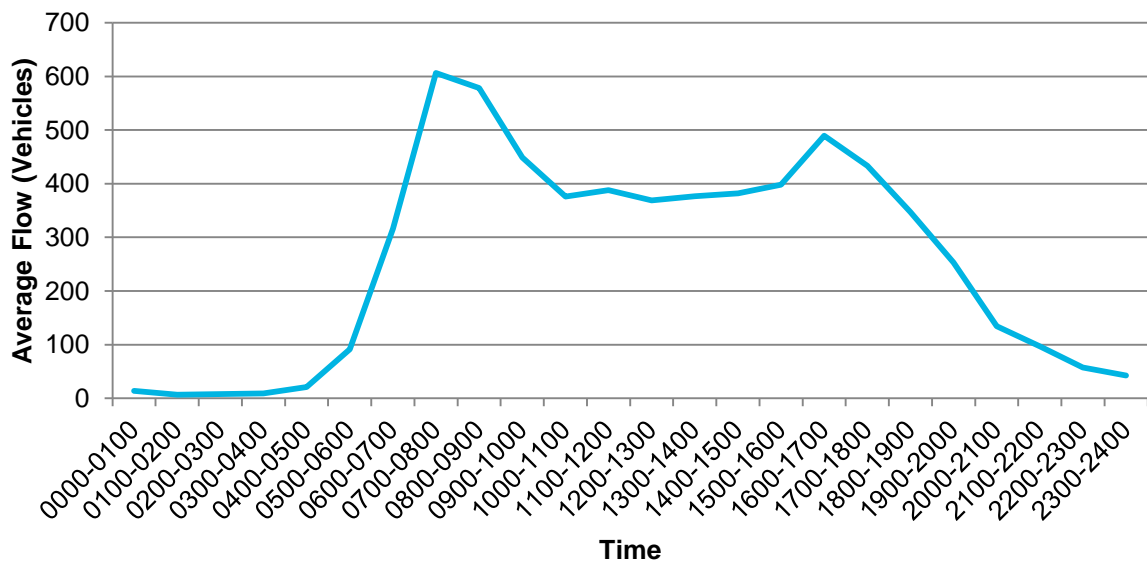


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**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 11 A1147 - North Bound**

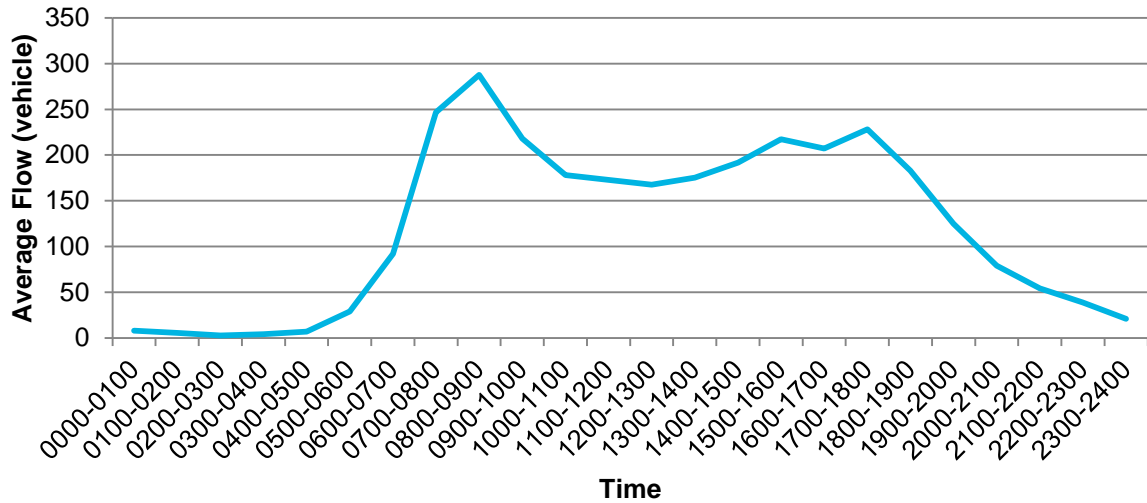


**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 11 A1147- South Bound**

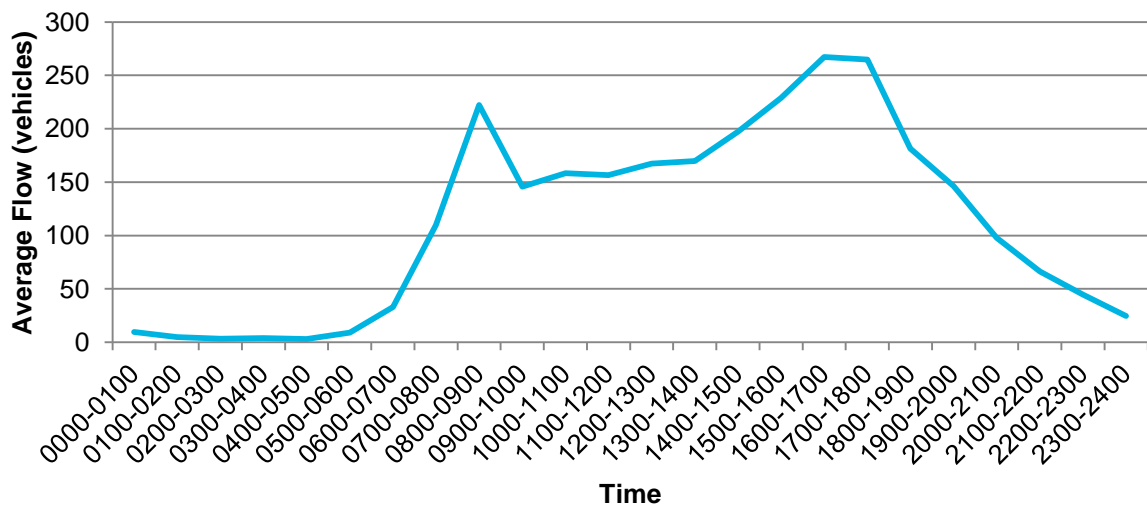


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**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 12 B1331 Furnace Bank - East
Bound**

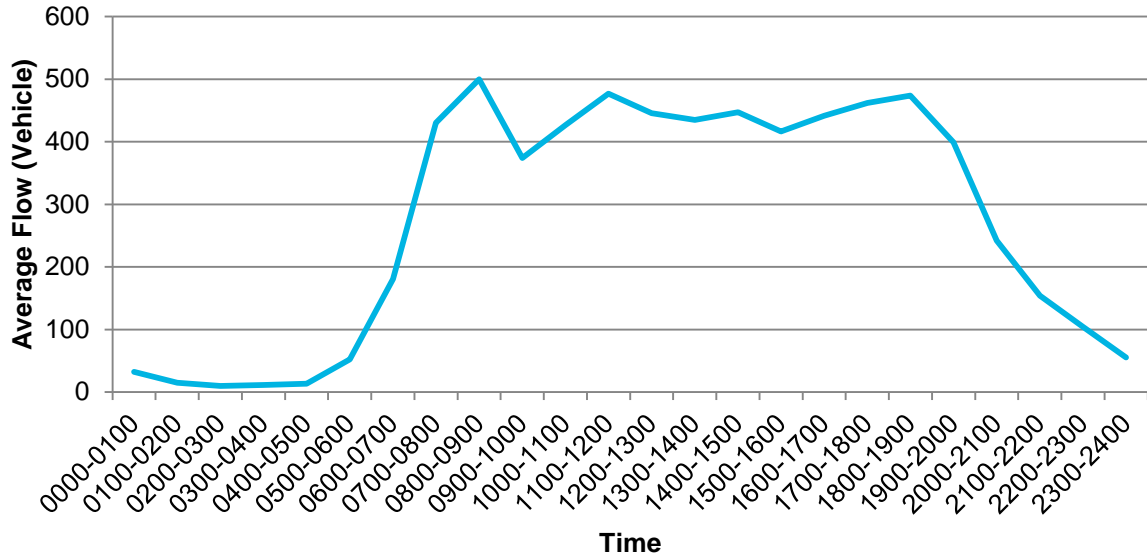


**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 12 B1331 Furnace Bank - West
Bound**

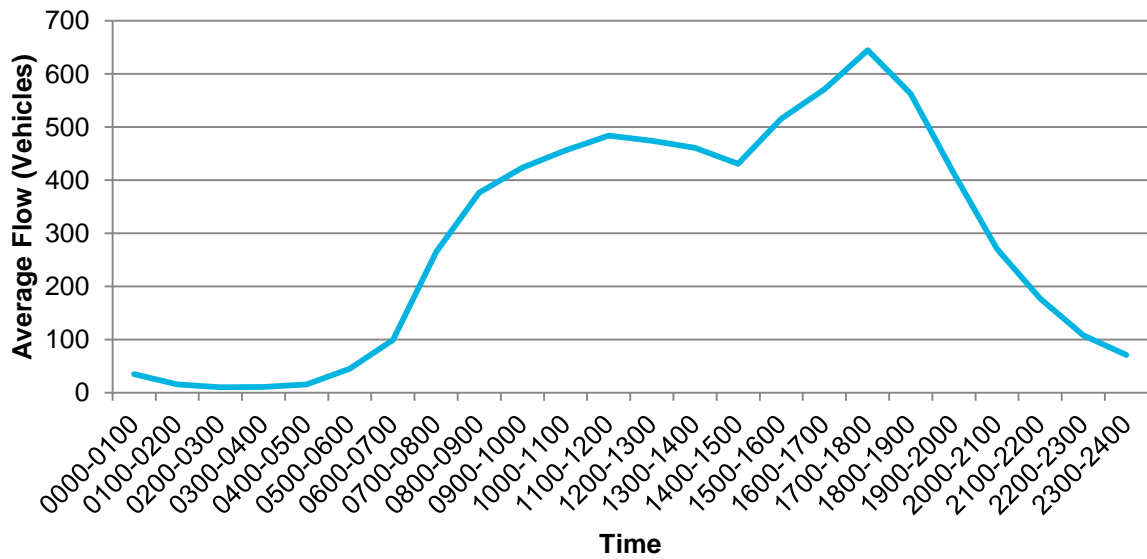


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**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 13 Chase Farm Drive - North Bound**

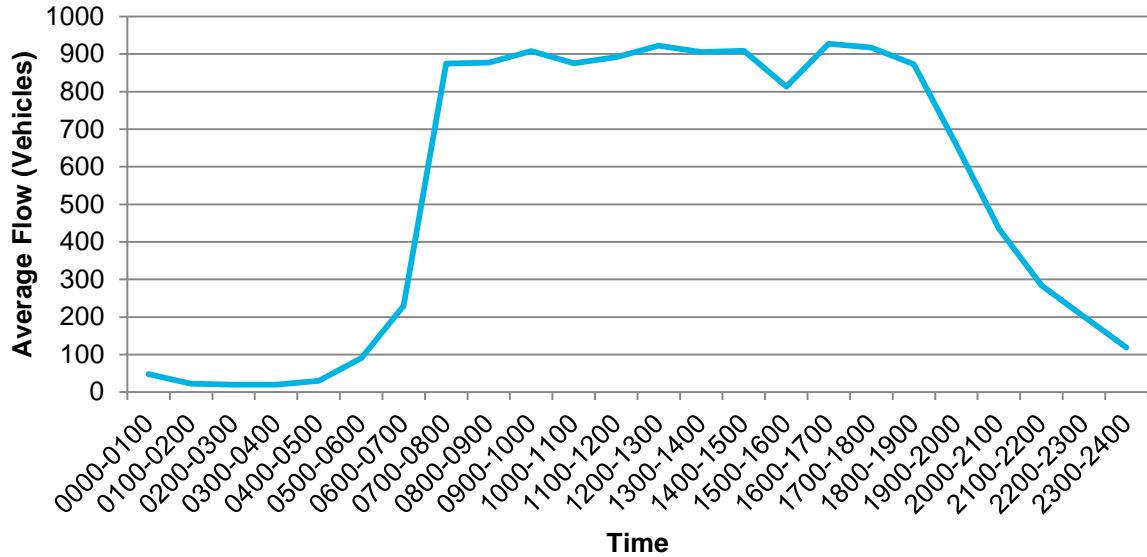


**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 13 Chase Farm Drive - South Bound**

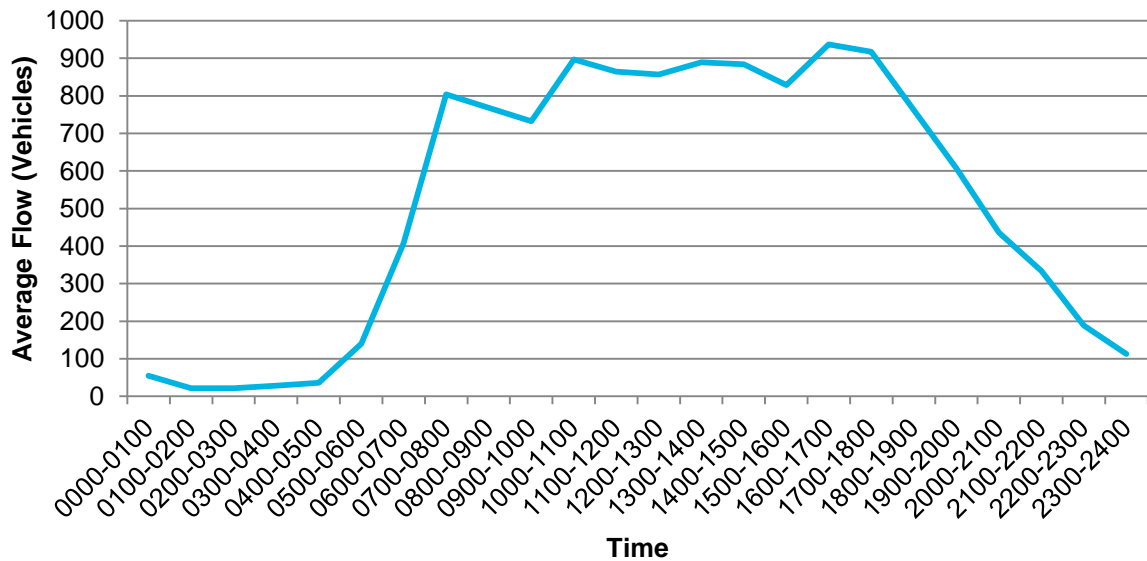


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**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 14 Cowpen Road - East Bound**

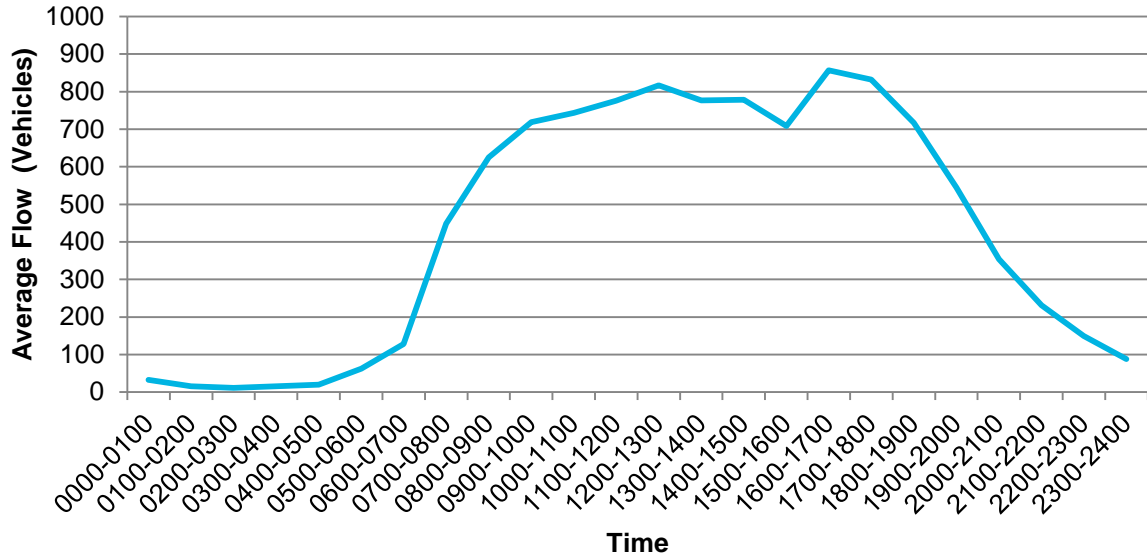


**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 14 Cowpen Road - West Bound**

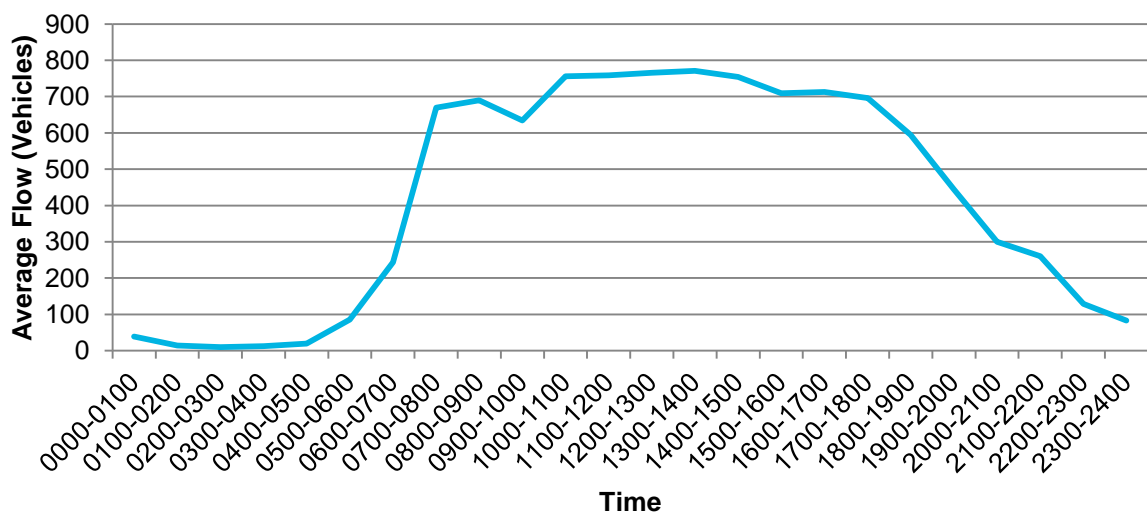


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**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 15 Cowpen Road (Mid) - East Bound**

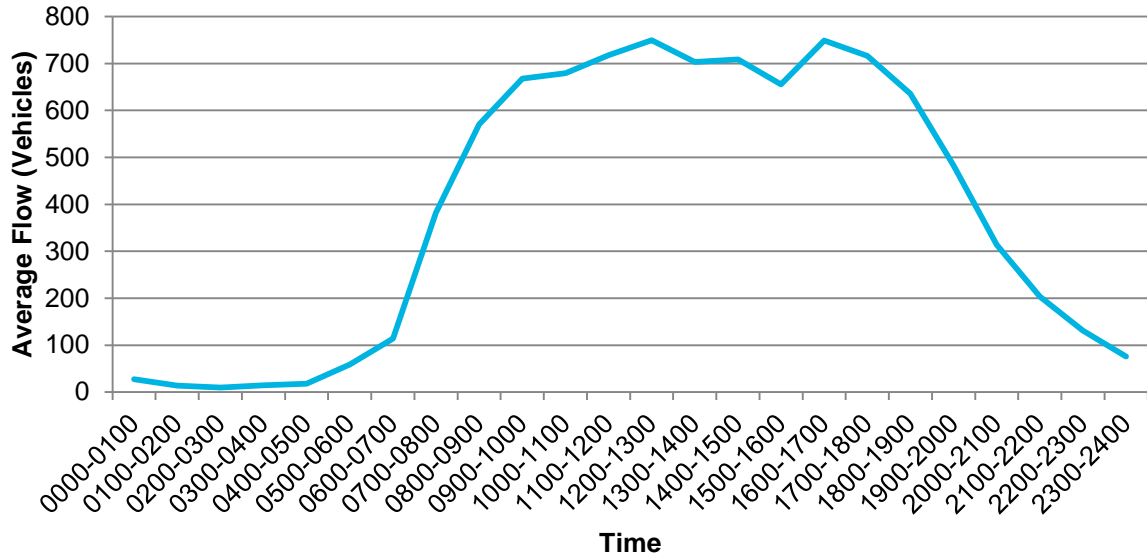


**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 15 Cowpen Road (Mid) - West Bound**

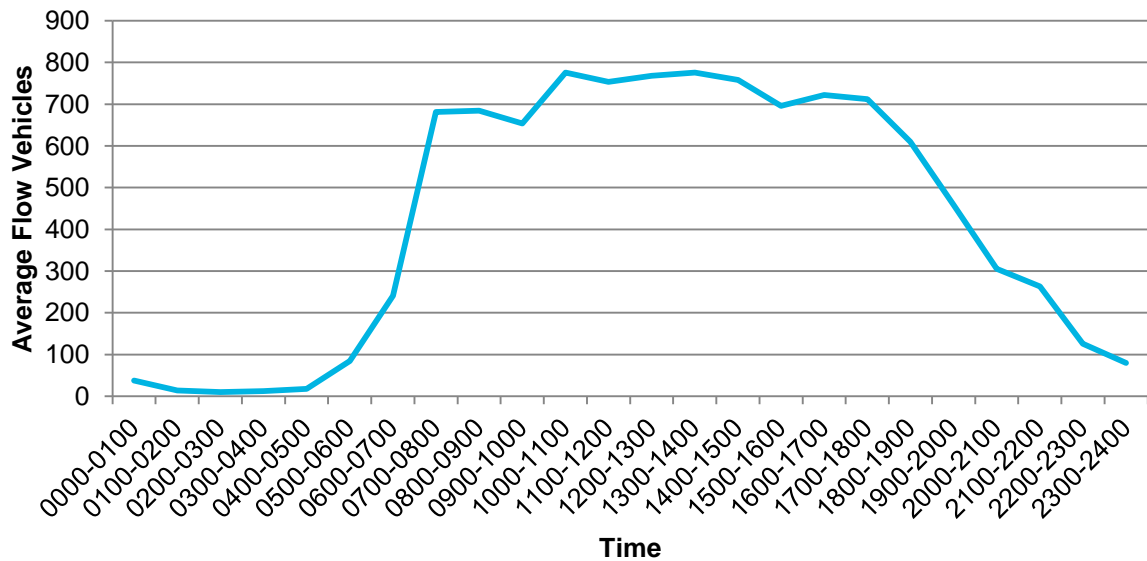


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**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 16 Cowpen Road (E) - East Bound**

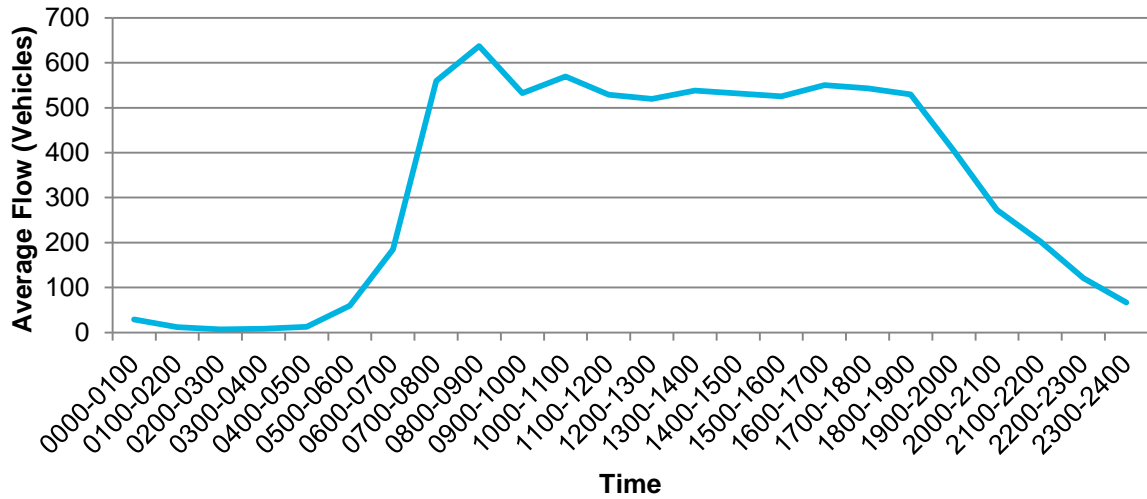


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(Monday-Friday) September 2016
Site 16 Cowpen Road (E) - West Bound**

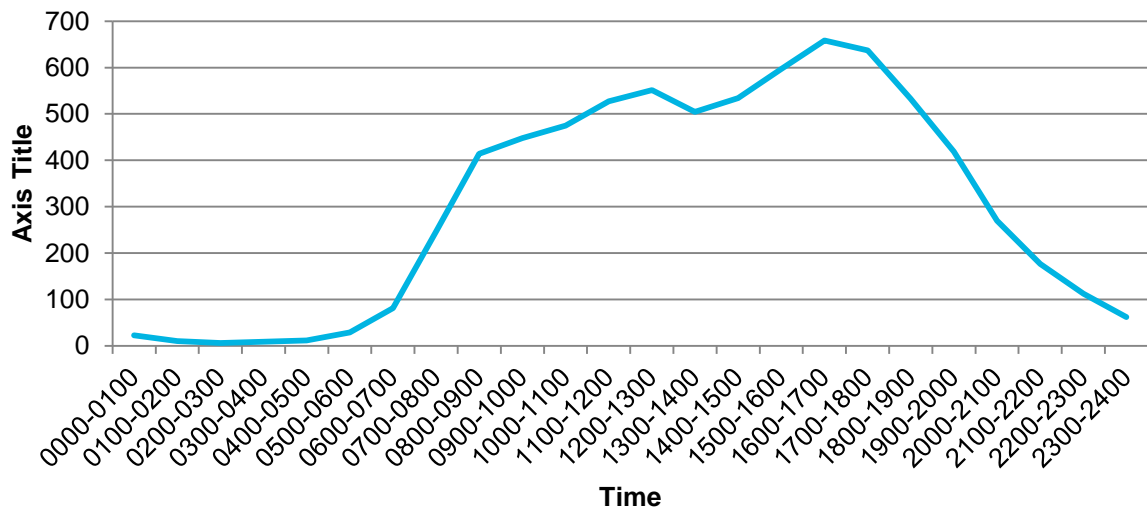


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**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 17 A193 Cowpen Road South -
North Bound**

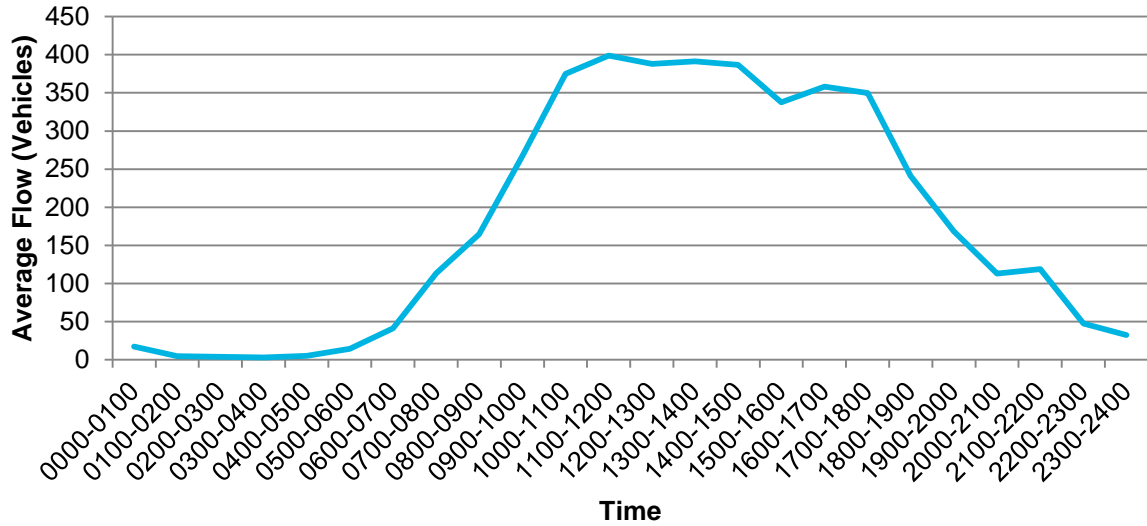


**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 17 A193 Cowpen Road South -
South Bound**

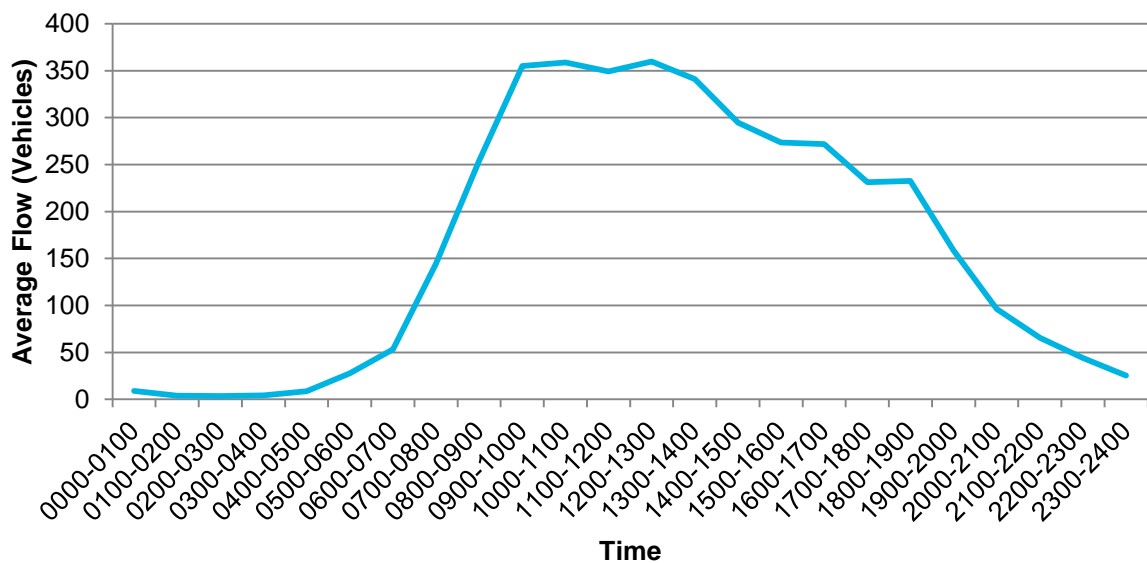


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**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 18 B1329- North Bound**

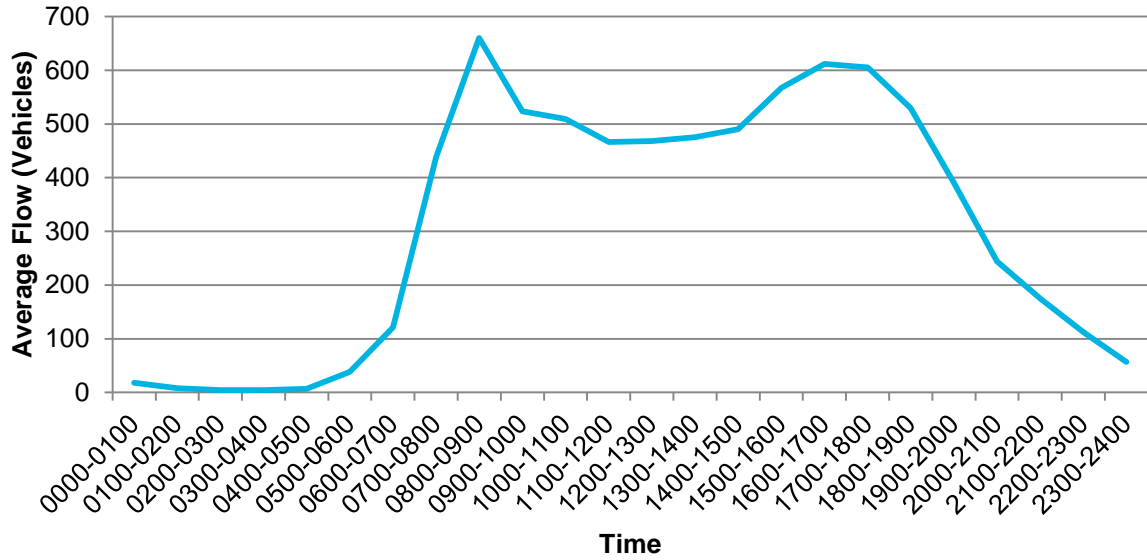


**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 18 B1329- South Bound**

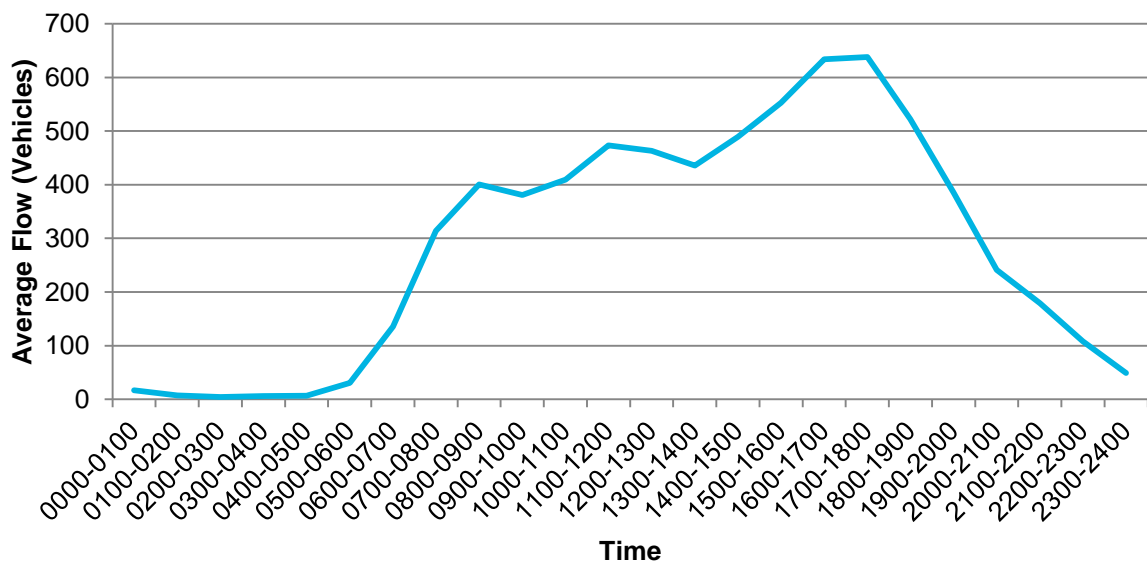


Final

**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 19 A193- North Bound**

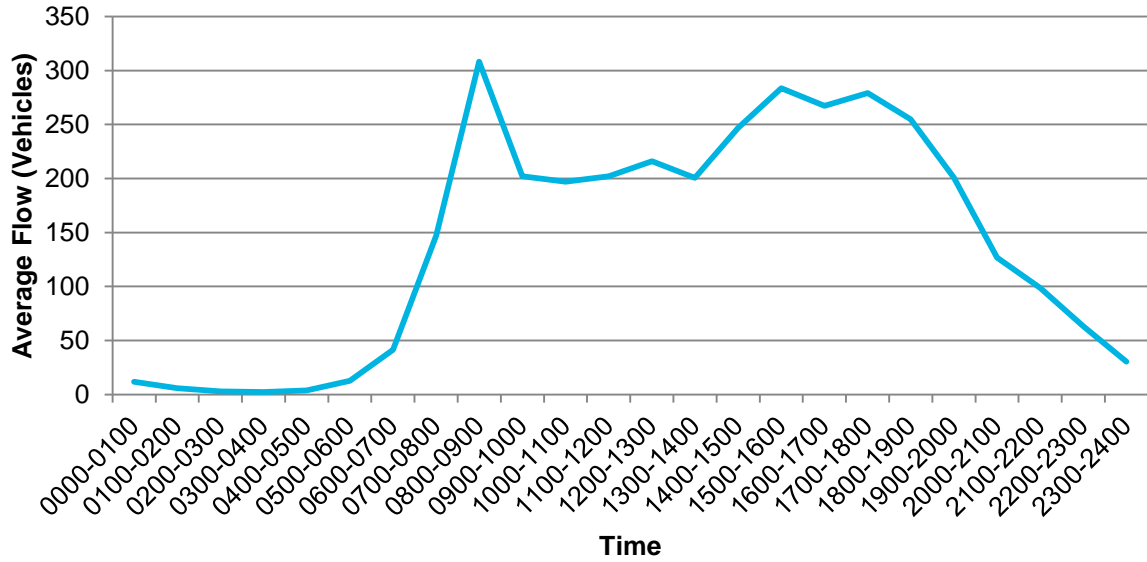


**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 19 A193- South Bound**

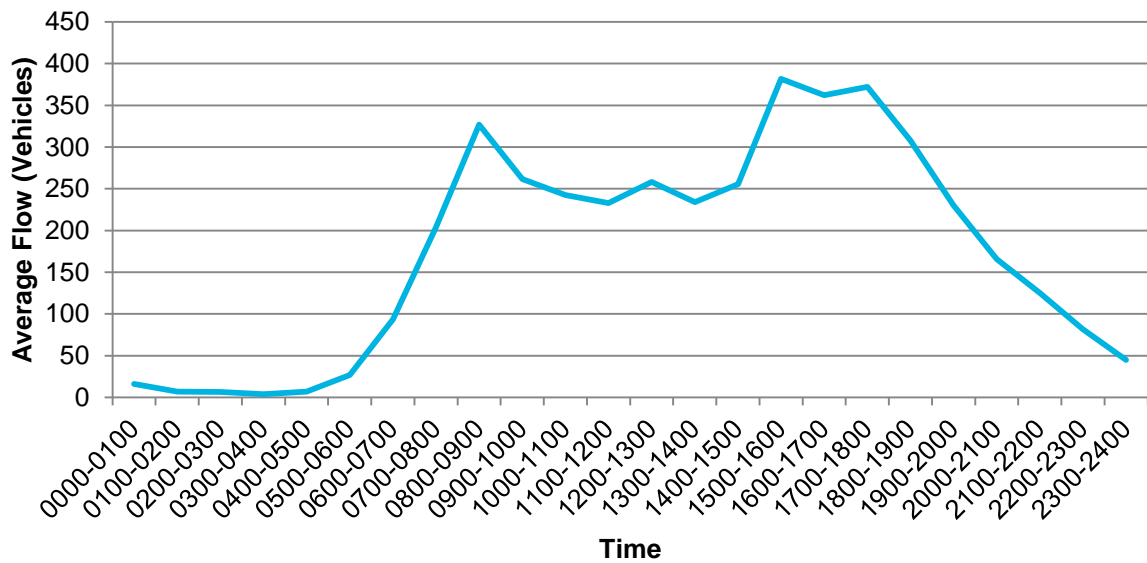


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**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 20 Deneview Road - East Bound**

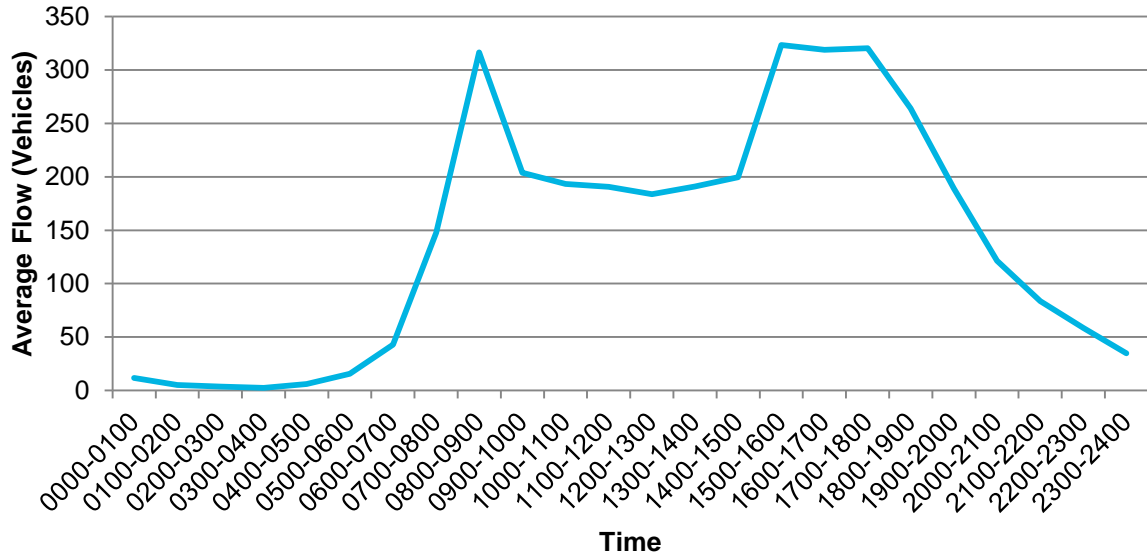


**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 20 Deneview Road - West Bound**

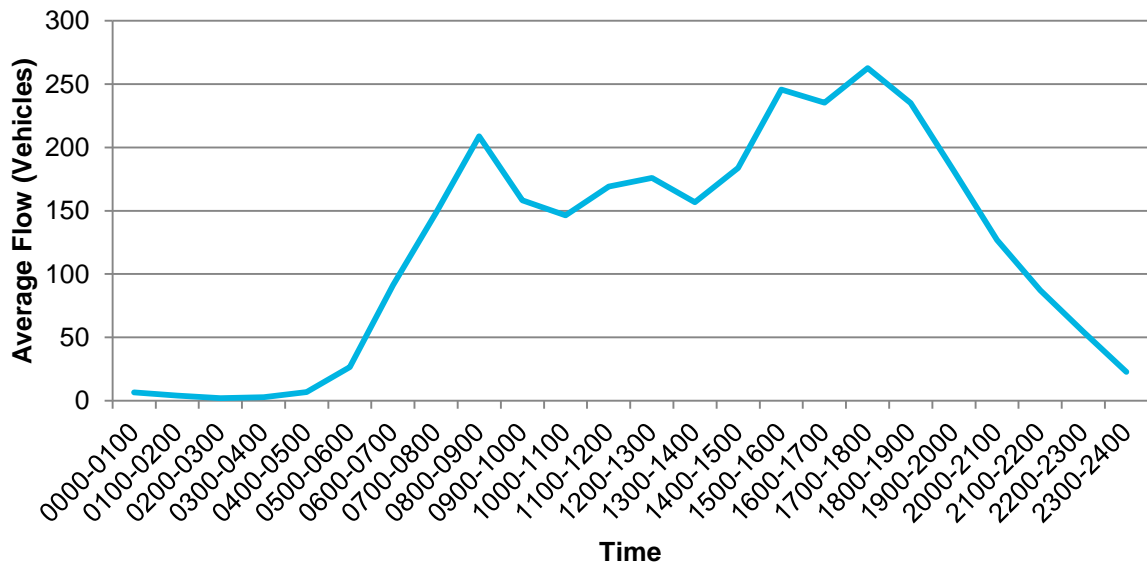


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**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 21 Newsham Road - North Bound**

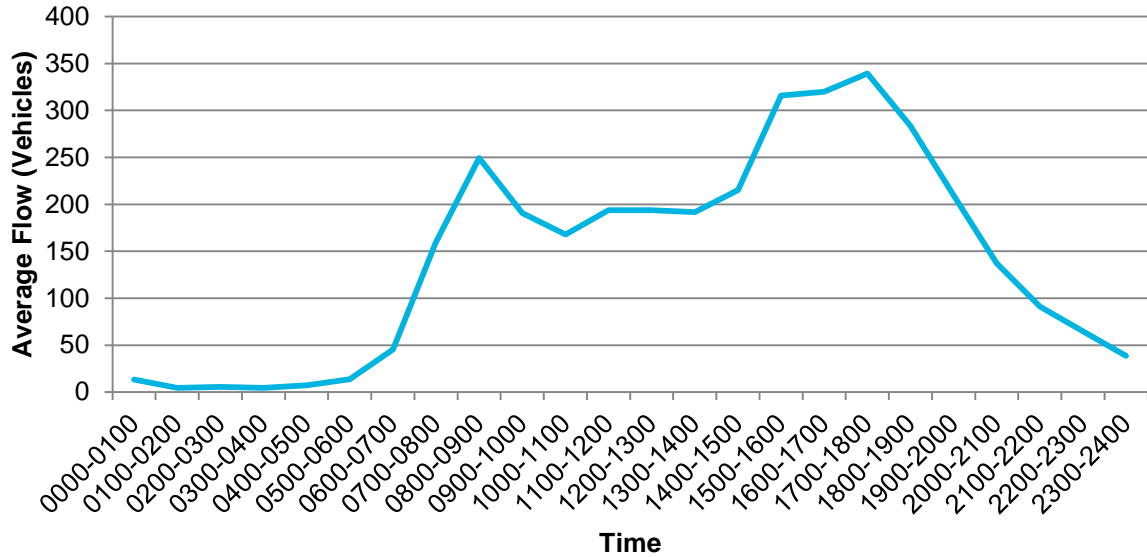


**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 21 Newsham Road - South Bound**

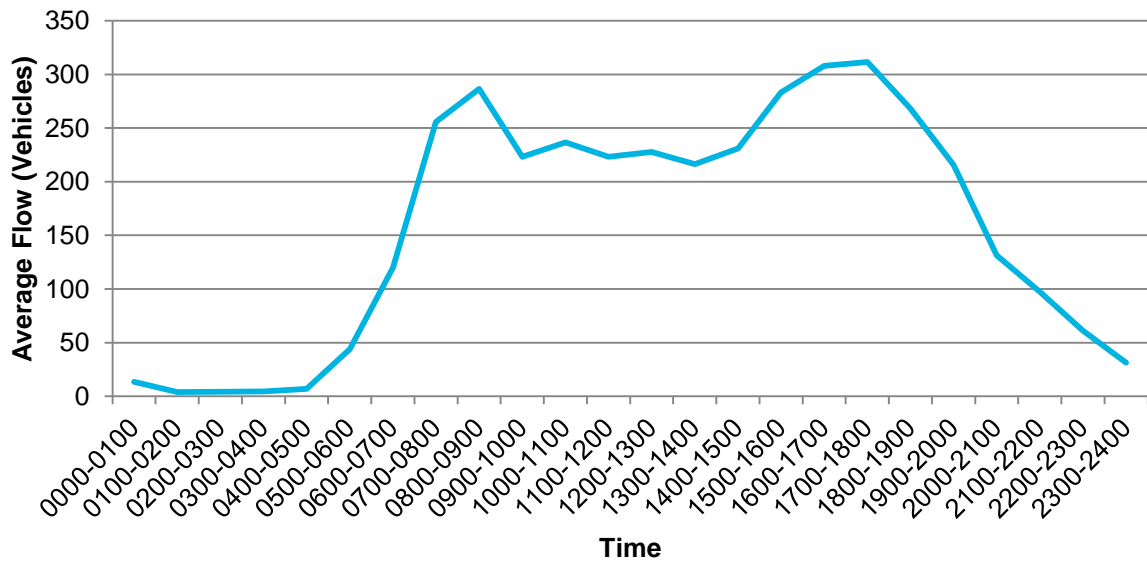


Final

**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 22 Plessey Road - East Bound**



**24 hour 5 day average flow rates
(Monday-Friday) September 2016
Site 22 Plessey Road - West Bound**



Final

Appendix F Journey Time Routes Map

This document has been prepared by AECOM for the sole use of our Client (the "Client") and in accordance with generally accepted consultancy principles. The budget for fees and terms of reference agreed between AECOM and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of AECOM.

