

Appendix 60

SATURN Forecasting Report

Peel Hall Forecasting Report

SATNAM Millennium
(Under the instruction of Highgate Transportation)

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Quality information

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1. Introduction

1.1 Background

This report summarises the methodology adopted in order to model and forecast the future impacts of the proposed Peel Hall development. The main objective of a Forecasting Report is to describe the development of the future year, SATURN based, traffic model to inform the operational and environmental evaluation of the proposed Peel Hall development. The evaluation has been undertaken through comparison of the Do-Minimum reference case and the Do-Something test case for each scenario.

1.2 Report Structure

Following this introductory section, this report has been prepared in the following structure:

- **Section 2** provides a background to the model and the approach to forecasting;
- **Section 3** discusses the future highway network conditions;
- **Section 4** discusses the forecast trip production matrix;
- **Section 5** discusses the impacts on journey times ;
- **Section 6** discusses the impacts on delay;
- **Section 7** focusses on queueing; and
- **Section 8** discusses volume to capacity.

2. Model Background

2.1 Modelled Time Periods

Two base year SATURN models have been developed for the following time periods:

- 2015, Morning Peak (08:00-09:00); and
- 2015, Evening Peak (17:00-18:00).

This is discussed further in the *Peel Hall SATURN Local Model Validation Report (AECOM 2017)*.

2.2 Vehicle Types and Trip Purposes

Demand matrices have been produced for five separate user classes. The first three represent car user classes split by journey purposes to reflect differing values of time and distance. The fourth and fifth user classes are for medium and heavy goods vehicles.

The input matrix structure is as follows:

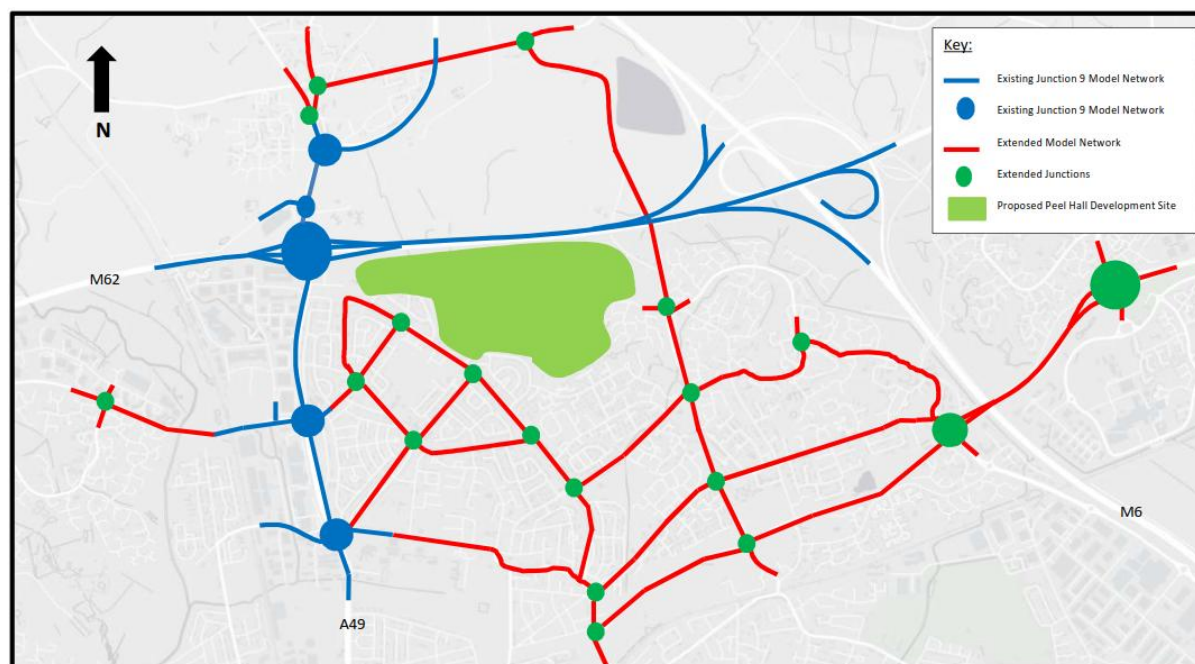
- User class 1 (cars – commuting);
- User class 2 (cars – business);
- User class 3 (cars – other);
- User class 4 (LGVs); and
- User class 5 (HGVs).

2.3 Geographical Extent of the Model

The overall study area is sufficient to ensure an accurate representation of strategic routes in proximity to the Peel Hall site. The study area is defined in **Figure 2.1** overleaf and in **Appendix A**. The study area includes the following key junctions;

- The M62 Junction 9;
- The A49 north from Warrington to Junction 9;
- The A50 east/west; and
- The A574 Birchwood.

Figure 2.1, Peel Hall Traffic Model Study Area



2.4 Zoning System

The zone system in the SATURN model is based upon the existing zoning system defined within the previous VISSIM model. Within the core study area, zones are defined by individual output areas, with aggregation of output area with distance from the scheme. This resulted in 71 zones in the base year models.

2.5 Network Description

The model consists entirely of simulation network. The simulation network is coded in detail using the junction based data in addition to link based data. The simulation area consists of Junction 9 of the M62, A49, A50, A574, Winwick Link Road, the minor road network surrounding the proposed Peel Hall site, and Blackbrook Avenue. This allows for delays and blocking back from the town centre and Junction 9 of the M62 to be replicated accurately across the network.

2.6 Model Validation

The *Peel Hall SATURN Model Local Model Validation Report* demonstrated that the base year Peel Hall SATURN model is a validated model which replicates the existing situation and is a suitable basis for forecasting.

2.7 Forecast Scenarios

The forecasting work has been undertaken in accordance with current WebTAG guidance.

Networks and trip matrices were developed for the following forecast years:

- 2025, Do-Minimum – Base year traffic flows + Background Traffic Growth + Committed Developments;
- 2025, Do-Something – Base year traffic flows + Background Traffic Growth + Committed Developments + Peel Hall Site Partial Build Out Traffic;
- 2030, Do-Minimum – Base year traffic flows + Background Traffic Growth + Committed Developments;
- 2030, Do-Something– Base year traffic flows + Background Traffic Growth + Committed Developments + Peel Hall site full build out traffic; and
- 2030, Through Route – Base year traffic flows + Background Traffic Growth + Committed Developments + Peel Hall site full build out traffic with a through route connecting to the A49.

3. Future Year Highway Networks

3.1 Do-Minimum Highway Networks

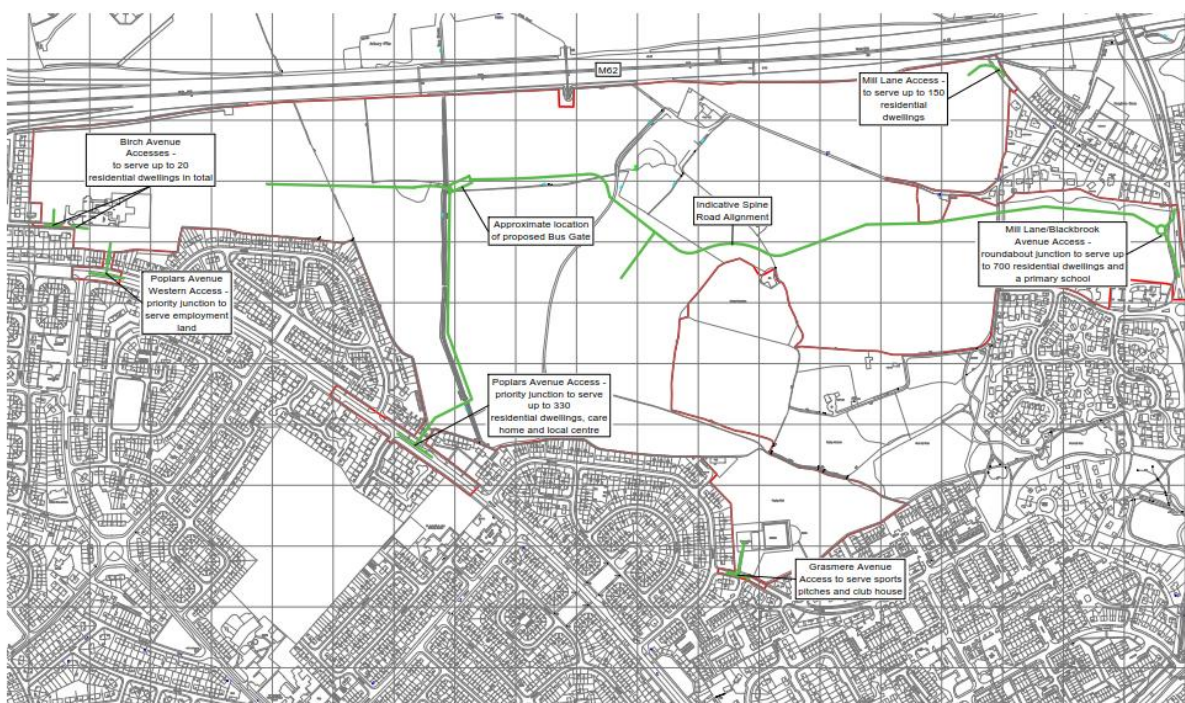
Information provided by HTP identified one committed highway scheme of significance in the modelled area; the signalised pinch point improvement scheme at Oakwood Gate roundabout.

To address queueing on the A574 Birchwood Way westbound, the A574 Birchwood Way approach to the Oakwood Gate junction and corresponding internal roundabout link were signalised in 2016. All future year models have been updated to reflect the set of traffic signals.

3.2 2025 Do-Something Highway Networks

Access arrangements for the proposed Peel Hall site in 2025, operating with a partial build out, were provided by Highgate Transportation. The proposed site layout and access points are detailed in Highgate's Technical Note HTP/1107/TN/19, a copy of this is presented **Figure 3.1** below and in **Appendix B** of this report.

Figure 3.1, Peel Hall Proposed Access Arrangements



In order to replicate the development proposals, 6 new zones and three new junctions were added to the network. These are detailed below;

- Birch Avenue Access – Zone added to the existing highway network;
- Poplars Avenue West Access – New Priority junction with Poplars Avenue added to the network;
- Poplars Avenue Central Access – New Priority junction with Poplars Avenue added to the network;
- Mill Lane Access – Zone added to the existing highway network;
- Grassmere Avenue – Zone added to the existing highway network; and
- Mill Lane / Blackbrook Road Access – New Roundabout junction added to the highway network.

3.3 2030 Do-Something Highway Networks

Access arrangements to the proposed Peel Hall site in 2030, operating with a full build out, were provided by Highgate Transportation. The proposed site layout and access points detailed in Highgate's Technical Note

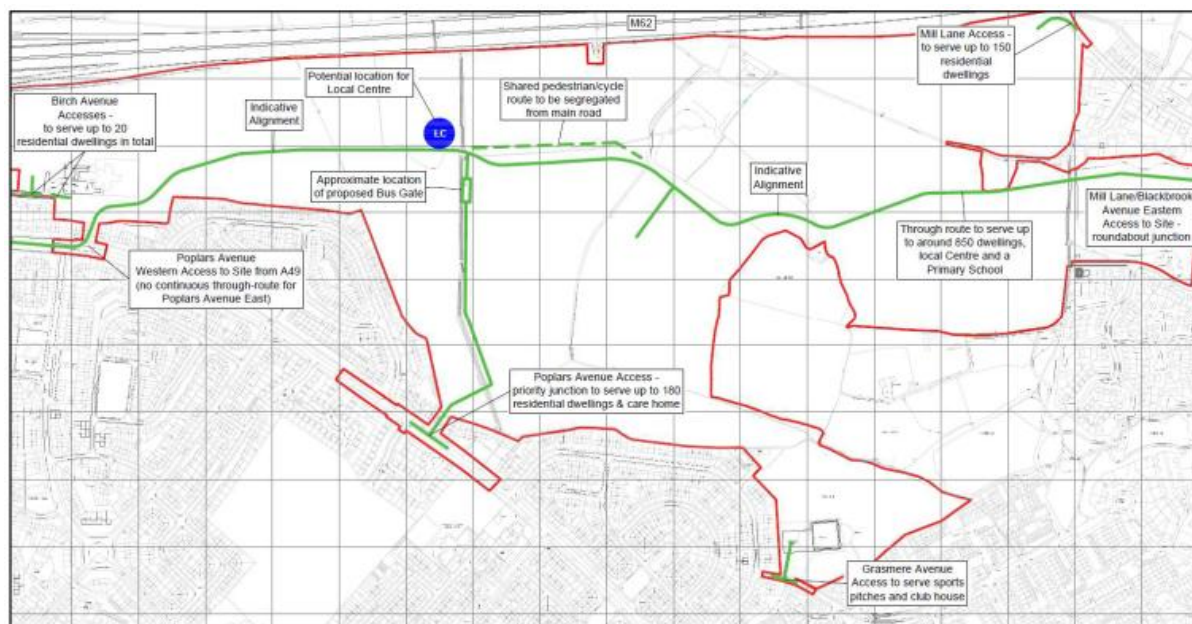
HTp/1107/TN/19 and section 3.2 above, a copy of this is presented in **Figure 3.1** above and in **Appendix B** of this report.

To replicate the full build out the same amendments as detailed in section 3.2 above have been coded into the SATURN model.

3.4 2030 Through Route Networks

Highgate Transportation provided an indicative plan of a Through Route option linking Blackbrook Avenue to the A49 through the proposed site. The proposed layout for the Through Route option is shown in **Figure 3.2** below and detailed in HTP's Technical Note HTp/1107/TN/21 attached to this report in **Appendix C**.

Figure 3.2, Peel Hall Proposed Access Arrangements for Through Route



The Through Route option proposes to stop up the northern section of Poplars Avenue to provide a direct through route from the A49 to the Mill Lane / Blackbrook Road junction. Cotswold Road and Lancing Avenue would be converted to one way with access from the south and egress via a left only turn onto the Through Route. A bus gate would be provided on the Poplars Avenue Central access road which would prevent through trips between the main Through Route and the Poplars Avenue for general traffic.

Highgate Transportation also provided an indicative junction layout for a proposed signalised junction on the A49 at the junction with Birch Avenue, this option was coded into the SATURN model.

In order to replicate the development proposals, seven new zones and five new junctions were added to the network. These are detailed below;

- Birch Avenue Access – Zone added to the existing highway network;
- Poplars Avenue West Access – Poplars Avenue western section will be extended eastwards to provide a through route connecting with the proposed Mill Lane / Blackbrook Road junction. At its junction with Cotswold Avenue the eastern section of Poplars Avenue will be stopped up;
- Cotswold Avenue – A new junction providing egress only onto the new Through Route has been added to the network;
- Lancing Avenue – A new junction providing egress only onto the new Through Route has been added to the network;
- Poplars Avenue Central Access – New Priority junction with Poplars Avenue added to the network;
- Mill Lane Access – Zone added to the existing highway network;
- Grassmere Avenue – Zone added to the existing highway network; and

- Mill Lane / Blackbrook Road Access – New Roundabout junction added to the highway network and linked by the through route to the Poplars Avenue west access.

4. Future Year Trip Matrix Development

4.1 Introduction

In order to replicate traffic growth in the future year scenarios, HTP provided information on background traffic growth and proposed committed developments in the study.

4.2 Background Traffic Growth

Motorway background traffic growth factors for all vehicle trips were provided by HTP as detailed in their Technical Note HTP/1107/TN/20. The growth factors taken from Table 2.1 of the aforementioned technical note, are detailed in **Table 4.1** below, the technical note is attached to this report as **Appendix D**.

Table 4.1: TEMPRO 7.2, Growth Factors

Time Period	Growth Rates	
	AM	PM
2015-2025	1.1749	1.1652
2015-2030	1.2211	1.2098

4.3 Committed Development

The committed developments included in all future year matrices are as per those detailed in HTP's Technical Note HTP/1107/TN/20 included in **Appendix D**. The committed developments are identified in **Table 4.2** below.

Table 4.2: Committed Developments included within all Future Year Traffic Models

Committed Development	Planning Reference
Land at Benson Road, Birchwood	Ref: 2015/26220
Birchwood Shopping Centre	Ref: 2015/25880

4.4 Proposed Developments

HTP provided the total forecast development trips to be generated by the Peel Hall development at the various access and egress points on the local highway network.

Detailed in HTP's Technical Note HTP/1107/TN/19, the forecast trip quantum's for the 2025 Do-Something scenario (partial build out) are presented in **Table 4.3** following.

Table 4.3: Summary of 2025 Peak Hour Vehicle Trips

Access	Quantum of Development	AM Arrival	AM Departure	PM Arrival	PM Departure
Poplars Avenue (Central)	145 Dwellings	33	76	72	45
	Care home	7	7	8	8
	Food Store	92	61	181	191
	Local Shops	30	29	36	39
	Family Pub	0	0	23	15
	Total	162	173	320	298
Poplars Avenue (West)	Employment Land	69	39	20	47
Mill Lane	150 Dwellings	34	79	74	46
Mill Lane/ Blackbrook Avenue	285 Dwellings	64	149	141	88
Birch Avenue	20 Dwellings	5	11	10	6

Grasmere Avenue	Community uses	10	5	7	8
TOTAL		344	456	572	493

The 2030 Do-Something (full build out and Through Route) forecast trip quanta for the Peel Hall development as provided by Highgate Transportation in TN/19 and TN/21 are presented in **Table 4.4** below.

Table 4.4: Summary of 2030 Peak Hour Vehicle Trips

Access	Quantum of Development	AM Arrival	AM Departure	PM Arrival	PM Departure
Poplars Avenue (Central)	330 Dwellings	74	173	163	101
	Care home	7	7	8	8
	Food Store	28	18	54	57
	Local Shops	0	0	0	0
	Family Pub	0	0	23	15
	Total	109	198	248	181
Poplars Avenue (West)	Employment Land	69	39	20	47
Mill Lane	150 Dwellings	34	79	74	46
Mill Lane/ Blackbrook Avenue	700 Dwellings	158	366	347	215
	Primary school	57	40	10	14
Birch Avenue	20 Dwellings	5	11	10	6
Grasmere Avenue	Community uses	10	5	7	8
TOTAL		592	849	888	703

4.5 Trip Distribution

The trip distribution for both committed developments and future year Peel Hall Development trips is based on the existing 2009 VISUM model zone structure, which provided the prior matrix for the original VISSIM model.

The validated SATURN base matrices were converted back to the more aggregated zone structure of the VISUM model and then the future year trips were assigned by existing trip volumes. The resulting matrices were then converted back to the disaggregated SATURN matrices and assigned in SATURN.

The trip distribution is detailed in AECOMs Technical Note *“Proposed Trip Distribution for Peel Hall Development”* which is included in **Appendix E** of this report.

4.6 Convergence Proximity

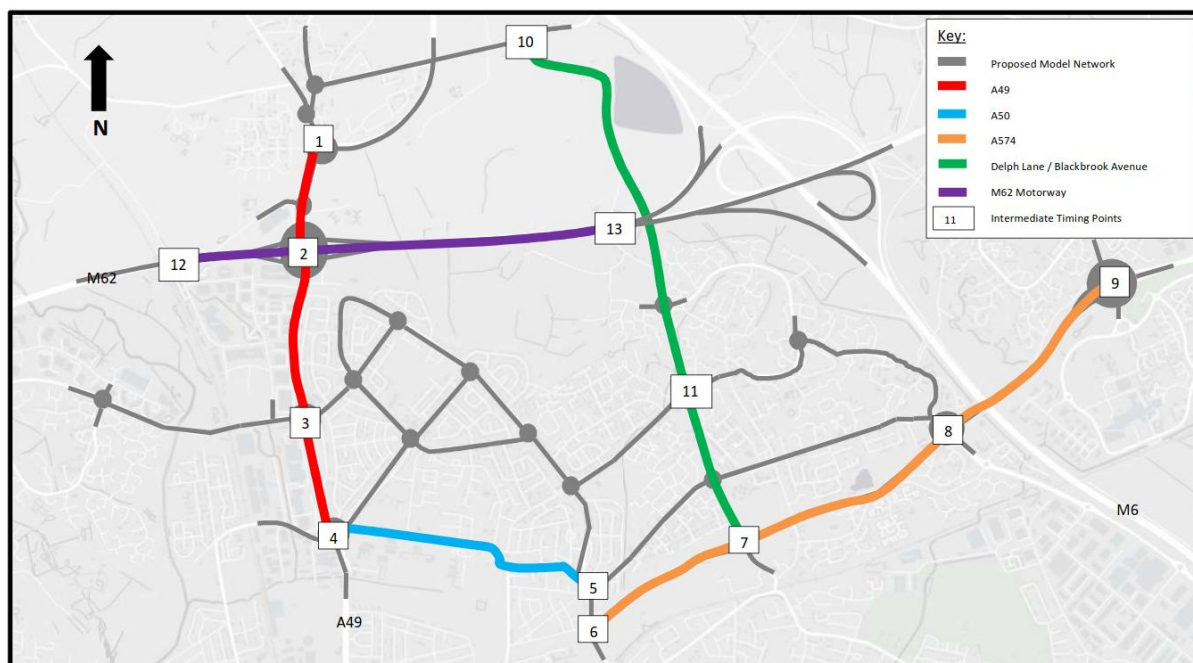
Delta values for each run have been checked to ensure that they are less than 1%. In most cases delta is significantly lower, typically around 0.15%.

5. Assessment of Impacts on Journey Times

5.1 Introduction

The journey times analysed in this section of the report are those used to validate the SATURN model, a plan of the journey times is provided in **Figure 5.1** below.

Figure 5.1, Journey Times used in the Analysis



5.2 2025 Do-Minimum Compared to 2025 Do-Something

5.2.1 AM

Table 5.2 below compares the modelled journey times in the AM peak for the 2025 Do-Minimum scenario and the 2025 Do-Something scenario-wherein the Peel Hall development is partially built out.

Table 5.2: AM 2025 Do-Minimum & Do-Something Journey Times

AM Journey Times (seconds)		2025		
		Do-Minimum	Do-Something	Difference
A49	Northbound	488	499	11
	Southbound	973	1,018	45
A50	Eastbound	192	192	0
	Westbound	290	294	4
Blackbrook Avenue/ Mill Lane	Northbound	336	346	10
	Southbound.	333	405	72
A574 Birchwood	Eastbound	275	315	40
	Westbound	233	226	-7
M62 Motorway	Eastbound	189	189	0
	Westbound	89	89	0

The proposed development is forecasted to increase journey times on the A49 in the northbound and southbound directions. The A49 northbound is forecast to experience an 11 second increase in journey times, whilst traffic routing southbound increases by 45 seconds.

Blackbrook Avenue southbound is forecast to experience an increase in average journey time of 72 seconds whilst the journey times northbound are forecasted increase by 10 seconds. The A574 eastbound is forecasted to experience an increase in journey times of 40 seconds, whilst traffic routeing westbound are forecast to experience a decrease of 7 seconds.

5.2.2 PM

Table 5.3 below compares the modelled journey times in the AM peak for the 2025 Do-Minimum scenario and the 2025 Do-Something scenario wherein the Peel Hall development is partially built out.

Table 5.3: PM 2025 Do-Minimum & Do-Something Journey Times

PM Journey Times (seconds)		2025		
		Do-Minimum	Do-Something	Difference
A49	Northbound	694	772	78
	Southbound	519	524	5
A50	Eastbound	209	207	-2
	Westbound	295	360	65
Blackbrook Avenue/ Mill Lane	Northbound	308	331	23
	Southbound	305	340	35
A574 Birchwood	Eastbound	210	218	8
	Westbound	326	379	53
M62 Motorway	Eastbound	99	99	0
	Westbound	89	90	1

In the PM peak period, the A49 is forecast to experience an increase in average journey time of 78 seconds in a northbound direction and 5 seconds southbound. The A50 is forecast to experience a decrease of 2 seconds in an eastbound direction and an increase of 65 seconds westbound. Additionally, the Blackbrook Avenue / Mill Lane junction is forecast to experience an increase of 23 seconds in a northbound direction and 35 seconds southbound.

The A574 Birchwood Way is also forecast to experience increases in average journey times, with an 8 second increase forecasted in an eastbound direction and 53 seconds westbound.

5.3 2030 Do-Minimum Compared to 2030 Do-Something

5.3.1 AM

Table 5.4 below compares the modelled journey times in the AM peak for the 2030 Do-Minimum scenario and the 2025 Do-Something scenario wherein the proposed Peel Hall development is fully built out.

Table 5.4: AM 2030 Do-Minimum & Do-Something Journey Times

AM Journey Times (seconds)		2030		
		Do-Minimum	Do-Something	Difference
A49	Northbound	571	581	10
	Southbound	1049	1136	87
A50	Eastbound	192	193	1
	Westbound	297	294	-3
Blackbrook Avenue / Mill Lane	Northbound	342	375	33
	Southbound	338	503	165
A574 Birchwood	Eastbound	318	392	74
	Westbound	237	236	-1
M62 Motorway	Eastbound	202	202	0
	Westbound	92	92	0

Once the Peel Hall development is fully built, the A49 is forecasted to experience an increase of 10 seconds northbound and 87 seconds southbound. Blackbrook Avenue/ Mill Lane is forecast to experience an increase in average journey times of 33 seconds northbound and 165 seconds southbound in the AM peak. Whilst the A574 eastbound is forecast to experience an increase in average journey times of 74 seconds eastbound and a decrease in 1 second westbound.

5.3.2 PM

Table 5.5 below compares the modelled journey times in the PM peak for the 2030 Do-Minimum scenario and the 2025 Do-Something scenario wherein the proposed Peel Hall development is fully built.

Table 5.5: PM 2030 Do-Minimum & Do-Something Journey Times

PM Journey Times (seconds)		2030		
		Do-Minimum	Do-Something	Difference
A49	Northbound	767	823	56
	Southbound	522	533	11
A50	Eastbound	209	208	-1
	Westbound	301	375	74
Blackbrook Avenue/ Mill Lane	Northbound	313	359	46
	Southbound	312	371	59
A574 Birchwood	Eastbound	213	221	8
	Westbound	349	412	63
M62 Motorway	Eastbound	103	103	0
	Westbound	94	94	0

During the PM peak, with Peel Hall fully constructed the A49 is forecast to experience an increase in journey times of 56 seconds northbound and 11 seconds southbound. There are varying impacts forecasted for the A50, whereby traffic routing eastbound is forecast to experience a decrease of a second, whilst alternatively the westbound average journey times are forecasted to increase by 74 seconds.

Blackbrook Avenue and Mill Lane experience a 46 second increase in average journey time northbound and 59 seconds southbound. Additionally, the A574 experiences an 8 second increase in average journey time eastbound towards Birchwood, and a 63 second increase in average journey time westbound.

5.4 2030 Through Route Option Comparisons

5.4.1 AM

Table 5.6 below compares the 2030 Through Route option against the 2030 Do-Minimum, and 2030 Do-Something fully built out scenarios, where no through route is provided.

Table 5.6: Comparison of Average Journey Times for the 2030 AM Through Route Scenario

AM Journey Times (seconds)		2030		
		Through Route	Difference to Do-Minimum	Difference Do-Something
A49	Northbound	568	-3	-13
	Southbound	1203	154	67
A50	Eastbound	193	1	0
	Westbound	295	-2	1
Blackbrook Avenue/ Mill Lane	Northbound	379	37	4
	Southbound	516	178	13

A574 Birchwood	Eastbound	428	110	36
	Westbound	231	-6	-5
M62 Motorway	Eastbound	202	0	0
	Westbound	92	0	0

The Through Route option is forecasted to decrease journey times on the A49 northbound by 3 seconds compared to the Do-Minimum scenario, and 13 seconds against the Do-Something. However the A49 southbound is forecast to experience an increase in journey times of 15 seconds and 67 seconds against the Do-Minimum and Do-Something respectively.

On the A50, the Through Route option is forecasted to increase journey times by 1 second eastbound compared to the Do-Minimum scenario and has no impact when compared to the Do-Something. The A50 westbound is forecast to experience a decrease of 2 seconds in journey time compared to the Do-Minimum and an increase of 1 second against the Do-Something.

Operating with the Through Route, Blackbrook Avenue, when compared against the Do-Minimum scenario is forecast to experience a 37 second increase in average journey times northbound, and 178 seconds southbound. When compared to the Do-Something with no through route, Blackbrook is forecast to experience an average journey time increase of 4 seconds northbound and 13 seconds southbound.

The A574 is forecast to experience an increase in average journey time eastbound of 110 seconds and a decrease in average journey times of 6 seconds westbound if the Through Route is provided compared to the Do-Minimum scenario. The Through Route option is forecast to experience a 36 second increase in average journey time eastbound and reduces average journey times by 5 seconds in a westbound direction compared to the Do-Something scenario.

5.4.2 PM

Table 5.7 below compares the 2030 'Through Route' option against the 2030 Do-Minimum and 2030 Do-Something scenarios where there is no 'Through Route'.

Table 5.7: Comparison of Journey Times for the PM 'Through Route' Scenario

PM Journey Times (seconds)		2030		
		Through Route	Do-Minimum Difference	Do-Something Difference
A49	Northbound	758	-9	-65
	Southbound	569	47	36
A50	Eastbound	206	-3	-2
	Westbound	327	26	-48
Blackbrook Avenue/ Mill Lane	Northbound	446	133	87
	Southbound	346	34	-25
A574 Birchwood	Eastbound	219	6	-2
	Westbound	367	18	-45
M62 Motorway	Eastbound	103	0	0
	Westbound	94	0	0

Providing a Through Route between the A49 and Blackbrook Avenue is forecast to result in a decrease in average journey time of 9 seconds northbound and increase average journey times by 47 seconds southbound on the A49 over the Do-Minimum scenario. Compared to the Do-Something scenario, the Through Route is forecast to result in a decrease in average journey times by 65 seconds in a northbound direction and increase journey times by 36 seconds southbound on the A49.

Compared to the Do-Minimum scenario, the A50 is forecast to experience a 3 second reduction in average journey times in an eastbound direction and a 26 second increase in journey times westbound. Compared to the Do-Something scenario the A50 eastbound is forecast to experience a 2 second reduction in average journey time in addition to a 48 second reduction in average journey time in a westbound direction.

Blackbrook Avenue is forecast to experience a 133 second increase in average journey time northbound and 34 second increase southbound if the Through Route is provided compared to the Do-Minimum scenario. Compared to the Do-Something scenario the Through Route is forecast to experience an increase in average journey time of 87 seconds northbound and a decrease of 25 seconds southbound.

The A574 eastbound is forecast to experience a 6 second increase in average journey time, whilst westbound traffic the average journey time is forecast to experience an increase of 18 seconds compared to the Do-Minimum scenario. Compared to the Do-Something, the eastbound average journey time is forecast to experience a decrease of 2 seconds, westbound average journey times are forecast to experience a greater decrease of 45 seconds.

6. Assessment of Impact on Delay

6.1 2025 Do-Minimum and 2025 Do-Something Total Delay Comparison

6.1.1 AM

Figure 6.1 below presents the differences in Total Delay between the 2025 AM Do-Minimum scenario compared against the 2025 AM Do-Something scenario. Links highlighted in green are forecasted to experience an increase in delay and blue a decrease.

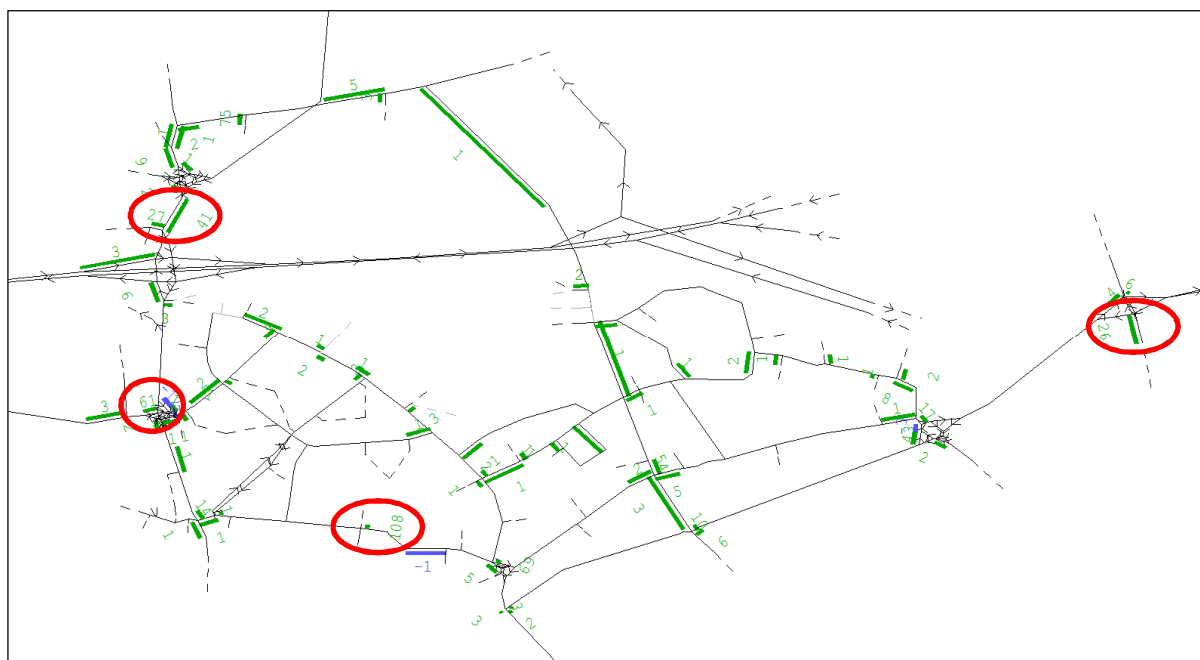


Figure 6.1: Comparison of Total Delay between the 2025 AM Do-Minimum and Do-Something Part Build Out

The Newton Road / A49 Newton Road / A49 Winwick Link Road junction is forecast to experience a small increase in Total Delay at the Newton Road southbound and A49 Newton Road northbound approach links of one and two seconds respectively.

During the AM peak period there is a forecast increase in Total Delay of 6 seconds on the A49 northbound approach to in the 2025 Do-Something scenario compared to 2025 Do-Minimum where the A49 joins Junction 9 of the M62, the eastbound off-slip is forecast to experience a 3 second increase in Total Delay, whilst the Westbound off-slip and A49 Southbound are forecast to not to experience an increase in Total Delay.

The A49 / Newton Road / Delph Lane Retail junction is a forecast to experience an increase in Total Delay of 41 seconds in the 2025 Do-Something scenario compared to the 2025 Do-Minimum on the A49 southbound approach to the junction. Northbound the A59 is forecast to experience no increase over the Do-Minimum scenario. Traffic exiting Delph Lane is forecast to experience a 27 second increase in Total Delay over the Do-Minimum scenario.

The Cromwell Avenue approach to the A49 / Cromwell Avenue / Sandy Lane signalised junction is forecast to experience a 61 second increase in Total Delay in the 2025 Do-Something part build out scenario compared to the 2025 Do-Minimum scenario. The A49 southbound to Sandy Lane West is forecast to experience a 12 second decrease in Total Delay. The Sandy Lane approach to the signalised roundabout is forecast to experience a one second increase in Total Delay. The A49 northbound approach to the junction is forecast to experience a two second increase in Total Delay.

The Crab Lane / Birchwood Way / Woolston Grange Avenue is forecast to experience an increase in Total Delay of 17 and 43 seconds on the Birchwood Way eastbound and Crab Lane Southbound approaches to the roundabout.

6.1.2 PM

Figure 6.2 below presents the differences in Total Delay between the 2025 PM Do-Minimum scenario compared against the 2025 PM Do-Something scenario.

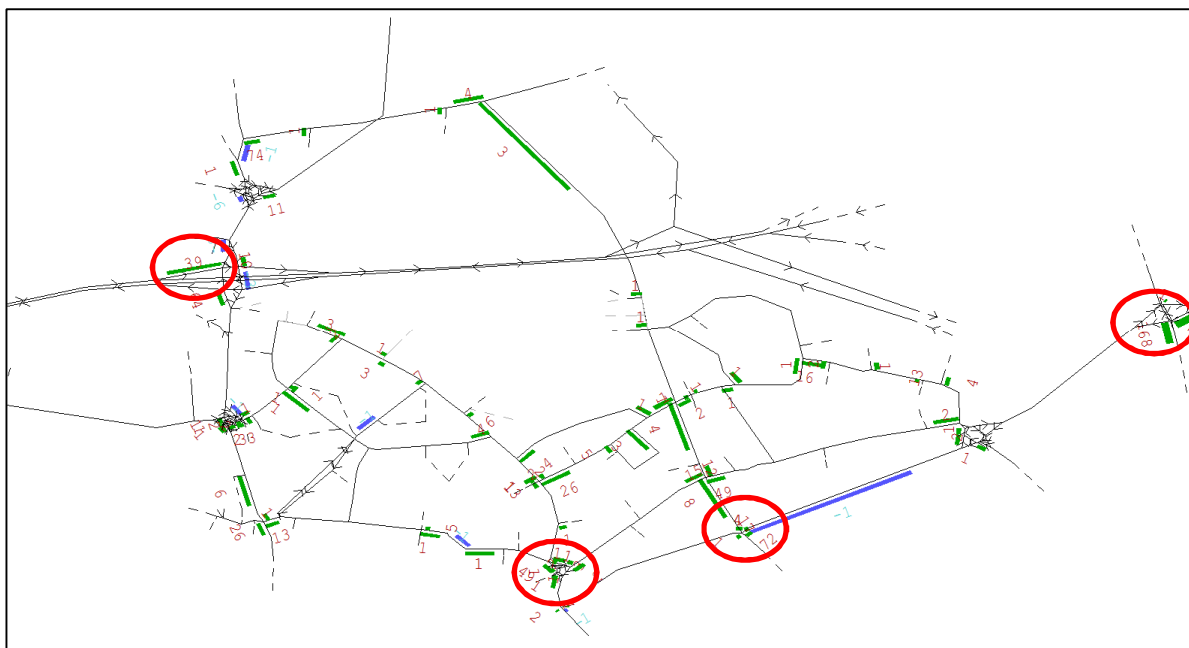


Figure 6.2: Comparison of Total Delay between the 2025 PM Do-Minimum and Do-Something Part Build Out

The PM peak is forecast to experience higher increases in delay compared to the AM.

The A49 northbound is forecast to experience a 64 second increase in delay where it joins Junction 9 in the 2025 PM peak Do-Something scenario compared to the 2025 PM Do-Minimum scenario. The A49 southbound approach to Junction 9 is forecast to experience a 10 second increase in delay compared to the Do-Minimum scenario. The eastbound off-slip at Junction 9 is forecast to experience a 39 second increase in delay, whilst the westbound off-slip is forecast to experience no increase in total delays.

Three of the four approaches to the A49 / Long Lane signalised junction are forecast to experience an increase in Total Delay over the Do-Minimum scenario. The highest forecast increase in delay of the approaches is the A49 northbound which is forecast to experience an increase in Total Delay of 26 seconds, an increase from 173 seconds.

The A50 westbound from the Hilden Road / Orford Road roundabout is forecast to experience an increase in delay of 49 seconds in the Do-Something scenario.

The A574 westbound approach to the roundabout junction with Blackbrook Avenue is forecast to experience an increase in Total Delay of 72 seconds. The southbound Blackbrook Avenue approach is forecast to experience a 17 second increase in Total Delay.

The Birchwood Way westbound approach and northbound Oakwood Gate approach to the Birchwood Way / Oakwood Gate junction is forecast to experience increases in Total Delay of 200 seconds and 168 seconds respectively.

6.2 2030 Do-Minimum and 2030 Do-Something Total Delay Comparison

6.2.1 AM

Figure 6.3 below presents the differences in Total Delay between the 2030 AM Do-Minimum and 2030 AM Do-Something scenario.

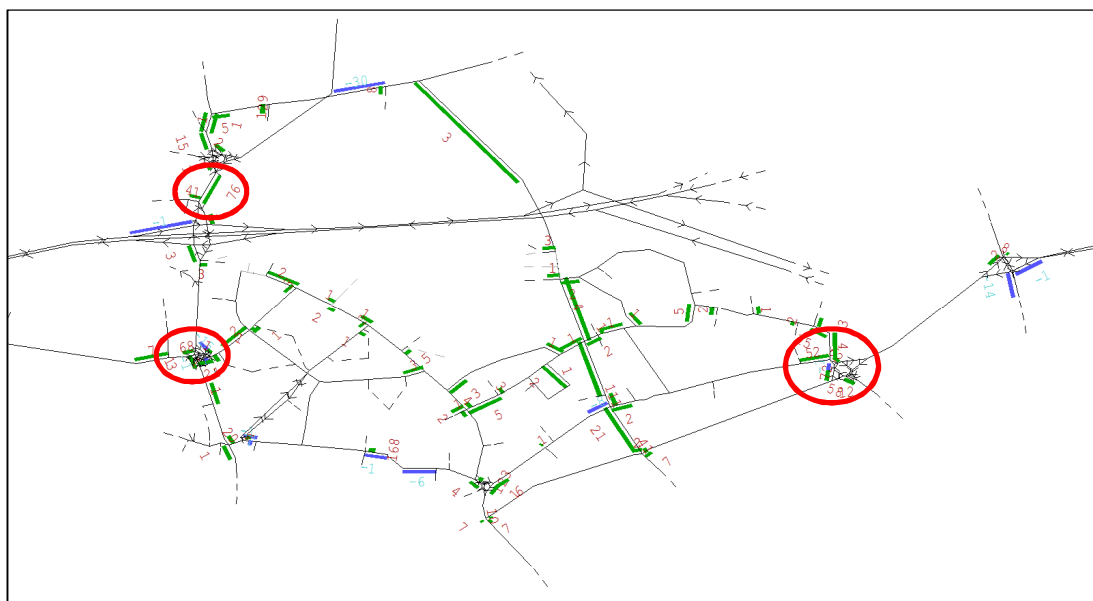


Figure 6.3: Comparison of Total Delay between the 2030 AM Do-Minimum and Do-Something Fully Built Out Scenario

In the AM peak period, a 76 second increase in Total Delay is forecast on Newton Road southbound at the signalised junction with the Delph Lane retail park when comparing the 2030 Do-Minimum and 2030 Do-Something scenarios. Traffic exiting the retail park is forecast to experience a 41 second increase in delay compared to the Do-Minimum scenario.

The A49 is forecast to experience similar levels of delay compared to the Do-Minimum scenario. A decrease in Total Delay of 11 seconds is forecast on the A49 southbound, at the signalised junction with Sandy Lane West, and an increase in Total Delay of 21 seconds on the A49 southbound at the signalised junction with the A50 compared to the Do-Minimum scenario. Cromwell Avenue is forecast to experience an increase of 68 seconds in Total Delay at the signalised junction with the A49 compared to the Do-Minimum scenario.

The A49 southbound approach at its junction with the A50 is forecast to experience an increase in delay of 20 seconds. An increase of 123 seconds in Total Delay is forecast on Poplars Avenue at its junction with the A50 as a result of the increase in traffic routing along Poplars Avenue.

Blackbrook Avenue is forecast to experience increases in Total Delay of 41 seconds in a southbound direction at its junction with the A574 Birchwood Way.

The Birchwood Way/ Oakwood Gate junction is forecast to experience a decrease in Total Delay of 1 second on Birchwood Way westbound, and 14 seconds from Oakwood Gate northbound.

6.2.2 PM

Figure 6.4 below presents the differences in Total Delay between the 2030 PM Do-Minimum and the 2030 PM-Do Something scenario.

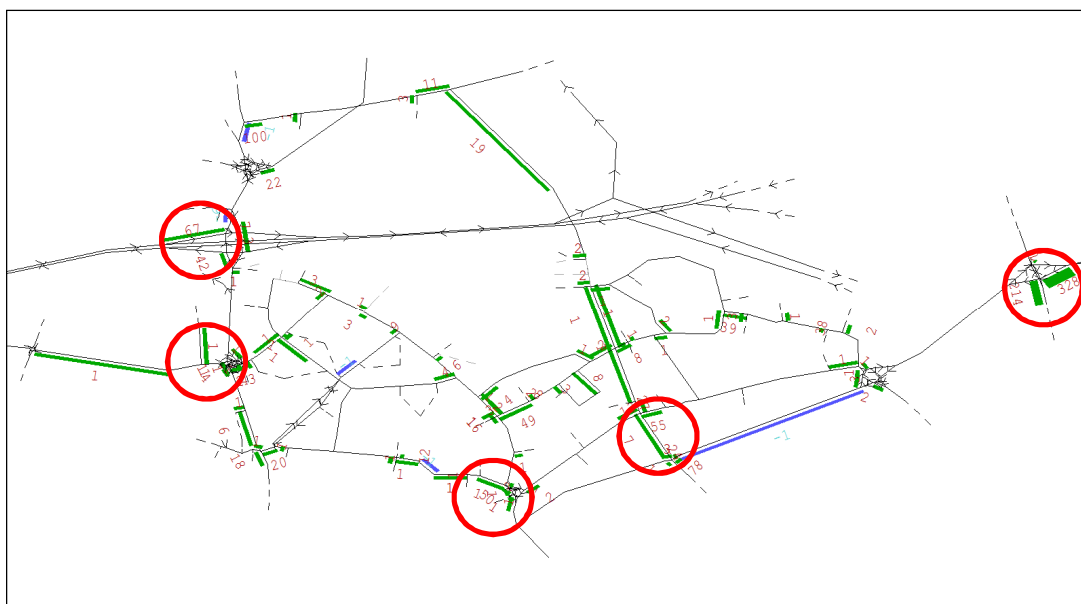


Figure 6.4: Comparison of Total Delay between the 2030 PM Do-Minimum and Do-Something Fully Built Out Scenario

With the development fully built out there is a forecast increase of 42 seconds in Total Delay on the A49 northbound approach to Junction 9 of the M62. The M62 Eastbound off-slip is forecast to experience an increase of in Total Delay of 67 seconds.

The A49 Winwick Link Road approach to the Newton Road / A49 Newton Road / A49 Winwick Link Road junction is forecast to experience a 22 second increase in Total Delay compared to the Do-Minimum scenario. The other approaches to the junction are forecast not to experience an increase in Total Delay as a result of the development proposals.

The A49 northbound approach to its signalised junction with the A50 is forecast to experience an increase in delay of 18 seconds. The A50 westbound approach at the same junction is forecast to experience a 20 second increase in Total Delay.

The A574 Birchwood Way westbound approach to the Oakwood Gate Junction is forecast to experience a 328 second increase in Total Delay, whilst traffic approaching the junction on Oakwood Gate is forecast to experience an increase in Total Delay of 214 seconds.

6.3 2030 Through Route Delay Comparison

6.3.1 AM

Figures 6.5 & 6.6 overleaf present the forecast Total Delay for the AM 2030 Do Something scenarios with and without the Through Route option. Due to the structural changes required to build the 'Through Route' into the SATURN model, a comparison overlay could not be clearly presented, therefore two separate plots have been presented.

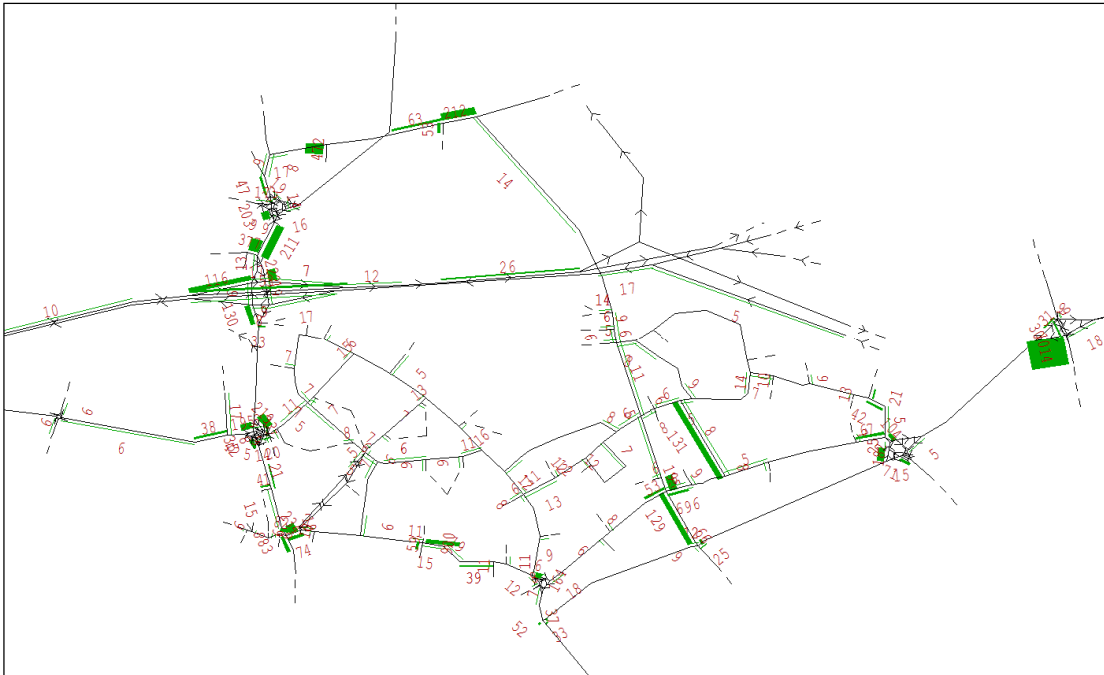


Figure 6.5: 2030 AM Do-Something Total Delay

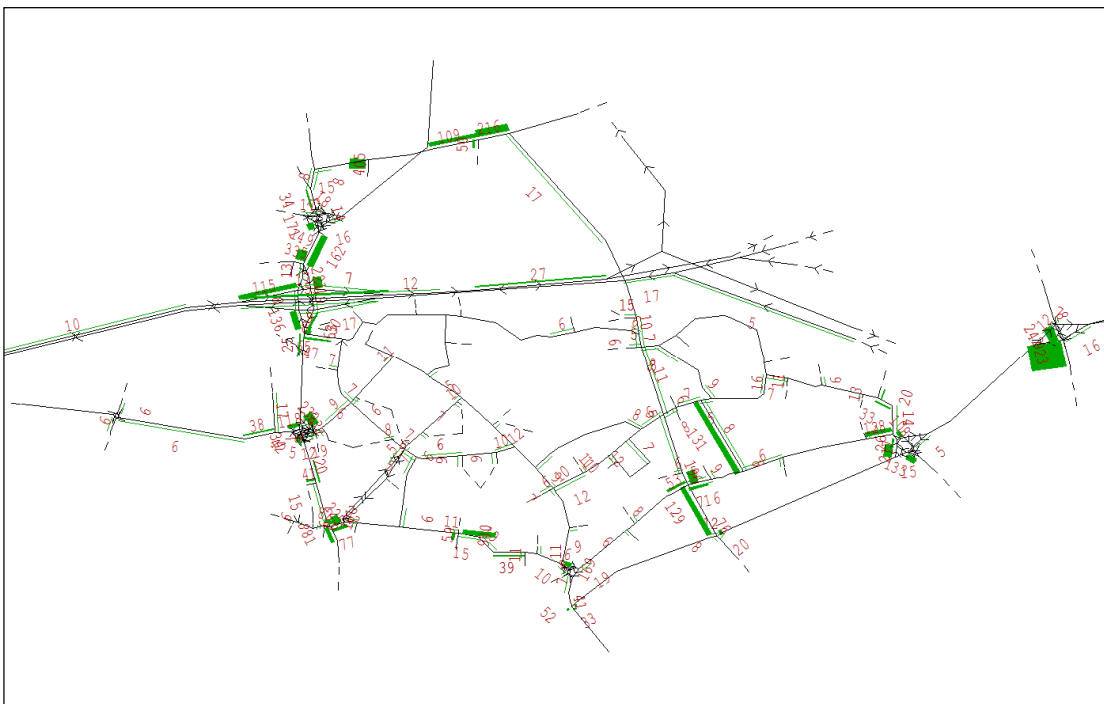


Figure 6.6: AM Do-Something 'Through Route' Total Delay

The proposed signalised junction, provided on the A49 to connect the Through Route is forecast to experience 25 seconds delay on the A49 northbound approach. In addition the A49 northbound approach to Junction 9 of the M62 is forecast to experience a 6 second increase in delay over the 2030 Do-Something scenario.

The Through Route approach arm to the A49 signalised junction is forecast to experience an increase in Total Delay of 47 seconds. Vehicles heading southbound from Junction 9 are forecast to experience an increase in delay of 63 seconds at the new signalised junction of the A49 / Through Route.

Delays on the minor road network, such as Poplars Avenue, Cotswold Way and Sandy Lane West are forecast to experience small reductions in Total Delay compared to the 2030 Do-Something no Through Route scenario as a result of fewer vehicles traversing these roads.

There is a forecast decrease in Total Delay of 49 seconds on the A49 southbound approach to the A49 / Delph Lane junction as a result of traffic rerouting and using the Through Route. This is also evident with forecast small reductions in Total Delay on Golbourne Road and Myddleton Road.

The junction of the A49 / Sandy Lane West / Cromwell Avenue is forecast to experience an increase in Total Delay of 13 seconds for vehicles routeing southbound through the junction on the A49. Vehicle movements from Cromwell Avenue approach arm are forecast to experience a decrease in Total Delay of 77 seconds compared to the 2030 Do-Something with no Through Route scenario, as a result of less traffic routing through the signalised roundabout junction.

The Through Route option is forecast to experience a decrease in Total Delay of 10 seconds for traffic approaching the A49 / A50 junction on the A49 southbound approach. Vehicles entering the A49 / A50 junction from the other arms are forecast to experience similar delays to those forecast as part of the 2030 Do-Something option.

6.3.2 PM

Figures 6.7 & 6.8 below and overleaf present the forecast Total Delay within the PM 2030 Do-Something scenarios with and without the Through Route option. Due to the structural changes required to build the Through Route into the SATURN model a comparison overlay could not be clearly presented, therefore two separate plots have been presented.

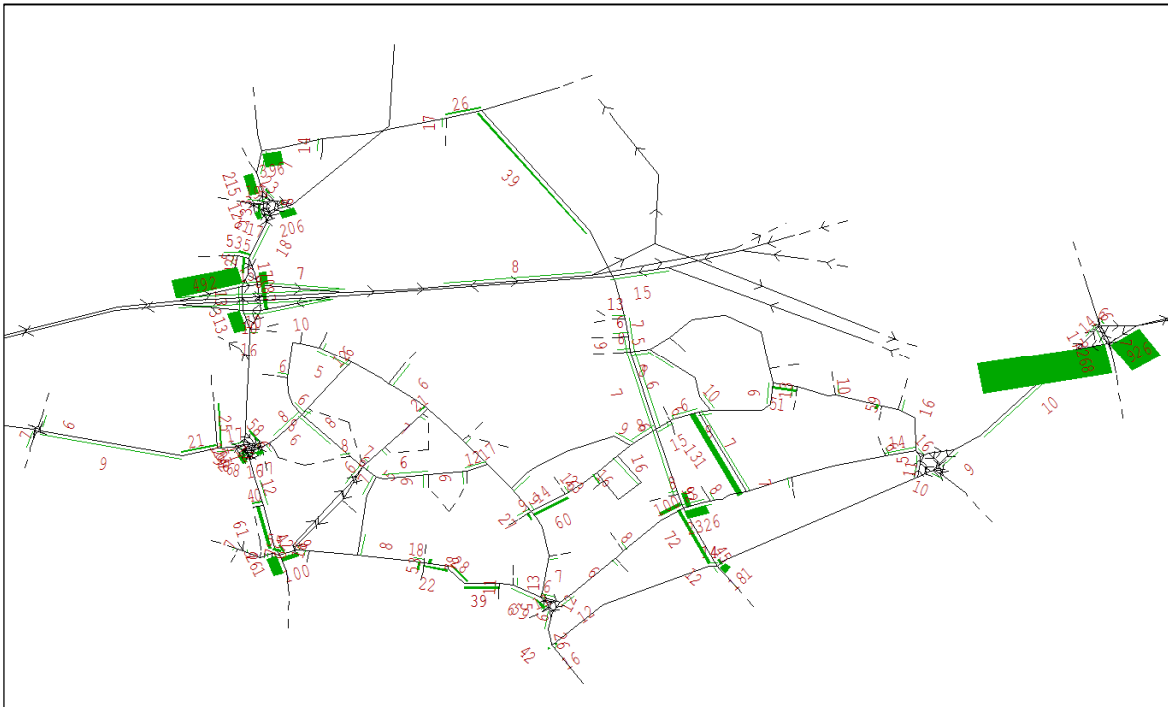


Figure 6.7: 2030 PM Do-Something Total Delay

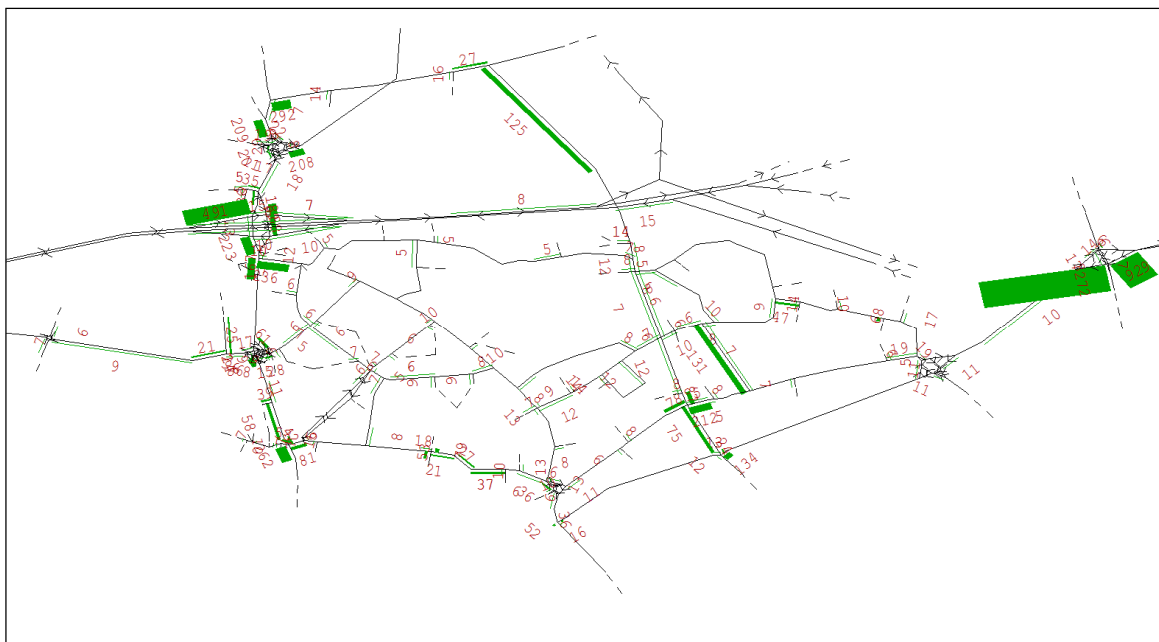


Figure 6.8: 2030 PM Do-Something Through Route Total Delay

In the PM Peak, the Through Route from the Peel Hall development is forecast to experience 236 seconds of Total Delay for traffic attempting to join the A49 at the proposed signalised junction. At the same junction the A49 northbound approach is forecast to experience 167 seconds of Total Delay.

Southbound movements from Junction 9 to the proposed signalised junction, (which provides the connection to the Through Route) are forecast to experience an increased Total Delay on the A49 of 12 seconds.

The A49 northbound approach to Junction 9 of the M62 is forecast to experience a 90 second decrease in Total Delay. Whilst some of this reduction is as a result of providing the new signalised junction a short distance to the south of the approach, it is also as a result of traffic transferring to the Through Route. This is evidence for trips heading to Myddleton Lane and Southworth Lane as they now use the Through Route and transfer to Delph Lane. As a result the Delph Lane northbound approach to its junction with the aforementioned roads is forecast to experience an increase in Total Delay of 86 seconds.

The Through Route option is forecast to result in a decrease in delay from Sandy Lane West to Cromwell Avenue of 49 seconds. The other arms at this junction remain consistent with the 2030 Do-Something no Through Route Option.

Delay at the A49 / A50 signalised junction decreases by 19 seconds on the A50 westbound approach to the signalised junction, however remains consistent on all other approach arms of the junction.

6.4 Total Delay Comparison for All Scenarios

Table 6.1 overleaf presents the AM total delay for all scenarios in PCU hours. The 2025 Do Something scenario, whereby the Peel Hall development is partially built is forecasted to experience an increase in total delay of 163 PCU hours compared to the 2025 Do Minimum. The 2030 AM Do Something scenario, whereby the Peel Hall Development is expected to be fully built increases total delay by 291 PCU hours compared to the 2030 Do Minimum. The Through Route option in the 2030 AM period is forecasted to experience a further increase of 67 PCU hours taking total delay on the network to 358 PCU hours.

AM TOTAL DELAY			
PCU Hours	Do Minimum 2025	Do-Something 2025	Difference to Do-Min
	1,331	1,494	163
	Do-Minimum 2030	Do-Something 2030	Difference to Do-Min
	1,623	1,914	291
		Through Route	Difference to Do-Min
		1,981	358
			Difference to Do-Something No Through Route
			67

Table 6.1: AM Total Delay Comparison for all Scenarios

Table 6.2 below presents PM total delay for all scenarios in PCU hours. The 2025 Do Something scenario, whereby the Peel Hall development is partially built is forecasted to experience an increase in total delay of 426 PCU hours compared to the 2025 Do Minimum. The 2030 AM Do Something scenario, whereby the Peel Hall Development is expected to be fully built increases total delay by 636 PCU hours compared to the 2030 Do Minimum. The Through Route option in the 2030 AM period is forecasted to experience a decrease of 64 PCU hours taking total delay on the network to 572 PCU hours.

PM TOTAL DELAY			
PCU Hours	Do-Minimum 2025	Do-Something 2025	Difference to Do-Min
	2,152	2578	426
	Do-Minimum 2030	Do-Something 2030	Difference to Do-Min
	2,512	3,148	636
		Through Route	Difference to Do-Min
		3,084	572
			Difference to Do-Something No Through Route
			-64

Table 6.2: 2030 PM Total Delay Comparison for all Scenarios

7. Assessment of Impact on Queueing

7.1 Introduction

This section will provide a summary of the key changes in Average Queue lengths for each scenario. This section is supported by **Appendix G** which provides outputs of Average Queue lengths for each scenario modelling in SATURN.

7.2 2025 Do-Minimum and 2025 Do-Something Part Build Out Queue Length Comparison

7.2.1 AM

The most significant differences in average queues between the 2025 Do-Minimum AM Peak and 2025 Do-Something Part Build Out AM Peak scenarios are highlighted below;

- A forecast increase in Average Queue length of 17 PCUs for the A49 southbound approach to the A49 / Delph Lane signalised junction;
- A forecast increase in Average Queue length of 3 PCUs on the A49 northbound at Junction 9 of the M62;
- Cromwell Avenue and A49 Northbound are forecast to experience an increase of 24 PCUs and 4 PCUs respectively at the A49 / Sandy Lane / Cromwell Avenue signalised junction; and
- The A49 southbound approach to the A49 / A50 traffic signalised junction is forecast to experience an increase in Average Queue of 7 PCUs.

7.2.2 PM

The most significant differences in average queues between the 2025 Do-Minimum PM Peak and 2025 Do-Something Part Build Out PM Peak scenarios are highlighted below;

- The A49 northbound approach to Junction 9 of the M62 Stump Cross roundabout is forecast to experience an increase in Average Queue of 34 PCUs;
- The eastbound off-slip at Junction 9 of the M62 junction is forecast to experience an increase in Average Queue of 11 PCUs;
- The A49 northbound at the signalised junction of the A49 / A50 is forecast to experience an increase in Average Queue of 14 PCUs; and
- The A574 Birchwood Way is forecast to experience an increase in Average Queue of 42 PCUs in a westbound direction towards the Oakwood Gate junction, whilst northbound traffic joining the same junction from Oakwood Gate is forecast to experience an increase Average Queue of 23 PCUs.

7.3 2030 Do-Minimum and 2030 Do-Something Full Build Out Queue Length Comparison

7.3.1 AM

The most significant differences in Average Queues between the 2030 Do-Minimum AM Peak and 2030 Do-Something full build out AM Peak scenarios are highlighted below;

- The A49 Newton Road southbound approach at the A49 / Delph Lane signalised junction is forecasted to experience an increase in Average Queue length of 31 PCUs;
- A decrease in Average Queue length of 5 PCUs is forecast on the A49 southbound at the junction with Sandy Lane west;

- The A49 southbound at the signalised junction with the A50 is forecast to experience an increase in Average Queue length of 10 PCUs;
- The Cromwell Avenue approach to its junction with the A49 is forecast to experience an increase in Average Queue length of 26PCUs. The remainder of the A49 remains relatively consistent with the Do-Minimum scenario; and
- The A574 Birchwood Way northbound approach to the Oakwood Gate junction is forecast to experience a minor decrease in Average Queue length of 1 PCU. There are no further changes in average queues forecasted for the Oakwood Gate junction.

7.3.2 PM

The most significant differences in Average Queues between the 2030 Do-Minimum PM Peak and 2030 Do-Something full build out PM Peak scenarios are highlighted below;

- The A49 northbound approach to Junction 9 of the M62 is forecast to experience an increase in Average Queue length of 22 PCUs;
- The eastbound off-slip approach to Junction 9 of the M62 is forecast to experience an increase in Average Queue of 19 PCUs;
- The A49 northbound approach to the A49 / A50 signalised junction is forecasted to experience an increase in average queues of 10 PCUs, the remainder of the A49 is not forecasted to experience increases in the Do Something scenario; and
- The A574 Birchwood way northbound approach to the Oakwood Gate junction is forecast to experience an increase in queue length of 59 PCUs. The A574 Birchwood Way westbound approach to Oakwood Gate junction is forecast to experience an increase in queue length of 39 PCUs compared to the Do-Minimum scenario.

7.4 2030 Through Route Option Queue Length Comparison

7.4.1 AM

In the following section, the proposed Through Route option is compared against the 2030 Do Something scenario.

The introduction of the Through Route scenario is forecasted to create additional queueing at the proposed signalised junction on the A49. The proposed junction is forecast to experience an Average Queue of 5 PCUs on the A49 northbound approach and 15 PCUs on the A49 southbound approach, in addition to an Average Queue of 2 PCUS from the proposed through route.

The Through Route is forecast to result in the reduction of Average Queues on the Cromwell Avenue approach to the A49 / Sandy Lane West signalised junction, a reduction from 60 PCUs in the 2030 Do-Something scenario to 32 PCUs with the Through Route. Queues on the remaining approaches to the junction are forecast to remain of a similar magnitude to the Do-Minimum option.

Queues northbound towards the Oakwood Gate junction on the Oakwood Gate approach are forecast to decrease by 9 PCUs compared to the Do-Minimum scenario.

7.4.2 PM

The introduction of the Through Route and associated signalised junction on the A49, to serve the Peel Hall development, is forecast to result in an Average Queue of 71 PCUs on the A49 northbound approach and 4 PCUs on the A49 southbound approach. The Through Route approach is forecast to experience an Average Queue of 13 PCUs in the PM peak period.

The Through Route is not forecasted to increase average queues on Mill Lane / Blackbrook Avenue.

The A547 Birchwood Way is forecast to operate in the Through Route scenario with the same queues as forecast in the 2030 Do-Something scenario.

8. Assessment of Impact on Volume over Capacity (%)

8.1 Introduction

This section will provide a summary of the key changes in Volume over Capacity (VoC) for each scenario. This section is supported by **Appendix H** which provides VoC outputs for each scenario modelled in SATURN.

8.2 2025 Do-Minimum and 2025 Do-Something Part Build Out

8.2.1 AM

The most noticeable increases in VoC in the 2025 AM Do-Something Scenario are forecast on the minor road network in proximity to the Peel Hall development. The highest increase in the vicinity of the development is 14% up from 62% on Cleveland Road in an eastbound direction at its approach to the junction with Poplars Avenue.

Poplars Lane is forecast to experience an average increase in VoC of 10%, however the increase is from a low VoC, 20%, in the Do-Minimum scenario.

Sandy Lane West is forecast to experience an increase in VoC of 12% eastbound towards the proposed Peel Hall development, an increase from 58% to 70%.

The A49 in both the north and southbound directions is forecast to experience an average increase of 1% in VoC. The majority of links along the A49 operate in the Do-Minimum scenario with a VoC of between 40 and 50%. However, the A49 southbound approach to the A50 Long Lane and Delph Lane signalised junctions are forecast to operate with a VoC% of 100 and 103%, therefore, whilst the increases in VoC remain low, less than 1%, they may have a more profound impact.

8.2.2 PM

Similarly to the AM scenario, the A49 is forecast to experience minor increases in VoC, the largest increase of 5% is forecast on the A49 northbound approach to Junction 9 of the M62, an increase up from 101% to 105%.

The Sandy Lane West approach to its signalised junction with the A49 is forecast to experience an increase in VoC of 17%, an increase from 80% to 97%, highlighting that the junction is approaching capacity.

The minor road network in the vicinity of the proposed Peel Hall development is also forecast to experience an increase in VoC. Sandy Lane West is forecast to experience an increase of between 8% and 9% in a southbound direction, an increase from 33% to 41% and 35% to 44%. The Cleveland Road approach is forecast to experience an increase of 16% from 48% to 64% at the roundabout junction with Sandy Lane, Sandy Lane West and Cotswold Road.

Poplars Avenue is forecast to experience an increase of 18% in VoC in proximity to the proposed central Peel Hall access, whilst the remainder of Poplars Avenue experiences a maximum increase of 13% from 30% to 43%.

8.3 2030 Do-Minimum and 2030 Do-Something Full Build Out

8.3.1 AM

The A49 in the AM 2030 Do-Something scenario is forecast to experience minor increases of between 1 and 2% to 43% northbound and 55% southbound.

The signalised roundabout with Sandy Lane West is forecast an increase in VoC of 9% to 68%, and 11% to 53% from Sandy Lane West onto the A49 roundabout.

As a result of the additional traffic the minor road network surrounding the proposed Peel Hall development is also forecast to experience an increase in VoC. An increase of 11% in VoC is forecast on Sandy Lane West, increasing it to 75%. Cleveland Road at its junction with Poplars Avenue is forecast to experience a VoC of 75%, an increase of 16%. Poplars Avenue is forecast to experience an increase in VoC of 9% in proximity to the proposed Peel Hall central access with the remainder of Poplars Avenue forecast to experience a maximum increase of 14% in VoC. However, the average VoC is approximately 25% along Poplars Avenue in the 2030 Do-Minimum scenario, so the increase is not as significant.

8.3.2 PM

In the PM 2030 Do-Something scenario the A49 northbound approach to Junction 9 of the M62 is forecast to experience a maximum increase in VoC of 3%, to 107%. The A49 northbound is forecast to experience an increase of 2% to 57% northbound and 1% to 41% southbound.

Traffic routing towards Sandy Lane West through the signalised junction is forecast to experience an increase in VoC of approximately 5% to 50%, whilst traffic routing from Sandy Lane West to the A49 is forecast to experience an increase in VoC of 13% to 99% when approach the signalised junction.

The minor road network surrounding the proposed Peel Hall development is forecast to experience an increase in VoC. A maximum increase in VoC of 8% is forecast to be experienced on Sandy Lane West northbound, an increase to 56%. Cleveland Road is forecast to experience an increase in VoC of 15% to 63% at its junction with Poplars Avenue.

Poplars Avenue is forecast to experience an increase in VoC of 15% in close proximity to the proposed Peel Hall central access point, whilst the remainder of Poplars Avenue is forecast to experience a maximum increase in VoC of 13% to a maximum of 42% VoC.

Howson Road northbound is forecasted to experience an increase of 35% to 59% VoC at its junction with Poplars Avenue.

Blackbrook Avenue is forecast to experience an increase in VoC of 25% northbound to a VoC of 65% and 16% southbound to 51% VoC at its junction with the proposed Peel Hall access.

8.4 2030 Through Route Option

8.4.1 AM

The A49 northbound approach to the proposed signalised junction is forecast to experience a VoC of 71%. Southbound the junction is forecast to experience a VoC of 101%, identifying the junction operates over capacity in the 2030 PM peak. The remainder of the A49 mainline remains consistent with the A49 Do-Something scenario.

The forecast modelling, encompassing provision of the Through Route, identifies a positive impact on Sandy Lane West reducing the forecast VoC by 6% in an eastbound direction and 13% in a westbound direction compared to the 2030 Do-Something scenario. Further reductions in VoC compared to the 2030 Do-Something scenario are forecast on the minor road network in proximity to the proposed Peel Hall development. Cleveland Road at its junction with Poplars Avenue is forecast to experience a 20% reduction in in VoC compared to the 2030 Do-Something scenario.

Poplars Avenue is forecast to experience a decrease in VoC compared to the 2030 Do-Something scenario, a reduction averaging 10%. Howson Road at its junction with Poplars Avenue is forecast to experience a reduction in VoC of 7% compared to the 2030 DO-Something Scenario. Blackbrook Avenue and the junction with the proposed Through Route is forecast to experience an increase in VoC of 3%.

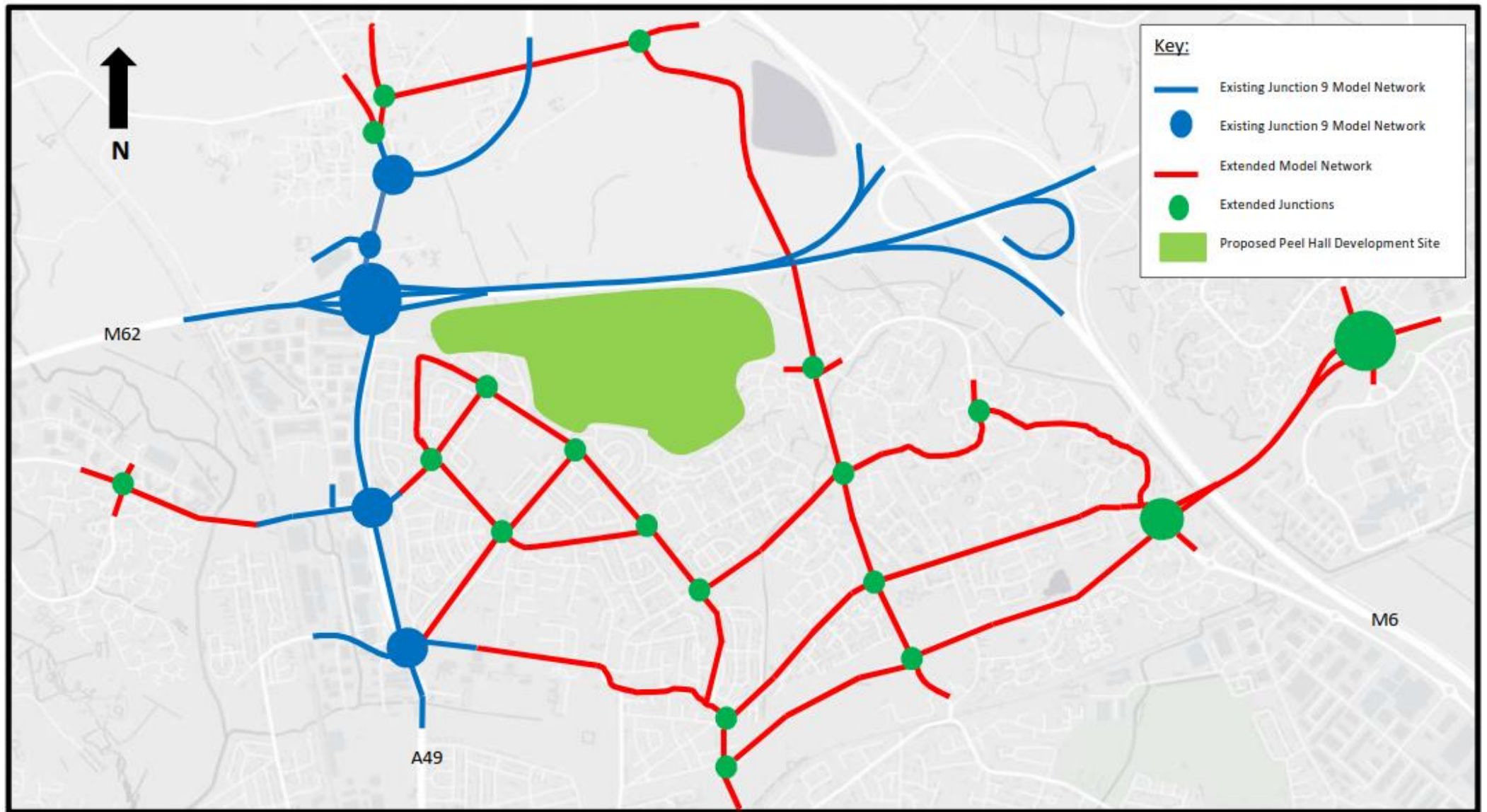
8.4.2 PM

The A49 approaches to the proposed signalised junction for the Through Route is forecast to experience a VoC of 97% northbound and 76% southbound. The remainder of the A49 remains relatively consistent with the 2030 Do-Something scenario.

As per in the AM, the Through Route is forecast to result in the reduction in the volume of traffic traversing Sandy Lane West in both directions. The reduction in traffic results in the forecast VoC values reducing by 10% in an eastbound direction and 24% in a westbound direction for Sandy Lane West compared to the 2030 Do-Something scenario.

Further reductions in VoC are forecast on the minor road network in proximity to the proposed Peel Hall development compared to the 2030 Do-Something scenario. Sandy Lane West is forecast to experience an average decrease of 10% in both directions. Cleveland Road is forecasted to experience a reduction of 24% at the junction with Poplars Avenue, whilst Howson Road at its junction with Poplars Avenue is forecast to experience a reduction of 41% compared to the 2030 Do-Something scenario.

Appendix A Study Area



Appendix A, Figure 2.1 – 2025 AM Do Minimum Do Something Delay Comparison

Appendix B Technical Note HTp/1107/TN19

Highgate*Transportation*

Land at Peel Hall, Warrington

Technical Note

Peel Hall Vehicular Trips

(HTp/1107/TN/19)

May 2017

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Figures

Figure 1.1 Peel Hall Network 2025 Pre-Spine Road Link to Local Centre

Appendices

Appendix 1 Access Strategy Plan

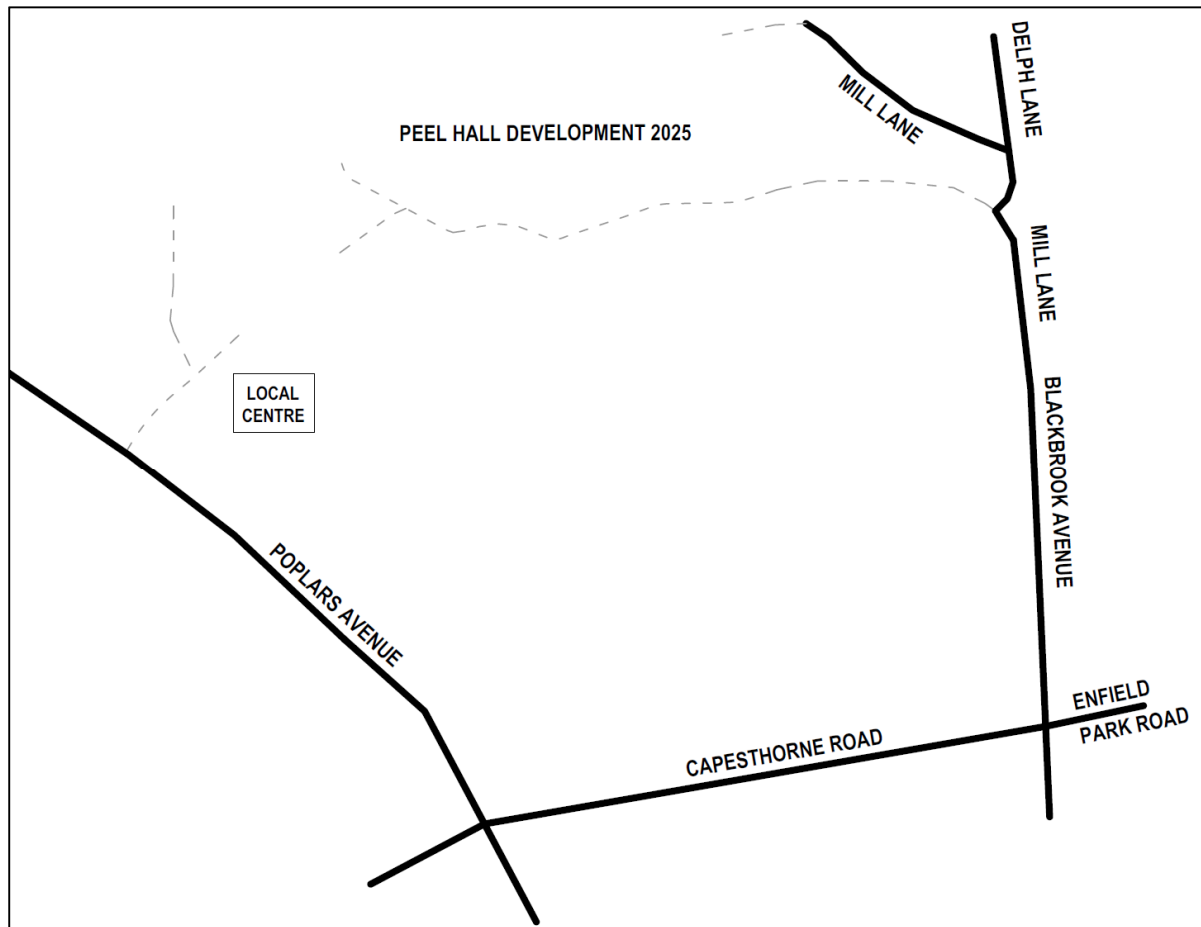
Appendix 2 Peel Hall Indicative Highways Build Out Table and Plan

Appendix 3 Proposed Local Centre Car Park

1.0 Introduction

- 1.1 Following the refusal of application ref: 2016/28492, the opportunity has been taken to review the years of assessment, build out programme and application of trip rate discounts.
- 1.2 This Technical Note has been prepared by Highgate Transportation Limited to confirm the trip rates used for each land use and to also set out the trip discounting assumptions. This information is then used to summarise the level of vehicular trips at each access point of the proposed Peel Hall development for an intermediate build out year of 2025 and a final year of 2030, as agreed with officers at Warrington Borough Council at a meeting on 22nd March 2017.
- 1.3 The assessment for a future year of 2025 will be for 600 residential dwellings, the care home, employment land and local centre as well as the relocation of the sports pitches. However, there will be no connecting through-route for dwellings accessed from the Mill Lane/Blackbrook Avenue access point (48% of the 600 dwellings), which is scheduled by the end of that year.
- 1.4 The opening of a link to the local centre from both sides will provide internal vehicular access to and from the main areas of the site, negating the need for residents to drive around the outside of the site on the local highway network. This link is not anticipated to be a through-route across the site, as the local centre car park is intended to be split with a physical barrier to car traffic provided; this barrier could however also provide the required infrastructure for an initial bus route to be brought through the site in 2025.

Figure 1.1 - Peel Hall network 2025 pre-spine road link to local centre



- 1.5 The assessment for a future year of 2030 will be for the full development. The local centre traffic will be discounted as a result of the internal accessibility across the site.
- 1.6 The application is for an outline scheme and the Peel Hall development can be summarised as:
- i. Up to 1,200 residential dwellings. This will include a mix of market and affordable homes as well as houses and apartments. The houses are expected to be a mix of two, three and four bedroomed houses and one and two bedroomed apartments. It is anticipated that up to 60 of these dwellings will be provided as a retirement home development.
 - ii. A 100 bedroom care home.
 - iii. An area of employment land comprising up to 7,500sqm Gross Floor Area (GFA) of light industrial units.

- iv. A local centre comprising a food store of up to 2,000sqm GFA plus up to a further 600sqm GFA of local centre type facilities (such as A1-A5 and D1) plus a family pub and restaurant of up to 800sqm GFA. The local centre car park will be located so that it can also be conveniently used as a school drop off facility.
- v. Up to a two form entry primary school with a maximum of up to 420 pupils.
- vi. Relocating and upgrading of existing sports pitches to provide like-for-like replacement in terms of number of pitches and the provision of ancillary facilities, which are expected to include changing facilities for up to four teams at any one time and a function room that can be used for local community uses such as a mother and toddler group.

1.7 As a guide, the contents of each section of this report are as follows:

i. **Section 2.0 – Access Strategy**

This section provides an overview of the Peel Hall access strategy, including the locations of the accesses, quantum of development from each access and the proposed local centre car park arrangement that provides an overarching through-route for all traffic being created, whilst also negating the need for vehicle trips from the residential dwellings accessed from the Mill Lane/Blackbrook Avenue access junction to leave the site and travel on the local highway network.

ii. **Section 3.0 – Trip Rates Summary**

This section sets out the trip rates that have been used to assess the level of traffic likely to be generated by the different land uses proposed on the Peel Hall site.

iii. **Section 4.0 – Vehicular Trips 2025**

This section provides a summary of the number of vehicular trips from each access point in the future year of 2025, based on the trip rates set out in **Section 3.0**, with justification of the appropriate level of trip discounting to be used in the assessment.

iv. **Section 5.0 – Vehicular Trips 2030**

This section provides a summary of the number of vehicular trips from each access point in the future year of 2030, based on the trip rates set out in **Section 3.0**, with justification of the appropriate level of trip discounting to be used in this assessment for the anticipated year of completion.

1.8 The information in this Technical Note is intended to inform the SATURN modelling and has been provided following a review of the Warrington Borough Council consultation response to application 2016/28492, various meetings held with the Council between January 2016 and March 2017 and correspondence since January 2016 regarding the highways and transportation elements of the scheme.

2.0 Access Strategy

- 2.1 The access strategy currently proposed has not changed from that previously set out, in that whilst the whole site will be fully permeable for pedestrians and cyclists the parcels of land for residential development correspond directly to a single point of vehicular access only. This is set out in **Table 2.1** below and on the Access Strategy Plan contained in **Appendix 1**.

Table 2.1 – Quantum of development served off each access

Access	Units/sqm
Mill Lane	150 Dwellings
Mill Lane/ Blackbrook Avenue	700 Dwellings
	Primary School (up to 420 pupils)
Poplars Ave. (Central)	330 Dwellings
	Food Store (2,000sqm)
	Local Centre (600sqm)
	Family Pub/ Restaurant (1,600sqm)
	100-Bed Care Home
Poplars Ave. (West)	Employment (7,500sqm)
Birch Avenue	20 Dwellings
Grasmere Avenue	Sports Pitches and Community Facilities

- 2.2 For assessment purposes it is assumed that first occupation will be in 2021, with 120 dwellings being occupied per year through to 2030. This has been agreed with officers at Warrington Borough Council.
- 2.3 The indicative highways build out programme is set out in the table contained at **Appendix 2** and on the accompanying plan, and this has informed the 2025 assessment in terms of the loading of development traffic (and for which land uses) at each respective access point from the existing local highway network (see **Section 4.0**).
- 2.4 It is proposed that the local centre car park will be split into two sections with a physical barrier as set out in **paragraph 1.3**. This is intended to prevent through-traffic between both sections of the site, whilst facilitating access from both Poplars Avenue in the south and Blackbrook Avenue/Mill Lane in the east. This arrangement results in 86% of the 1,200 dwellings having vehicular access to the local centre and as such will be contained within the Peel Hall site i.e. not travelling onto the local highway network. An indicative layout of the local centre car park is shown on the plan contained at **Appendix 3** of this report.
- 2.5 Warrington Borough Council have requested that a sensitivity test is also carried out to assess the impact of traffic across the network if a through-route was created across the Peel Hall site to carry traffic between the A49 in the west and Blackbrook Avenue in the east; i.e. the creation of a distributor road through the peel Hall site. This is set out further in Technical Note TN/21 to inform the SATURN modelling sensitivity test for a future year assessment of 2030.

- 2.6 Technical note TN/20 is provided to set out the growth rates for background traffic growth in both future year models of 2025 and 2030.

3.0 Trip Rates Summary

- 3.1 The trips rates used for assessing the impact of the Peel Hall development have previously been set out in Technical Notes TN/02/A (March 2016) and TN/12 (April 2016). These trip rates were further substantiated in TN/13 (July 2016).
- 3.2 Data for the AM and PM peak hours of 0800-0900 and 1700-1800 hours respectively is required for the SATURN modelling work, and this has been taken from the TRICS database output files previously used.
- 3.3 A summary of the peak hour trip rate data to be used and the resultant trips for each land use are set out below (taken from TN/02/A) as follows:

Table 3.1 – Residential Vehicular Trip Rate and Generation Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
85 th Percentile Trip Rates (per unit)	0.225	0.523	0.495	0.307
Residential Trips (1,200 units)	270	628	594	368

Table 3.2 – Care Home Vehicular Trip Rates and Attraction Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Trip Rates (per bedroom)	0.068	0.068	0.083	0.113
Retirement Flat Trips (100-beds)	7	7	8	8

Table 3.3 – Employment Vehicular Trip Rates and Attraction Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Trip Rates (per 100sqm GFA)	0.919	0.514	0.260	0.621
Employment Trips (7,500sqm GFA)	69	39	20	47
HGV %Proportion	7%	10%	10%	4%

Table 3.4 – Food Store Vehicular Trip Rate and Attraction Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Trip Rates (per 100sqm GFA)	4.615	3.030	9.056	9.550
Food Store Trips (2,000sqm GFA)	92	61	181	191

Table 3.5 – Local Centre Vehicular Trip Rate and Attraction Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Trip Rates (per 100sqm GFA)	5.025	4.780	6.039	6.495
Local Centre Trips (600sqm GFA)	30	29	36	39

Table 3.6 – Primary School Vehicular Trip Rate and Attraction Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Trip Rates (per pupil)	0.269	0.189	0.045	0.063
Primary School Trips (all 420 pupils)	113	79	19	27

- 3.4 The proposed development at Peel Hall will include the existing open space and local authority community buildings and sports area on the land off Windermere Avenue and Grasmere Avenue to the southeast of the site. This will be linked to the site and new sports pitches will be provided to replace those currently located on the HCA land to the east of the site, off Mill Lane.
- 3.5 The facilities will likely include full-sized grass pitches, a multi-use games area, junior grass pitches and changing facilities for up to four teams. The expectation is that these proposals will also include a clubhouse/function room for community use.
- 3.6 The sports pitches will predominantly be used at the weekends and it was agreed at the 2013 Public Inquiry (Appeal ref: APP/M0655/A/13/2192076) that this element of the development proposals would not need to be included within the weekday modelling. Furthermore there will be an offset in trip generation from the current on-site uses at the existing location and from the sports pitches on the HCA land, which are to be relocated.

- 3.4 It is likely that the proposed clubhouse facilities will be used by the local community, for example, by a mother and toddler group, and also that the sports pitches may be used during the evening after 1800 hours. Therefore it was agreed at the 2013 Inquiry that the clubhouse facilities for local community use may attract up to 15 car movements over two-hour time slots during the day between the hours of 0900 and 1800. As this cannot be accurately modelled within our one hour peak AM and PM time periods, the 15 movements have been concentrated into each peak hour. This is set out on **Table 3.7** below.

Table 3.7 – Sports Pitches and Ancillary Facilities Vehicular Trip Rate and Attraction Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Community Use Trips	10	5	7	8

- 3.7 The size of the family pub was changed in April 2016 as the scheme evolved, reducing to 800sqm GFA. The change in floor area was set out in Technical Note TN/12 and the resulting trips are represented in **Table 3.8** below.

Table 3.8 – Family Pub/Restaurant Vehicular Trip Rate and Attraction Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Trip Rates (per 100sqm GFA)	-	-	2.847	1.845
Family Pub/Restaurant Trips (800sqm GFA)	-	-	23	15

- 3.8 In summary, the vehicle trips associated with each land use are tabulated below for ease of reference in **Table 3.9**. Please note that no discount has been applied to these figures.

Table 3.9 – Peel Hall Vehicular Trip Generation Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Residential Trips	270	628	594	368
Care Home Trips	7	7	8	8
Employment Trips*	69	39	20	47
Food Store Trips	92	61	181	191
Local Centre Shop Trips	30	29	36	39
Primary School Trips	113	79	19	27
Community Uses	10	5	7	8
Family Pub/Restaurant Trips	-	-	23	15
Total Trips	591	848	888	703

** See Table 3.3 for HGV proportion of peak hour traffic*

4.0 Vehicular Trips 2025

- 4.1 The table contained in **Appendix 2** sets out the anticipated number of dwellings coming forward in each year from each part of the development, and hence off each access point. The table also demonstrates when the other land uses such as the local centre, school and employment land will come forward for development. It can be seen from this table that:
- i. The sports pitches will be relocated to the land off Grasmere Avenue in year 1 (i.e. 2021).
 - ii. The local centre and care home will come forward in year 2 (i.e. 2022).
 - iii. Employment land may come forward in year 3 (i.e. 2023).
 - iv. There will be circa 600 dwellings occupied by 2025, as follows:
 - Blackbrook Avenue/Mill Lane – 285 dwellings (main site access).
 - Poplars Avenue – 145 dwellings (local centre access).
 - Mill Lane – 150 dwellings.
 - Birch Avenue – 20 dwellings.
- 4.2 It has been agreed with Warrington Borough Council that an intermediate year of 2025 will be assessed in terms of the traffic impact on the local highway network before the internal link to the local centre is created. As such, all dwellings taking access from the Mill Lane/Blackbrook Avenue access will have to drive onto the surrounding local highway network in order to access the local centre by car. It is agreed that this will present a worst case intermediate build out scenario.
- 4.3 Therefore, based on the number of dwellings and other land uses coming forward by 2025 as set out above in **paragraph 4.1**, the number of vehicle trips at each access point are provided in **Table 4.1** using the trip rates set out in **Section 3.0**.

Table 4.1 – Summary of 2025 Peak Hour Vehicle Trip Numbers at Each Access Location

Access	Quantum of Development	AM Arrival	AM Departure	PM Arrival	PM Departure
Poplars Avenue (Central)	145 dwellings	33	76	72	45
	care home	7	7	8	8
	food store	92	61	181	191
	local shops	30	29	36	39
	family pub	0	0	23	15
	<i>Total</i>	<i>162</i>	<i>173</i>	<i>320</i>	<i>298</i>
Poplars Avenue (West)	employment land	69	39	20	47
Mill Lane	150 dwellings	34	79	74	46
Mill Lane/Blackbrook Avenue	285 dwellings	64	149	141	88
Birch Avenue	20 dwellings	5	11	10	6
Grasmere Avenue	community uses	10	5	7	8
Total		344	456	572	493

- 4.4 It can be seen from the above that when considering the total number of vehicle trips at each access location there may be up to around 800 vehicle movements arising from the Peel Hall development profile in AM peak hour and 1,065 in the PM peak hour.
- 4.5 No trip discounting for any of the land uses has been carried out for this intermediate build out assessment, and no pass-by trips have been taken into account for the food store and other local centre uses. Furthermore, no discounting for internal trips to the local centre facilities have been made to account for those dwellings accessed from Poplars Avenue (145 dwellings) or linked trips between the non-residential land uses. It is therefore considered that this is a robust assessment.

5.0 Vehicular Trips 2030

- 5.1 It is agreed acceptable to model the impact of the Peel Hall development on the local highway network as fully built out and occupied by 2030.
- 5.2 Therefore, the number of vehicle trips at each access point has been provided below in **Table 5.1** using the trip rates set out in **Section 3.0** for the whole Peel Hall development. No discounts have been applied to these figures.

Table 5.1 – Summary of 2030 Peak Hour Vehicle Trip Numbers at Each Access Location

Access	Quantum of Development	AM Arrival	AM Departure	PM Arrival	PM Departure
Poplars Avenue (Central)	330 dwellings	74	173	163	101
	care home	7	7	8	8
	food store	92	61	181	191
	local shops	30	29	36	39
	family pub	0	0	23	15
	<i>Total</i>	<i>203</i>	<i>270</i>	<i>411</i>	<i>354</i>
Poplars Avenue (West)	employment land	69	39	20	47
Mill Lane	150 dwellings	34	79	74	46
Mill Lane/Blackbrook Avenue	700 dwellings	158	366	347	215
	primary school	113	79	19	27
Birch Avenue	20 dwellings	5	11	10	6
Grasmere Avenue	community uses	10	5	7	8
Total		592	849	888	703

- 5.3 It can be seen from the above that when considering the total number of vehicle trips at each access location there may be up to around 1,441 vehicle movements arising from the Peel Hall development profile in AM peak hour and 1,591 in the PM peak hour, with no adjustments made for internal trips or discounting.

- 5.4 However, it is appropriate to apply a trip discount to these figures, as the above represents double counting of vehicular trips when considering, for example, that the vehicular trip associated with a resident travelling to the local centre will be represented as both a trip departing from the dwellings and a trip arriving at the local centre.
- 5.5 It is proposed that no discounting of trips will occur with the residential, care home, community uses, and family pub/restaurant or employment trips.
- 5.6 The food store trips are to be discounted by 100% in the SATURN modelling, with 30% of these trips being redistributed from existing traffic on the network passing by the Poplars Avenue access. These pass-by trips will have no material impact on the operation of the wider highway network.
- 5.7 Furthermore, it has previously been set out in TN/13 that the proposed primary school is not intended as a replacement and that primary school trip discounts should be based on internal trip containment; the number of pupils expected to be generated by the development based on the calculation factor supplied by Warrington Borough Council, and comparing this to the number of children expected in a school with up to two-form entry i.e. up to 30 children in each class (therefore 60 children per year group from reception to year 6 i.e. 420 children).
- 5.8 The information for primary school places issued by WBC was based on census data and the following calculation:

0.3 pupil places per dwelling x number of dwellings

0.3 x 1,200 = 360 (85% of 420 primary school places)

- 5.9 The calculation indicates that the development will generate 360 primary school places and therefore it is considered appropriate to apply a 50% discount.
- 5.10 Therefore trip discounts can be summarised as follows for both the AM and PM peak hours:
- i. Residential 0%
 - ii. Care Home 0%
 - iii. Employment 0%
 - iv. Food Store 100% (70% discount and 30% pass-by)
 - v. Local Centre 100%
 - vi. Family Pub/Restaurant 0%
 - vii. Primary School 50%
 - viii. Community uses 0%
- 5.11 These discounts have been applied to the figures contained in **Table 5.1** and a revised summary of the proposed Peel Hall development trips is set out on **Table 5.2** below.

Table 5.2 – Summary of 2030 Peak Hour Vehicle Trip Numbers at Each Access Location (with discounts applied)

Access	Quantum of Development	AM Arrival	AM Departure	PM Arrival	PM Departure
Poplars Avenue (Central)	330 dwellings	74	173	163	101
	care home	7	7	8	8
	food store*	28	18	54	57
	local shops	0	0	0	0
	family pub	0	0	23	15
	<i>Total</i>	<i>109</i>	<i>198</i>	<i>248</i>	<i>181</i>
Poplars Avenue (West)	employment land	69	39	20	47
Mill Lane	150 dwellings	34	79	74	46
Mill Lane/Blackbrook Avenue	700 dwellings	158	366	347	215
	primary school	57	40	10	14
Birch Avenue	20 dwellings	5	11	10	6
Grasmere Avenue	community uses	10	5	7	8
Total		442	738	716	517

* pass-by trips only

5.12 It can be seen from the above that when considering the total number of vehicle trips at each access location there may be up to around 1,180 vehicle movements arising from the Peel Hall development profile in AM peak hour and 1,233 in the PM peak hour.

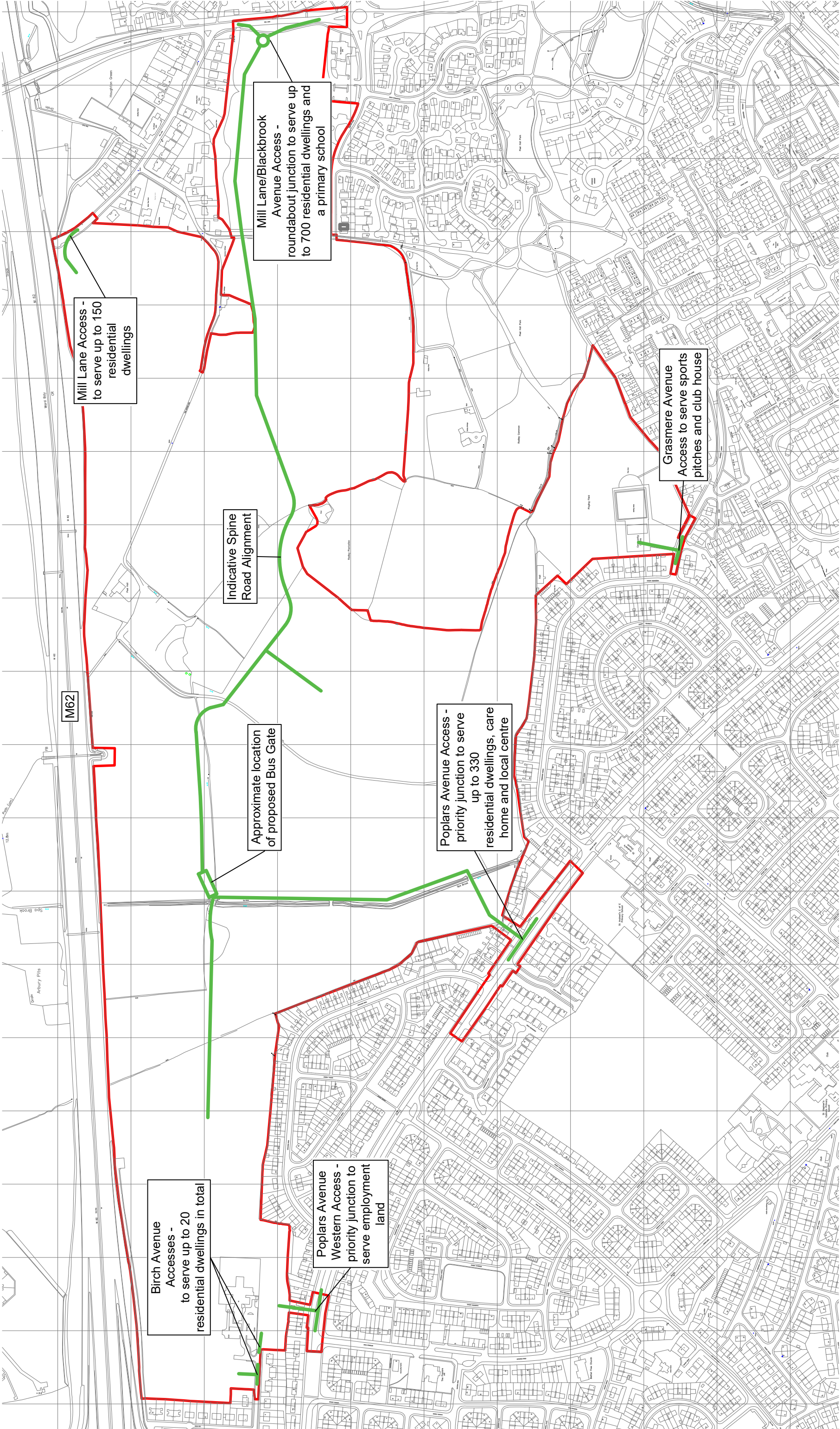
5.13 These figures from **Table 5.2** are to be used in the SATURN modelling.

6.0 Summary

- 6.1 Following the refusal of application ref: 2016/28492, the opportunity has been taken to review the years of assessment, build out programme and application of trip rate discounts.
- 6.2 This Technical Note has been prepared by Highgate Transportation to confirm the trip rates used for each land use and set out the trip discounting assumptions. This information has been used to summarise the level of vehicular trips at each access point of the proposed Peel Hall development for an intermediate build out year of 2025 and a final year of 2030 as agreed with officers at Warrington Borough Council at a meeting on 22nd March 2017.
- 6.3 The information in this Technical Note is intended to inform the SATURN modelling and has been provided following a review of the Warrington Borough Council consultation response to application 2016/28492, various meetings held with the Council between January 2016 and March 2017 and correspondence since January 2016 regarding the highways and transportation elements of the scheme.
- 6.4 The vehicular trips contained in **Table 4.1** and **Table 5.2** are to be used to inform the SATURN modelling for future years of 2025 and 2030 respectively.

Appendix 1

Access Strategy Plan



NOTES:
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E	Amendment to annotation	10/05/17
E	Amendment to annotations	10/05/16
D	Amendment to bus gate location	04/03/16
C	Alteration to dwelling numbers at access points	04/03/16
B	Alteration to dwelling numbers at access points	04/03/16
A	Reduction in number of dwellings shown off Birch Avenue	19/02/16
ISSUE	REASON FOR REVISION	DATE
DATE:	CHECKED:	
	DRAWN BY:	DT
	FB	
	12/01/15	

PROJECT:	PEEL HALL, WARRINGTON		
	SATNAM		
CLIENT:			

TITLE:			
PROPOSED ACCESS POINTS AND INDICATIVE SPINE ROAD			
PROJECT REFERENCE:	1107	DRAWING NUMBER:	19
		SCALE:	Not to scale

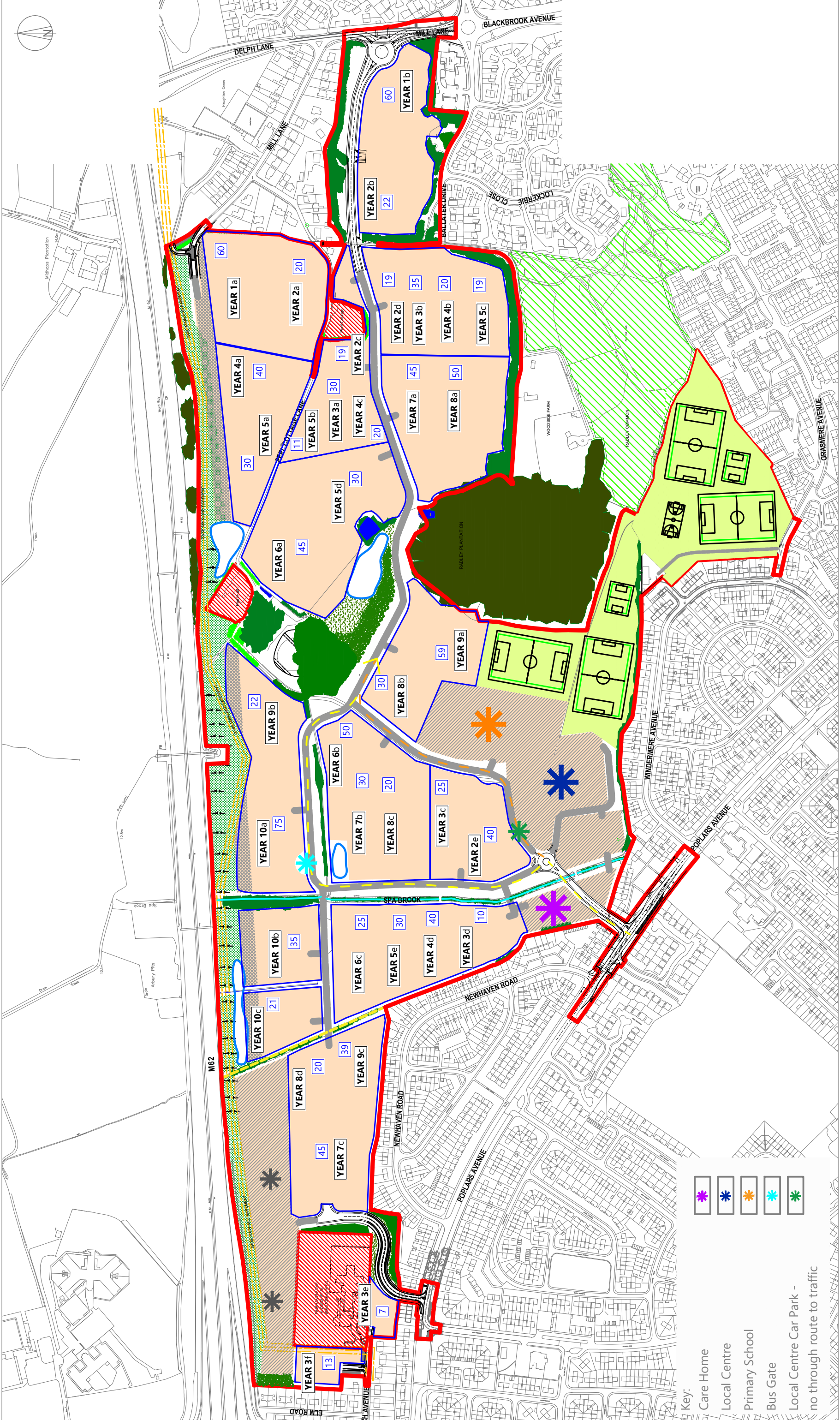
Appendix 2

Peel Hall Indicative Highways Build Out Table and Plan

Year End	Number of Residential Units off Each Access								Indicative Highways Build Out (number of properties sold at year end)	
	Distributor Road Blackbrook Ave		Distributor Road Poplars Ave		Mill Lane		Birch Ave			Cumulative Total
	New	Cum.	New	Cum.	New	Cum.	New	Cum.		
1	60	60	0	0	60	60	0	0	120	1a 60 1b 60
2										Relocated sports pitches
										2a 20
										2b 22
										2c 19
										2d 19
										2e 40
	60	120	40	40	20	80	0	0	240	Temporary emergency link to be via Radley Lane (north). Need first part of distributor road from east and turning area for bus service
3										Local Centre and Care Home off Poplars Ave
										3a 30
										3b 35
										3c 25
										3d 10
										3e 7
	65	185	35	75	0	80	20	20	360	3f 13
										Employment Land off Poplars Ave (west) with temporary emergency link through to Elm Walk

Year End	Number of Residential Units off Each Access							Indicative Highways Build Out (number of properties sold at year end)
	Distributor Road Blackbrook Ave		Distributor Road Poplars Ave		Mill Lane		Birch Ave	Cumulative Total
	New	Cum.	New	Cum.	New	Cum.		
4	40	225	40	115	40	120	0 20	480
5	60	285	30	145	30	150	0 20	600
6	95	380	25	170	0	150	0 20	720
7	75	455	45	215	0	150	0 20	840

Year End	Number of Residential Units off Each Access								Indicative Highways Build Out (number of properties sold at year end)	
	Distributor Road Blackbrook Ave		Distributor Road Poplars Ave		Mill Lane		Birch Ave			Cumulative Total
	New	Cum.	New	Cum.	New	Cum.	New	Cum.		
8	100	555	20	235	0	150	0	20	960	8a 50 8b 30 8c 20 8d 20 Primary School Completion of spine road for full bus service
9	70	625	50	285	0	150	0	20	1,080	9a 59 9b 22 9c 39
10	75	700	45	330	0	150	0	20	1,200	10a 64 10b 35 10c 21 Provision of final emergency access through to employment spine road



NOTES:
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KEY:
Indicative Year Numbering
Indicative Number of units Completed at Year End
Initial Bus Link
End Bus Link

Phasing subject to detailed phasing plan to be submitted at Reserved Matters stage			
ISSUE	REASON FOR REVISION	DRAWN BY:	CHECKED:
DATE:	11/05/17	FB	FB

PROJECT:	PEEL HALL, WARRINGTON
CLIENT:	SATNAM MILLENNIUM LTD

TITLE:	INDICATIVE HIGHWAYS BUILD OUT PLAN
PROJECT REFERENCE:	1107
DRAWING NUMBER:	27/G
SCALE:	NOT TO SCALE

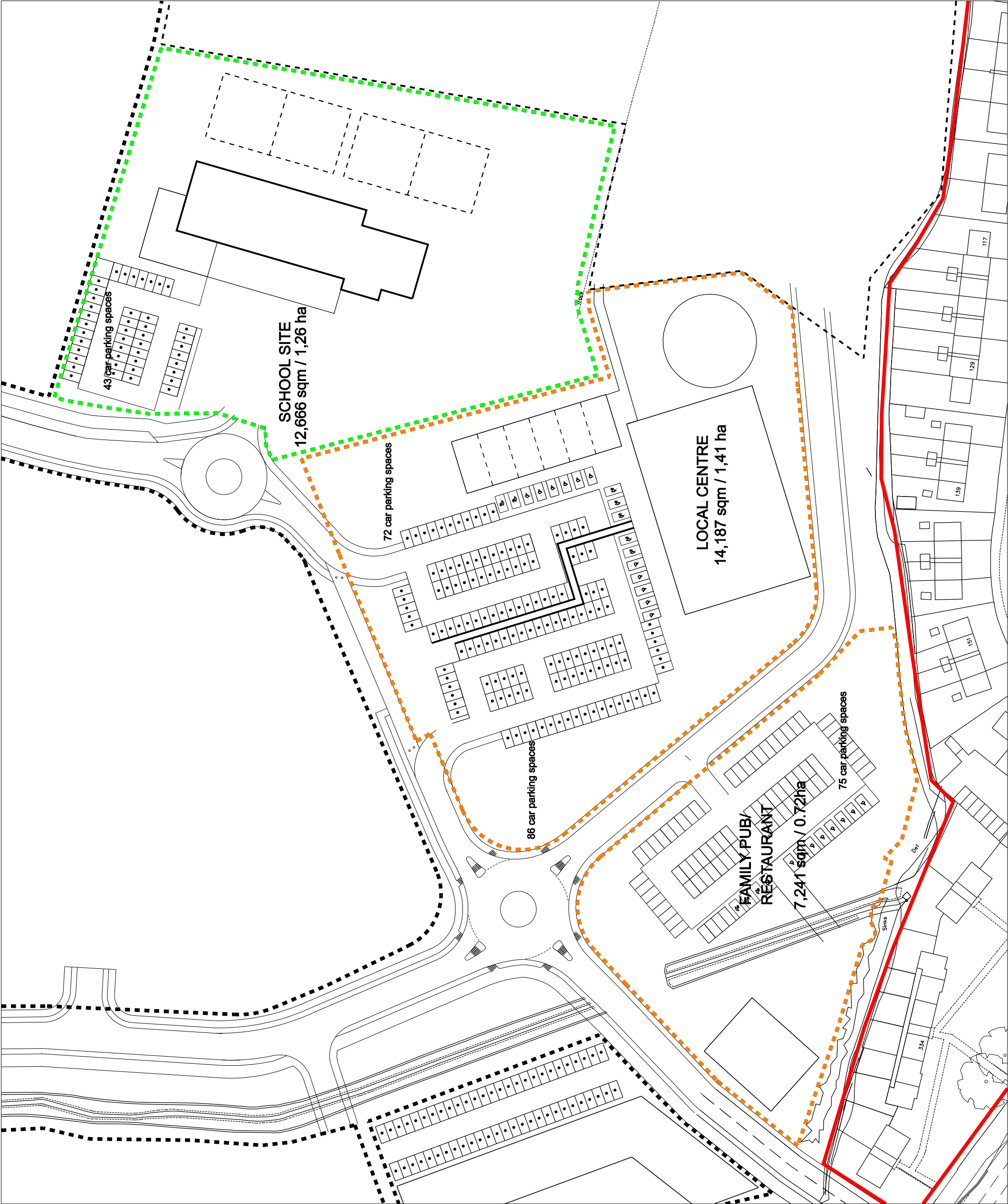
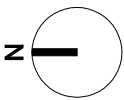
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07973 375 937 / 07595 892 217
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Appendix 3

Proposed Local Centre Car Park

Notes

Do not scale from this drawing.
All dimensions are to be checked prior to construction and any discrepancies are to be identified to the Architect.
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A 07.07.16 Issued for comments JHD

ISSUED FOR PLANNING

Revisions

Client
Satnam Millennium Ltd

Project
Peel Hall Masterplan

Title
Illustrative Local Centre, Family Pub
& School Layout

Scale Size Date Drawn Checked
1:1000 A3 July'16 JHD DB

3DReid
12 Caroline Street,
Birmingham,
B3 1TR
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Architecture Conservation
Interiors Masterplanning
Partnerships Sustainability

Drawing No. 140367-D-003
Rev. A

Appendix C Technical Note HTp/1107/TN21

Highgate*Transportation*

Land at Peel Hall, Warrington

Technical Note – Through Route Scenario

(HTp/1107/TN/21)

July 2017

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3.0 Traffic Flows	6

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Figure 1.1	Site Location Plan
Figure 2.1	Extract of Indicative Through Route Alignment
Figure 2.2	Extract of Proposed Alignment for Through Route at A49
Figure 2.3	Extract of Main Site Access at Blackbrook Avenue

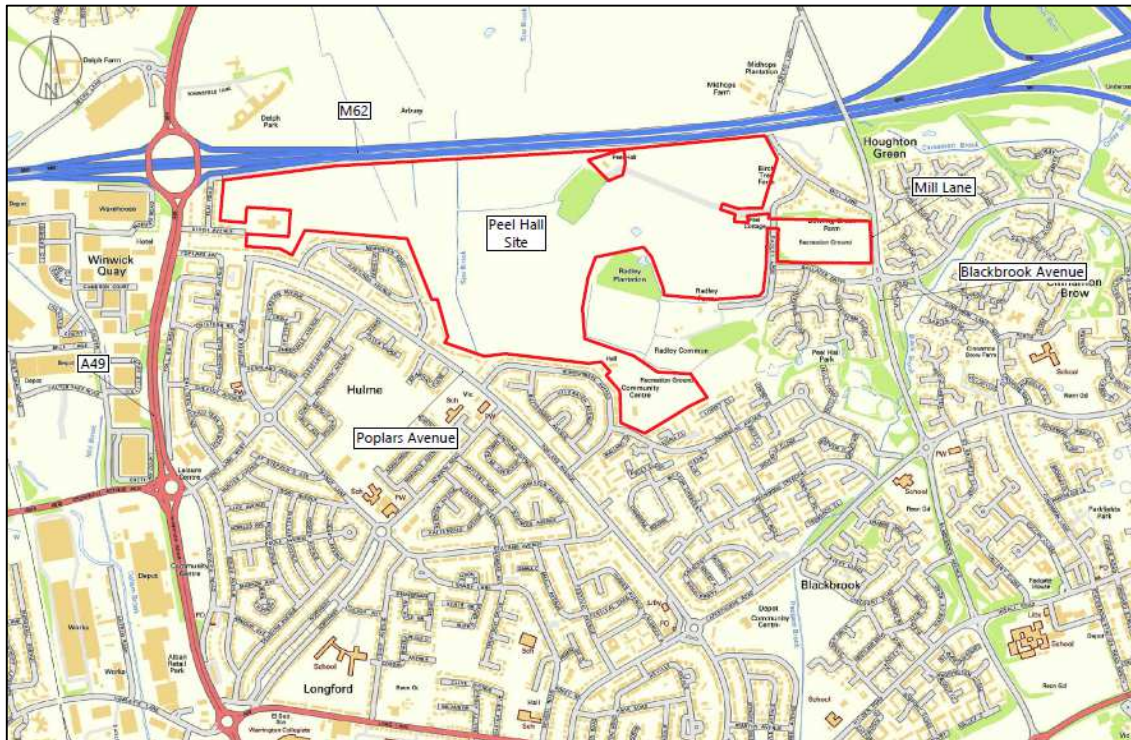
Appendices

Appendix 1	Indicative Through Route Alignment
Appendix 2	Peel Hall Proposed Alignment for Through Route to A49
Appendix 3	Proposed Main Site Access at Blackbrook Avenue

1.0 Introduction

- 1.1 This Technical Note has been prepared by Highgate Transportation Limited to set out the proposed alignment for a potential through route for all vehicles to be created from the A49 to the west of the Peel Hall site, through the site to Mill Lane/Blackbrook Avenue in the east. The site location is illustrated in **Figure 1.1** below.

Figure 1.1 – Site location plan



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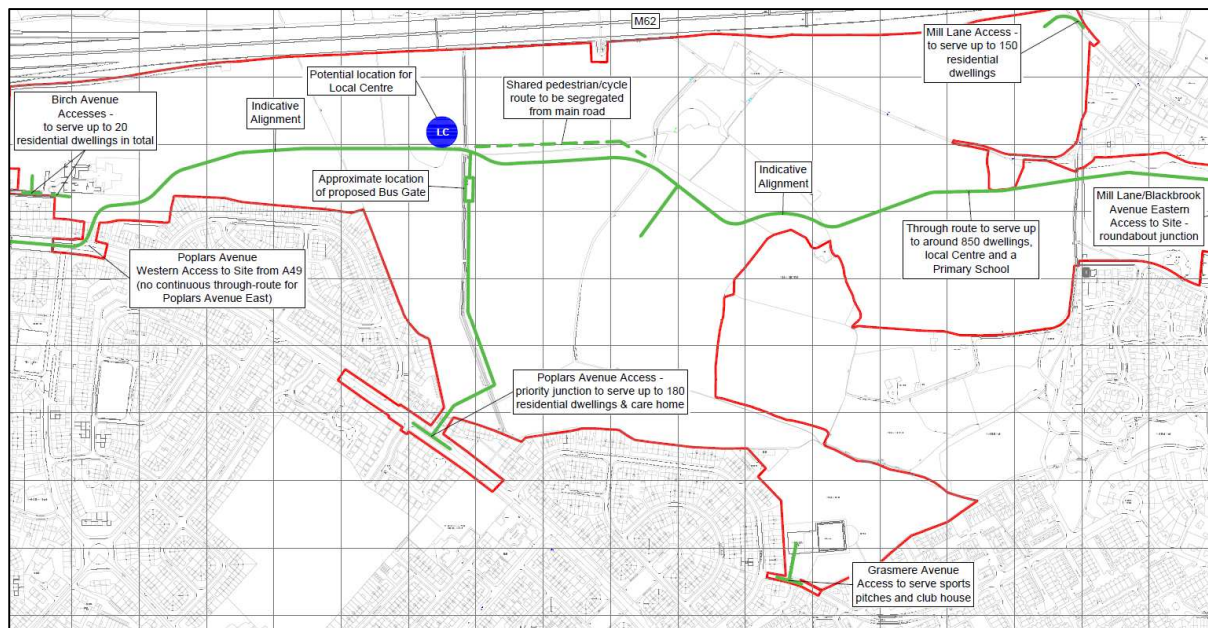
- 1.2 The through route has been proposed as a sensitivity test at the request of the Warrington Borough Council (WBC) highway officers. The through route scenario is to be tested in the Peel Hall SATURN model for a full development profile build-out in the future year of 2030.
- 1.3 The application is for an outline scheme, with access for determination. The Peel Hall development can be summarised as:
- Up to 1,200 residential dwellings.
 - A 100 bedroom care home.
 - An area of employment land comprising up to 7,500sqm Gross Floor Area (GFA) of light industrial units.
 - A local centre comprising a food store of up to 2,000sqm GFA plus up to a further 600sqm GFA of local centre type facilities (such as A1-A5 and D1) plus a family pub and restaurant of up to 800sqm GFA.
 - Up to a two form entry primary school with a maximum of up to 420 pupils.

- vi. Relocating and upgrading of existing sports pitches to provide like-for-like replacement in terms of number of pitches and the provision of ancillary facilities, which are expected to include changing facilities for up to four teams at any one time and a function room that can be used for local community uses such as a mother and toddler group.
- 1.4 The alignment of the proposed all-vehicle through route and the preliminary proposed junction arrangement with the A49 is set out in **Section 2.0** of this report, which also includes details of the main site access junction to the east of the Peel Hall site from Blackbrook Avenue at Mill Lane. The Blackbrook Avenue junction is a three-arm roundabout as per the original Peel Hall access strategy (2016 application, updated to reflect Road Safety Audit comments).
- 1.5 The 2030 development trip rates are taken from Section 5.0 of the HTP Technical Note TN/19 (dated May 2017) for the purposes of this assessment, and are set out in **Section 3.0** of this report in relation to the vehicular trips forecast to be associated with the through route sensitivity test.

2.0 Through Route

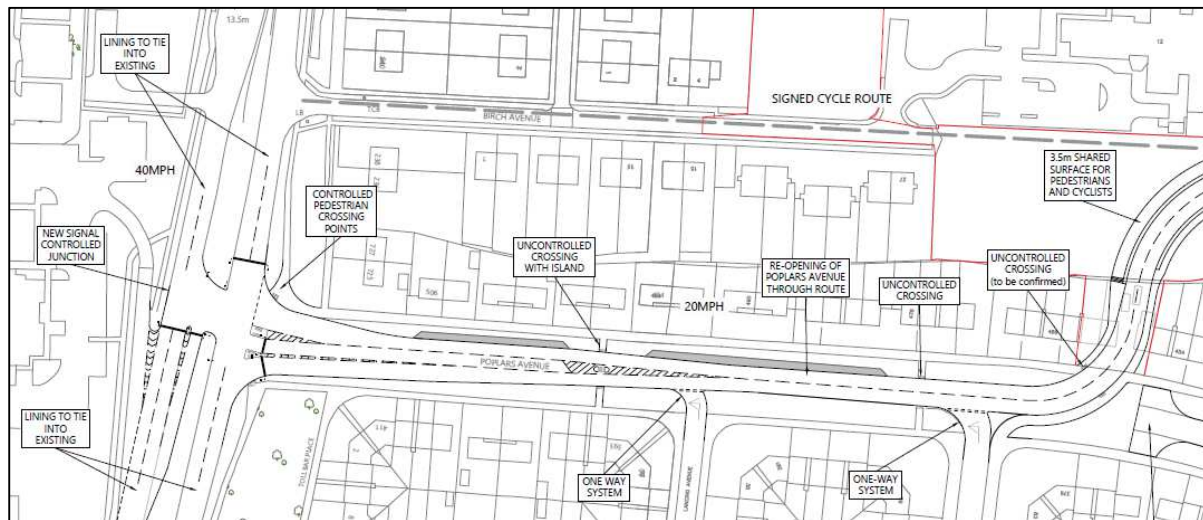
- 2.1 The through route will act as a local distributor road between the A49 in the east and Blackbrook Avenue through Mill Lane to the west. The alignment will pass through the centre of the site.
- 2.2 The carriageway will be 7.3 metres wide, with a 3.5 metres shared surface footway-cycleway to one side and a 2.0 metre footway to the other side. The through route is illustrated in **Figure 2.1** below and the full plan is contained at **Appendix 1**.

Figure 2.1 - Extract of indicative through route alignment



- 2.3 The through route will require a new signalised junction with the A49 and for Poplars Avenue to be reopened west of Cotswold Road (east of Lancing Avenue). This will enable traffic from the development to access the A49 without the need to travel through the existing residential area to the south of the site.
- 2.4 The access to the site from Poplars Avenue West will be a continuation of the Poplars Avenue link with the A49. An extract of this is shown in **Figure 2.2** below and the full plan is contained at **Appendix 2**.

Figure 2.2 - Extract of proposed alignment for through route at A49



- 2.5 The new signalised junction will enable development traffic to travel north or south on the A49 and for A49 traffic from the north and the south to access the development and travel through the development to the wider highway network east of the site (and vice versa) via the proposed Blackbrook Avenue site access.
- 2.6 To ensure that the existing residential areas surrounding the site are protected from development traffic the following measures are proposed:
- Lancing Avenue one way northbound with a left-turn out only manoeuvre allowed at poplars Avenue.
 - Cotswold Road one way northbound with a left-turn out only manoeuvre allowed at poplars Avenue.
 - Poplars Avenue stopped up west of Cotswold Avenue and the proposed access road.
 - A bus gate provided to prevent traffic from the development travelling to and from the area of Poplars Avenue to the south (see **Figure 2.1**).
- 2.7 The Blackbrook Avenue access will be as per the original access strategy, with a three arm roundabout from Mill Lane (south) linking to the existing Blackbrook Avenue roundabout. An extract of this is shown in **Figure 2.3** below and the full plan is contained at **Appendix 3**.

Figure 2.3 - Extract of main site access at Blackbrook Avenue



3.0 Traffic Flows

Development Profile

3.1 The through route will carry local traffic as well as serve to facilitate access to the following elements of the development profile:

- i. Up to around 850 dwellings.
- ii. Local centre (comprising a food store of up to 2,000sqm GFA plus up to a further 600sqm GFA of local centre type facilities plus a family pub and restaurant of up to 800sqm GFA).
- iii. Up to two-form entry primary school.
- iv. An area of employment land comprising up to 7,500sqm GFA of light industrial units.

3.2 For reference, the remaining development profile is proposed to be served as follows:

- i. Up to 20 dwellings off Birch Avenue.
- ii. Up to 180 dwellings and a 100 bedroomed care home off Poplars Avenue (Central); with a bus gate to prevent general vehicular traffic travelling further north onto the through route.
- iii. Up to 150 dwellings off Mill Lane (north).
- iv. Sports pitches and community uses served from Grasmere Avenue.

Traffic Flows

3.3 Section 3.0 of Technical Note TN/19 (May 2017) is repeated below for ease of reference.

3.4 A summary of the peak hour trip rate data to be used and the resultant trips for each land use are set out below (taken from TN/02/A) as follows:

Table 3.1 – Residential Vehicular Trip Rate and Generation Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
85 th Percentile Trip Rates (per unit)	0.225	0.523	0.495	0.307
Residential Trips (1,200 units)	270	628	594	368

Table 3.2 – Care Home Vehicular Trip Rates and Attraction Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Trip Rates (per bedroom)	0.068	0.068	0.083	0.113
Care Home Trips (100-beds)	7	7	8	8

Table 3.3 – Employment Vehicular Trip Rates and Attraction Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Trip Rates (per 100sqm GFA)	0.919	0.514	0.260	0.621
Employment Trips (7,500sqm GFA)	69	39	20	47
HGV %Proportion	7%	10%	10%	4%

Table 3.4 – Food Store Vehicular Trip Rate and Attraction Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Trip Rates (per 100sqm GFA)	4.615	3.030	9.056	9.550
Food Store Trips (2,000sqm GFA)	92	61	181	191

Table 3.5 – Local Centre Vehicular Trip Rate and Attraction Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Trip Rates (per 100sqm GFA)	5.025	4.780	6.039	6.495
Local Centre Trips (600sqm GFA)	30	29	36	39

Table 3.6 – Primary School Vehicular Trip Rate and Attraction Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Trip Rates (per pupil)	0.269	0.189	0.045	0.063
Primary School Trips (all 420 pupils)	113	79	19	27

- 3.5 The proposed development at Peel Hall will include the existing open space and local authority community buildings and sports area on the land off Windermere Avenue and Grasmere Avenue to the southeast of the site. This will be linked to the site and new sports pitches will be provided to replace those currently located on the HCA land to the east of the site, off Mill Lane.
- 3.6 The facilities will likely include full-sized grass pitches, a multi-use games area, junior grass pitches and changing facilities for up to four teams. The expectation is that these proposals will also include a clubhouse/function room for community use.
- 3.7 The sports pitches will predominantly be used at the weekends and it was agreed at the 2013 Public Inquiry (Appeal ref: APP/M0655/A/13/2192076) that this element of the development proposals would not need to be included within the weekday modelling. Furthermore there will be an offset in trip generation from the current on-site uses at the existing location and from the sports pitches on the HCA land, which are to be relocated.
- 3.5 It is likely that the proposed clubhouse facilities will be used by the local community, for example, by a mother and toddler group, and also that the sports pitches may be used during the evening after 1800 hours. Therefore it was agreed at the 2013 Inquiry that the clubhouse facilities for local community use may attract up to 15 car movements over two-hour time slots during the day between the hours of 0900 and 1800. As this is cannot be accurately modelled within our one hour peak AM and PM time periods, the 15 movements have been concentrated into each peak hour. This is set out on **Table 3.7** below.

Table 3.7 – Sports Pitches and Ancillary Facilities Vehicular Trip Rate and Attraction Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Community Use Trips	10	5	7	8

- 3.8 The size of the family pub was changed in April 2016 as the scheme evolved, reducing to 800sqm GFA. The change in floor area was set out in Technical Note TN/12 and the resulting trips are represented in **Table 3.8** below.

Table 3.8 – Family Pub/Restaurant Vehicular Trip Rate and Attraction Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Trip Rates (per 100sqm GFA)	-	-	2.847	1.845
Family Pub/Restaurant Trips (800sqm GFA)	-	-	23	15

3.9 In summary, the vehicle trips associated with each land use are tabulated below for ease of reference in **Table 3.9**. *Please note that no discount has been applied to these figures.*

Table 3.9 – Peel Hall Vehicular Trip Generation Summary

Development Traffic	AM Peak Hour		PM Peak Hour	
	Arrival	Departure	Arrival	Departure
Residential Trips	270	628	594	368
Care Home Trips	7	7	8	8
Employment Trips*	69	39	20	47
Food Store Trips	92	61	181	191
Local Centre Shop Trips	30	29	36	39
Primary School Trips	113	79	19	27
Community Uses	10	5	7	8
Family Pub/Restaurant Trips	-	-	23	15
Total Trips	591	848	888	703

* See Table 3.3 for HGV proportion of peak hour traffic

2030 Traffic Flows

- 3.6 It has been agreed that the through route is to be tested in the future year of 2030.
- 3.7 The development trips set out in **Table 3.9** above are to be discounted in line with TN/19 (Section 5.0) as follows for the AM and PM peak hours:
- i. Residential 0%
 - ii. Care Home 0%
 - iii. Employment 0%
 - iv. Food Store 100% (70% discount and 30% pass-by)
 - v. Local Centre 100%
 - vi. Family Pub/Restaurant 0%
 - vii. Primary School 50%
 - viii. Community uses 0%
- 3.8 These discounts have been applied to the figures contained in **Table 3.9** and a revised summary of the proposed Peel Hall development trips for 2030 with a through route is set out on **Table 3.10** below for the relevant access locations.

Table 3.10 – Summary of 2030 Peak Hour Vehicle Trip Numbers at Each Access Location (with discounts applied)

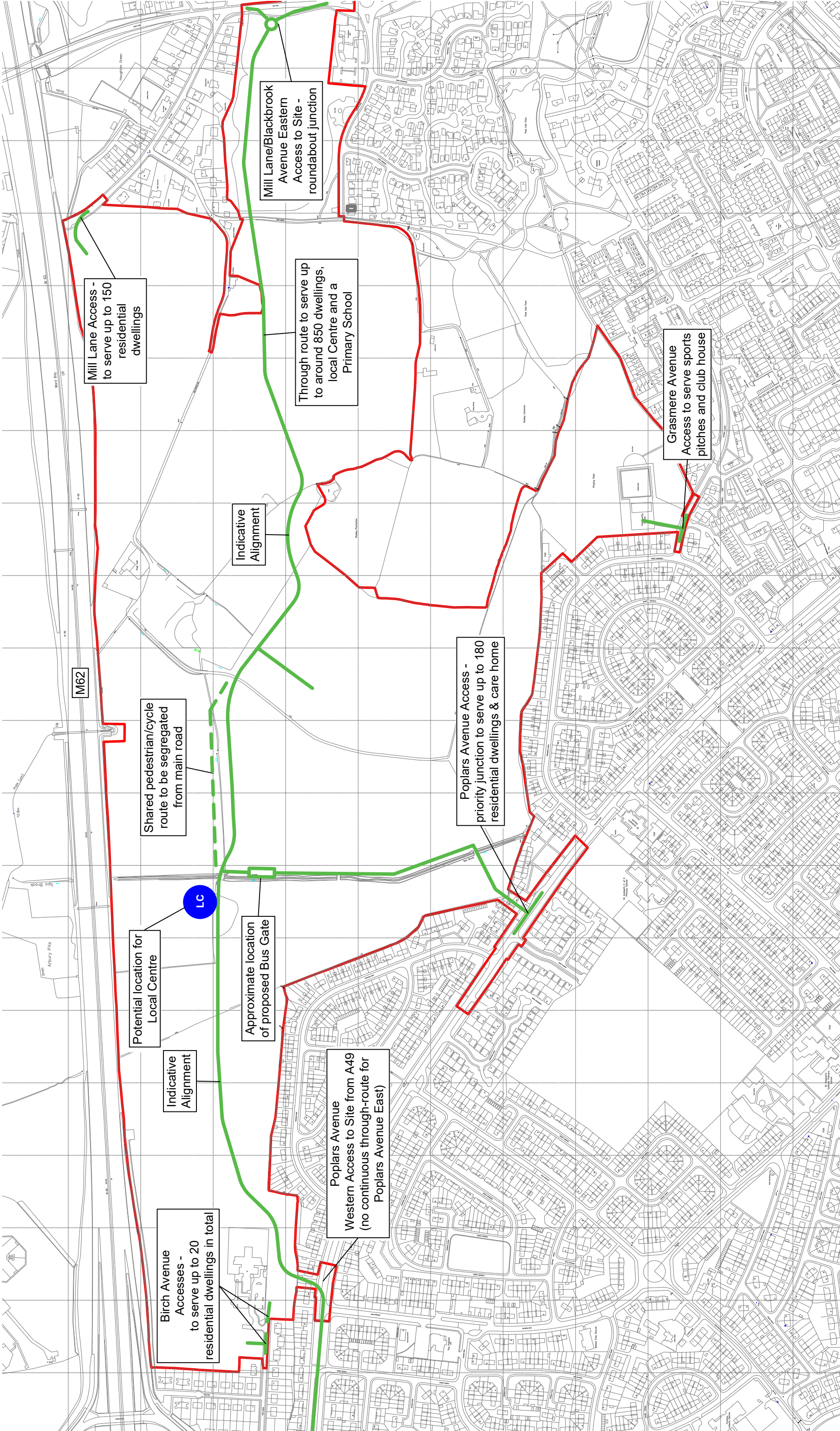
Access	Quantum of Development	AM Arrival	AM Departure	PM Arrival	PM Departure
Poplars Avenue (Central)	180 dwellings	41	94	89	55
	care home	7	7	8	8
	<i>Total</i>	<i>48</i>	<i>101</i>	<i>97</i>	<i>63</i>
Poplars Avenue (West) through to A49 & Mill Lane/Blackbrook Avenue	food store*	28	18	54	57
	local shops	0	0	0	0
	family pub	0	0	23	15
	850 dwellings	191	445	421	261
	primary school	57	40	10	14
	employment land	69	39	20	47
	<i>Total</i>	<i>345</i>	<i>542</i>	<i>528</i>	<i>394</i>
Mill Lane	150 dwellings	34	79	74	46
Birch Avenue	20 dwellings	5	11	10	6
Grasmere Avenue	community uses	10	5	7	8
Total		442	738	716	517

* pass-by trips only

- 3.9 The through route scenario test for the Peel Hall SATURN model can be carried out with the above vehicle trips and loading.
- 3.10 It can be seen from **Table 3.10** that there will be up to around an additional 1,200 vehicle trips on the local highway network in each of the weekday peak hours as a result of the Peel Hall development.

Appendix 1

Indicative Through Route Alignment



NOTES:
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PROJECT:
PEEL HALL, WARRINGTON

CLIENT:
SATNAM MILLENNIUM LTD

TITLE:
INDICATIVE THROUGH ROUTE AND ACCESS POINTS

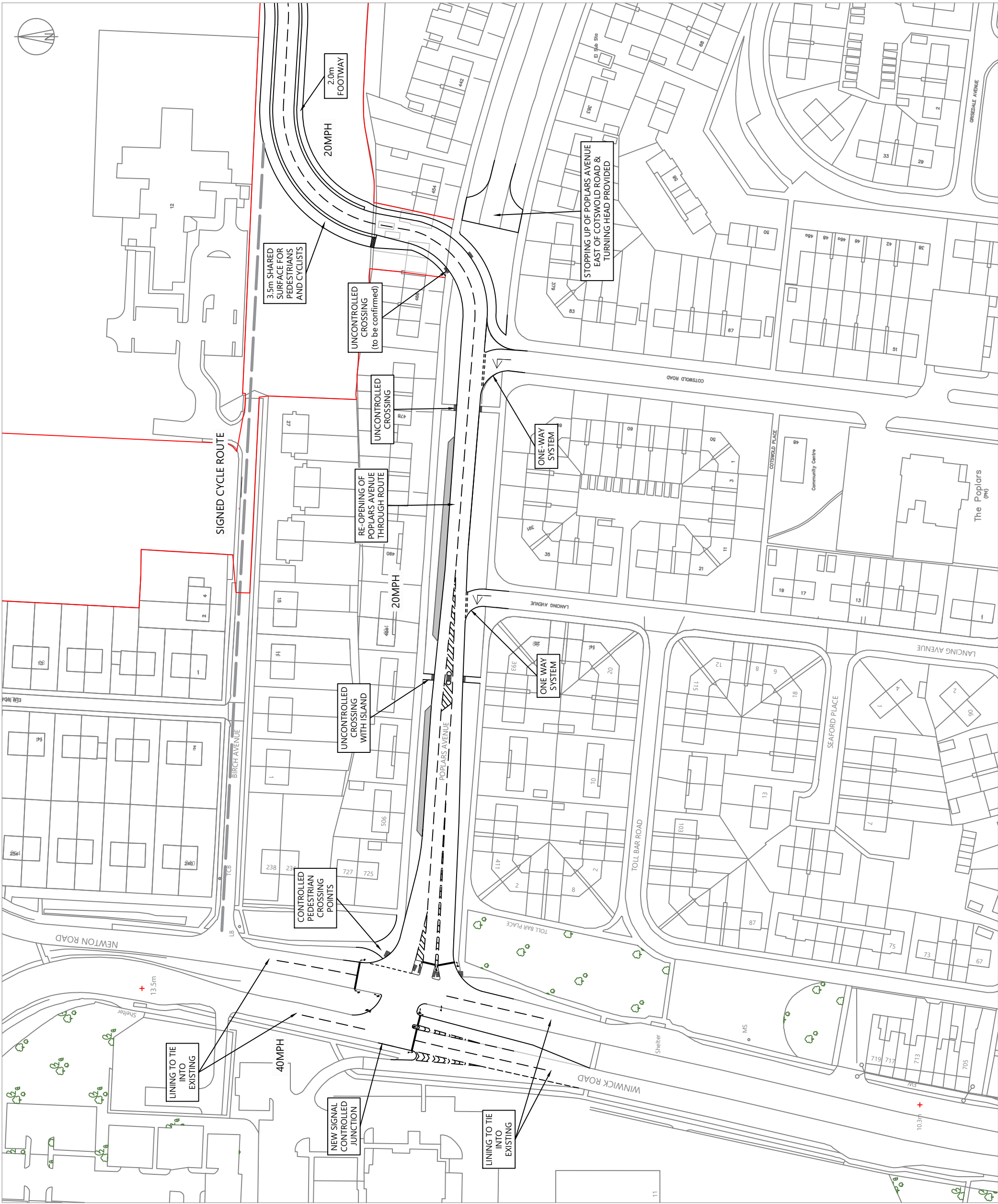
PROJECT REFERENCE: 1107	DRAWING NUMBER: 43	SCALE: Not to scale
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First Floor, 43-45 Park Street
Bristol BS1 5NL
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Appendix 2

Peel Hall Proposed Alignment for Through Route to A49



NOTES:
Drawing based on Appletons Opportunities & Constraints plan 1820_21 dated 21/10/14.

PRELIMINARY

KEY

New on-street parking bays

Red line boundary

ISSUE	REASON FOR REVISION	DATE

PROJECT:
PEEL HALL,
WARRINGTON

CLIENT:
SATNAM MILLENNIUM
LTD

PROJECT REFERENCE:
1107

DRAWING NUMBER:
52/A

SCALE:
1:1,250 @ A3

HighgateTransportation
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First Floor, 43-45 Park Street
Bristol BS8 1ES
07973 375 937 / 07595 892 217
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TITLE:
PEEL HALL PROPOSED ALIGNMENT
FOR THROUGH ROUTE TO A49

DATE:
13/06/17

DRAWN BY:
FB

CHECKED:
DT

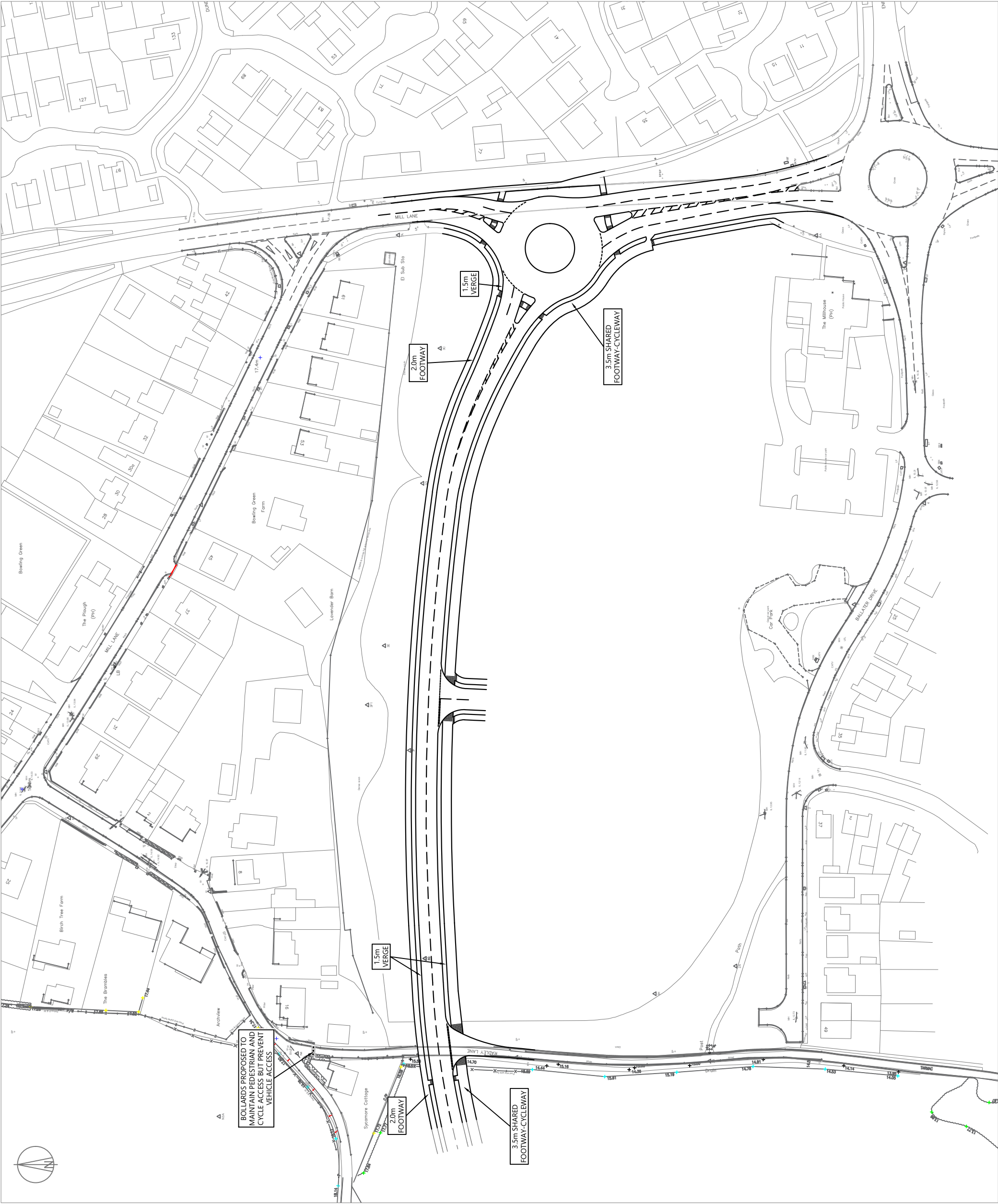
Appendix 3

Proposed Main Site Access at Blackbrook Avenue

NOTES: Drawing based on Powers & Tiltman topographical survey 6297/01 dated 25/07/11 and Geomatic Surveys Ltd topographical survey 01532/01 dated 27/07/15. © Crown copyright and database rights 2015 OS Licence 100035409.		
ISSUE	REASON FOR REVISION	DATE

PROJECT: PEEL HALL, WARRINGTON		
CLIENT: SATNAM MILLENNIUM LTD		
PROJECT REFERENCE:	DRAWING NUMBER:	SCALE:
1107	10/L	1:1,250 @ A3

Highgate <i>Transportation</i> www.highgatetransportation.co.uk Box 13, 42 Triangle West Park Street, Bristol BS8 1ES 07973 375 937 / 07595 892 217 © Highgate Transportation Limited		
TITLE: PROPOSED MAIN SITE ACCESS AT BLACKBROOK AVENUE		
DATE:	DRAWN BY:	CHECKED:
03/02/17	FB	DT



Appendix D Technical Note HTP/1107/TN20

Highgate*Transportation*

**Land at Peel Hall, Warrington
Technical Note on Traffic Growth**

(HTp/1107/TN/20)

May 2017

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HTp@highgatetransportation.co.uk

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2.0 Growth Rates	2

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Figure 2.1	Census 2011 Data, Warrington 006
Figure 2.2	Census 2011 Data, Warrington Super Output Areas

Appendices

Appendix 1	TEMPRO Screen Captures
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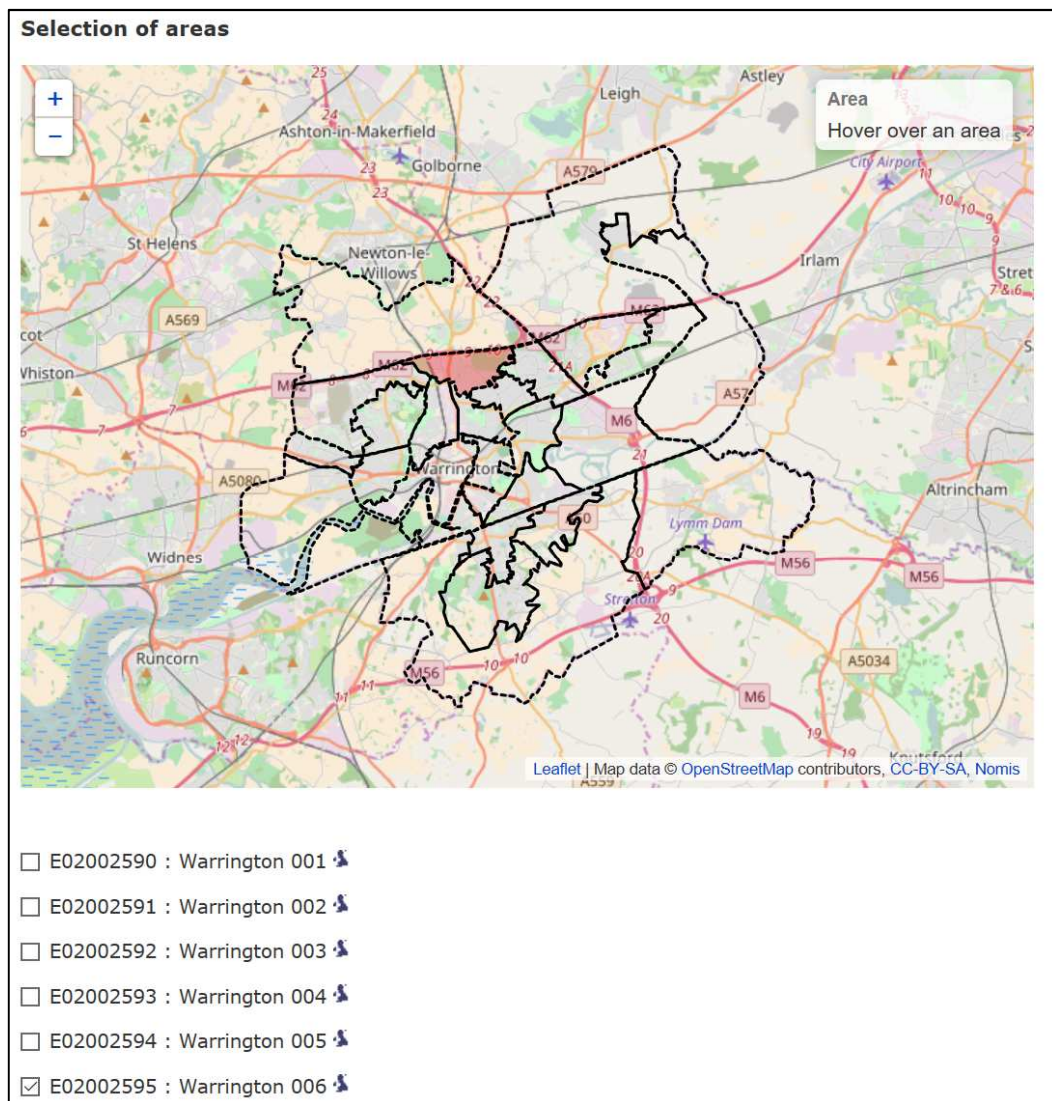
1.0 Introduction

- 1.1 This Technical Note has been prepared by Highgate Transportation Limited further to Technical Note TN/07/Addendum on Traffic Growth (October 2016), to update the growth rates used for modelling the traffic impact of the proposed Peel Hall development in the future years of 2025 and 2030.
- 1.2 Previously TEMPRO 6 (version 6.2) was used. However, now that the modelling is being revised the opportunity has been taken to use TEMPRO 7. The latest version currently available is version 7.2, which has been used for this exercise.
- 1.3 Technical Note TN/07 on Growth Rates dated May 2016 set out that there was an agreement to use Motorway growth rates for the modelling. It should be noted that this represents an over-estimate for the traffic growth over much of the model network because it is the highest growth factor from this dataset in the TEMPRO programme; it will nevertheless provide confidence in the modelling results as well as account for trips from the OMEGA development.

2.0 Growth Rates

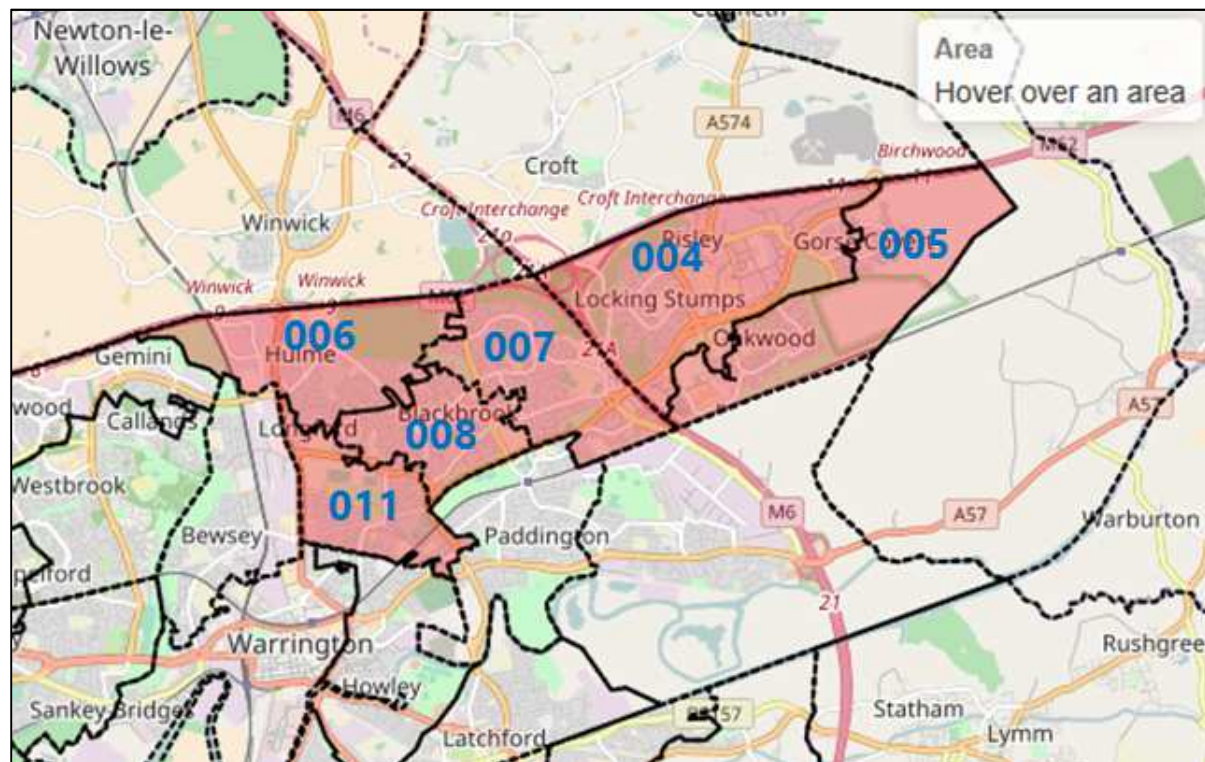
- 2.1 The TEMPRO database version 7.2 has been reviewed for the appropriate growth factors to apply to the 2015 base model flows to forecast traffic in the future years of 2025 and 2030.
- 2.2 TEMPRO version 7 uses census 2011 Super Output Areas (mid layer) data. The Peel Hall site is located in the Hulme area, as indicated in **Figure 2.1** below, which is Warrington 006 (E02002595), see below.

Figure 2.1 – Census 2011 Data, Warrington 006



- 2.3 The other areas classified by the census data that are covered within the area-wide modelling for the Peel Hall site are illustratively shown in **Figure 2.2** below for ease of reference.

Figure 2.2 – Census 2011 Data, Warrington Super Output Areas



2.4 The census reference numbers for the areas shown above are as follows:

- i. 007, E02002596
- ii. 004, E02002593
- iii. 005, E02002594
- iv. 008, E02002597
- v. 011, E02002600

2.5 Therefore the Warrington 006 are will be selected for calculating the growth rate for the Peel Hall assessments.

2.6 Using Urban Motorway roads to forecast 2025 and 2030 traffic growth the resultant growth factors are set out in **Table 2.1** below. The TEMPRO data is contained in **Appendix 1** for reference.

Table 2.1 – Growth rates

	AM	PM
2015-2025	1.1749	1.1652
2015-2030	1.2211	1.2098

2.7 For reference, the above growth rates are higher than any of the other areas also highlighted in **Figure 2.1** and **paragraph 2.4** above, as set out below for reference (for 2015-2030):

- i. Selecting 004 gives growth rates of AM 1.1921, PM 1.1798.
- ii. Selecting 005 gives growth rates of AM 1.1886, PM 1.1842.
- iii. Selecting 007 gives growth rates of AM 1.1693, PM 1.1536.
- iv. Selecting 008 gives growth rates of AM 1.2010, PM 1.1986.
- v. Selecting 011 gives growth rates of AM 1.1882, PM 1.1857.
- vi. Selecting Warrington (Authority) gives AM 1.1838, PM 1.1765.

2.8 Therefore it is considered that the use of the Warrington 006 growth rates are appropriate for the Peel Hall area-wide modelling.

Employment

2.9 As previously set out in Technical Note TN/07/Addendum on Traffic Growth (October 2016) and agreed with highway officers, two of the employment sites identified as committed developments; Calver Park (ref: 2015/26685 and 2013/22533) and Birchwood Park (ref: 2015/26044, 214/23358 and 2008/12744), are included in the Local Plan.

2.10 Therefore it can reasonably be assumed that an estimation of the volume of trips these developments would generate will have been provided by Warrington and feed into TEMPRO, and as such these committed developments have not been added again in the future years.

2.11 Furthermore, highway officers have confirmed that the Winwick B&Q proposals can be excluded from the list of committed developments as it is agreed that any additional traffic is insignificant.

2.12 In summary, the committed developments added to the Peel Hall modelling can be summarised as follows:

- i. Land at Benson Road, Birchwood (ref: 2015/26220).
- ii. Birchwood Shopping Centre (ref: 2015/25880).

1107 Peel Hall
TEMPro 7.2
2015-2025

Motorway Growth

Warrington 006 – AM Peak Hour

TEMPro main form

Data selections

Trip end selections

Trip end by time period selections

Select time period:

Weekday AM peak period (0700 - 0959)

Trip end type

Production/Attraction

Origin/Destination

Select data type

Growth factors

Future year minus base year

Base year data

Future year data

*Italicised results indicate that there is a lower level of confidence in data presented at the zonal level than when aggregated to higher geographical levels

Car Driver

Combined Modes

Area Description

Level

Name

Origin

All Purposes

Destination

Authority

Warrington

Warrington 006

1.0158

1.0899

E02002595

1.1

1.1

Reset Selections

Results

NTM Traffic Growth Calculations

1: Select NTM Dataset:

NTM Dataset Description	From	To
NTM AP15 Dataset	2010	2040
NTM AP09 Dataset	2003	2035
NTM AP08 Dataset	2003	2025

2: Select Areas to make up the geographic region:

☒ Warrington

☒ Warrington 006 (E02002595)

3: Select area type:

Urban

Rural

All

4: Select road type:

Motorway

Trunk

Principal

Minor

All

5: Select which area it serves:

Region

England

Calculate the adjusted local growth figure

Results

Level	Area	Local Growth Figure
Authority	Warrington	1.1453
E02002595	Warrington 006	1.1749

Warrington 006 – PM Peak Hour

TEMPro main form

Data selections

Trip end selections

Trip end by time period selections

Select time period:

Weekday PM peak period (1600 - 1859)

Trip end type

Production/Attraction

Origin/Destination

Select data type

Growth factors

Future year minus base year

Base year data

Future year data

*Italicised results indicate that there is a lower level of confidence in data presented at the zonal level than when aggregated to higher geographical levels

Car Driver

Combined Modes

Area Description

Level

Name

Origin

All Purposes

Destination

Authority

Warrington

Warrington 006

1.0775

1.0547

E02002595

1.0915

1.0904

Reset Selections

Results

NTM Traffic Growth Calculations

1: Select NTM Dataset:

NTM Dataset Description	From	To
NTM AP15 Dataset	2010	2040
NTM AP09 Dataset	2003	2035
NTM AP08 Dataset	2003	2025

2: Select Areas to make up the geographic region:

☒ Warrington

☒ Warrington 006 (E02002595)

3: Select area type:

Urban

Rural

All

4: Select road type:

Motorway

Trunk

Principal

Minor

All

5: Select which area it serves:

Region

England

Calculate the adjusted local growth figure

Results

Level	Area	Local Growth Figure
Authority	Warrington	1.1387
E02002595	Warrington 006	1.1652

1107 Peel Hall
TEMPRO 7.2
2015-2025

AM Peak Hour – displaying years of 2015-2025

Select dataset version: 72

Result type

Trip ends by time period

Trip ends by car availability

Car ownership data

Planning data

Set area definition...

Enter base year 2015

Enter future year 2025

Trip end selections

Trip end by time period selections

Reset Selections

Select data type

Growth factors

Future year minus base year

Base year data

Future year data

*Thalised results indicate that there is a lower level of confidence in data presented at the zonal level than when aggregated to higher geographical levels

Car Driver

Combined Modes

Area Description	Name	Origin	Destination
Level	Warrington	1.0558	1.0895
Authority	Warrington 006	1.1	1.1

NTM Traffic Growth Calculations

1: Select NTM Dataset:

NTM Dataset Description	From	To
NTM AF 15 Dataset	2010	2040
NTM AF09 Dataset	2003	2035
NTM AF08 Dataset	2003	2025

2: Select Areas to make up the geographic region:

Warrington

Warrington 006 (E02002595)

3: Select area type:

Urban

Rural

All

4: Select road type:

Motorway

Trunk

Principal

Minor

All

5: Select which area it serves:

Region

England

Calculate the adjusted local growth figure

Results

Level	Area	Local Growth Figure
Authority	Warrington	1.1453
E02002595	Warrington 006	1.1749

Appendix 1

TEMPRO Screen Capture

1107 Peel Hall
TEMPro 7.2
2015-2030

Motorway Growth

Warrington 006 – AM Peak Hour

TEMPro main form

Data selections

Trip end selections

Trip end by time period selections

Select time period:

Weekday AM peak period (0700 - 0959)

Trip end type

Production/Attraction

Origin/Destination

Reset Selections

Select data type

Growth factors

Future year minus base year

Base year data

Future year data

*Italicised results indicate that there is a lower level of confidence in data presented at the zonal level than when aggregated to higher geographical levels

Results

Car Driver Combined Modes

Area Description	Name	Origin	Destination
Level	Warrington	1.0772	1.1214
Authority	Warrington 006	1.1246	1.1232

NTM Traffic Growth Calculations

1: Select NTM Dataset:

NTM Dataset Description	From	To
NTM AF15 Dataset	2010	2040
NTM AF09 Dataset	2003	2035
NTM AF08 Dataset	2003	2025

2: Select Areas to make up the geographic region:

Warrington

Warrington 006 (E02002595)

3: Select area type:

Urban

Rural

All

4: Select road type:

Motorway

Trunk

Principal

Minor

All

5: Select which area it serves:

Region

England

Calculate the adjusted local growth figure

Results

Level	Area	Local Growth Figure
Authority	Warrington	1.1838
E02002595	Warrington 006	1.2211

Warrington 006 – PM Peak Hour

TEMPro main form

Data selections

Trip end selections

Trip end by time period selections

Select time period:

Weekday PM peak period (1600 - 1855)

Trip end type

Production/Attraction

Origin/Destination

Reset Selections

Select data type

Growth factors

Future year minus base year

Base year data

Future year data

*Italicised results indicate that there is a lower level of confidence in data presented at the zonal level than when aggregated to higher geographical levels

Results

Car Driver Combined Modes

Area Description	Name	Origin	Destination
Level	Warrington	1.1075	1.0775
Authority	Warrington 006	1.1235	1.1234

NTM Traffic Growth Calculations

1: Select NTM Dataset:

NTM Dataset Description	From	To
NTM AF15 Dataset	2010	2040
NTM AF09 Dataset	2003	2035
NTM AF08 Dataset	2003	2025

2: Select Areas to make up the geographic region:

Warrington

Warrington 006 (E02002595)

3: Select area type:

Urban

Rural

All

4: Select road type:

Motorway

Trunk

Principal

Minor

All

5: Select which area it serves:

Region

England

Calculate the adjusted local growth figure

Results

Level	Area	Local Growth Figure
Authority	Warrington	1.1765
E02002595	Warrington 006	1.2098

AM Peak Hour – displaying years of 2015-2030

Data selections

Data selection version: 72

Select data type

- ☒ Growth factors
- ☐ Future year minus base year
- ☐ Base year data
- ☐ Future year data

*Italicised results indicate that there is a lower level of confidence in data presented at the zonal level than when aggregated to higher geographical levels

Car Driver Combined Modes		All Purposes	
Level	Name	Origin	Destination
Authority	Warrington	1.0772	1.1214
E02002595	Warrington 006	1.1246	1.1202

Enter base year: 2015
Enter future year: 2030

Trip end selections: Trip ends by time period
Trip end by time period selections: Car ownership data, Planning data

Reset Selections

Results

NTM Traffic Growth Calculations

- Select NTM Dataset:**

NTM Dataset Description	From	To
+ NTM AP 15 Dataset	2010	2040
- NTM AF09 Dataset	2003	2035
- NTM AF08 Dataset	2003	2025
- Select Areas to make up the geographic region:**
 - ☒ Warrington
 - ☒ Warrington 006 (E02002595)
- Select area type:**
 - ☒ Urban
 - ☐ Rural
 - ☐ All
- Select road type:**
 - ☒ Motorway
 - ☐ Trunk
 - ☐ Principal
 - ☐ Minor
 - ☐ All
- Select which area it serves:**
 - ☒ Region
 - ☐ England

Calculate the adjusted local growth figure

Results

Level	Area	Local Growth Figure
Authority	Warrington	1.1838
E02002595	Warrington 006	1.2211

Appendix E Technical Note of Trip Distribution

Project:	Peel Hall SATURN Model Assessment	Job No:	60337714
Subject:	Proposed Trip Distribution for Future Year Development Trips		
Prepared by:	Alistair Johnson	Date:	06/09/2017
Checked by:	Chris Peachey	Date:	06/09/2017
Approved by:	Catherine Zoefitig	Date:	06/09/2017

Introduction

As part of a commission to produce a package of SATURN models to support the planning application for Peel Hall, Warrington, AECOM have developed a proposed trip distribution for the development.

This Technical Note details the exercise, and provides an evidence base for Highgate Transportation (working on behalf of Satnam Developments Ltd) to enable the proposed distribution to be agreed with Warrington Borough Council (WBC).

The volume of trips to and from the proposed development for each modelled time period was provided by Highgate Transportation in their Technical Note listed below:

- HTp/1107/TN/19 – Peel Hall Vehicular Trips

Methodology

The distribution of trips was calculated at the zoning level (**Appendix A, Figure 2**) derived from the Warrington Multi Modal Transport Model (WMMTM).

Development trips were grouped into three categories:

- Residential;
- Employment; and
- Other.

For each trip purpose, existing zones, of similar land uses within the modelled area were selected to act as a proxy for the distribution of trips to and from the new development. The zones used were:

- For residential, zones 21 (Callands) and 69 (Hulme);
- For employment, zone 226 (Winwick Quay); and
- For other developments, zone 152 (Warrington Collegiate).

The proposed land uses within the Peel Hall development were each then categorised within one of the trip types identified above; these are presented in **Table 1** overleaf.

Table 1, Trip Type for each Land Use

Trip Type	Proposed Land Use
Employment	Employment
Residential	150 Dwellings
	700 Dwellings
	330 Dwellings
	20 Dwellings
Other	Primary School
	Food Store
	Local Centre
	Family Pub
	100-Bed Care Home
	Sports and Community Facilities

The 2015 SATURN matrices were originally developed from the WMMTM and were updated utilising new traffic counts and matrix estimation techniques within VISUM (TFlowFuzzy) and ultimately SATURN ME2 module.

Once the matrices were validated in the 2015 SATURN models, using the three aforementioned zones as proxies, the proportion of trips from and too the new development within the modelled area, and the proportion of trips and directions of travel from and too zones outside the modelled area were calculated for the AM and PM peak periods on the basis of the updated 2015 SATURN trip matrices proportions.

These proportions were applied to the trip numbers supplied by Highgate Transportation to produce origin-destination matrices of development trips for both AM and PM peak time periods.

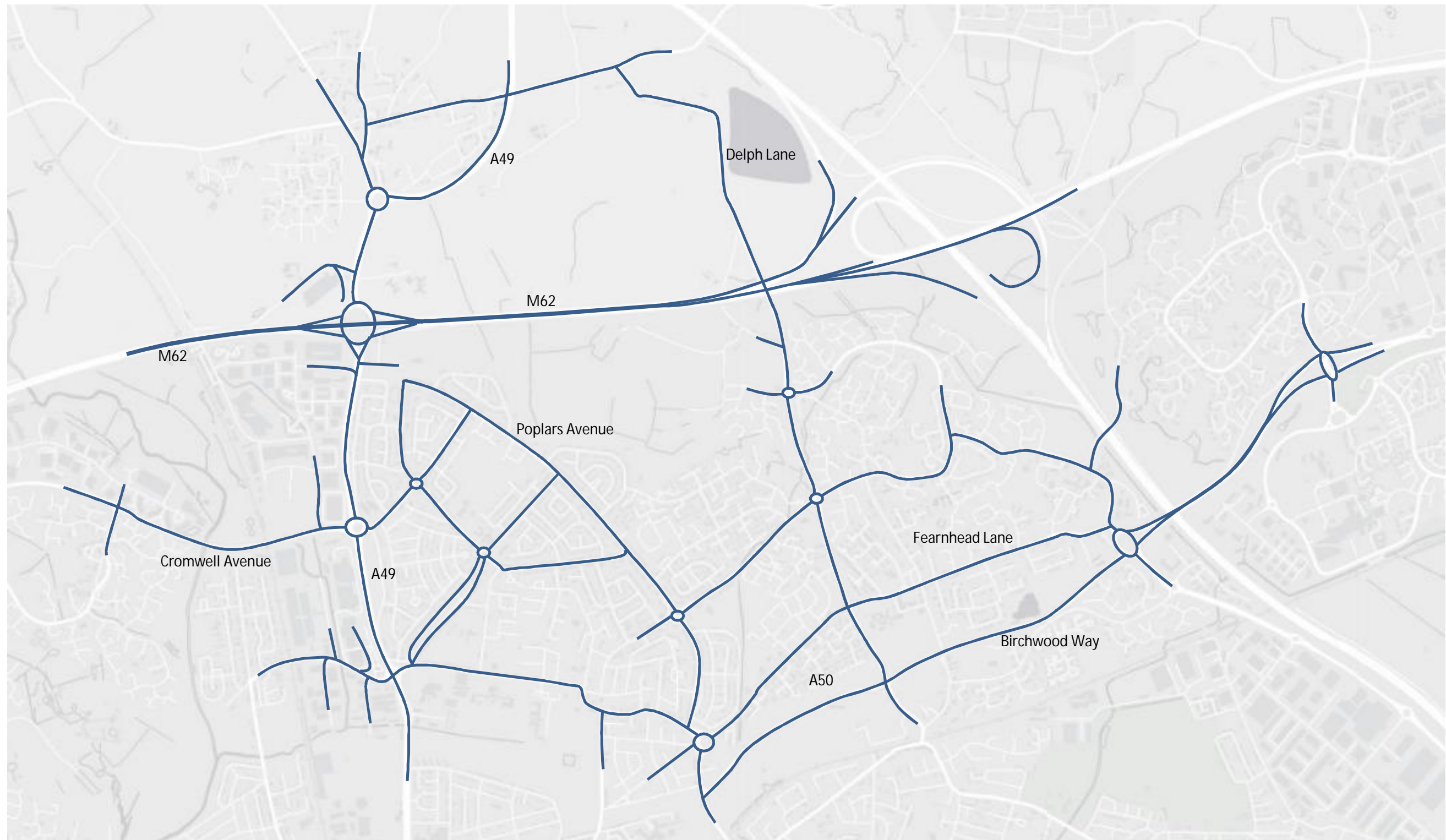
The final trip distributions split by trip type and all together are presented in **Appendix B, Figures 1 – 16**.

Appendix C, Figures 1 – 16 present the volume of trips split by land use and total trips for each model time period.

As per Highgate Transportation TN/19 – “*Peel Hall Vehicular Trips*”, the proposed development will benefit from six entrance and exit points to the network. The trip distribution (Production and Attraction Factors) presented in **Appendix B, Figure 1 - 16** will be applied to the appropriate development for each of the three trip purposes, and loaded into the SATURN model for it to assign the traffic on the model network via the six proposed access points.

Appendix A

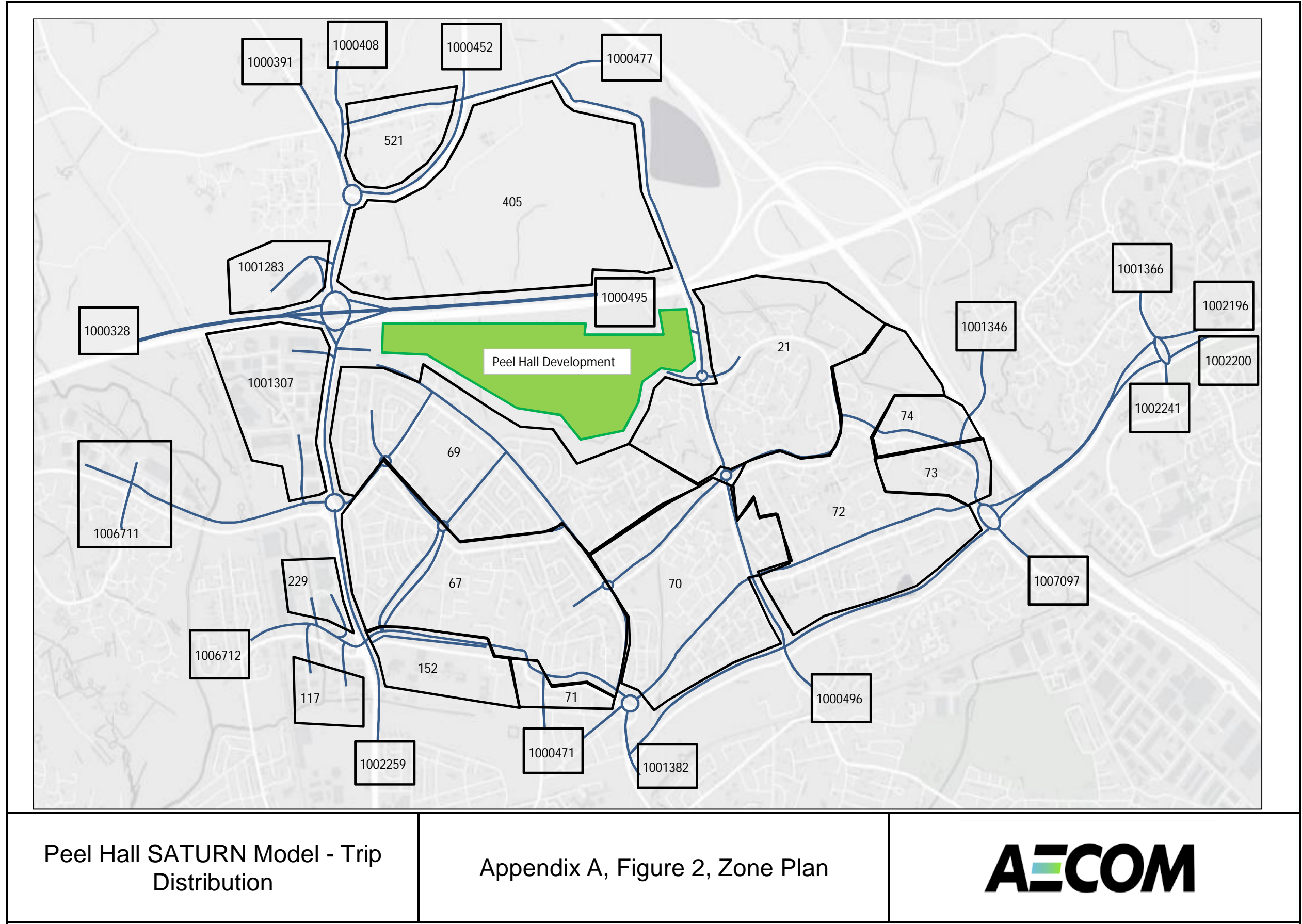
Model Network and Zone Structure



Peel Hall SATURN Model - Trip
Distribution

Appendix A, Figure 1, Model Network

AECOM



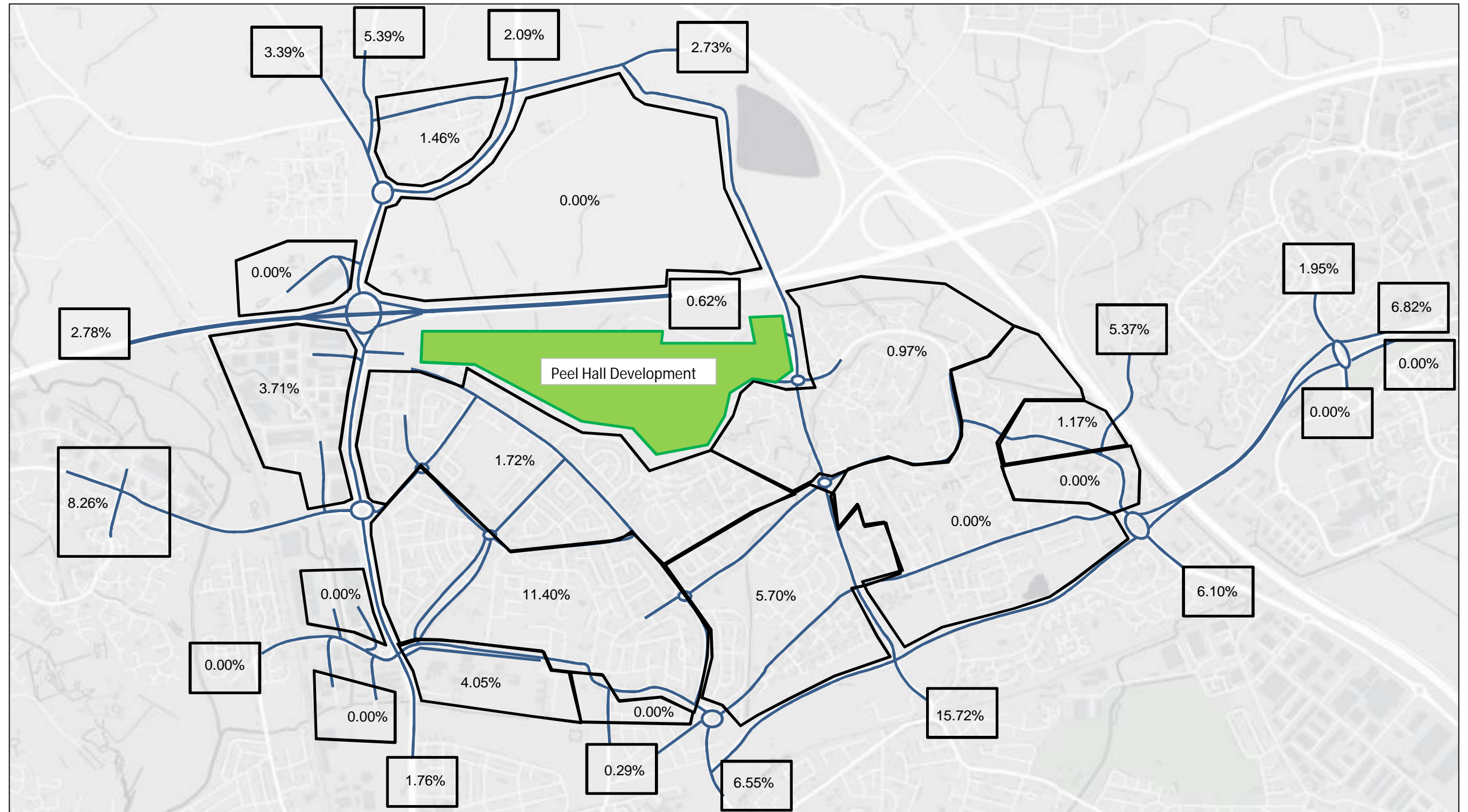
Peel Hall SATURN Model - Trip Distribution

Appendix A, Figure 2, Zone Plan



Appendix B

Proposed Trip Distribution Percentages

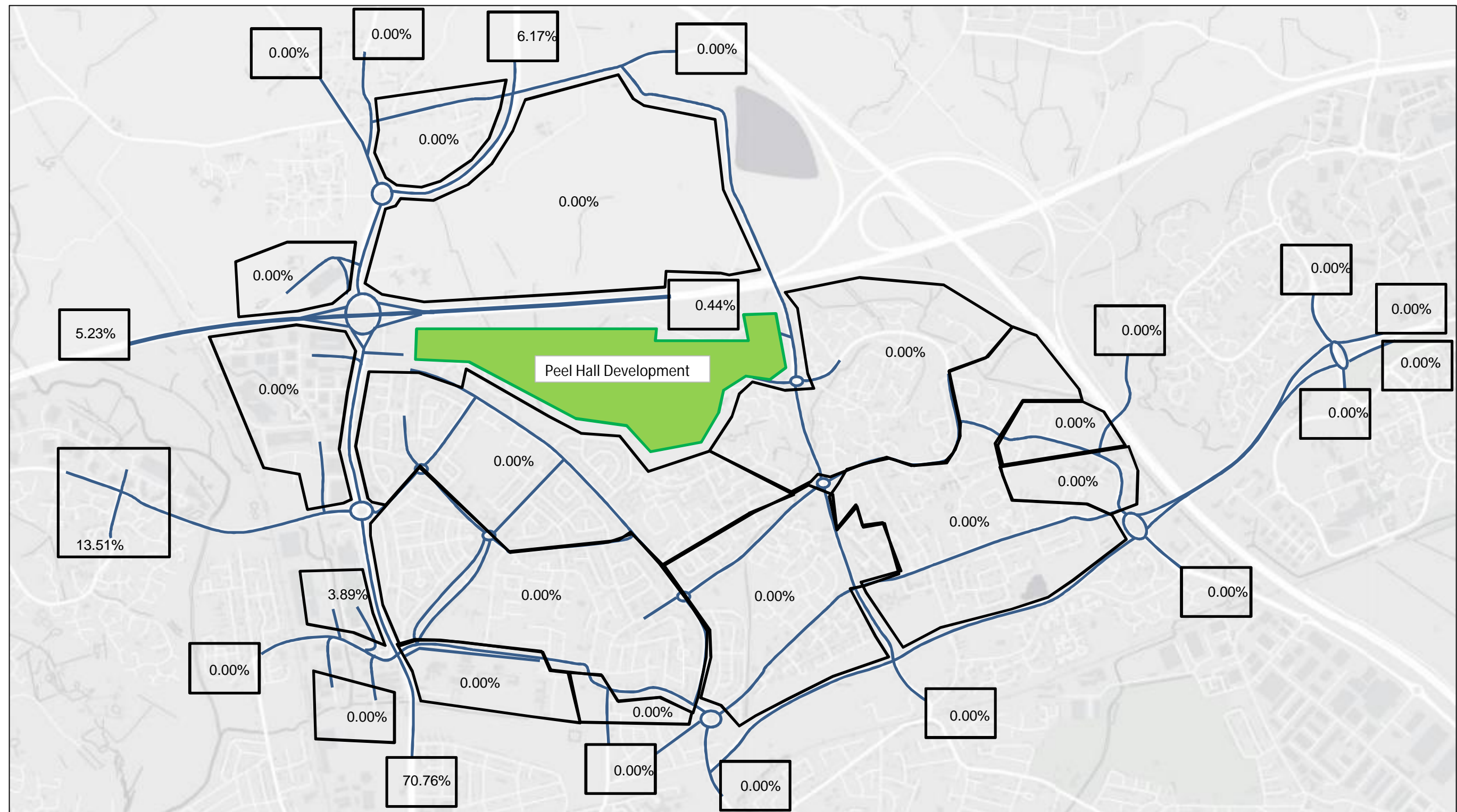


** Due to rounding to nearest number within Excel, percentages presented might not fully add to 100%

Peel Hall SATURN Model - Trip Distribution

Appendix B, Figure 1, AM Percentage Distribution for Residential Trips from Peel Hall Development



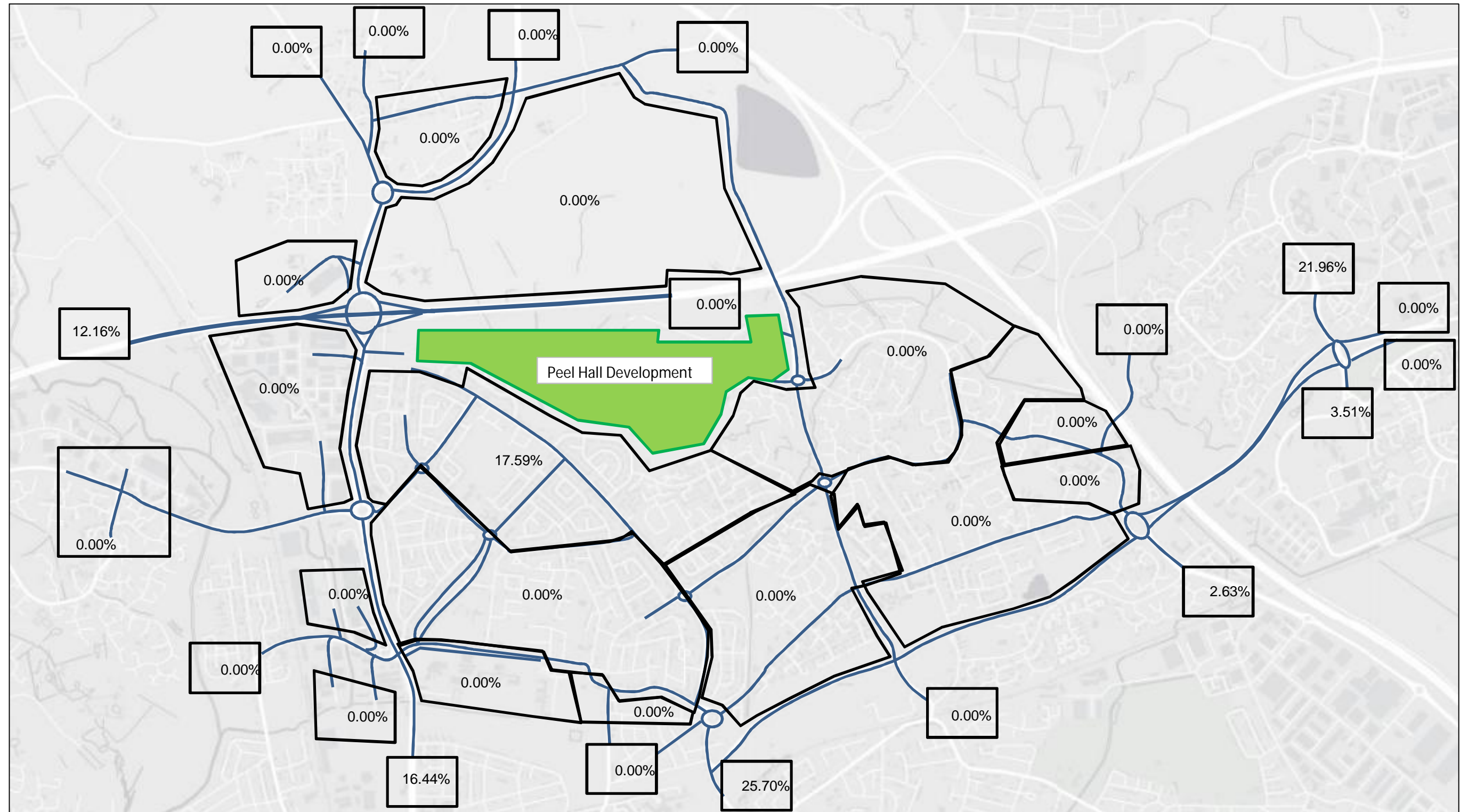


** Due to rounding to nearest number within Excel, percentages presented might not fully add to 100%

Peel Hall SATURN Model - Trip Distribution

Appendix B, Figure 2, AM Percentage Distribution for Work Trips from Peel Hall Development



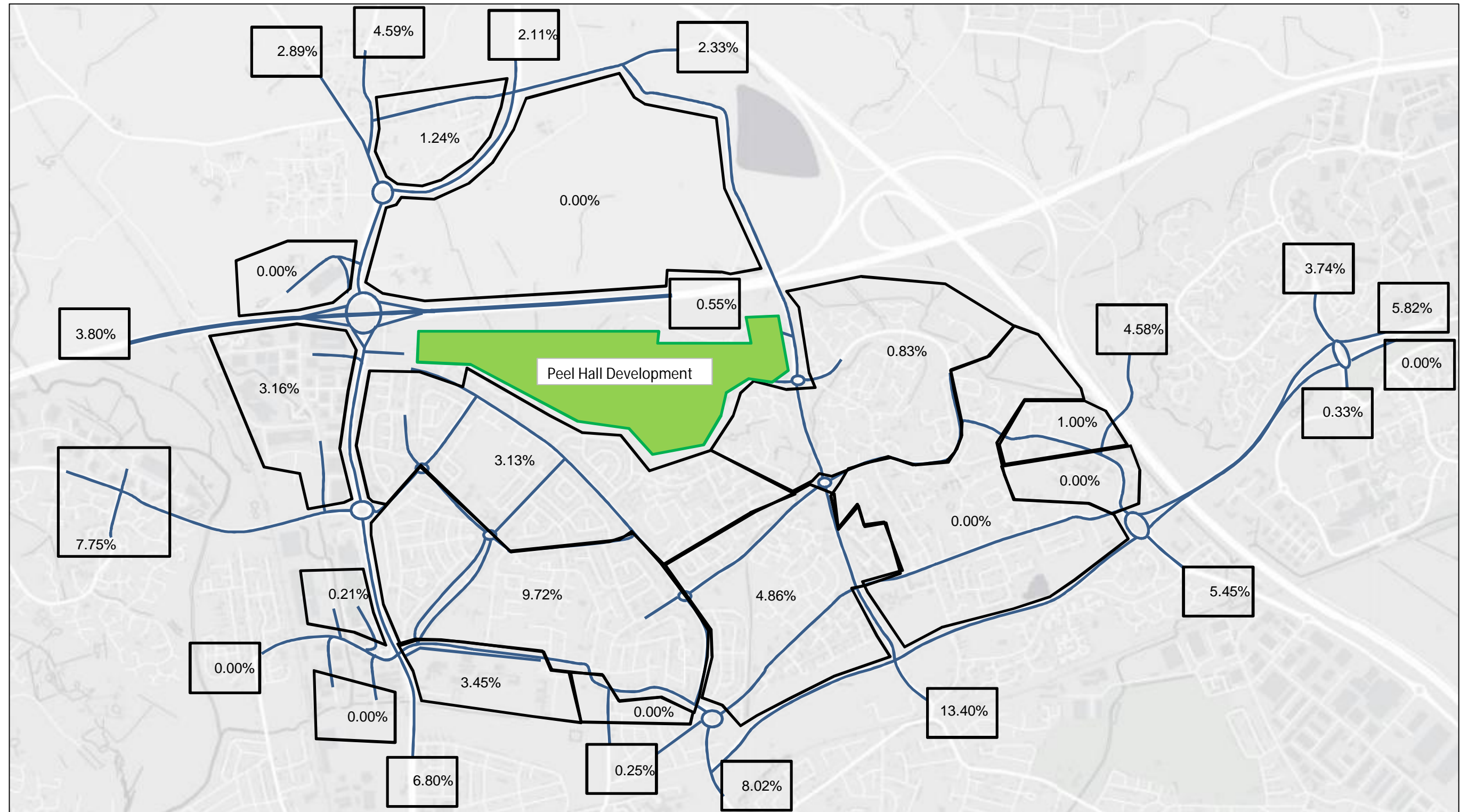


** Due to rounding to nearest number within Excel, percentages presented might not fully add to 100%

Peel Hall SATURN Model - Trip
Distribution

Appendix B, Figure 3, AM Percentage
Distribution for Other Trips from Peel Hall
Development

AECOM

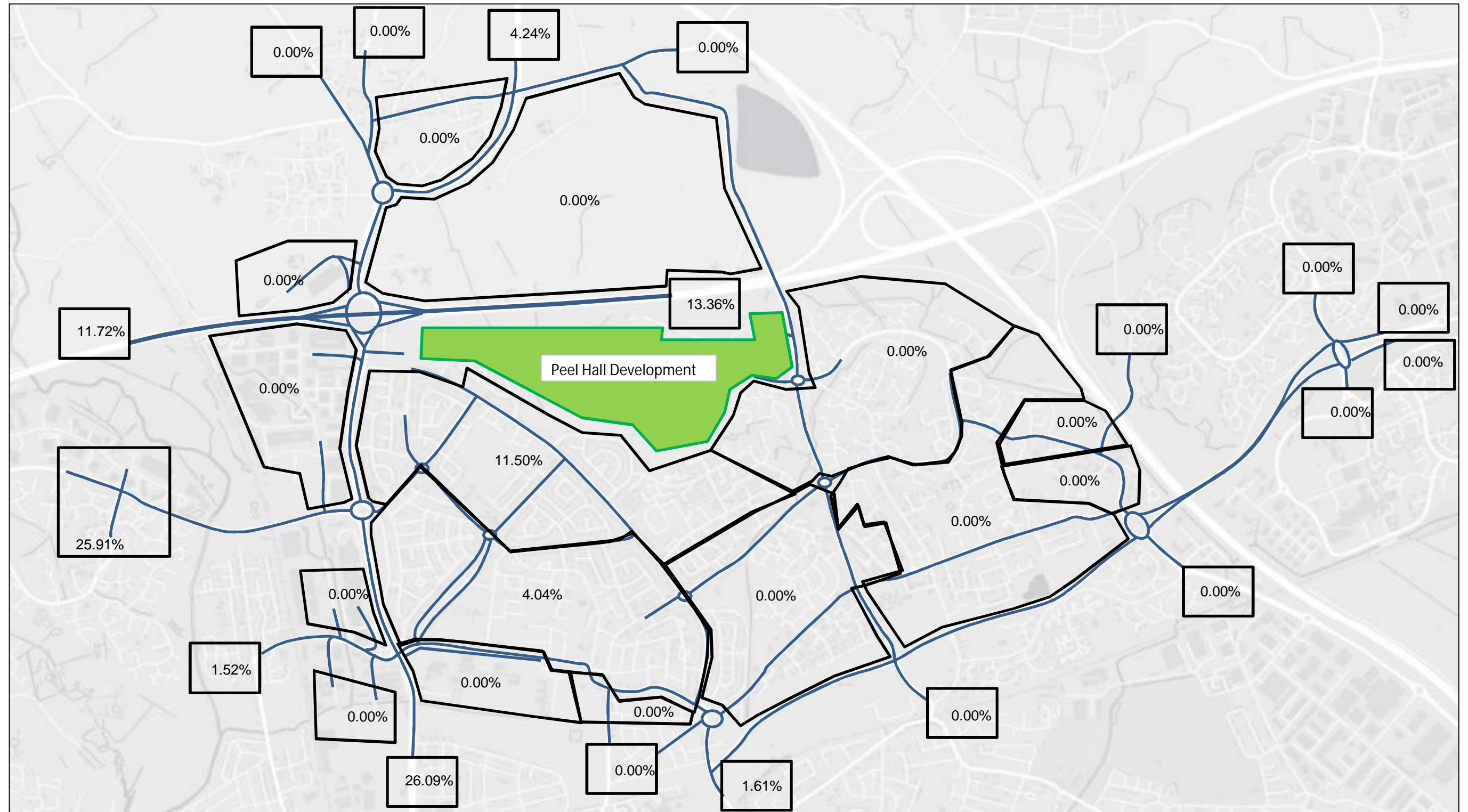


** Due to rounding to nearest number within Excel, percentages presented might not fully add to 100%

Peel Hall SATURN Model - Trip Distribution

Appendix B, Figure 4, AM Percentage Distribution for All Trips from Peel Hall Development

AECOM

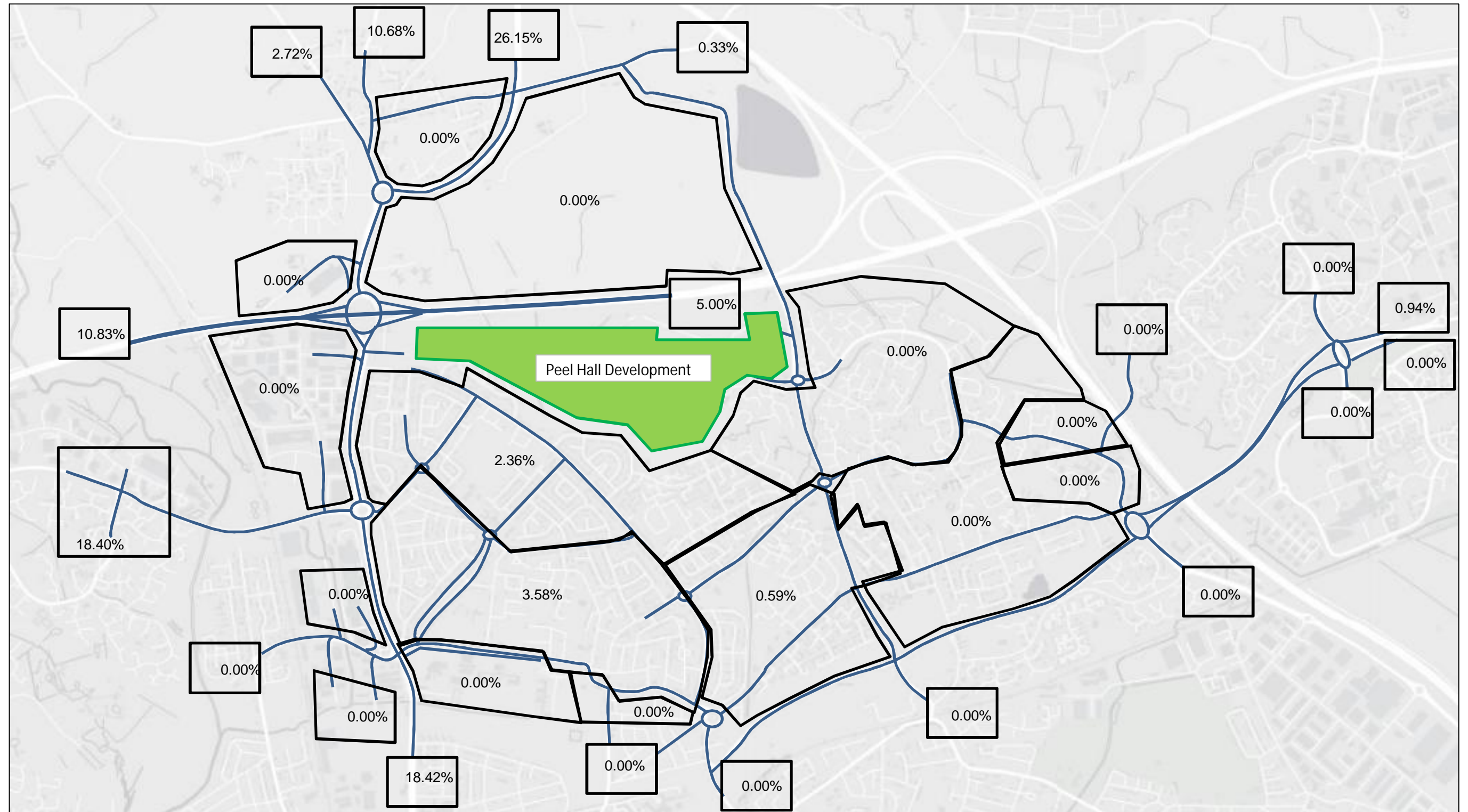


** Due to rounding to nearest number within Excel, percentages presented might not fully add to 100%

Peel Hall SATURN Model - Trip Distribution

Appendix B, Figure 6, AM Percentage Distribution for Work Trips to Peel Hall Development



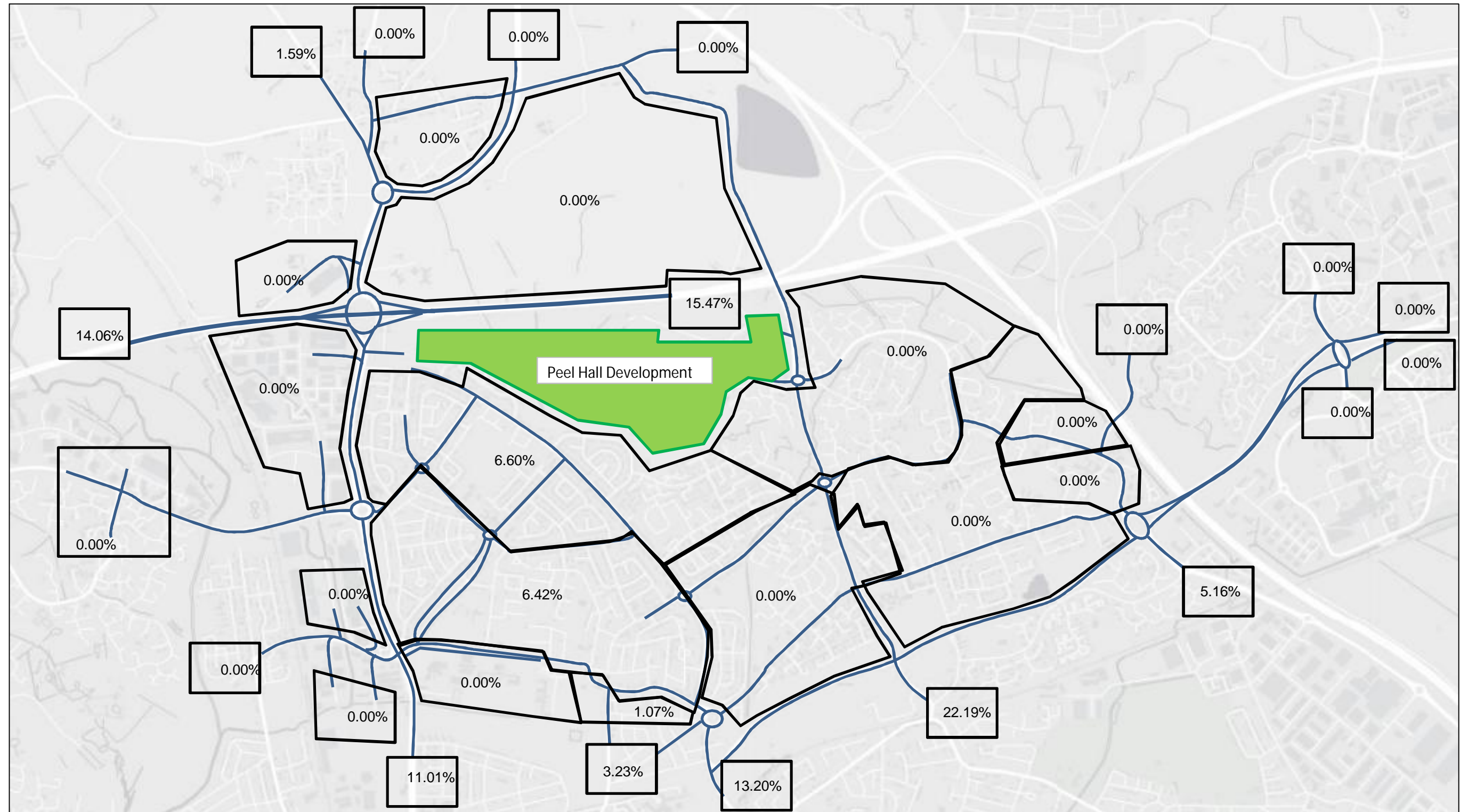


** Due to rounding to nearest number within Excel, percentages presented might not fully add to 100%

Peel Hall SATURN Model - Trip
Distribution

Appendix B, Figure 10, PM Percentage
Distribution for Work Trips from Peel Hall
Development

AECOM

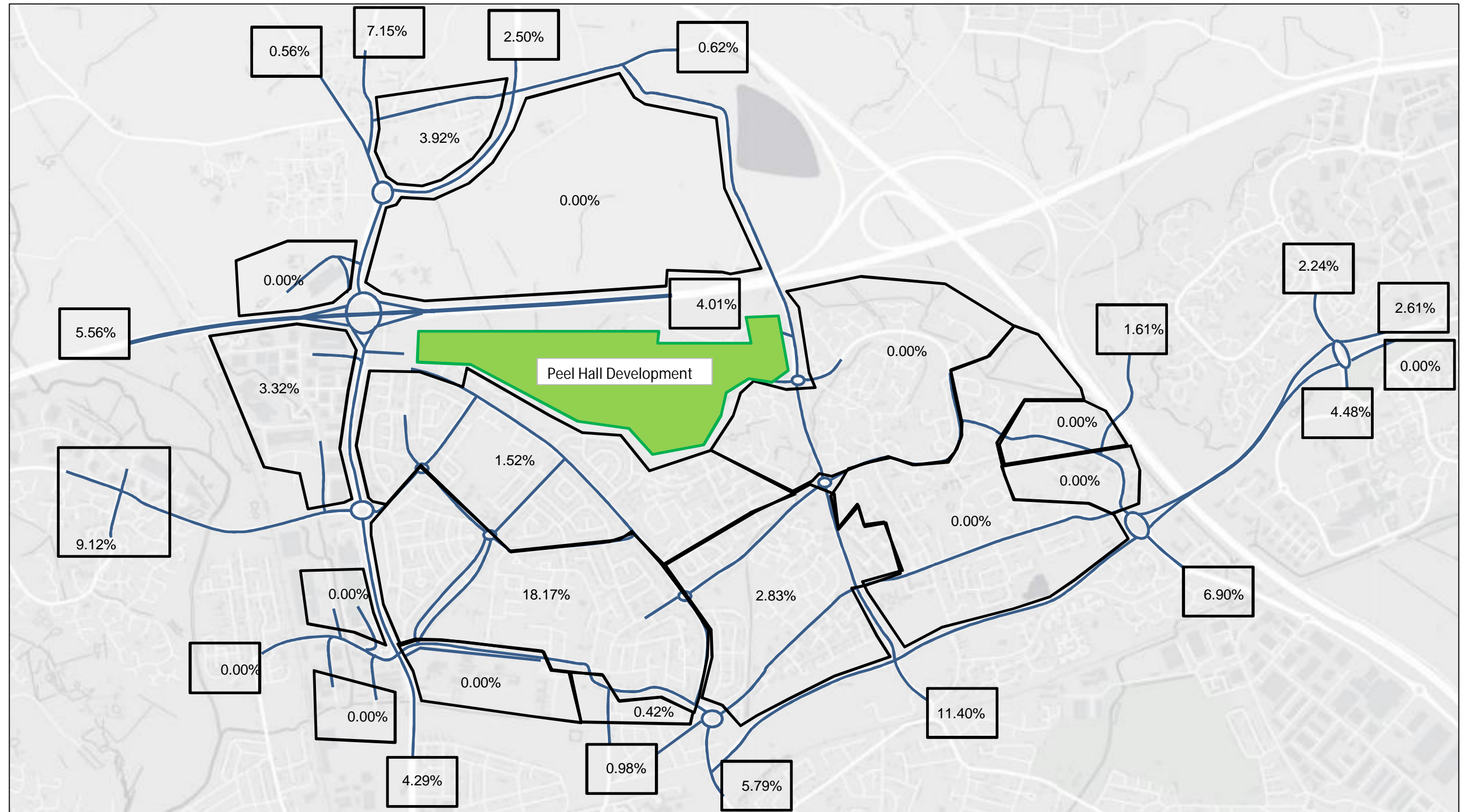


** Due to rounding to nearest number within Excel, percentages presented might not fully add to 100%

Peel Hall SATURN Model - Trip Distribution

Appendix B, Figure 11, PM Percentage Distribution for Other Trips from Peel Hall Development

AECOM

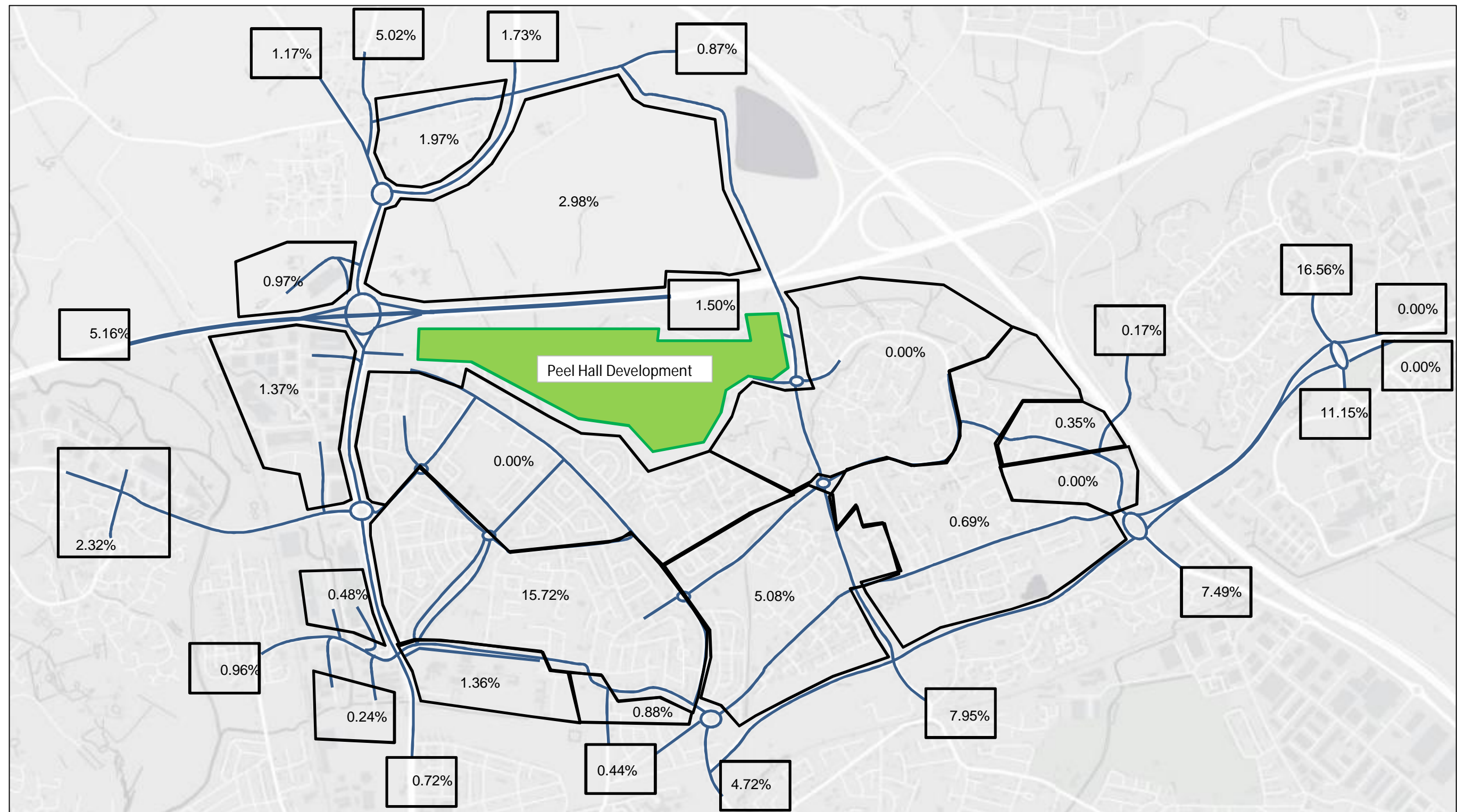


** Due to rounding to nearest number within Excel, percentages presented might not fully add to 100%

Peel Hall SATURN Model - Trip Distribution

Appendix B, Figure 12, PM Percentage Distribution for All Trips from Peel Hall Development



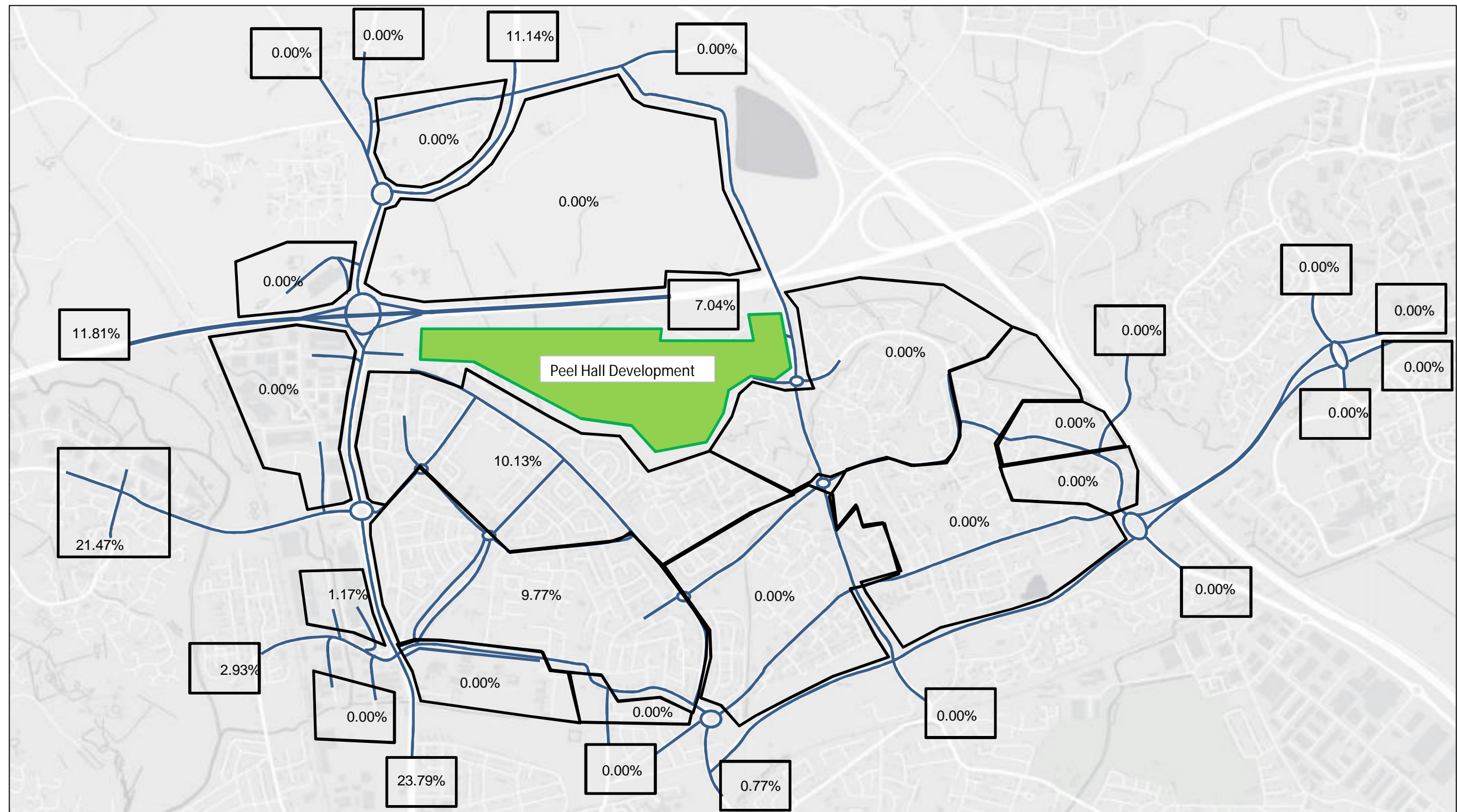


** Due to rounding to nearest number within Excel, percentages presented might not fully add to 100%

Peel Hall SATURN Model - Trip Distribution

Appendix B, Figure 13, PM Percentage Distribution for Residential Trips to Peel Hall Development



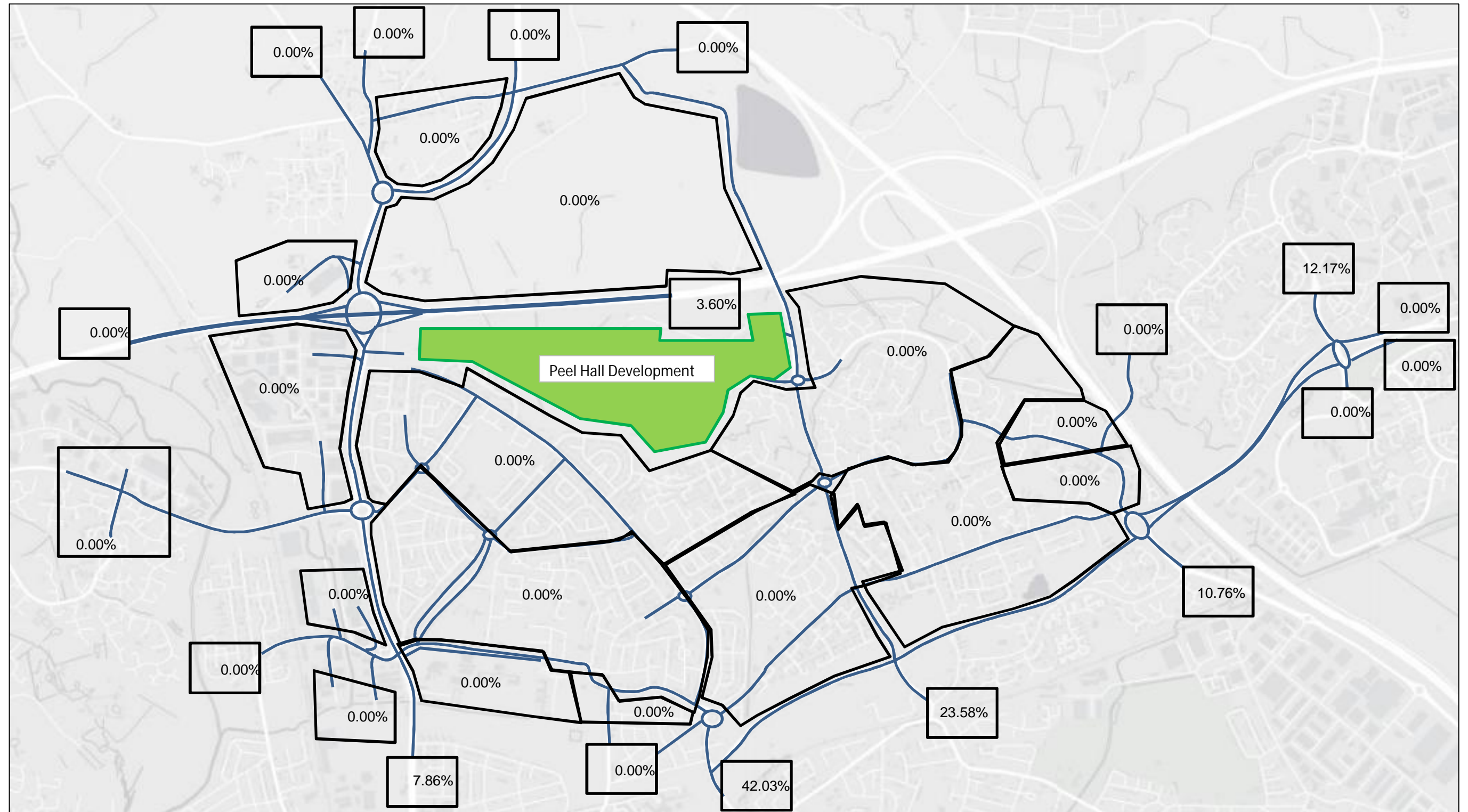


** Due to rounding to nearest number within Excel, percentages presented might not fully add to 100%

Peel Hall SATURN Model - Trip
Distribution

Appendix B, Figure 14, PM Percentage
Distribution for Work Trips to Peel Hall
Development

AECOM

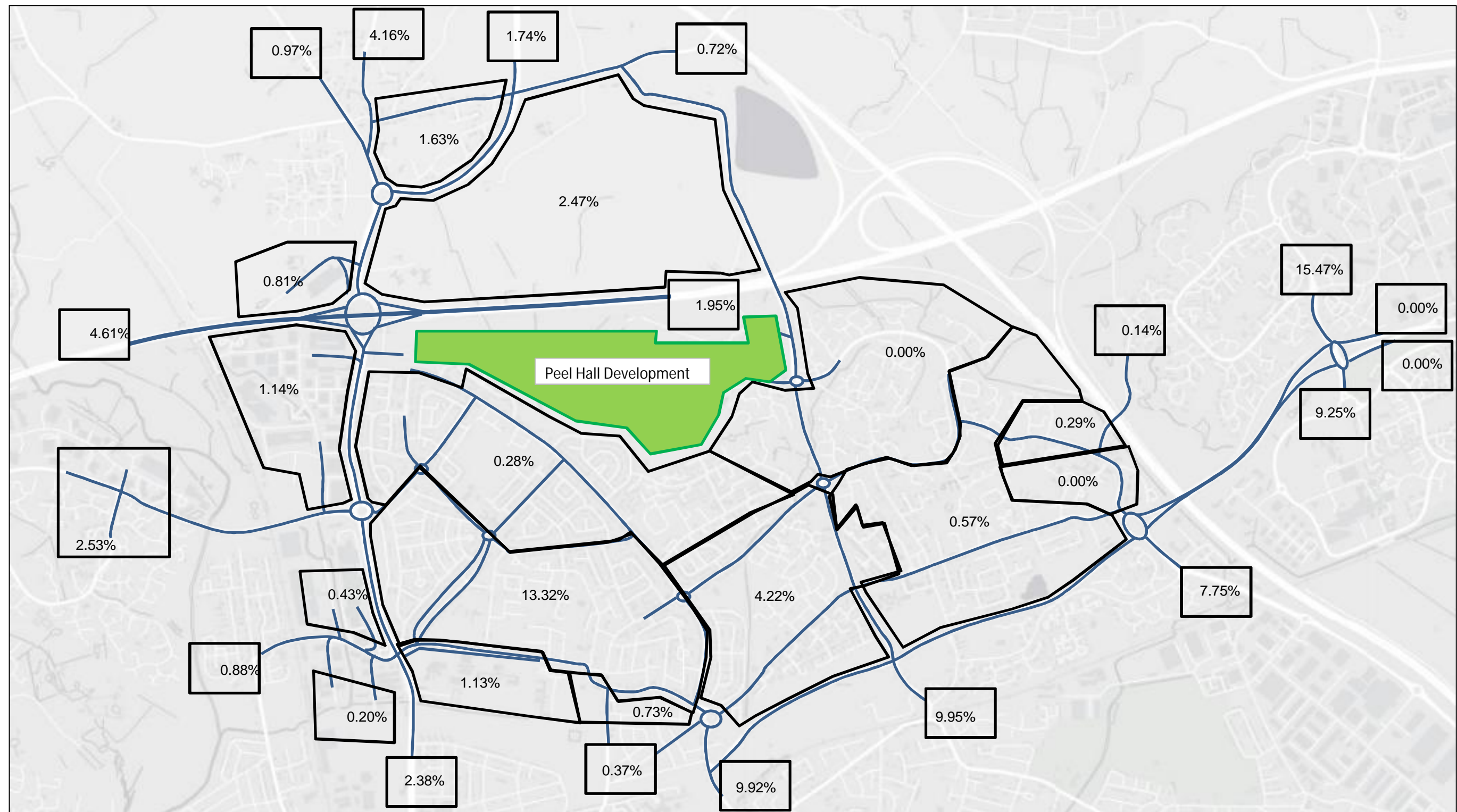


** Due to rounding to nearest number within Excel, percentages presented might not fully add to 100%

Peel Hall SATURN Model - Trip
Distribution

Appendix B, Figure 15, PM Percentage
Distribution for Other Trips to Peel Hall
Development

AECOM



** Due to rounding to nearest number within Excel, percentages presented might not fully add to 100%

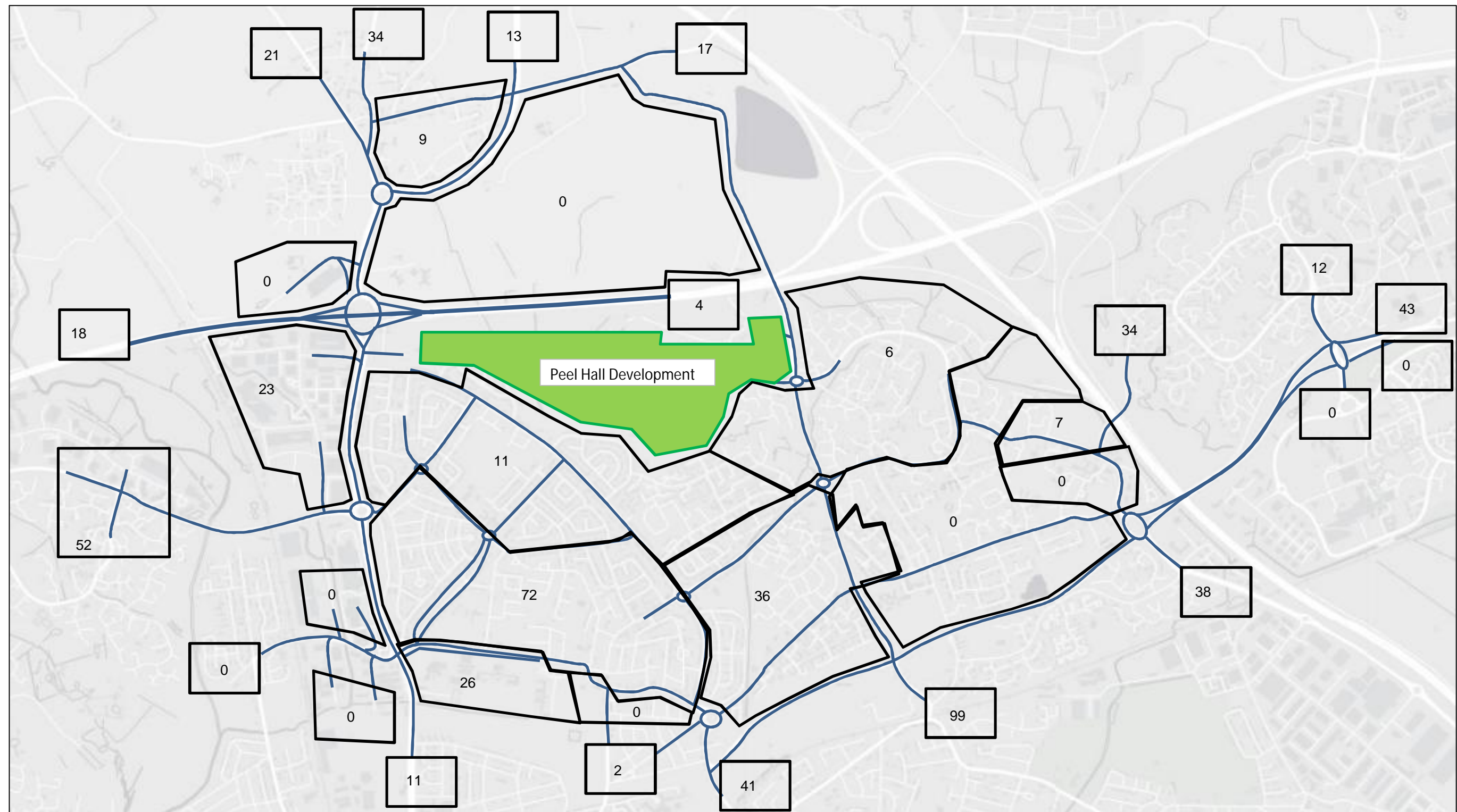
Peel Hall SATURN Model - Trip Distribution

Appendix B, Figure 16, PM Percentage Distribution for All Trips to Peel Hall Development



Appendix C

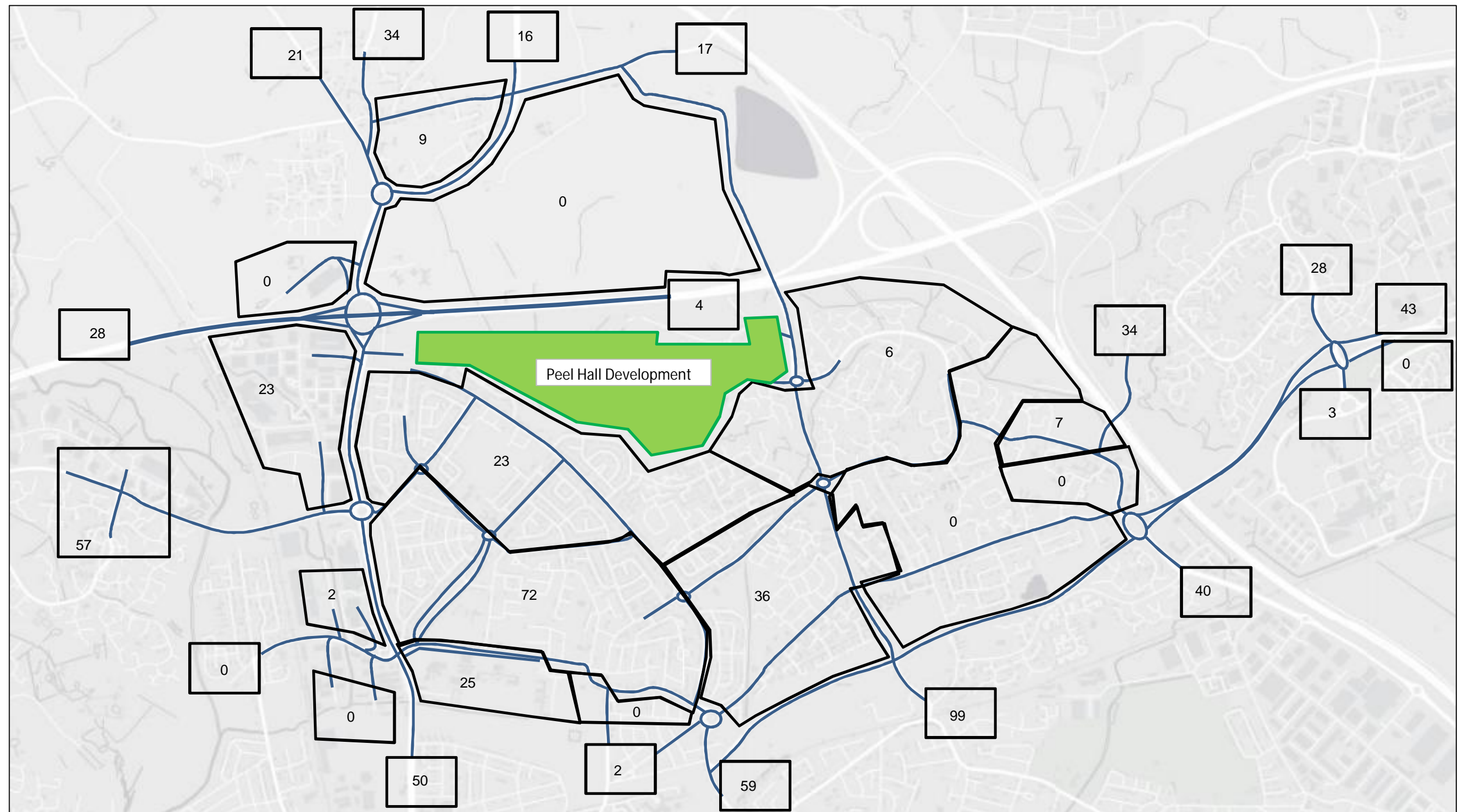
Total Proposed Trips per Time Period



Peel Hall SATURN Model - Trip Distribution

Appendix C, Figure 1, AM (0800-0900)
Residential Trips from Peel Hall Development

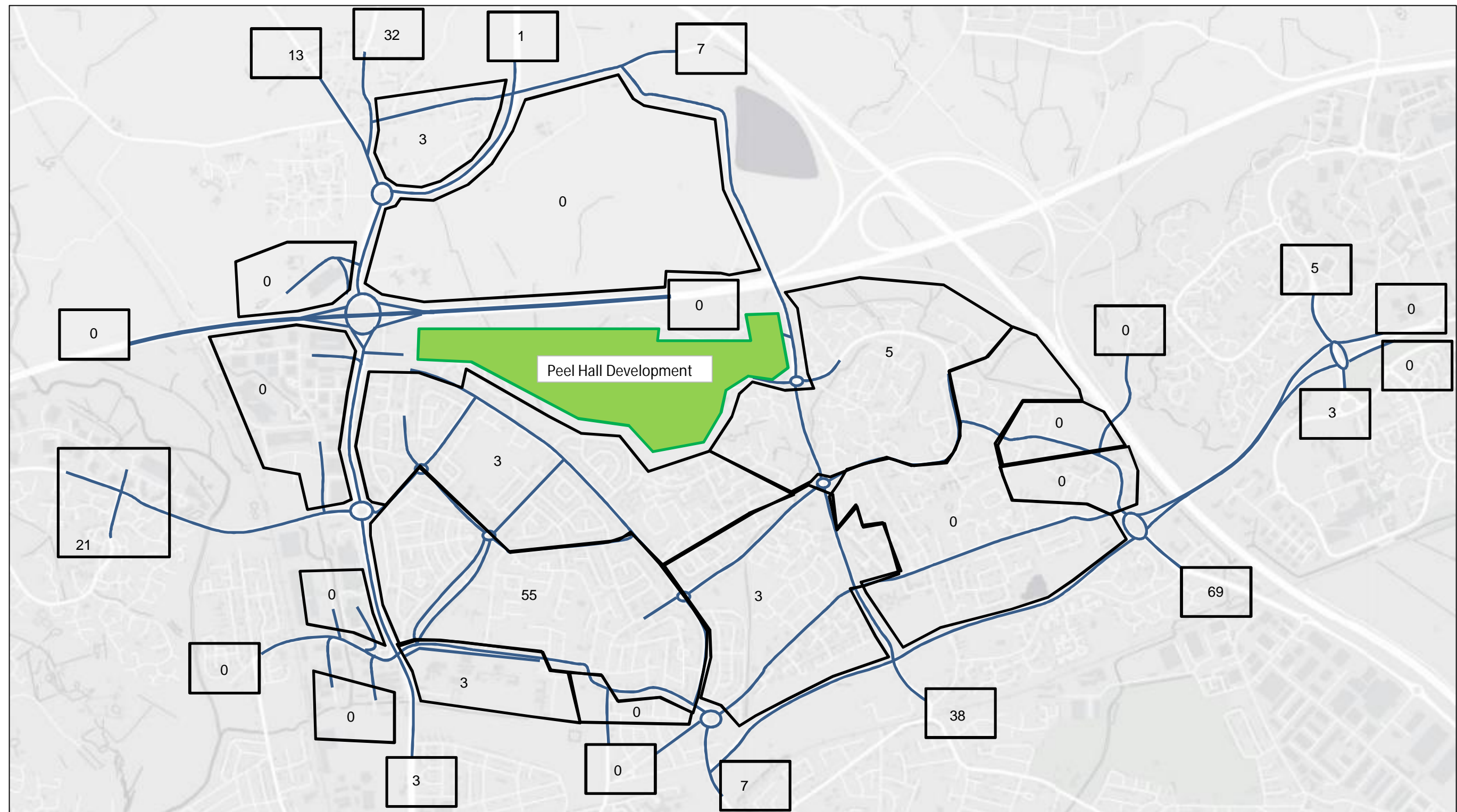
AECOM



Peel Hall SATURN Model - Trip Distribution

Appendix C, Figure 4, AM (0800-0900)
Total Trips from Peel Hall Development

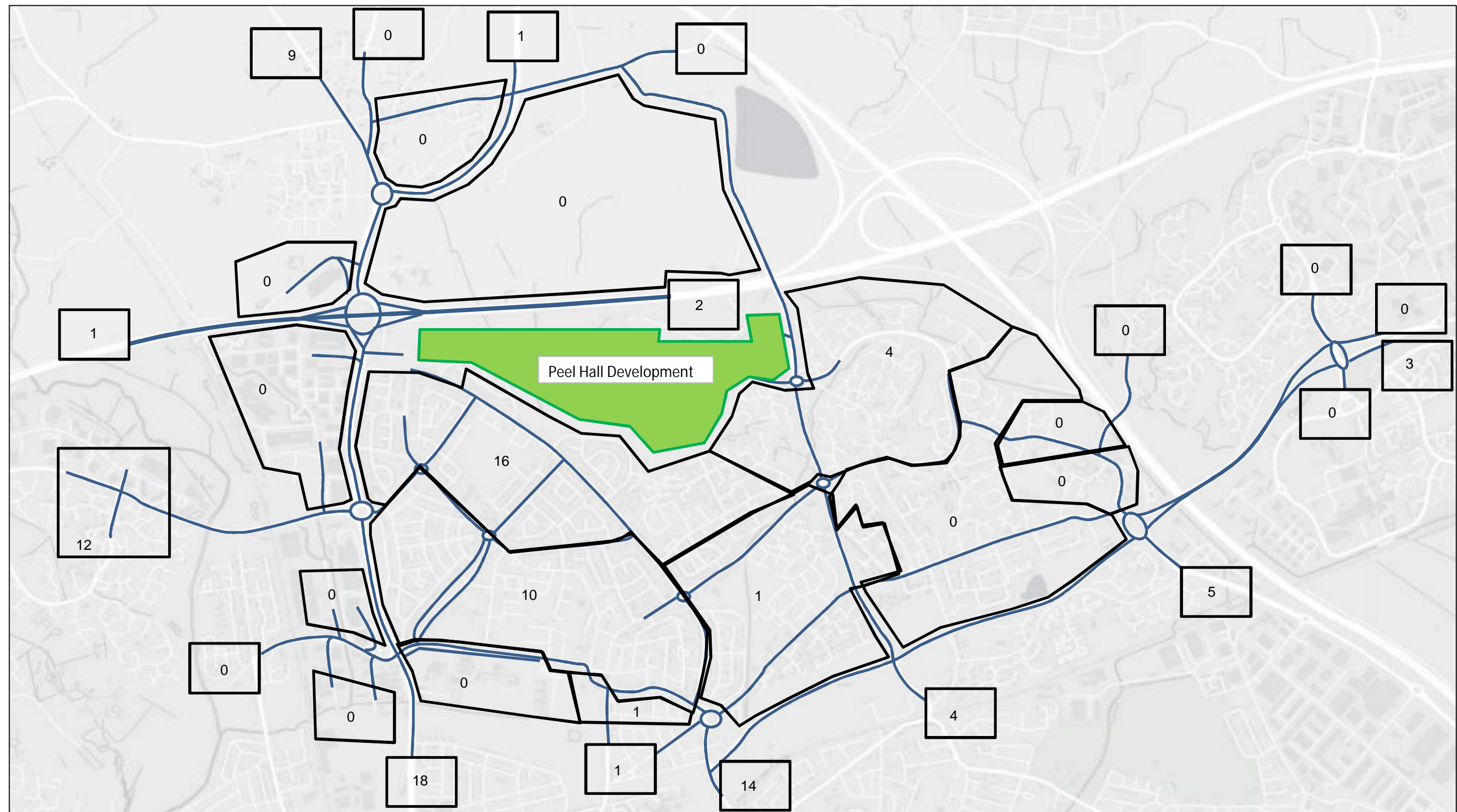
AECOM



Peel Hall SATURN Model - Trip Distribution

Appendix C, Figure 5, AM (0800-0900)
Residential Trips to Peel Hall Development

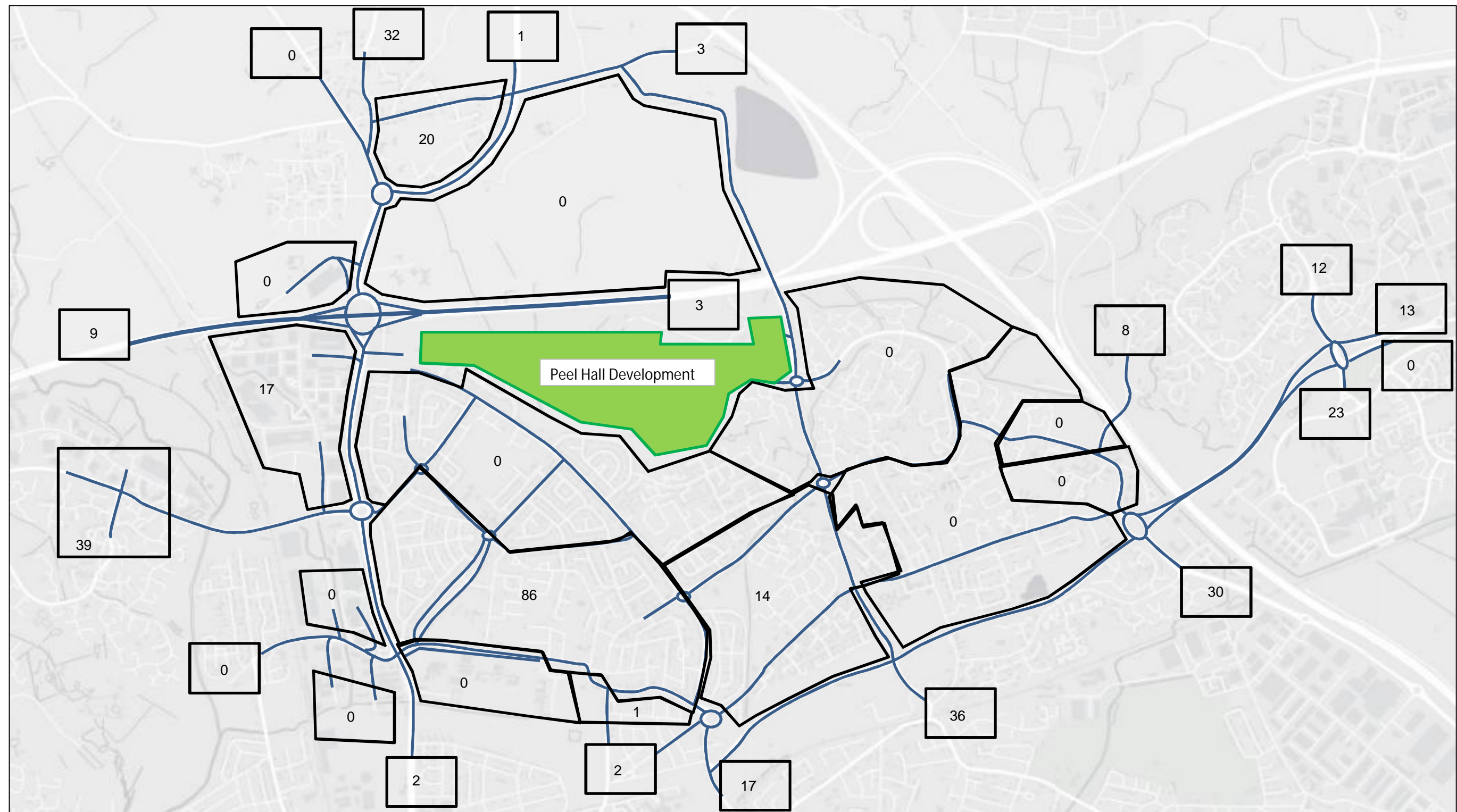




Peel Hall SATURN Model - Trip Distribution

Appendix C, Figure 7, AM (0800-0900)
Other Trips to Peel Hall Development

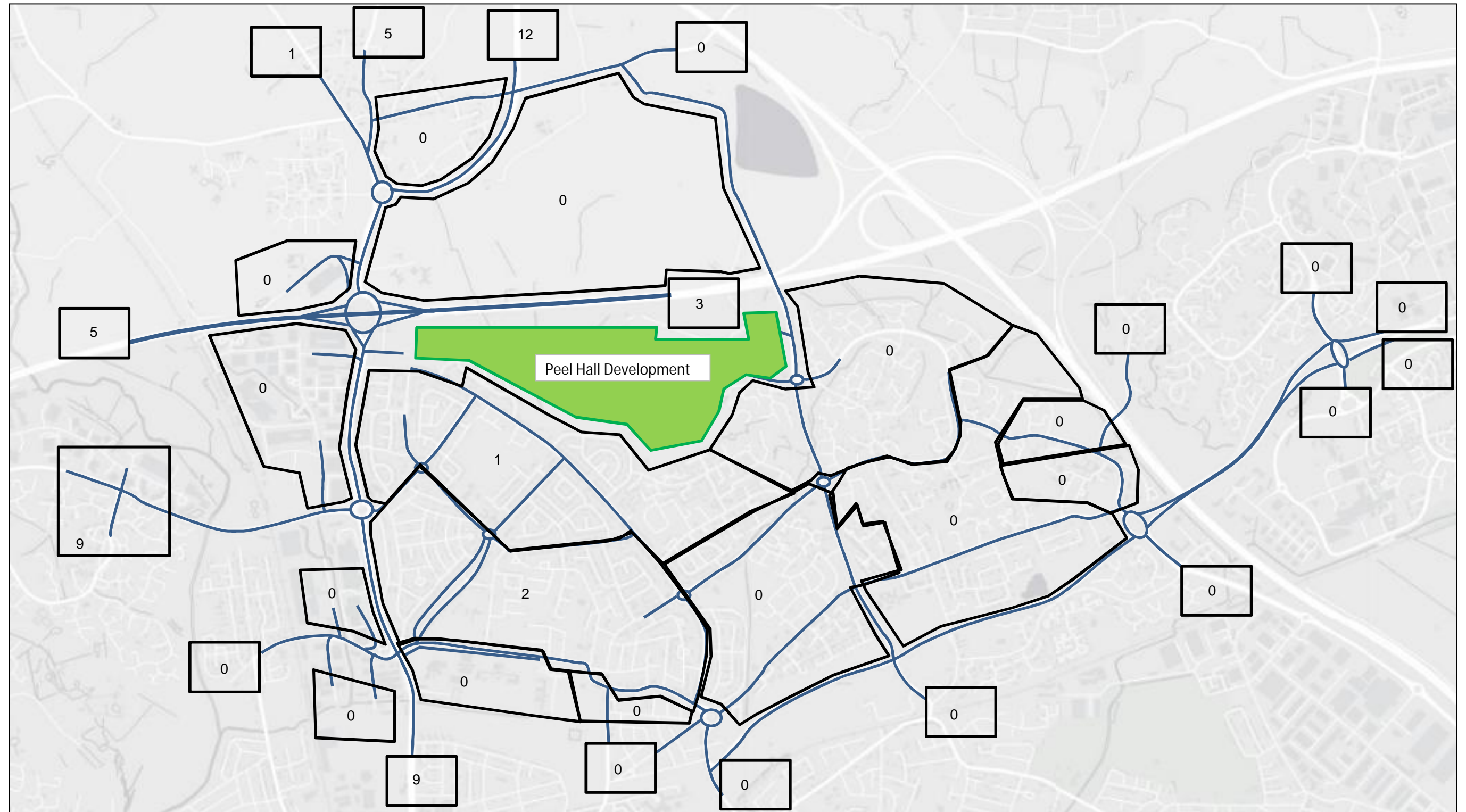




Peel Hall SATURN Model - Trip Distribution

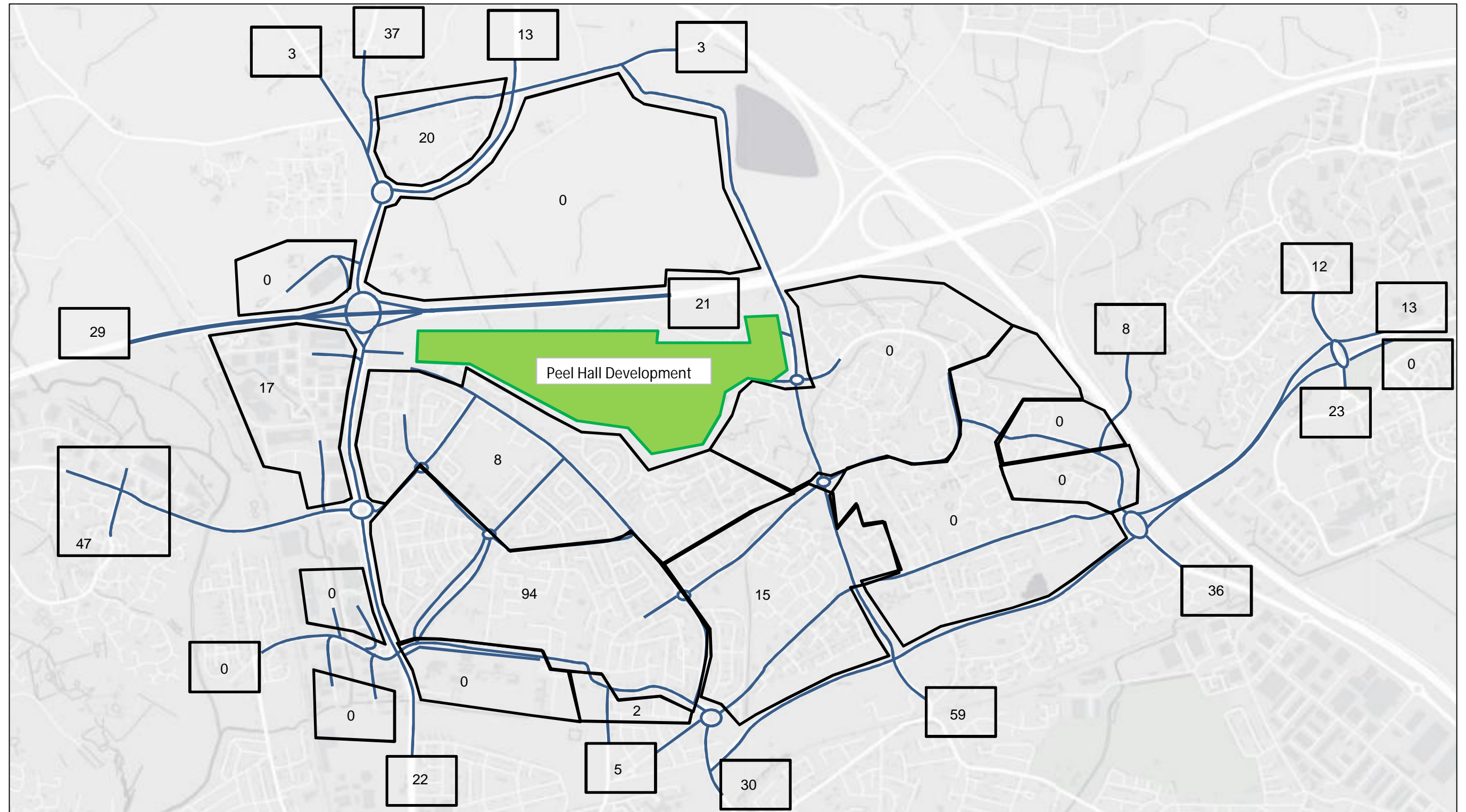
Appendix C, Figure 9, PM (1700-1800)
Residential Trips from Peel Hall Development

AECOM



Peel Hall SATURN Model - Trip Distribution

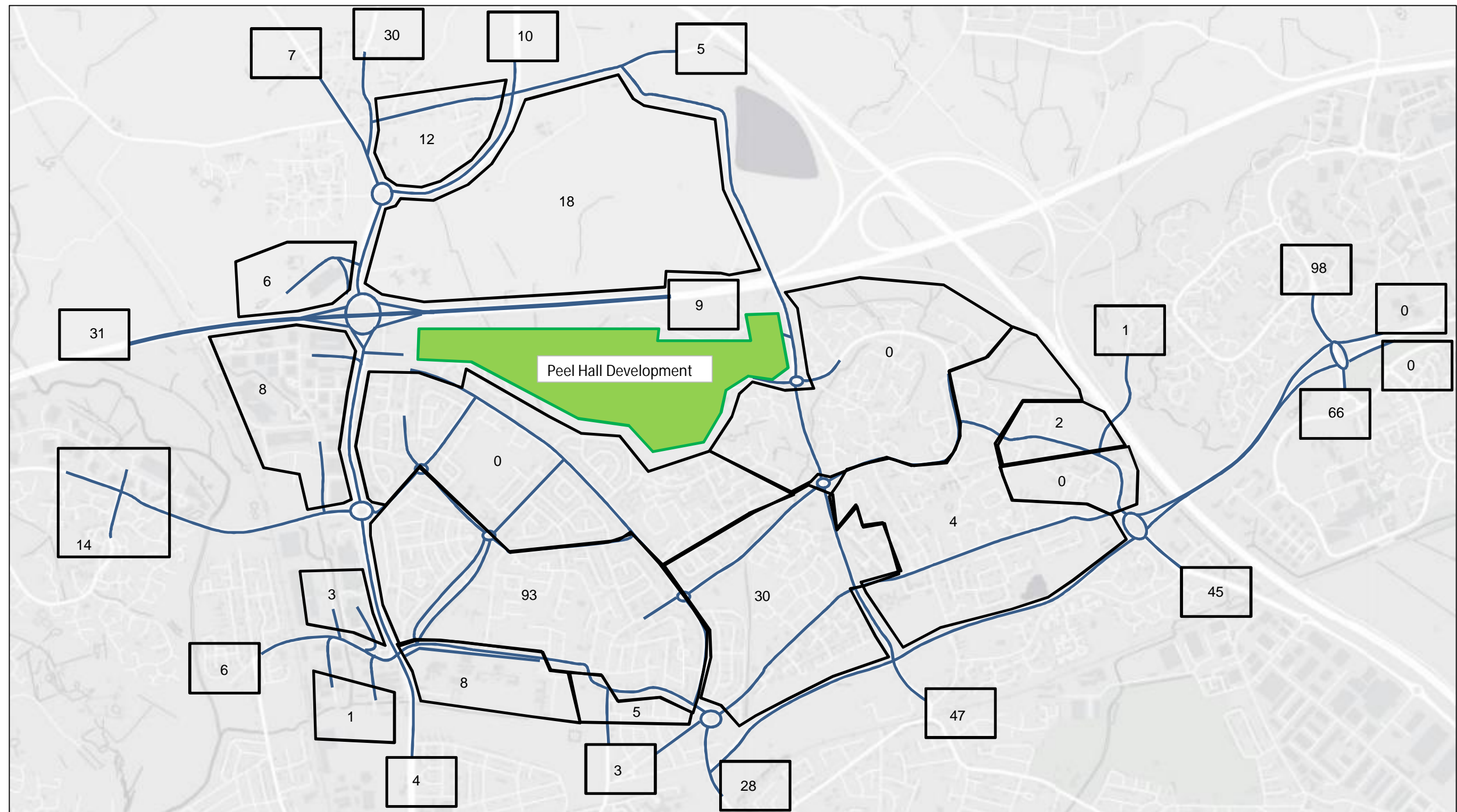
Appendix C, Figure 10, PM (1700-1800)
Work Trips from Peel Hall Development



Peel Hall SATURN Model - Trip Distribution

Appendix C, Figure 12, PM (1700-1800)
Total Trips from Peel Hall Development

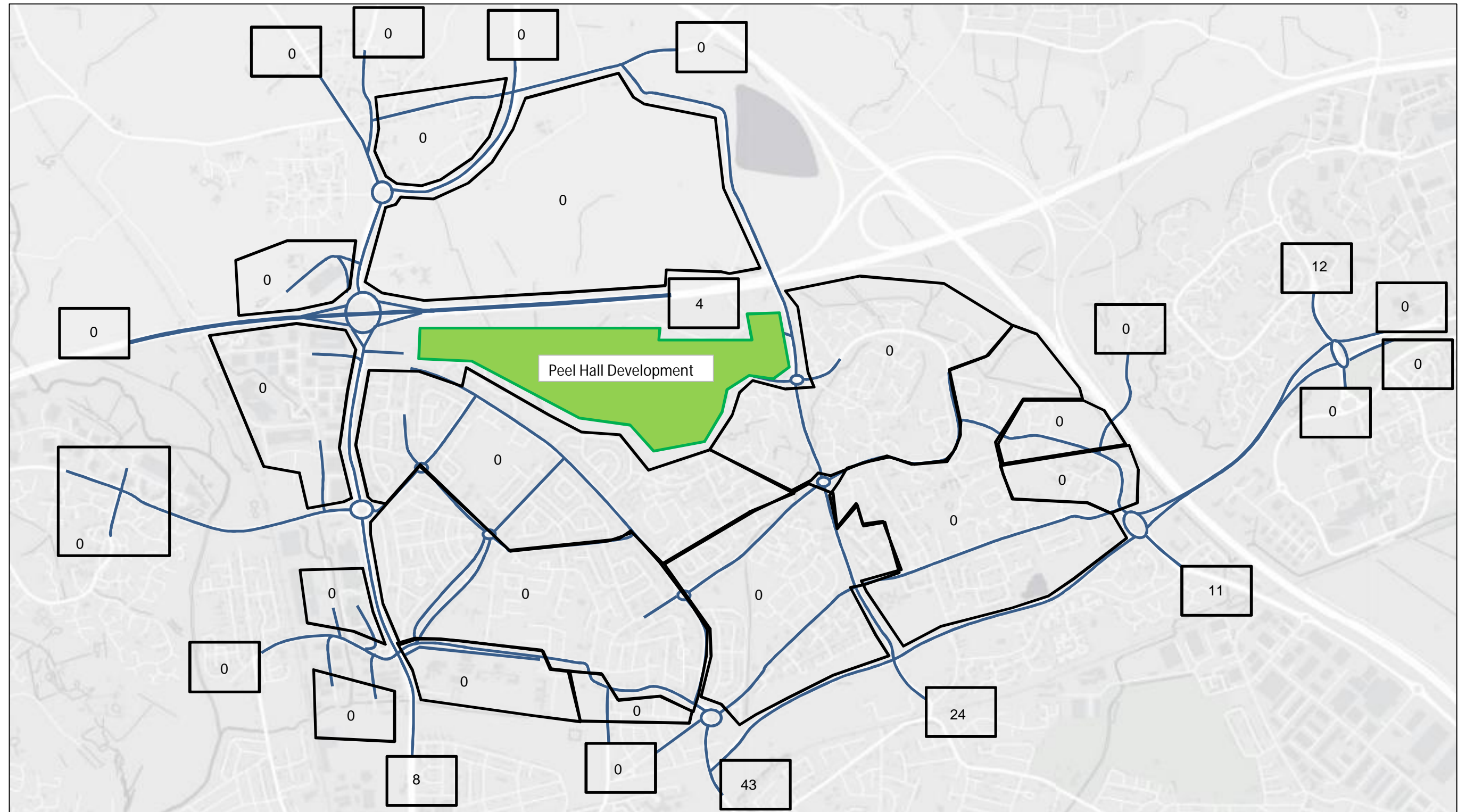
AECOM



Peel Hall SATURN Model - Trip Distribution

Appendix C, Figure 13, PM (1700-1800)
Residential Trips to Peel Hall Development

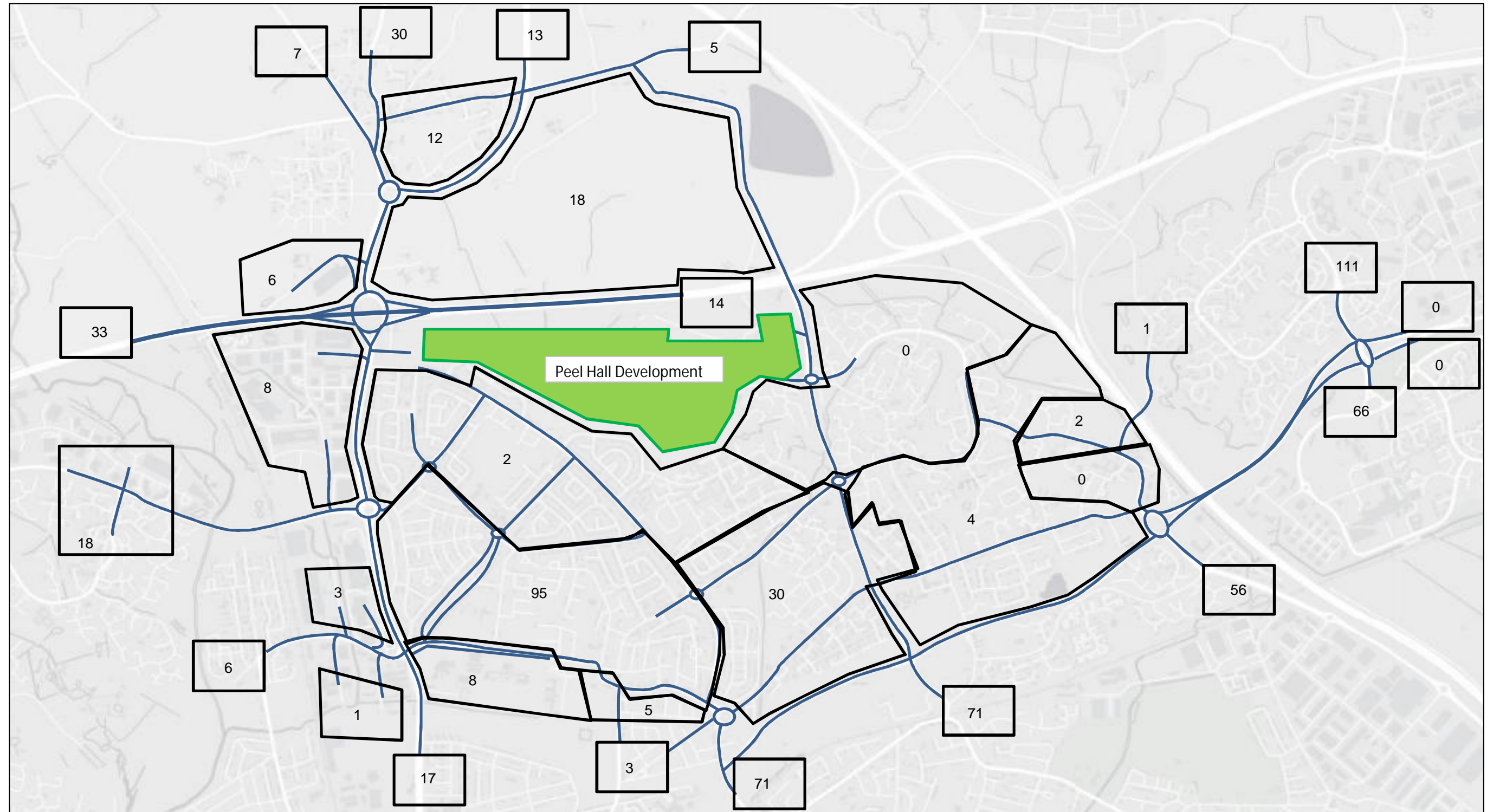




Peel Hall SATURN Model - Trip Distribution

Appendix C, Figure 15, PM (1700-1800)
Other Trips to Peel Hall Development



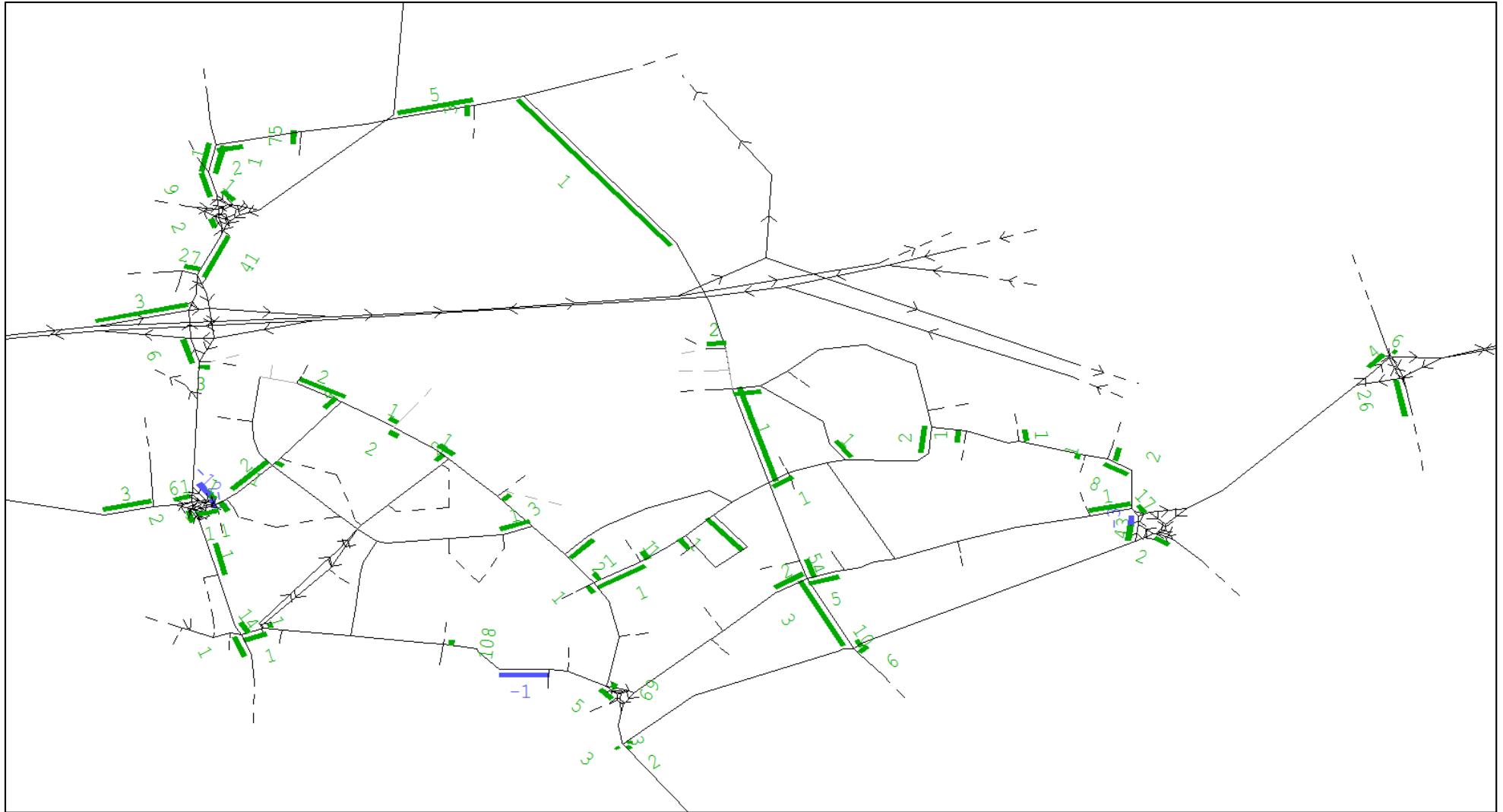


Peel Hall SATURN Model - Trip Distribution

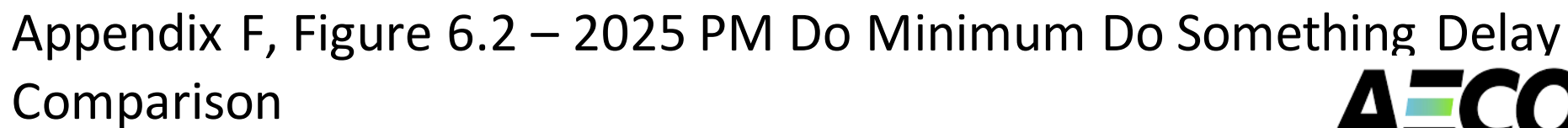
Appendix C, Figure 16, PM (1700-1800)
Total Trips to Peel Hall Development

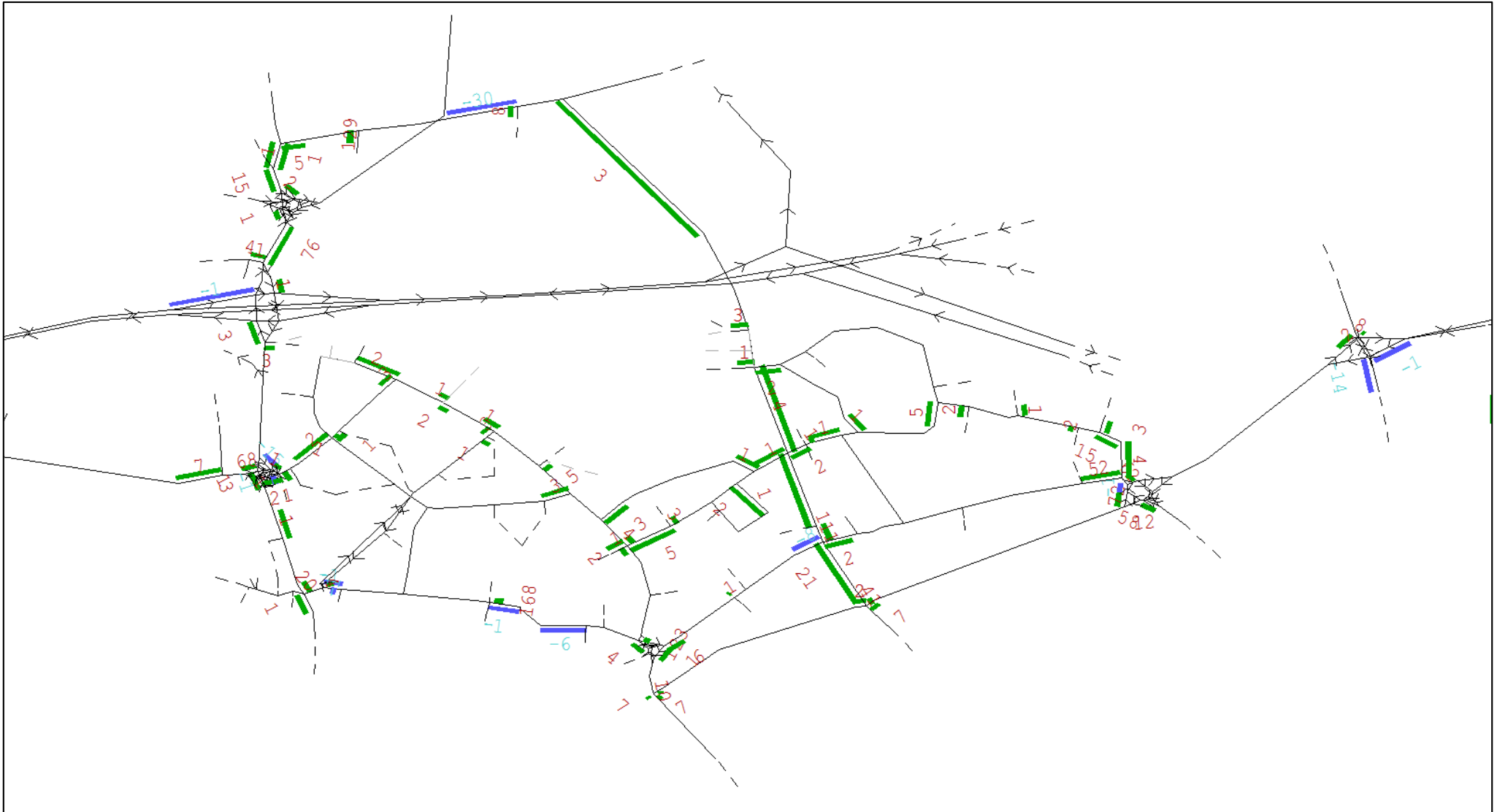


Appendix F Evidence Base for Delay Per Link

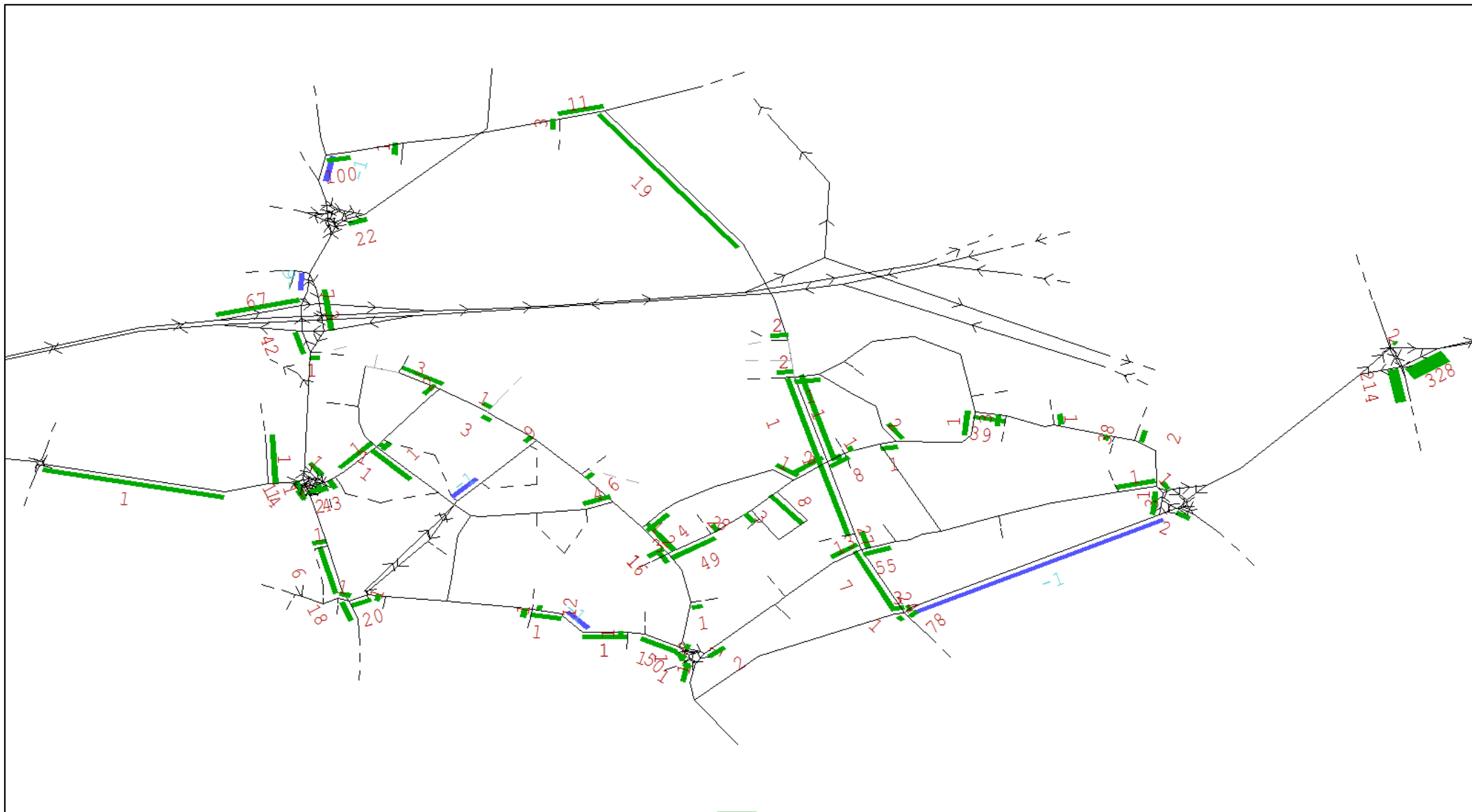


Appendix F, Figure 6.1 – 2025 AM Do Minimum Do Something Delay Comparison

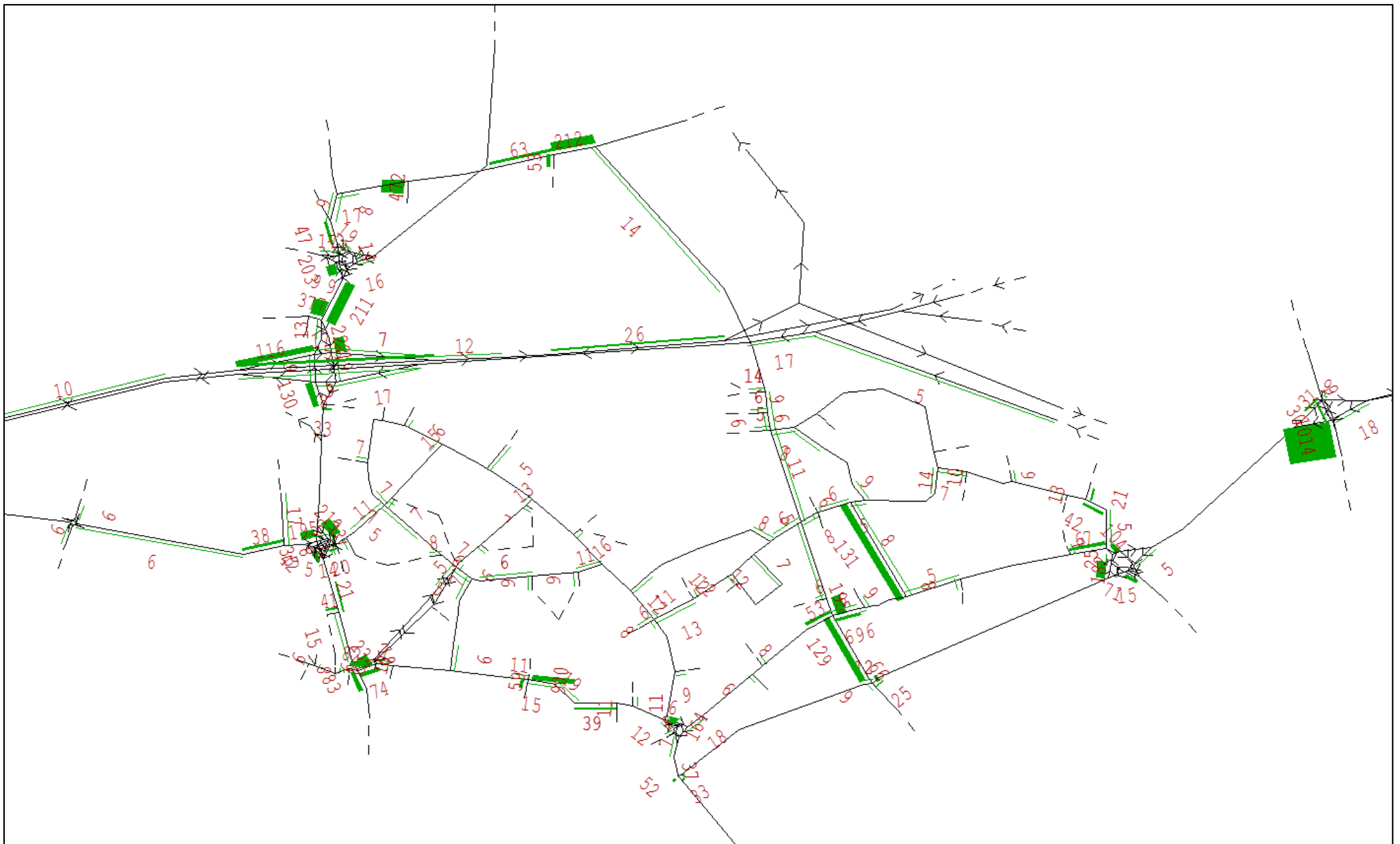




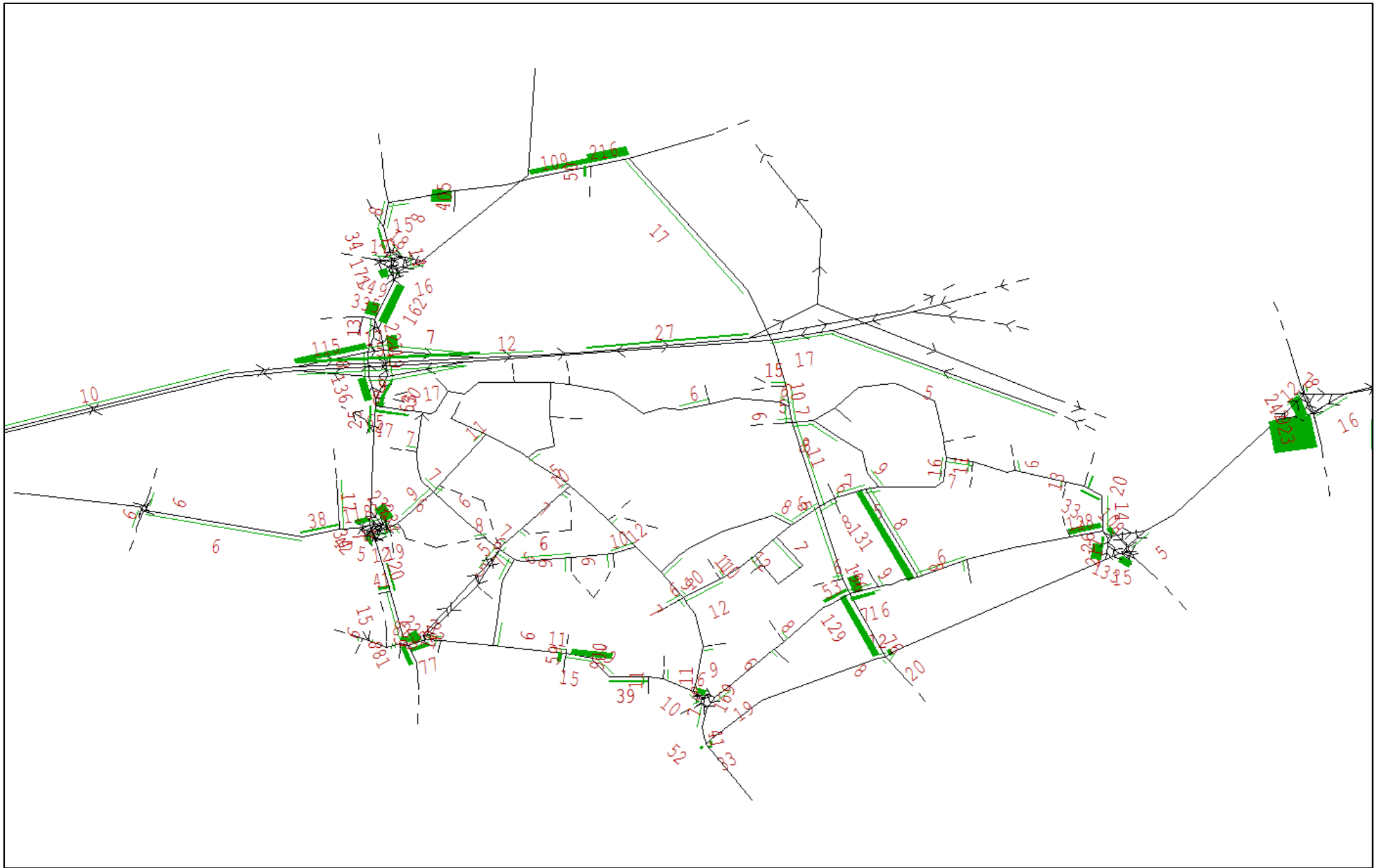
Appendix F, Figure 6.3 – 2030 AM Do Minimum Do Something Delay Comparison



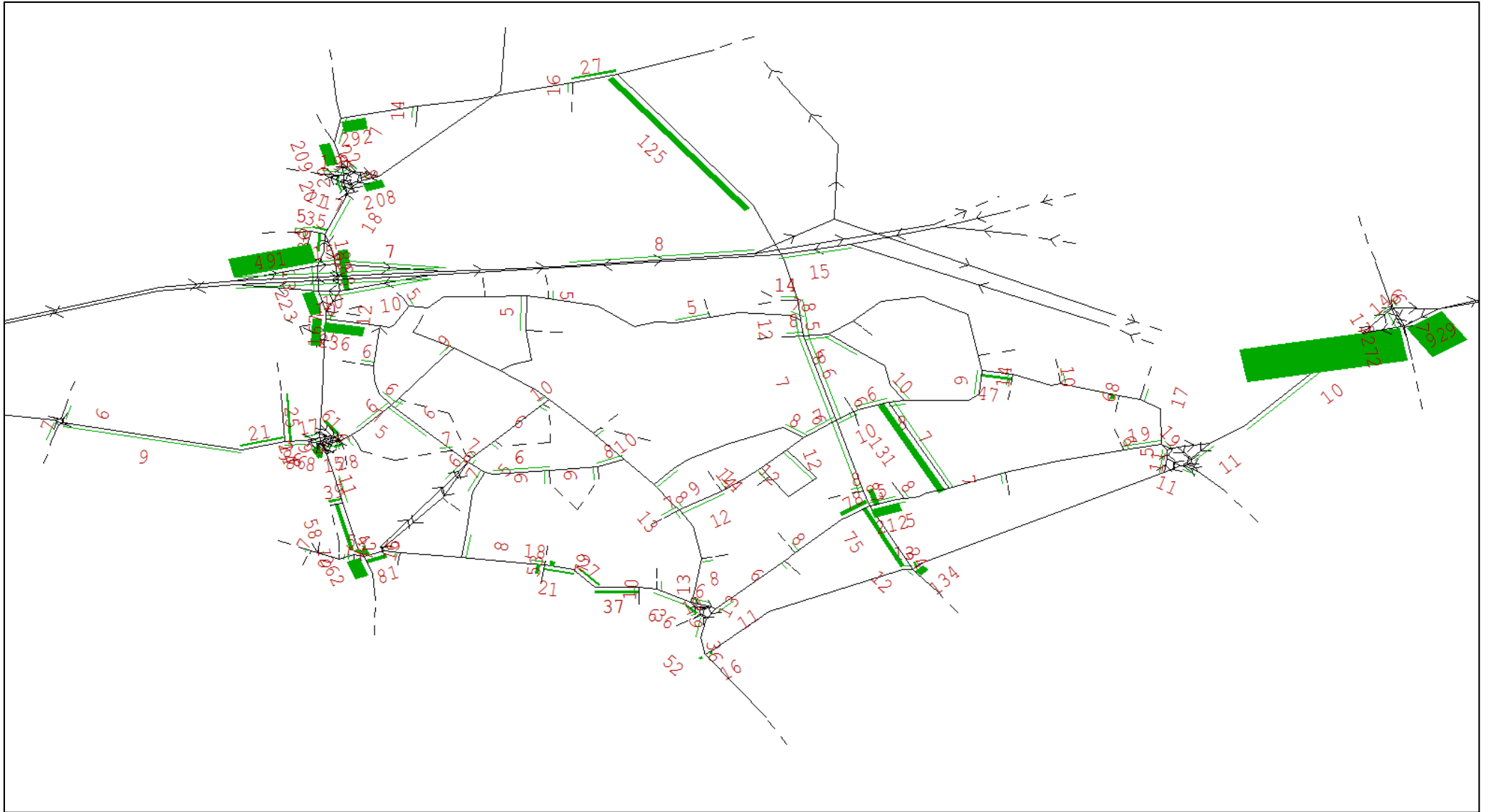
Appendix F, Figure 6.4 – 2030 PM Do Minimum Do Something Delay Comparison



Appendix F, Figure 6.5 – 2030 AM Do Something Total Delay

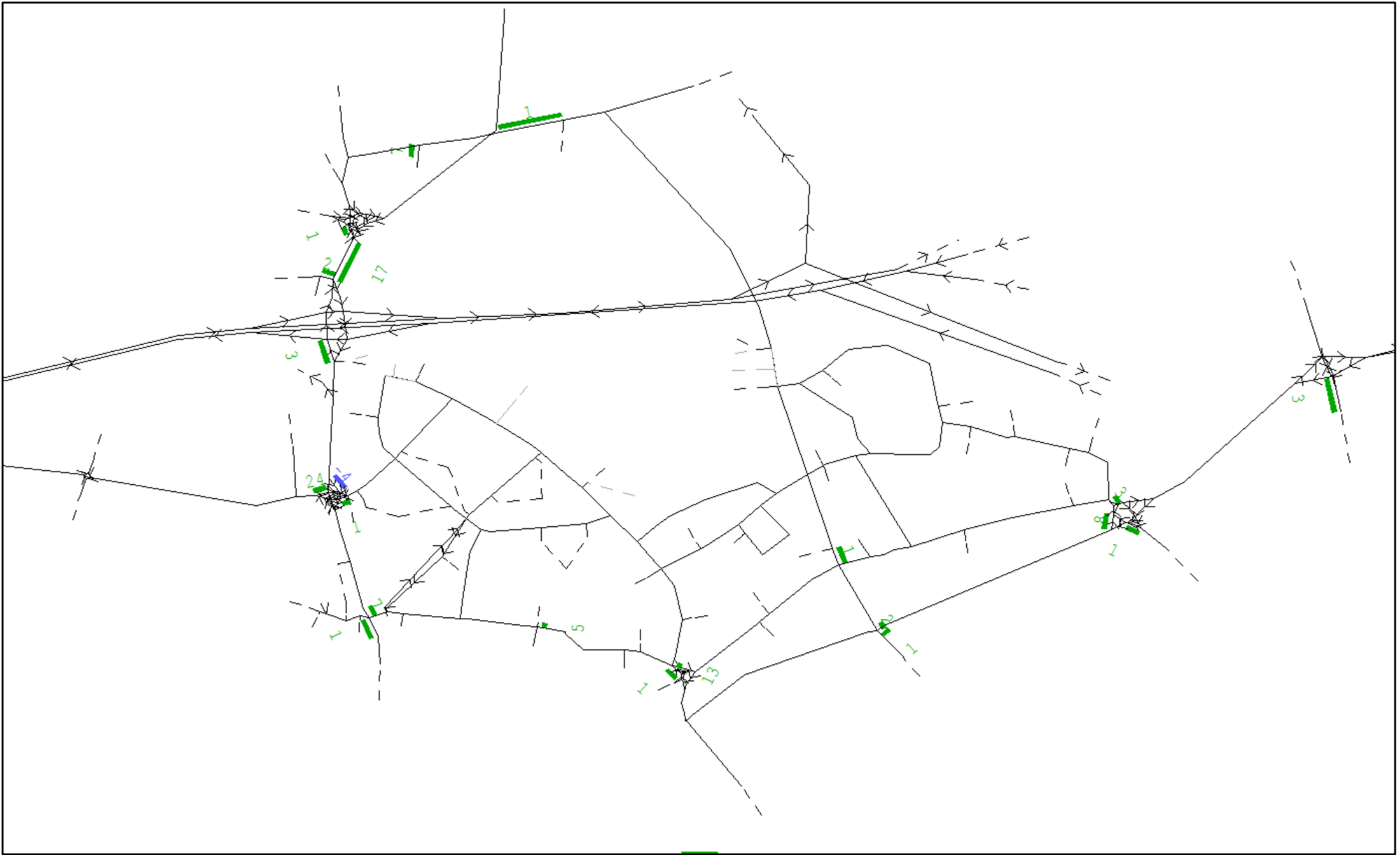


Appendix F, Figure 6.6 – 2030 AM Through Route Total Delay

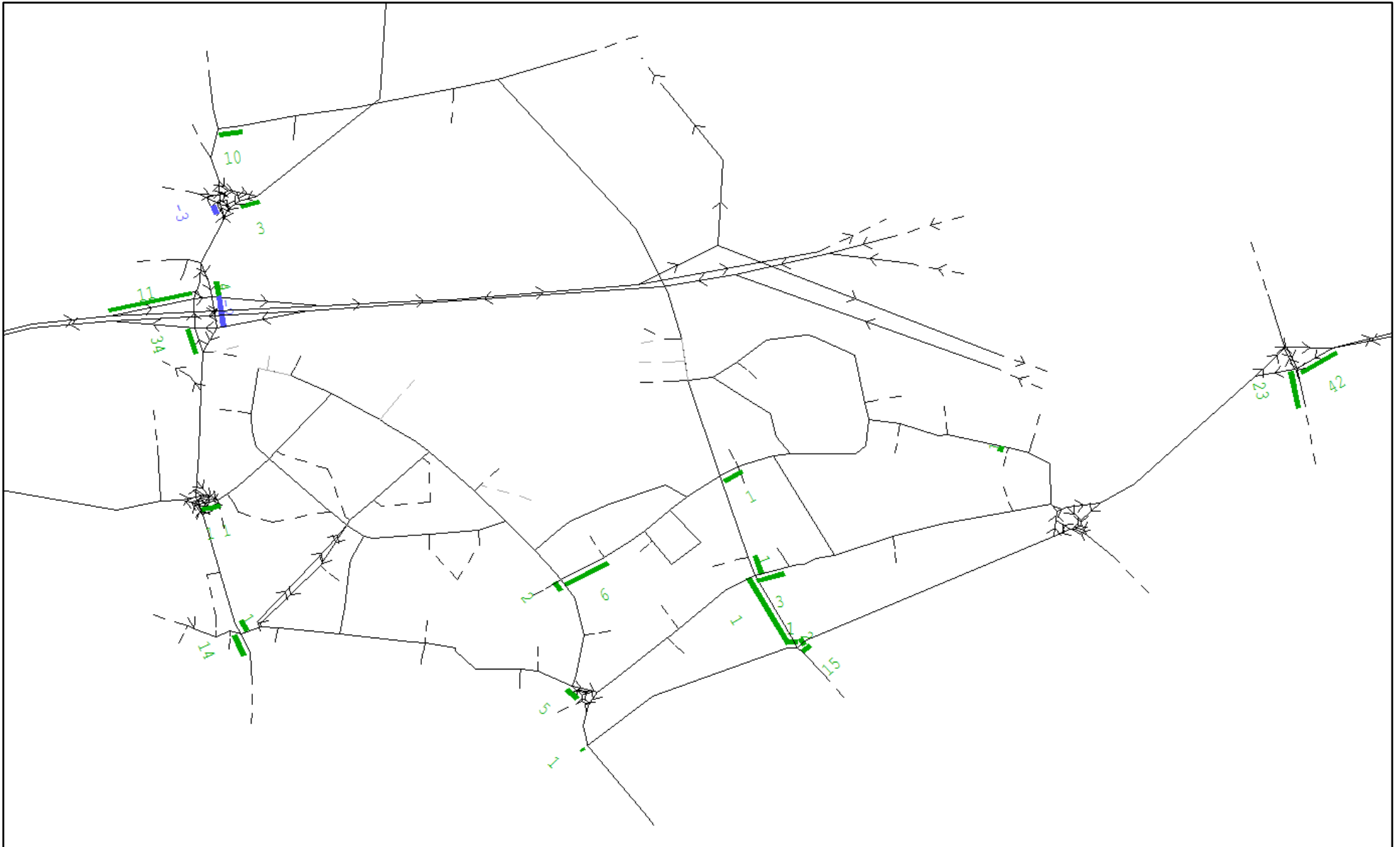


Appendix F, Figure 6.8 – 2030 PM Through Route Total Delay

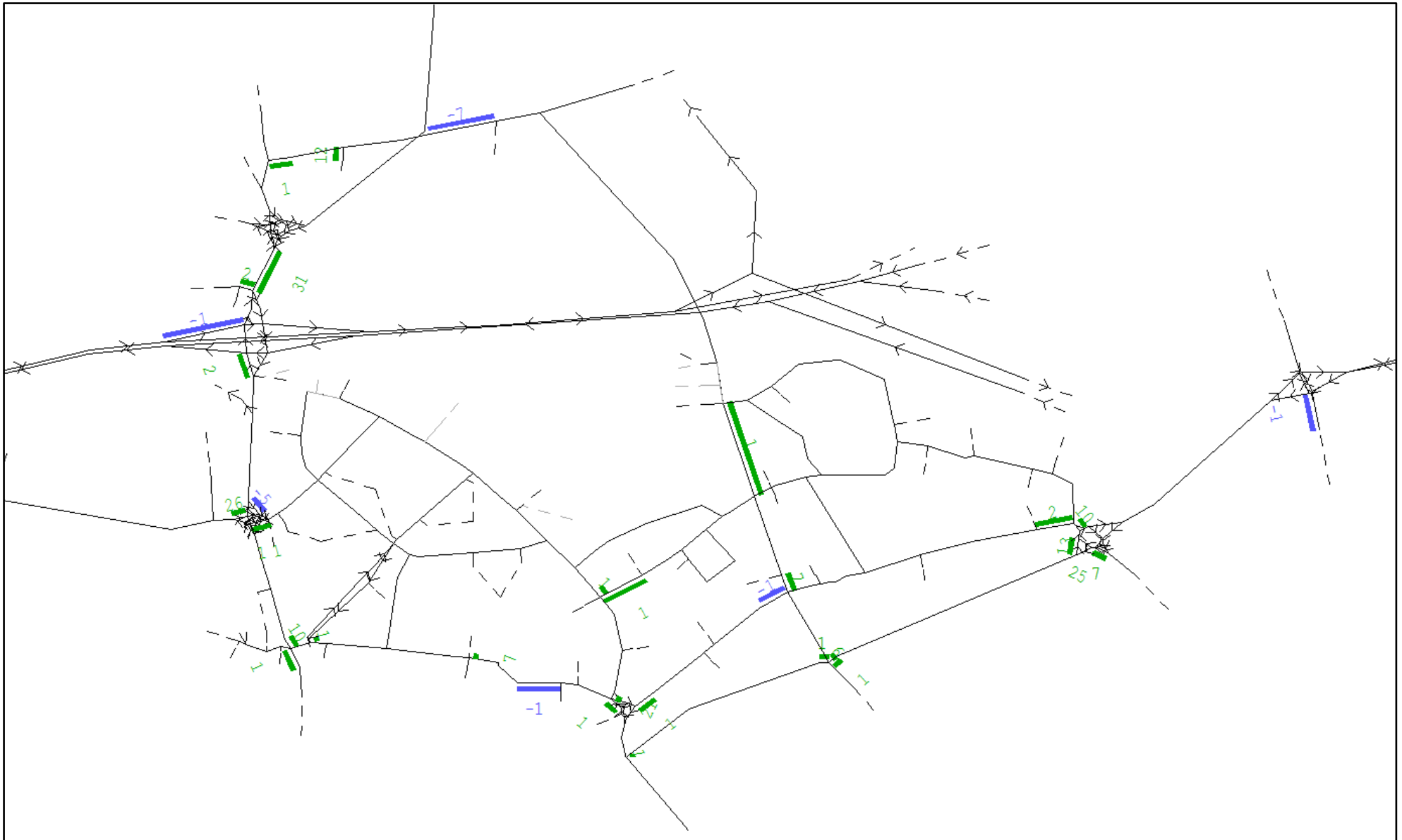
Appendix G Evidence Base For Forecast Queue Lengths



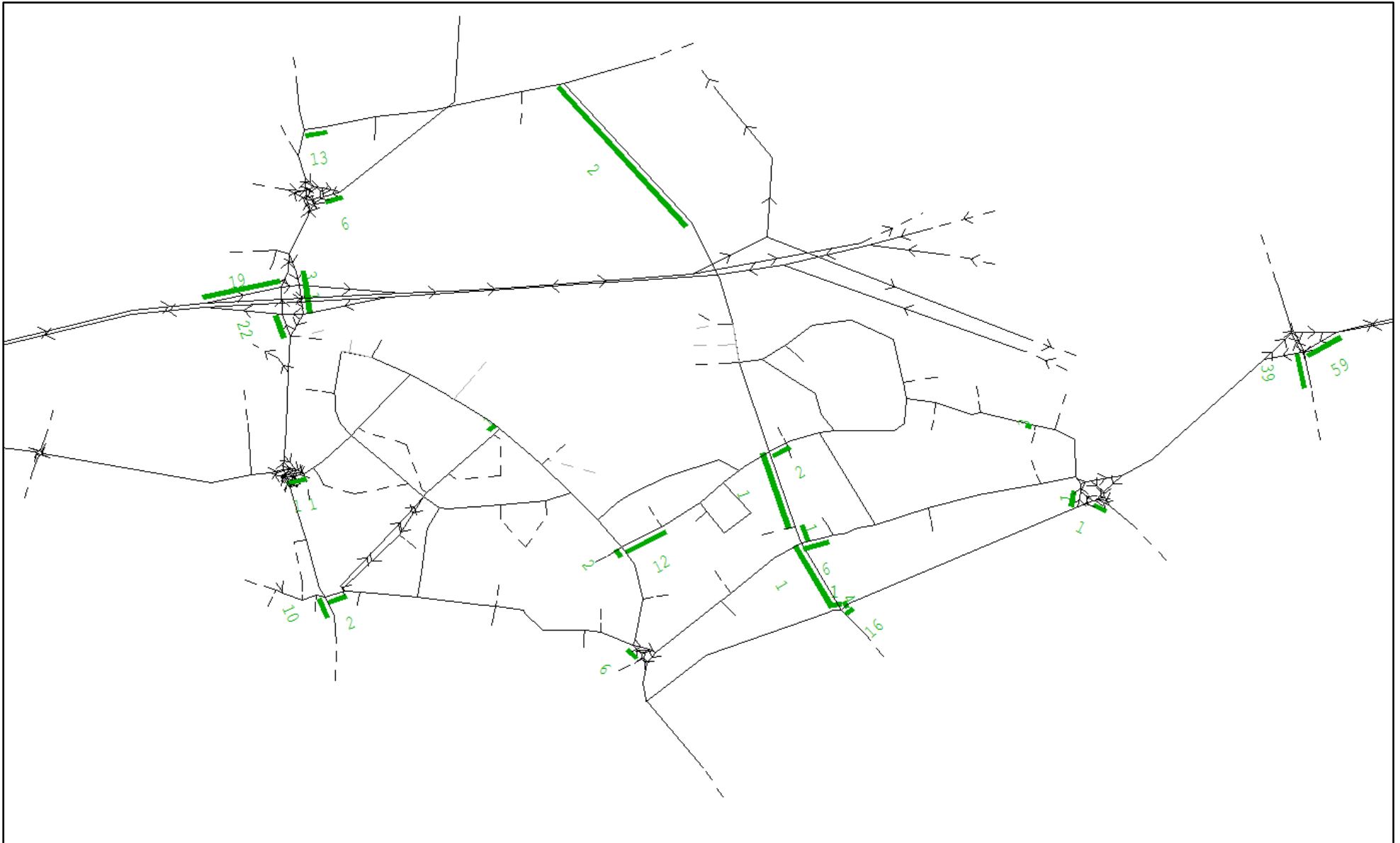
Appendix G, 2025 AM Do Minimum vs Do Something Average
Queue Comparisons



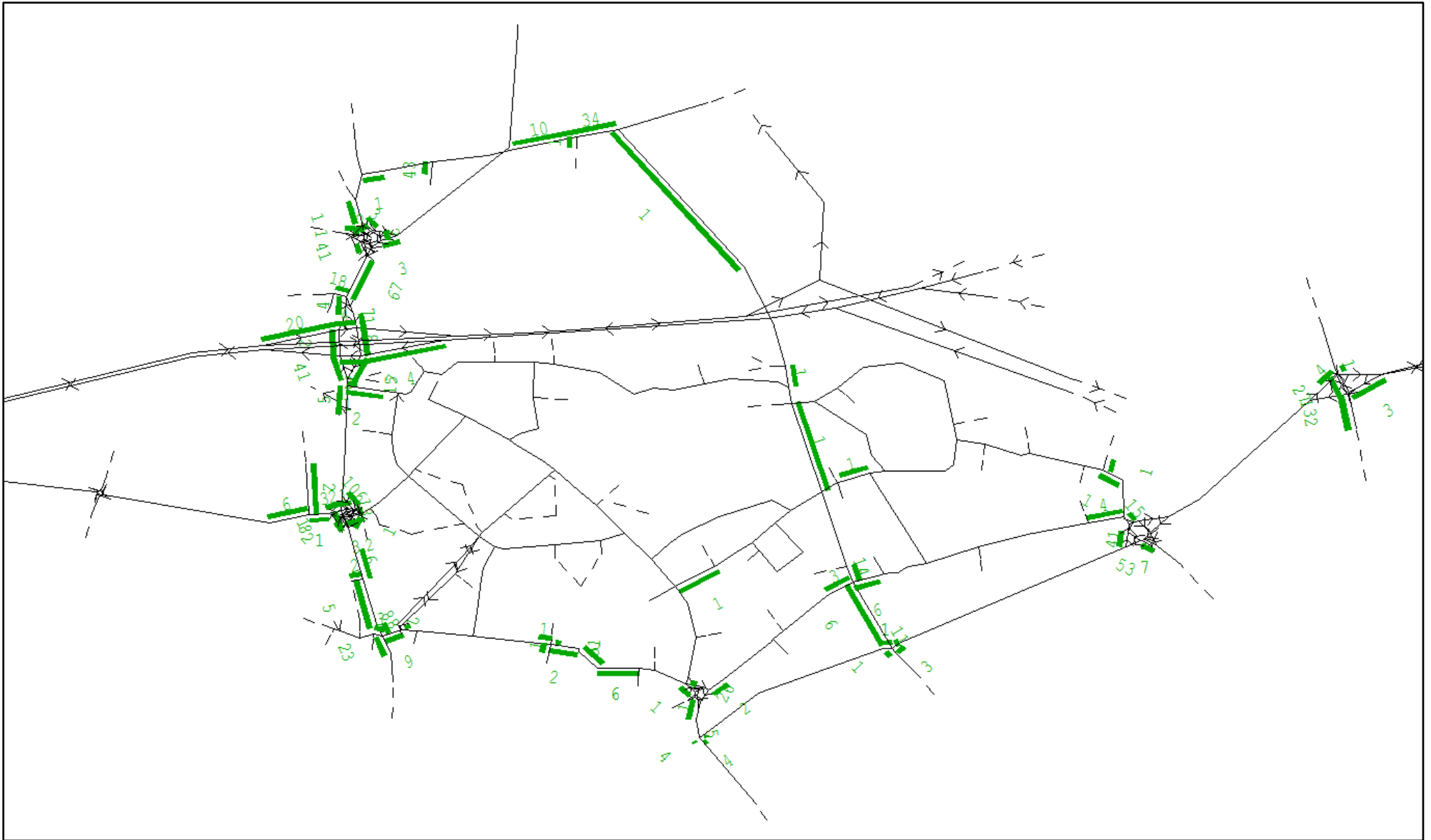
Appendix G, 2025 PM Do Minimum vs Do Something Average Queue Comparisons



Appendix G, 2030 AM Do Minimum vs Do Something Average Queue Comparisons

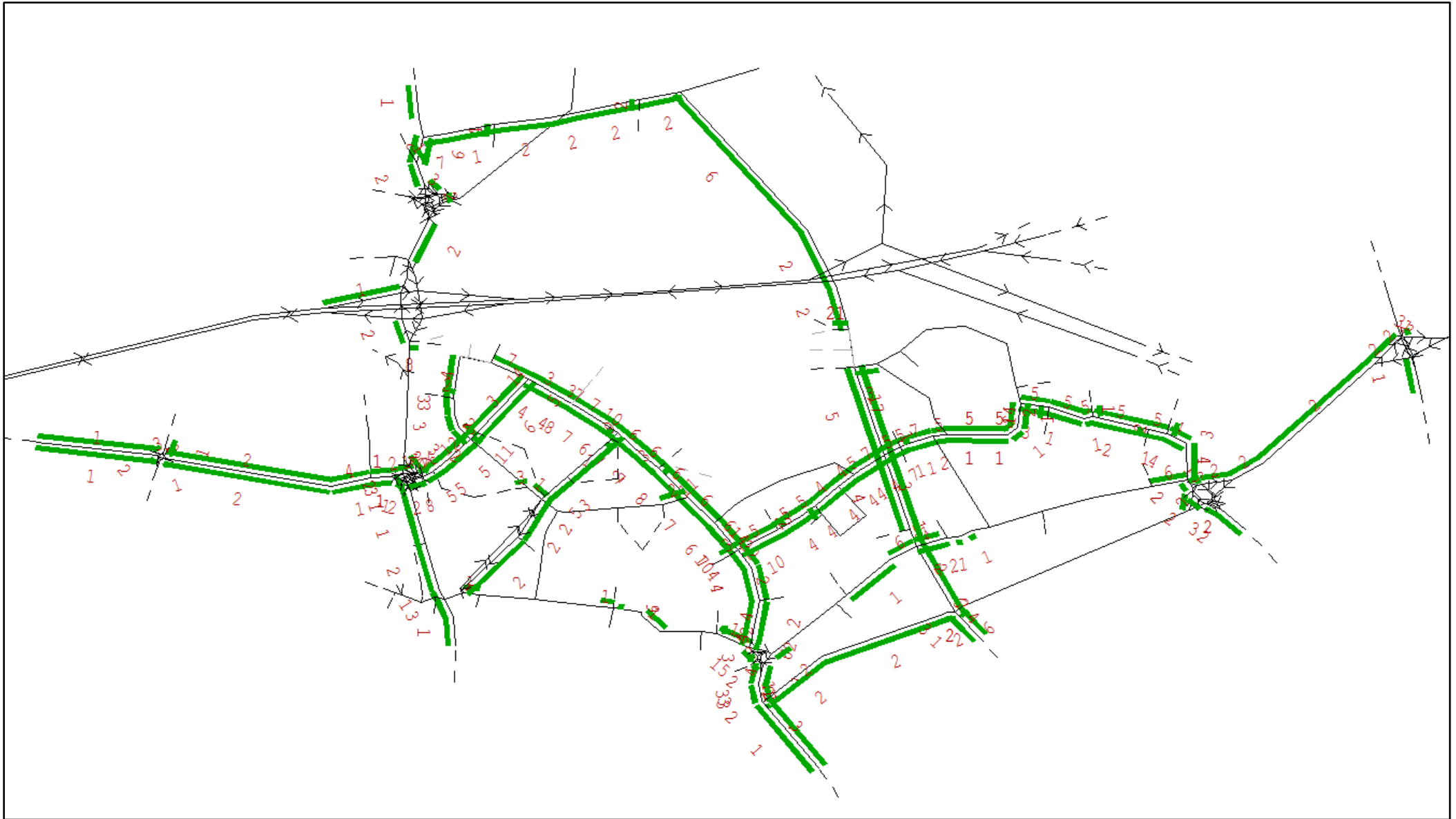


Appendix G, 2030 PM Do Minimum vs Do Something Average Queue Comparisons

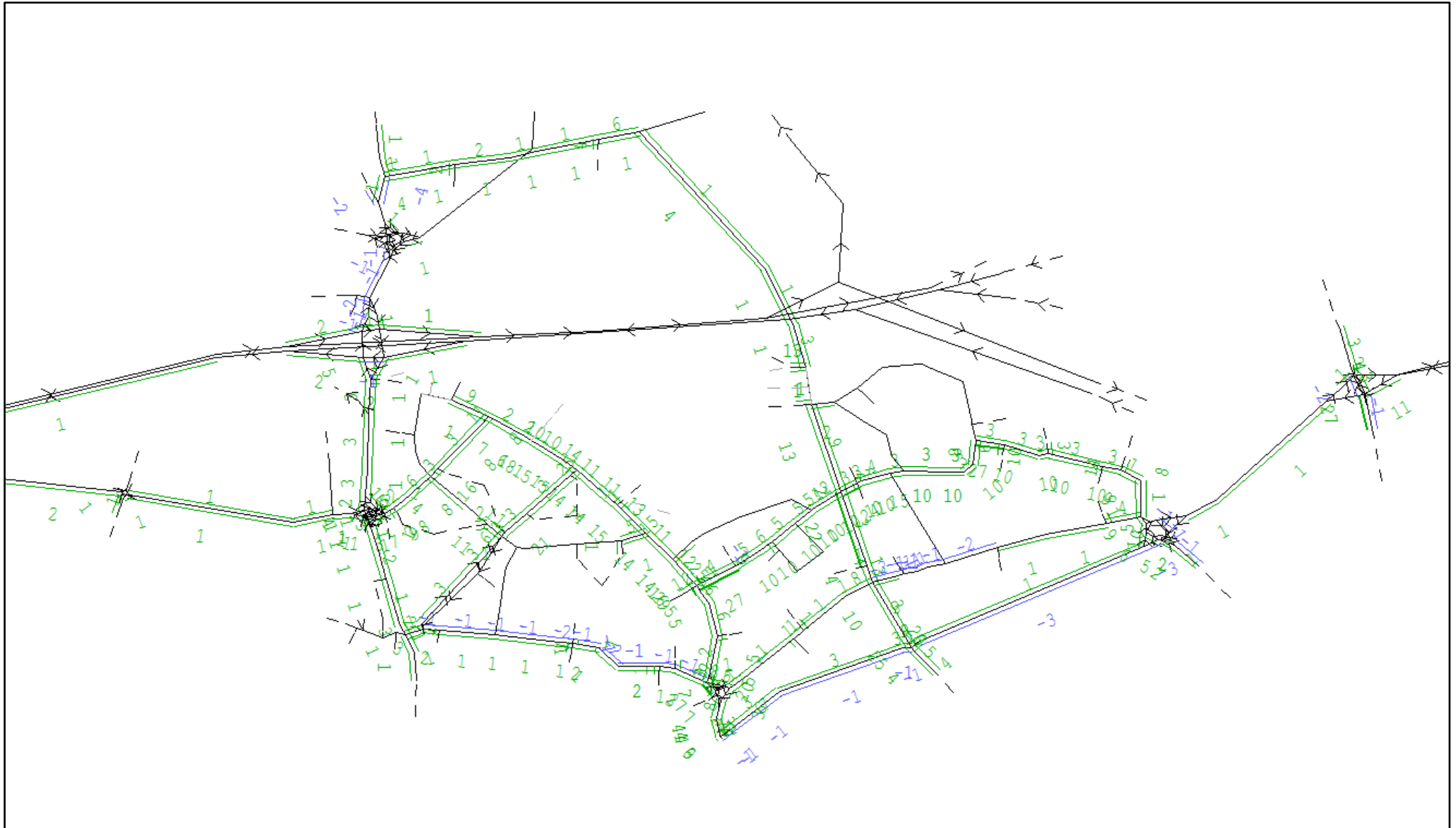


Appendix G, 2030 AM Through Route Total Average Queue

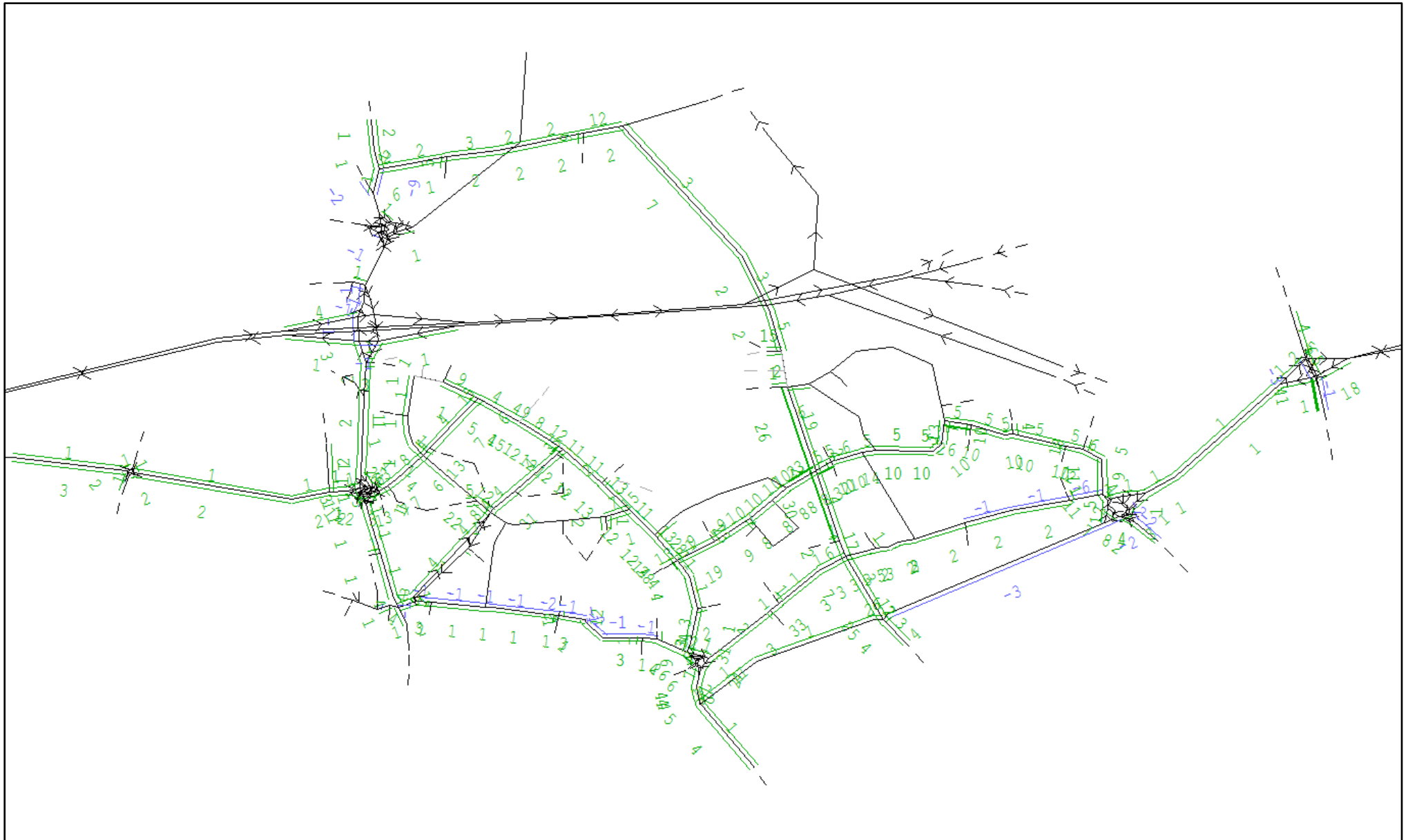
Appendix H evidence Base for Volume to Capacity



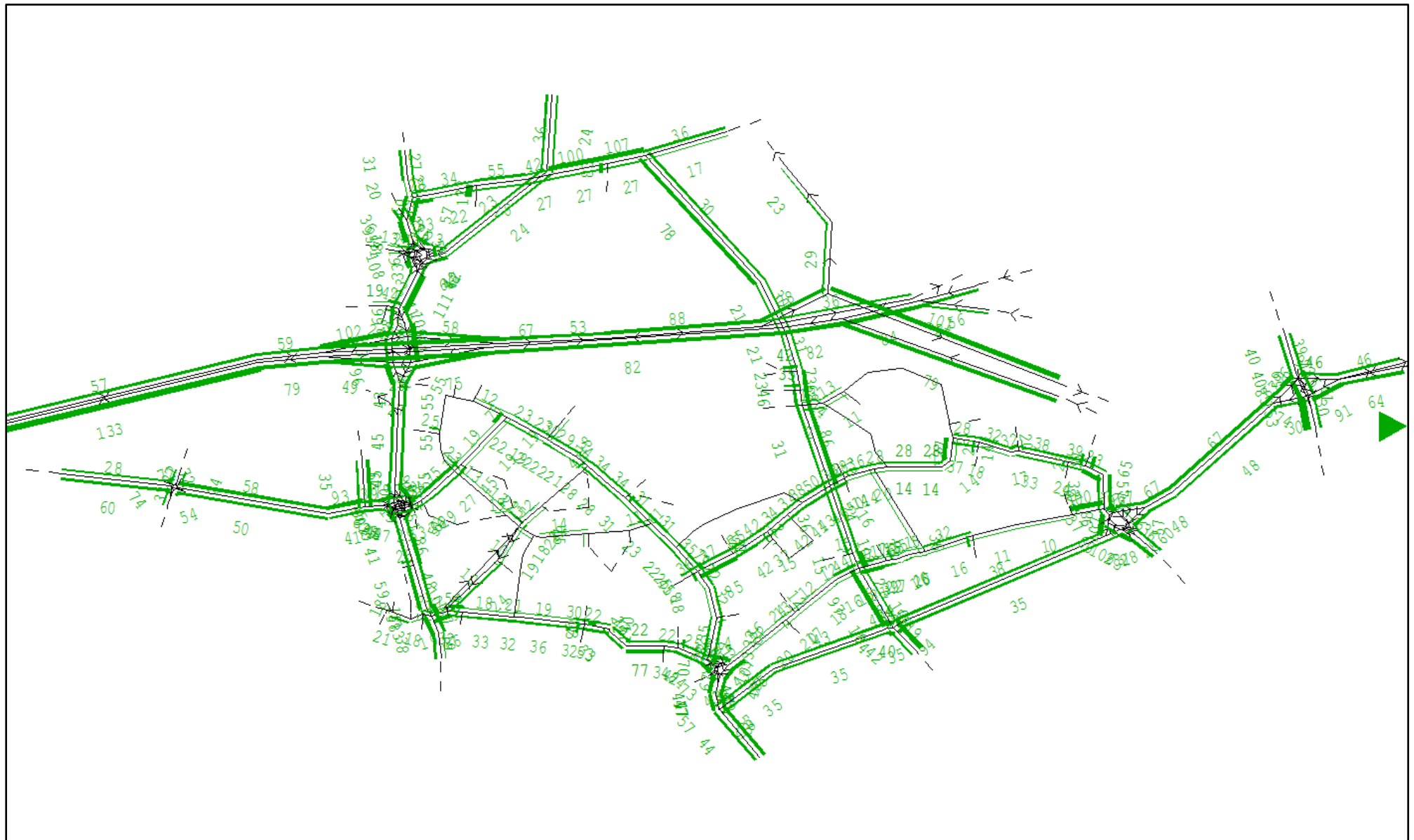
Appendix H, 2025 AM Do Minimum vs Do Something Volume of Capacity (%) Comparisons



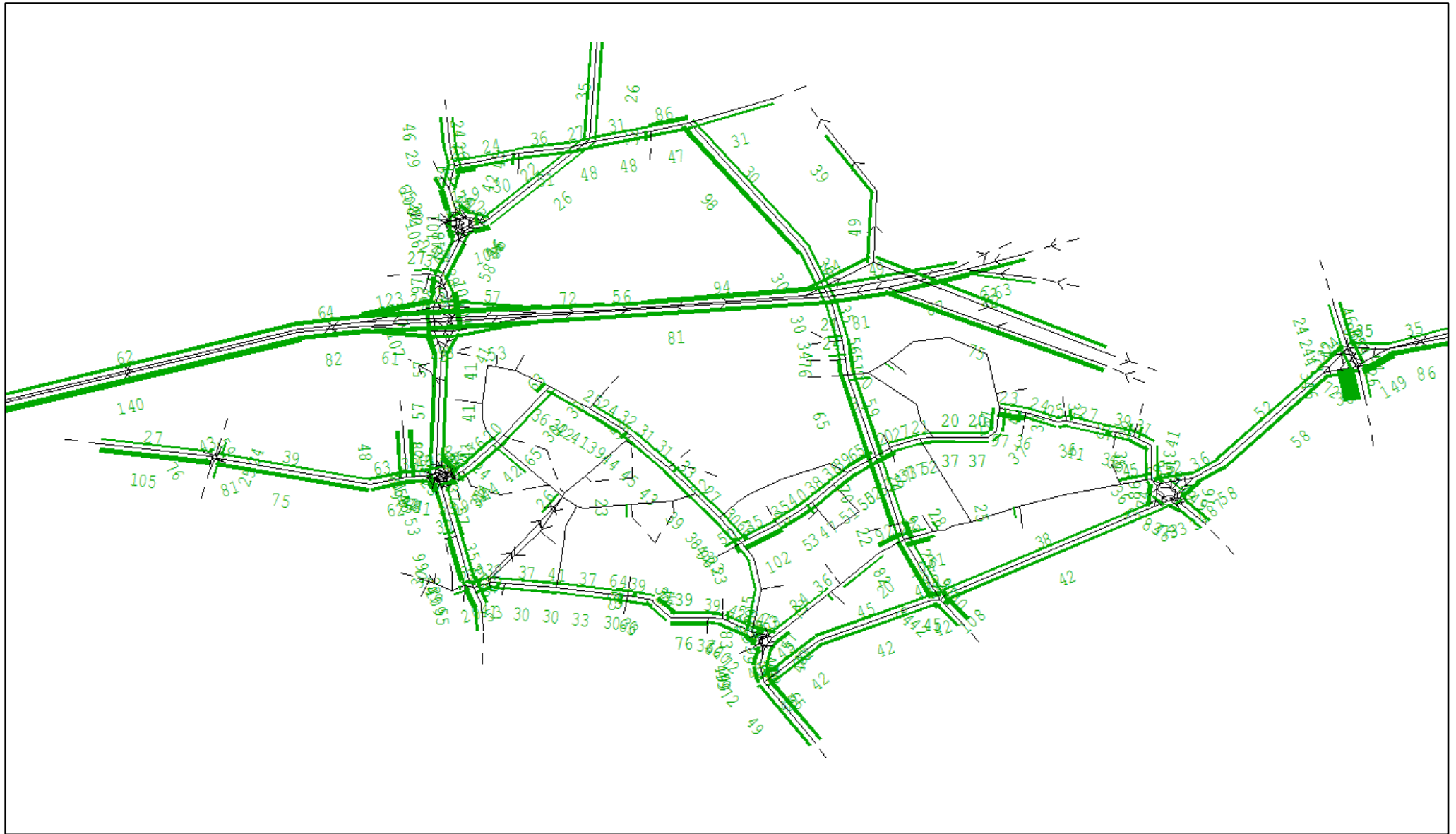
Appendix H, 2025 PM Do Minimum vs Do Something Volume of Capacity (%) Comparisons



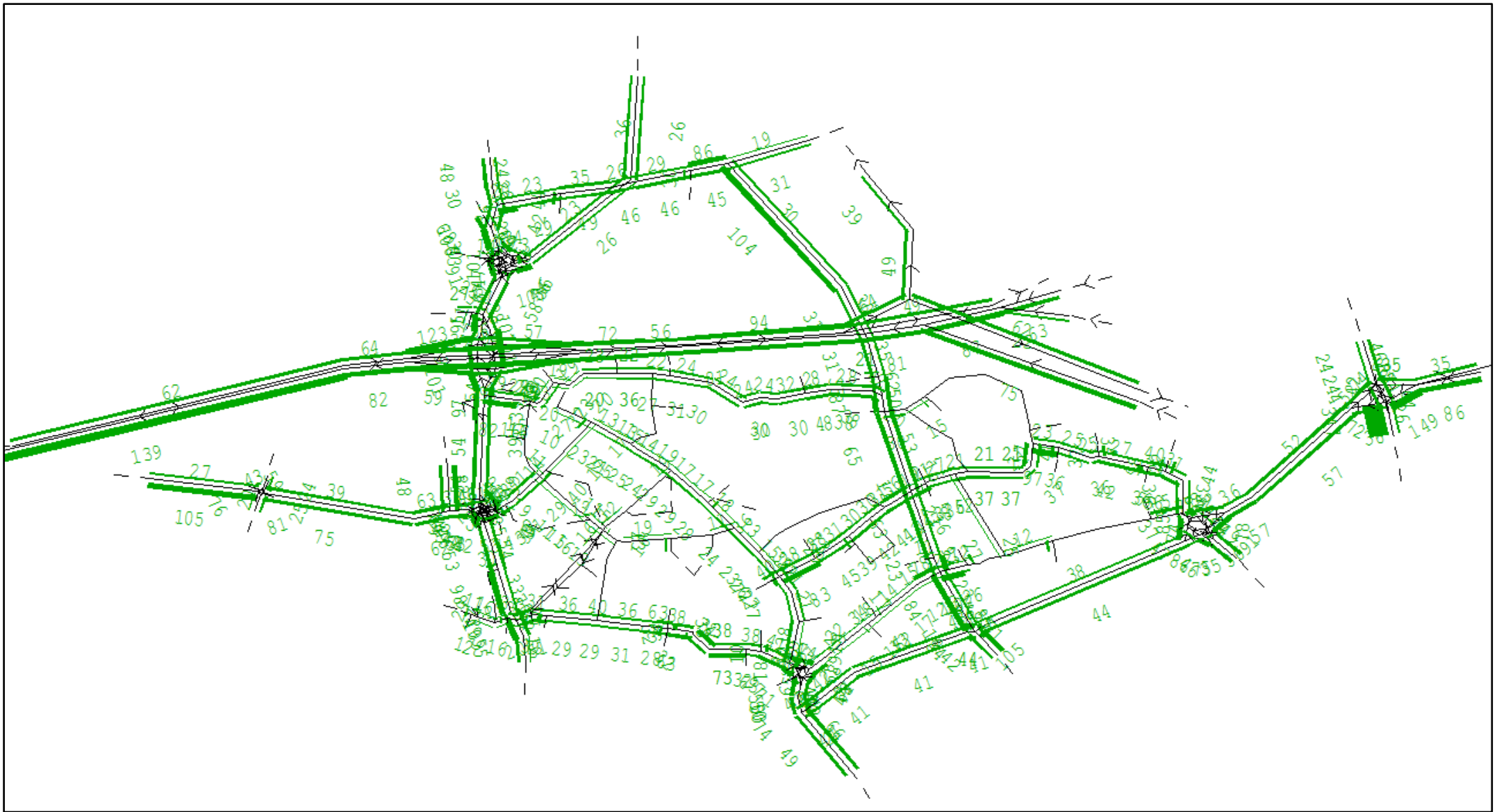
Appendix H, 2030 PM Do Minimum vs Do Something Volume of Capacity (%) Comparisons



Appendix H, 2030 AM Do Something Total Volume of Capacity (%)



Appendix H, 2030 PM Do Something Total Volume of Capacity (%)



Appendix H, 2030 PM Through Route Total Volume of Capacity (%)