Appendix J Trip Generation and Distribution Technical Note

TECHNICAL NOTE

Job Name: Fort Halstead

Job No: 41290

Note No: 1

Date: 18/01/2019

Prepared By: MMNejad

Subject: **Trip Generation and Distribution**

Introduction

This technical note sets out the methodology undertaken to estimate the likely trip generation, mode of travel and distribution of trips associated with the proposed development during the peak hour periods (weekday morning peak from 08:00 to 09:00 and weekday evening peak between 17:00 and 18:00). It subsequently outlines the number of trips generated by each of the development uses, and the distribution of the vehicle trips over the local highway network.

The trip generation assessment focuses on the proposed new residential and commercial uses, which account for the majority of the trips. The development includes a number of other minor uses that will be located within the small village centre or adjacent to the fort. This comprises local facilities including village shop, community facilities which could include healthcare and a Historic Interpretation Centre of the Fort. However, these are likely to generate only a small number of trips, most of which would be internal within the site, or at weekends.

The trip generation estimates have been based on a combination of onsite surveys undertaken as part of the Transport Assessment (TA) for the consented Outline Planning Application (OPA) and data from the TRICS database. Mode share estimates have been informed by local surveys, TRICS data and Census data for journey to work.

Overall methodology

Residential Trip Generation

The TRICS database has been used to provide trip rates for the residential component of the proposed development. With regard to the previous trip generation assessment undertaken as part of the OPA, it has been agreed with KCC that the TRICS surveys used are likely to be outdated and should be updated to include surveys undertaken up to five years ago.

The assessment of trip generation figures uses the industry standard TRICS database with sites selected because of similar trip generating characteristics; situated in a predominately out of town location, more than 200 privately owned houses and with access to a bus stop. The following criteria was used in the selection of sites:

- Land Use – Residential, privately owned houses;

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- Categories - C3;
- Regions – England excluding Greater London;
- Survey type – Multi Modal;
- Range – 200 to 805;
- Survey Days – Monday to Friday.

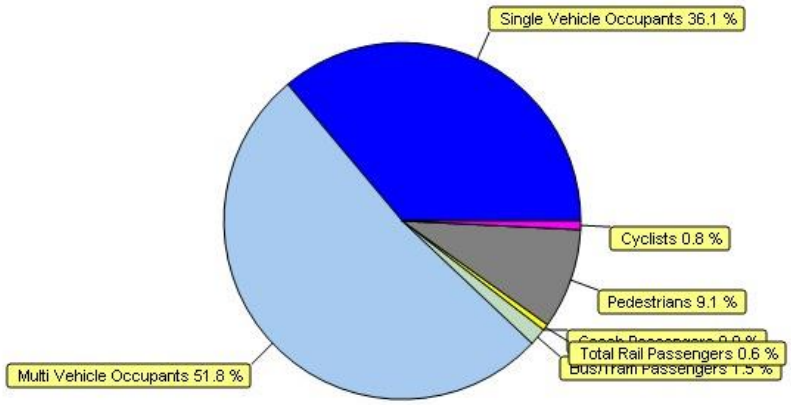
A summary of the TRICS sites selected based on the criteria set out above has been shown in Table 1.

Table 1: Selected Residential Sites from TRICS (including two-way 12-hour trips)

Site Reference	Borough	Units	Parking	Daily Person trips/ Unit	Similarities	Differences
ES-03-A-03	East Sussex	212	357	8.698	Bus stop within 400m	1/3 not privately owned
KC-03-A-06	Kent	363	789	7.419	Bus stop within 400m	All private
KC-03-A-07	Kent	288	891	11.292	Bus stop within 400m	All private
NE-03-A-02	North East	432	432	6.120	Bus stop within 400m	All private
ST-03-A-07	Staffordshire	148	881	6.804	Bus stop within 400m	All private
WS-03-A-06	West Horsham	805	1726	4.993	Bus stop within 400m	19% not privately owned

The modal split percentages from the multi-modal survey results are provided within Figure 1. As can be seen, motor vehicles are the dominant mode of transport making up 87.9% of journeys recorded. However, for a robust assessment of vehicle trip generation, the person trips rates from the TRICS sites have been used along with the assumed mode shares to be applied (Table 4) in order to estimate residential vehicle trip generation. This methodology is in line with the OPA TA and ensures that non-vehicle trips are not over estimated.

Figure 1: Modal Split from Multi-Modal



The person trips based on the TRICS surveys listed in Table 1, have been set out in Table 2.

Table 2: Peak Hour Trip Rates minus OGV Trip Rates

Time	Trip Rates (per unit)		
	Arrive	Depart	2-Way
08:00 – 09:00	0.191	0.827	1.018
17:00 – 18:00	0.637	0.297	0.934

Commercial Development

The commercial vehicle trip generation has been calculated based on traffic surveys undertaken on site as part of the OPA TA work. Trip rates were calculated from the survey results by comparing against the 1,000 employees that were known to be employed at the time of survey. Since the surveys included the traffic associated with the small residential community (72 homes), the traffic associated with that use has been removed in order to provide a more accurate estimate of trips generated by the commercial development only. This was done by reference to appropriate TRICS data for residential sites.

1.1.1 A summary of the vehicle trip rates per job for the commercial development is displayed in Table 3 below. These are the same trip rates as the consented OPA commercial trip rates.

Table 3: Trip Rates for Commercial Development

Commercial Trip Rates based on OPA 2014 Surveys (1,000 Employed on site)	AM peak (08:00 to 09:00)		PM peak (17:00 to 18:00)	
	In	Out	In	Out
Vehicle trip rate per job	0.295	0.030	0.019	0.230

Modal Split

For the residential element of the proposed development, the modal splits associated with the consented OPA have been adopted. The OPA TA modal splits are based on a combination of 'journey to work' 2011 Census data, TRICS survey modal splits and knowledge of the local transport network characteristics. Particular consideration was given to the fact that the site has poor public transport connectivity and that vehicles are likely to be the dominant mode choice in the absence of a transport strategy or travel plan measures. It should be noted that the general level of public transport provision has remained similar compared to 2015.

The proposed modal split to be applied to the TRICS person trip rates has been presented in Table 4 below, and, the detailed methodology and assumptions are available in Appendix H of the OPA TA (2015).

Table 4: Proposed Mode Splits to be Applied to Residential Person Trips

Mode	AM		PM	
	In	Out	In	Out
Public transport (bus, coach and all rail)	1%	12%	3%	3%
Private car and taxis	91%	83%	84%	85%
Drivers (% of total mode split)	*59%*	*51%*	*66%*	*64%*
Passengers (% of total mode split)	*32%*	*32%*	*18%*	*21%*
Powered two-wheeler	2%	1%	2%	2%
Bicycle	2%	1%	3%	2%
Pedestrians (including 'others')	4%	3%	8%	8%
Total	**100%**	**100%**	**100%**	**100%**

Summary Trip Generation

The peak hour total trip generation for the residential and commercial proposals of the proposed development have been provided within Table 5.

Table 5: Peak Hour Residential Trip Generation Summary

Land Use/ Trip Type	AM (08:00 – 09:00)		PM (17:00 – 18:00)	
	Arr	Dep	Arr	Dep
Residential Use (750 units)				
Person trip rate per unit	0.191	0.827	0.637	0.297
Person trip Generation	143	620	478	223
Car Driver Share	59%	51%	66%	64%
Total Vehicle Trips	85	315	316	143
Commercial Use (1,483 jobs)				
Vehicle trip rate per job	0.295	0.030	0.019	0.230
Vehicle (driver) trips	437	45	29	341
Total Vehicle Trips				
Total Vehicle Trips	522	360	345	485
Uplift From OPA	40	118	130	27

Trip Distribution

A detailed trip distribution and assignment analysis has been undertaken. The methodology and key outcomes are summarised below:

- The distribution of the vehicle trips generated by the development during the peak hours has been based on journey to work origin-destination data from the 2011 National Census.
- Only the car/van driver mode of travel to work has been used to account for the impact on the highway network. Most of the other modes have negligible numbers of trips according to the census with the notable exception of train, which is dominant for commuter trips to/from London. However, such trips will mainly occur outside the morning and evening peak hour periods.
- For the residential element, the proportions that apply are those referring to residents in Sevenoaks 008 who work elsewhere. The site boundary in relation to Sevenoaks 008 is presented in Figure A1 within Appendix A. Whilst the site straddles two supper output areas, it was considered that MSOA 008 best represents the more rural nature of the site whereas 011 includes most of the Sevenoaks urban area.
- For the commercial development, the relevant proportions are those of workers in the Sevenoaks 008 MSOA living elsewhere.

Seventeen feed points to the highway network were defined to represent the origin/ destination of all journeys to/from the site within the surrounding highway network under consideration. The number of trips feeding from each point from/ to each MSOA has been based on journey to work origin-destination data from the 2011 National Census.

The location of the feed points has been shown in Figure A2 within Appendix A.

Traffic Assignment

The assignment of vehicle trips to the local highway network, and hence each feed point, has been based on GIS journey time data for the for the AM and PM peak hours to and from the site access points.

GIS data is not available for the highway network within the site and so journey times for the internal element of trips has been estimated based on the proposed speed limit for the different links/ proposed traffic calming measures. Given the size of the site, the masterplan area has been disaggregated into 22 zones and journey times estimated from each zone's internal access point to each of the two site access points based on the current masterplan.

The final assignment of trips to/from each internal zone from/to each feed point is subsequently determined by considering both the journey time from each internal zone to the site access points and the journey time from the site access points to the 17 feed points.

It should be noted that this method is likely to under-estimate the number trips using the main Polhill access as it does not consider of deterrence factors associated with routing via narrow country lanes other than speed.

The expected number vehicle trips to/from each feed point and the site access used has been shown in Table 6 for the AM peak hour and Table 7 for the PM peak hour

The distributed vehicle trip generation has been shown on Figure B1 and Figure B2 within Appendix B for the AM and PM peak hours respectively.

Table 6: Total Vehicle Trip Generation to/from Each Feed Point (AM Peak Hour)

Feed Point	IN		OUT	
	North Access	South Access	North Access	South Access
1	4	4	3	3
2	11	12	9	12
3	0	14	0	9
4	0	5	0	4
5	0	9	0	7
6	5	0	4	0
7	39	42	24	31
8	2	3	2	3
9	15	16	13	16
10	22	17	26	6
11	25	20	24	6
12	15	0	5	0
13	37	0	20	1
14	56	0	34	0
15	6	0	3	0
16	0	0	0	0
17	144	0	96	0
Total	380	142	263	97

Table 7: Total Vehicle Trip Generation to/from Each Feed Point (PM Peak Hour)

Feed Point	IN		OUT	
	North Access	South Access	North Access	South Access
1	3	3	4	4
2	9	12	11	12
3	0	8	0	12
4	0	4	0	4
5	0	7	0	9
6	3	0	4	0
7	23	29	36	39
8	2	3	2	3
9	12	15	14	16
10	26	5	23	14
11	24	5	25	17
12	4	0	12	0
13	18	1	33	0
14	32	0	51	0
15	3	0	5	0
16	0	0	0	0
17	92	0	133	0
Total	252	93	353	132

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Appendix A - Figures

Figure A1: Site Location in relation to MSOA Sevenoaks 008

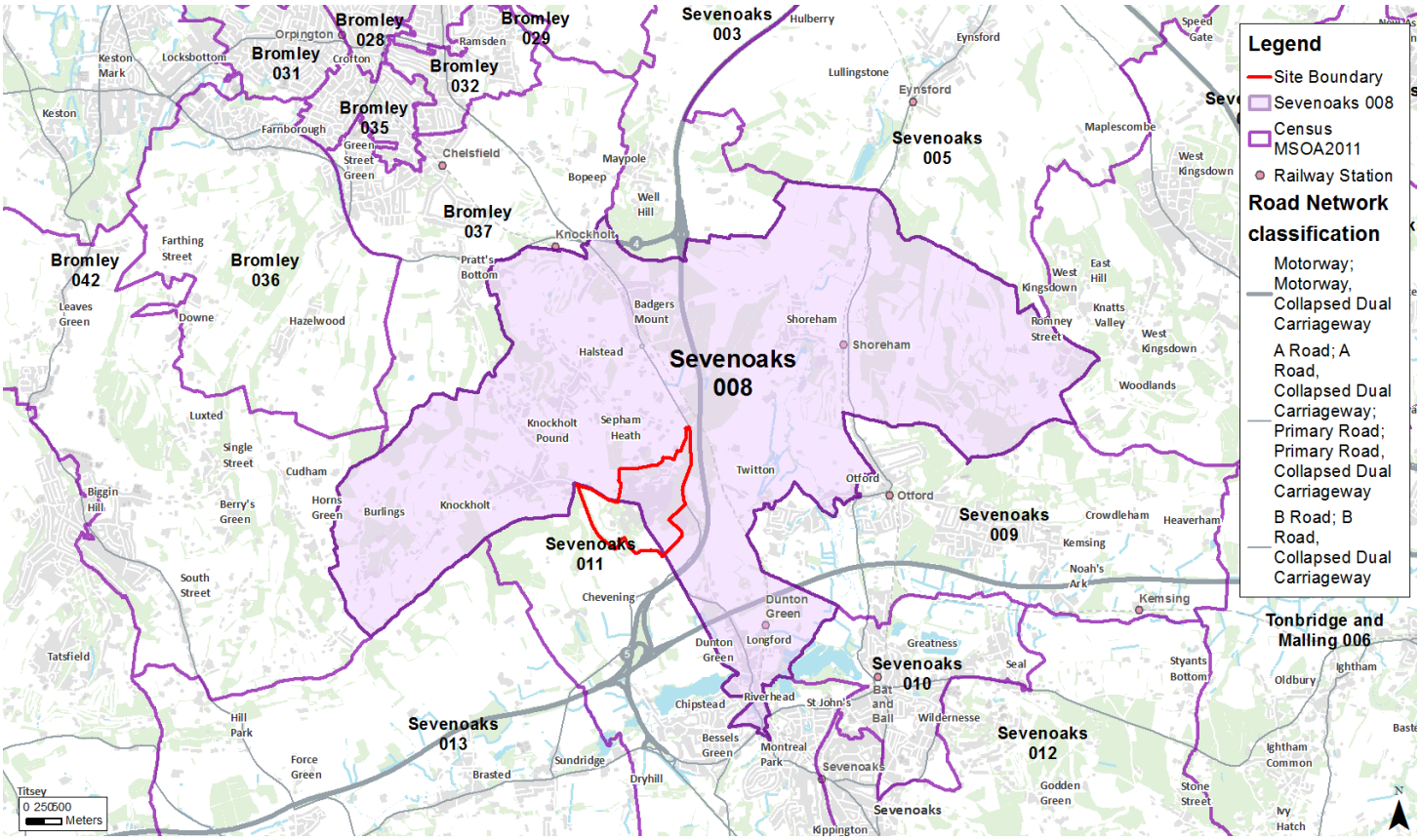
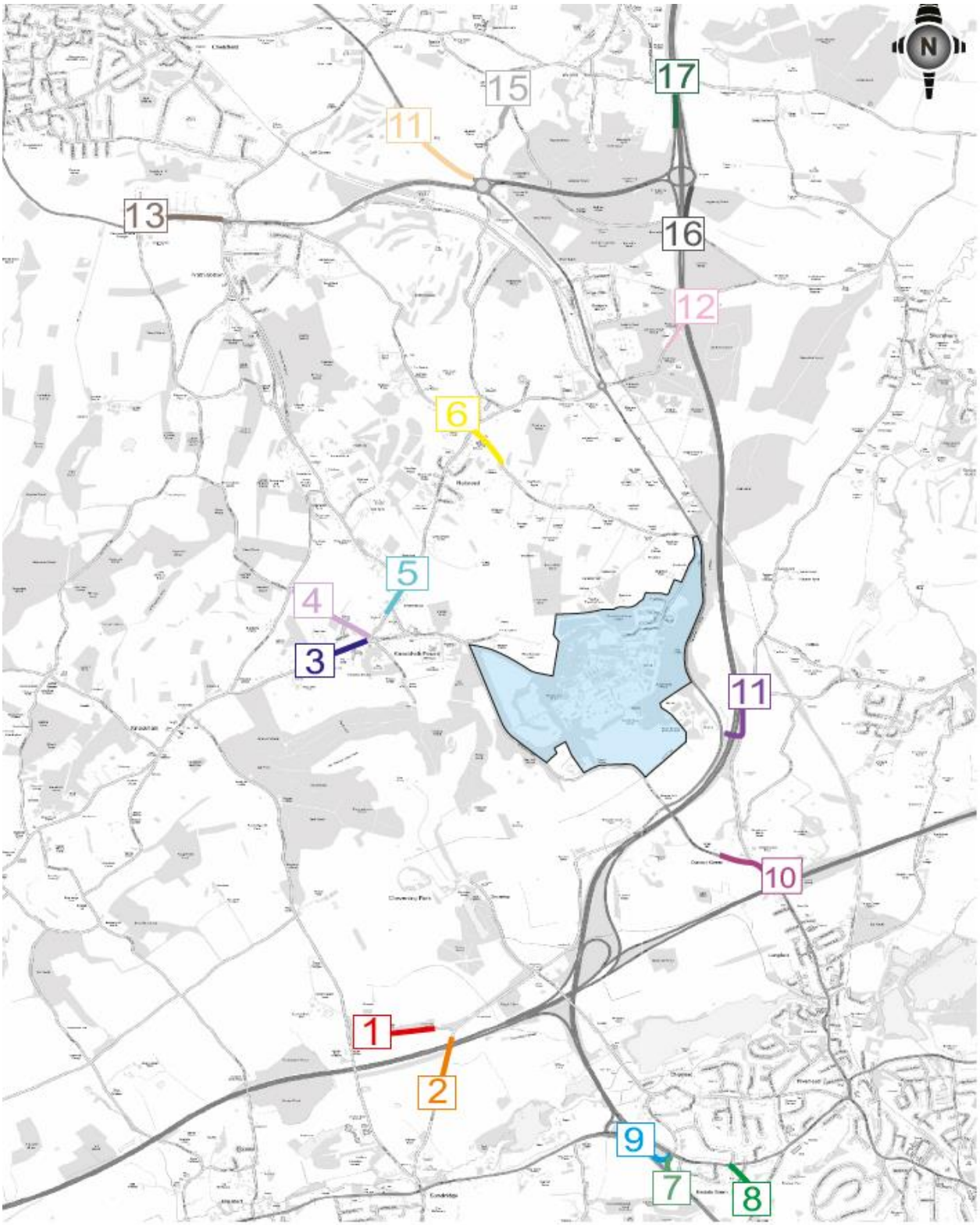


Figure A2: Location of Feed Points used for Traffic Assignment



Appendix B – Trip Generation Network Diagrams

Figure B1 Fort Halstead Development Vehicle Flows AM Peak (0800-0900)

Note: Numbers in the red box represent the different feed points, as defined within the report

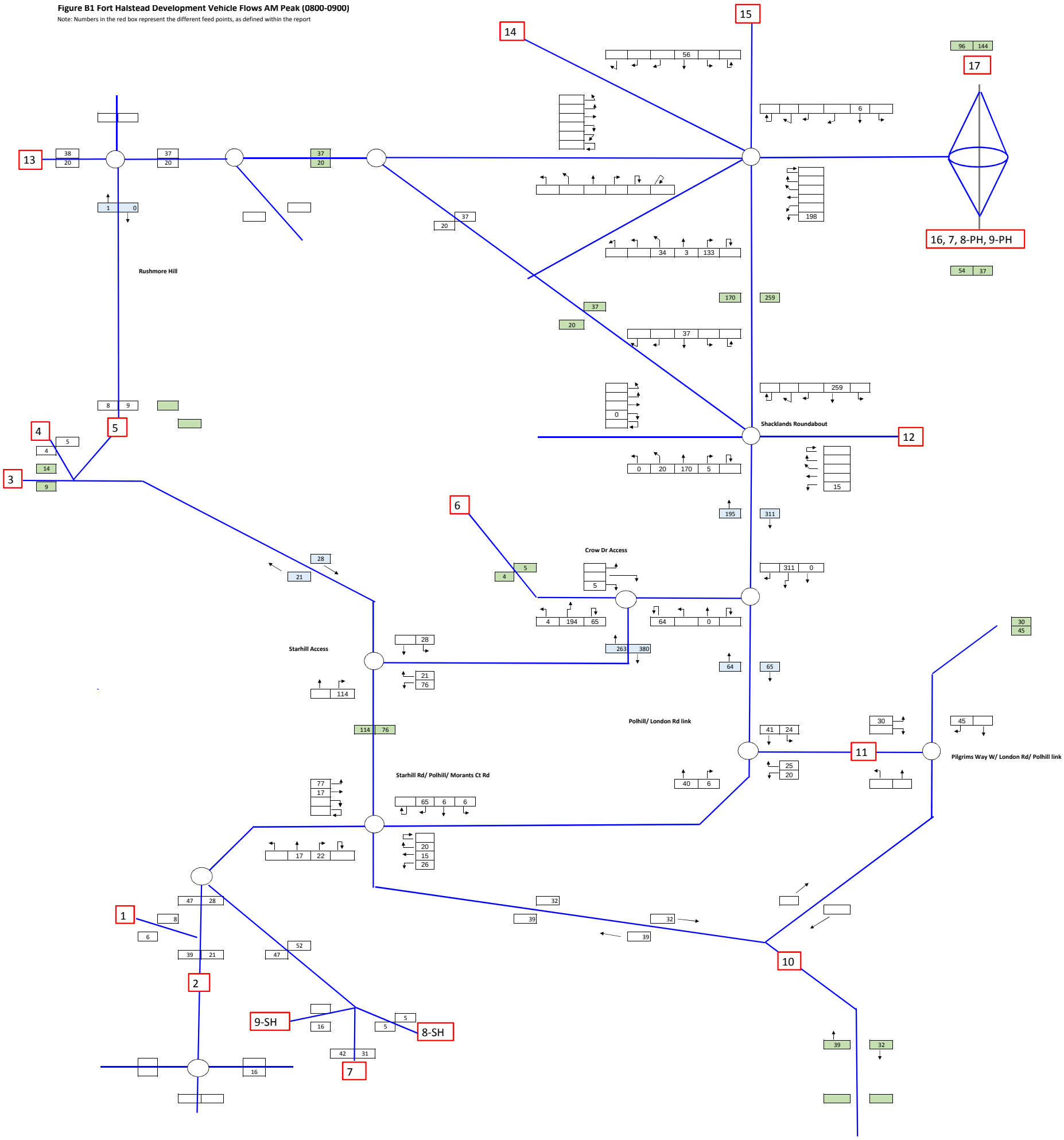


Figure B2: Fort Halstead Development Vehicle Flows PM Peak (1700-1800)

Note: Numbers in the red box represent the different feed points, as defined within the report