Brighton & Hove City Council

Brighton & Hove City Plan

Addendum Report to the May 2013 Strategic Transport Assessment

June 2014

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Brighton & Hove City Plan

Strategic Transport Assessment

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Tables and Figures

Appendices

1 Introduction

1.1 This addendum report provides an update to the May 2013 Strategic Transport Assessment (STA) for the city (shown in Figure 1.1) which reviews the impact of committed developments and strategic land allocations, identified in the City Plan up to 2030.

1.2 An update to the City Plan STA is required following the recent examination into the soundness of the plan where the inspector requested that the city council explore a number of new spatial options with a view to increasing the supply of housing sites. This is documented in the Urban Fringe Study available on the Brighton & Hove City Council website.

1.3 The submission City Plan from which the May 2013 STA was derived proposed 11,300 new homes by 2030. This update to the May 2013 STA considers the impact of an increase in the housing target by approximately 1,900 units to 13,200 units. It is understood that there are three potential sources of increased housing supply:

i) Windfall Allowance in first 10 years: - Approximately an additional 650 units

ii) Urban Fringe sites – The maximum expected is approximately 1060 additional units

iii) SHLAA Update - The Urban Fringe Study also indicated an additional supply of approximately 150 dwellings

1.4 To determine the additional impact a forecast model has been developed from the existing SATURN[1] highway model (developed in 2010). This model is supported by a public transport model using CUBE VOYAGER[2] software as well as a custom-built variable demand model, built using the principles outlined in the Department for Transport's (DfT) WebTAG unit 3.10 for assessing traffic management changes and testing of the behavioural responses of the multimodal model.

Objectives of the STA

1.5 The study objectives include:-

- Understanding the transport impacts of the updated development strategy detailed in the City Plan including potential highway and public transport impacts and associated constraints on travel
- Identifying the level of additional mitigation required beyond that already proposed (if any) in order to manage traffic and transport and thereby supporting sustainable development

Study Area

1.6 The study area is unchanged from that shown in the May 2013 STA and is replicated in Figure 1.1 below.

[1] SATURN is a traffic simulation and assignment model which models the time and distance taken to travel between origins and destinations, including delays due to congestion, and calculates the most likely route to be used by traffic travelling between different origins and destinations.

[2] CUBE VOYAGER is a package of programs for modelling travel including traffic assignment, public transport modelling and travel demand. It takes account of journey times and costs as part of the demand and mode split model.

Figure 1.1 Study Area

Development Areas

1.7 The previous version of the City Plan directed the majority of new housing, employment and retail development to eight specific development areas (DA1-8).

1.8 The eight development areas were defined as:

- DA1: Brighton Centre and Churchill Square Avenue;
- DA2: Brighton Marina, Gas Works and Black Rock Area;
- DA3: Lewes Road Area;
- DA4: New England Quarter and London Road Area;
- DA5: Eastern Road and Edward Street Area;
- DA6: Hove Station Area;
- DA7: Toads Hole Valley; and
- DA8: Shoreham Harbour.

1.9 This updated assessment contains further urban fringe sites mainly to the north and east of the city which account for a further1060 dwellings. In addition there is a further 650 windfall sites. More detail is included in Section 2.

Development Scenarios

1.10 The base model for this assessment has been developed from an existing SATURN model used for the previous Core Strategy and validated using travel surveys from 2010. Full details are

provided in the LMVR. The public transport and demand model elements have been developed from first principles.

1.11 From this base model, two future forecast year scenarios have been revised to incorporate the additional demand arising from the 1,900 dwellings. These are:-

- 2030 Updated City Plan Reference Case – This is the base model plus committed developments and transport schemes plus the strategic development sites and urban fringe windfall/ sites noted in the updated City Plan. The level of economic and demographic growth has been controlled to TEMPRO[3] growth rates. This assessment is detailed later in the report.
- 2030 Updated City Plan Mitigation Case –This is the updated 2030 City Plan Reference Case plus the mitigation measures previously identified by in the 2013 May STA. The flows from this scenario have been compared to the 2030 City Plan Reference Case flows to link measures to developments. This assessment is detailed in Section 6 of this report.

1.12 BHCC have confirmed that there have been no material changes in committed developments since the previous 2013 May STA and hence the 2030 Committed Base has not been rerun. This scenario was previously compared to the 2030 City Plan Reference Case to reveal the changes to the operation of the public transport and highway network arising from the development and in so doing assisted in identifying potential mitigation measures that might be required. This assessment is detailed in the previous May 2013 STA.

1.13 The Highways Agency has been consulted as a key stakeholder and the following has been discussed and agreed:

- Trip rates have not changed materially since the previous assessment and hence can be used in the updated STA
- The development scenarios used in the previous STA are appropriate
- The forecasting methodology used in the May 2030 STA can be used and this will ensure that a like for like comparison can be undertaken which will enable the impact of the additional dwellings to be isolated.
- Changes in flows on the Strategic Road Network (SRN) should be assessed through the use of local junction models; and
- The previous mitigation identified for the SRN should be utilised as a starting point for assessment.

Structure of Report

1.14 Following this introductory chapter, This STA is structured as shown:

- **Section 2: City Plan Development Proposals – Update**. This summarises the development proposals for the additional sites identified including details of land use; quantum and location. The connection to the local transport networks for each development area is also defined
- **Section 3: Trip Generation –** This details the work undertaken to cross check the previous assumptions with the latest TRICS data.

[3] TEMPRO uses local planning data from the National Trip End Model (NTEM) and traffic growth from the National Transport Model (NTM) to produce a local traffic growth factor.

- **Section 4: Committed City-Wide Interventions by 2030 –** Reiterates the previously agreed committed City-wide transport interventions that are certain or near certain to be delivered in the plan period.
- **Section 5: Traffic and Public Transport Modelling –** Provides a brief overview of the agreed modelling methodology used including traffic distribution and assignment methodology.
- **Section 6: Assessment of City Plan Mitigation –** Provides a discussion of the modelling results for the 2030 City Plan Mitigation results
- **Section 10: Summary and Conclusion –** Summarises and concludes the main points of the report.

1.15 In addition, OS Mastermap data has been obtained under sub-license from Brighton & Hove City Council No. L100020999, 2011. Unless specifically stated, all other map extracts are taken from OS Open data sources, © Crown Copyright 2011.

2 City Plan Development Proposals - Update

2.1 A list of sites including the eight development areas that were used in the previous assessment of the City Plan are contained in the May 2013 STA. This section provides details of the additional sites identified to increase the number of dwellings in the City Plan from 11,300 to 13,200.

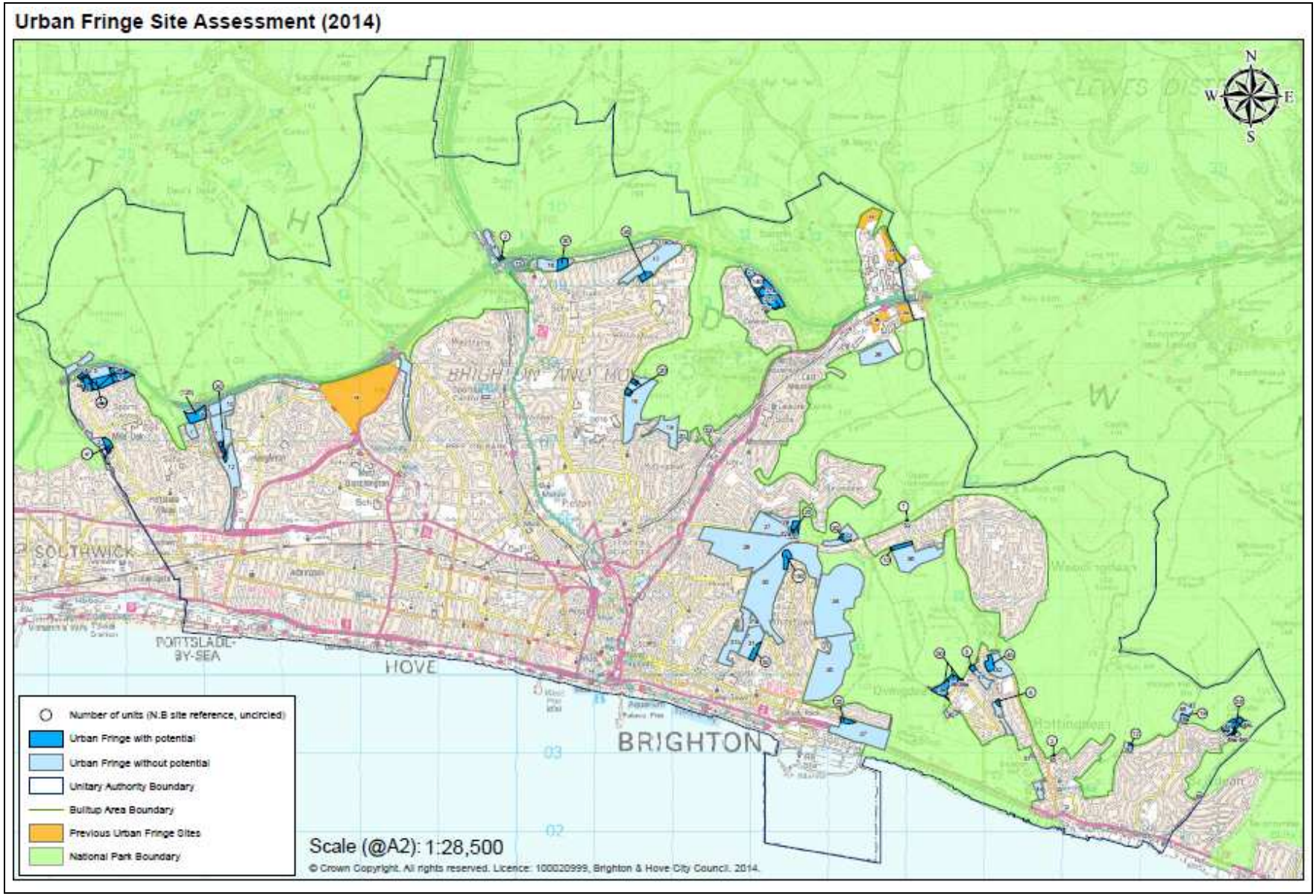
2.2 The list of sites to be used in the updated 2030 City Plan Reference Case and 2030 Mitigation scenarios were supplied by Brighton & Hove City Council.

2.3 These are shown in Figure 2.1 below and consist of mainly small developments of less than 25 units mainly on the northern and eastern fringes of Brighton. The largest sites with over 100 dwellings identified are:-

- 280 dwellings at Mile Oak
- 150 dwellings at Brighton Racecourse
- 140 dwellings at Coldean Lane East

2.4 A full list of sites can be found at Appendix A.

Figure 2.1 City Plan – Additional Urban Fringe Sites



Urban Fringe Sites Assessment (2014)

3 Trip Generation

3.1 Trip generation is the process of using existing information to predict the likely travel patterns associated with proposed developments including time and frequency of travel, mode split and journey purpose.

3.2 A comprehensive trip generation note was previously prepared and agreed with the Highways Agency as part of the development of the STA. A copy is provided in Appendix B of the May 2013 STA.

3.3 In discussions with the Highways Agency it was agreed that a comparative analysis would be undertaken between the residential trip rates used in the May 2013 STA (TRICS 2012 (b) v 6.10.1) and the latest version of TRICS v7.1.1.

3.4 TRICS® is an industry recognised database of transport surveys for a wide range of development types across the UK and Ireland. Trip rates can be influenced by a number of factors including:

- local environment and surroundings;
- the composition and functions of the site;
- its on-site and off-site parking facilities; and
- availability of other modes of transport.

3.5 A trip generation rate for a development is derived by filtering the database to return only results that match the criteria required. The assessment was completed in line with best practice guidance and based on the following selection criteria:

- Use of multi-modal trip rates;
- No surveys older than 2001;
- Where possible surveys have been selected from the South East of England. There are a limited number of surveys available in this area, and, unless unavoidable, it is not recommended to base a trip rate assumption on a single site unless it is known to be a good representation of the development site. Therefore, where required, the search area has been widened although Greater London was excluded due to differences in travel behaviour;
- Trip rates have been generated for Gross Floor Area (m2) or dwellings depending on land use; and
- Urban surveys were defined as sites within ‘Town Centre’ or ‘Edge of Town Centre’ locations and suburban surveys as sites categorised as ‘Suburban Area’ or ‘Edge of Town’.

3.6 Tables 3.1 provides a comparative analysis between the previously agreed and new residential trip rates. This shows that the changes between the two datasets are very small and therefore are unlikely to result in a material change to trip generation. On this basis, the previously agreed trip rates have been used to calculate the multi modal trip generation.

Table 3.1 Trip Generation Comparison

			Car		PT		HGV	
			Urban	Sub	Urban	Sub	Urban	Sub
Flats (Private)	Origin	2013 AM Rates	0.3	0.257	0.044	0.132	0	0
	Dest.		0.066	0.066	0	0.02	0	0
	Origin	2014 AM Rates	0.246	0.257	0.060	0.132	0.000	0.000
	Dest.		0.072	0.066	0.000	0.020	0.000	0.000
	Origin	2013 PM Rates	0.097	0.079	0.000	0.000	0.000	0.000
	Dest.		0.225	0.211	0.000	0.046	0.000	0.000
	Origin	2014 PM Rates	0.090	0.079	0.000	0.000	0.000	0.000
	Dest.		0.210	0.211	0.000	0.046	0.000	0.000
Flats (Affordable)	Origin	2013 AM Rates	0.063	0.116	0.063	0.067	0	0.006
	Dest.		0.125	0.073	0.016	0.012	0	0.003
	Origin	2014 AM Rates	0.128	0.122	0.043	0.067	0.000	0.006
	Dest.		0.128	0.076	0.000	0.012	0.000	0.003
	Origin	2013 PM Rates	0.078	0.104	0.000	0.003	0.000	0.003
	Dest.		0.078	0.119	0.000	0.021	0.000	0.003
	Origin	2014 PM Rates	0.043	0.110	0.064	0.003	0.000	0.003
	Dest.		0.128	0.128	0.021	0.021	0.000	0.003
Flats and Houses (Private)	Origin	2013 AM Rates	0.161	0.171	0	0.057	0	0
	Dest.		0.081	0.076	0	0	0	0
	Origin	2014 AM Rates	0.161	0.171	0.000	0.024	0.000	0.002
	Dest.		0.081	0.076	0.000	0.000	0.000	0.003
	Origin	2013 PM Rates	0.145	0.152	0.000	0.000	0.000	0.000
	Dest.		0.177	0.286	0.016	0.057	0.000	0.000
	Origin	2014 PM Rates	0.145	0.183	0.000	0.000	0.000	0.000
	Dest.		0.177	0.310	0.016	0.016	0.000	0.000
Flats and Houses (Affordable)	Origin	2013 AM Rates	0.425	0.322	0	0	0	0
	Dest.		0.175	0.136	0	0	0	0
	Origin	2014 AM Rates	0.425	0.318	0.000	0.047	0.000	0.000
	Dest.		0.175	0.116	0.000	0.000	0.000	0.008
	Origin	2013 PM Rates	0.1	0.237	0.000	0.000	0.025	0.000
	Dest.		0.275	0.441	0.000	0.000	0.025	0.000
	Origin	2014 PM Rates	0.125	0.217	0.000	0.000	0.025	0.000
	Dest.		0.300	0.364	0.000	0.023	0.025	0.000

Mode Split

3.7 The journey to work mode split data used in the May 2013 STA was based on the 2001 Census data which was the most recent data set available at the time the STA was produced. In discussions with the Highways Agency it was agreed that a comparative analysis would be undertaken between the 2001 census data used in the May 2013 STA and the 2011 census data now available. This was to determine whether the modal split used to calculate public transport mode share was still valid and also to provide an additional check in relation to the vehicular trip generation.

3.8 The net change in mode split has been disaggregated down to Ward level as shown in Table 3.2 below

Table 3.2 Net Change in Mode Split 2001 to 2011 Census Data – Journey to Work

Net Change										
Mode of Travel	Ward									Brighton and Hove
	Regency	South Portslade	Brunswick and Adelaide	St. Peter's and North Laine	Goldsmid	Queen's Park	Hanover and Elm Grove	Wish	Patcham	
Work from Home	0%	-4%	1%	-1%	-1%	-1%	-1%	-2%	-2%	-1%
Train	0%	3%	1%	1%	3%	1%	0%	4%	1%	1%
Bus, Minibus or Coach	2%	3%	2%	0%	0%	1%	2%	0%	1%	2%
Taxi	0%	0%	0%	0%	-1%	0%	0%	-1%	0%	-1%
Car Driver	-8%	-3%	-11%	-8%	-7%	-6%	-6%	-6%	-1%	-6%
Car Passenger	-1%	-2%	-1%	-1%	-1%	-1%	-1%	-1%	-2%	-2%
Motorcycle	0%	0%	0%	-1%	0%	1%	0%	0%	0%	0%
Bicycle	2%	2%	2%	3%	3%	1%	3%	3%	1%	2%
On-Foot	5%	0%	6%	5%	4%	4%	3%	1%	1%	4%
Other	0%	1%	0%	0%	1%	0%	1%	0%	0%	0%
Total										
Public Transport	2%	6%	2%	1%	3%	3%	2%	5%	2%	3%

3.9 Table 3.2 indicates that since 2011, car use in Brighton & Hove has declined across the whole of the city with a 6% drop on average. Public Transport, Cycle and On foot use has correspondingly increased.

3.10 Based on the data above and that from TRICS it is suggested that trip rates for residential development in Brighton is likely to be the same or less than that previously used in the 2013 May STA and hence the continued use of the previous trip rates will present a worst case scenario in terms of trip generation. The additional trips by mode are shown in Table 3.3 below.

TEMPRO Growth Rate

3.11 To ensure that the proposed multi-modal profile is in line with expected overall growth in the local area, the resultant trip generation shown above was capped using local based growth factors derived from TEMPRO.

3.12 Capping of the trip generation using TEMPRO growth factors ensures that the proposed multi-modal profile is in line with expected overall growth in the local area and distributes the growth across the city allowing the location and size of development areas to be considered in the assessment.

Table 3.3 Additional Trips by mode – Urban Fringe Sites

				Cars								PT			
				am			pm			am		pm			
				Proposed			Proposed			Proposed		Proposed			
Site No's	Location	Indicative Number of Dwellings	Indicative Totals following Site Cluster Moderation (Area/Dwelling Number)	Arrivals	Departures	Total	Arrivals	Departures	Total	Arrivals	Departures	Total	Arrivals	Departures	Total
1	Oakdene, Southwick Hill	25	25	3	6	8	9	5	13	0	1	1	1	0	1
2	West of Mile Oak Road, Portslade	12	12	1	3	4	4	2	6	0	0	0	0	0	0
3	South Wick Hill	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Mile Oak Road, Portslade	75	Limited to 5.6ha (280 dwellings) across the cluster of sites 4-6.	8	17	25	26	14	40	0	3	3	3	0	3
4a	Mile Oak Road, Portslade	25		3	6	8	9	5	13	0	1	1	1	0	1
4b	Mile Oak Road, Portslade	25		3	6	8	9	5	13	0	1	1	1	0	1
4c	Mile Oak Road, Portslade	0		0	0	0	0	0	0	0	0	0	0	0	0
5	Mile Oak Road, Portslade	175		18	41	58	61	33	94	0	6	6	6	0	6
5a	Mile Oak Road, Portslade	25		3	6	8	9	5	13	0	1	1	1	0	1
6	Mile Oak allotments, Portslade	50		5	12	17	17	9	27	0	2	2	2	0	2
7	Foredown Allotments, Portslade	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Hangleton Bottom, Portslade	125	125	13	29	41	44	23	67	0	4	4	4	0	4
10	Benfield Hill, Benfield Valley	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Benfield Valley	15	15	2	3	5	5	3	8	0	1	1	1	0	1

				Cars								PT			
				am			pm			am		pm			
				Proposed			Proposed			Proposed		Proposed			
Site No's	Location	Indicative Number of Dwellings	Indicative Totals following Site Cluster Moderation (Area/Dwelling Number)	Arrivals	Departures	Total	Arrivals	Departures	Total	Arrivals	Departures	Total	Arrivals	Departures	Total
12	Benfield Valley, Hangleton Lane	15	15	2	3	5	5	3	8	0	1	1	1	0	1
14	Three Cornered Copse	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	A27/A23 Interchange	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Horsdean Allotments and Recreation Ground	30	30	3	7	10	10	6	16	0	1	1	1	0	1
17	Ladies Mile, Carden Avenue	35	35	4	8	12	12	7	19	0	1	1	1	0	1
17a	Mackie Avenue	0		0	0	0	0	0	0	0	0	0	0	0	0
18	Hollingbury Park	20	20	2	5	7	7	4	11	0	1	1	1	0	1
19	Lower Roedale	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	Hertford School	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	Land to North East of Coldean	130		13	30	43	45	24	69	0	4	4	4	0	4
				0	0	0	0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0	0	0	0
21a	Land North of Varley Halls	50		5	12	17	17	9	27	0	2	2	2	0	2
21b	Varley Halls, Coldean Lane	0		0	0	0	0	0	0	0	0	0	0	0	0
21c	Land South of Varley Halls	7	*Limited to 2.1ha (140 dwellings) across the cluster of*	1	2	2	2	1	4	0	0	0	0	0	0

				Cars								PT			
				am			pm			am		pm			
				Proposed			Proposed			Proposed		Proposed			
Site No's	Location	Indicative Number of Dwellings	Indicative Totals following Site Cluster Moderation (Area/Dwelling Number)	Arrivals	Departures	Total	Arrivals	Departures	Total	Arrivals	Departures	Total	Arrivals	Departures	Total
			sites 21, 21a and 21c.												
26	Brighton University Playing Fields	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0	0	0	0
27	Brighton Borough Cemetery	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	Brighton Borough Cemetery	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	Brighton Borough Cemetery Extension	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	Brighton Race Course	150	150	15	35	50	52	28	80	0	5	5	5	0	5
31	Whitehawk Allotments	50	50	5	12	17	17	9	27	0	2	2	2	0	2
31a	Whitehawk Hill Road/Manor Hill	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31b	West of Whitehawk Hill Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	South Downs Riding School	20	20	2	5	7	7	4	11	0	1	1	1	0	1
32a	Reservoir Site	5	5	1	1	2	2	1	3	0	0	0	0	0	0
33	North of Warren Road	30	30	3	7	10	10	6	16	0	1	1	1	0	1
33a	East of Warran Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33b	South of Warran Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	Sheepcote	0	0	0	0	0	0	0	0	0	0	0	0	0	0

				Cars						PT						
				am			pm			am			pm			
				Proposed			Proposed			Proposed			Proposed			
Site No's	Location	Indicative Number of Dwellings	Indicative Totals following Site Cluster Moderation (Area/Dwelling Number)	Arrivals	Departures	Total	Arrivals	Departures	Total	Arrivals	Departures	Total	Arrivals	Departures	Total
	Valley															
35	East Brighton Park and Sports Ground	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	Lawns Memorial Park burial grounds/fields	10	10	1	2	3	3	2	5	0	0	0	0	0	0	0
37	Roedean Miniature Golf Course	25	25	3	6	8	9	5	13	0	1	1	1	0	1	
				0	0	0	0	0	0	0	0	0	0	0	0	
38	Ovingdean Hall Farm	25		3	6	8	9	5	13	0	1	1	1	0	1	
38a	Ovingdean Hall Farm	5		1	1	2	2	1	3	0	0	0	0	0	0	
39	Land at Bulstrode Farm / Ovingdean Farm	35	*Limited to 2ha (50 dwellings) across sites 38, 38a and 39).*	4	8	12	12	7	19	0	1	1	1	0	1	
40	Land east of Greenways	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
41	Wanderdown Road Open Space	5	5	1	1	2	2	1	3	0	0	0	0	0	0	
				0	0	0	0	0	0	0	0	0	0	0	0	
42	Land adjacent to Ovingdean Road	45	45	5	10	15	16	8	24	0	2	2	2	0	2	
43	Land to rear of Longhill Road	6	6	1	1	2	2	1	3	0	0	0	0	0	0	
44	Allotments to west of The Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
45	Rear of Bazehill Road	2	2	0	0	1	1	0	1	0	0	0	0	0	0	
46	Land west of Saltdean Vale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

				Cars								PT			
				am			pm			am		pm			
				Proposed			Proposed			Proposed		Proposed			
Site No's	Location	Indicative Number of Dwellings	Indicative Totals following Site Cluster Moderation (Area/Dwelling Number)	Arrivals	Departures	Total	Arrivals	Departures	Total	Arrivals	Departures	Total	Arrivals	Departures	Total
46a	Former Nursery site west of Saltdean Vale	18	18	2	4	6	6	3	10	0	1	1	1	0	1
47	Pickershill, Saltdean Vale	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	Coombe Farm Westfield Avenue	50		5	12	17	17	9	27	0	2	2	2	0	2
48a	Field north of Westfield Rise	12		1	3	4	4	2	6	0	0	0	0	0	0
48b	Westfield Avenue North	2	*Limited to 2.1ha (55 dwellings) across sites 48, 48a, 48b and 48c.*	0	0	1	1	0	1	0	0	0	0	0	0
48c	Saltdean Boarding Kennels	7		1	2	2	2	1	4	0	0	0	0	0	0
49	Covered Reservoir – Longridge Avenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	West of Falmer Avenue	12	12	1	3	4	4	2	6	0	0	0	0	0	0
51	Rottingdean Recreation Ground	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0	0	0	0	0
52	Rosebery Avenue, Woodingdean	1	1	0	0	0	0	0	1	0	0	0	0	0	0
53	Queensdown School	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	Braypool Lane	2	2	0	0	1	1	0	1	0	0	0	0	0	0
	TOTAL TRIPS			**136**	**314**	**449**	**473**	**252**	**724**	**0**	**46**	**46**	**46**	**0**	**46**

4 Committed City-Wide Interventions by 2030

4.1 The future year forecasting assumptions for the transport network include any schemes that can reasonably be expected to be delivered by the end of the plan period and which were not built out in the 2010 Base Year. These are unchanged from the previous May 2013 STA.

4.2 These interventions broadly focus on implementing the more certain aspects of Local Transport Plan 3 and / or schemes that have recently been awarded funding.

4.3 These interventions are included in the updated City Plan and have been included in the 2030 Updated City Plan Reference Case scenarios. The interventions are shown in Figure 4.1. and described in the May 2013 STA in more detail.

Figure 4.1 – Committed Transport Interventions

5 Traffic & Public Transport Modelling

5.1 This section sets out the brief methodology used for the impact assessment on the network including the scenarios tested, software used and assumptions made. A more detailed description can be found in the May 2013 STA.

Model Structure

5.2 JMP were commissioned by Brighton & Hove City Council in September 2010 to develop a full multi-modal model for the city centre.

5.3 The study aim was to develop tools with which to investigate the impact of transport schemes and proposed developments in Brighton & Hove.

5.4 To achieve this it was deemed that the study objectives would be best achieved by developing and updating the existing SATURN highway model, building a new public transport model using the VOYAGER software, together with a custom-built variable demand model, built using the principals outlined in WebTAG Unit 3.10.

5.5 The methodology provides a modelling package suitable for testing proposed transport and development schemes with the demand model estimating changes in demand for trips made by all motorised modes of transport. Further details are contained in the May 2013 STA.

Study Area

5.6 In identifying the potential geographical coverage of the model, the following have been considered:

- The coverage of the existing Brighton & Hove multi-modal model.
- Current and emerging strategic planning and transportation considerations, which are identified in the City Plan and the Local Transport Plan
- Best practice model guidance notes and in particular WebTAG, DMRB and other DfT and Highways Agency guidance notes such as IAN 36/01 The Use and Application of Microsimulation Traffic Models.
- Cross boundary issues that impact on travel patterns within Brighton & Hove.

5.7 The detailed model study area covers the City of Brighton & Hove, along with Shoreham. All significant roads and junctions have been included, as have all bus and rail public transport services. Figure 5.1 below shows the extent of the study area.

5.8 . The SATURN model highway network is shown in Figure 5.2.

Figure 5.1 Study Area

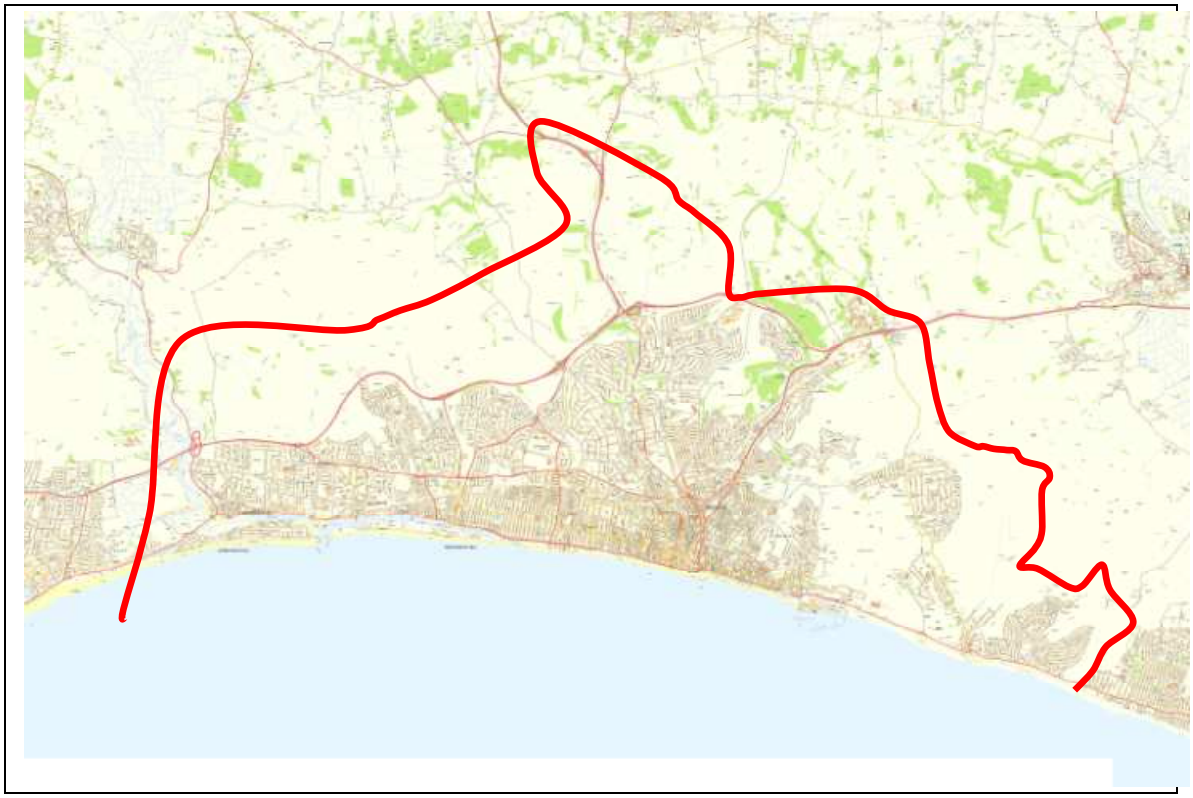


Figure 5.2 Detailed Model Area

Modes

5.9 The model is designed to estimate the routes chosen by persons travelling by the following modes:

- Car
- Bus
- Rail
- Coach

Temporal Scope

5.10 The model is designed to replicate travelling conditions during a neutral month (October) in the following three time periods:

- AM Peak Hour (8am to 9am)
- An average Inter-Peak hour (10am-4pm)
- PM Peak Hour (5pm to 6pm)

5.11 The model has a base year of 2010.

Journey Purposes

5.12 The journey purposes used in the model are:

- Commute – including trips to and from education
- Business – i.e. trips made on employer's business
- Other – including shopping trips, leisure trips, trips to personal appointments etc.

Vehicle Classes

5.13 The following user classes were simulated in the transport model:

Highway Model

- Car – commute
- Car – business
- Car – other
- LGV – private
- LGV – work
- HGV
- Bus

Public Transport Model

- Bus
- Coach
- Rail

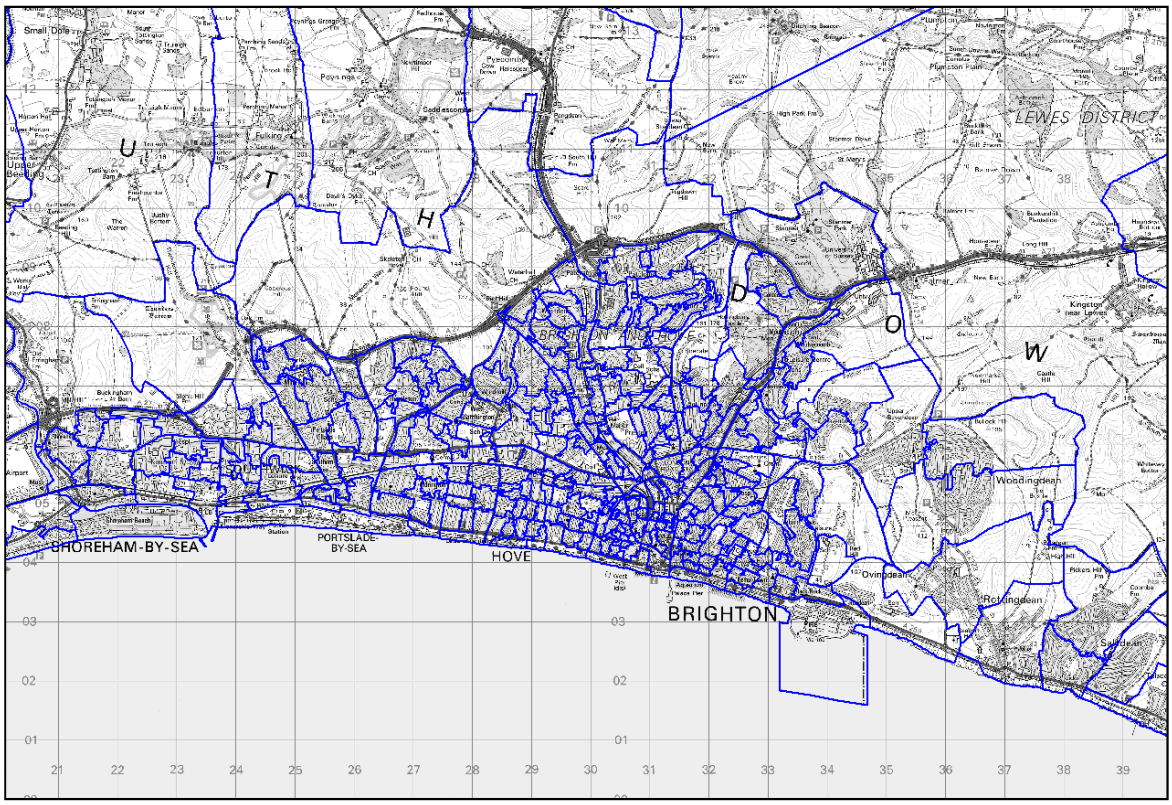
Zoning System

5.14 The traffic model is structured around a series of zones connected into the model network. A key element of the model updating process was to revise the zoning system as appropriate to provide a robust basis for representing the additional trip movement patterns within the model and also to aid the future year forecasting of the Urban Fringe sites using the model.

5.15 The existing zone boundaries were updated to be consistent with census output areas to facilitate the development of the base year matrix, and also to ensure compatibility with the TEMPRO zones

5.16 Figure 5.3 below shows the zoning system for the detailed area.

Figure 5.3 Model Zone Plan



Base Year

5.17 Details relating to the Base Year Model can be found in the May 2013 STA.

Future Year Forecasting

5.18 The remainder of this section summarises the approach taken to forecasting the impacts during the City Plan period. Full details are provided in the Forecasting Report, provided in Appendix C of the May 2013 STA

Development Scenarios

5.19 From the base model, three scenarios have been developed for assessment:-

- 2030 Committed Base
- 2030 City Plan Reference Case; and

- 2030 City Plan Mitigation Case

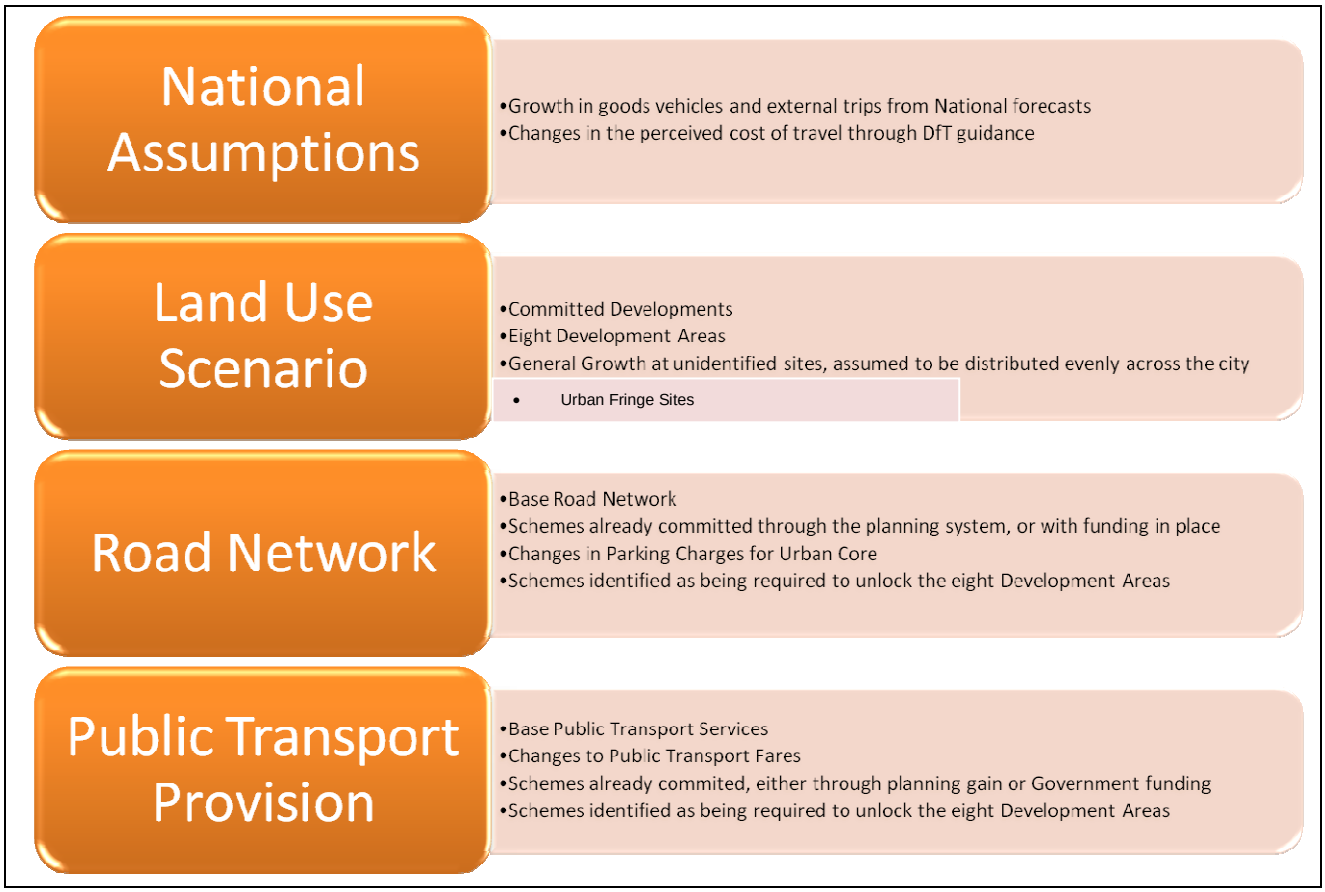
5.20 The 2030 City Plan Reference Case has been revised to include the additional housing sites and is the:-

> *"Base model plus all planning data within the 2030 Plan period together with the measures identified in Section 6 which either have funding in place or measures that are site specific improvements required to facilitate the developments. The level of growth is to be controlled to TEMPRO growth rates as discussed later in this Section."*

5.21 This scenario is designed to enable the impact of the additional development through to 2030 to be evaluated against the already committed levels of development. A comparison can also be made between with the reference cases run as part of the May 2013 STA in order to isolate the impact of the urban fringe sites. Figure 5.4 summarises the contents of the 2030 City Plan Reference Case scenario.

5.22 Latent travel demand has also been input into the Brighton & Hove multi-modal model to allow for changes to travel destinations and mode (as a result of changes in the costs of travel) to be incorporated into the forecasts.

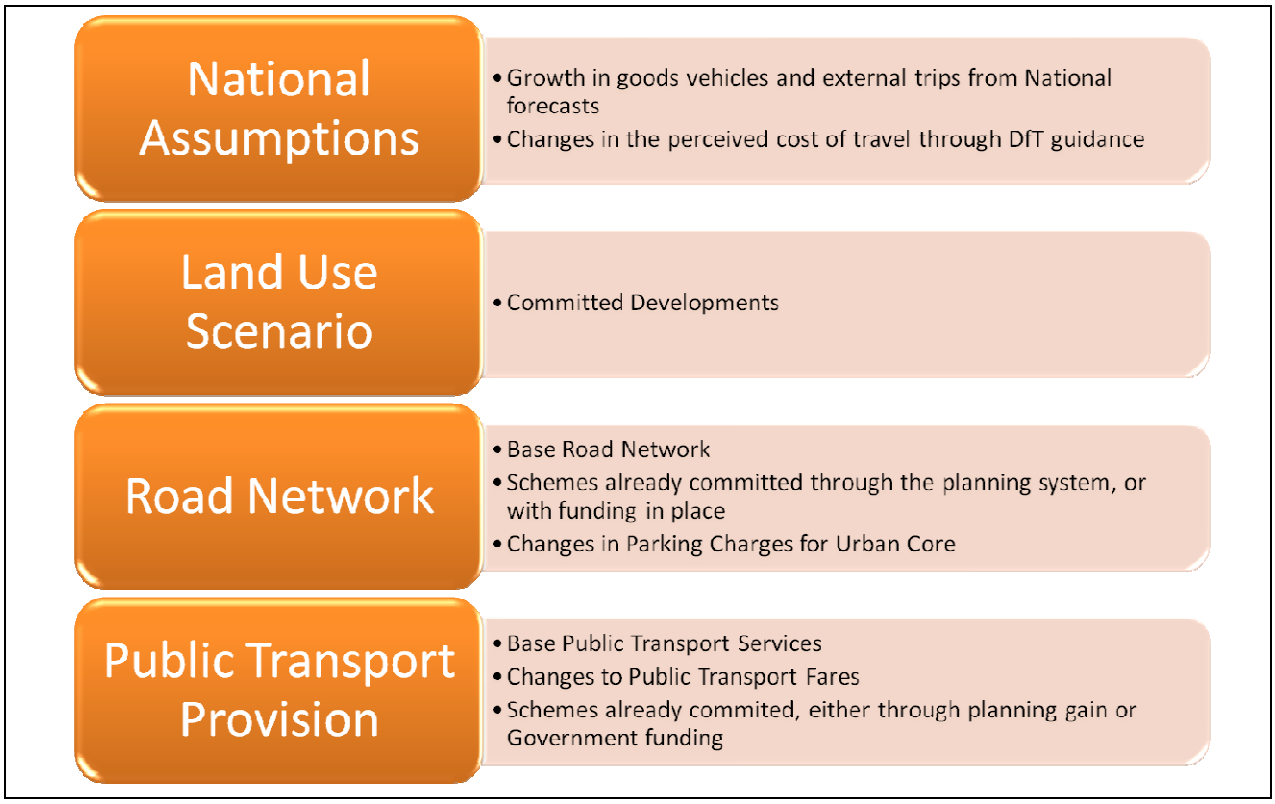
Figure 5.4 - 2030 City Plan Reference Case scenario



5.23 The 2030 Committed Base is the:

"2030 City Plan Reference Case plus any committed developments that were not operational during the surveys or 2010. This scenario will be compared to the 2030 City Plan Reference Case to reveal additional mitigation measures required. Figure 7.6 provides a summary of the contents of the 2030 Committed Base Scenario."

Figure 5.5 2030 Committed Base scenario



JMP

5.24 The 2030 City Plan Mitigation Case is the:

" 2030 City Plan Reference Case plus the resultant additional mitigation measures from the 2030 Committed Base. This scenario provides evidence of the impacts of the Development Sites and highlights where further mitigation measures will be required to help mitigate against negative impacts. The flows from this scenario have been compared to the Updated 2030 City Plan Reference Case flows to link measures to developments".

TEMPRO Constraints

5.25 To take account of changes in car ownership and ensure compatibility with national derived forecasts, trip totals have been constrained to that output by TEMPRO. Further details can be found in the May 2013 STA

Goods Vehicle Growth

5.26 Rather than using national growth forecasts, the forecast goods vehicles growth has been based on trend analysis of automated traffic counts over the last ten years including the use of the Highways Agency's Traffic Flow Data System (TRADS) database. Further details can be found in the May 2013 STA

Trip distribution & assignment

5.27 New zones have been created in the model for the urban fringe sites as follows:-

- Developments around Mile Oak [Notionally referred to as 'development area' DA9 for the purposes of this assessment]
- Developments around Coldean : [Notionally referred to as 'development area' DA10 for the purposes of this assessment]
- Developments in East Brighton: [Notionally referred to as 'development area' DA11 for the purposes of this assessment]

5.28 Each development area was given an individual zone to allow separate analysis of their impacts on the performance of the road network. This is especially important for development area DA9 and DA10 due to their proximity to the strategic road network.

5.29 For all of the other model zones, a growth rate based on the change between the council supplied City Plan data and the base year planning data was used to growth the base year trip matrix. This included the windfall sites and will allow for the cumulative impact of all of the City Plan policies to be analysed.

Trip distribution & assignment

5.30 The next stage has been to produce a set of travel patterns for the three new 'development areas'. This is accomplished through the use of a calibrated gravity model. The base year travel demands have been analysed with respect to the base year travel costs to provide a set of 'cost curves' relating the cost of trips to the number of trips for each time period, journey purpose and mode combination.

5.31 This calibrated cost curve has been used in conjunction with identified trip origins (or destinations) of each of the development areas and the total base year destinations (or origins) to forecast a pattern of travel for each development area.

5.32 The resulting travel patterns were loaded onto the base year routes to produce a diagram for each development area. These diagrams demonstrate that the initial seeded trip distribution pattern is a plausible pattern of travel for the development areas. These diagrams are provided in Appendix E for information. The link bandwidths shown on the diagrams are colour coded to show those with 30 or less development trips (green) and over 30 development trips (red). Sites generating over 30 trips normally require transport assessments.

5.33 The trip distribution for the remaining developments which are outside development areas is based on the validated base model travel patterns. The percentage change in planning data terms has been applied to the trip matrices, with the change in households being a proxy for trip origins and the change in jobs being a proxy for destinations.

5.34 Further details on the trip distribution and assignment can be found in the May 2013 STA.

Detailed SRN modelling

5.35 Based on the results of the network models, local models have been developed for junctions on the SRN to provide more detailed assessment. These are discussed in greater detail in the following section.

6 Assessment of City Plan Mitigation Measures

Summary of May 2013 STA work

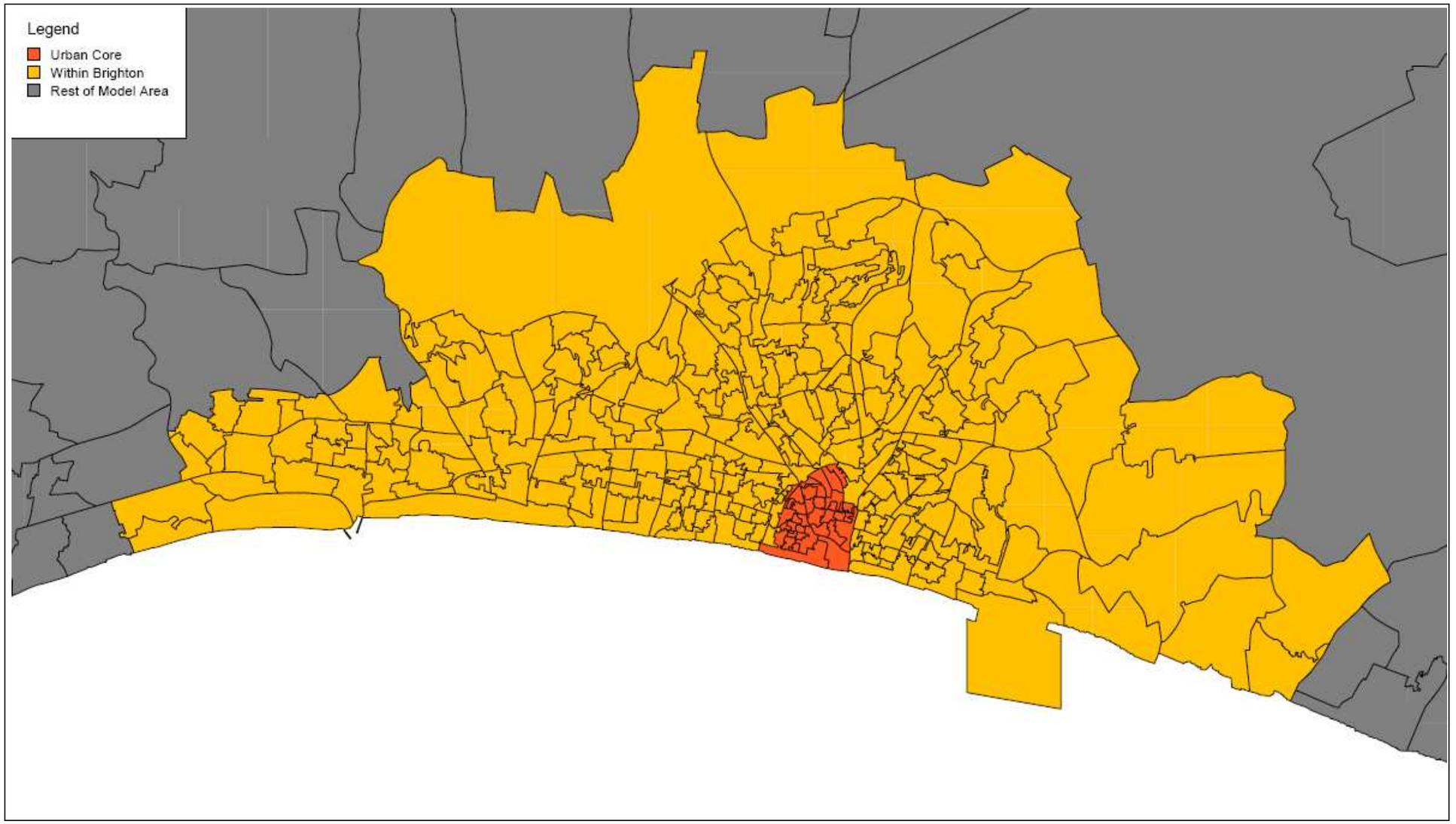
6.1 The May 2013 STA identified the impact of the committed developments and Development Areas identified in Section 2 together with the impact of the committed city-wide interventions outlined in Section 4.

6.2 The analysis of impacts was taken at two levels:-

- The Urban Core which contains the key employment, retail and tourist destinations in the city centre and also a significant proportion of flats; and
- Within Brighton & Hove which covers the outlying mainly residential areas between the A27 and the Urban Core (north – south) and between the Urban Core and the administrative boundary of Brighton & Hove (east- west).

6.3 These two areas were chosen because of the known differences in travel behaviour such as higher car ownership and lower public transport usage in the suburbs as identified in census data. The differentiation between zones is shown graphically in Figure 8.1 below.

Figure 6.1 Sector Plan for Brighton & Hove and surrounding area



6.4 Analyses were produced at two levels:-

- Area Wide Statistics; and
- Corridor Based Analysis ;

6.5 The main conclusions from the May 2013 STA were that:-

- Public transport mode share will fall in the city when the Development Areas are built out unless mitigation is identified.
- The impact of the 2030 City Plan Reference Case compared to the 2030 Committed Base equates to a 1% modal shift away from public transport to car travel in the PM peak.
- Without mitigation vehicle kilometres and vehicle minutes will increase between the 2030 Committed Base and the 2030 City Plan Reference Case as a result of the inclusion of the Development Areas.

6.6 In order to mitigate the impact of the Development Areas a list of transport interventions were identified in the May 2013 STA which would meet one or more of the following objectives:-

- Building on successful behavioural change programmes
- Increasing modal choice to the new strategic development areas by walking, cycling and public transport modes
- Tackling safety issues on the strategic road network where queues block back to mainline carriageways; and
- Addressing air quality issues through freight management and sustainable transport provision in the urban core

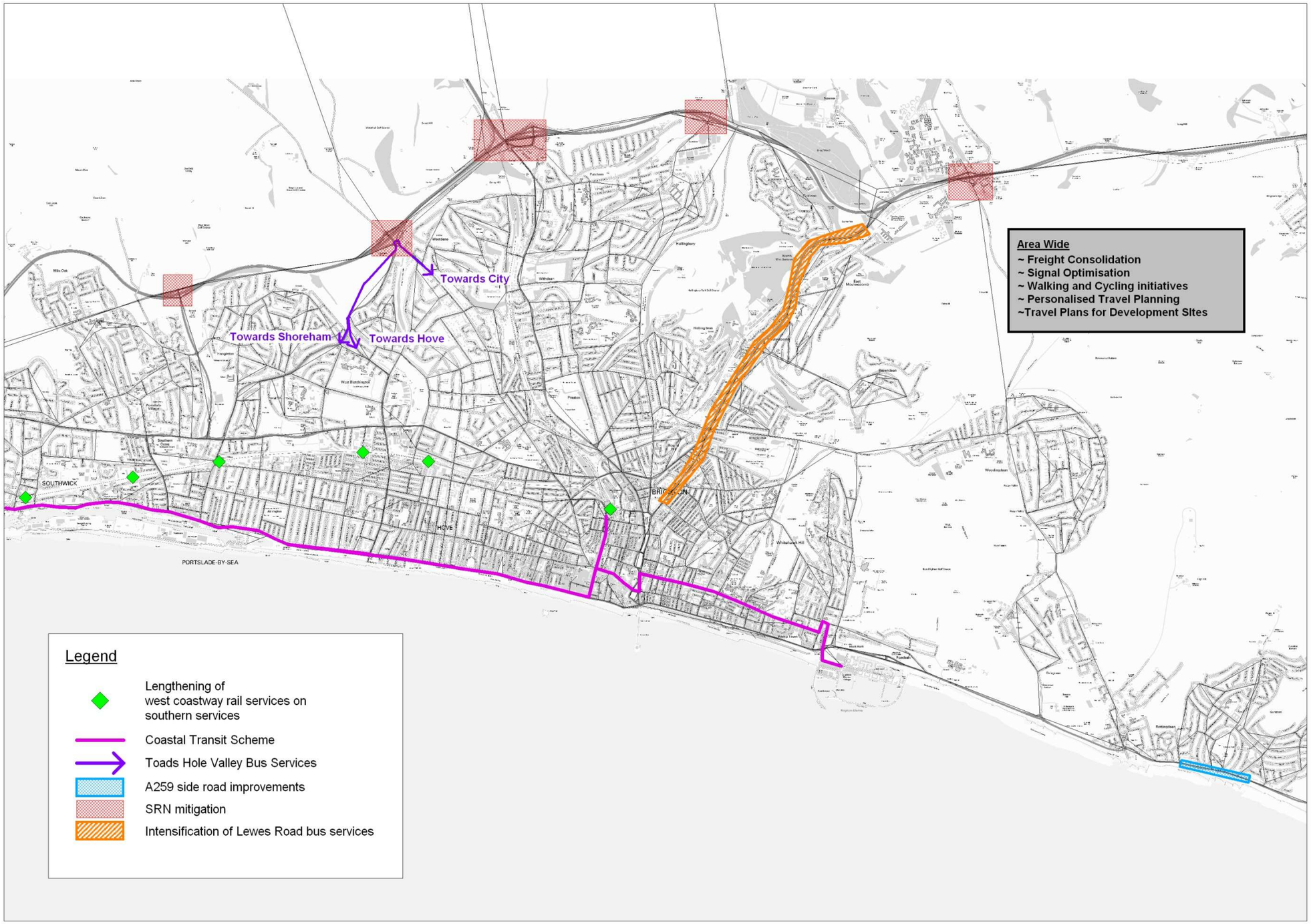
6.7 Table 6.1 below provides a summary of the key transport interventions which are also shown graphically in Figure 6.2

Table 6.1 - Summary of Transport Interventions for 2030 City Plan Mitigation Scenario

Scheme	City Plan Mitigation Case - Objectives			
	Behaviour change to reduce background traffic growth	Modal Choice to new strategic sites	SRN Safety - Reducing demand on SRN and selective infrastructure improvements	Improving air quality in the urban core - Sustainable Transport and Freight Management
Implementation of Coastal Transit Scheme (Brighton Station to Marina)	✓	✓		✓
Implementation of Coastal Transit Scheme (Brighton Station to Shoreham Harbour / Worthing)	✓	✓	✓	✓
Toads Hole Valley Bus Services		✓	✓	
Intensification of Lewes Road Bus Services		✓		✓
A259 Side Road Improvements - Saltdean				
Lengthening of West Coastway rail services on Southern Services		✓	✓	✓
Freight Consolidation / Management	✓			✓
Local road signal optimisation and UTC/ MOVA roll out				✓
SRN Infrastructure Mitigation at five junctions			✓	
Walking and Cycling Initiatives in development areas and connectivity to surrounding areas	✓	✓		✓
Personalised Travel Planning on congested corridors	✓			
Travel Plans for development sites	✓	✓	✓	

6.8 It should be noted that the A259 side road improvements are related to improving the flow of traffic onto the A259 during the morning peaks.

Figure 6.2 - 2030 City Plan Mitigation Measures from May 2013 STA



Testing the impact of the 2030 City Plan Mitigation Strategy

6.9 The mitigation strategy identified above was tested using the multi modal model. Analyses were produced at three levels:-

- Area Wide Statistics
- Corridor Based Analysis ; and
- Strategic Road Network Analysis

6.10 The strategic road network analysis was undertaken using local models to provide a finer grain of analysis and in order to satisfy the Highways Agency that there were no adverse slip road impacts affecting the mainline of the A27.

Area Wide Statistics- Total Change in Daily Trips/Time Period by mode

6.11 Table 6.2 shows the changes in trips for 'within Brighton & Hove' and 'within the urban core' presented in the May 2013 STA for 11,300 dwellings and the revised assessment with 13,200 dwellings shown in **bold**.

Table 6.2 - Growth in Daily Trips

		2010 Base to 2030 City Plan Mitigation Case				2030 Committed Base to 2030 City Plan Mitigation Case				2030 City Plan Reference Case to 2030 City Plan Mitigation Case			
		Car Persons		PT Persons		Car Persons		PT Persons		Car Persons		PT Persons	
		Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Trips within Brighton & Hove	AM Peak	3869	11%	5436	46%	2634	7%	1796	12%	-732	-2%	691	4%
		4890	**14%**	**4840**	**41%**	**3655**	**10%**	**1200**	**8%**	**-244**	**-1%**	**-66**	**-1%**
	PM Peak	2769	9%	5104	41%	1457	4%	1134	7%	-1115	-3%	857	5%
		4072	**13%**	**4585**	**37%**	**2759**	**8%**	**615**	**4%**	**-452**	**-1%**	**-170**	**-2%**
Trips to/from Urban Core (excluding External)	AM Peak	561	8%	2380	43%	487	7%	848	12%	-74	-1%	188	3%
		568	**10%**	**1676**	**41%**	**530**	**9%**	**450**	**8%**	**181**	**1%**	**50**	**1%**
	PM Peak	145	2%	2744	37%	200	2%	741	8%	-298	-3%	85	4%
		196	**3%**	**1807**	**32%**	**398**	**6%**	**323**	**4%**	**271**	**2%**	**107**	**1%**

6.12 When compared to the 2010 Base and 2030 Committed Base, both the 2030 City Plan Mitigation Case runs shows an increase in both car trips and public transport trips. This is largely due to the overall increase in trips associated with the Development Areas and the Urban Fringe Sites

6.13 However, when compared against the 2030 City Plan Reference Case, both 2030 City Plan Mitigation Cases actually shows a reduction in car trips for trips within Brighton & Hove. However the reductions in car usage are less when the urban fringe sites are added because they have poorer levels of public transport accessibility than some of the more centrally located development areas.

6.14 The enhanced public transport provision in the mitigation case compared to the 2010 base also has a significant impact on the rate of increase of public transport person trips compared to car person trips. For example with the additional 11,300 dwellings reported in the May 2013 STA, public transport person trips increased by an average ratio of 4 to 1 compared to car person trips. With the additional 1,900 dwellings the ratio falls to 3 to 1. This suggests that the introduction of 20mph zones coupled with the increase in public transport provision particularly on the Lewes Road and Coastal Transit Scheme corridors will underpin the growth in public transport trips in the development areas but that additional bus mitigation measures will be required to transfer trips away from the car and onto public transport in the urban fringe areas.

6.15 It is suggested that this might be able to be achieved through the:-

- Extension of existing bus services
- Improved frequencies of existing bus services
- New bus services

6.16 The table below suggests some potential measures which might wish to be considered at the detailed planning application stage for the urban fringe sites. For clarity these have been identified into clusters/ groupings.

Table 6.3 - Potential Additional Transport Interventions for Updated 2030 City Plan Mitigation Scenario at Urban Fringe Sites

	Mile Oak Cluster	Hangleton Cluster	Coldean Cluster	East Brighton Cluster
Extension of 1 and 1a bus service	Yes			
Diversion of 2 bus service				Yes
Diversion of 16/66 bus service		Yes		
Linkage with Toads Hole Valley Bus Services	Yes	Yes		
Increased frequency of 24 and 46 bus services			Yes	

6.17 The provision of these services would offer an alternative travel choice for residents living in these areas.

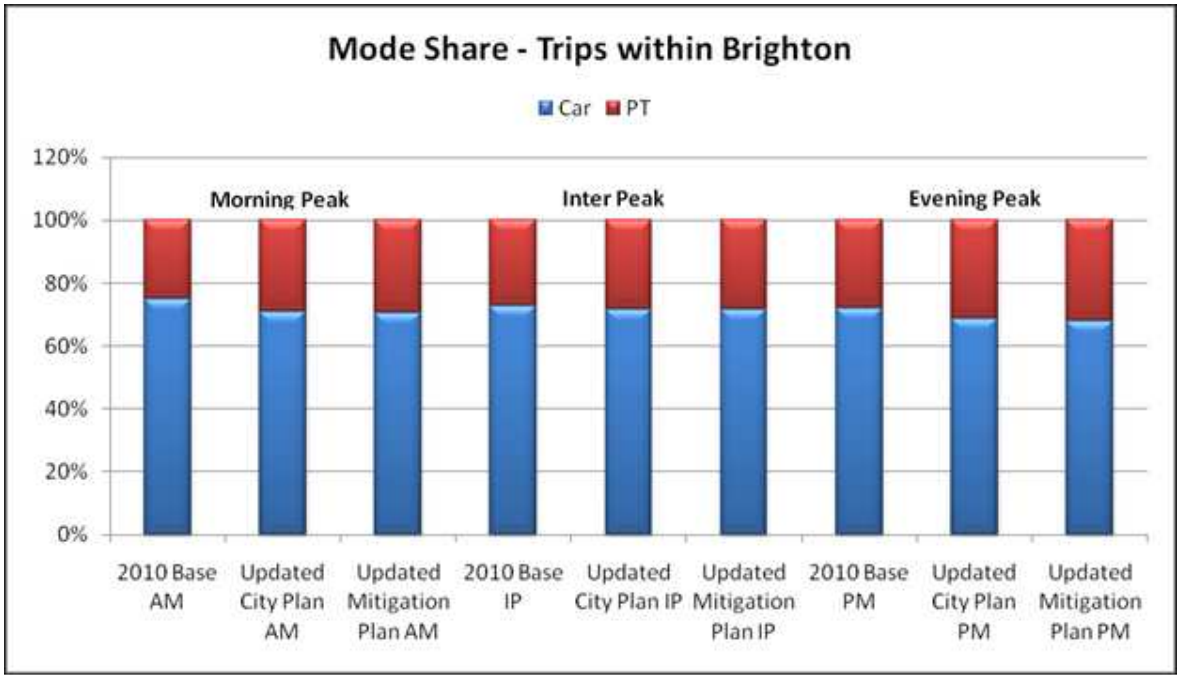
Demand Analysis by mode/journey purpose

6.18 Figures 9.2 and 9.3 show the change in modal share for each of the scenarios and it should be noted that the 2030 assessment years have a lower car occupancy in line with DfT guidance.

Trips within Brighton

6.19 The graph below shows that the introduction of City Plan Mitigation measures increases public transport mode share compared to the 2010 base and 2030 City Plan Reference Case and that this is maintained with the introduction of an additional 1,900 dwellings for trips within Brighton & Hove.

Figure 6.3 Mode Share - Trips within Brighton & Hove (including Mitigation Case)



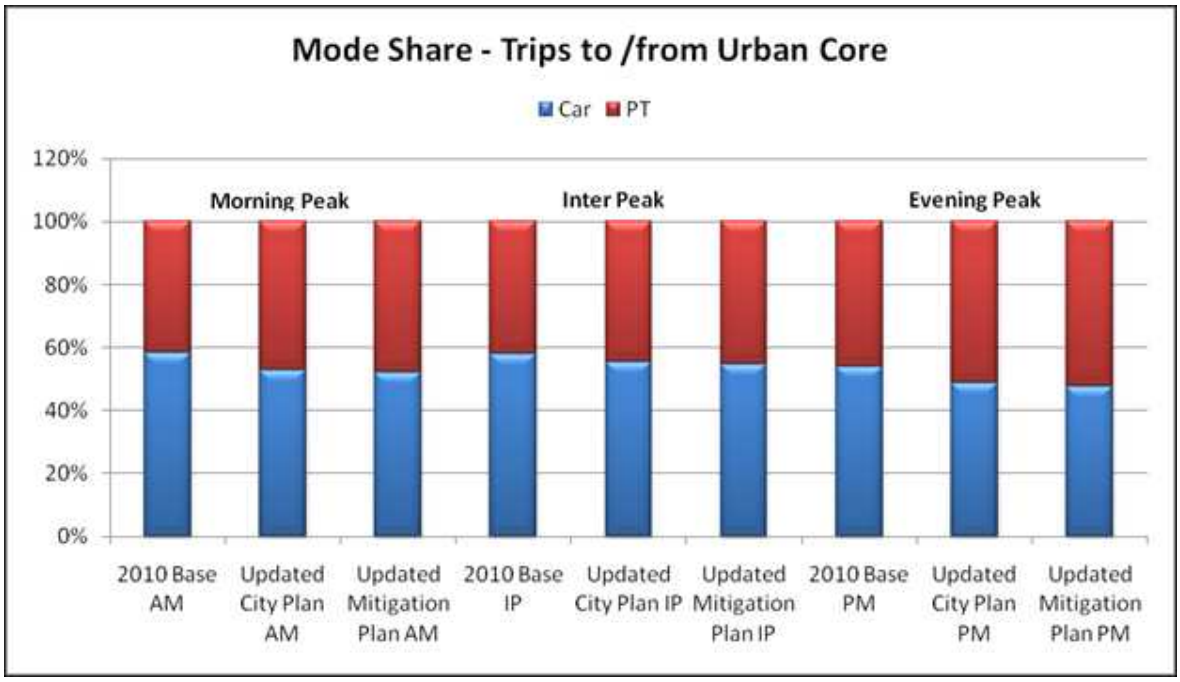
Trips to/from the Urban Core (excluding external trips)

6.20 The updated assessments shown in Figure 6.4 indicate that for trips to and from the urban core a similar pattern is displayed as for trips within Brighton.

6.21 However, the introduction of the mitigation identified in the May 2013 STA, shows that the public transport mode share will increase by a more significant margin than within the rest of Brighton & Hove.

6.22 Given that the mitigation shows a bigger shift in public transport users for the trips to / from the urban core; it is suggested that the improvements to the radial bus routes are having the greatest impact. However in order to ensure that the urban fringe areas are not 'car captive' and that improvements to public transport mode share are maintained it is suggested that the measures identified in Table 6.3 are considered at the planning application stage. Pooling of contributions through CIL may be required in order to sustain these services given that many of the developments proposed are small in size. Linkages with Toads Hole Valley bus services should also be considered.

Figure 6.4 Mode Share - Trips to/from Urban Core (including Mitigation Case)



Journey Times

6.23 Table 9.4 presents the changes in average journey times across radial corridors (see Figure 8.8 in the 2013 May STA for routes) and has been compared with the 2010 base and the 2030 Committed Base and 2030 City Plan Reference Case scenarios. The analysis reveals that journey times across all routes are forecast to increase by around 50% between the 2010 base and the 2030 City Plan Reference Case.

6.24 The increase is in part due to a number of factors including:-

- Reallocation of roadspace on the Lewes Road corridor
- Introduction of 20mph zones on some of the routes
- Traffic Growth on the network

Table 6.4 – Average difference in journey times relative to the 2010 base across radial corridors

	Difference in Journey Times relative to 2010 base		
Time Period	2030 Consented	Updated 2030 City Plan Reference Case	Updated 2030 City Plan Mitigation Case
Morning Peak	33%	49%	41%
Evening Peak	33%	53%	31%

6.25 Table 9.3 also indicates that with the introduction of mitigation as identified in the May 2013 STA, increases in journey times particularly in the evening peak return to those levels shown in the 2030 consented case. That is the interventions proposed in the May 2013 STA will almost fully mitigate

the impact of the development areas returning the operation of the network in the evening peak to slightly better than if the developments were not there.

6.26 However and particularly in the morning peak, in order to exact more modal shift to public transport in the urban fringe areas, public transport will need to be improved further as identified in Table 6.3.

6.27 At a corridor level, the updated 2030 City Plan Mitigation Case has assessed the impacts on car journey times on a number of radial corridors. Appendix B identifies the travel patterns from all the developments which show that most links will experience increases in traffic volumes of less than 25 movements per hour (denoted by green links regardless of thickness of line) from each development area grouping . Hence journey times and congestion/delay will follow a similar pattern to that previously identified in the May 2013 STA and documented in Section 9 of the report.

6.28 As might be expected the areas where traffic increases are most marked and hence where journey times could be expected to increase more significantly are:-

- The northern end of the A293 between the A270 and the A27
- Chalky Road / Fox Way between Mile Oak Road and the A293
- Mile Oak Road, north of the A270
- Coldean Lane and in particular its junction with Lewes Road
- The northern end of Ditchling Road approaching the Hollingbury Interchange
- Bear Road/Elm Grove to Warren Road corridor
- Falmer Road , north of the Woodingdean crossroads

6.29 In summary, the results indicate that the updated 2030 City Plan Mitigation case has a generally positive impact on reducing journey times with many routes performing better than in the 2030 Committed Base. This suggests that the impact of the development areas can be adequately mitigated, although it is recommended that further public transport improvements are made in the urban fringe to reduce the impact on the local road network particularly where it meets the A27. This is discussed further in the next section.

SRN Mitigation

6.30 The previous May 2013 STA noted that for nearly all the SRN junctions tested, there was an imbalance in delays and queuing across the arms. In discussions with the Highways Agency it was considered that most of these junctions would probably benefit from some form of signalisation by the end of the plan period in order to better distribute queues and delays. In conjunction with the HA, schemes were developed to a level of detail sufficient for the purposes of transport modelling and a high-level assessment of feasibility. These are reproduced from the May 2013 STA and are shown in Appendix C. This work demonstrated that the mitigation proposed would avoid detriment to the A27 and can be summarised as follows:-

- Falmer Interchange - upgrade of the northern roundabouts to a signalised teardrop junction and the southern roundabout to a signalised T Junction
- Hollingbury Interchange (Carden Avenue/A27)- the signalisation and remodelling of the northern roundabout to create a 't junction' South roundabout converted to a 'teardrop junction' with accompanying part signalisation of the junction.
- Patcham Interchange (A23/A27) - signalisation and remodelling of the northern roundabout to create a teardrop junction and part signalisation of the southern roundabout
- Devils Dyke roundabout- northern roundabout be converted to a teardrop junction. Two northbound lanes across the bridge is also likely to be required. This could be achieved by reducing the southbound movement to one lane or possibly relocating the footway on a new parallel bridge structure across the A27 to provide the necessary width for general traffic lanes.
- Hangleton Link (A293) / A27 junction- Improvements to reduce the queuing on the northbound section under the bridge are likely to be required. Part signalising the southern roundabout to regulate flow into this section could be adopted to better manage flows.

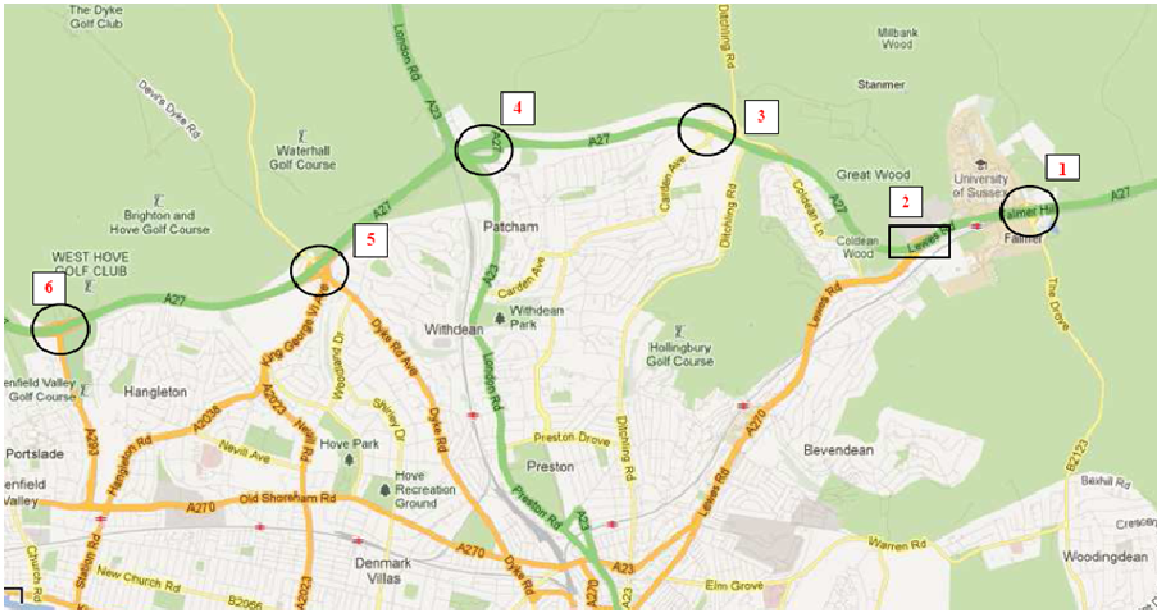
6.31 Traffic flow increases and/or changes in patterns of movement have been identified from the updated 2030 Reference Case modelling. This was already identified as needing further investigation and mitigation in the May 2013 STA and this work should take account of likely increases arising from an additional 1900 dwellings.

6.32 The SRN junctions warranting further investigation are those that were identified in the May 2013 STA namely:-

1. A27 / Falmer Interchange – north and south roundabouts;
3. A27 / Hollingbury Interchange – north and south roundabouts
4. A27 / A23 Junction – north, south and west roundabouts;
5. A27 / King George VI / Devils Dyke Road Junction – north and south roundabouts; and
6. A27 / A293 Junction Hangleton Link– north and south roundabouts.

6.33 These junctions are shown in Figure 7.4 and sit within the Brighton administrative boundary. The exception is the Falmer Interchange which is located in East Sussex but is very much 'Brighton facing' given that access roads to the junction from the south and west are located in Brighton & Hove.

Figure 6.5 SRN Junctions warranting further investigation



6.34 The future year scenarios for the updated 2030 City Plan Reference Case' have been developed by establishing the difference between the updated 2030 City Plan Reference Case and the 2010 Base and adding these flows to the, LINSIG[4] mitigation models. The results of this revised assessment under the mitigation heading are included in Appendix D and E.

6.35 The results indicate that there will be a slight deterioriation in the operational performance of the network but that slip road and overbridge queuing on the local road network can be contained within acceptable limits without impacting on the A27 mainline.

6.36 It is recognised that an upgrade of the Hangleton Link / A27 junction may be required in order to reduce the queuing on the northbound section under the bridge. Part signalising the southern roundabout to regulate flow into this section could potentially better manage flows.

6.37 The preferred strategy is therefore to carefully manage the volume of traffic entering the city on the A27 through selective improvements which minimise reassignment to local roads and to maximise opportunities for residents of the urban fringe sites closest to the SRN (such as Mile Oak, Coldean and Toads Hole Valley) to use public transport alternatives.

6.38 In summary therefore, the results indicate that the potential package of works identified in conjunction with the HA and summarised in paragraphs 9.84 to 9.87 of the 2013 May STA (and shown indicatively in Appendix C of this addendum report) will be sufficient to mitigate the impact of the additional 1,900 dwellings on the SRN.

[4] LINSIG is a piece of software used for design and modelling of signalised traffic junctions including optimisation of signal stage, phase and cycle timings.

7 Conclusions

7.1 This addendum report has documented the additional transport impacts arising from the updated 2030 Brighton & Hove City Plan The key objectives have been to:

- Determine the transport impacts of the development strategy detailed in the updated 2030 City Plan including potential highway and public transport impacts and associated constraints on travel
- Determine the level of interventions (mitigation) required to manage traffic and transport in order to support sustainable development and the City Plan.

7.2 Specifically this report has sought to determine whether the mitigation previously proposed for 11,300 dwellings; also satisfactorily mitigates the additional 1,900 dwellings identified in Brighton & Hove mainly on the urban fringe.

7.3 To establish the impacts of the updated City Plan the following forecast year scenarios have been re-run:

- 2030 City Plan Reference Case – Base model plus committed developments and transport schemes that are certain or near certain of being delivered in the plan period plus the strategic developments noted in the proposed City Plan (Development Areas 1 to 8) and Urban Fringe sites. The level of economic and demographic growth has been controlled to TEMPRO[5] growth rates.
- 2030 City Plan Mitigation Case – This is the 2030 City Plan Reference Case plus the additional mitigation measures identified in the May 2013 STA and required to address travel constraints.

7.4 The assessment of these scenarios has been conducted for a morning and evening weekday peak period and has revealed the following at a strategic level:-

- The proposals within the updated City Plan Mitigation show an increase in both car trips and public transport trips. This is to be expected given 20 years of growth on the network from committed developments and background traffic growth.
- The overall public transport modal split for the city is lower with the urban fringe sites because these have lower levels of public transport accessibility than the development areas already tested
- Without further public transport interventions, the modal split from the new urban fringe sites is likely to be more car dominated than for the development areas which were tested in the 2013 May STA.
- There is a higher modal share by public transport with and without the additional 1,900 dwellings than in the 2010 base.
- In the evening peak, the mitigation measures already identified in the May 2013 STA will be sufficient to return the operation of the network to slightly better than if the developments were not there. In the morning peak, the model is forecasting a slight deterioration of around 8%.

7.5 The results of the modelling show that a sustained improvement in public transport provision and walking and cycling facilities accompanied by personalised travel planning and behaviour change

[5] TEMPRO uses local planning data from the National Trip End Model (NTEM) and traffic growth from the National Transport Model (NTM) to produce a local traffic growth factor.

campaigns will be required to ensure that developments in the urban fringe offer a realistic travel choice. This is in addition to the mitigation already identified in the May 2013 STA.

7.6 Given the location of these sites, bus based solutions are likely to be required and Table 6.3 has identified some potential measures which might wish to be considered at the detailed planning application stage as developments come forward. In particular opportunities should be explored to link some of the public transport interventions at Toads Hole Valley with those in neighbouring development areas such as Hangleton and Mile Oak.

7.7 At a local level, increases in traffic and journey times are forecast around the northern part of Brighton & Hove and in particular where it interfaces with the Highways Agency's Strategic Road Network.

7.8 The City Plan mitigation previously developed in conjunction with the Highways Agency has been tested further and this indicates that the conclusions drawn for the May 2013 STA are still valid. That is, a package of junction improvements has been identified and discussed with the HA which would enable traffic to more efficiently leave the A27, with no detrimental impact on the safety and efficiency of the mainline carriageway.

7.9 Further work, will be required as planning applications come forward, but the level of transport modelling work undertaken to inform the City Plan is appropriate for this stage of the plan making process.

Appendix A

Summary Schedule of Urban Fringe Sites

Summary Schedule of Urban Fringe Sites

Site No's	Location	Key Constraints	Mitigation Potential	Housing Potential	Density	Total Area of Site (Hectares)	Potentially Developable Area of Site (Hectares)	Percentage of Total Area of Site (%)	Indicative Number of Dwellings	Indicative Totals following Site Cluster Moderation (Area/Dwelling Number)
1	Oakdene, Southwick Hill	Ecology; Landscape	Yes	Yes	Low	2.25	1	44%	25	25
2	West of Mile Oak Road, Portslade	Ecology; Open Space; Landscape	Yes	Yes	Low	2.5	0.5	20%	12	12
3	South Wick Hill	Ecology; Open Space; Landscape; Topography; Access	Yes	No	N/A	1.15	0	0%	0	0
4	Mile Oak Road, Portslade	None	N/A	Yes	Medium	1.71	1.5	88%	75	Limited to 5.6ha (280 dwellings) across the cluster of sites 4-6.
4a	Mile Oak Road, Portslade	Flooding	Yes	Yes	Medium	0.55	0.5	91%	25	
4b	Mile Oak Road, Portslade	Flooding	Yes	Yes	Medium	0.63	0.5	79%	25	
4c	Mile Oak Road,	Absolute Constraint: Reservoir; Utilities; Landscape				3.38	0	0%	0	

Site No's	Location	Key Constraints	Mitigation Potential	Housing Potential	Density	Total Area of Site (Hectares)	Potentially Developable Area of Site (Hectares)	Percentage of Total Area of Site (%)	Indicative Number of Dwellings	Indicative Totals following Site Cluster Moderation (Area/Dwelling Number)
	Portslade									
5	Mile Oak Road, Portslade	Ecology; Landscape	Yes	Yes	Medium	6.89	3.5	51%	175	
5a	Mile Oak Road, Portslade	Ecology; Open Space; Flooding	Yes	Yes	Medium	1.24	0.5	40%	25	
6	Mile Oak allotments, Portslade	Open Space; Flooding	Yes	Yes	Medium	2.07	1	48%	50	
7	Foredown Allotments, Portslade	Ecology; Open Space	Yes	No	N/A	2.31	0	0%	0	0
9	Hangleton Bottom, Portslade	Flooding	Yes	Yes	Medium	3.37	2.5	74%	125	125
10	Benfield Hill, Benfield Valley	Ecology; Heritage; Open Space; Landscape	Yes	No	N/A	5.65	0	0%	0	0
11	Benfield Valley	Ecology; Heritage; Open Space;	Yes	Yes	Low	8.75	0.75	9%	15	15

Site No's	Location	Key Constraints	Mitigation Potential	Housing Potential	Density	Total Area of Site (Hectares)	Potentially Developable Area of Site (Hectares)	Percentage of Total Area of Site (%)	Indicative Number of Dwellings	Indicative Totals following Site Cluster Moderation (Area/Dwelling Number)
		Landscape								
12	Benfield Valley, Hangleton Lane	Ecology; Heritage; Open Space; Landscape; Flooding	Yes	Yes	Low	10.65	0.75	7%	15	15
14	Three Cornered Copse	Ecology; Heritage; Open Space; Landscape	Yes	No	N/A	6.86	0	0%	0	0
15	A27/A23 Interchange	Heritage; Flooding	Yes	No	N/A	1.16	0	0%	0	0
16	Land at and adjoining Horsdean Recreation Ground, Patcham	Heritage; Open Space; Landscape; Flooding	Yes	Yes	Low	5.79	1.25	22%	30	30
17	Land at Ladies Mile, Carden Avenue	Ecology; Heritage; Open Space; Landscape	Yes	Yes	Low	17	1.5	9%	35	35
17a	Mackie Avenue	Absolute Constraint: Schedule Monument				1.49	0	0%	0	

Site No's	Location	Key Constraints	Mitigation Potential	Housing Potential	Density	Total Area of Site (Hectares)	Potentially Developable Area of Site (Hectares)	Percentage of Total Area of Site (%)	Indicative Number of Dwellings	Indicative Totals following Site Cluster Moderation (Area/Dwelling Number)
18	Land south of Hollingbury Golf Course and East of Ditchling Rise	Ecology; Heritage; Open Space; Landscape; Flooding	Yes	Yes	Low	20.1	0.75	4%	20	20
19	Lower Roedale	Ecology; Heritage; Open Space; Landscape; Flooding	Yes	No	N/A	7.06	0	0%	0	0
20	Hertford School	Ecology; Heritage; Open Space; Landscape; Flooding	Yes	No	N/A	1.62	0	0%	0	0
21	Land to North East of Coldean	Ecology; Heritage; Open Space: Landscape	Yes	Yes	High	3.36	1.75	52%	130	*Limited to 2.1ha (140 dwellings) across the cluster of sites 21, 21a and 21c.*
21a	Land North of Varley Halls	Ecology; Heritage; Open Space; Landscape; Flooding	Yes	Yes	High	4.14	0.75	18%	50	

Site No's	Location	Key Constraints	Mitigation Potential	Housing Potential	Density	Total Area of Site (Hectares)	Potentially Developable Area of Site (Hectares)	Percentage of Total Area of Site (%)	Indicative Number of Dwellings	Indicative Totals following Site Cluster Moderation (Area/Dwelling Number)
21b	Varley Halls, Coldean Lane	Heritage; Open Space	Yes	No	N/A	2.58	0	0%	0	
21c	Land South of Varley Halls	Ecology; Heritage; Open Space; Landscape; Flooding	Yes	No	N/A	1.51	0.3	20%	7	
26	Brighton University Playing Fields	Ecology; Heritage; Open Space; Flooding	Yes	No	N/A	9.09	0	0%	0	0
27	Brighton Borough Cemetery	Absolute Constraint: Cemetery				9.4	0	0%	0	0
28	Brighton Borough Cemetery	Ecology; Heritage; Open Space; Landscape; Flooding	Yes	No	N/A	39.2	0	0%	0	0
29	Jewish Cemetery Extension	Ecology; Open Space; Landscape; Flooding	Yes	Yes	Medium	2.92	0	0%	0	0
30	Brighton Race	Ecology; Heritage;	Yes	Yes	High	46.01	1.5	3%	150	150

Site No's	Location	Key Constraints	Mitigation Potential	Housing Potential	Density	Total Area of Site (Hectares)	Potentially Developable Area of Site (Hectares)	Percentage of Total Area of Site (%)	Indicative Number of Dwellings	Indicative Totals following Site Cluster Moderation (Area/Dwelling Number)
	Course	Open Space; Landscape; Flooding								
31	Land east of Whitehawk Hill Road	Ecology; Heritage; Open Space; Landscape; Flooding	Yes	Yes	Medium	8.75	1	11%	50	50
31a	Whitehawk Hill Road/Manor Hill	Absolute Constraint: Scheduled Monument				1.36	0	0%	0	0
31b	West of Whitehawk Hill Road	Ecology; Heritage; Open Space; Landscape; Flooding	Yes	No	N/A	10.68	0	0%	0	0
32	South Downs Riding School	Ecology; Landscape; Flooding	Yes	Yes	Low	1.71	0.75	44%	20	20
32a	Reservoir Site	Reservoir; Landscape	Yes	Yes	Low	0.39	0.2	51%	5	5
33	North of Warren Road	Open Space; Landscape	Yes	Yes	Low	5.23	1.25	24%	30	30
33a	East of Warran Road	Open Space; Landscape	Yes	No	N/A	1.5	0	0%	0	0

Site No's	Location	Key Constraints	Mitigation Potential	Housing Potential	Density	Total Area of Site (Hectares)	Potentially Developable Area of Site (Hectares)	Percentage of Total Area of Site (%)	Indicative Number of Dwellings	Indicative Totals following Site Cluster Moderation (Area/Dwelling Number)
33b	South of Warran Road	Open Space; Landscape	Yes	No	N/A	2.75	0	0%	0	0
34	Sheepcote Valley	Ecology; Open Space; Landscape; Flooding	Yes	Yes	Medium	43.14	0	0%	0	0
35	East Brighton Park and Sports Ground	Ecology; Open Space; Landscape; Flooding	Yes	Yes/No	N/A / Medium	32.74	0	0%	0	0
36	Land south of Warren Road	Cemetery; Open Space; Landscape	Yes	Yes	Low	14.88	0.5	3%	10	10
37	Land south of Roedean Road	Ecology; Heritage; Open Space; Landscape	Yes	Yes	Low	17.38	1	6%	25	25
38	Ovingdean Hall Farm	Heritage	Yes	Yes	Low	1.34	1	75%	25	*Limited to 2ha (50 dwellings) across sites 38, 38a and 39).*
38a	Ovingdean Hall Farm	Heritage	Yes	Yes	Low	0.22	0.2	91%	5	
39	Land at Bulstrode Farm	Heritage;	Yes	Yes	Low	2.83	1.5	53%	35	

Site No's	Location	Key Constraints	Mitigation Potential	Housing Potential	Density	Total Area of Site (Hectares)	Potentially Developable Area of Site (Hectares)	Percentage of Total Area of Site (%)	Indicative Number of Dwellings	Indicative Totals following Site Cluster Moderation (Area/Dwelling Number)
	/ Ovingdean Farm	Flooding								
40	Land east of Greenways	Heritage; Open Space Landscape	Yes	No	N/A	1.15	0	0%	0	0
41	Wanderdown Road Open Space	Heritage; Landscape	Yes	Yes	Low	2.94	0.3	10%	5	5
42	Land adjacent to Ovingdean Road	Ecology; Open Space	Yes	Yes	Low	7.47	1.75	23%	45	45
43	Land to rear of Longhill Road	Heritage; Landscape; Flooding	Yes	Yes	Low	3.45	0.25	7%	6	6
44	Allotments to west of The Green	Ecology; Heritage; Open Space; Landscape	Yes	No	N/A	2.35	0	0%	0	0
45	Rear of Bazehill Road	Heritage	N/A	Yes	Low	0.15	0.1	67%	2	2
46	Land west of Saltdean Vale	Open Space; Flooding	Yes	Yes	Low	3.26	0	0%	0	0

Site No's	Location	Key Constraints	Mitigation Potential	Housing Potential	Density	Total Area of Site (Hectares)	Potentially Developable Area of Site (Hectares)	Percentage of Total Area of Site (%)	Indicative Number of Dwellings	Indicative Totals following Site Cluster Moderation (Area/Dwelling Number)
46a	Former Nursery site west of Saltdean Vale	Flooding	Yes	Yes	Low	0.97	0.75	77%	18	18
47	Pickershill, Saltdean Vale	Flooding	Yes	Yes	Low	0.31	0	0%	0	0
48	Coombe Farm Westfield Avenue	Flooding	Yes	Yes	Low	3.48	2.0	57%	50	*Limited to 2.1ha (55 dwellings) across sites 48, 48a, 48b and 48c.*
48a	Field north of Westfield Rise	None	N/A	Yes	Medium	0.6	0.3	50%	12	
48b	Westfield Avenue North	None	N/A	Yes	Low	0.58	0.2	34%	2	
48c	Saltdean Boarding Kennels	None	N/A	Yes	Low	0.88	0.3	34%	7	
49	Covered Reservoir – Longridge Avenue	Absolute Constraint: Covered Reservoir				0.57	0	0%	0	0
50	West of Falmer Avenue	None	N/A	Yes	Low	1.3	0.5	38%	12	12
51	Rottingdean Recreation	Heritage;	Yes	Yes	Low	0.14	0	0%	0	0

Site No's	Location	Key Constraints	Mitigation Potential	Housing Potential	Density	Total Area of Site (Hectares)	Potentially Developable Area of Site (Hectares)	Percentage of Total Area of Site (%)	Indicative Number of Dwellings	Indicative Totals following Site Cluster Moderation (Area/Dwelling Number)
	Ground	Open Space; Flooding								
52	Rosebery Avenue, Woodingdean	Open Space	Yes	Yes	N/A	0.11	0.05	45%	1	1
53	Queensdown School	Ecology; Open Space	Yes	No	N/A	1.03	0	0%	0	0
54	Braypool Lane	Open Space	Yes	Yes	Low	3.18	0.2	6%	2	2
Indicative Totals						411.21 Ha	34.90 Ha	8.5% of Fringe	1,356 Dwellings	**1,183 Dwellings 30.9 Ha (7.5%)**

Appendix B

Travel Patterns

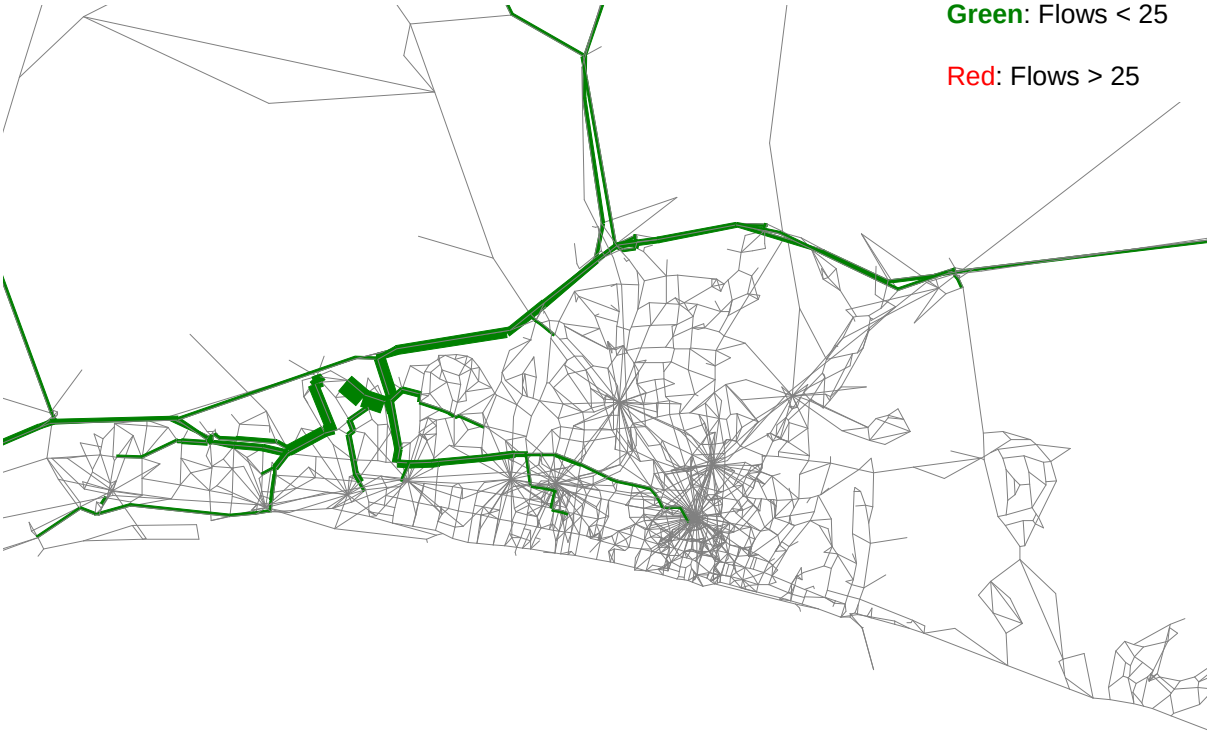
Travel Patterns for Developments around Mile Oak – 2030 Updated City Plan Reference Case

AM

Key

Green: Flows < 25

Red: Flows > 25

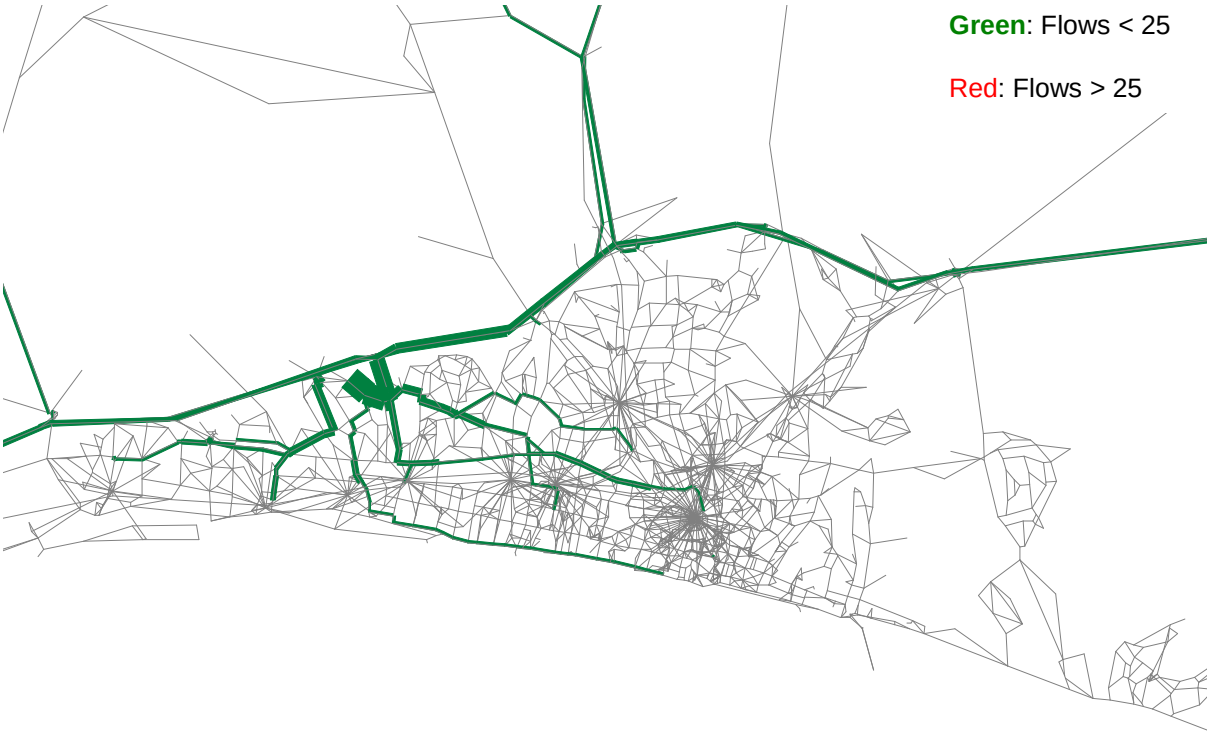


PM

Key

Green: Flows < 25

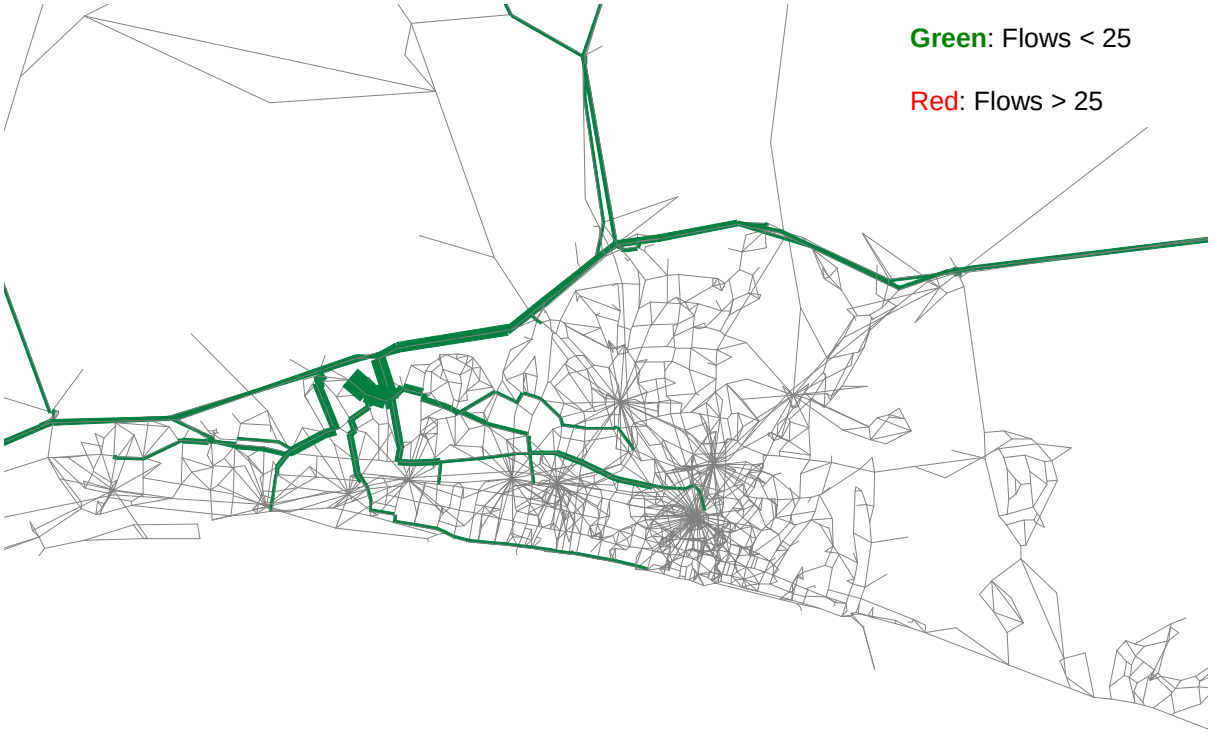
Red: Flows > 25



Travel Patterns for Developments around Mile Oak – 2030 Updated City Plan Mitigation Case

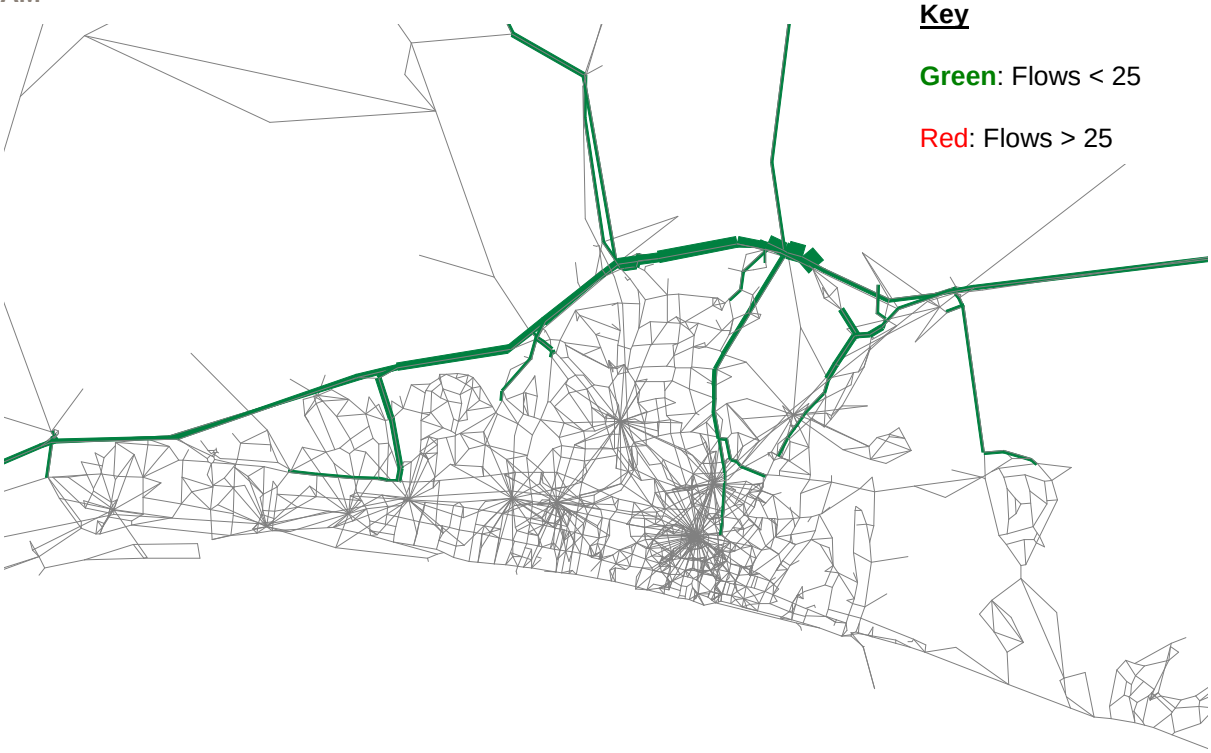
AM

PM



Travel Patterns for Developments around Coldean – 2030 Updated City Plan Reference Case

AM



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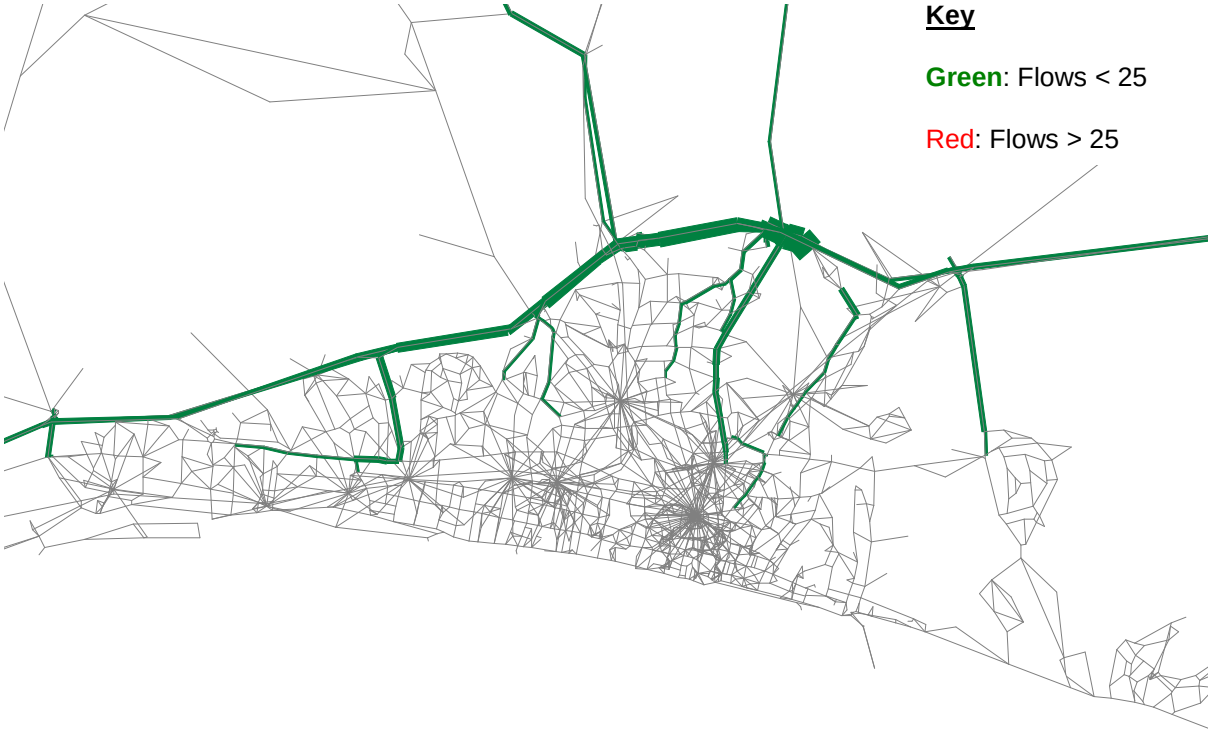
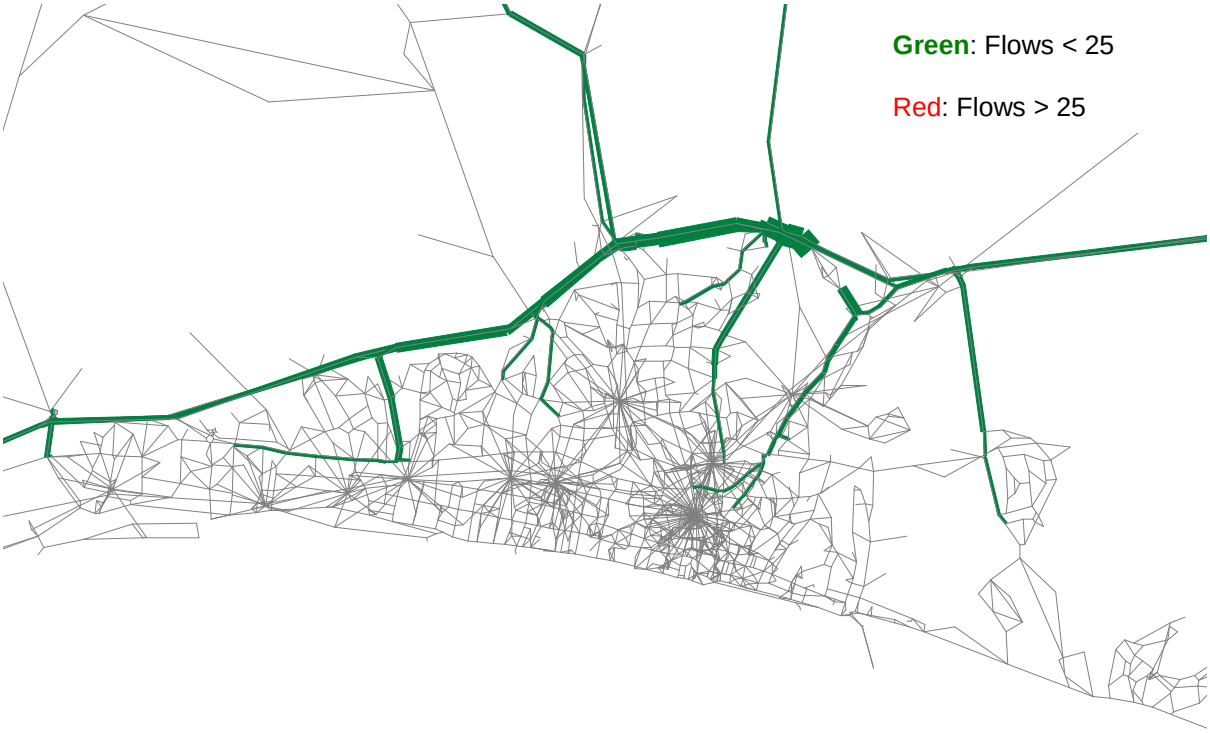


Travel Patterns for Developments around Coldean – 2030 Updated City Plan Mitigation Case

AM

PM



Travel Patterns for Developments around East Brighton – 2030 Updated City Plan Reference Case

AM

PM

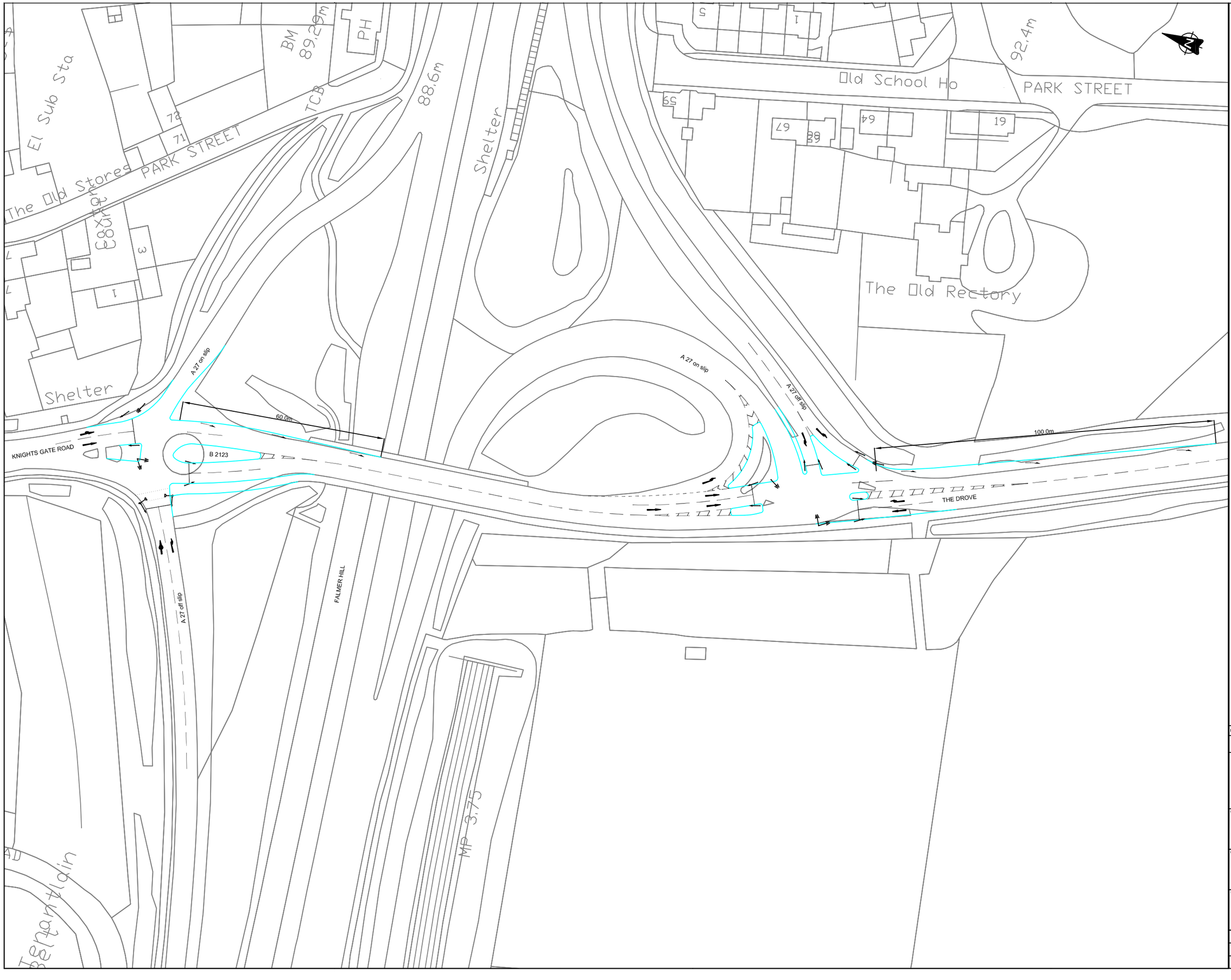
Travel Patterns for Developments around East Brighton – 2030 Updated City Plan Mitigation Case

AM

PM

Appendix C

Junction Plans



Notes:

1. Do not scale from this drawing. If in doubt refer to the project manager for clarification.

Key

- Survey base
- Proposed kerb

Rev.	Date	Revision details	Drawn	Checked	Approved

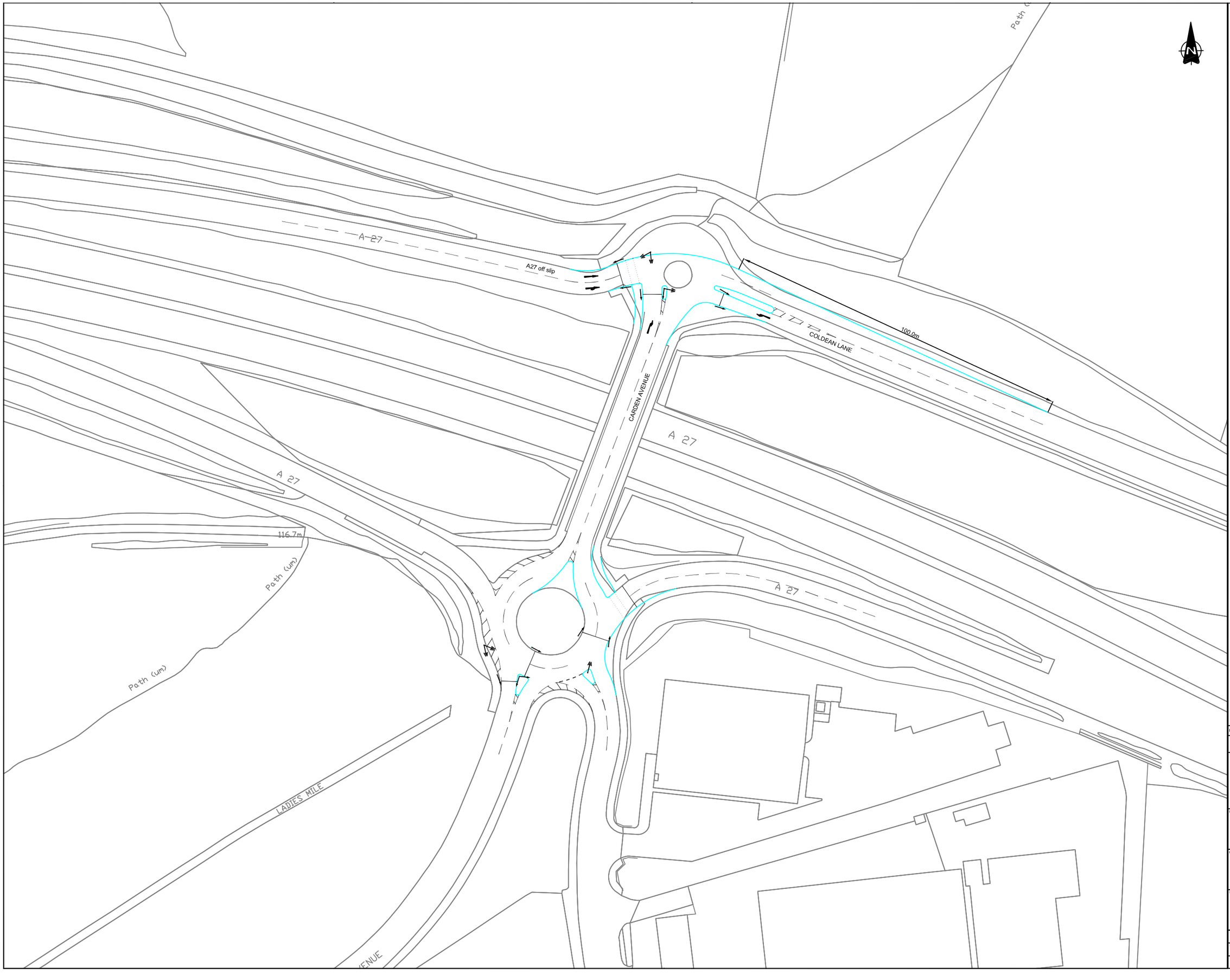
JMP

Client: BRIGHTON AND HOVE CITY COUNCIL

Project: BRIGHTON CITY PLAN

Title: FALMER INTERCHANGE

Drawn	Checked	Approved
SRP	CS	CS
Original drg. size: A1	Date: 18-12-12	Scale: 1:500
Drawing Status: Information	Drawing Number: ST13119-01	Rev.



Notes:

1. Do not scale from this drawing. If in doubt refer to the project manager for clarification.

Key

Survey base

Proposed kerb

Rev.	Date	Revision details	Drawn	Checked	Approved

JMP

Client

BRIGHTON AND HOVE CITY COUNCIL

Project

BRIGHTON CITY PLAN

Title

CARDEN AVENUE JUNCTION

Drawn	Checked	Approved
SRP	CS	CS
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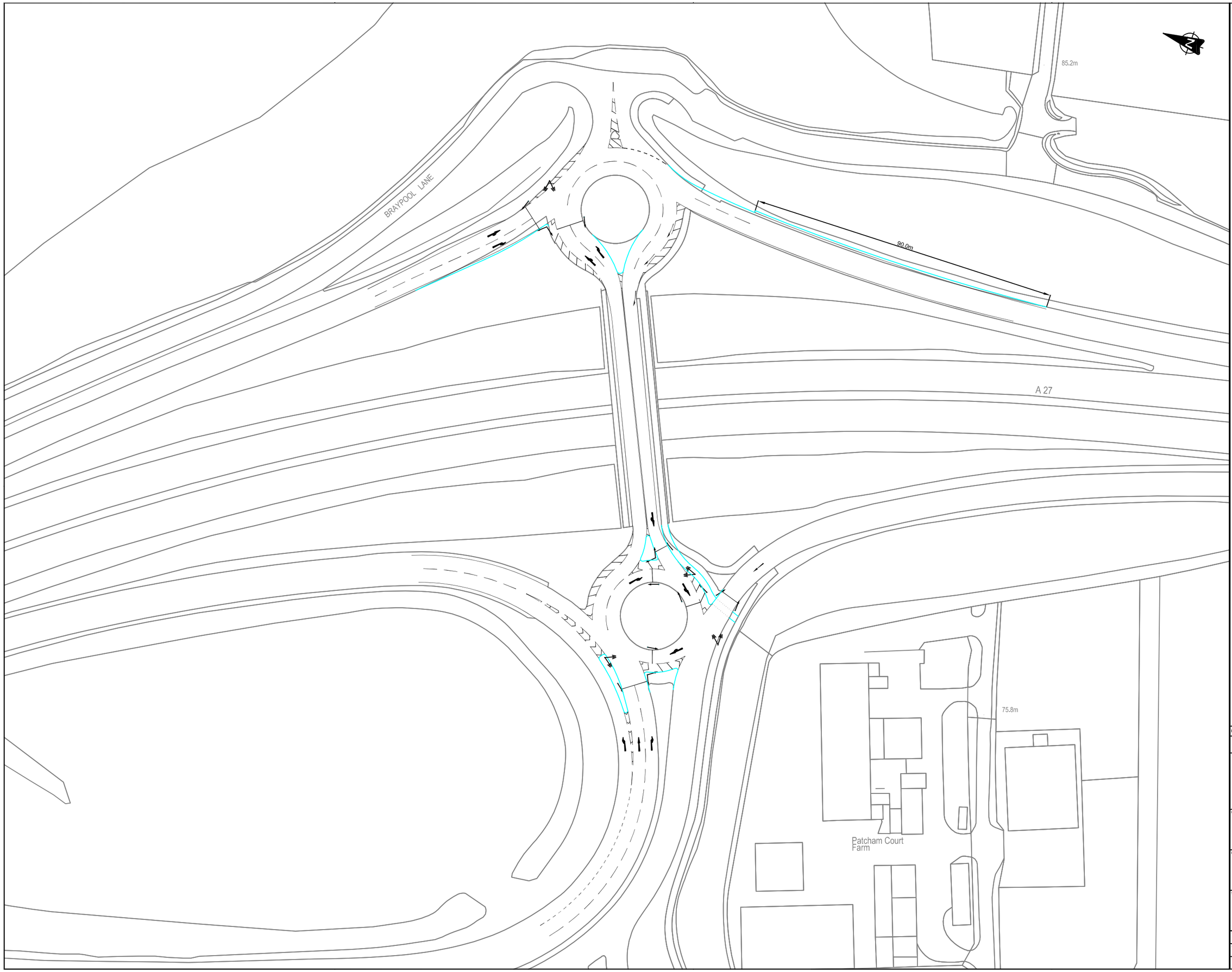
Drawing Status: Information	Drawing Number: ST13119-02	Rev.



Notes:

1. Do not scale from this drawing. If in doubt refer to the project manager for clarification.

Key

Survey base

Proposed kerb

Rev.	Date	Revision details	Drawn	Checked	Approved

JMP

Client

BRIGHTON AND HOVE CITY COUNCIL

Project

BRIGHTON CITY PLAN

Title

PATCHAM INTERCHANGE
(A27 NORTH AND SOUCH)

Drawn	Checked	Approved
SRP	CS	CS
Original drg. size	**Date**	**Scale**
A1	18-12-12	1:500

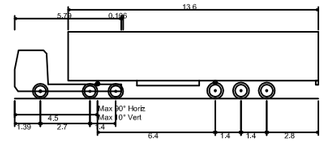
Drawing Status	Drawing Number	Rev.
Information	ST13119-04	

Notes:

1. Do not scale from this drawing. If in doubt refer to the project manager for clarification.

Key

- Existing Features
- Proposed Features
- Highway Boundary



Max Legal Articulated Vehicle (16.5m)

Overall Length	16.500m
Overall Width	2.500m
Overall Body Height	3.632m
Min Body Ground Clearance	0.396m
Max Track Width	2.500m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	6.870m

Rev.	Date	Revision details	Drawn	Checked	Approved

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Brighton & Hove City Council

Brighton City Plan

Proposed Roundabout
Layout Option 5
Teardrop Junction &
Two Lanes Northbound on Bridge Deck &
Teardrop Buildout

PG	SD	SD
A3	12/04-2013	1:1000
INFORMATION	STH12212-1-5	-

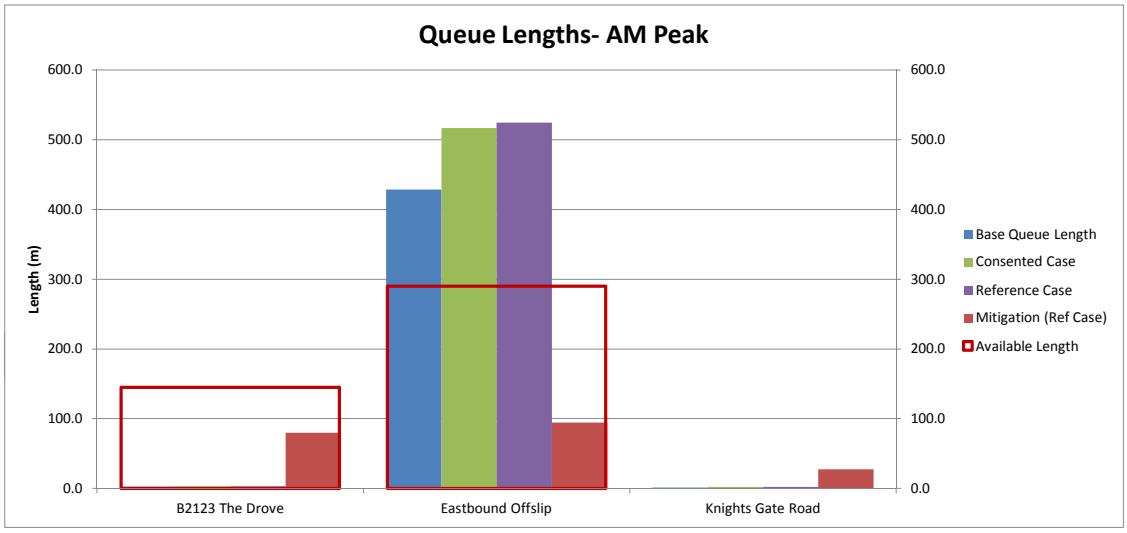
SCALE 1:500

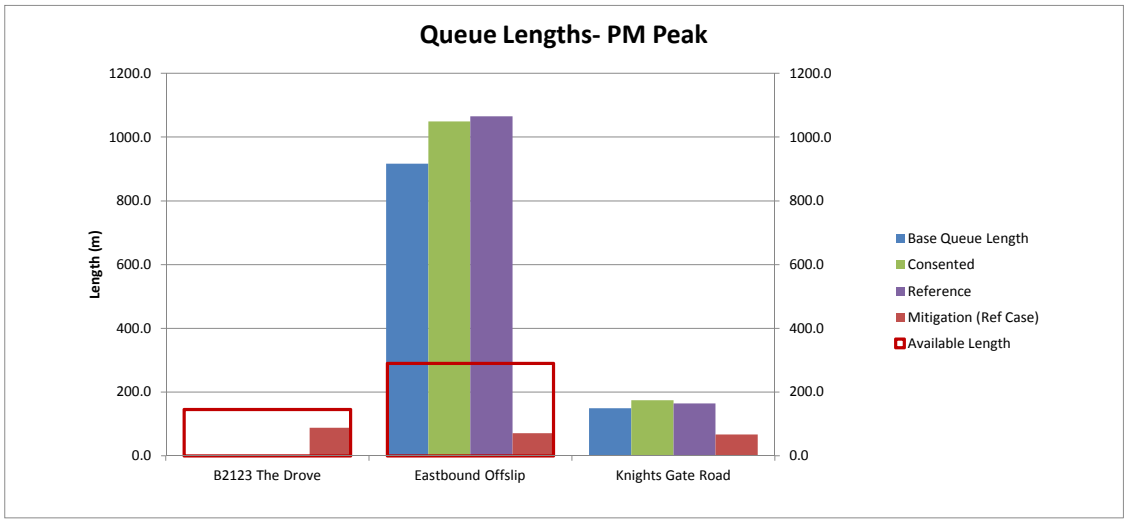
Appendix D

LINSIG Results for All Assessments – Degree of Saturation and Queue Length Graphs

Site 1- Falmer Interchange, North Roundabout

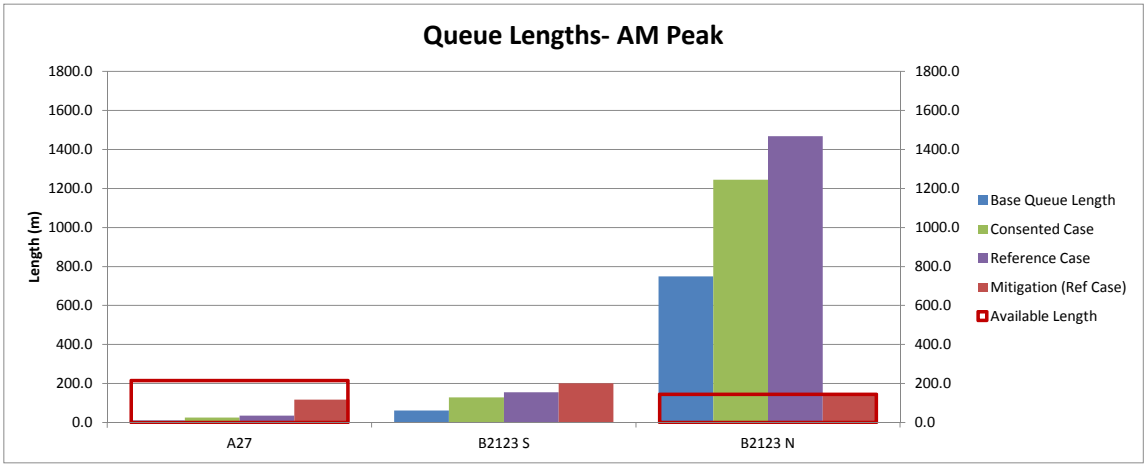
	AM						PM					
	Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)	Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)
	Existing Layout - 2012 Existing						Existing Layout - 2012 Existing					
B2123 The Drove	0.47	3.68	0.31	A			0.35	3.42	0.25	A		
Eastbound Offslip	74.57	167.52	1.1	F			159.43	733.87	1.36	F		
Knights Gate Road	0.24	4.51	0.17	A			25.94	186.95	1.08	F		
	Existing Layout - Consented Case						Existing Layout - Consented Case					
B2123 The Drove	0.55	3.87	0.35	A			0.42	3.58	0.29	A		
Eastbound Offslip	89.83	202.24	1.12	F			182.55	860.14	1.4	F		
Knights Gate Road	0.39	4.83	0.25	A			30.42	218.86	1.1	F		
	Existing Layout - Ref Case				June 2014 STA mitigation runs		Existing Layout - Ref Case				June 2014 STA mitigation runs	
B2123 The Drove	0.56	3.89	0.35	A	13.9	0.85	0.49	3.76	0.32	A	15.3	0.84
Eastbound Offslip	91.19	205.41	1.13	F	16.4	0.78	185.29	872.76	1.4	F	12.3	0.68
Knights Gate Road	0.42	4.96	0.26	A	4.8	0.67	28.59	204.67	1.1	F	11.6	0.76

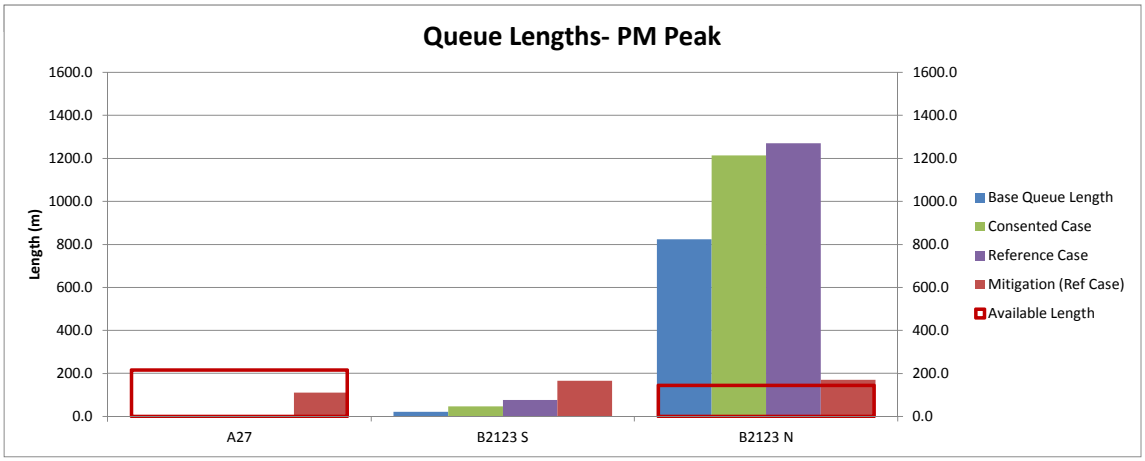




Site 1- Falmer Interchange, South Roundabout

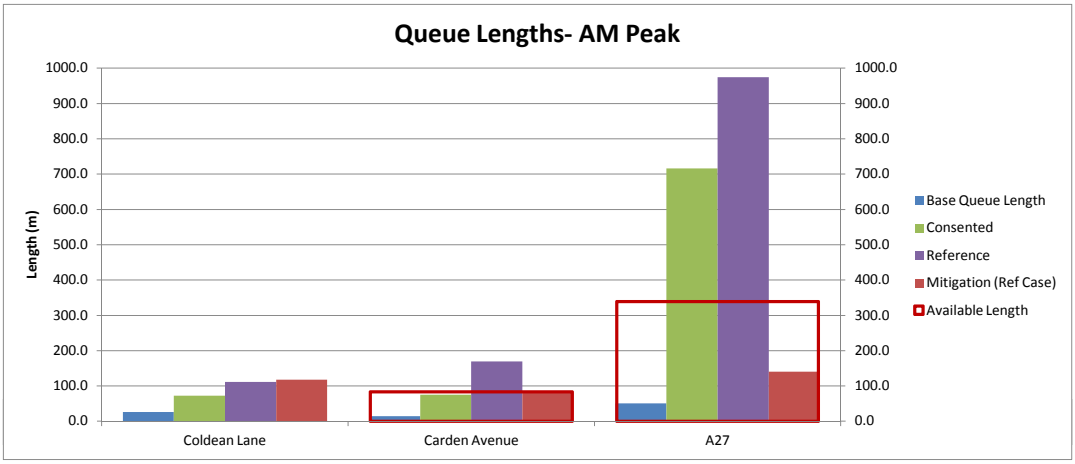
	AM						PM					
	Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)	Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)
Existing Layout - 2012 Base												
A27	1.81	11.94	0.64	B			0.79	7.68	0.44	A		
B2123 S	10.84	36.46	0.93	E			3.76	12.83	0.79	B		
B2123 N	130.26	718.21	1.4	F			143.21	757.75	1.41	F		
Existing Layout - Consented Case												
A27	4.51	23.42	0.83	C			1.23	9.21	0.55	A		
B2123 S	22.49	67.44	0.99	F			8.13	25.18	0.9	D		
B2123 N	216.34	1235.98	1.58	F			211.1	1184.99	1.59	F		
	Existing Layout - Ref Case				**June 2014 STA mitigation runs**		**Existing Layout - Ref Case**				**June 2014 STA mitigation runs**	
A27	6.07	30.27	0.87	D	20.6	0.94	1.21	9.1	0.55	A	19.3	0.92
B2123 S	26.97	77.81	1.01	F	35.0	1.00	13.32	39.34	0.95	E	28.9	0.99
B2123 N	255.32	1470.23	1.66	F	26.3	0.90	220.94	1257.01	1.62	F	29.7	0.86

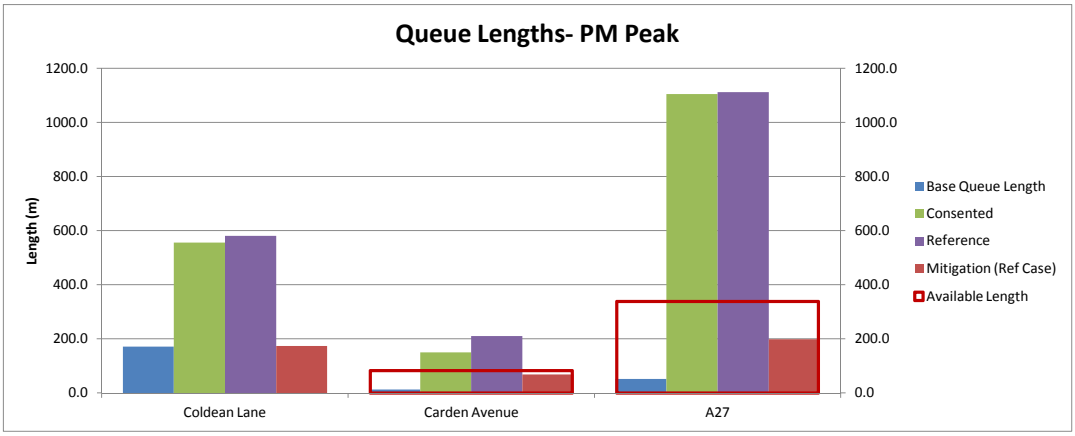




Site 3- A27/Carden Avenue, North Roundabout

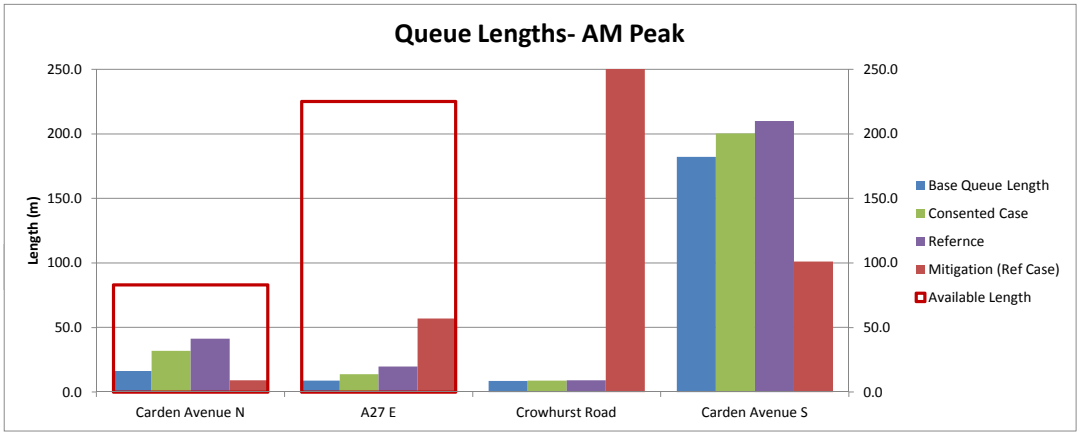
	AM						PM					
	Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)	Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)
Existing Layout - 2012 Base												
Coldean Lane	4.61	18.92	0.83	C			29.78	95.2	1.02	F		
Carden Avenue	2.5	13.37	0.72	B			2.25	12.32	0.69	B		
A27	8.88	32.36	0.91	D			9.05	32.4	0.91	D		
Existing Layout - Consented Case												
Coldean Lane	12.57	48.41	0.95	E			96.75	321.58	1.16	F		
Carden Avenue	13.14	54.59	0.95	F			26.11	94.83	1.01	F		
A27	124.52	378.12	1.23	F			192.18	623.49	1.34	F		
	Existing Layout - Ref Case				**June 2014 STA mitigation runs**		**Existing Layout - Ref Case**				**June 2014 STA mitigation runs**	
Coldean Lane	19.37	69.16	0.99	F	20.5	0.79	101.02	334.17	1.17	F	30.2	0.90
Carden Avenue	29.45	104.59	1.03	F	14.3	0.84	36.55	123.96	1.05	F	11.9	0.90
A27	169.53	563.18	1.3	F	24.5	0.94	193.37	635.21	1.33	F	34.6	0.89

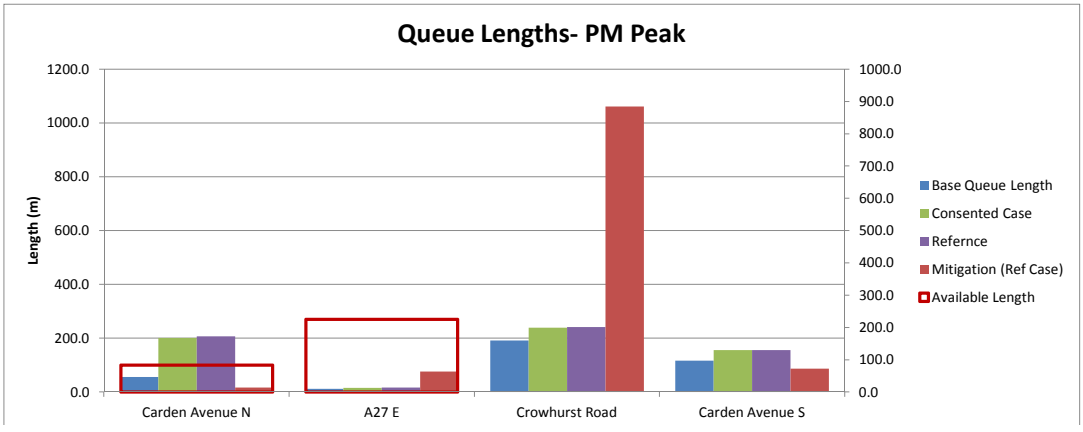




Site 3- A27/Carden Avenue, South Roundabout

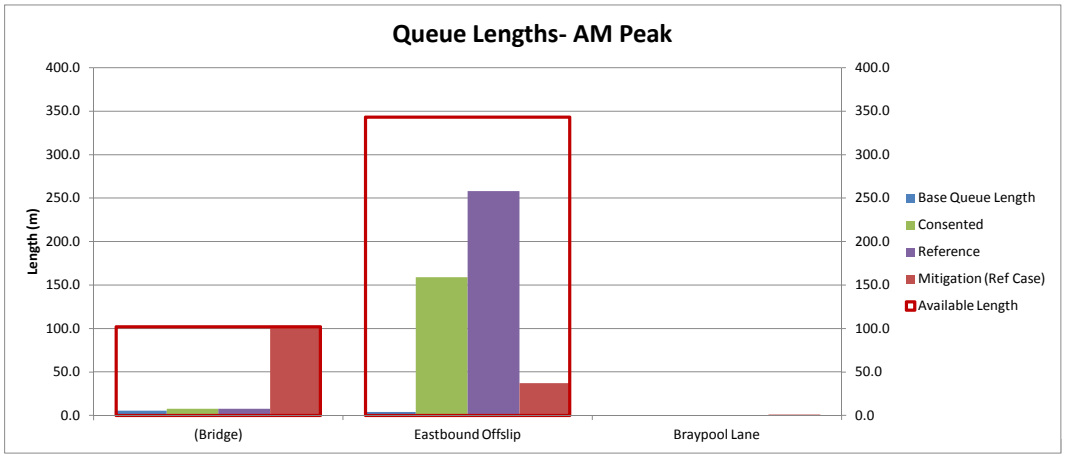
	AM						PM					
	Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)	Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)
	Existing Layout - 2012 Base											
A27 E	1.56	12.88	0.62	B			2.06	20.14	0.69	C		
Crowhurst Road	1.5	21.22	0.59	C			34.19	294.71	1.13	F		
Carden Avenue S	31.67	134.12	1.05	F			20.23	108.92	1.08	F		
Carden Avenue N	2.83	8.94	0.74	A			9.65	25.27	0.92	D		
	Existing Layout - Consented Case											
A27 E	2.4	18.94	0.72	C			2.77	27.5	0.75	D		
Crowhurst Road	1.55	22.07	0.6	C			41.53	356.45	1.22	F		
Carden Avenue S	34.81	148.76	1.06	F			26.99	150.61	1.11	F		
Carden Avenue N	5.56	13.93	0.86	B			34.94	63.19	1.06	F		
	Existing Layout - Ref Case				June 2014 STA mitigation runs		Existing Layout - Ref Case				June 2014 STA mitigation runs	
A27 E	3.46	25.18	0.8	D	9.9	0.72	2.81	27.91	0.76	D	13.3	0.85
Crowhurst Road	1.58	22.66	0.6	C	55.3	1.08	41.99	360.37	1.23	F	184.5	1.79
Carden Avenue S	36.52	156.72	1.06	F	17.6	0.80	27.1	151.02	1.11	F	15.1	0.83
Carden Avenue N	7.21	16.82	0.89	C	1.6	0.74	36.09	65.29	1.06	F	2.9	0.84

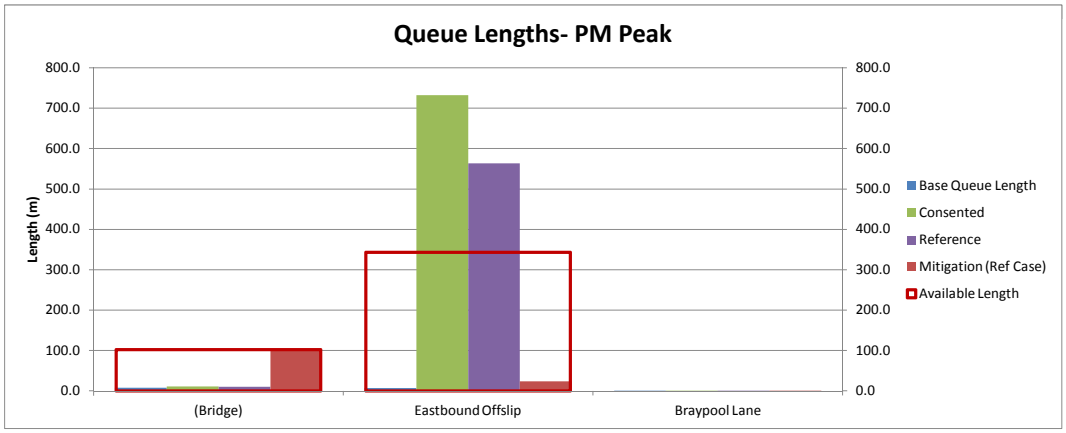




Site 4- A27/A23, North Roundabout

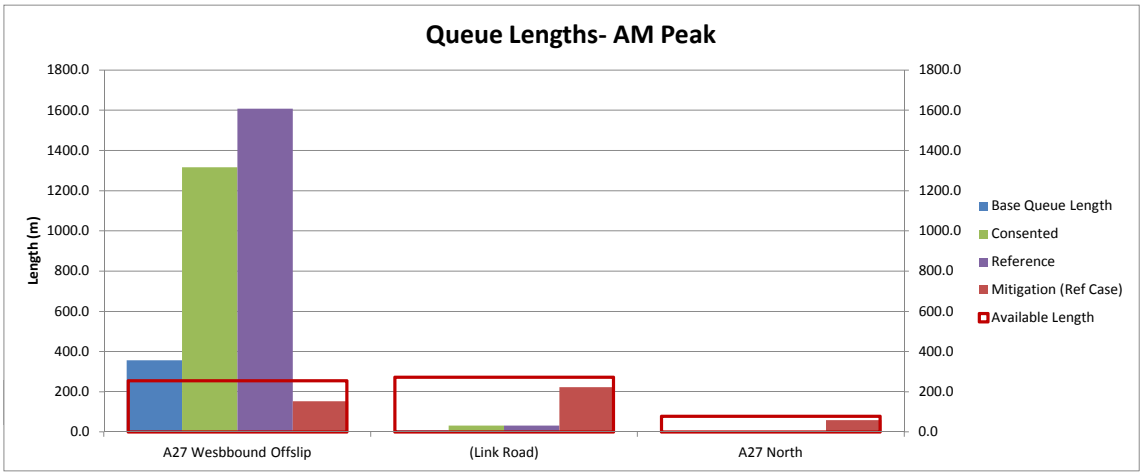
	AM						PM					
	Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)	Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)
	Existing Layout - 2012 Base											
(Bridge)	0.96	2.94	0.47	A			1.36	3.46	0.57	A		
Eastbound Offslip	0.72	12.79	0.41	B			1.26	23.34	0.56	C		
Braypool Lane	0.06	4.84	0.05	A			0.05	6.07	0.04	A		
	Existing Layout - Consented Case											
(Bridge)	1.32	3.46	0.55	A			1.88	4.22	0.65	A		
Eastbound Offslip	27.65	220.32	1.11	F			127.29	1414.93	1.97	F		
Braypool Lane	0.08	7.29	0.08	A			0.06	8.41	0.06	A		
	Existing Layout - Ref Case				June 2014 STA mitigation runs		Existing Layout - Ref Case				June 2014 STA mitigation runs	
(Bridge)	1.34	3.5	0.56	A	17.9	0.87	1.86	4.19	0.65	A	17.3	0.91
Eastbound Offslip	44.85	329.25	1.21	F	6.5	0.67	98.05	836.57	1.74	F	4.1	0.70
Braypool Lane	0.09	7.38	0.08	A	0.2	0.11	0.06	8.36	0.06	A	0.1	0.08

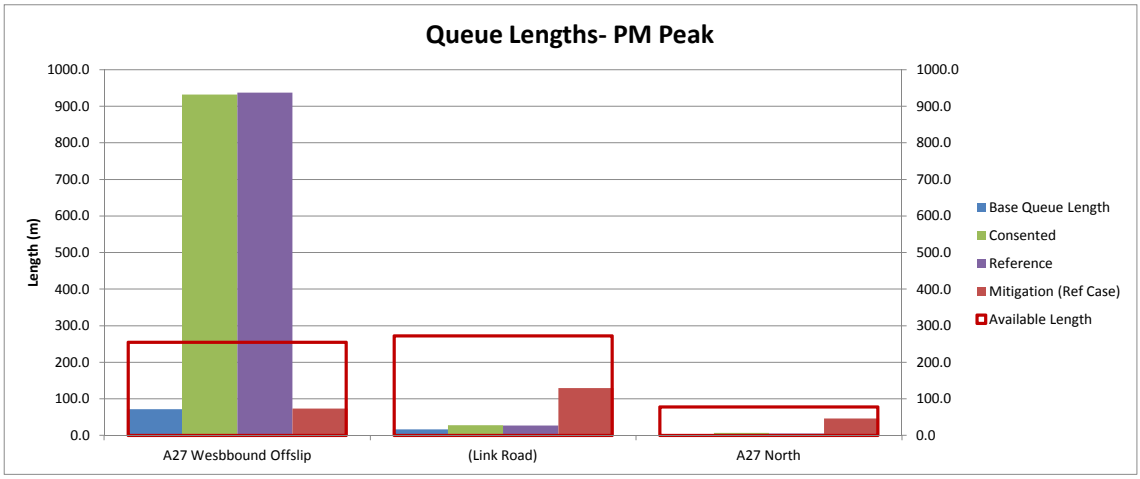




Site 4- A27/A23, South Roundabout

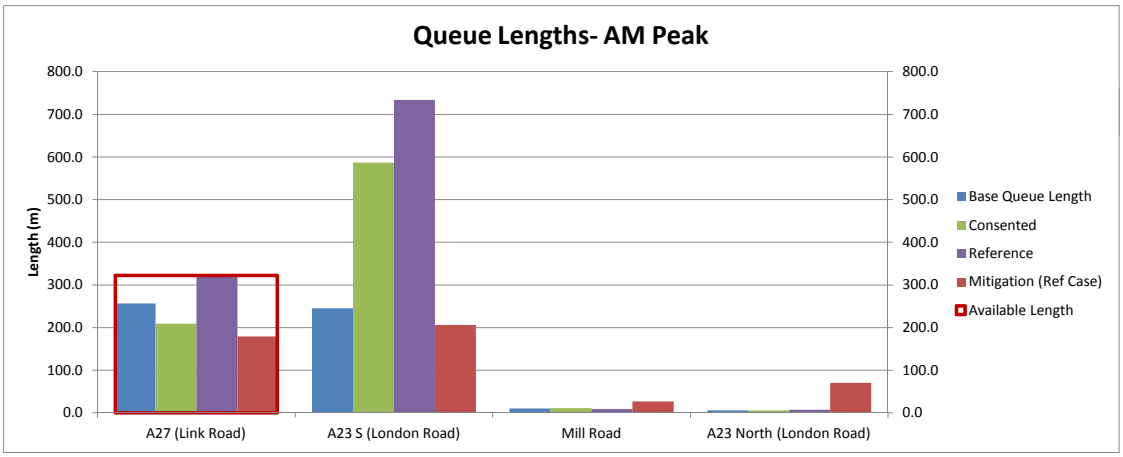
	AM						PM					
	Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)	Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)
	Existing Layout - 2012 Base											
A27 Westbound Offslip	62.13	172.44	1.09	F			12.43	49.89	0.95	E		
(Link Road)	1.39	4.17	0.57	A			2.89	6.68	0.74	A		
A27 North	0.28	4.57	0.22	A			0.31	4.92	0.24	A		
	Existing Layout - Consented Case											
A27 Westbound Offslip	228.97	776.26	1.38	F			162.13	625.8	1.34	F		
(Link Road)	5.47	11.29	0.84	B			4.86	10.15	0.83	B		
A27 North	0.76	6.25	0.43	A			1.14	8.03	0.53	A		
	Existing Layout - Ref Case				June 2014 STA mitigation runs		Existing Layout - Ref Case				June 2014 STA mitigation runs	
A27 Westbound Offslip	279.66	960.59	1.45	F	26.5	0.91	162.94	614.72	1.33	F	12.8	0.80
(Link Road)	5.51	11.36	0.84	B	38.7	0.93	4.76	9.98	0.83	A	22.5	0.83
A27 North	0.87	6.61	0.46	A	10.3	0.28	0.93	7.26	0.48	A	8.0	0.53

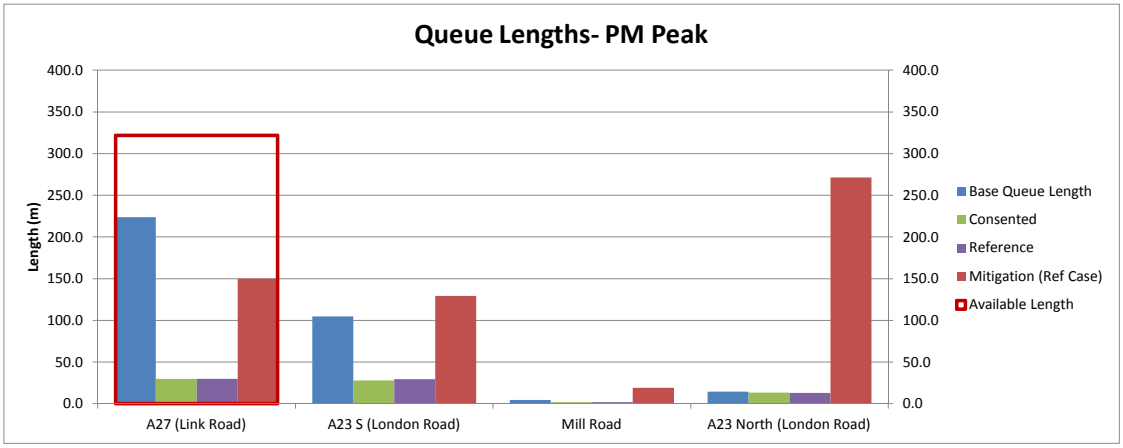




Site 4- A27/A23, A23 Roundabout

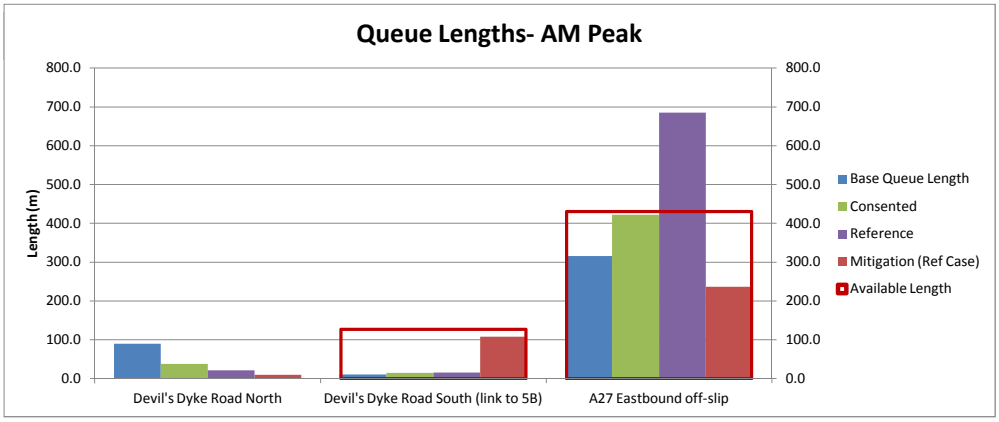
	AM						PM					
	Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)	Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)
	Existing Layout - Base 2012											
A27 (Link Road)	44.64	90.2	1.03	F			38.94	96.49	1.03	F		
A23 S (London Road)	42.6	117.04	1.06	F			18.22	55.56	0.98	F		
Mill Road	1.8	36.38	0.66	E			0.76	15.84	0.44	C		
A23 North (London Road)	0.99	3.3	0.49	A			2.52	5.98	0.72	A		
	Existing Layout - Consented Case											
A27 (Link Road)	36.33	75.64	1.02	F			5.2	14.24	0.84	B		
A23 S (London Road)	102.01	206.06	1.14	F			4.84	14.95	0.83	B		
Mill Road	1.97	52.88	0.69	F			0.3	10.41	0.23	B		
A23 North (London Road)	1.05	3.5	0.5	A			2.3	5.44	0.7	A		
	Existing Layout - Ref Case				June 2014 STA mitigation runs		Existing Layout - Ref Case				June 2014 STA mitigation runs	
A27 (Link Road)	56.11	110.31	1.05	F	31.2	0.95	5.18	14.19	0.84	B	26.1	0.94
A23 S (London Road)	127.59	299.34	1.17	F	35.9	0.98	5.16	15.99	0.84	C	22.5	0.92
Mill Road	1.48	39.23	0.61	E	4.7	0.76	0.3	10.49	0.24	B	3.3	0.60
A23 North (London Road)	1.27	3.92	0.55	A	12.2	0.62	2.29	5.41	0.69	A	47.2	0.98

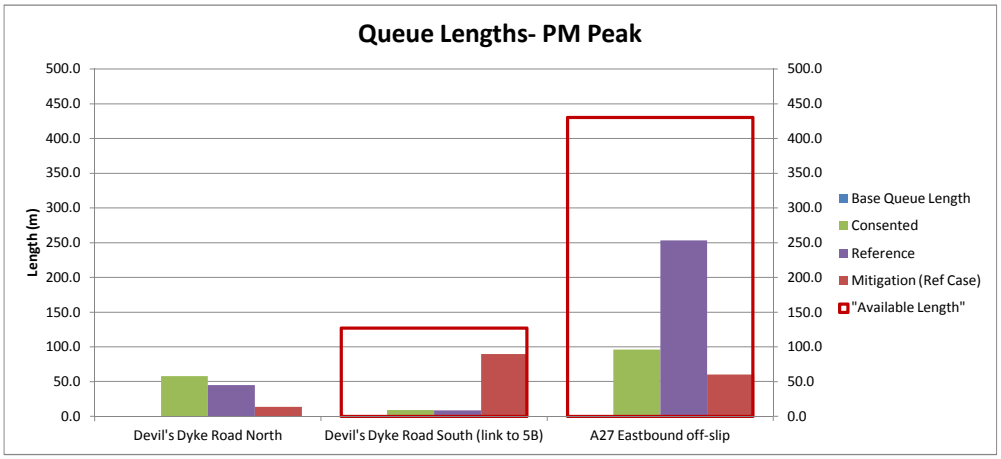




Site 5- A27/Dyke Road/King George VI, North Roundabout

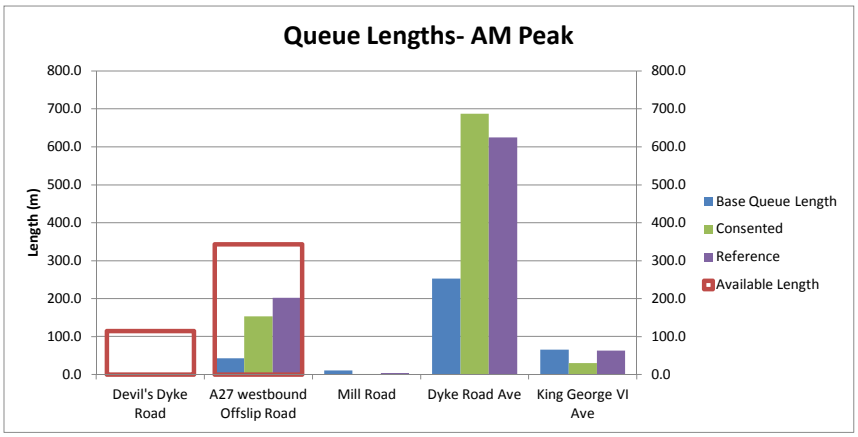
	AM							PM					
	Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)		Queue (PCU)	Delay (s)	RFC	LOS	MMQ (PCU)	Deg Sat (%)
	Existing Layout - 2012 Base							Existing Layout - 2012 Base					
Devil's Dyke Road North	15.57	235.53	1.09	F			Devil's Dyke Road North	7.65	90.98	0.93	F		
Devil's Dyke Road South (link to 5B)	1.87	3.56	0.65	A			Devil's Dyke Road South (link to 5B)	1.13	2.64	0.53	A		
A27 Eastbound off-slip	54.95	375.65	1.27	F			A27 Eastbound off-slip	3.03	25.09	0.76	D		
	Existing Layout - Consented Case							Existing Layout - Consented Case					
Devil's Dyke Road North	6.55	175.02	0.96	F			Devil's Dyke Road North	10.06	175.78	1.02	F		
Devil's Dyke Road South (link to 5B)	2.53	4.38	0.72	A			Devil's Dyke Road South (link to 5B)	1.55	3.15	0.61	A		
A27 Eastbound off-slip	73.4	614.97	1.56	F			A27 Eastbound off-slip	16.71	128.06	1.02	F		
	Existing Layout - Ref Case				June 2014 STA mitigation runs			Existing Layout - Ref Case				June 2014 STA mitigation runs	
Devil's Dyke Road North	3.68	132.05	0.84	F	1.7	0.52	Devil's Dyke Road North	7.84	142.6	0.97	F	2.4	0.66
Devil's Dyke Road South (link to 5B)	2.74	4.64	0.73	A	18.7	0.91	Devil's Dyke Road South (link to 5B)	1.5	3.1	0.6	A	15.6	0.93
A27 Eastbound off-slip	119.19	1439.83	2.04	F	41.1	1.12	A27 Eastbound off-slip	44.02	262.78	1.16	F	10.5	0.90

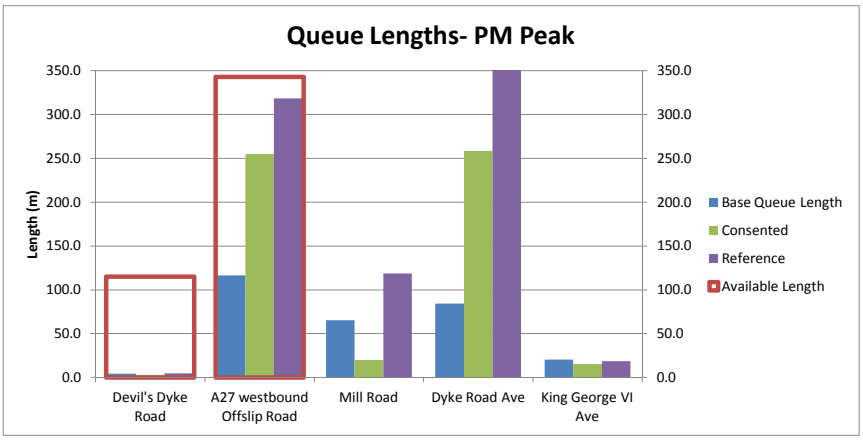




Site 5- A27/Dyke Road/King George VI, South Roundabout

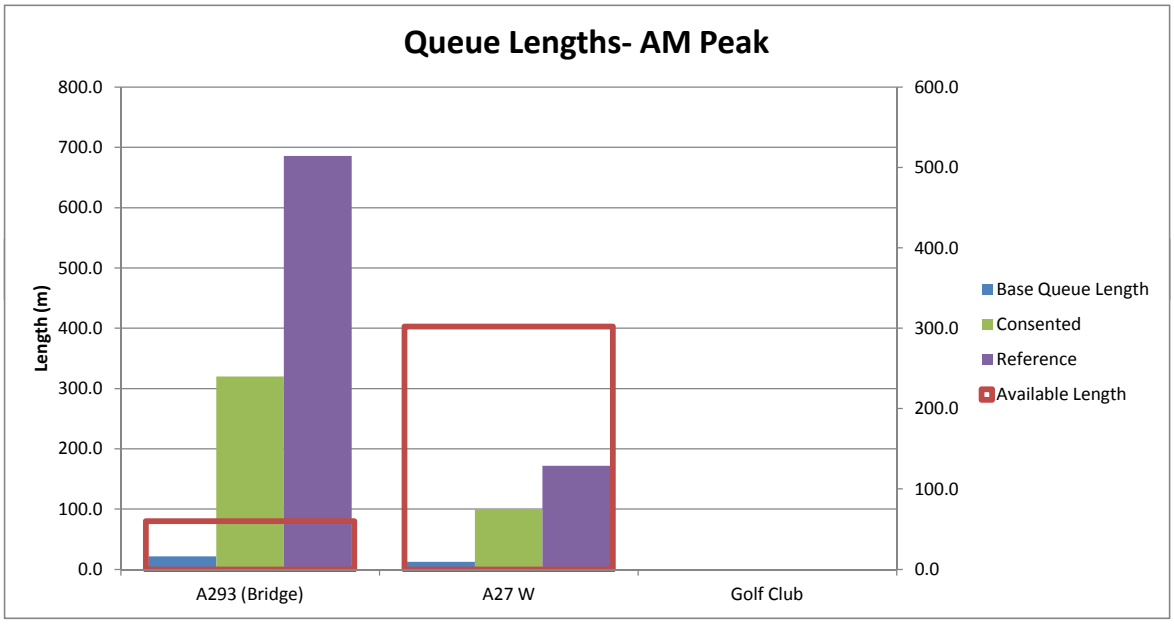
	AM					PM			
	Queue (PCU)	Delay (s)	RFC	LOS		Queue (PCU)	Delay (s)	RFC	LOS
	Existing Layout - 2012 Base					Existing Layout - 2012 Base			
Devil's Dyke Road	0.63	3.71	0.38	A	Devil's Dyke Road	0.76	3.96	0.43	A
westbound Offslip Road	7.43	19.95	0.89	C	westbound Offslip Road	20.23	49.88	0.98	E
Mill Road	1.95	19.36	0.67	C	Mill Road	11.39	87.8	0.97	F
Dyke Road Ave	44.04	132.34	1.06	F	Dyke Road Ave	14.64	58.15	0.97	F
King George VI Ave	11.47	34.51	0.94	D	King George VI Ave	3.55	11.86	0.78	B
	Existing Layout - Consented Case					Existing Layout - Consented Case			
Devil's Dyke Road	0.41	3.11	0.29	A	Devil's Dyke Road	0.51	3.27	0.34	A
A27 westbound Offslip Road	26.68	56.86	0.99	F	A27 westbound Offslip Road	44.34	86.53	1.03	F
Mill Road	0.27	9.03	0.21	A	Mill Road	3.51	34.96	0.8	D
Dyke Road Ave	119.57	301.87	1.18	F	Dyke Road Ave	44.95	120.7	1.06	F
King George VI Ave	5.34	18.06	0.85	C	King George VI Ave	2.67	10.5	0.73	B
	Existing Layout - Ref Case June 2014					Existing Layout - Ref Case June 2014			
Devil's Dyke Road	0.6	3.54	0.37	A	Devil's Dyke Road	0.8	3.92	0.44	A
A27 westbound Offslip Road	35.26	73.83	1.01	F	A27 westbound Offslip Road	55.38	109.46	1.05	F
Mill Road	0.74	13.58	0.43	B	Mill Road	20.61	154.34	1.06	F
Dyke Road Ave	108.61	281.96	1.17	F	Dyke Road Ave	75.79	202.38	1.12	F
King George VI Ave	11.02	34.1	0.93	D	King George VI Ave	3.25	12	0.77	B

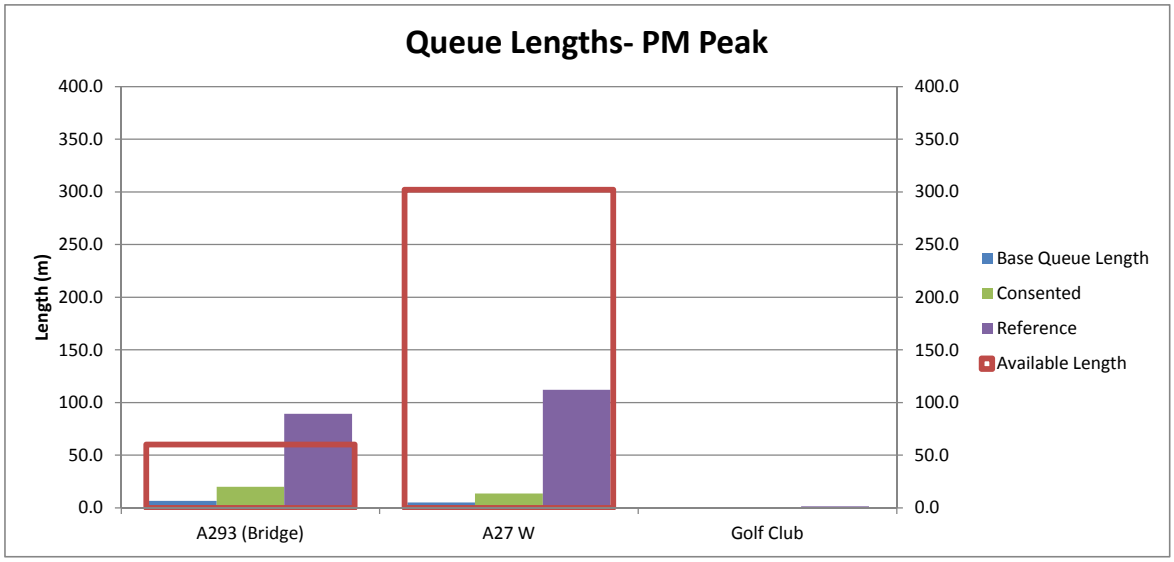




Site 6- A27/A293, North Roundabout

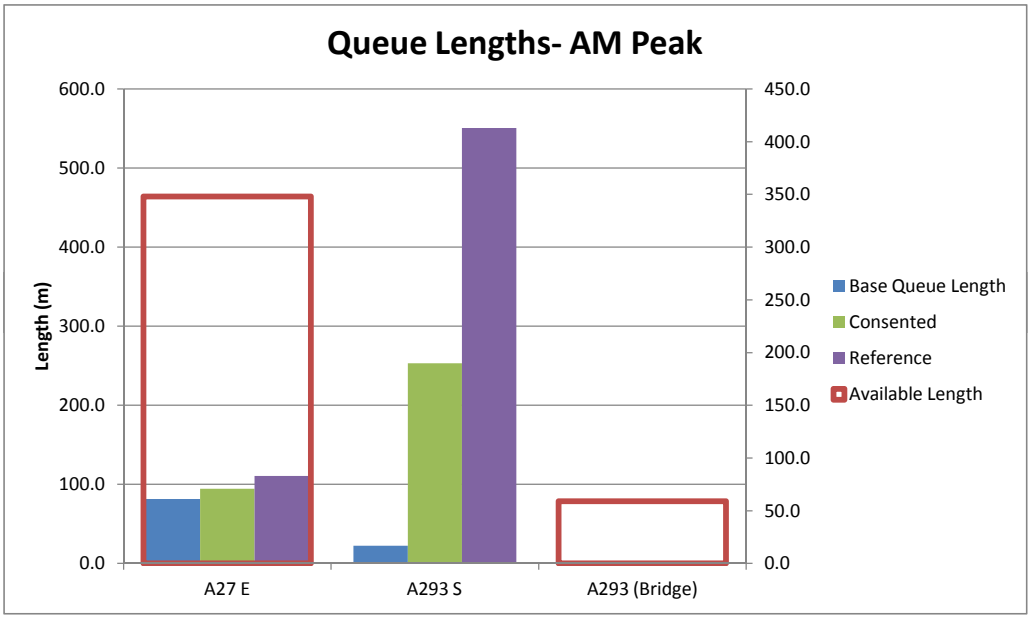
	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	Existing Layout - 2012 Base							
A293 (Bridge)	3.78	12.12	0.79	B	1.16	5.36	0.53	A
A27 Eastbound Offslip	2.14	19.79	0.69	C	0.86	8.44	0.46	A
Golf Club	0	0	0	A	0.05	8.45	0.05	A
	Existing Layout - Consented Case							
A293 (Bridge)	55.61	119.38	1.05	F	3.49	11.28	0.78	B
A27 Eastbound Offslip	17.29	145.48	1.04	F	2.37	21.01	0.71	C
Golf Club	0	0	0	A	0.09	16.51	0.09	C
	Existing Layout - Ref Case June 2014							
A293 (Bridge)	119.23	871.13	1.15	F	15.5	42.15	0.96	E
A27 Eastbound Offslip	29.85	237.72	1.11	F	19.48	144.23	1.05	F
Golf Club	0	0	0	A	0.24	43.71	0.2	E

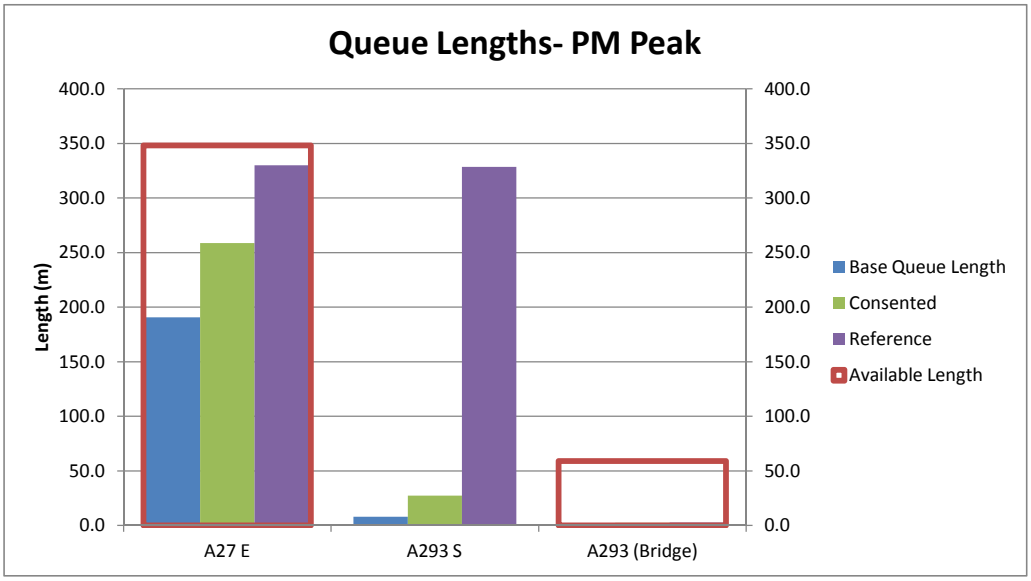




Site 6- A27/A293, South Roundabout

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	Existing Layout - Base 2012							
A27 E	14.18	49.23	0.95	E	33.17	96.63	1.03	F
A293 S	3.88	10.11	0.79	B	1.41	4.92	0.58	A
A293 (Bridge)	0.36	3.27	0.26	A	0.36	3.25	0.26	A
	Existing Layout - Consented Case							
A27 E	16.4	56.31	0.97	F	44.99	126.51	1.06	F
A293 S	44.02	82.1	1.02	F	4.76	11.94	0.83	B
A293 (Bridge)	0.39	3.34	0.28	A	0.42	3.41	0.3	A
	Existing Layout - Ref Case June 2014							
A27 E	19.26	65.1	0.98	F	57.38	158.68	1.08	F
A293 S	95.78	157.97	1.09	F	57.1	101.21	1.04	F
A293 (Bridge)	0.42	3.43	0.3	A	0.49	3.57	0.33	A





Appendix E

Comparative Analysis between May 2013 STA & June 2014 STA

Site 1- Falmer Interchange, North Roundabout

	AM				PM			
	May 2013 STA mitigation runs		June 2014 STA mitigation runs		May 2013 STA mitigation runs		June 2014 STA mitigation runs	
	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)
B2123 The Drove	10.6	0.78	13.9	0.85	14.0	0.79	15.3	0.84
Eastbound Offslip	15.0	0.73	16.4	0.78	11.8	0.65	12.3	0.68
Knights Gate Road	4.9	0.77	4.8	0.67	10.5	0.66	11.6	0.76

Site 1- Falmer Interchange, South Roundabout

	AM				PM			
	May 2013 STA mitigation runs		June 2014 STA mitigation runs		May 2013 STA mitigation runs		June 2014 STA mitigation runs	
	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)
A27	15.2	0.85	20.6	0.94	13.6	0.75	19.3	0.92
B2123 S	13.7	0.88	35.0	1.00	26.2	0.90	28.9	0.99
B2123 N	20.6	0.87	26.3	0.90	24.5	0.89	29.7	0.86

Site 3- A27/Carden Avenue, North Roundabout

	AM				PM			
	May 2013 STA mitigation runs		June 2014 STA mitigation runs		May 2013 STA mitigation runs		June 2014 STA mitigation runs	
	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)
Coldean Lane	19.5	0.78	20.5	0.79	24.9	0.85	30.2	0.90
Carden Avenue	13.5	0.78	14.3	0.84	14.5	0.77	11.9	0.90
A27	17.7	0.83	24.5	0.94	17.2	0.89	34.6	0.89

Site 3- A27/Carden Avenue, South Roundabout

	AM				PM			
	May 2013 STA mitigation runs		June 2014 STA mitigation runs		May 2013 STA mitigation runs		June 2014 STA mitigation runs	
	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)
A27 E	10.5	0.87	9.9	0.72	8.1	0.59	13.3	0.85
Crowhurst Road	16.1	0.96	55.3	1.08	149.4	1.55	184.5	1.79
Carden Avenue S	16.6	0.78	17.6	0.80	17.3	0.88	15.1	0.83
Carden Avenue N	1.4	0.73	1.6	0.74	2.6	0.83	2.9	0.84

Site 4- A27/A23, North Roundabout

	AM				PM			
	May 2013 STA mitigation runs		June 2014 STA mitigation runs		May 2013 STA mitigation runs		June 2014 STA mitigation runs	
	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)
(Bridge)	16.1	0.84	17.9	0.87	14.5	0.89	17.3	0.91
Eastbound Offslip	5.7	0.61	6.5	0.67	7.1	0.90	4.1	0.70
Braypool Lane	0.2	0.10	0.2	0.11	0.1	0.07	0.1	0.08

Site 4- A27/A23, South Roundabout

	AM				PM			
	May 2013 STA mitigation runs		June 2014 STA mitigation runs		May 2013 STA mitigation runs		June 2014 STA mitigation runs	
	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)
A27 Westbound Offslip	23.8	0.89	26.5	0.91	19.1	0.88	12.8	0.80
(Link Road)	33.2	0.90	38.7	0.93	21.8	0.82	22.5	0.83
A27 North	9.2	0.26	10.3	0.28	8.5	0.53	8.0	0.53

Site 4- A27/A23, A23 Roundabout

	AM				PM			
	May 2013 STA mitigation runs		June 2014 STA mitigation runs		May 2013 STA mitigation runs		June 2014 STA mitigation runs	
	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)
A27 (Link Road)	25.1	0.88	31.2	0.95	21.5	0.89	26.1	0.94
A23 S (London Road)	19.9	0.89	35.9	0.98	19.9	0.88	22.5	0.92
Mill Road	4.7	0.76	4.7	0.76	3.3	0.60	3.3	0.60
A23 North (London Road)	10.4	0.56	12.2	0.62	30.5	0.89	47.2	0.98

Site 5- A27/Dyke Road/King George VI, North Roundabout

	AM				PM			
	May 2013 STA mitigation runs		June 2014 STA mitigation runs		May 2013 STA mitigation runs		June 2014 STA mitigation runs	
	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)	MMQ (PCU)	Deg Sat (%)
Devil's Dyke Road North	1.9	0.53	1.7	0.52	2.5	0.67	2.4	0.66
Devil's Dyke Road South (link to 5B)	16.4	0.87	18.7	0.91	10.8	0.83	15.6	0.93
A27 Eastbound off-slip	9.0	0.87	41.1	1.12	7.4	0.83	10.5	0.90

Site 5- A27/Dyke Road/King George VI, South Roundabout

	AM								PM							
	May 2013 STA mitigation runs				June 2014 STA mitigation runs				May 2013 STA mitigation runs				June 2014 STA mitigation runs			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
Devil's Dyke Road	0.47	3.25	0.32	A	0.60	3.54	0.37	A	0.64	3.57	0.39	A	0.80	3.92	0.44	A
A27 westbound Offslip Rd	32.04	66.70	1.01	F	35.26	73.83	1.01	F	39.60	81.28	1.02	F	55.38	109.46	1.05	F
Mill Road	0.39	10.27	0.28	B	0.74	13.58	0.43	B	7.86	70.13	0.93	F	20.61	154.34	1.06	F
Dyke Road Ave	116.63	302.68	1.18	F	108.61	281.96	1.17	F	55.90	146.45	1.08	F	75.79	202.38	1.12	F
King George VI Ave	7.73	24.64	0.90	C	11.02	34.10	0.93	D	2.99	11.34	0.75	F	3.25	12.00	0.77	B

Site 6- A27/A293, North Roundabout

	AM								PM							
	May 2013 STA mitigation runs				June 2014 STA mitigation runs				May 2013 STA mitigation runs				June 2014 STA mitigation runs			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
A293 (Bridge)	85.75	174.78	1.10	F	119.23	871.13	1.15	F	5.44	16.40	0.85	A	15.5	42.15	0.96	E
A27 Eastbound Offslip	19.86	164.53	1.05	F	29.85	237.72	1.11	F	2.95	27.61	0.76	A	19.48	144.23	1.05	F
Golf Club	0.00	0.00	0.00	A	0	0	0	A	0.12	20.62	0.11	C	0.24	43.71	0.2	E

Site 6- A27/A293, South Roundabout

	AM								PM							
	May 2013 STA mitigation runs				June 2014 STA mitigation runs				May 2013 STA mitigation runs				June 2014 STA mitigation runs			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
A27 E	16.72	57.31	0.97	F	19.26	65.1	0.98	F	40.98	116.35	1.05	F	57.38	158.68	1.08	F
A293 S	69.96	120.07	1.06	F	95.78	157.97	1.09	F	10.74	24.96	0.93	C	57.1	101.21	1.04	F
A293 (Bridge)	0.39	3.35	0.28	A	0.42	3.43	0.3	A	0.40	3.36	0.29	A	0.49	3.57	0.33	A