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Date: 12/12/18

Olympia – No CS9 – Revised Testing following TfL Audit

1. INTRODUCTION

This technical note (TN) details the VISSIM modelling undertaken for Momentum Transport Consultancy for the proposed Olympia Exhibition Centre development in Hammersmith, London.

The VISSIM modelling has been based on Transport for London's (TfL's) model of Hammersmith, which has been used to test the Cycle Superhighways proposals (CS9) in the area.

The model extents are shown in **Figure 1**.

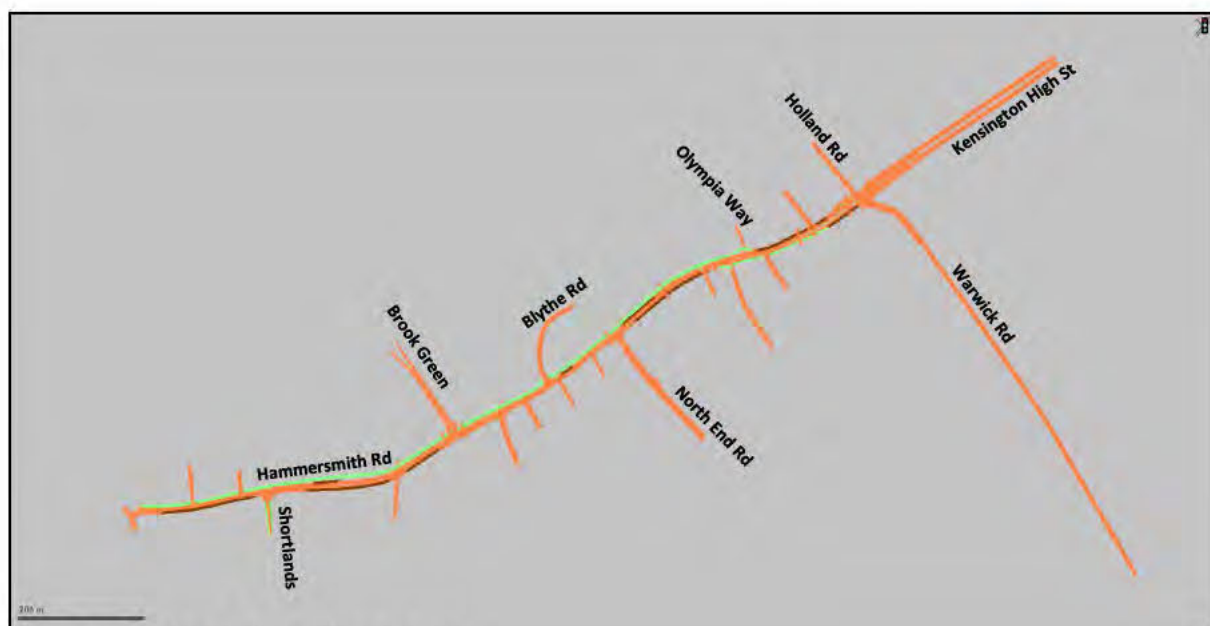


Figure 1 – VISSIM Modelling Extents

This TN builds upon the following TNs:

- TN1 – which detailed initial VISSIM assessment for the Olympia development.
- TN3 – which detailed testing following changes to some of the flow assumptions and scenarios modelled.

The main difference with this assessment is that modelling **does not include** the proposed CS9 improvements.

2. SCENARIOS MODELLED

As stated in TN3, the following scenarios have been tested as part of this VISSIM modelling exercise, as agreed with Momentum and TfL.

Table 1 – Modelled VISSIM Scenarios

Scenario		VISSIM Scenario No.
No.	Name	
1	Future Baseline (Existing TfL VISSIM model, excluding CS9 proposals)	16, 17
2a	Future Baseline + Proposed Blythe Road Signalisation	37, 38
3a	Future Baseline + Proposed Olympia Development	39, 40
4a	Future Baseline + Proposed Olympia Development + Proposed Blythe Road Signalisation	41, 42
5a	Future Baseline + Proposed Olympia Development + Proposed D-Gate Signalisation	43, 44
6a	Future Baseline + Proposed Olympia Development + Proposed Blythe Road Signalisation + Proposed D-Gate Signalisation	45, 46

It should be noted that, for the purposes of this TN, the following scenario has not been compared and analysed following agreement with Momentum:

- Scenario 2a – Future Baseline + Proposed Blythe Road Signalisation.

3. CHANGES TO MODEL

A comprehensive list of the modification files created and their associated details can be found in Section 3 in TN3.

This TN focuses on the audit comments made by TfL and the respective changes made to address them.

Comments from TfL were received on 31st October 2018 via Claire Farrow and a follow-on response to these comments was sent from Multimodal to TfL on 1st November 2018 (see **Appendix A** for email chain). A further response from TfL was provided by TfL on 28th November 2018 and the following headings below detail further model changes to answer TfL's remaining queries.

1) D-Gate Flows appear incorrect – should there be 0 flows out in the AM peak?

Multimodal have discussed this query with Momentum Transport Planning and can confirm that the flows are 0 in the AM peak and 6 in the PM peak. The reasoning for this is stated below, from an email received from Momentum following their discussions with TfL (email from Mailys Pineau to Multimodal sent on 30/11/18 at 09:19):

“Just to confirm on the modelled D-Gate flows (0 in and 0 out in the morning ; 0 in and 6 out in the evening).

D-Gate is the exhibition visitor proposed car park access. Exhibition visitors have specific profiles linked to the opening and closing times of the shows which are outside of network peaks and specifically the peak hours modelled in VISSIM.

We agreed these profiles with the spatial team at TfL and it was also highlighted to the network performance team at the time of the modelling. You'll see in the attached email from July that the agreed trip generation methodology leads to zero arrivals for the AM peak and 3% departures for the PM evening (because the 3% is from 1700 and 1800 and our model is 1745-1845, we have 'pushed' the 3% into the model times to test a worst case). 181 spaces car park x 3% of departures = 6 vehicles out during the PM peak.”

Further details on the email exchanges regarding this query can be provided if necessary.

2) Behaviour of Cyclists at D-Gate junction – very slow on exit?

TfL's main query related to the link having different widths through the junction, which could have affected the behaviour. Multimodal have undertaken a review of the link structure and can confirm that the cycle links are the same width through D-Gate (when signalised). For the scenarios where D-Gate is priority controlled, the cycle link structure and behaviours have been kept consistent with TfL's 'Proposed AM/PM V2' models.

Our standard modelling methodology when working with pre-approved models is to make no changes to the model set-up, unless specifically instructed to do so and with solid, agreed reasoning. In keeping with this approach for the cyclist behaviour, no further changes have therefore been made to the models and further advice is sought from TfL if changes are required above the approved 'Proposed AM/PM V2' models.

3) North End Road cyclist numbers require attention – vary between scenarios?

Following a review of the cyclist flows, Multimodal can confirm that Scenarios 3a and 5a have the correct cyclist flows. For Scenarios 4a and 6a, as a result of the closure of Munden Street to 'Entry Only' traffic, the vehicles which previously entered the network from this approach were reassigned to North End Road. However, a review of the calculation of these inputs has revealed an error in the number of cyclists calculated. The updated calculations for the North End Road vehicle inputs can be found in **Appendix B**, Modification Files 96 and 97 have been updated and the models have been re-run for new results.

4) Northbound link at Munden Street – differences between scenarios?

In scenarios 4a and 6a, this approach is 'Entry Only' in line with Momentum's mitigation proposals. This was confirmed by Momentum in an email from [REDACTED] on 24/07/18 at 12:52, which stated:

"...when Blythe road is signalised Munden Street becomes entry only from Hammersmith Road."

5) Scenario 3a and 4a – Vehicles taking a long time to leave D-Gate?

Multimodal have reviewed the operation of vehicles exiting D-Gate and have added a number of new priority rules onto the Hammersmith Road in both directions to give vehicles leaving D-Gate more opportunities to pull out.

Priority Rule numbers 1310, 1311, 1312 and 1313 have been added to Modification File 65 to assist the vehicles leaving D-Gate in SC3a and SC4a.

4. RESULTS

To compare the effects in the network of the various scenarios, the following outputs have been obtained as agreed with TfL:

- Journey Times (for General Traffic, Buses, Cyclists)
- Queue Lengths (Average Queues at each junction in the network)
- Saturation Flows (for each approach at each signalised junction in the network)
- Overall Network Performance

In line with previous CS9 modelling, the following random seeds have been run:

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Table 2 – Random Seed Runs

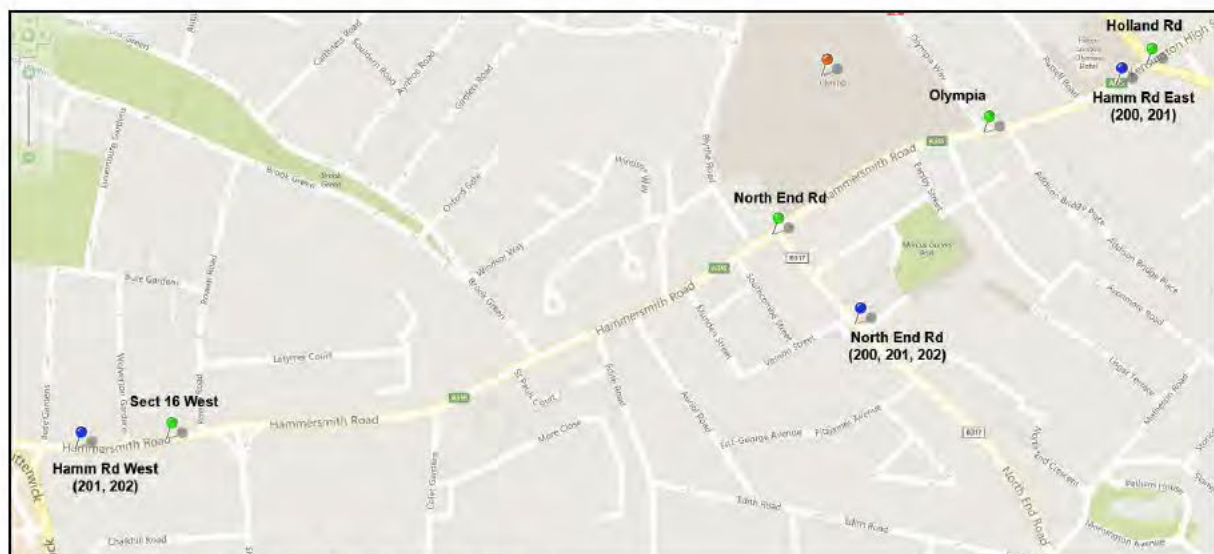
Peak	AM	PM
Starting Seed	42	42
Increment	1	19
No. of Runs	20	20

Journey Times

Journey times 9000-9056 have been obtained for the same sections used in the CS9 assessment, as agreed with TfL. Numbers 200-202 have also been obtained following correspondence with TfL. For reference, the journey time sections are listed in Table 3 and shown in Figure 2.

Table 3 – Journey Time Sections

No.	Journey Time	No.	Journey Time
9001	Sect 16 West to Holland Road	9049	North End Rd to Sect 16 West
9002	Holland Rd to Sect 16 West	9050	Sect 16 West to North End Rd Cyclists
9003	Sect 16 West to Holland Road Cyclists	9051	North End Rd to Sect 16 West Cyclists
9004	Holland Rd to Sect 16 West Cyclists	9055	EB_Olympia_Holland Road
9017	Sect 16 West to Olympia	9056	WB_Holland Road_Olympia
9018	Olympia to Sect 16 West	200	MM - NorthEndRd to HammRdEast
9019	Sect 16 West to Olympia Cyclists	201	MM - NorthEndRd to HammRdWest
9020	Olympia to Sect 16 West Cyclists	202	MM - NorthEndRd to HammRdWest (Cycles)
9048	Sect 16 West to North End Rd		

**Figure 2 – Journey Time Marker Locations**

The full set of AM and PM results are shown in Tables 5 and 6.

Table 4 – Journey Time Results – AM

AM PEAK (0745-0845)		Traffic					Traffic - Impact of Scenarios against FY Base			
Journey Time Measurement		Average Journey Time (s)					Average Journey Time (s)			
No.	Name	SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
9001	Sect 16 West to Holland Road	499	543	674	692	682	45	175	193	184
9002	Holland Rd to Sect 16 West	187	243	555	297	583	56	368	109	395
9003	Sect 16 West to Holland Road Cyclists	-	-	-	-	-	-	-	-	-
9004	Holland Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9017	Sect 16 West to Olympia	415	475	620	643	631	59	205	228	215
9018	Olympia to Sect 16 West	144	195	349	221	372	52	206	78	229
9019	Sect 16 West to Olympia Cyclists	-	-	-	-	-	-	-	-	-
9020	Olympia to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9048	Sect 16 West to North End Rd	378	427	586	605	592	49	208	227	214
9049	North End Rd to Sect 16 West	-	-	151	-	147	-	-	-	-
9050	Sect 16 West to North End Rd Cyclists	-	-	-	-	-	-	-	-	-
9051	North End Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9055	EB_Olympia_Holland Road	94	77	64	64	66	-17	-31	-30	-28
9056	WB_Holland Road_Olympia	44	48	213	79	217	5	170	36	173
200	MM - NorthEndRd to HammRdEast	256	370	413	311	426	115	158	55	170
201	MM - NorthEndRd to HammRdWest	-	-	337	-	344	-	-	-	-
202	MM - NorthEndRd to HammRdWest (Cycles)	-	-	-	-	-	-	-	-	-

AM PEAK (0745-0845)		Buses					Buses - Impact of Scenarios against FY Base			
Journey Time Measurement		Average Journey Time (s)					Average Journey Time (s)			
No.	Name	SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
9001	Sect 16 West to Holland Road	613	565	709	724	725	-48	96	111	112
9002	Holland Rd to Sect 16 West	281	296	513	361	525	15	231	80	243
9003	Sect 16 West to Holland Road Cyclists	-	-	-	-	-	-	-	-	-
9004	Holland Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9017	Sect 16 West to Olympia	514	497	644	660	665	-17	130	146	151
9018	Olympia to Sect 16 West	214	248	326	272	328	34	112	59	115
9019	Sect 16 West to Olympia Cyclists	-	-	-	-	-	-	-	-	-
9020	Olympia to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9048	Sect 16 West to North End Rd	452	434	596	602	606	-18	144	150	153
9049	North End Rd to Sect 16 West	145	155	201	174	197	10	56	29	52
9050	Sect 16 West to North End Rd Cyclists	-	-	-	-	-	-	-	-	-
9051	North End Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9055	EB_Olympia_Holland Road	112	76	74	77	79	-35	-38	-35	-33
9056	WB_Holland Road_Olympia	68	49	194	91	201	-19	127	23	133
200	MM - NorthEndRd to HammRdEast	316	382	382	360	406	65	65	44	90
201	MM - NorthEndRd to HammRdWest	249	385	401	304	403	136	152	55	154
202	MM - NorthEndRd to HammRdWest (Cycles)	-	-	-	-	-	-	-	-	-

AM PEAK (0745-0845)		Cyclists					Cyclists - Impact of Scenarios against FY Base			
Journey Time Measurement		Average Journey Time (s)					Average Journey Time (s)			
No.	Name	SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
9001	Sect 16 West to Holland Road	558	561	630	635	640	3	72	76	82
9002	Holland Rd to Sect 16 West	233	263	424	285	421	30	191	52	188
9003	Sect 16 West to Holland Road Cyclists	-	319	-	-	-	-	-	-	-
9004	Holland Rd to Sect 16 West Cyclists	-	263	-	-	-	-	-	-	-
9017	Sect 16 West to Olympia	430	452	543	552	549	22	113	122	119
9018	Olympia to Sect 16 West	182	200	226	208	226	18	44	25	44
9019	Sect 16 West to Olympia Cyclists	-	262	-	-	-	-	-	-	-
9020	Olympia to Sect 16 West Cyclists	-	224	-	-	-	-	-	-	-
9048	Sect 16 West to North End Rd	371	393	483	492	490	22	112	121	119
9049	North End Rd to Sect 16 West	109	118	146	121	136	9	37	12	27
9050	Sect 16 West to North End Rd Cyclists	-	207	-	-	-	-	-	-	-
9051	North End Rd to Sect 16 West Cyclists	-	181	-	-	-	-	-	-	-
9055	EB_Olympia_Holland Road	142	122	97	99	101	-20	-45	-43	-41
9056	WB_Holland Road_Olympia	51	50	193	80	197	0	142	29	147
200	MM - NorthEndRd to HammRdEast	323	286	380	322	384	-36	57	-1	61
201	MM - NorthEndRd to HammRdWest	178	204	265	207	260	27	88	29	83
202	MM - NorthEndRd to HammRdWest (Cycles)	-	354	-	-	-	-	-	-	-

Table 5 – Journey Time Results – PM

PM PEAK (1745-1845)		Traffic					Traffic - Impact of Scenarios against FY Base			
Journey Time Measurement		Average Journey Time (s)					Average Journey Time (s)			
No.	Name	SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
9001	Sect 16 West to Holland Road	366	437	594	438	621	71	229	72	256
9002	Holland Rd to Sect 16 West	217	311	747	303	773	95	531	86	557
9003	Sect 16 West to Holland Road Cyclists	-	-	-	-	-	-	-	-	-
9004	Holland Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9017	Sect 16 West to Olympia	303	375	550	379	580	72	247	76	277
9018	Olympia to Sect 16 West	160	224	449	223	476	64	289	63	316
9019	Sect 16 West to Olympia Cyclists	-	-	-	-	-	-	-	-	-
9020	Olympia to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9048	Sect 16 West to North End Rd	263	338	520	337	545	75	257	75	282
9049	North End Rd to Sect 16 West	-	-	166	-	172	-	-	-	-
9050	Sect 16 West to North End Rd Cyclists	-	-	-	-	-	-	-	-	-
9051	North End Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9055	EB Olympia_Holland Road	65	66	55	62	55	1	-10	-4	-11
9056	WB_Holland Road_Olympia	57	95	294	84	291	37	237	27	234
200	MM - NorthEndRd to HammRdEast	220	293	399	334	412	73	179	114	192
201	MM - NorthEndRd to HammRdWest	-	-	345	-	364	-	-	-	-
202	MM - NorthEndRd to HammRdWest (Cycles)	-	-	-	-	-	-	-	-	-

PM PEAK (1745-1845)		Buses					Buses - Impact of Scenarios against FY Base			
Journey Time Measurement		Average Journey Time (s)					Average Journey Time (s)			
No.	Name	SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
9001	Sect 16 West to Holland Road	500	520	667	520	678	20	168	21	178
9002	Holland Rd to Sect 16 West	327	356	616	358	611	29	289	31	284
9003	Sect 16 West to Holland Road Cyclists	-	-	-	-	-	-	-	-	-
9004	Holland Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9017	Sect 16 West to Olympia	429	442	624	452	637	13	195	23	208
9018	Olympia to Sect 16 West	244	276	377	271	377	32	132	27	133
9019	Sect 16 West to Olympia Cyclists	-	-	-	-	-	-	-	-	-
9020	Olympia to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9048	Sect 16 West to North End Rd	359	378	560	381	569	20	202	22	211
9049	North End Rd to Sect 16 West	168	179	215	176	213	11	47	8	45
9050	Sect 16 West to North End Rd Cyclists	-	-	-	-	-	-	-	-	-
9051	North End Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9055	EB Olympia_Holland Road	74	77	60	72	57	4	-14	-2	-17
9056	WB_Holland Road_Olympia	84	85	235	89	229	2	151	5	146
200	MM - NorthEndRd to HammRdEast	277	337	384	371	417	60	108	94	141
201	MM - NorthEndRd to HammRdWest	267	311	430	329	435	45	163	63	168
202	MM - NorthEndRd to HammRdWest (Cycles)	-	-	-	-	-	-	-	-	-

PM PEAK (1745-1845)		Cyclists					Cyclists - Impact of Scenarios against FY Base			
Journey Time Measurement		Average Journey Time (s)					Average Journey Time (s)			
No.	Name	SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
9001	Sect 16 West to Holland Road	471	503	566	503	568	32	95	33	97
9002	Holland Rd to Sect 16 West	254	287	478	278	476	33	224	24	222
9003	Sect 16 West to Holland Road Cyclists	-	-	-	-	-	-	-	-	-
9004	Holland Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9017	Sect 16 West to Olympia	380	415	497	419	499	35	116	38	119
9018	Olympia to Sect 16 West	186	194	242	191	239	8	56	6	54
9019	Sect 16 West to Olympia Cyclists	-	-	-	-	-	-	-	-	-
9020	Olympia to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9048	Sect 16 West to North End Rd	333	366	448	363	453	33	115	30	120
9049	North End Rd to Sect 16 West	146	143	157	143	152	-4	11	-3	6
9050	Sect 16 West to North End Rd Cyclists	-	-	-	-	-	-	-	-	-
9051	North End Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9055	EB Olympia_Holland Road	90	90	75	85	75	0	-14	-4	-14
9056	WB_Holland Road_Olympia	69	95	233	88	233	27	165	19	164
200	MM - NorthEndRd to HammRdEast	249	287	343	303	355	38	94	55	106
201	MM - NorthEndRd to HammRdWest	230	241	275	246	270	11	45	16	40
202	MM - NorthEndRd to HammRdWest (Cycles)	-	-	-	-	-	-	-	-	-

AM Results

In the AM peak, **Table 4** shows that when comparing against SC1, SC3a has the least impact on journey times (adding Olympia development, no signalisation schemes) for all modes (general traffic, buses and cyclists). This seems to indicate that by reassigning traffic from using Olympia Way to Blythe Road, the network journey times are affected, but not to the same degree as the other scenarios. The maximum increases are around 2.5 minutes for traffic and buses and 30 seconds for cyclists. There are also a number of improvements in journey times, with 48 seconds being the highest time saving.

The introduction of signals at Blythe Road (SC4a), D-Gate (SC5a) or both junctions (SC6a) tends to have more of an impact on the journey times for all modes of travel. This is particularly noticeable for SC4a and SC6a for westbound journey times on Hammersmith Road (no's 9002, 9018), where increases of 4-7 minutes were experienced for traffic and buses and 3 minutes for cyclists.

In an eastbound direction (no's 9001, 9017), SC4a, SC5a and SC6a all have increased times, varying between 1 and 4 minutes for all modes of travel.

Travelling both eastbound and westbound from North End Road (no's 200 and 201), the journey times are increased compared to SC1. The increases are highest in SC6a and SC4a. SC5a tends to be better than SC3a travelling eastbound, but not westbound.

Across all the scenarios, there are some improvements in the eastbound movement from Olympia to Holland Road (no. 9055), with reductions of 17- seconds across all modes of travel. In the other direction (no. 9056), SC4a and SC6a have the most impact on journey times, followed by SC5a and then SC3a.

PM Results

In the PM peak, **Table 5** shows that Hammersmith Road westbound journey times are most affected (no. 9002) for SC4a and SC6a, where the increases range from 4-9 minutes across all modes of travel. For the other westbound journey time sections (no's 9018, 9048), SC4a and SC6a have bigger journey time increases compared to SC3a and SC5a.

In the eastbound direction (no's 9001 & 9017), SC4a and SC6a again have the bigger increases in journey times across all modes of travel (1.5 to 4 minutes), but these are not as high as the westbound direction.

For journeys from North End Road (no's 200 and 201), SC3a and SC5a have the least impact on travel times, with increases of 10 seconds to 2 minutes for all modes compared to 40 seconds to 3 minutes for SC4a and SC6a.

As in the AM peak, there are some slight improvements (up to 17 seconds for SC6a) to general traffic, bus and cyclist journey times for traffic travelling from Olympia to Holland Road (no's 9055). However, the westbound direction (no. 9056) is more negatively impacted, particularly in SC4a and SC6a.

Queue Lengths

Average queue lengths have been obtained for the junctions listed below and shown in **Figure 3**:

- J1 – Hammersmith Rd / Avonmore Rd;
- J2 – Hammersmith Rd / North End Rd;
- J3 – Hammersmith Rd / Blythe Rd;
- J4 – Hammersmith Rd / Edith Rd;
- J5 – Hammersmith Rd / Brook Green;
- J6 – Hammersmith Rd / Shortlands;
- J7 – Hammersmith Rd / D-Gate;
- J8 – Kensington High St / Warwick Rd.

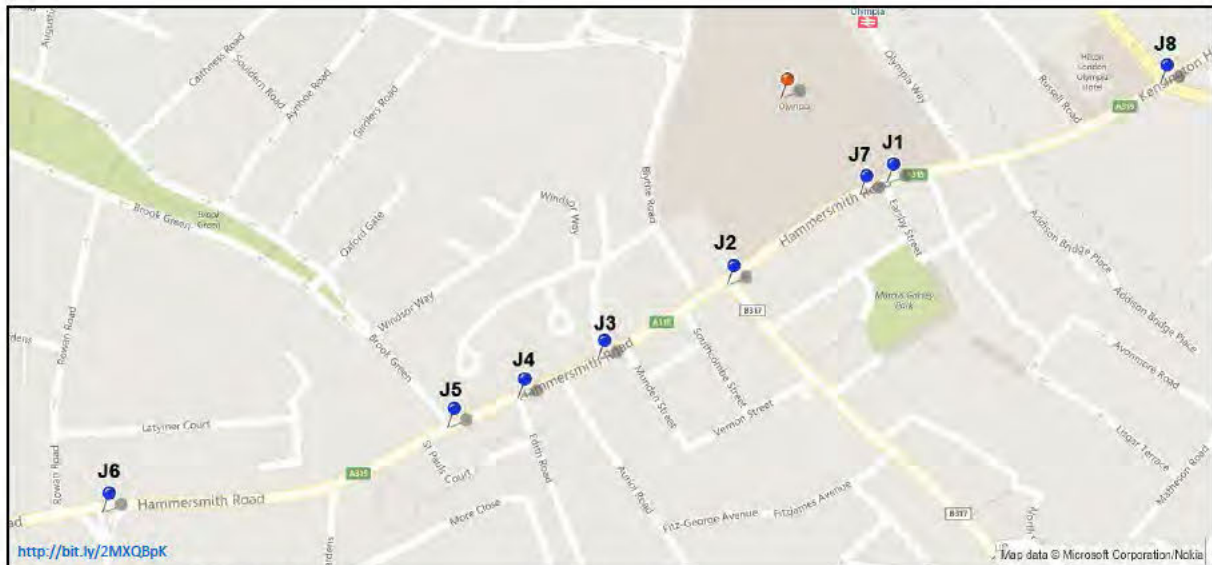


Figure 3 – Junctions Assessed

The comparisons for each junction are shown in **Figures 5-12** under the related sections.

J1 – Hammersmith Rd / Avonmore Rd



Figure 4 – Hammersmith Rd / Avonmore Rd Queue Comparisons

In the AM peak, the longest queues are on the Hammersmith Road East approach, with SC4a and SC6a (Blythe Road signalisation and both sets of signals (Blythe Road and D-Gate)) queues maintaining a constant length of ~240m throughout the peak period. This plateau of queuing suggests that the queues are reaching back as far as the Kensington High Street / Warwick Road junction. SC5a and SC3a have queues which reach ~150m in length, which is again higher than the 50m average queue length for SC1.

On the Avonmore Road approach, queues for all scenarios reach a maximum of ~145m before decreasing in length as the peak progresses. This suggests that the queues reach back to the end of the link for a period of time, but then reduce towards the end of the peak period.

For Hammersmith Road West, the queue lengths are all minimal and similar between the scenarios, indicating the signals proposed have more of an effect in the busier westbound direction.

In the PM peak, SC4a and SC6a are again the scenarios with the longest queues on the Hammersmith Road East approach. As in the AM peak, the levels are maintained at around 240m in length, suggesting blocking back to the Kensington High Street junction. SC3a and SC5a have average queue lengths which build as the peak progresses but reaches up to 240m before reducing again.

For Avonmore Road, all of the scenarios have longer queues than SC1, with SC4a having the largest queues.

On the Hammersmith Road West approach, the queue lengths and profiles are similar between all of the scenarios.

J2 – Hammersmith Rd / North End Rd



Figure 5 – Hammersmith Rd / North End Rd Queue Comparisons

In the AM peak, SC4a and SC6a have mixed effects on the two Hammersmith Road approaches. On the East approach, the queue lengths for SC6a and SC4a are around 100m and 65m respectively, compared to ~50m for SC5a, ~40m for SC3a and 20m for SC1. However, on the West approach, SC4a and SC6a have shorter queues than SC1, SC3a and SC5a (which all have similar lengths of around 80m). This suggests that the proposed signalisation of Blythe Road and D-Gate will have mixed impacts on this junction in the AM peak.

For the North End Road approach, SC4a and SC6a have average queues reaching up to 110m in length and then levelling out. This suggests that queues reach the end of the link and there is latent demand as a result. SC5a has queues up to 90m and SC3a reaches up to 60m in length. These are all higher than SC1, which has queue lengths up to 40m in length.

In the PM peak, the same effects are apparent as in the AM peak. On the Hammersmith Road East approach, the queue lengths are similar for the associated scenarios, with SC6a producing the longest queues, followed by SC4a, SC5a, SC3a and SC1. For the West approach, SC4a and SC6a are slightly lower than the other scenarios, but not by such a large margin as in the AM peak.

For North End Road, SC4a and SC6a have queue lengths similar to the AM peak. SC5a and SC3a reach up to 110m in length, suggesting a worse performance than in the AM peak. SC1 again has queues around 40m in length, much lower than the other scenarios.

J3 – Hammersmith Rd / Blythe Rd



Figure 6 – Hammersmith Rd / Blythe Rd Queue Comparisons

In the AM peak, the Hammersmith Road East approach queue lengths are highest for SC4a and SC6a, with levels fluctuating around 100m in length. SC5a has queue lengths of ~40m and SC3a has average queue lengths of around 20m. These are all higher than the future baseline, where queuing on this approach was minimal.

On the Hammersmith Road West approach, the queue lengths between the scenarios were more comparable (60-75m max). This indicates that the signalisation of Blythe Road (SC4a, SC6a) has less of an impact on this approach in comparison to the East approach.

On Blythe Road, SC5a has the longest queues, with all the other scenarios having similar queue length profiles.

For Munden Street, SC3a and SC5a have the longest queues (~20m). There are no queue lengths from SC4a and SC6a as a result of Munden Street being closed and traffic reassigned.

In the PM peak, the effects on Hammersmith Road East are similar to the AM peak. SC4a and SC6a have the longest queues (~100m), followed by SC5a, SC3a and then SC1.

On the Hammersmith Road West approach, SC4a and SC6a have longer queues than the other scenarios, with average queue lengths of up to 70m. This is in comparison to SC5a, SC3a and SC1, which have queues up to ~15, ~10 and ~5m respectively. With signals proposed in these scenarios, this indicates that this is the likely cause for the increases.

For the Blythe Road and Munden Street approaches, the average queue lengths for all scenarios are approximately 20m, with SC5a having the highest lengths on both approaches.

J4 – Hammersmith Rd / Edith Rd



Figure 7 – Hammersmith Rd / Edith Rd Queue Comparisons

In the AM peak, the queue lengths on the Hammersmith Rd East approach are highest for SC4a and SC6a, building to around 40m towards the end of the peak. SC3a and SC5a have queue lengths which peak at around 20m. All of these queues are higher than SC1, which has a maximum average queue of ~5m.

For the Hammersmith Road West approach, SC4a, SC5a and SC6a all have queue lengths which build up to ~80m in length and remain around this level for the peak period. SC3a and SC1 queue lengths are lower and take longer to build up to a maximum of ~75m at their peak.

On Edith Road, the queue lengths for all scenarios are minimal, at ~5m throughout the AM peak period.

In the PM peak, the Hammersmith Road East queue profiles are similar to the AM peak for SC3a, SC4a, SC5a and SC6a. The only difference is SC1 has longer queues, which are more similar in length to the other scenarios.

On Hammersmith Road West, SC4a and SC6a have noticeably longer queues than the other scenarios, reaching up to 70m at their highest. SC3a and SC5a have average queues around 10-15m, with SC1 queues averaging at ~5m.

For Edith Road, the average queue lengths are again minimal for all scenarios, averaging out at around 5m.

J5 – Hammersmith Rd / Brook Green


Figure 8 – Hammersmith Rd / Brook Green Queue Comparisons

In the AM peak, the queues on Hammersmith Road West are the longest, with SC3a, SC4a, SC5a and SC6a all reaching ~260m in length. These queue lengths are maintained for SC4a, SC5a and SC6a, suggesting blocking back to the Shortlands junction. SC3a and SC1 queues build as the peak progresses but fall just short of affecting the Shortlands junction for long periods of time.

The Brook Green approach has the longest queues in SC5a (peaking at ~100m). The consistent lengths suggest queues reach back to the start of the link, which will lead to latent demand on this approach as a result. SC4a and SC6a have queues which reach ~75m and SC3a queues extent to ~50m. SC1 has the lowest queue lengths, reaching up to around 35m in length.

On the Hammersmith Road East approach, queue lengths for all the scenarios are similar, reaching up to 35-40m at their highest.

In the PM peak, the queues on Hammersmith Road West reach back to approximately 260m in length for SC4a and SC6a, although this is not for such a consistent time as in the AM peak. The other scenarios all have shorter queues, with SC3a and SC5a having lengths up to 150m and 130m respectively and SC1 reaching 90m at most.

For the Brook Green approach, queues for SC4a and SC6a are the longest, reaching 70m at most. SC3a, SC5a and SC1 have shorter queues, with consistent profiles of up to 25m in length.

As in the AM peak, the queues on the Hammersmith Road East approach are similar between all the scenarios.

J6 – Hammersmith Rd / Shortlands



Figure 9 – Hammersmith Rd / Shortlands Queue Comparisons

In the AM peak, the Hammersmith Road East approach has minimal queuing (up to 5m) for all scenarios.

For Hammersmith Road West, the queues for SC4a, SC5a and SC6a scenarios reach back as far as the end of the link (~200m). This occurs earlier in the peak for SC4a and SC6a, with latent demand likely as a result. Queues for SC3a increase as the peak progresses and reach a length of 200m right at the end of the peak period.

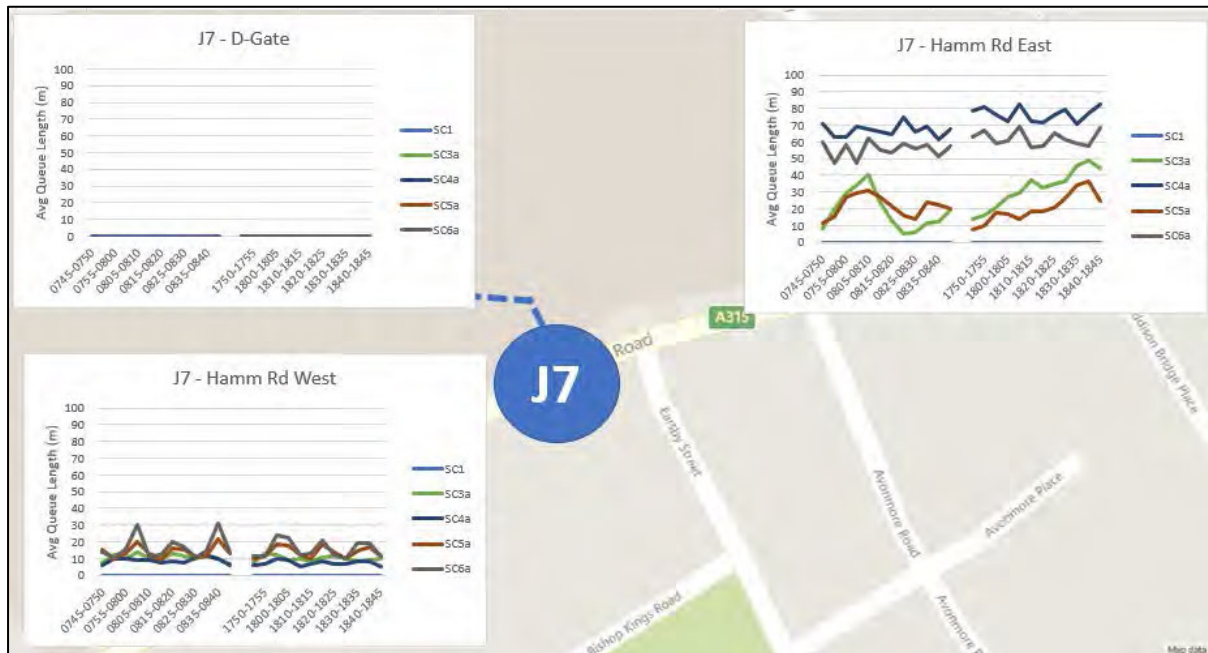
For the Shortlands approach, the queue lengths and profiles are consistent for all scenarios, reaching approximately 20m at their longest.

In the PM peak, the Hammersmith Road East approach experiences the same levels of queuing, with all scenarios having minimal queue lengths.

For the Hammersmith Road West approach, the queue lengths for SC6a and SC4a are again the highest, reaching up to 125m and 100m in length respectively. However, these do not reach back to the start of link as in the AM peak. Queues for SC3a, SC5a and SC1 are much lower and more consistent, averaging at around 10-15m in length.

The average queues on the Shortlands approach are minimal, averaging out at around 5m for all scenarios.

J7 – Hammersmith Rd / D-Gate


Figure 10 – Hammersmith Rd / D-Gate Queue Comparisons

In the AM peak, queues on the D-Gate approach are minimal, with very little traffic exiting this approach.

On the Hammersmith Road East approach, the introduction of signals at Blythe Road, D-Gate or both (SC4a, SC5a, SC6a) increases the queue lengths on this approach. SC4a and SC6a provide the biggest increase with queues averaging 60-70m. Queues for SC3a and SC5a reach up to 30-40m and SC1 has no queueing as a result of this junction not being included in the future baseline.

On the Hammersmith Road West approach, SC5a and SC6a have slightly longer queues than SC3a and SC4a (20-30m against 10-15m). This indicates that the introduction of signals at D-Gate does have an effect. SC1 has no queue lengths as this junction was not included.

In the PM peak, the D-Gate queues are minimal.

For Hammersmith Road, the East approach has higher average queue lengths in SC4a and SC6a (~60-70m). SC5a and SC3a have average queues up to 30-50m in length, whilst SC1 has no queues (junction not included in scenario).

For the West approach, the profiles are similar to the AM peak, with SC5a and SC6a having slightly longer queues than SC3a and SC5a (20-30m against 10-15m).

J8 – Kensington High St / Warwick Rd



Figure 11 – Kensington High St / Warwick Rd Queue Comparisons

In the AM peak, there are big differences in queuing on the Kensington High Street East approach. SC4a and SC6a have queues which build back to the start of the link (~340m) and are then maintained for the rest of the peak period. This is likely due to queuing back from the Avonmore Road junction (see **Figure 5**) and will likely lead to latent demand on this approach in these scenarios. SC3a, SC5a and SC1 all have smaller queues, averaging 20-50m.

For Kensington High St West, SC1 is the worst performing, with average queues reaching ~110m at their peak. The scenarios with the proposed signals (SC4a, SC5a and SC6a) produce the lower queue lengths, likely due to traffic being held up further downstream in the network.

On Warwick Road, the queue profiles for all scenarios show a queue that reduces and then builds back up at the end of peak period. SC4a and SC6a have the longest average queues, with SC3a, SC5a and SC1 showing a greater reduction in length before building up again. The differences in queue lengths could be attributed to the blocking back from the Avonmore Road junction, which disrupts westbound traffic.

In the PM peak, the queues on Kensington High Street East are the same for SC4a and SC6a as in the AM peak, with sustained queues back to the start of the link (~340m). This again is likely due to upstream queuing from the Avonmore Road junction (see **Figure 5**). SC3a and SC5a queues build up to higher levels than in the AM peak (up to ~275m), but do not reach as far back as the end of the link. SC1 has the smallest queues, with lengths averaging around 50m.

For the West approach of Kensington High St, the queuing profiles are more consistent with all queues averaging around 50m.

The Warwick Road approach has longer queues for SC4a and SC6a, which reach up to 600m at the end of the peak period. The other scenarios have lower queue lengths but build up to around 500m by the end of the peak period. The effects are likely due to the queuing back from the Avonmore Road junction, which has a more significant impact for SC4a and SC6a.

Saturation Flows

Saturation flows have been obtained at the following signalised junctions as listed below and shown in **Figure 3**:

- J2 – Hammersmith Rd / North End Rd;
- J3 – Hammersmith Rd / Blythe Rd;
- J4 – Hammersmith Rd / Edith Rd;
- J5 – Hammersmith Rd / Brook Green;
- J7 – Hammersmith Rd / D-Gate;
- J8 – Kensington High St / Warwick Rd.

The results of the AM and PM comparisons are shown in **Tables 7 and 8**, which have been based on the following Saturation Flow criteria from TfL's 'VISSIM Saturation Flow Tool' (see **Figure 12**). The criteria has been based on the TfL Guidance Notes, with adjustments made to the 'General Parameters' section to obtain as many readings as possible from the VISSIM results.

Tool Settings for Saturation Flow Measurement	
<u>General Parameters:</u>	
Number of vehicles across stopline to ignore at start of green	<input type="text" value="2"/>
Minimum number of vehicles required in a single measurement	<input type="text" value="6"/>
Minimum number of measurements for average sat flow calculation	<input type="text" value="5"/>
Global PCU Factor (adjust for specific links on survey/results sheets)	<input type="text" value="1.00"/>
<input type="button" value="Test these settings on an individual Axx/Dis file"/> (Select Axx file) <input type="button" value="Run with these settings on multiple Axx/Dis files"/> (Select VISSIM model file)	
<u>Time Parameters:</u>	
Include measurements from time	<input type="text" value="0"/> s
Disregard measurements after time	<input type="text" value="7200"/> s
<input type="button" value="Clear Survey Data"/> <input type="button" value="Clear Results Data"/>	
<u>End of Saturation:</u>	
End of saturation is assumed when any of the following occur (tick as appropriate):	
<input checked="" type="checkbox"/> Headway is greater than	<input type="text" value="3.5"/> s
<input checked="" type="checkbox"/> Increase between successive headways exceeds	<input type="text" value="175"/> %
<input checked="" type="checkbox"/> (Max headway + min headway) greater than	<input type="text" value="3.50"/>
Do not assume the above values are 'standard' values which are correct in all cases. They must be tested for suitability on a variety of links in the network concerned, and adjusted as necessary.	

Figure 12 – Saturation Flow Criteria for TfL's VISSIM Saturation Flow Tool

Table 6 – Saturation Flow Comparisons – AM Peak

AM PEAK (0745-0845)											
Junction		From	Saturation Flows (pcu/hr)					% Difference to SC1			
No.	Name		SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
2	Hamm Rd / North End Rd	Hamm Rd East - Ahead	1743	1739	1713	1763	1731	0%	-2%	1%	-1%
		Hamm Rd East - Left	-	-	-	-	-	-	-	-	-
		North End Rd	-	1507	1470	-	-	-	-	-	-
		Hamm Rd West - Ahead	1788	1740	1720	1660	1724	-3%	-4%	-7%	-4%
		Hamm Rd West - Right	-	-	-	-	-	-	-	-	-
3	Blythe Rd / Hamm Rd	Blythe Rd - LT	-	-	-	-	-	-	-	-	-
		Blythe Rd - RT	-	-	-	-	-	-	-	-	-
		Hamm Rd East	-	-	1664	-	1663	-	-	-	-
		Munden St	-	-	-	-	-	-	-	-	-
		Hamm Rd West	-	-	1914	-	1906	-	-	-	-
4	Hamm Rd / Edith Rd	Hamm Rd East	1948	1898	1882	1909	1888	-3%	-3%	-2%	-3%
		Edith Rd	-	-	-	-	-	-	-	-	-
		Hamm Rd West - RT	-	-	-	-	-	-	-	-	-
		Hamm Rd West - Ahead	1748	1771	1736	1754	1747	1%	-1%	0%	0%
5	Brook Green / Hamm Rd	Brook Green - LT	-	-	-	-	-	-	-	-	-
		Brook Green - RT	-	-	-	-	-	-	-	-	-
		Hamm Rd East - Ahead/Right	-	-	-	-	-	-	-	-	-
		Hamm Rd East - Ahead	-	-	-	-	1759	-	-	-	-
		Hamm Rd West - Left/Ahead	1716	1706	-	-	-	-1%	-	-	-
7	D-Gate / Hamm Rd	Hamm Rd West - Ahead	1529	1612	-	-	-	5%	-	-	-
		D-Gate	-	-	-	-	-	-	-	-	-
		Hamm Rd East - Ahead/Right	-	-	-	1727	1693	-	-	-	-
		Hamm Rd East - Ahead (Bus Lane)	-	-	-	-	-	-	-	-	-
		Hamm Rd West - Left/Ahead	-	-	-	2218	2278	-	-	-	-
8	Holland Rd / Kensington High St / Warwick Rd	Hamm Rd West - Ahead	-	-	-	1709	1735	-	-	-	-
		Kens. High St East - Ahead	1801	-	-	1671	1664	-	-	-7%	-8%
		Kens. High St East - Ahead	1688	1743	1957	1731	1754	3%	16%	3%	4%
		Kens. High St East - Right	-	-	-	-	-	-	-	-	-
		Warwick Rd - Ahead	1746	1744	1749	1752	1747	0%	0%	0%	0%
		Warwick Rd - Ahead	1771	1769	1771	1770	1784	0%	0%	0%	1%
		Warwick Rd - LT	1708	1726	-	1732	-	1%	-	1%	-
		Kens. High St West - Ahead	-	-	-	-	-	-	-	-	-
		Kens. High St West - Ahead	1862	1856	1822	1835	1831	0%	-2%	-1%	-2%
		Kens. High St West - LT	-	-	-	-	-	-	-	-	-

From **Table 6**, the main junction affected in a negative way by the proposals is the North End Road junction, with the Hammersmith Road West approach experiencing decreases in saturation flows of 3-7%.

The other junction of note is the Edith Road junction, where the Hammersmith Road East approach has reductions in saturation flows of 2-3%.

Comparing the different scenarios, SC3a has the least variance in saturation flows, with percentages ranging +5% to -3%. SC3a, SC4a and SC5a all have much more varied impacts on the saturation flows, both in a positive and negative way.

There were a large number of stop-lines where saturation flows could not be obtained. This was due to the outputs from VISSIM not satisfying the criteria as shown in **Figure 12**.

Table 7 – Saturation Flow Comparisons – PM Peak

PM PEAK (1745-1845)											
Junction		From	Saturation Flows (pcu/hr)					% Difference to SC1			
No.	Name		SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
2	Hamm Rd / North End Rd	Hamm Rd East - Ahead	1757	1770	1712	1780	1725	1%	-3%	1%	-2%
		Hamm Rd East - Left	-	-	-	-	-	-	-	-	-
		North End Rd	-	1474	1494	-	1478	-	-	-	-
		Hamm Rd West - Ahead	1670	1653	1615	1450	1604	-1%	-3%	-13%	-4%
		Hamm Rd West - Right	-	-	-	-	-	-	-	-	-
3	Blythe Rd / Hamm Rd	Blythe Rd - LT	-	-	-	-	-	-	-	-	-
		Blythe Rd - RT	-	-	-	-	-	-	-	-	-
		Hamm Rd East	-	-	1697	-	1683	-	-	-	-
		Munden St	-	-	-	-	-	-	-	-	-
		Hamm Rd West	-	-	1941	-	1939	-	-	-	-
4	Hamm Rd / Edith Rd	Hamm Rd East	1914	1907	1876	1911	1892	0%	-2%	0%	-1%
		Edith Rd	-	-	-	-	-	-	-	-	-
		Hamm Rd West - RT	-	-	-	-	-	-	-	-	-
		Hamm Rd West - Ahead	1872	1934	1802	1891	1791	3%	-4%	1%	-4%
5	Brook Green / Hamm Rd	Brook Green - LT	1487	1487	1463	1491	1456	0%	-2%	0%	-2%
		Brook Green - RT	-	-	-	-	-	-	-	-	-
		Hamm Rd East - Ahead/Right	-	-	-	-	-	-	-	-	-
		Hamm Rd East - Ahead	1981	1812	-	2042	2450	-8%	-	3%	24%
		Hamm Rd West - Left/Ahead	-	1875	1926	1815	-	-	-	-	-
7	D-Gate / Hamm Rd	Hamm Rd West - Ahead	-	-	-	-	-	-	-	-	-
		D-Gate	-	-	-	-	-	-	-	-	-
		Hamm Rd East - Ahead/Right	-	-	-	1742	1701	-	-	-	-
		Hamm Rd East - Ahead (Bus Lane)	-	-	-	-	-	-	-	-	-
		Hamm Rd West - Left/Ahead	-	-	-	-	-	-	-	-	-
8	Holland Rd / Kensington High St / Warwick Rd	Hamm Rd West - Ahead	-	-	-	1719	1762	-	-	-	-
		Kens. High St East - Ahead	1803	1917	-	1900	-	6%	-	5%	-
		Kens. High St East - Ahead	1788	1824	2333	1820	1693	2%	30%	2%	-5%
		Kens. High St East - Right	-	-	-	-	-	-	-	-	-
		Warwick Rd - Ahead	1854	1857	1854	1852	1853	0%	0%	0%	0%
		Warwick Rd - Ahead	1868	1855	1861	1864	1868	-1%	0%	0%	0%
		Warwick Rd - LT	-	-	-	-	-	-	-	-	-
		Kens. High St West - Ahead	-	-	-	-	-	-	-	-	-
		Kens. High St West - Ahead	1840	1842	1817	1843	1832	0%	-1%	0%	0%
		Kens. High St West - LT	-	-	-	-	-	-	-	-	-

From **Table 7**, there is much more variance in the saturation flow percentage difference than in the AM peak.

The Hammersmith Road West approach at the North End Road junction is most affected, particularly in SC5a where there is a 13% reduction in saturation flow. Looking at the positive impacts, the Kensington High Street East approach in SC4a has a saturation flows that has increased by 30%.

When comparing the different scenarios, SC3a shows the least variance (+6% to -8%), All of the other scenarios have much more varied impacts on the saturation flows, with SC4a and SC6a having the highest benefits and SC5a having the biggest negative impact.

There were a large number of stop-lines where saturation flows could not be obtained, similar to the AM peak. This was due to the outputs from VISSIM not satisfying the criteria as shown in **Figure 12**.

Overall Network Performance

The overall network performance of the scenarios has been compared, to give an overall picture of how the different networks perform in terms of average delay, average speed and latent demand and delay.

The AM and PM results are shown in **Tables 8 and 9**.

Table 8 – Network Performance Comparisons – AM Peak

NETWORK PERFORMANCE								
AM Peak (0745-0845)								
Scenario	Average Delay (s)			Average Speed (mph)			Latent Delay (hrs)	Latent Demand
No.	Traffic	Buses	Cyclists	Traffic	Buses	Cyclists	All Vehs	All Vehs
1	181	241	304	8	6	6	0	30
3a	220	276	317	7	6	6	1	61
4a	412	564	421	4	3	4	6	387
5a	257	331	370	6	5	5	2	135
6a	417	562	422	4	3	4	6	381

NETWORK PERFORMANCE - comparison vs. SC1								
AM Peak (0745-0845)								
Scenario	Average Delay (s)			Average Speed (mph)			Latent Delay (hrs)	Latent Demand
No.	Traffic	Buses	Cyclists	Traffic	Buses	Cyclists	All Vehs	All Vehs
3a	39	35	13	-1	0	0	1	32
4a	232	323	117	-4	-3	-1	6	358
5a	76	90	66	-2	-1	-1	1	106
6a	237	321	118	-4	-3	-1	5	352

**Some values different due to rounding in Excel*

In the AM peak, it can be seen that in terms of average delay, SC4a and 6a have the biggest impact compared to SC1. SC3a has minimal impact and SC5a is the better performing of the three mitigation scenarios (SC4a, SC5a and SC6a). General traffic and buses are most affected, which may be due to the changes made in introducing signals at Blythe Road and a combination of Blythe Road and D-Gate signals.

This trend is repeated for the average speed comparisons, where the network speeds are lower for SC4a and 6a. This is particularly of note for general traffic, which are affected by additional signals holding them within the network.

In terms of latent demand and associated latent delay, all of the scenarios show an increase over SC1. SC3a performs the best, whilst SC4a and SC6a show the greatest impact. As with the other results, SC5a (D-Gate signals only) is the better performing of the three mitigation options and has just over 100 unreleased vehicles within the network during the peak period (compared to over 350 unreleased vehicles in SC4a and SC6a).

Table 9 – Network Performance Comparisons – PM Peak

NETWORK PERFORMANCE								
PM Peak (1745-1845)								
Scenario	Average Delay (s)			Average Speed (mph)			Latent Delay (hrs)	Latent Demand
No.	Traffic	Buses	Cyclists	Traffic	Buses	Cyclists	All Vehs	All Vehs
1	116	211	160	10	7	9	0	0
3a	167	285	220	8	6	7	0	44
4a	347	596	569	4	3	3	12	667
5a	163	271	204	8	6	7	0	43
6a	348	607	573	4	3	3	12	671

NETWORK PERFORMANCE - comparison vs. SC1								
PM Peak (1745-1845)								
Scenario	Average Delay (s)			Average Speed (mph)			Latent Delay (hrs)	Latent Demand
No.	Traffic	Buses	Cyclists	Traffic	Buses	Cyclists	All Vehs	All Vehs
3a	51	74	60	-2	-1	-2	0	44
4a	230	385	409	-6	-4	-6	12	667
5a	47	60	44	-2	-1	-1	0	43
6a	231	396	414	-6	-4	-6	12	671

**Some values different due to rounding in Excel*

In the PM peak, the increases in average delays for all scenarios are generally higher than in the AM peak. Comparing the scenarios to SC1, SC3a and SC5a have the least impact and as a result, SC5a gives the more favourable results out of the mitigation scenarios. Scenarios 4a and 6a has the greatest impact, with both adding over 6 minutes of delay to Buses and Cyclists within the peak hour.

For the comparison of average speeds, SC3a and SC5a and SC4a and SC6a have the same differences. SC3a and SC5a provide the least impact, with SC4a and SC6a the most.

In terms of latent demand and associated latent delay, SC3a and SC5a do not show a significant increase in comparison to SC1. Conversely, SC4a and SC6a have a much bigger impact, with over 660 unreleased vehicles during the peak period.

5. SUMMARY & CONCLUSIONS

This technical note (TN) details the VISSIM modelling undertaken for Momentum Transport Consultancy for the proposed Olympia Exhibition Centre development in Hammersmith, London.

The VISSIM modelling has been based on Transport for London's (TfL's) model of Hammersmith, which has been used to test the Cycle Superhighways proposals (CS9) in the area.

This TN builds upon TN3, which detailed revised testing following changes to the flow assumptions and scenarios modelled. Since that submission, TfL have provided audit comments on the modelling and this note addresses the model changes and the updated results. The main difference with this assessment is that modelling **does not include** the proposed CS9 improvements.

The modelling scenarios tested and analysed in this TN were as follows:

- Scenario 1 – Future Baseline
- Scenario 3a – Future Baseline + Proposed Olympia Development
- Scenario 4a – Future Baseline + Proposed Olympia Development + Proposed Blythe Road Signalisation
- Scenario 5a – Future Baseline + Proposed Olympia Development + Proposed D-Gate Signalisation
- Scenario 6a – Future Baseline + Proposed Olympia Development + Proposed Blythe Road Signalisation + Proposed D-Gate Signalisation

To compare the effects in the network of the various scenarios, the following outputs have been obtained as agreed with TfL:

- Journey Times (for General Traffic, Buses, Cyclists)
- Queue Lengths (Average Queues at each junction in the network)
- Saturation Flows (for each approach at each signalised junction in the network)
- Overall Network Performance

From the results collected, in terms of traffic related performance and impact, there was no scenario which clearly and conclusively showed comparability with SC1 across all of the results collected.

From a network performance and journey time perspective, SC3a and SC5a appear to perform better than SC4a and SC6a, but these still result in a worsened level of performance against SC1 (particularly in the AM peak). For queue lengths and saturation flows, the results are much more varied. The different scenarios have advantages and disadvantages over SC1 and each other, depending on the junction and approach considered. This makes it difficult to draw suitable conclusions as to which scenario gives the better performance overall.

Further consideration should be given to the pros and cons of the proposals against other external factors (such as safety of all road users), to identify the preferred scenario against a wider range of criteria.

Appendix A – TfL Audit Comments & Responses

From: [Farrow Claire \(ST\)](#)

To: [REDACTED]

Cc: [Burman Thomas](#); [Greenland Adam](#); [Bottoms Joseph](#); [Miklasz Michal](#); [REDACTED]; [REDACTED]

Subject: RE: Olympia models - comments

Date: 28 November 2018 16:18:05

Attachments: [image001.png](#)
[image008.png](#)

Hi [REDACTED]

Please see below for my comments in red (both with and without CS9 – please scroll all the way to the end).

Any questions please let me know.

Kind regards,

Claire Farrow

Principal Network Manager – West (A4)

Network Performance – Delivery

My usual hours are 07:30-16:45 Monday & Tuesday, 08:30-16:15 Wednesday

 **TRANSPORT FOR LONDON**

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[REDACTED] | E: [claire.farrow](mailto:claire.farrow@tfl.gov.uk) [REDACTED]

From: [REDACTED] [mailto:[REDACTED]@multimodaluk.com]

Sent: 01 November 2018 10:29

To: Farrow Claire (ST)

Cc: Burman Thomas; Greenland Adam; Bottoms Joseph; Miklasz Michal; [REDACTED]; [REDACTED]

Subject: RE: Olympia models - comments

Hi Claire,

Please see response below on the latest modelling comments.

D-Gate Flows

Response previously provided in email to Claire Farrow on 05/10/18 at 12:33 – flows based on numbers provided by Momentum. **Is it possible momentum are incorrect? It seems unlikely there would be 0 flow out of D-gate so this can be raised with Momentum.**

Cyclist Numbers on North End Road

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Scenario 3a & 4a – Leaving D-Gate

This comment is acknowledged and the priority rules will be reviewed to create more opportunities for right turning traffic to leave D-Gate when Hammersmith Road is queuing westbound. **Ok.**

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In scenarios where D-Gate is signalised, the staging chosen has been deemed the most efficient way of operating the junction to reduce delays. However, if TfL have suggestions to improve the operation through a reconfigured signal set-up, then comments/information on this is welcome. **We will look into this further to see if we can identify any improvements.**

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Large Input Flows

It is not clear which flows TfL are referring to for this comment. The only changes made to the inputs for this piece of work have been the inclusion of 'OlymDev' flows for the associated scenarios (SC3a, 4a, 5a, 6a). All other flows have been kept consistent with TfL's approved 'Future Base AM/PM' models (SC16 & 17).

Generally traffic flows in the warm-down period (final 1800 seconds of the model I assume) are lower than usual counts – in order for the model to clear out, however, in this case this doesn't appear to be happening.

-

If these flows are to change, then we would need to include our Client, Momentum, in these discussions as these changes are considered 'out of scope'. It was always our intention to keep all previous vehicle inputs consistent with the approved TfL models.

Hope this all helps and makes sense. However, if anything is unclear, please get in touch.

Kind regards,

■

■ | Transport Modelling | Associate



Telephone: ■

Mobile: ■

Email: ■ multimodaluk.com

From: Farrow Claire (ST)

Sent: 31 October 2018 16:17

To: ■

Cc: Burman Thomas ; Greenland Adam ; Bottoms Joseph ; Miklasz Michal

Subject: RE: Olympia models - comments

Hi ■

Please see below for comments on Olympia models – without CS9 scenarios. There is a slight delay on

comments for scenario 6a but these will be with you by the end of next week. I thought I would send you these in the meantime. Quite a few of the comments are similar to those we had for the with CS9 scenarios and I know you have already provided a response to those. We will start going through those now while we await your response to the below comments. We will get back to you on all your responses for all scenarios once we have received them.

-

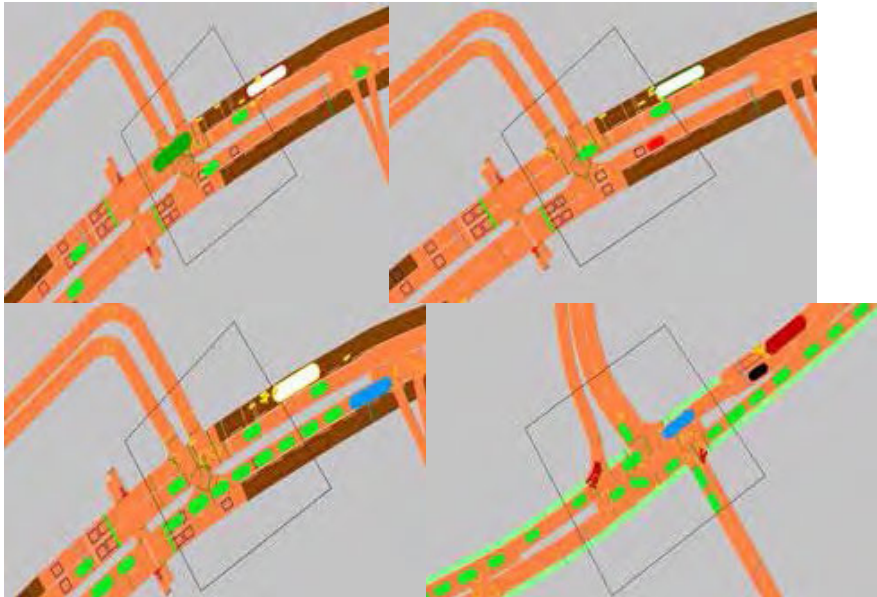
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- D-gate lack of flows?
- Cyclist numbers on North End Road query?

-

Scenario 3a & 4a:

AM – cyclists stuck behind buses at bus stop on eastbound exit of both D-gate and Blythe Road junctions – some turn left around the bus, some turn right. Behaviour seems a bit erratic/unrealistic?



PM – took a very long time for vehicles leaving D-gate to get out



Scenario 5a:

D-gate:

3 stages, less efficient than stand-alone crossing with give-way junction

- Main road
- Peds
- Side Road

The following Priority Rules do not affect any vehicle types as follows

- 1304
- 1305
- 1306
- 1307

Fairly large input flows during last 1800 seconds of model run during warm-down period, seems a bit strange.

Thanks.

Kind regards,

Claire Farrow

Principal Network Manager – West (A4)

Network Performance – Delivery

My usual hours are 07:30-16:45 Monday & Tuesday, 08:30-16:15 Wednesday

 **TRANSPORT FOR LONDON**

Surface Transport | Network Management Directorate

Palestra House | 3rd floor – Zone 3B3 | 197 Blackfriars Road | London SE1 8NJ

 | E: claire.farrow@transportforlondon.gov.uk 

From:  [<mailto:multimodaluk.com>]

Sent: 18 October 2018 11:04

To: Farrow Claire (ST)

Subject: RE: Olympia models - comments

Hi Claire,

Thanks for the email and the update, much appreciated.

Kind regards,



 | Transport Modelling | Associate



Telephone: 





Mobile: 

Email:  multimodaluk.com

From: Farrow Claire (ST) <Claire.Farrow@transportforlondon.gov.uk>

Sent: 17 October 2018 16:43

To:  < multimodaluk.com>

Cc: Miklasz Michal <MichalMiklasz@transportforlondon.gov.uk>; Burman Thomas <>; Greenland Adam <AdamGreenland@transportforlondon.gov.uk>; Bottoms Joseph <JosephBottoms@transportforlondon.gov.uk>;  < [@multimodaluk.com](mailto:multimodaluk.com)>;  @momentum-transport.com>

Subject: RE: Olympia models - comments

Hi [REDACTED]

Apologies for the delay in replying.

Yes we will get you our comments in the next 2 weeks on the 'without' CS9 scenarios and also address the comments on 'with' CS9 scenarios below.

Progressing with any revised modelling once you have received all comments for all scenarios is fine.

Thanks.

Kind regards,

Claire Farrow

Principal Network Manager – West (A4)

Network Performance – Delivery

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Surface Transport | Network Management Directorate

Palestra House | 3rd floor – Zone 3B3 | 197 Blackfriars Road | London SE1 8NJ

[REDACTED] | E: [claire.farrow](mailto:claire.farrow@tfl.gov.uk) [REDACTED]

From: [REDACTED] [[mailto:\[REDACTED\]@multimodaluk.com](mailto:[REDACTED]@multimodaluk.com)]

Sent: 11 October 2018 13:56

To: Farrow Claire (ST)

Cc: Miklasz Michal; Burman Thomas; Greenland Adam; Bottoms Joseph [REDACTED]; [REDACTED]

Subject: RE: Olympia models - comments

Hi Claire,

Further to my email below, I just wanted to check if we are due to be receiving further model audit comments for the Olympia modelling?

I only ask as the response below acknowledges the need for revised testing, but wanted to ensure you were not awaiting this updated modelling before providing any further audit comments? Our assumption was that we would receive all audit comments for the 'With' and 'Without' CS9 testing before progressing with the revised modelling.

Hope that makes sense and thanks in advance.

Kind regards,

[REDACTED]

[REDACTED] | Transport Modelling | Associate



Telephone: [REDACTED]

Mobile: [REDACTED]

Email: [REDACTED] [\[REDACTED\]@multimodaluk.com](mailto:[REDACTED]@multimodaluk.com)

From: [REDACTED]

Sent: 05 October 2018 12:33

To: 'Farrow Claire (ST)' <Claire.Farrow@multimodaluk.com>

Cc: Miklasz Michal <MichalMiklasz@multimodaluk.com> Burman Thomas <ThomasBurman@momentum-transport.com>; Greenland Adam <AdamGreenland@multimodaluk.com>; Bottoms Joseph <[REDACTED]>; [REDACTED] <[REDACTED]@multimodaluk.com>; [REDACTED] <[REDACTED]@momentum-transport.com>

Subject: RE: Olympia models - comments

Hi Claire,

Thanks for your email.

I have provided some responses below on your comments.

Westbound approach at D-gate junction

A separate document has been attached showing the differences in the network layout between the scenarios in the location. It can be seen from the proposals for Scenarios 3a and 4a that a two-lane approach would not be representative of what is proposed. **Ok.**

D-Gate Flows

These values are correct and based on proposed development flows provided by Momentum. Appendix A of Multimodal's TN titled '*180802 03541 MM TN2 -C- Revised Olympia Proposal Testing*' provides the flow diagram. **Is it possible momentum are incorrect? It seems unlikely there would be 0 flow out of D-gate so this can be raised with Momentum.**

D-Gate Split Phasing

Split phasing of Phases A and B was a follow on from initial mitigation testing that had a separate right turn stage into D-Gate. However, revisions to the mitigation meant that this separate stage was no longer required, but the separate phases remained.

-
The comment on the PUA file is acknowledged and Phase A should start at 16s instead of 12s. However, this is unlikely to change the modelled results given the low flows into D-Gate and vehicles driving towards a priority rule to give-way to on-coming traffic.

The split phasing at Blythe Road for Phases C and D is also carried through from initial mitigation testing and has no impact on the revised mitigation results.

Ok.

Cyclist Behaviour

From a review of the link structure, the cycle links are the same width through D-Gate (when signalised). For the scenarios where D-Gate is priority controlled, the cycle link structure and behaviours have been kept consistent with TfL's 'Proposed AM/PM V2' models. **I think the behaviour was not so much the concern here but rather the width of the cycle track being inconsistent causing some issues as cyclists merge.**

Further advice is sought from TfL on this comment if changes are required above the approved 'Proposed AM/PM V2' models. We would also need to include our Client, Momentum, in these discussions as these changes are considered 'out of scope'. It was always our intention to keep the cyclist behaviour and set-up consistent with the approved TfL models.

Cyclist Numbers

Scenarios 3a and 5a have the correct cyclist flows. For Scenarios 4a and 6a, as a result of the closure of

Munden Street to 'Entry Only' traffic, the vehicles which previously entered the network from this approach were reassigned to North End Road. However, a review of the calculation of these inputs has revealed an error in the number of cyclists calculated and the models will need to be re-run for Scenarios 4a and 6a. **Ok.**

Northbound Link on Munden Road

In scenarios 4a and 6a, this approach is 'Entry Only' in line with Momentum's mitigation proposals. This was confirmed by Momentum, but unfortunately not updated on the drawing at the time of issuing the VISSIM models. Scenario 5a should have Munden Street attached to the network in the models that were submitted. **Ok – will this be updated?**

Priority Rules

This warning appears due to the way in which the different scenarios read the modifications in VISSIM's Scenario Manager. Rather than take out the priority rules, to then add them back in later on, these have simply been made to apply to no vehicle types. This was for Scenarios 5a and 6a, where the exit to D-Gate was replaced from a priority controlled exit to a signalised exit (which no longer needed the priority rules). **Ok.**

Hope this all helps and make senses. However, if anything is unclear, please get in touch.

Kind regards,

■

■ | Transport Modelling | Associate



Telephone: ■

Mobile: ■

Email: ■ multimodaluk.com

From: Farrow Claire (ST) <Claire.Farrow ■>

Sent: 03 October 2018 16:04

To: ■ <■ multimodaluk.com>

Cc: Miklasz Michal <MichalMiklasz ■>; Burman Thomas <ThomasBurman ■>; Greenland Adam <AdamGreenland ■>; Bottoms Joseph <JosephBottoms ■>

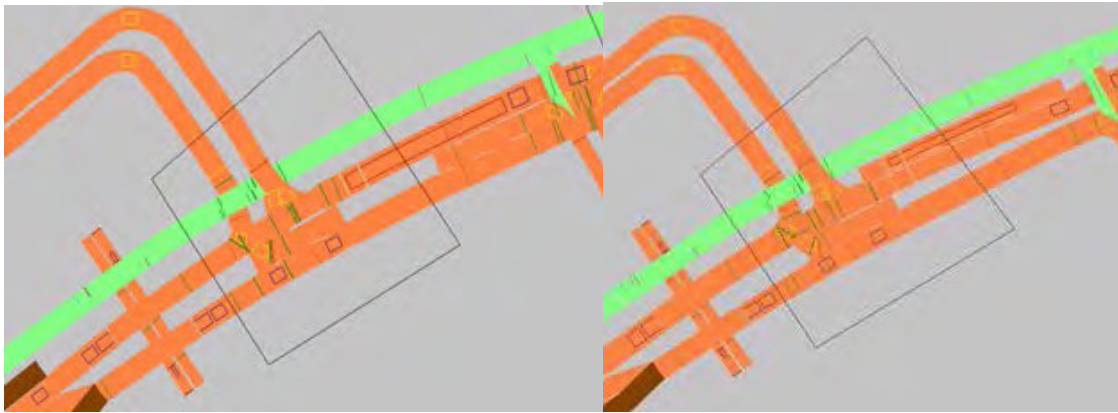
Subject: Olympia models - comments

Hi ■

Please see below for comments on Olympia models – with CS9 scenarios.

- Westbound approach at D-gate junction: On signalised scenarios 5a and 6a westbound has a 2 lane approach from Earsby Road as per design. In 3a however it goes from 2 lanes to 1 lane and back to 2. In 4a it is 1 lane until close to the stopline when it becomes 2 lanes. All the designs suggest this westbound section should be 2 lanes from Earsby Road up to the stopline. According to the drawing lane 1 should be ahead and right turn but appears to be only right turn in the model.

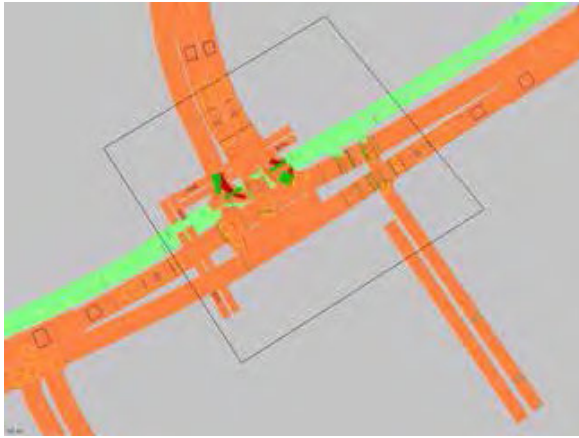
3a: 4a:



- D-gate: No flow in the AM models for D-gate input, and only 6pcu in the PM – is this correct?
- Is split phasing of movements necessary for phases A & B at the D-gate? This seems to imply that right turners would get a full green when opposed by ahead traffic (phase C) and therefore creating a conflict. They should presumably run together as one phase with right turners gap accepting until westbound traffic is stopped. An error in PUA file – westbound RT lane signalled in different phase and receives green before both ahead movements.
 - \$INTERSTAGE
 - INTERSTAGE_number : 10
 - Length [s] : 16
 - From stage : 4
 - To stage : 1
 - \$
 - F -127 0
 - G -127 0
 - A 12 127
 - B 16 127
 - C 16 127

A similar situation also exists with phases C & D on Blythe Rd (without the obvious opposing phase).

- Behaviour of cyclists at D-gate junction very slow on exit of junction. It could be that the width of the cycle track is inconsistent, this can cause stuttering behaviour as the cyclists “merge” – this should be dealt with by changing the cycle track width gradually with multiple links, rather than over a connector between a wide link and a narrow link
- Cyclist numbers significantly vary between scenarios at North End Road approach: Scenarios 4a and 6a have in the region of ~200 every 15 minutes, while scenarios 3a and 5a have ~30 every 15 minutes. This needs to be checked – which flow input is correct? This high cyclist numbers in 6a cause further problems due to D-gate being signalised in this option - cyclists are queuing back from the D-Gate junction and eventually blocking the North End Rd junction. This essentially causes the whole model to work incorrectly, making it hard to see any other potential problems. This does not happen in 5a the other scenario with D-gate signalised as the cycle flows are so much lower. We need to identify which cycle flow is correct. Queuing of cyclists also seems unrealistic. The long queues are a results of the limitations of VISSIM modelling, but I believe that if queues reached the length they are in the AM model on the westbound approach to both Blythe Rd and D-Gate, what you would actually see is more bunching & cyclists getting off the cycle superhighway and using the main road.
- Northbound link on Munden Road (opposite Blythe Road): In scenarios 4a, 5a, and 6a this link is not attached to the network (no connector), according to the drawing this should have a stopline set back followed by a give way to get onto Hammersmith Road. Only in 3a has this link been connected to network but presumably it should be in all scenarios.



- Priority rules – these rules were highlighted by VISSIM because they do not affect any vehicle types:
 - Rule 152
 - Rule 153
 - Rule 155
 - Rule 156

If you have any questions please let me know.

Kind regards,

Claire Farrow

Principal Network Manager – West (A4)

Network Performance – Delivery

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██████████ | E: claire.farrow@tfl.gov.uk ██████████

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Click [here](#) to report this email as SPAM.

From: [REDACTED]
To: "Farrow Claire (ST)"
Cc: Burman Thomas; Greenland Adam; Bottoms Joseph; Miklasz Michal; [REDACTED]; [REDACTED]
Subject: RE: Olympia models - comments
Date: 01 November 2018 10:28:00
Attachments: [image001.png](#)
[image008.png](#)

Hi Claire,

Please see response below on the latest modelling comments.

D-Gate Flows

Response previously provided in email to Claire Farrow on 05/10/18 at 12:33 – flows based on numbers provided by Momentum.

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Kind regards,

■

■ | Transport Modelling | Associate

MULTIMODAL
MODELLING | ANALYSIS | PRESENTATION

Telephone: ■

Mobile: ■

Email: ■ multimodaluk.com

From: Farrow Claire (ST) <Claire.Farrow ■>

Sent: 31 October 2018 16:17

To: ■ <■@multimodaluk.com>

Cc: Burman Thomas <ThomasBurman ■> Greenland Adam <AdamGreenland ■>

Bottoms Joseph <JosephBottoms ■> Miklasz Michal <MichalMiklasz ■>

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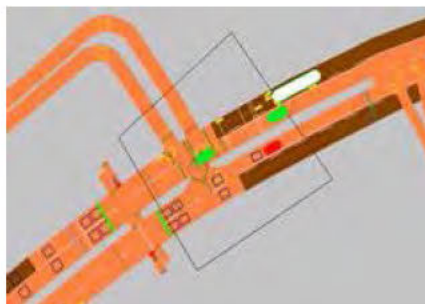
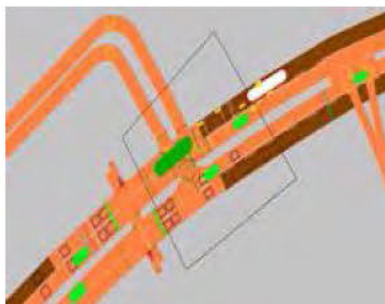
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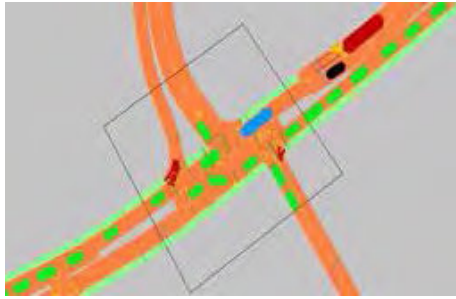
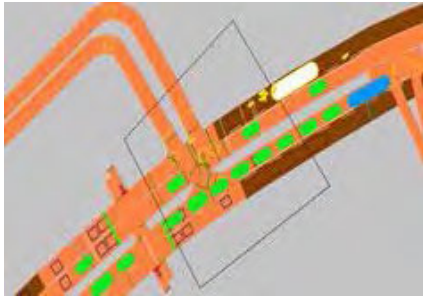
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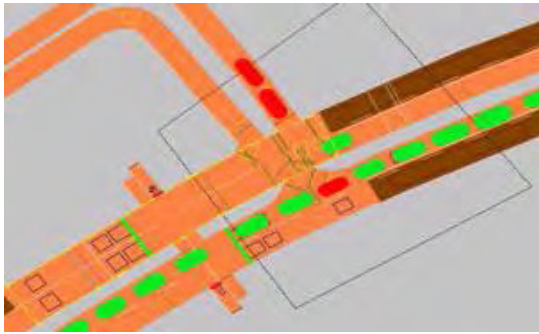
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Surface Transport | Network Management Directorate

Palestra House | 3rd floor – Zone 3B3 | 197 Blackfriars Road | London SE1 8NJ

██████████ | E: claire.farrow@tfl.gov.uk ██████████

From: ██████████ [<mailto:██████████@multimodaluk.com>]

Sent: 18 October 2018 11:04
To: Farrow Claire (ST)
Subject: RE: Olympia models - comments

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■

■ | Transport Modelling | Associate



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Mobile: ■
Email: ■ multimodaluk.com

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Sent: 17 October 2018 16:43
To: ■ <■ multimodaluk.com>
Cc: Miklasz Michal <MichalMiklasz ■>; Burman Thomas <ThomasBurman ■>; Greenland Adam <AdamGreenland ■>; Bottoms Joseph <JosephBottoms ■>; ■
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■ ■ ■ | E: claire.farrow ■

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Cc: Miklasz Michal; Burman Thomas; Greenland Adam; Bottoms Joseph; ■; ■ ■
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[REDACTED]

[REDACTED] | Transport Modelling | Associate



Telephone: [REDACTED]
Mobile: [REDACTED]
Email: [REDACTED] [\[REDACTED\]@multimodaluk.com](mailto:[REDACTED]@multimodaluk.com)

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Sent: 05 October 2018 12:33
To: 'Farrow Claire (ST)' <Claire.Farrow@multimodaluk.com>
Cc: Miklasz Michal <MichalMiklasz@multimodaluk.com>; Burman Thomas <ThomasBurman@momentum-transport.com>; Greenland Adam <AdamGreenland@multimodaluk.com>; Bottoms Joseph <JosephBottoms@momentum-transport.com>; [REDACTED]
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-

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Telephone: ■
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Email: ■ multimodaluk.com

From: Farrow Claire (ST) <Claire.Farrow@multimodaluk.com>

Sent: 03 October 2018 16:04

To: ■ <multimodaluk.com>

Cc: Miklasz Michal <MichalMiklasz@multimodaluk.com>; Burman Thomas <ThomasBurman@multimodaluk.com>; Greenland Adam <AdamGreenland@multimodaluk.com>; Bottoms Joseph <JosephBottoms@multimodaluk.com>

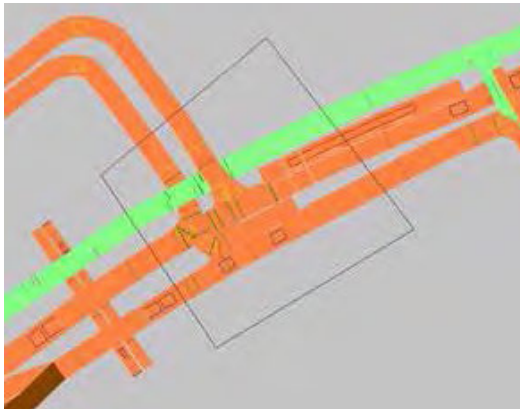
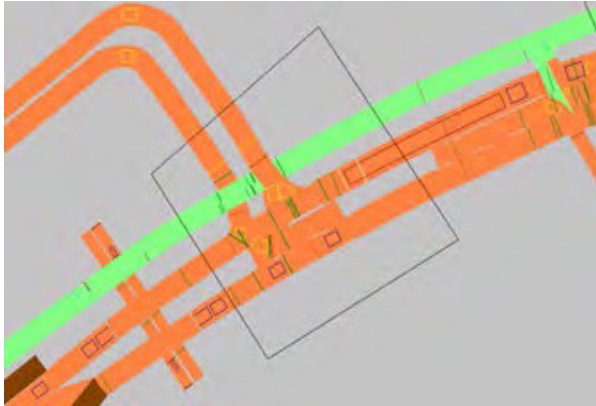
Subject: Olympia models - comments

Hi [REDACTED]

Please see below for comments on Olympia models – with CS9 scenarios.

- Westbound approach at D-gate junction: On signalised scenarios 5a and 6a westbound has a 2 lane approach from Earsby Road as per design. In 3a however it goes from 2 lanes to 1 lane and back to 2. In 4a it is 1 lane until close to the stopline when it becomes 2 lanes. All the designs suggest this westbound section should be 2 lanes from Earsby Road up to the stopline. According to the drawing lane 1 should be ahead and right turn but appears to be only right turn in the model.

3a:



4a:

- D-gate: No flow in the AM models for D-gate input, and only 6pcu in the PM – is this correct?
- Is split phasing of movements necessary for phases A & B at the D-gate? This seems to imply that right turners would get a full green when opposed by ahead traffic (phase C) and therefore creating a conflict. They should presumably run together as one phase with right turners gap accepting until westbound traffic is stopped. An error in PUA file – westbound RT lane signalled in different phase and receives green before both ahead movements.

```
■ $INTERSTAGE
■ INTERSTAGE_number : 10
■ Length [s] : 16
■ From stage : 4
■ To stage : 1
■ $
■ F -127 0
■ G -127 0
■ A 12 127
■ B 16 127
```


A similar situation also exists with phases C & D on Blythe Rd (without the obvious opposing phase).

- Behaviour of cyclists at D-gate junction very slow on exit of junction. It could be that the width of the cycle track is inconsistent, this can cause stuttering behaviour as the cyclists “merge” – this should be dealt with by changing the cycle track width gradually with multiple links, rather than over a connector between a wide link and a narrow link
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- Northbound link on Munden Road (opposite Blythe Road): In scenarios 4a, 5a, and 6a this link is not attached to the network (no connector), according to the drawing this should have a stopline set back followed by a give way to get onto Hammersmith Road. Only in 3a has this link been connected to network but presumably it should be in all scenarios.



- Priority rules – these rules were highlighted by VISSIM because they do not affect any vehicle types:
 - Rule 152
 - Rule 153
 - Rule 155
 - Rule 156

If you have any questions please let me know.

Kind regards,

Claire Farrow

Principal Network Manager – West (A4)

Network Performance – Delivery

My usual hours are 07:30-16:45 Monday & Tuesday, 08:30-16:15 Wednesday

TRANSPORT FOR LONDON

Surface Transport | Network Management Directorate

Palestra House | 3rd floor – Zone 3B3 | 197 Blackfriars Road | London SE1 8NJ

██████████ | E: [claire.farrow](mailto:claire.farrow@tfl.gov.uk) ██████████

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From: [Farrow Claire \(ST\)](#)
To: [REDACTED]
Cc: [Burman Thomas](#); [Greenland Adam](#); [Bottoms Joseph](#); [Miklasz Michal](#)
Subject: RE: Olympia models - comments
Date: 31 October 2018 16:17:17
Attachments: [image016.png](#)
[image018.png](#)

Hi [REDACTED]

Please see below for comments on Olympia models – without CS9 scenarios. There is a slight delay on comments for scenario 6a but these will be with you by the end of next week. I thought I would send you these in the meantime. Quite a few of the comments are similar to those we had for the with CS9 scenarios and I know you have already provided a response to those. We will start going through those now while we await your response to the below comments. We will get back to you on all your responses for all scenarios once we have received them.

-

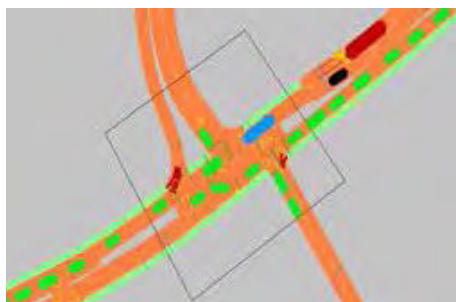
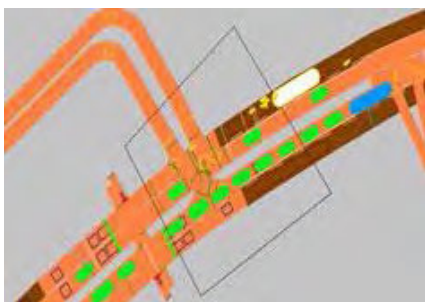
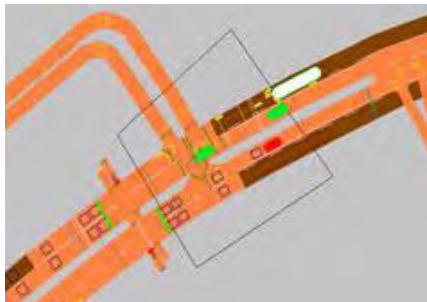
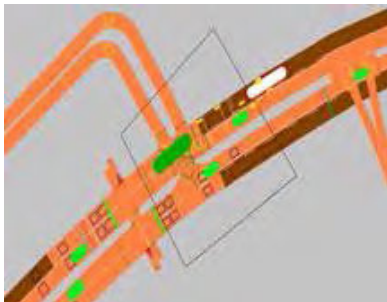
As in the with CS9 scenario:

- D-gate lack of flows?
- Cyclist numbers on North End Road query?

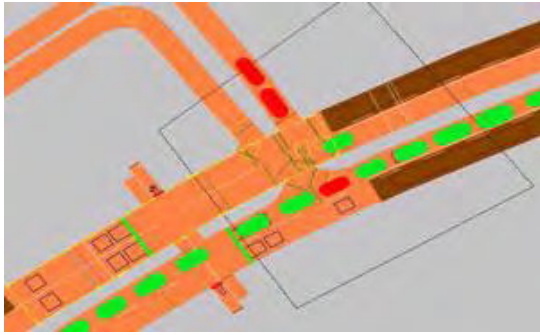
-

Scenario 3a & 4a:

AM – cyclists stuck behind buses at bus stop on eastbound exit of both D-gate and Blythe Road junctions – some turn left around the bus, some turn right. Behaviour seems a bit erratic/unrealistic?



PM – took a very long time for vehicles leaving D-gate to get out



Scenario 5a:

D-gate:

3 stages, less efficient than stand-alone crossing with give-way junction

- Main road
- Peds
- Side Road

The following Priority Rules do not affect any vehicle types as follows

- 1304
- 1305
- 1306
- 1307

Fairly large input flows during last 1800 seconds of model run during warm-down period, seems a bit strange.

Thanks.

Kind regards,

Claire Farrow

Principal Network Manager – West (A4)

Network Performance – Delivery

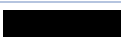
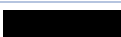
My usual hours are 07:30-16:45 Monday & Tuesday, 08:30-16:15 Wednesday

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Surface Transport | Network Management Directorate

Palestra House | 3rd floor – Zone 3B3 | 197 Blackfriars Road | London SE1 8NJ

 | E: [claire.farrow](mailto:claire.farrow@tfl.gov.uk) 

From:  [mailto:@multimodaluk.com]

Sent: 18 October 2018 11:04

To: Farrow Claire (ST)

Subject: RE: Olympia models - comments

Hi Claire,

Thanks for the email and the update, much appreciated.

Kind regards,



[REDACTED] | Transport Modelling | Associate



Telephone: [REDACTED]
Mobile: [REDACTED]
Email: [REDACTED] [multimodaluk.com](mailto:[REDACTED]@multimodaluk.com)

From: Farrow Claire (ST) <Claire.Farrow@[REDACTED]>
Sent: 17 October 2018 16:43
To: [REDACTED] <[REDACTED]@multimodaluk.com>
Cc: Miklasz Michal <MichalMiklasz@[REDACTED]>; Burman Thomas <ThomasBurman@[REDACTED]>; Greenland Adam <AdamGreenland@[REDACTED]>; Bottoms Joseph <JosephBottoms@[REDACTED]>; [REDACTED]@multimodaluk.com>; [REDACTED]@momentum-transport.com>
Subject: RE: Olympia models - comments

Hi [REDACTED]

Apologies for the delay in replying.

Yes we will get you our comments in the next 2 weeks on the 'without' CS9 scenarios and also address the comments on 'with' CS9 scenarios below.

Progressing with any revised modelling once you have received all comments for all scenarios is fine.

Thanks.

Kind regards,

Claire Farrow

Principal Network Manager – West (A4)

Network Performance – Delivery

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[REDACTED] [\[REDACTED\]@multimodaluk.com](mailto:[REDACTED]@multimodaluk.com)

From: [REDACTED] [\[mailto:\[REDACTED\]@multimodaluk.com\]](mailto:[REDACTED]@multimodaluk.com)
Sent: 11 October 2018 13:56
To: Farrow Claire (ST)
Cc: Miklasz Michal; Burman Thomas; Greenland Adam; Bottoms Joseph; [REDACTED]; [REDACTED]
Subject: RE: Olympia models - comments

Hi Claire,

Further to my email below, I just wanted to check if we are due to be receiving further model audit comments for the Olympia modelling?

I only ask as the response below acknowledges the need for revised testing, but wanted to ensure you were not awaiting this updated modelling before providing any further audit comments? Our assumption was that we would receive all audit comments for the 'With' and 'Without' CS9 testing before progressing with the revised modelling.

Hope that makes sense and thanks in advance.

Kind regards,

■

■ | Transport Modelling | Associate



Telephone: ■
Mobile: ■
Email: ■ multimodaluk.com

From: ■
Sent: 05 October 2018 12:33
To: 'Farrow Claire (ST)' <Claire.Farrow@multimodaluk.com>
Cc: Miklasz Michal <MichalMiklasz@multimodaluk.com>; Burman Thomas <ThomasBurman@momentum-transport.com>; Greenland Adam <AdamGreenland@multimodaluk.com>; Bottoms Joseph <■>; ■ <■@multimodaluk.com>; ■ <■@momentum-transport.com>
Subject: RE: Olympia models - comments

Hi Claire,

Thanks for your email.

I have provided some responses below on your comments.

[Westbound approach at D-gate junction](#)

A separate document has been attached showing the differences in the network layout between the scenarios in the location. It can be seen from the proposals for Scenarios 3a and 4a that a two-lane approach would not be representative of what is proposed.

[D-Gate Flows](#)

These values are correct and based on proposed development flows provided by Momentum. Appendix A of Multimodal's TN titled '*180802 03541 MM TN2 -C- Revised Olympia Proposal Testing*' provides the flow diagram.

[D-Gate Split Phasing](#)

Split phasing of Phases A and B was a follow on from initial mitigation testing that had a separate right turn stage into D-Gate. However, revisions to the mitigation meant that this separate stage was no longer required, but the separate phases remained.

-

The comment on the PUA file is acknowledged and Phase A should start at 16s instead of 12s. However, this is unlikely to change the modelled results given the low flows into D-Gate and vehicles driving towards a priority rule to give-way to on-coming traffic.

The split phasing at Blythe Road for Phases C and D is also carried through from initial mitigation testing and has no impact on the revised mitigation results.

[Cyclist Behaviour](#)

From a review of the link structure, the cycle links are the same width through D-Gate (when signalised). For the scenarios where D-Gate is priority controlled, the cycle link structure and behaviours have been kept

consistent with TfL's 'Proposed AM/PM V2' models.

Further advice is sought from TfL on this comment if changes are required above the approved 'Proposed AM/PM V2' models. We would also need to include our Client, Momentum, in these discussions as these changes are considered 'out of scope'. It was always our intention to keep the cyclist behaviour and set-up consistent with the approved TfL models.

Cyclist Numbers

Scenarios 3a and 5a have the correct cyclist flows. For Scenarios 4a and 6a, as a result of the closure of Munden Street to 'Entry Only' traffic, the vehicles which previously entered the network from this approach were reassigned to North End Road. However, a review of the calculation of these inputs has revealed an error in the number of cyclists calculated and the models will need to be re-run for Scenarios 4a and 6a.

Northbound Link on Munden Road

In scenarios 4a and 6a, this approach is 'Entry Only' in line with Momentum's mitigation proposals. This was confirmed by Momentum, but unfortunately not updated on the drawing at the time of issuing the VISSIM models. Scenario 5a should have Munden Street attached to the network in the models that were submitted.

Priority Rules

This warning appears due to the way in which the different scenarios read the modifications in VISSIM's Scenario Manager. Rather than take out the priority rules, to then add them back in later on, these have simply been made to apply to no vehicle types. This was for Scenarios 5a and 6a, where the exit to D-Gate was replaced from a priority controlled exit to a signalised exit (which no longer needed the priority rules).

Hope this all helps and make senses. However, if anything is unclear, please get in touch.

Kind regards,

■

■ | Transport Modelling | Associate



Telephone: ■
Mobile: ■
Email: ■ multimodaluk.com

From: Farrow Claire (ST) <Claire.Farrow ■>
Sent: 03 October 2018 16:04
To: ■ <■ multimodaluk.com>
Cc: Miklasz Michal <MichalMiklasz ■>; Burman Thomas <ThomasBurman ■>; Greenland Adam <AdamGreenland ■>; Bottoms Joseph <JosephBottoms ■>
Subject: Olympia models - comments

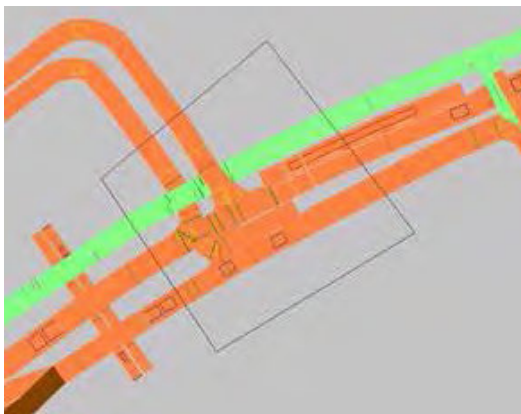
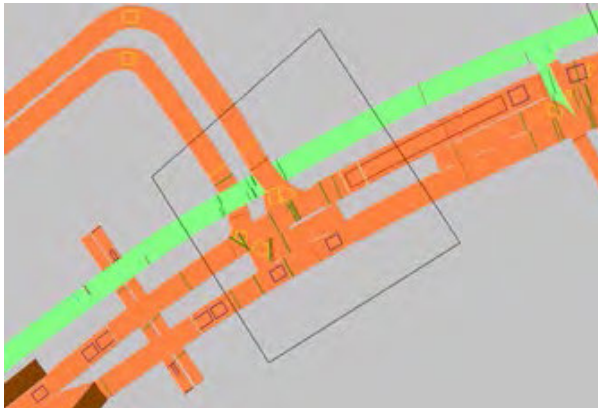
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■ $INTERSTAGE
■ INTERSTAGE_number    : 10
■ Length [s]           : 16
■ From stage            : 4
■ To stage              : 1
■ $
■ F    -127    0
■ G    -127    0
■ A     12    127
■ B     16    127
■ C     16    127

```

A similar situation also exists with phases C & D on Blythe Rd (without the obvious opposing phase).

- Behaviour of cyclists at D-gate junction very slow on exit of junction. It could be that the width of the cycle track is inconsistent, this can cause stuttering behaviour as the cyclists “merge” – this should be dealt with by changing the cycle track width gradually with multiple links, rather than over a connector between a wide link and a narrow link
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 - Rule 156

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Kind regards,

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Tel: +44 (0)20 7534 7534 | E: claire.farrow@tfl.gov.uk

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Appendix B – Munden Street to North End Road Input Calculations

NO CS9 - VEH INPUTS - AM

Future Base AM

No.	Name	Link	0	900	1800	2700	3600	4500	5400	6300	Veh Composition
1	Kensington High St East - Cars	103	594	630	839	532	464	488	559	625	11 Cars - 30mph
2	Kensington High St East - HGVs	103	116	60	121	58	33	135	174	613	21 HGV - 30mph
3	Kensington High St East - Cyclists	103	16	27	64	43	59	112	107	155	50 Cyclists
4	Kensington High St East - LGVs	103	0	0	0	0	0	0	0	0	60 LGV
5	Kensington High St East - Coaches	103	0	0	0	0	0	0	0	0	70 Coach
6	Kensington High St East - Taxis	103	4	22	34	16	14	41	16	40	80 Taxi
7	Kensington High St East - Motorbikes	103	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
8	Warwick Road - Cars	104	978	857	945	841	882	1158	816	1040	11 Cars - 30mph
9	Warwick Road - HGVs	104	37	415	59	83	116	430	67	34	21 HGV - 30mph
10	Warwick Road - Cyclists	104	64	107	107	70	54	70	123	102	50 Cyclists
11	Warwick Road - LGVs	104	0	0	0	0	0	0	0	0	60 LGV
12	Warwick Road - Coaches	104	0	0	0	0	0	0	0	0	70 Coach
13	Warwick Road - Taxis	104	11	26	0	0	5	6	0	7	80 Taxi
14	Warwick Road - Motorbikes	104	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
15	Avonmore Road - Motorbikes	61	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
16	Avonmore Road - Taxis	61	0	0	149	75	0	0	149	75	80 Taxi
17	Avonmore Road - Coaches	61	0	0	0	0	0	0	0	0	70 Coach
18	Avonmore Road - LGVs	61	0	0	0	0	0	0	0	0	60 LGV
19	Avonmore Road - Cyclists	61	21	27	5	27	54	32	32	16	50 Cyclists
20	Avonmore Road - HGVs	61	76	0	76	0	0	76	0	21	HGV - 30mph
21	Avonmore Road - Cars	61	41	47	125	153	106	91	72	100	11 Cars - 30mph
22	North End Road - Cars	51	150	158	142	142	174	146	154	138	11 Cars - 30mph
23	North End Road - HGVs	51	0	0	0	0	0	0	0	0	21 HGV - 30mph
24	North End Road - Cyclists	51	16	37	16	32	32	21	37	16	50 Cyclists
25	North End Road - LGVs	51	0	0	0	0	0	0	0	0	60 LGV
26	North End Road - Coaches	51	0	0	0	0	0	0	0	0	70 Coach
27	North End Road - Taxis	51	0	1	1	3	0	0	2	0	80 Taxi
28	North End Road - Motorbikes	51	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
29	Munden Street - Motorbikes	70	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
30	Munden Street - Taxis	70	5	5	5	5	5	5	5	5	80 Taxi
31	Munden Street - Coaches	70	0	0	0	0	0	0	0	0	70 Coach
32	Munden Street - LGVs	70	0	0	0	0	0	0	0	0	60 LGV
33	Munden Street - Cyclists	70	0	5	5	5	0	11	0	0	50 Cyclists
34	Munden Street - HGVs	70	1	1	1	1	1	1	1	1	21 HGV - 30mph
35	Munden Street - Cars	70	18	54	99	72	108	45	117	36	11 Cars - 30mph
36	Blythe Road - Cars	22	85	111	144	197	151	161	125	164	11 Cars - 30mph
37	Blythe Road - HGVs	22	0	1	3	4	1	0	3	1	21 HGV - 30mph
38	Blythe Road - Cyclists	22	0	5	5	5	32	16	21	27	50 Cyclists
39	Blythe Road - LGVs	22	0	0	0	0	0	0	0	0	60 LGV
40	Blythe Road - Coaches	22	0	0	0	0	0	0	0	0	70 Coach
41	Blythe Road - Taxis	22	14	0	5	0	0	19	10	29	80 Taxi
42	Blythe Road - Motorbikes	22	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
43	Edith Road - Motorbikes	44	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
44	Edith Road - Taxis	44	4	4	4	4	4	4	4	4	80 Taxi
45	Edith Road - Coaches	44	0	0	0	0	0	0	0	0	70 Coach
46	Edith Road - LGVs	44	0	0	0	0	0	0	0	0	60 LGV
47	Edith Road - Cyclists	44	16	11	32	59	48	43	59	64	50 Cyclists
48	Edith Road - HGVs	44	0	0	28	0	0	56	28	21	HGV - 30mph
49	Edith Road - Cars	44	67	30	62	57	59	74	47	42	11 Cars - 30mph
50	Brook Green - Cars	7	167	179	228	285	197	182	149	182	11 Cars - 30mph
51	Brook Green - HGVs	7	7	14	7	7	14	7	0	7	21 HGV - 30mph
52	Brook Green - Cyclists	7	27	21	21	37	48	27	16	64	50 Cyclists
53	Brook Green - LGVs	7	0	0	0	0	0	0	0	0	60 LGV
54	Brook Green - Coaches	7	0	0	0	0	0	0	0	0	70 Coach
55	Brook Green - Taxis	7	0	0	31	10	10	0	21	10	80 Taxi
56	Brook Green - Motorbikes	7	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
57	Shortlands - Motorbikes	94	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
58	Shortlands - Taxis	94	0	15	0	15	0	73	0	15	80 Taxi
59	Shortlands - Coaches	94	0	0	0	0	0	0	0	0	70 Coach
60	Shortlands - LGVs	94	0	0	0	0	0	0	0	0	60 LGV
61	Shortlands - Cyclists	94	11	5	0	11	5	5	5	16	50 Cyclists
62	Shortlands - HGVs	94	0	27	27	27	0	27	53	27	21 HGV - 30mph
63	Shortlands - Cars	94	127	127	143	175	111	111	111	95	11 Cars - 30mph
64	Hammersmith Road West - Cars	1	177	243	255	298	338	278	238	246	11 Cars - 30mph
65	Hammersmith Road West - HGVs	1	7	22	15	15	15	7	45	15	21 HGV - 30mph
66	Hammersmith Road West - Cyclists	1	327	369	375	401	418	487	353	236	50 Cyclists
67	Hammersmith Road West - LGVs	1	0	0	0	0	0	0	0	0	60 LGV
68	Hammersmith Road West - Coaches	1	0	0	0	0	0	0	0	0	70 Coach
69	Hammersmith Road West - Taxis	1	17	30	27	20	44	34	30	23	80 Taxi
70	Hammersmith Road West - Motorbikes	1	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
1000	East of Shortlands - NB	38	16	4	12	68	104	76	72	120	40 Pedestrians
1001	East of Shortlands - SB	40	20	16	16	24	24	44	32	40	40 Pedestrians
1002	East of Collet Gardens - NB	41	0	0	28	20	32	28	32	20	40 Pedestrians
1003	East of Collet Gardens - SB	55	8	12	24	28	44	92	84	32	40 Pedestrians
1004	West of Earsby Street - SB	116	16	24	45	45	45	45	45	48	40 Pedestrians
1005	West of Earsby Street - NB	115	20	16	45	45	45	45	45	45	40 Pedestrians
1006	West of Russell Road - SB	118	68	52	112	80	120	136	156	76	40 Pedestrians
1007	West of Russell Road - NB	117	32	24	44	36	28	52	84	72	40 Pedestrians
1102	Brook Green - Crossing 1	100	9	9	35	35	35	35	9	9	40 Pedestrians
1106	Edith Road - Crossing 1	112	8	33	100	100	100	100	8	8	40 Pedestrians
1108	Warwick Road - Crossing 1	131	6	6	26	26	26	26	6	6	40 Pedestrians
1109	Warwick Road - Crossing 2	135	8	8	33	33	33	33	8	8	40 Pedestrians
1110	North End Road - Crossing 1	120	9	9	37	37	37	37	9	9	40 Pedestrians
1111	Olympia Way	126	42	42	84	84	84	84	42	42	40 Pedestrians
1119	Colet Gardens - Taxi	88	13	13	13	13	13	13	13	13	80 Taxi
1125	Warwick Road - Crossing 3	128	6	6	26	26	26	26	6	6	40 Pedestrians

Reassigning traffic
entering network from
Munden St to North End
Rd as a result of
proposed mitigation



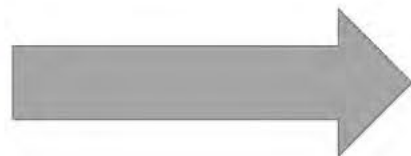
No.	Name	Link	Volume								Veh Composition
			0	900	1800	2700	3600	4500	5400	6300	
1	Kensington High St East - Cars	103	594	630	839	532	464	488	559	625	11 Cars - 30mph
2	Kensington High St East - HGVs	103	116	60	121	58	33	135	174	613	21 HGV - 30mph
3	Kensington High St East - Cyclists	103	16	27	64	43	59	112	107	155	50 Cyclists
4	Kensington High St East - LGVs	103	0	0	0	0	0	0	0	0	60 LGV
5	Kensington High St East - Coaches	103	0	0	0	0	0	0	0	0	70 Coach
6	Kensington High St East - Taxis	103	4	22	34	16	14	41	16	40	80 Taxi
7	Kensington High St East - Motorbikes	103	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
8	Warwick Road - Cars	104	978	857	945	841	882	1158	816	1040	11 Cars - 30mph
9	Warwick Road - HGVs	104	37	415	59	83	116	430	67	34	21 HGV - 30mph
10	Warwick Road - Cyclists	104	64	107	107	70	54	70	123	102	50 Cyclists
11	Warwick Road - LGVs	104	0	0	0	0	0	0	0	0	60 LGV
12	Warwick Road - Coaches	104	0	0	0	0	0	0	0	0	70 Coach
13	Warwick Road - Taxis	104	11	26	0	0	5	6	0	7	80 Taxi
14	Warwick Road - Motorbikes	104	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
15	Avonmore Road - Motorbikes	61	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
16	Avonmore Road - Taxis	61	0	0	149	75	0	0	149	75	80 Taxi
17	Avonmore Road - Coaches	61	0	0	0	0	0	0	0	0	70 Coach
18	Avonmore Road - LGVs	61	0	0	0	0	0	0	0	0	60 LGV
19	Avonmore Road - Cyclists	61	21	27	5	27	54	32	32	16	50 Cyclists
20	Avonmore Road - HGVs	61	76	0	76	0	0	0	76	0	21 HGV - 30mph
21	Avonmore Road - Cars	61	41	47	125	153	106	91	72	100	11 Cars - 30mph
22	North End Road - Cars	51	168	212	241	214	282	191	271	174	11 Cars - 30mph
23	North End Road - HGVs	51	1	1	1	1	1	1	1	1	21 HGV - 30mph
24	North End Road - Cyclists	51	16	43	21	37	32	32	37	16	50 Cyclists
25	North End Road - LGVs	51	0	0	0	0	0	0	0	0	60 LGV
26	North End Road - Coaches	51	0	0	0	0	0	0	0	0	70 Coach
27	North End Road - Taxis	51	5	6	6	8	5	5	7	5	80 Taxi
28	North End Road - Motorbikes	51	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
29	Munden Street - Motorbikes	70	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
30	Munden Street - Taxis	70	0	0	0	0	0	0	0	0	80 Taxi
31	Munden Street - Coaches	70	0	0	0	0	0	0	0	0	70 Coach
32	Munden Street - LGVs	70	0	0	0	0	0	0	0	0	60 LGV
33	Munden Street - Cyclists	70	0	0	0	0	0	0	0	0	50 Cyclists
34	Munden Street - HGVs	70	0	0	0	0	0	0	0	0	21 HGV - 30mph
35	Munden Street - Cars	70	0	0	0	0	0	0	0	0	11 Cars - 30mph
36	Blythe Road - Cars	22	85	111	144	197	151	161	125	164	11 Cars - 30mph
37	Blythe Road - HGVs	22	0	1	3	4	1	0	3	1	21 HGV - 30mph
38	Blythe Road - Cyclists	22	0	5	5	5	32	16	21	27	50 Cyclists
39	Blythe Road - LGVs	22	0	0	0	0	0	0	0	0	60 LGV
40	Blythe Road - Coaches	22	0	0	0	0	0	0	0	0	70 Coach
41	Blythe Road - Taxis	22	14	0	5	0	0	19	10	29	80 Taxi
42	Blythe Road - Motorbikes	22	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
43	Edith Road - Motorbikes	44	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
44	Edith Road - Taxis	44	4	4	4	4	4	4	4	4	80 Taxi
45	Edith Road - Coaches	44	0	0	0	0	0	0	0	0	70 Coach
46	Edith Road - LGVs	44	0	0	0	0	0	0	0	0	60 LGV
47	Edith Road - Cyclists	44	16	11	32	59	48	43	59	64	50 Cyclists
48	Edith Road - HGVs	44	0	0	28	0	0	0	56	28	21 HGV - 30mph
49	Edith Road - Cars	44	67	30	62	57	59	74	47	42	11 Cars - 30mph
50	Brook Green - Cars	7	167	179	228	285	197	182	149	182	11 Cars - 30mph
51	Brook Green - HGVs	7	7	14	7	7	14	7	0	7	21 HGV - 30mph
52	Brook Green - Cyclists	7	27	21	21	37	48	27	16	64	50 Cyclists
53	Brook Green - LGVs	7	0	0	0	0	0	0	0	0	60 LGV
54	Brook Green - Coaches	7	0	0	0	0	0	0	0	0	70 Coach
55	Brook Green - Taxis	7	0	0	31	10	10	0	21	10	80 Taxi
56	Brook Green - Motorbikes	7	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
57	Shortlands - Motorbikes	94	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
58	Shortlands - Taxis	94	0	15	0	15	0	73	0	15	80 Taxi
59	Shortlands - Coaches	94	0	0	0	0	0	0	0	0	70 Coach
60	Shortlands - LGVs	94	0	0	0	0	0	0	0	0	60 LGV
61	Shortlands - Cyclists	94	11	5	0	11	5	5	5	16	50 Cyclists
62	Shortlands - HGVs	94	0	27	27	27	0	27	53	27	21 HGV - 30mph
63	Shortlands - Cars	94	127	127	143	175	111	111	111	95	11 Cars - 30mph
64	Hammersmith Road West - Cars	1	177	243	255	298	338	278	238	246	11 Cars - 30mph
65	Hammersmith Road West - HGVs	1	7	22	15	15	15	7	45	15	21 HGV - 30mph
66	Hammersmith Road West - Cyclists	1	327	369	375	401	418	487	353	236	50 Cyclists
67	Hammersmith Road West - LGVs	1	0	0	0	0	0	0	0	0	60 LGV
68	Hammersmith Road West - Coaches	1	0	0	0	0	0	0	0	0	70 Coach
69	Hammersmith Road West - Taxis	1	17	30	27	20	44	34	30	23	80 Taxi
70	Hammersmith Road West - Motorbikes	1	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
1000	East of Shortlands - NB	38	16	4	12	68	104	76	72	120	40 Pedestrians
1001	East of Shortlands - SB	40	20	16	16	24	24	44	32	40	40 Pedestrians
1002	East of Collet Gardens - NB	41	0	0	28	20	32	28	32	20	40 Pedestrians
1003	East of Collet Gardens - SB	55	8	12	24	28	44	92	84	32	40 Pedestrians
1004	West of Earsby Street - SB	116	16	24	45	45	45	45	45	48	40 Pedestrians
1005	West of Earsby Street - NB	115	20	16	45	45	45	45	45	40	40 Pedestrians
1006	West of Russell Road - SB	118	68	52	112	80	120	136	156	76	40 Pedestrians
1007	West of Russell Road - NB	117	32	24	44	36	28	52	84	72	40 Pedestrians
1102	Brook Green - Crossing 1	100	9	9	35	35	35	35	9	9	40 Pedestrians
1106	Edith Road - Crossing 1	112	8	33	100	100	100	100	100	8	40 Pedestrians
1108	Warwick Road - Crossing 1	131	6	6	26	26	26	26	6	6	40 Pedestrians
1109	Warwick Road - Crossing 2	135	8	8	33	33	33	33	8	8	40 Pedestrians
1110	North End Road - Crossing 1	120	9	9	37	37	37	37	9	9	40 Pedestrians
1111	Olympia Way	126	42	42	84	84	84	84	42	42	40 Pedestrians
1119	Colet Gardens - Taxi	88	13	13	13	13	13	13	13	13	80 Taxi
1125	Warwick Road - Crossing 3	128	6	6	26	26	26	26	6	6	40 Pedestrians

NO CS9 - VEH INPUTS - PM

Future Base PM

No.	Name	Link	0	900	1800	2700	3600	4500	5400	6300	Veh Composition
1	Kensington High St East - Cars	103	616	709	649	743	806	748	573	573	11 Cars - 30mph
2	Kensington High St East - HGVs	103	6	6	0	25	25	89	76	165	21 HGV - 30mph
3	Kensington High St East - Cyclists	103	214	187	273	412	482	498	359	359	50 Cyclists
4	Kensington High St East - LGVs	103	0	0	0	0	0	0	0	0	60 LGV
5	Kensington High St East - Coaches	103	0	0	0	0	0	0	0	0	70 Coach
6	Kensington High St East - Taxis	103	45	25	54	51	65	58	41	41	80 Taxi
7	Kensington High St East - Motorbikes	103	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
8	Warwick Road - Cars	104	745	943	1179	1283	870	1581	1016	1016	11 Cars - 30mph
9	Warwick Road - HGVs	104	40	22	31	29	16	11	6	6	21 HGV - 30mph
10	Warwick Road - Cyclists	104	43	70	43	70	43	54	75	75	50 Cyclists
11	Warwick Road - LGVs	104	0	0	0	0	0	0	0	0	60 LGV
12	Warwick Road - Coaches	104	0	0	0	0	0	0	0	0	70 Coach
13	Warwick Road - Taxis	104	30	14	4	16	8	10	3	3	80 Taxi
14	Warwick Road - Motorbikes	104	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
15	Avonmore Road - Motorbikes	61	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
16	Avonmore Road - Taxis	61	4	0	4	8	8	0	4	4	80 Taxi
17	Avonmore Road - Coaches	61	0	0	0	0	0	0	0	0	70 Coach
18	Avonmore Road - LGVs	61	0	0	0	0	0	0	0	0	60 LGV
19	Avonmore Road - Cyclists	61	21	11	16	27	16	16	27	27	50 Cyclists
20	Avonmore Road - HGVs	61	84	0	84	0	0	84	0	84	21 HGV - 30mph
21	Avonmore Road - Cars	61	108	181	145	166	188	173	101	101	11 Cars - 30mph
22	North End Road - Cars	51	160	166	173	176	192	127	143	143	11 Cars - 30mph
23	North End Road - HGVs	51	6	16	3	3	6	3	13	0	21 HGV - 30mph
24	North End Road - Cyclists	51	16	21	27	21	16	21	27	27	50 Cyclists
25	North End Road - LGVs	51	0	0	0	0	0	0	0	0	60 LGV
26	North End Road - Coaches	51	0	0	0	0	0	0	0	0	70 Coach
27	North End Road - Taxis	51	17	6	8	8	8	11	6	6	80 Taxi
28	North End Road - Motorbikes	51	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
29	Munden Street - Motorbikes	70	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
30	Munden Street - Taxis	70	3	3	3	3	3	3	3	3	80 Taxi
31	Munden Street - Coaches	70	0	0	0	0	0	0	0	0	70 Coach
32	Munden Street - LGVs	70	0	0	0	0	0	0	0	0	60 LGV
33	Munden Street - Cyclists	70	0	5	5	5	5	11	0	0	50 Cyclists
34	Munden Street - HGVs	70	0	0	0	0	0	0	0	0	21 HGV - 30mph
35	Munden Street - Cars	70	64	38	77	45	108	38	51	51	11 Cars - 30mph
36	Blythe Road - Cars	22	154	118	160	140	151	157	168	168	11 Cars - 30mph
37	Blythe Road - HGVs	22	0	5	10	5	5	0	10	5	21 HGV - 30mph
38	Blythe Road - Cyclists	22	5	11	21	11	21	21	21	21	50 Cyclists
39	Blythe Road - LGVs	22	0	0	0	0	0	0	0	0	60 LGV
40	Blythe Road - Coaches	22	0	0	0	0	0	0	0	0	70 Coach
41	Blythe Road - Taxis	22	49	63	42	56	49	42	63	63	80 Taxi
42	Blythe Road - Motorbikes	22	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
43	Edith Road - Motorbikes	44	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
44	Edith Road - Taxis	44	0	0	8	0	0	8	0	8	80 Taxi
45	Edith Road - Coaches	44	0	0	0	0	0	0	0	0	70 Coach
46	Edith Road - LGVs	44	0	0	0	0	0	0	0	0	60 LGV
47	Edith Road - Cyclists	44	37	21	27	11	37	21	32	32	50 Cyclists
48	Edith Road - HGVs	44	0	0	12	0	0	0	24	12	21 HGV - 30mph
49	Edith Road - Cars	44	111	129	139	55	74	120	162	162	11 Cars - 30mph
50	Brook Green - Cars	7	315	257	379	398	398	392	334	334	11 Cars - 30mph
51	Brook Green - HGVs	7	7	14	7	7	14	7	0	7	21 HGV - 30mph
52	Brook Green - Cyclists	7	32	27	37	27	32	5	27	27	50 Cyclists
53	Brook Green - LGVs	7	0	0	0	0	0	0	0	0	60 LGV
54	Brook Green - Coaches	7	0	0	0	0	0	0	0	0	70 Coach
55	Brook Green - Taxis	7	79	53	53	26	53	53	105	105	80 Taxi
56	Brook Green - Motorbikes	7	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
57	Shortlands - Motorbikes	94	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
58	Shortlands - Taxis	94	5	5	0	5	5	26	15	15	80 Taxi
59	Shortlands - Coaches	94	0	0	0	0	0	0	0	0	70 Coach
60	Shortlands - LGVs	94	0	0	0	0	0	0	0	0	60 LGV
61	Shortlands - Cyclists	94	16	37	16	5	5	5	21	21	50 Cyclists
62	Shortlands - HGVs	94	1	1	1	1	0	1	3	1	21 HGV - 30mph
63	Shortlands - Cars	94	54	92	80	63	67	59	75	75	11 Cars - 30mph
64	Hammersmith Road West - Cars	1	218	234	302	258	278	246	218	218	11 Cars - 30mph
65	Hammersmith Road West - HGVs	1	8	24	16	16	16	8	48	16	21 HGV - 30mph
66	Hammersmith Road West - Cyclists	1	70	75	128	118	80	43	48	48	50 Cyclists
67	Hammersmith Road West - LGVs	1	0	0	0	0	0	0	0	0	60 LGV
68	Hammersmith Road West - Coaches	1	0	0	0	0	0	0	0	0	70 Coach
69	Hammersmith Road West - Taxis	1	11	16	63	32	53	37	26	26	80 Taxi
70	Hammersmith Road West - Motorbikes	1	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
1000	East of Shortlands - NB	38	28	32	60	108	116	28	52	52	40 Pedestrians
1001	East of Shortlands - SB	40	40	92	52	112	52	36	16	16	40 Pedestrians
1002	East of Collet Gardens - NB	41	48	60	48	44	72	48	24	24	40 Pedestrians
1003	East of Collet Gardens - SB	55	64	36	24	28	24	44	12	12	40 Pedestrians
1004	West of Earsby Street - SB	116	132	24	45	45	45	45	104	40	40 Pedestrians
1005	West of Earsby Street - NB	115	56	64	45	45	45	45	45	45	40 Pedestrians
1006	West of Russell Road - SB	118	32	48	88	72	24	48	32	32	40 Pedestrians
1007	West of Russell Road - NB	117	128	96	120	180	112	140	52	52	40 Pedestrians
1102	Brook Green - Crossing 1	100	10	10	38	38	38	38	10	10	40 Pedestrians
1106	Edith Road - Crossing 1	112	8	33	100	100	100	100	8	8	40 Pedestrians
1108	Warwick Road - Crossing 1	131	9	9	37	37	37	37	9	9	40 Pedestrians
1109	Warwick Road - Crossing 2	135	10	10	41	41	41	41	10	10	40 Pedestrians
1110	North End Road - Crossing 1	120	9	9	37	37	37	37	9	9	40 Pedestrians
1111	Olympia Way	126	42	42	84	84	84	84	42	42	40 Pedestrians
1120	Colet Gardens - Taxi	88	16	16	16	16	16	16	16	16	80 Taxi
1125	Warwick Road - Crossing 3	128	6	6	26	26	26	26	6	6	40 Pedestrians

Reassigning traffic
entering network from
Munden St to North End
Rd as a result of
proposed mitigation



No.	Name	Link	Volume								Veh Composition
			0	900	1800	2700	3600	4500	5400	6300	
1	Kensington High St East - Cars	103	616	709	649	743	806	748	573	573	11 Cars - 30mph
2	Kensington High St East - HGVs	103	6	6	0	25	25	89	76	165	21 HGV - 30mph
3	Kensington High St East - Cyclists	103	214	187	273	412	482	498	359	359	50 Cyclists
4	Kensington High St East - LGVs	103	0	0	0	0	0	0	0	0	60 LGV
5	Kensington High St East - Coaches	103	0	0	0	0	0	0	0	0	70 Coach
6	Kensington High St East - Taxis	103	45	25	54	51	65	58	41	41	80 Taxi
7	Kensington High St East - Motorbikes	103	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
8	Warwick Road - Cars	104	745	943	1179	1283	870	1581	1016	1016	11 Cars - 30mph
9	Warwick Road - HGVs	104	40	22	31	29	16	11	6	6	21 HGV - 30mph
10	Warwick Road - Cyclists	104	43	70	43	70	43	54	75	75	50 Cyclists
11	Warwick Road - LGVs	104	0	0	0	0	0	0	0	0	60 LGV
12	Warwick Road - Coaches	104	0	0	0	0	0	0	0	0	70 Coach
13	Warwick Road - Taxis	104	30	14	4	16	8	10	3	3	80 Taxi
14	Warwick Road - Motorbikes	104	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
15	Avonmore Road - Motorbikes	61	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
16	Avonmore Road - Taxis	61	4	0	4	8	8	0	4	4	80 Taxi
17	Avonmore Road - Coaches	61	0	0	0	0	0	0	0	0	70 Coach
18	Avonmore Road - LGVs	61	0	0	0	0	0	0	0	0	60 LGV
19	Avonmore Road - Cyclists	61	21	11	16	27	16	16	27	27	50 Cyclists
20	Avonmore Road - HGVs	61	84	0	84	0	0	0	84	0	21 HGV - 30mph
21	Avonmore Road - Cars	61	108	181	145	166	188	173	101	101	11 Cars - 30mph
22	North End Road - Cars	51	223	204	249	221	301	165	194	194	11 Cars - 30mph
23	North End Road - HGVs	51	6	16	3	3	6	3	13	0	21 HGV - 30mph
24	North End Road - Cyclists	51	16	27	32	27	21	32	27	27	50 Cyclists
25	North End Road - LGVs	51	0	0	0	0	0	0	0	0	60 LGV
26	North End Road - Coaches	51	0	0	0	0	0	0	0	0	70 Coach
27	North End Road - Taxis	51	20	9	11	11	11	14	9	9	80 Taxi
28	North End Road - Motorbikes	51	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
29	Munden Street - Motorbikes	70	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
30	Munden Street - Taxis	70	0	0	0	0	0	0	0	0	80 Taxi
31	Munden Street - Coaches	70	0	0	0	0	0	0	0	0	70 Coach
32	Munden Street - LGVs	70	0	0	0	0	0	0	0	0	60 LGV
33	Munden Street - Cyclists	70	0	0	0	0	0	0	0	0	50 Cyclists
34	Munden Street - HGVs	70	0	0	0	0	0	0	0	0	21 HGV - 30mph
35	Munden Street - Cars	70	0	0	0	0	0	0	0	0	11 Cars - 30mph
36	Blythe Road - Cars	22	154	118	160	140	151	157	168	168	11 Cars - 30mph
37	Blythe Road - HGVs	22	0	5	10	5	5	0	10	5	21 HGV - 30mph
38	Blythe Road - Cyclists	22	5	11	21	11	21	21	21	21	50 Cyclists
39	Blythe Road - LGVs	22	0	0	0	0	0	0	0	0	60 LGV
40	Blythe Road - Coaches	22	0	0	0	0	0	0	0	0	70 Coach
41	Blythe Road - Taxis	22	49	63	42	56	49	42	63	63	80 Taxi
42	Blythe Road - Motorbikes	22	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
43	Edith Road - Motorbikes	44	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
44	Edith Road - Taxis	44	0	0	8	0	0	8	0	8	80 Taxi
45	Edith Road - Coaches	44	0	0	0	0	0	0	0	0	70 Coach
46	Edith Road - LGVs	44	0	0	0	0	0	0	0	0	60 LGV
47	Edith Road - Cyclists	44	37	21	27	11	37	21	32	32	50 Cyclists
48	Edith Road - HGVs	44	0	0	12	0	0	0	24	12	21 HGV - 30mph
49	Edith Road - Cars	44	111	129	139	55	74	120	162	162	11 Cars - 30mph
50	Brook Green - Cars	7	315	257	379	398	398	392	334	334	11 Cars - 30mph
51	Brook Green - HGVs	7	7	14	7	7	14	7	0	7	21 HGV - 30mph
52	Brook Green - Cyclists	7	32	27	37	27	32	5	27	27	50 Cyclists
53	Brook Green - LGVs	7	0	0	0	0	0	0	0	0	60 LGV
54	Brook Green - Coaches	7	0	0	0	0	0	0	0	0	70 Coach
55	Brook Green - Taxis	7	79	53	53	26	53	53	105	105	80 Taxi
56	Brook Green - Motorbikes	7	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
57	Shortlands - Motorbikes	94	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
58	Shortlands - Taxis	94	5	5	0	5	5	26	15	15	80 Taxi
59	Shortlands - Coaches	94	0	0	0	0	0	0	0	0	70 Coach
60	Shortlands - LGVs	94	0	0	0	0	0	0	0	0	60 LGV
61	Shortlands - Cyclists	94	16	37	16	5	5	5	21	21	50 Cyclists
62	Shortlands - HGVs	94	1	1	1	1	0	1	3	1	21 HGV - 30mph
63	Shortlands - Cars	94	54	92	80	63	67	59	75	75	11 Cars - 30mph
64	Hammersmith Road West - Cars	1	218	234	302	258	278	246	218	218	11 Cars - 30mph
65	Hammersmith Road West - HGVs	1	8	24	16	16	16	8	48	16	21 HGV - 30mph
66	Hammersmith Road West - Cyclists	1	70	75	128	118	80	43	48	48	50 Cyclists
67	Hammersmith Road West - LGVs	1	0	0	0	0	0	0	0	0	60 LGV
68	Hammersmith Road West - Coaches	1	0	0	0	0	0	0	0	0	70 Coach
69	Hammersmith Road West - Taxis	1	11	16	63	32	53	37	26	26	80 Taxi
70	Hammersmith Road West - Motorbikes	1	0	0	0	0	0	0	0	0	31 Motorbikes - 30mph
1000	East of Shortlands - NB	38	28	32	60	108	116	28	52	52	40 Pedestrians
1001	East of Shortlands - SB	40	40	92	52	112	52	36	16	16	40 Pedestrians
1002	East of Collet Gardens - NB	41	48	60	48	44	72	48	24	24	40 Pedestrians
1003	East of Collet Gardens - SB	55	64	36	24	28	24	44	12	12	40 Pedestrians
1004	West of Earsby Street - SB	116	132	24	45	45	45	45	45	104	40 Pedestrians
1005	West of Earsby Street - NB	115	56	64	45	45	45	45	45	44	40 Pedestrians
1006	West of Russell Road - SB	118	32	48	88	72	24	48	32	32	40 Pedestrians
1007	West of Russell Road - NB	117	128	96	120	180	112	140	52	52	40 Pedestrians
1102	Brook Green - Crossing 1	100	10	10	38	38	38	38	10	10	40 Pedestrians
1106	Edith Road - Crossing 1	112	8	33	100	100	100	100	100	8	40 Pedestrians
1108	Warwick Road - Crossing 1	131	9	9	37	37	37	37	9	9	40 Pedestrians
1109	Warwick Road - Crossing 2	135	10	10	41	41	41	41	10	10	40 Pedestrians
1110	North End Road - Crossing 1	120	9	9	37	37	37	37	9	9	40 Pedestrians
1111	Olympia Way	126	42	42	84	84	84	84	42	42	40 Pedestrians
1120	Colet Gardens - Taxi	88	16	16	16	16	16	16	16	16	80 Taxi
1125	Warwick Road - Crossing 3	128	6	6	26	26	26	26	6	6	40 Pedestrians

