EAST FLOAT HIGHWAY NETWORK IMPROVEMENTS – POTENTIAL TRIGGER POINTS

1.0 Introduction

1.1 Wirral council transportation officers have requested that consideration be given to potential trigger points for highway infrastructure improvements to be delivered on the highways network in association with the East Float major regeneration scheme. SBA has therefore undertaken an analysis of this matter using the Paramics model built to assess the highway network serving the East Float development.

2.0 Methodology

2.1 The Paramics model is considered to be the most appropriate tool for this analysis, allowing a matrix of trips to be imputed for various scenarios.

2.2 The distribution of traffic accessing the development will be dictated to a degree by the phasing arrangements including the location of car parks. At this stage, therefore, a simplified approach is required to distributing development trips to/from various areas within the East Float site as there is no fixed phasing plan. Flexibility is required in terms of phasing given the timescales associated with the project and need to be dictated by market conditions.

2.3 It should be noted that although the Northbank East and Hydraulic Tower development proposals benefit from planning consents, this does not mean these developments would be completed in full before any other area of the East Float site would be developed. As such, for the purpose of this assessment, the base scenarios do not include Northbank East or the Hydraulic Tower developments but are included in the development assessment scenarios, along with development within other Quarters of East Float.

2.4 Trip generation information has been derived in total based on the working development trajectory and to simplify matters these trips have been allocated to each Quarter based on the percentage of total development within each Quarter. This is shown in Table A appended to this technical note. It is considered beneficial to relate trigger points to scale of development so the overall size of development is included in the trajectory, see Table A.

2.5 It should be noted that although the trip generations in Table A are related to the various Quarters, there are common access points and routes through key junctions on the

network for access to various Quarters. The methodology is therefore considered adequate in terms of assessing the likely overall levels of development that is likely to trigger the requirements for highway improvements, although this process will be refined as part of the reserved matters application process.

2.6 Further assessment of trigger points will be required as part of the Transport Assessment to support the reserved matters planning applications, based on the most up to date information, always considering the desire to reduce overall car use before setting out essential highway improvement needs.

2.7 To assess network operation for various scenarios, the Paramics model has been run for a 2015, 2020, 2025 and 2030 AM and PM peak periods, related to a scale of development, and hence trips at these various stages. The Paramics model has then been used to determine where on the network problems may arise for each scenario. Where problems have been identified for a particular future scenario, improvements have been included within the model and further assessment undertaken.

2.8 The findings of this approach are summarised in the following section. Appended to this note is a summary of the Paramics model output in visual form together with further explanation as to network operation and trigger points based on the working trajectory.

3.0 Results

3.1 The results of the testing of the various scenarios are set out below

2015: c 200,000m²

3.2 No major improvements identified as being required, apart from at the Dock Road/Birkenhead Road/Four Bridges junction, as identified from the Northbank East planning approval.

3.3 It is suggested that minor amendments are made to the Gorsey Lane/Dock Road/Duke Street traffic signal controlled junction to allow two northbound ahead lanes to improve operation beyond 2015, for the PM peak.

3.4 All other junctions operate satisfactorily at 2015.

2020: c 450,000m²

3.5 At 2020 AM peak the right turn from Dock Road into Duke Street, at the Gorsey Lane/Dock Road/Duke Street traffic signal controlled junctions approaches capacity. This can however be resolved by an amendment to the phasing of the signals based on the Paramics modelling. For the PM peak the minor amendments to lane markings for northbound traffic provides for adequate operation.

3.6 Gorsey Lane grade separated roundabout – for the AM peak capacity problems are seen on the westbound exit from the Kingsway Tunnel. This can be resolved by providing lane markings to allow two left turn lanes into Gorsey Lane, or by signalisation of this arm.

3.7 During the PM peak, queues can be observed forming on the internal link and northbound roundabout approach. The issue can be resolved through signalisation.

3.8 To conclude, based on the Paramics modelling improvements are required at the Gorsey Lane/Tunnel Approach junction by 2020.

3.9 Poulton Bridge Road/Dock Road/Docks Link Roundabout - this operates satisfactorily in the AM peak, but during the PM peak northbound on Poulton Bridge Road becomes a capacity issue. Significant improvements are therefore likely to be required by 2020.

3.10 Tower Road/Canning Street/Rendell Street - for the AM peak the Paramics model identifies queuing at the Tower Road southbound approach to the junction. Consideration should therefore be given to improving this junction at 2020.

3.11 All other locations operate satisfactorily.

2025: c 675,000m²

3.12 By 2025, problems are identified in the AM and PM peak at the Gorsey Lane/Dock Road/Duke Street traffic signal junction, necessitating the identified major improvement scheme compared to the interim more minor improvements described earlier.

3.13 No other major improvements identified.

2030: c 900,000m²

3.14 By 2030 the full dualling of Duke Street will be required in addition to the already identified junction improvements including the provision of a new bridge. However whilst for capacity reasons the dualling is not required until 2030, the larger access junction arrangements which are linked to the dualling will be required by 2025. It would be possible to relocate the access further south to allow provision of the larger access junction and avoid the need for dualling until later in the life of the development but if retained as shown both the access and dualling would be required by 2025.

3.15 At 2030 the proposed improvements to the Duke Street/Corporation Road roundabout will also be required.

4.0 Summary

Based on the Paramics modelling, a summary of the recommended trigger points for the various elements of the highway infrastructure improvements is provided below by location:

- Dock Road/Four Bridges/Birkenhead Road – 2015 c 200,000m²
- Poulton Bridge Road/Docks Link/Dock Road – 2020 c 400,000m²
- Gorsey Lane/Kingsway Tunnel Approaches Grade Separated Junction – 2020 c 400,000m²
- Tower Road/Canning Street/Rendell Street/Corporation Street – 2020 c 400,000m²
- Dock Road/Gorsey Lane/Duke Street traffic signal controlled junction minor improvements required at 2020 c 400,000m².
  Major improvements 2025 c 675,000m²
- Corporation Road/Duke Street roundabout – 2030 c 900,000m²
- Duke Street dualling including new bridge – 2030 c 900,000m² or 2025 c 675,000m² with currently shown access main arrangement to Sky City.

This table summarises the trip generation by quarter based on the following assumptions:
- the rate of development is consistent across all quarters
- A 20% internalisation factor has been applied between 2010-29. A 30% internalisation factor has been applied between 2030-49. A 40% internalisation factor has been applied at 2050
- total trips are split across each quarter based on the % of total development (floor area) in each quarter.

Summary of Floor Areas per Quarter

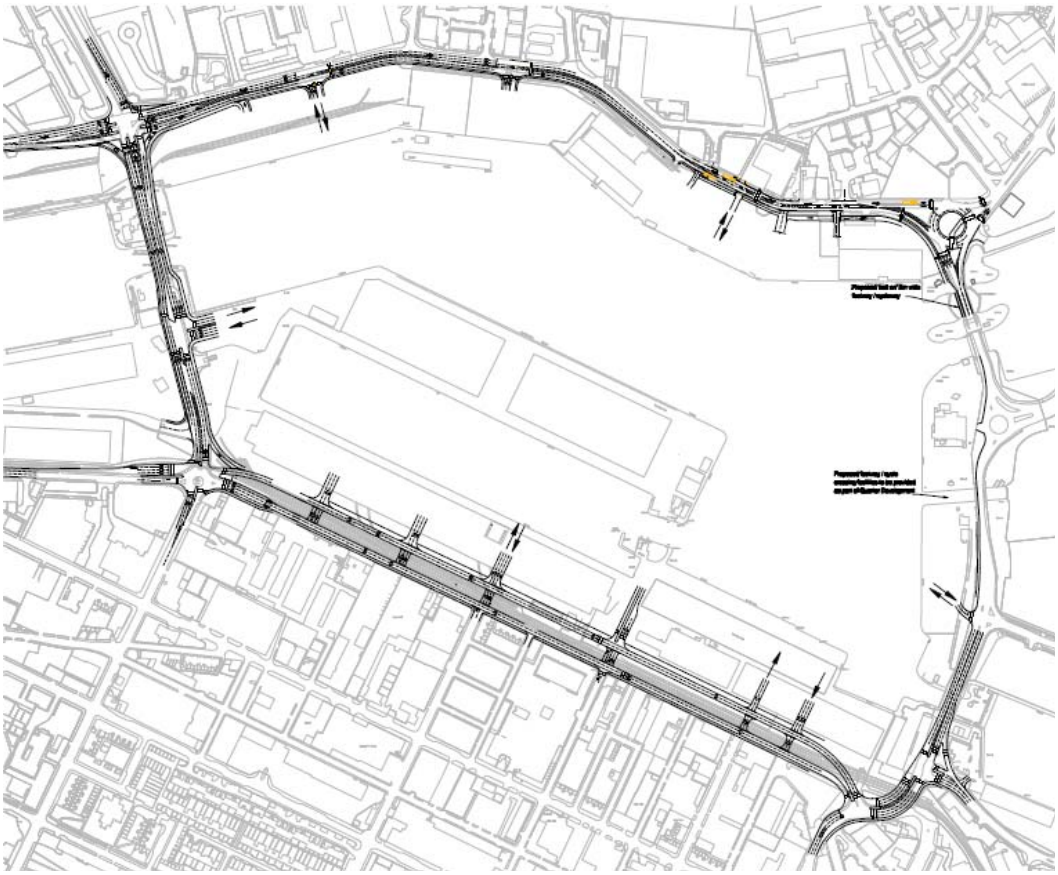
Quarter	Floor Area (	% of Total Development
Sky City & The Point (incl	625000	42%
Vittoria Studios	338000	23%
Marina View	191000	13%
Four Bridges	21757	1%
Northbank West	219000	15%
Northbank East	99555	7%

	Sky City & The Point (includes Vittoria Park)					Vittoria Studios					Marina View					Four Bridges & Hydraulic Tower					Northbank West					Northbank East					TOTAL				
		AM Peak Hour		PM Peak Hour			AM Peak Hour		PM Peak Hour			AM Peak Hour		PM Peak Hour			AM Peak Hour		PM Peak Hour			AM Peak Hour		PM Peak Hour			AM Peak Hour		PM Peak Hour			AM Peak Hour		PM Peak Hour	
Year (20..)	Floor Area (sqm	Inbound	Outbound	Inbound	Outbound	Floor Area (sqm	Inbound	Outbound	Inbound	Outbound	Floor Area (sqm	Inbound	Outbound	Inbound	Outbound	Floor Area (sqm	Inbound	Outbound	Inbound	Outbound	Floor Area (sqm	Inbound	Outbound	Inbound	Outbound	Floor Area (sqm	Inbound	Outbound	Inbound	Outbound	Floor Area (sqm	Inbound	Outbound	Inbound	Outbound
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	7400	3	16	7	4	2001	2	9	4	2	2035	1	5	2	1	0	0	1	0	0	3846	1	6	2	2	1682	0	3	1	1	16965	7	39	16	11
12	24304	42	45	24	39	9787	23	24	13	21	7099	13	14	7	12	384	1	2	1	1	10835	15	16	9	14	4832	7	7	4	6	57241	100	108	58	94
13	43378	90	77	45	82	19318	49	42	24	44	12794	27	24	14	25	1037	3	3	2	3	17965	32	27	16	29	8025	14	12	7	13	102516	215	185	107	196
14	62453	138	109	66	124	28849	75	59	35	67	18489	42	33	20	38	1689	5	4	2	4	25095	48	38	23	44	11218	22	17	10	20	147792	330	262	157	297
15	83576	195	145	88	174	39548	106	78	48	94	24812	60	44	27	53	2373	7	5	3	6	32866	68	51	31	61	14720	31	23	14	28	197895	467	346	211	416
16	104208	247	180	111	220	49744	134	97	60	119	30962	76	55	34	67	3038	9	6	4	8	40637	87	63	39	77	18204	39	29	18	35	246792	592	430	264	525
17	124767	295	215	132	262	59234	160	116	71	142	37135	90	66	40	80	3580	10	7	5	9	49049	103	75	46	92	21957	47	34	21	42	295722	706	513	315	627
18	145326	343	249	153	305	68723	186	135	83	165	43308	105	76	47	93	4123	12	9	5	11	57461	120	87	54	107	25711	55	40	24	49	344653	821	596	366	729
19	166077	400	285	176	354	79221	217	154	95	192	49490	122	87	54	108	4680	14	10	6	12	65090	140	100	62	124	29198	64	45	28	56	393756	957	681	420	847
20	186827	457	320	199	404	89719	247	173	107	218	55671	140	98	61	123	5237	16	11	7	14	72720	160	112	70	142	32685	73	51	32	64	442859	1094	765	475	966
21	207578	515	355	221	453	100217	278	192	120	245	61852	157	109	68	139	5794	18	12	8	16	80349	180	125	78	159	36172	82	57	35	72	491962	1230	850	530	1084
22	226113	570	385	242	501	109673	308	208	131	271	67494	174	118	74	153	6241	20	13	8	17	87338	200	135	85	175	39379	91	61	38	80	536238	1362	921	578	1197
23	245630	626	418	263	549	119837	339	226	142	297	73336	191	128	81	168	6799	22	15	9	19	94326	220	146	92	193	42586	100	67	42	88	582513	1498	1000	630	1314
24	265520	683	451	285	598	130203	369	244	154	323	79320	209	138	87	183	7483	24	16	10	21	101456	239	158	100	210	45807	109	72	45	95	629789	1633	1078	682	1430
25	285410	740	483	307	647	140569	400	261	166	350	85305	226	148	94	198	8166	26	17	11	23	108586	259	169	108	227	49028	118	77	49	103	677064	1769	1156	734	1547
26	304319	795	513	327	694	150227	430	278	177	375	91089	243	157	100	212	8740	28	18	11	24	115716	279	180	115	243	52249	127	82	52	111	722340	1901	1227	782	1660
27	323227	850	543	347	742	159885	460	294	188	401	96874	260	166	106	227	9314	30	19	12	26	122846	298	190	122	260	55470	135	87	55	118	767615	2033	1299	831	1773
28	339668	904	568	365	788	168876	489	307	198	426	101980	276	173	112	241	9888	31	20	13	27	128693	317	199	128	276	58130	144	90	58	125	807235	2162	1357	874	1883
29	356110	959	592	384	834	177866	518	320	207	451	107085	293	181	117	255	10462	33	21	13	29	134541	336	208	134	292	60791	153	94	61	133	846856	2292	1416	917	1993
30	373393	972	546	372	856	187389	526	295	201	463	112334	297	167	114	262	11145	34	19	13	30	140315	341	191	130	300	63400	155	87	59	136	887976	2324	1305	890	2047
31	389443	1025	568	389	901	196577	554	307	210	487	117244	313	173	119	275	11828	36	20	14	31	145449	359	199	136	316	65728	163	90	62	143	926269	2450	1357	930	2154
32	405493	1078	589	406	946	205766	583	319	219	511	122154	329	180	124	289	12511	38	21	14	33	150582	378	207	142	331	68057	172	94	65	151	964562	2577	1409	970	2261
33	420561	1129	609	421	989	214247	611	329	228	535	126863	345	186	129	302	13084	39	21	15	34	155715	396	213	148	347	70385	180	97	67	158	1000855	2700	1455	1007	2365
34	435256	1181	628	436	1033	222526	639	339	236	559	131430	361	192	133	316	13530	41	22	15	36	160706	414	220	153	362	72700	188	100	70	165	1036148	2823	1501	1043	2469
35	449951	1232	647	452	1076	230805	667	350	244	582	135998	377	198	138	329	13976	43	23	16	37	165698	432	227	158	377	75014	196	103	72	171	1071440	2947	1546	1080	2574
36	465628	1285	669	468	1121	239791	695	362	253	606	140765	393	204	143	343	14532	45	23	16	39	170689	450	234	164	393	77328	205	106	75	179	1108733	3073	1599	1120	2681
37	481305	1338	690	485	1166	248778	724	373	262	631	145532	409	211	148	356	15088	47	24	17	41	175681	469	242	170	409	79642	213	110	77	186	1146026	3200	1651	1160	2788
38	495888	1391	710	502	1211	257609	752	384	271	655	150017	425	217	153	370	15645	48	25	17	42	180105	487	249	176	424	81728	222	113	80	193	1180991	3325	1698	1200	2895
39	509863	1442	727	517	1255	265932	780	393	279	678	154444	441	222	158	383	16219	50	25	18	44	184671	505	255	181	440	83828	230	116	82	200	1214957	3448	1738	1235	2999
40	523021	1485	743	530	1292	273421	803	402	287	699	158583	454	227	162	395	16761	52	26	18	45	189236	520	260	186	453	85899	237	118	84	206	1246922	3551	1776	1268	3089
41	534947	1528	757	543	1329	280576	826	409	294	719	162381	467	231	166	406	17304	53	26	19	46	193161	535	265	190	466	87690	243	121	87	212	1276060	3652	1810	1298	3177
42	546872	1570	771	556	1365	287732	849	417	301	738	166180	480	236	170	417	17846	55	27	19	48	197085	550	270	195	478	89482	250	123	89	217	1305197	3754	1843	1329	3265
43	559640	1614	788	570	1403	295418	873	426	308	759	170122	493	241	174	429	18498	56	27	20	49	200936	566	276	200	492	91221	257	125	91	223	1335835	3859	1883	1362	3354
44	571691	1658	803	583	1440	302911	897	434	315	779	173867	507	245	178	440	19149	58	28	20	50	204416	581	281	204	504	92799	264	128	93	229	1364833	3964	1920	1393	3442
45	583225	1701	817	596	1476	310264	920	442	322	798	177470	520	250	182	451	19800	59	28	21	51	207626	596	286	209	517	94258	271	130	95	235	1392643	4068	1954	1424	3530
46	593777	1744	829	607	1512	316909	943	448	328	818	180872	533	253	185	462	20342	61	29	21	53	210835	611	290	213	530	95718	278	132	97	241	1418453	4169	1982	1451	3615
47	603984	1786	841	618	1547	323267	966	455	334	836	184139	546	257	189	473	20812	62	29	21	54	213894	626	295	216	542	97118	284	134	98	246	1443214	4270	2010	1477	3698
48	611556	1827	847	626	1580	328866	988	458	339	855	186664	558	259	191	483	21226	64	30	22	55	215606	640	297	219	554	97951	291	135	100	252	1461869	4368	2026	1498	3778
49	618281	1860	854	634	1607	333591	1006	462	343	869	188886	568	261	194	491	21607	65	30	22	56	217303	652	299	222	563	98744	296	136	101	256	1478413	4447	2042	1516	3843
50	624927	1865	758	597	1603	337947	1009	410	323	867	191014	570	232	183	490	21860	65	26	21	56	219008	654	266	209	562	99555	297	121	95	255	1494312	4460	1812	1428	3832

Paramics Modelling Phased Infrastructure Results

2015

Initial model included 2015 development traffic with reduced access arrangements. The diagram below shows the access points modelled indicated by arrows:

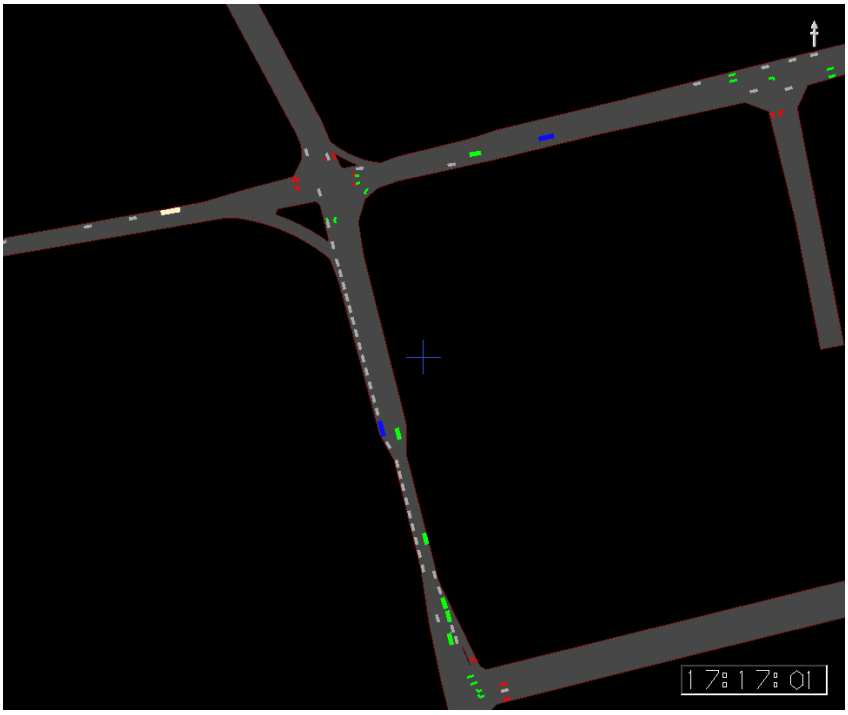


The Sky City junction has been modelled as a cut down version that has one lane left turn into the development rather than two.

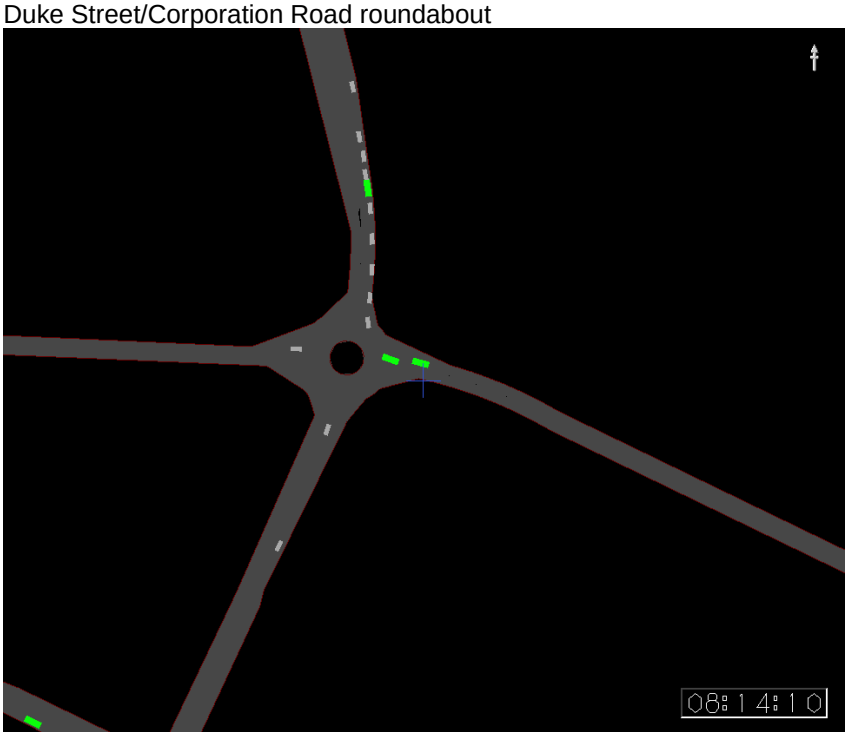
It is assumed that the proposals at the Tower Road/Dock Road/Kelvin Road junction are in place by 2015 as p[art of the North Bank East development proposals.

2015 identified issues include queuing northbound at the Duke Street/ Dock Road junction and transient queuing at the Duke Street/Corporation Road roundabout. The following diagrams illustrate the issues:

Duke Street/Dock Road

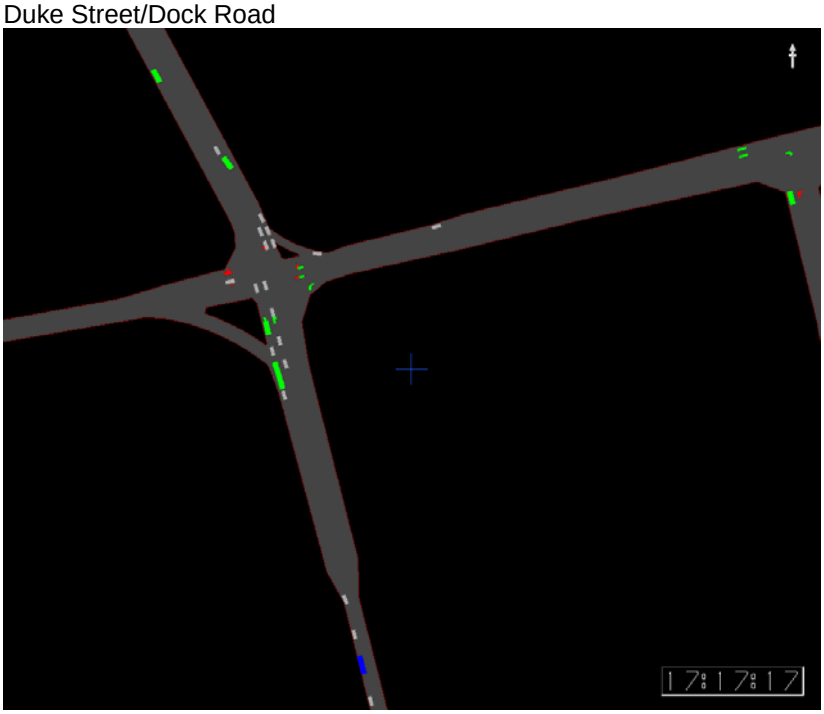


Duke Street/Corporation Road roundabout



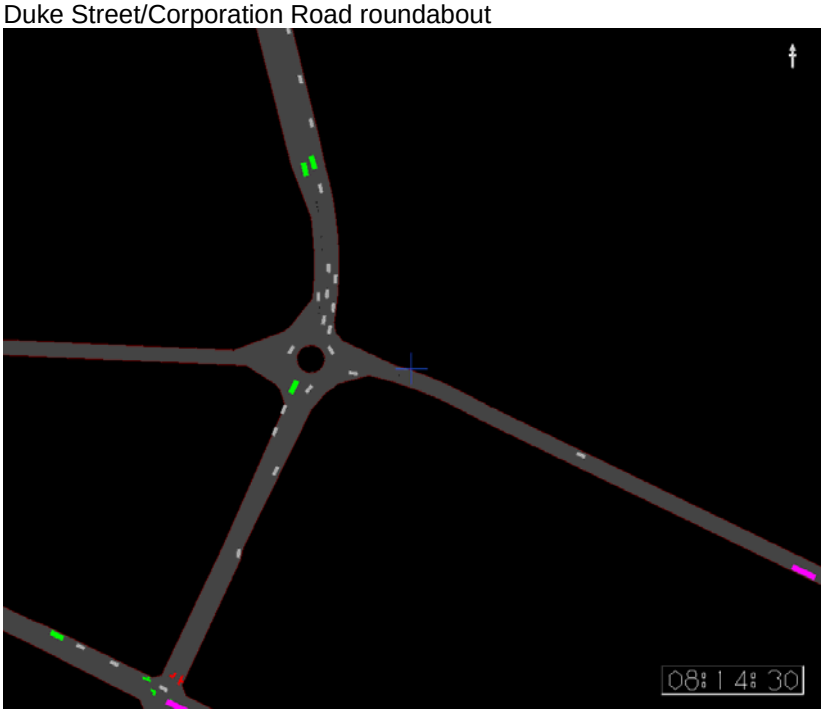
The single lane queuing northbound on Duke Street/Dock Road can be mitigated by allowing straight on traffic to use both lanes. The existing junction layout and signal staging (which runs the northbound approach unopposed) allows this to be achieved with minimal white lining updates.

Duke Street/Dock Road



Similarly, the carriageway widths are sufficient to allow 2 lanes on the approach and circulating carriageway of the Duke Street/Corporation Road junction. White lining at the roundabout would encourage better use of the existing road layout.

Duke Street/Corporation Road roundabout

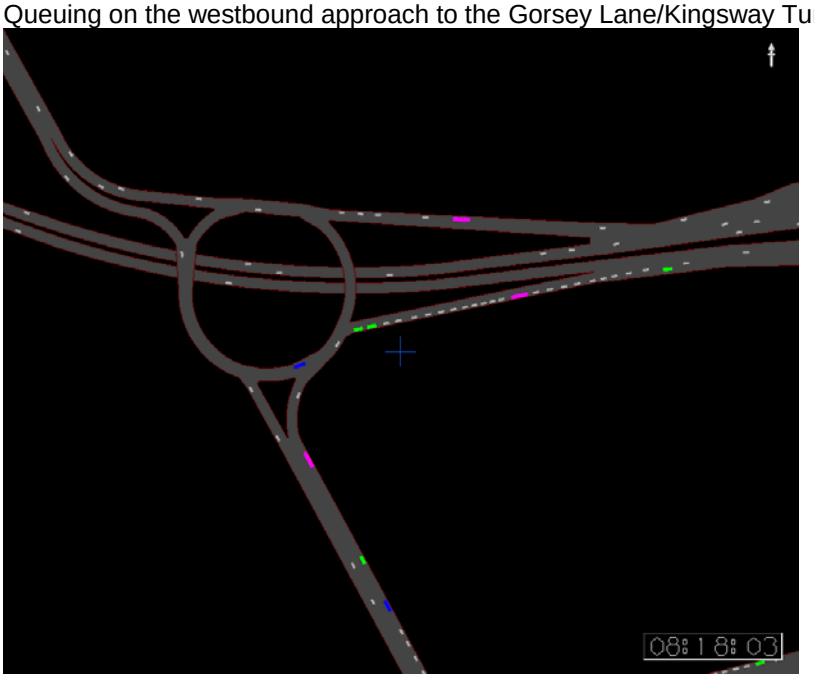


No other significant issues were identified for the 2015 AM or PM scenarios.

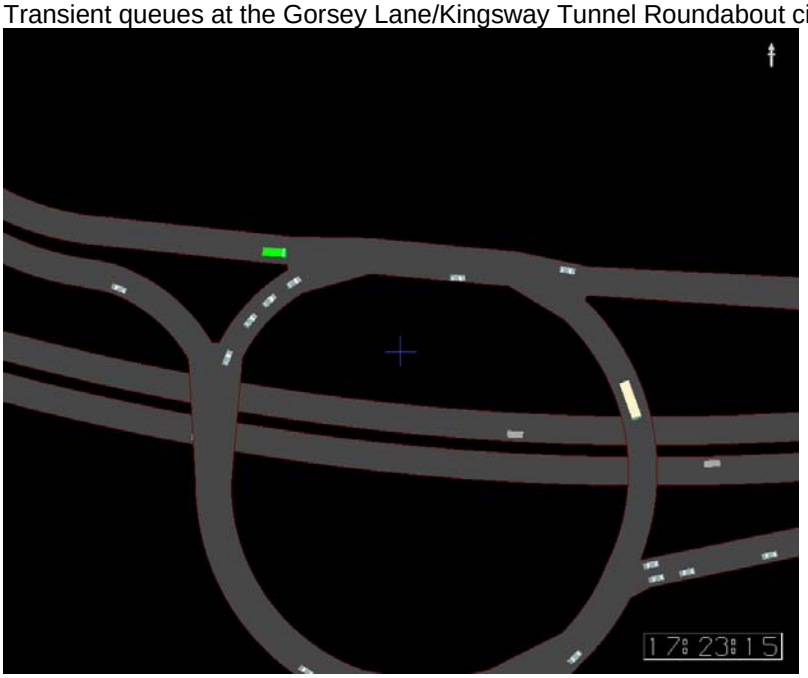
2020

2020 traffic flows were assigned to the network constructed for 2015. The following issues were identified:

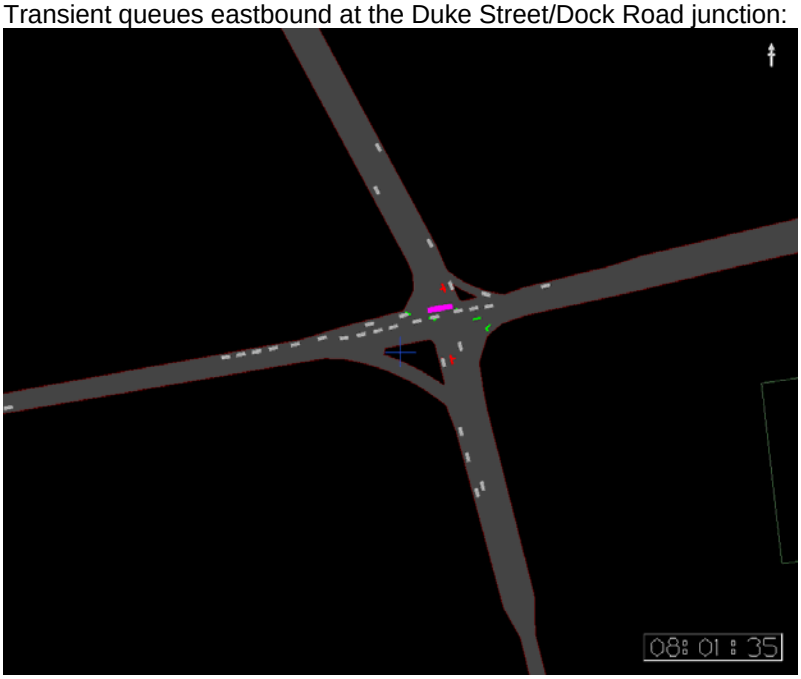
Queuing on the westbound approach to the Gorsey Lane/Kingsway Tunnel Roundabout:



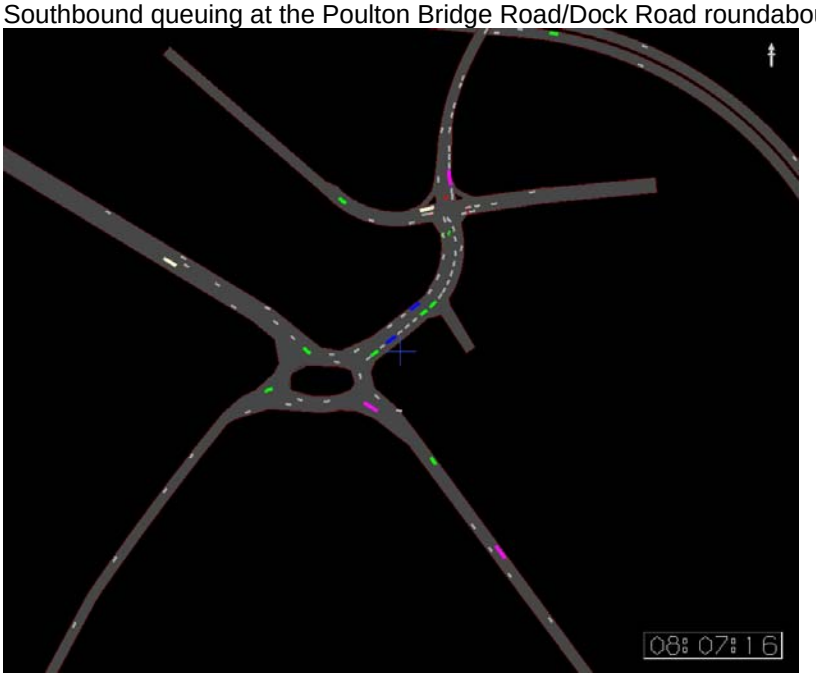
Transient queues at the Gorsey Lane/Kingsway Tunnel Roundabout circulating stopline:



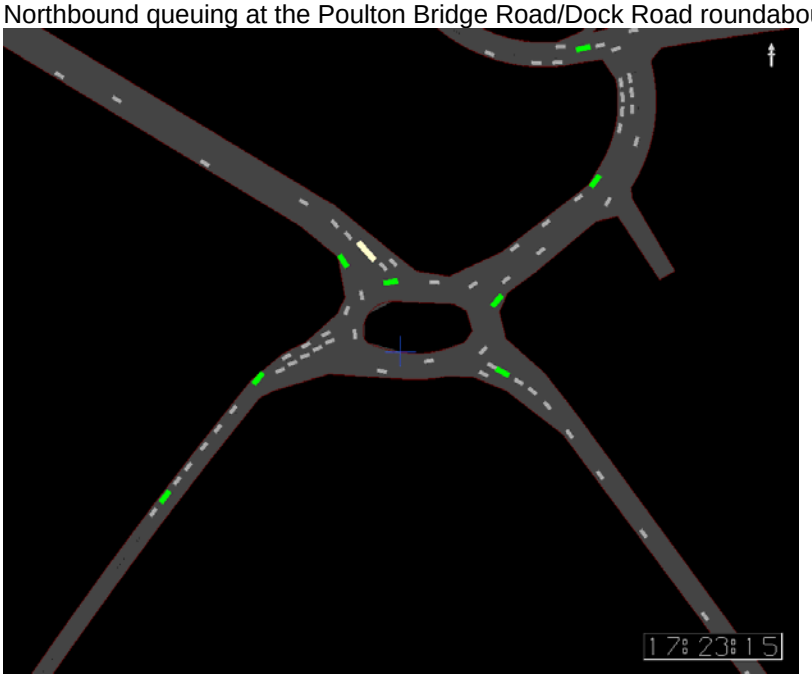
Transient queues eastbound at the Duke Street/Dock Road junction:



Southbound queuing at the Poulton Bridge Road/Dock Road roundabout in the AM peak:



Northbound queuing at the Poulton Bridge Road/Dock Road roundabout in the PM peak:



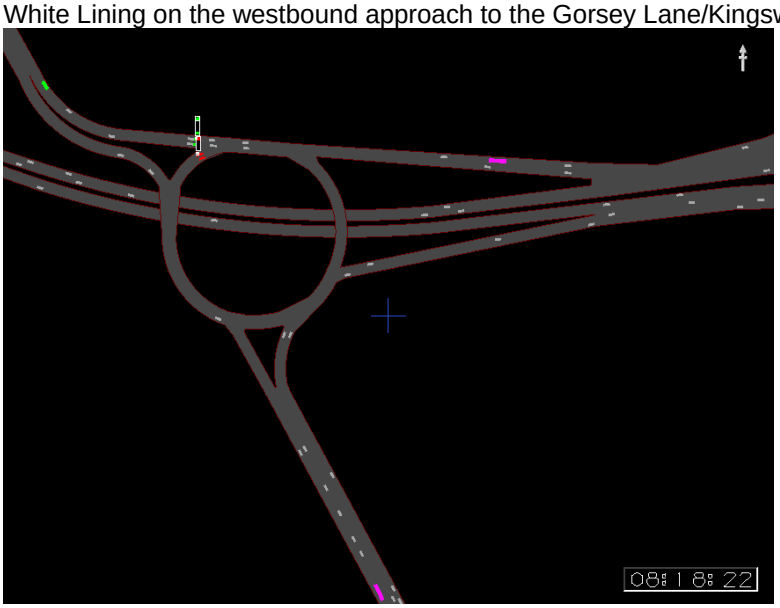
Queuing at the Tower Road/Rendell Street Junction

The transient queues eastbound at the Duke Street/Dock Road junction and the queuing on the westbound approach to the Gorsey Lane/Kingsway Tunnel roundabout can be addressed by use of amended signal timings and white lining to allow two lanes to turn left respectively. However, the other capacity would need more significant junction improvements and as such the proposed infrastructure layouts have been included.

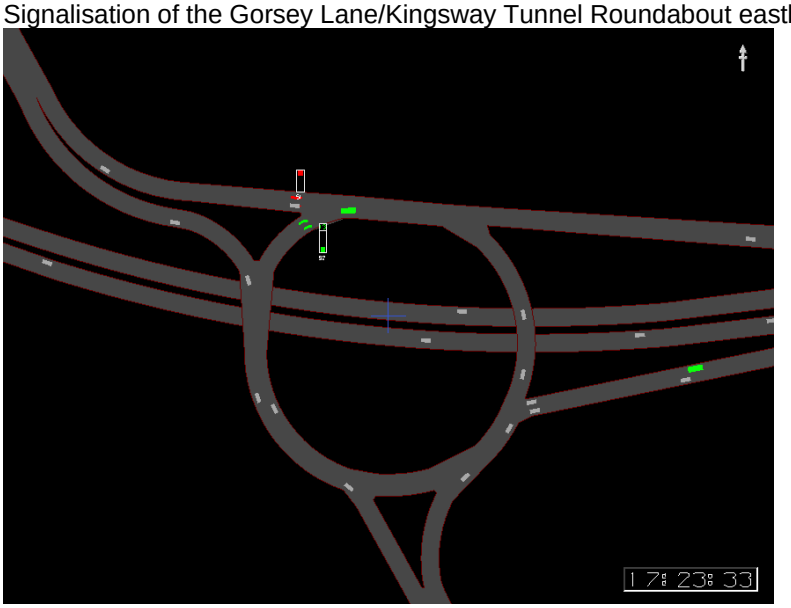
Minor improvement works were tested at the Dock Road/Poulton Bridge Road junction but these were not sufficient to address the capacity issues.

Mitigation for 2020:

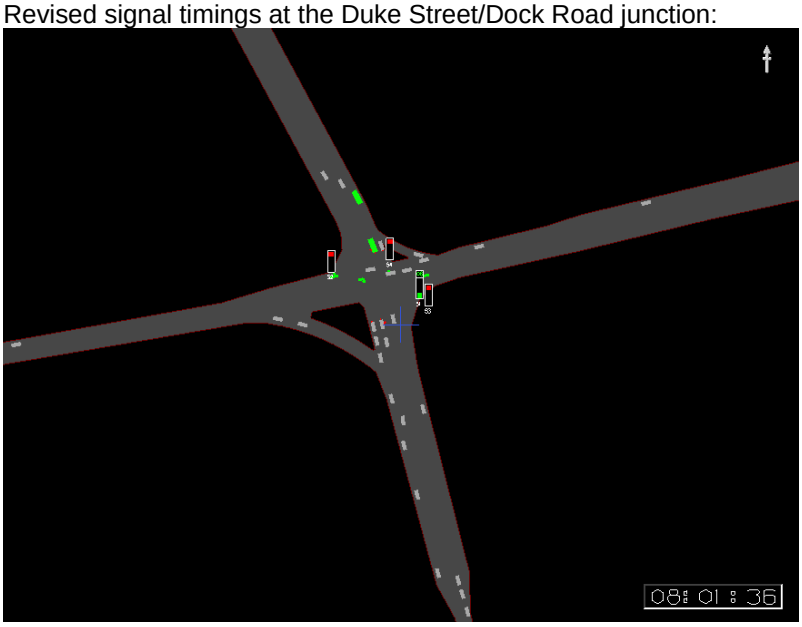
White Lining on the westbound approach to the Gorsey Lane/Kingsway Tunnel Roundabout:



Signalisation of the Gorsey Lane/Kingsway Tunnel Roundabout eastbound approach:

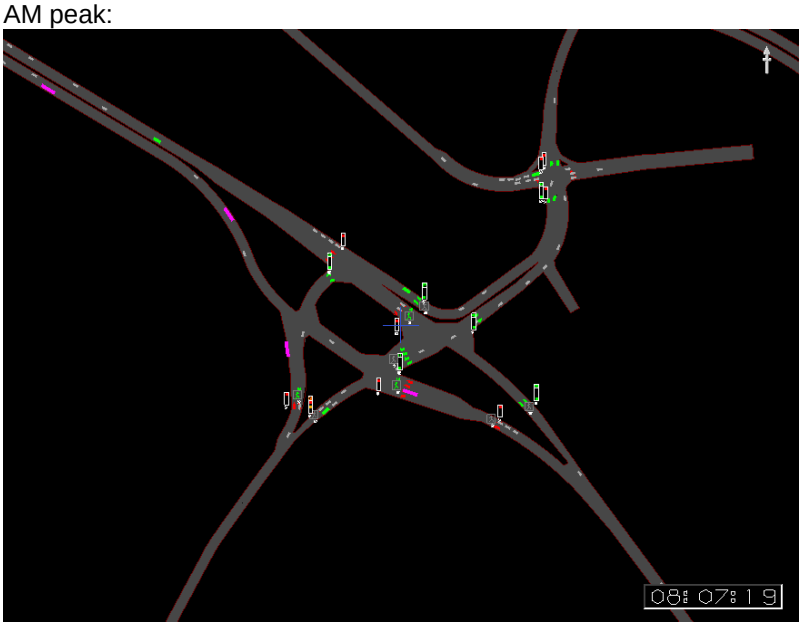


Revised signal timings at the Duke Street/Dock Road junction:

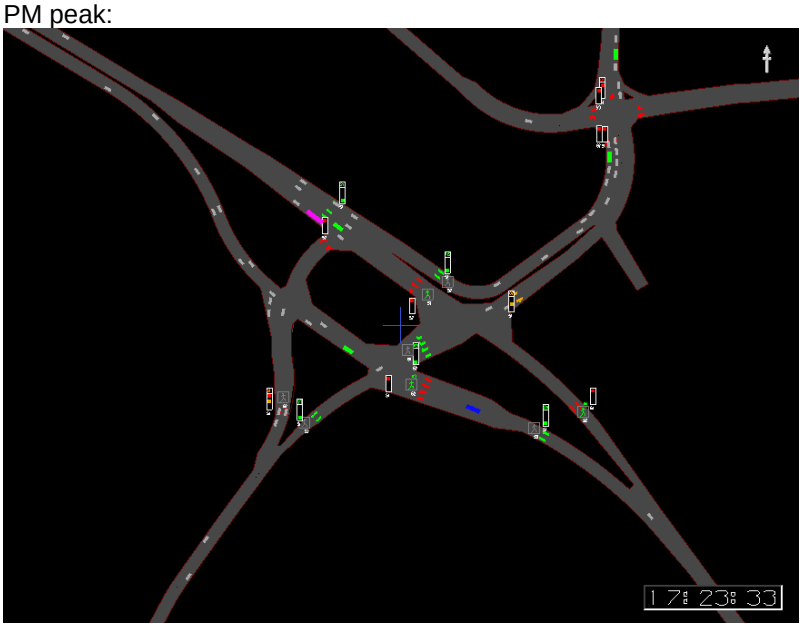


Full signalised proposals at the Poulton Bridge Road/Dock Road roundabout. This includes updating of the signal timings at the Mill Lane junction to the north of Poulton Bridge/Dock Road roundabout in order to allow the Poulton Bridge Road/Dock Road roundabout to operate at full capacity:

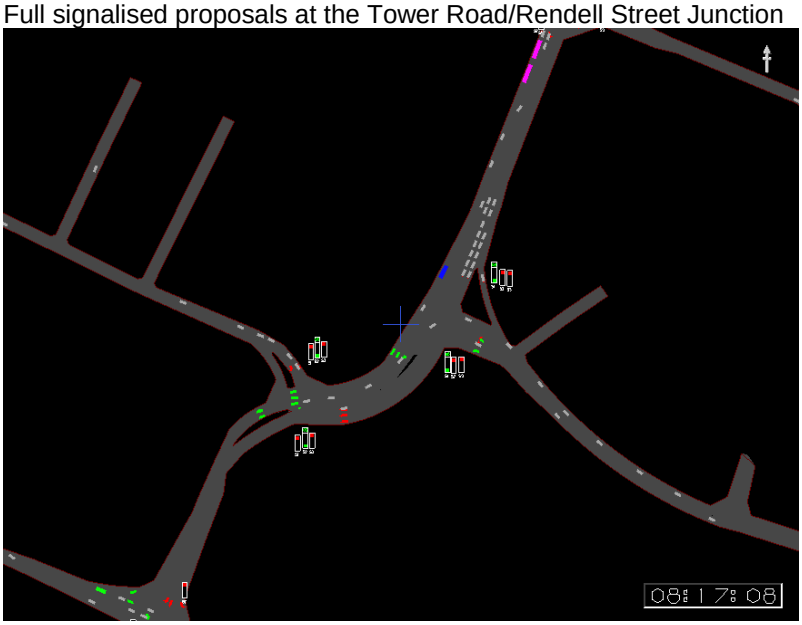
AM peak:



PM peak:



Full signalised proposals at the Tower Road/Rendell Street Junction

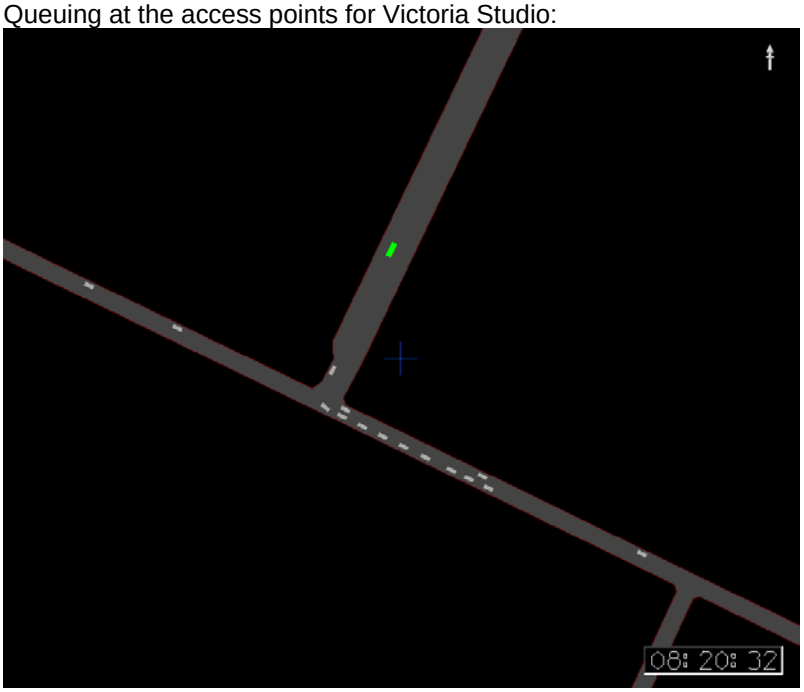


2025

Assignment of the 2025 traffic flows to the resultant 2020 network highlighted the following issues:

Queuing at Duke Street/Dock Road:

Queuing at the access points for Victoria Studio:



2025 Mitigation

Mitigation of the queuing at Duke Street/Dock Road would require significant infrastructure improvements. As such, the full proposed layout for this junction has been assumed.

As it is unlikely that the additional access into Victoria Studio would be constructed without the construction of the boulevard arrangement, this also means that the Duke Street/Corporation Road junction improvements would be required in order to tie the boulevard arrangement into the junction.

With the inclusion of these changes, the network constitutes the entire highways infrastructure proposed as part of the development. The exceptions are the inclusion of the second access point to North Bank West and inclusion of the second left turn lane at the Sky City access. These are assumed to be required by 2025 due to the internal site layout rather than due to offsite needs.

Additional Tests

A test network was built that included the full infrastructure proposals with the exception of the bridge widening on Duke Street. However, due to the additional flows using this route, if bridge widening is not carried out, traffic blocks back into the Dock Road junction in the AM peak and the Corporation Road junction in the PM peak as there is insufficient space between the junctions and the bridge to allow the traffic to merge in turn.