Portsmouth Air Quality Local Plan

21/10/2019

Reference number 108479

TRANSPORT MODELLING FORECASTING REPORT (T4)

PORTSMOUTH AIR QUALITY LOCAL PLAN

TRANSPORT MODELLING FORECASTING REPORT (T4)

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1. INTRODUCTION

1.1.1 SYSTRA was commissioned by Portsmouth City Council to provide strategic modelling inputs, using the SRTM model, to Portsmouth Air Quality Local Plan.

1.1.2 This document serves as one of the four key evidence bases for transport modelling for the study, specifically covering the forecasting approach for both the baseline and test scenarios. This document is structured as follows:

- Modelling methodology;
- Study scope;
- Baseline forecasts;
- Scenario forecasts;

2. MODELLING METHODOLOGY

2.1 Overview

2.1.1 This chapter discusses the methodology for forecasting and summarises a separate document, Local Plan Transport Modelling Methodology Report (T3) and we recommend referring to that document where further detail on methodology is required.

2.2 Baseline Scenario

2.2.1 A baseline scenario has been prepared as a reference case, which provides the best estimate of what traffic conditions will look like in the forecast model years of 2019 and 2026 without any interventions developed as part of this study. For the purpose of the Air Quality modelling, the AADT outputs from the 2019 and 2026 forecast years are interpolated to 2022.

2.2.2 The Baseline scenario (and all forecast year scenarios) accounts for a number of different transport, land use, and economic impacts that could be considered as relevant to the choices that transport users will make in the future as summarised in Table 1.

Table 1. Summary of changes made to Baseline Scenario

AREA	SUMMARY OF CHANGES
Network (Supply)	Number of local and strategic infrastructure changes to the road network, including M27 SMART motorways;
Demand Changes	Forecast updates for planning data (households, population, and employment) based on the Local Plans (or equivalent) for Local Authorities.
Model inputs & parameters	Changes to: • Car occupancy • Car availability; • General goods growth
Specific zonal growth	Freight and passenger growth for the following areas: • Soton airport; • Portsmouth port; and • Soton port.
Road assignment changes	Vehicle operating costs;
PT assignment changes	Values of time and associated weightings

2.2.3 Further information on the exact implementation of these changes can be found in Local Plan Transport Modelling Methodology Report (T3).

2.3 Forecast Scenarios

2.3.1 Having developed a Baseline scenario, a number of separate test scenarios were required which could be compared against the Baseline to evaluate the impact of the Air Quality improvement schemes. These included:

- CAZ C (Benchmark); and
- Preferred Package (CAZ B City Centre, Parking and Walking and Cycling schemes)

2.3.2 Aside from the scheme proposals specific to the scenario being tested, the underlying modelled networks and landuse are consistent with the Baseline.

3. STUDY SCOPE

3.1.1 The scope of this study is to prepare appropriate network changes which can be used as an input to Air Quality modelling for Portsmouth. To that end, the geographic scope is focussed on the area which is included in the Air Quality modelling, however, as that is only a subarea of the network which the SRTM considers the results which will be considered here will also include network wide statistics provided by SATURN and model wide planning data inputs for instance.

Figure 1. Scope of Wider SRTM Network

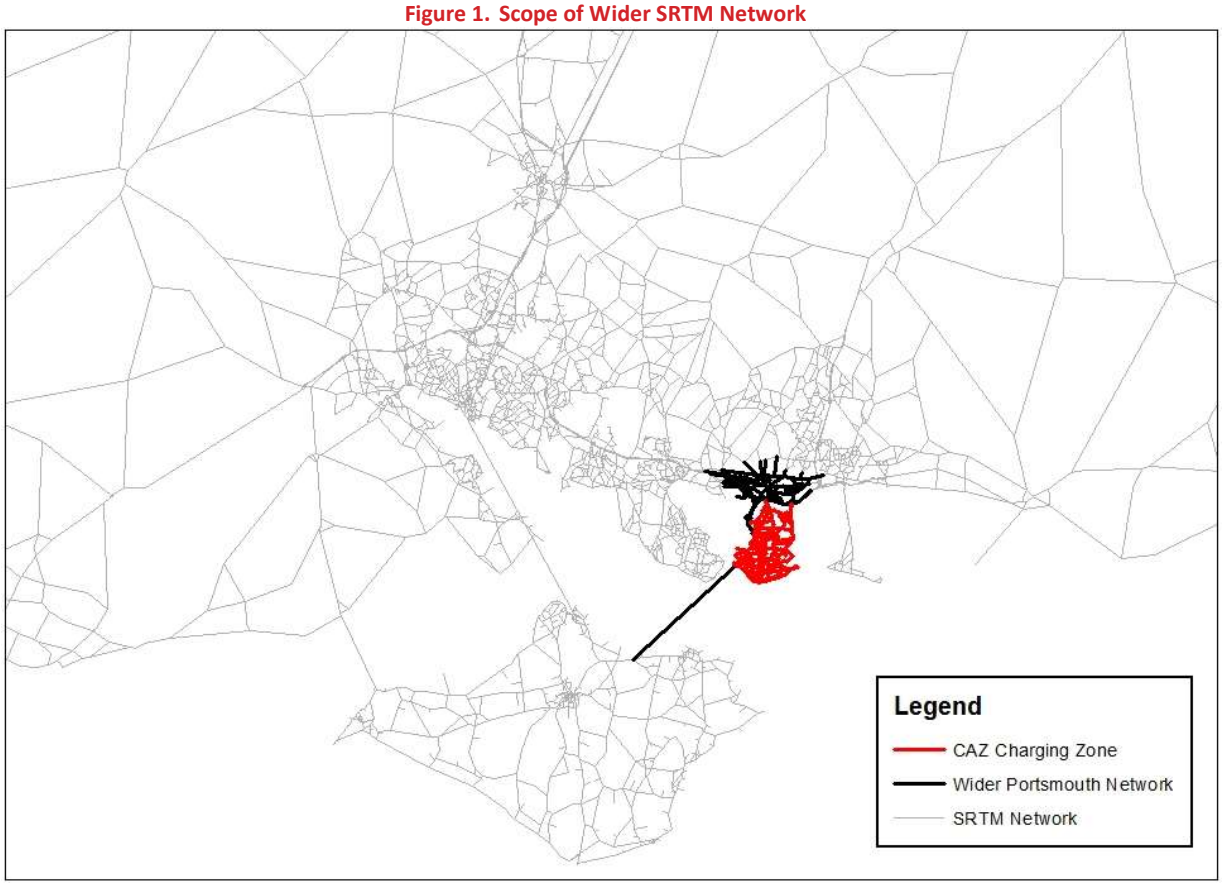
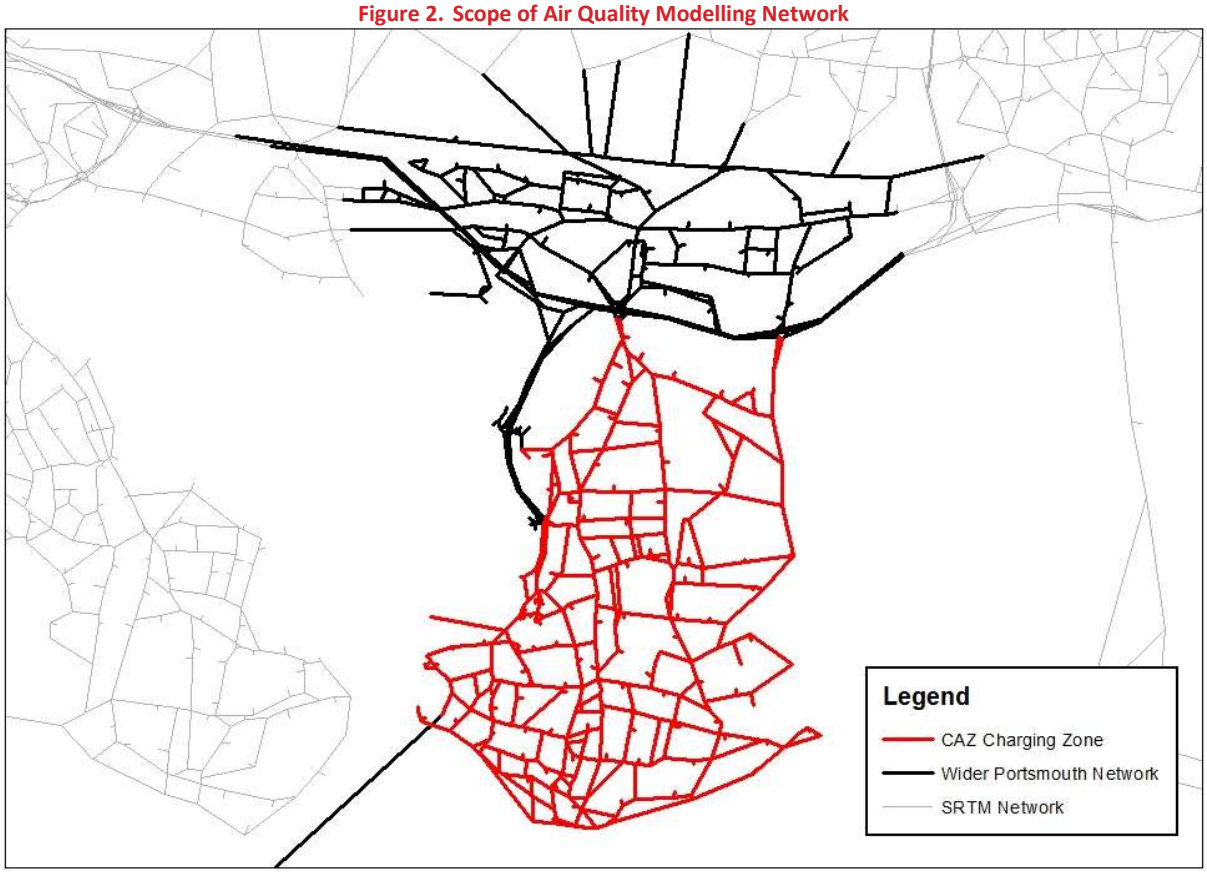


Figure 2. Scope of Air Quality Modelling Network



4. BASELINE FORECASTS

4.1 Overview

4.1.1 This chapter focusses on the change over time that the Baseline scenario will have from the base.

4.2 MDM Forecasts

4.2.1 Figure 3 shows the 12hr person demand for Portsmouth District, broken down by main mode, for each modelled year. Compared to 2015, total demand increases by just under 2% by 2019 and by just under 14% by 2026. Highway demand has the greatest increase at 4.5% in 2019 and 18.6% in 2026.

4.2.2 Focussing on highway demand, Figure 4 summarises 12 hour person demand by District for 2015, 2019 and 2026. Figure 5 shows the change in 12 hour highway demand by District for 2019 and 2026 compared back to 2015. For Portsmouth, 65-68% of highway demand across the 12 hour period is intra-district for the three reported years.

Figure 3. Total Trips To/From or Within Portsmouth District by Mode and Year

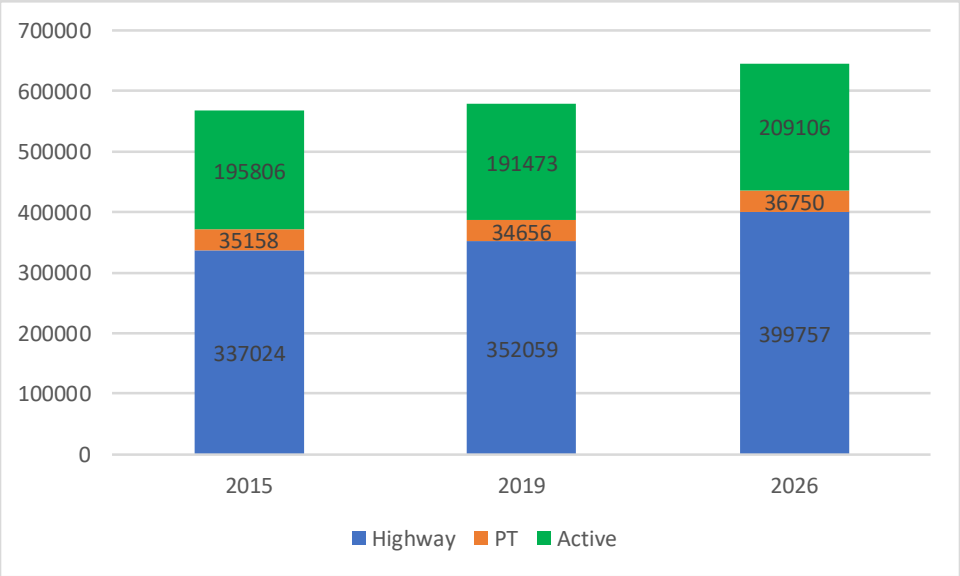


Figure 4. 12hr Highway, Person Demand by Core Area Authority (2015, 2019 & 2026)

2015 12hr (Highway)	New Forest	Test Valley	Southampton	Eastleigh	Winchester	Fareham	Gosport	Portsmouth	Havant	East Hampshire	Isle of Wight	Marginal	Buffer	External	Total
New Forest	61436	4494	17068	5616	3763	1315	123	1178	619	85	16	12700	5946	2447	116806
Test Valley	4663	20112	19759	11873	4508	851	67	413	248	40	21	2803	5011	1241	71608
Southampton	17062	19235	226795	46972	11435	11664	488	4647	2321	378	80	7451	10346	5839	364712
Eastleigh	5693	12376	47169	94730	25213	12327	642	5041	2116	286	22	4264	7418	5767	223064
Winchester	3797	4741	11987	24312	59444	14837	1840	7729	7528	908	48	8038	19441	10838	175486
Fareham	1297	875	11879	11970	14688	102111	21089	23542	9505	776	12	2359	2275	3638	206018
Gosport	124	70	543	642	2039	21237	65277	3840	1301	103	9	397	266	702	96550
Portsmouth	1033	381	4776	4685	7363	22560	3836	229132	35946	6015	373	8804	3522	8597	337024
Havant	550	239	2522	2117	7619	9142	1190	34410	111534	16865	55	20049	4010	7278	217579
East Hampshire	103	48	456	338	911	828	110	7295	18636	6121	16	3278	1178	2064	41380
Isle of Wight	13	20	59	21	49	12	9	256	55	16	240651	114	65	789	242130
Marginal	12824	2950	7089	4082	7940	2640	420	9517	20315	3274	208	39816	18126	12855	142055
Buffer	5863	5581	10622	7628	19570	2520	311	4055	4645	1206	78	17740	5899	23088	108806
External	2213	1363	6402	6346	11605	3758	716	9333	7952	2129	926	12608	20929	33623	119901
Total	116668	72485	367126	221332	176149	205803	96116	340388	222720	38202	242513	140421	104429	118766	2463119

2019 12hr (Highway)	New Forest	Test Valley	Southampton	Eastleigh	Winchester	Fareham	Gosport	Portsmouth	Havant	East Hampshire	Isle of Wight	Marginal	Buffer	External	Total
New Forest	60980	4786	16970	5972	3724	1495	164	1499	752	106	17	12747	6074	2381	117669
Test Valley	5076	22232	22012	13040	4909	1102	107	584	327	49	23	3177	5667	1257	79562
Southampton	17212	21574	238898	49488	11791	12789	897	5577	2713	456	96	7839	11178	6493	387002
Eastleigh	6056	13704	49354	95427	25628	12977	1213	5803	2422	334	25	4654	8084	5737	231417
Winchester	3715	5173	12206	24757	58678	15197	2177	9494	8904	1194	49	8632	20350	10342	180868
Fareham	1468	1145	12955	12692	15036	100909	23001	23738	9778	849	13	2518	2508	3512	210121
Gosport	170	120	958	1206	2350	22922	70027	5207	1938	175	9	558	316	698	106654
Portsmouth	1315	550	5673	5406	9191	23169	5464	232087	36927	6576	508	9666	4166	11360	352059
Havant	661	311	2892	2388	8885	9418	1834	35213	113967	18308	58	21399	4376	6866	226576
East Hampshire	124	58	531	385	1191	890	190	7640	20750	6743	17	3510	1275	1951	45255
Isle of Wight	14	22	73	26	50	13	9	393	59	17	257838	129	72	809	259525
Marginal	12886	3315	7369	4400	8531	2802	571	10234	21827	3538	237	42272	19255	12751	149988
Buffer	5970	6251	11265	8167	20357	2762	366	4694	5072	1312	87	18811	6405	23809	115330
External	2092	1379	6541	6200	11055	3605	708	11518	7532	2031	944	12404	21300	33062	120370
Total	117738	80620	387698	229554	181377	210051	106729	353680	232968	41688	259921	148317	111027	121027	2582395

2026 12hr (Highway)	New Forest	Test Valley	Southampton	Eastleigh	Winchester	Fareham	Gosport	Portsmouth	Havant	East Hampshire	Isle of Wight	Marginal	Buffer	External	Total
New Forest	65313	5583	18557	6320	3788	1682	194	1654	779	109	20	13669	6578	2627	126873
Test Valley	6009	23950	25419	14031	5241	1306	146	724	359	51	26	3532	6172	1396	88361
Southampton	19786	25425	271102	53869	13276	14484	1219	6170	2778	469	129	8662	12719	7682	437770
Eastleigh	6502	14871	53126	97380	27017	14826	1469	6408	2546	348	27	4866	8583	6233	244202
Winchester	3808	5614	13510	26156	59153	17334	2812	11352	9735	1406	48	8921	21886	11216	192950
Fareham	1631	1337	14223	14015	16855	104689	25872	26780	10400	958	14	2658	2713	3802	225947
Gosport	204	163	1263	1432	2976	25368	82781	6114	2135	202	12	633	373	805	124462
Portsmouth	1458	702	6323	6077	11058	26673	6538	261543	41144	7404	642	11280	4844	14071	399757
Havant	676	337	2944	2490	9676	10066	2029	39009	117040	18985	61	24255	4653	7274	239493
East Hampshire	127	61	557	409	1396	1021	226	8598	21329	6861	16	3736	1314	2004	47656
Isle of Wight	16	25	98	29	50	14	12	499	62	16	289077	147	83	990	291119
Marginal	13801	3656	7922	4539	8816	2957	644	11742	24399	3747	272	44777	20582	14075	161928
Buffer	6491	6864	12554	8600	21840	3022	435	5377	5396	1360	101	20083	7290	26596	126008
External	2287	1523	7553	6601	11780	3880	812	13997	7847	2079	1133	13563	23415	36091	132559
Total	128112	90111	435151	241948	192921	227321	125189	399966	245948	43994	291578	160782	121205	134862	2839086

Figure 5. Change in 12hr Highway Demand from 2015 by Core Area Authority (2019 & 2026)

2015 to 2019 Diff 12hr (Highway)	New Forest	Test Valley	Southampton	Eastleigh	Winchester	Fareham	Gosport	Portsmouth	Havant	East Hampshire	Isle of Wight	Marginal	Buffer	External	Total
New Forest	-456	291	-97	356	-39	180	41	321	134	21	2	47	128	-66	863
Test Valley	414	2120	2253	1168	401	251	41	171	79	9	2	375	656	15	7955
Southampton	150	2339	12103	2516	356	1125	409	931	393	78	16	387	833	654	22289
Eastleigh	363	1328	2185	697	415	650	571	762	306	48	3	390	667	-30	8353
Winchester	-82	432	219	446	-766	359	337	1765	1376	286	1	594	909	-496	5381
Fareham	172	270	1076	722	347	-1202	1912	195	273	73	1	158	233	-126	4103
Gosport	46	50	415	564	311	1685	4750	1366	637	72	1	161	51	-4	10104
Portsmouth	282	169	897	721	1829	608	1628	2955	982	561	135	861	644	2763	15035
Havant	112	73	370	271	1266	276	644	804	2433	1443	4	1350	365	-412	8997
East Hampshire	21	10	76	47	280	61	81	345	2114	622	1	233	98	-113	3875
Isle of Wight	1	2	14	4	1	1	1	137	4	1	17186	16	7	20	17395
Marginal	62	365	281	318	591	162	151	717	1512	263	29	2456	1129	-104	7933
Buffer	107	670	643	539	787	242	56	639	427	106	9	1071	506	721	6524
External	-121	16	139	-146	-550	-152	-8	2185	-420	-98	18	-204	371	-561	469
Total	1071	8135	20572	8222	5228	4248	10612	13292	10248	3486	17408	7896	6598	2261	119276

2015 to 2019 % Diff 12hr (Highway)	New Forest	Test Valley	Southampton	Eastleigh	Winchester	Fareham	Gosport	Portsmouth	Havant	East Hampshire	Isle of Wight	Marginal	Buffer	External	Total
New Forest	-1%	6%	-1%	6%	-1%	14%	33%	27%	22%	24%	11%	0%	2%	-3%	1%
Test Valley	9%	11%	11%	10%	9%	29%	61%	41%	32%	22%	11%	13%	13%	1%	11%
Southampton	1%	12%	5%	5%	3%	10%	84%	20%	17%	21%	20%	5%	8%	11%	6%
Eastleigh	6%	11%	5%	1%	2%	5%	89%	15%	14%	17%	13%	9%	9%	-1%	4%
Winchester	-2%	9%	2%	2%	-1%	2%	18%	23%	18%	31%	2%	7%	5%	-5%	3%
Fareham	13%	31%	9%	6%	2%	-1%	9%	1%	3%	9%	7%	7%	10%	-3%	2%
Gosport	37%	71%	77%	88%	15%	8%	7%	36%	49%	70%	8%	41%	19%	-1%	10%
Portsmouth	27%	44%	19%	15%	25%	3%	42%	1%	3%	9%	36%	10%	18%	32%	4%
Havant	20%	30%	15%	13%	17%	3%	54%	2%	2%	9%	7%	7%	9%	-6%	4%
East Hampshire	20%	21%	17%	14%	31%	7%	74%	5%	11%	10%	6%	7%	8%	-5%	9%
Isle of Wight	10%	11%	24%	21%	2%	7%	8%	53%	7%	6%	7%	14%	11%	2%	7%
Marginal	0%	12%	4%	8%	7%	6%	36%	8%	7%	8%	14%	6%	6%	-1%	6%
Buffer	2%	12%	6%	7%	4%	10%	18%	16%	9%	9%	12%	6%	9%	3%	6%
External	-5%	1%	2%	-2%	-5%	-4%	-1%	23%	-5%	-5%	2%	-2%	2%	-2%	0%
Total	1%	11%	6%	4%	3%	2%	11%	4%	5%	9%	7%	6%	6%	2%	5%

2015 to 2026 Diff 12hr (Highway)	New Forest	Test Valley	Southampton	Eastleigh	Winchester	Fareham	Gosport	Portsmouth	Havant	East Hampshire	Isle of Wight	Marginal	Buffer	External	Total
New Forest	3877	1088	1490	703	25	367	70	476	160	24	4	970	633	180	10068
Test Valley	1347	3838	5660	2159	734	454	80	310	110	11	5	729	1162	154	16753
Southampton	2724	6190	44307	6897	1841	2820	731	1524	458	91	49	1210	2373	1844	73058
Eastleigh	810	2494	5957	2650	1804	2498	827	1367	430	63	5	602	1166	466	21138
Winchester	11	873	1523	1844	-291	2497	973	3624	2207	497	1	883	2445	378	17464
Fareham	335	462	2344	2046	2166	2578	4783	3237	895	182	2	299	438	164	19929
Gosport	81	93	720	789	937	4132	17504	2273	834	99	3	236	108	104	27912
Portsmouth	426	321	1547	1392	3695	4112	2702	32411	5199	1389	269	2475	1321	5475	62733
Havant	127	99	422	373	2056	924	838	4599	5506	2120	7	4206	643	-5	21914
East Hampshire	25	13	101	71	485	192	116	1303	2693	740	0	459	136	-60	6276
Isle of Wight	4	5	39	8	1	2	3	242	7	0	48426	34	18	201	48990
Marginal	977	706	833	457	876	317	224	2225	4084	472	64	4961	2456	1220	19873
Buffer	628	1283	1932	971	2270	502	125	1322	751	154	23	2343	1391	3508	17201
External	75	161	1151	256	174	122	96	4664	-106	-50	207	954	2486	2468	12658
Total	11444	17626	68024	20616	16772	21518	29072	59577	23227	5792	49065	20360	16776	16097	375967

2015 to 2026 % Diff 12hr (Highway)	New Forest	Test Valley	Southampton	Eastleigh	Winchester	Fareham	Gosport	Portsmouth	Havant	East Hampshire	Isle of Wight	Marginal	Buffer	External	Total
New Forest	6%	24%	9%	13%	1%	28%	57%	40%	26%	28%	29%	8%	11%	7%	9%
Test Valley	29%	19%	29%	18%	16%	53%	120%	75%	44%	27%	26%	26%	23%	12%	23%
Southampton	16%	32%	20%	15%	16%	24%	150%	33%	20%	24%	61%	16%	23%	32%	20%
Eastleigh	14%	20%	13%	3%	7%	20%	129%	27%	20%	22%	23%	14%	16%	8%	9%
Winchester	0%	18%	13%	8%	0%	17%	53%	47%	29%	55%	2%	11%	13%	3%	10%
Fareham	26%	53%	20%	17%	15%	3%	23%	14%	9%	23%	15%	13%	19%	4%	10%
Gosport	65%	134%	133%	123%	46%	19%	27%	59%	64%	96%	40%	59%	41%	15%	29%
Portsmouth	41%	84%	32%	30%	50%	18%	70%	14%	14%	23%	72%	28%	38%	64%	19%
Havant	23%	41%	17%	18%	27%	10%	70%	13%	5%	13%	12%	21%	16%	0%	10%
East Hampshire	24%	28%	22%	21%	53%	23%	106%	18%	14%	12%	2%	14%	12%	-3%	15%
Isle of Wight	28%	25%	66%	35%	1%	15%	40%	94%	12%	2%	20%	30%	29%	25%	20%
Marginal	8%	24%	12%	11%	11%	12%	53%	23%	20%	14%	31%	12%	14%	9%	14%
Buffer	11%	23%	18%	13%	12%	20%	40%	33%	16%	13%	29%	13%	24%	15%	16%
External	3%	12%	18%	4%	2%	3%	13%	50%	-1%	-2%	22%	8%	12%	7%	11%
Total	10%	24%	19%	9%	10%	10%	30%	18%	10%	15%	20%	14%	16%	14%	15%

4.3 Highway Flow

4.3.1 The forecast change between Base and Baseline traffic flows (PCUs) on links are shown for the AM and PM peak hours in Figure 6 to Figure 9. An increase in vehicle flow is highlighted in pink/red and a reduction in blue but as this is a comparison between years, flow increases are most prevalent.

4.3.2 Figure 6 details the difference between 2015 and 2019 in the AM period. An overall increase on the network with a high increase in flows to the north-west of Portsmouth on the M27 can be seen. The highest increase in flows within Portsmouth are forecast along the M275 with northbound increasing by 380 PCUs and southbound by 160 PCUs. The other main arterial routes; A2047 London Road, A288 Copnor Road and A2030 Eastern Road are also forecast an increase in flows peaking at 100 PCUs.

4.3.3 Figure 7 shows the PM peak hour of 2019 compared to 2015. Similar trends are shown to the AM, with overall growth within the network. The M275 sees the greatest increase in flows, however, the directionality is reversed from what was seen in the AM. A total of 150 PCUs can be seen to travel northbound, whilst 440 PCUs are heading southbound. A significant increase in flows can be seen further south in the Western Corridor at A3 Marketway, with a 120 PCU increase southbound. Flows are forecast to increase on the main arterial routes providing north/south movement in Portsea Island.

4.3.4 Figure 8 shows the AM peak hour flow difference for 2015 compared to 2026. An overall trend of increased flows on the network can be seen due to future year development. Within Portsea Island, the M275 is set to see the greatest change in flows with a 900 PCUs increase in northbound flows and 370 PCUs southbound. Arterial roads such as the A3, A288 Copnor Road and A2030 Eastern corridor are forecast to see an increase in flows. This results in increased flows accessing junctions such as Portsbridge roundabout and Eastern Road / Havant Bypass.

4.3.5 Figure 9 shows the PM period comparing 2015 and 2026 flows. Again, the overall trend shows an increase in flows on the network. The M275 is forecast to experience the most prominent increase as southbound flows are forecast to increase by 950 PCUs. Flows along the A3 are forecast to increase by 530 PCUs northbound and 250 PCUs southbound. The A2030 Eastern Road is also forecast to experience an increase of greater than 200 PCUs. Flows are set to increase along all other main arterial routes and within the city centre.

Figure 6. AM Pk Hr 2015 Base v 2019 Baseline Flow Change

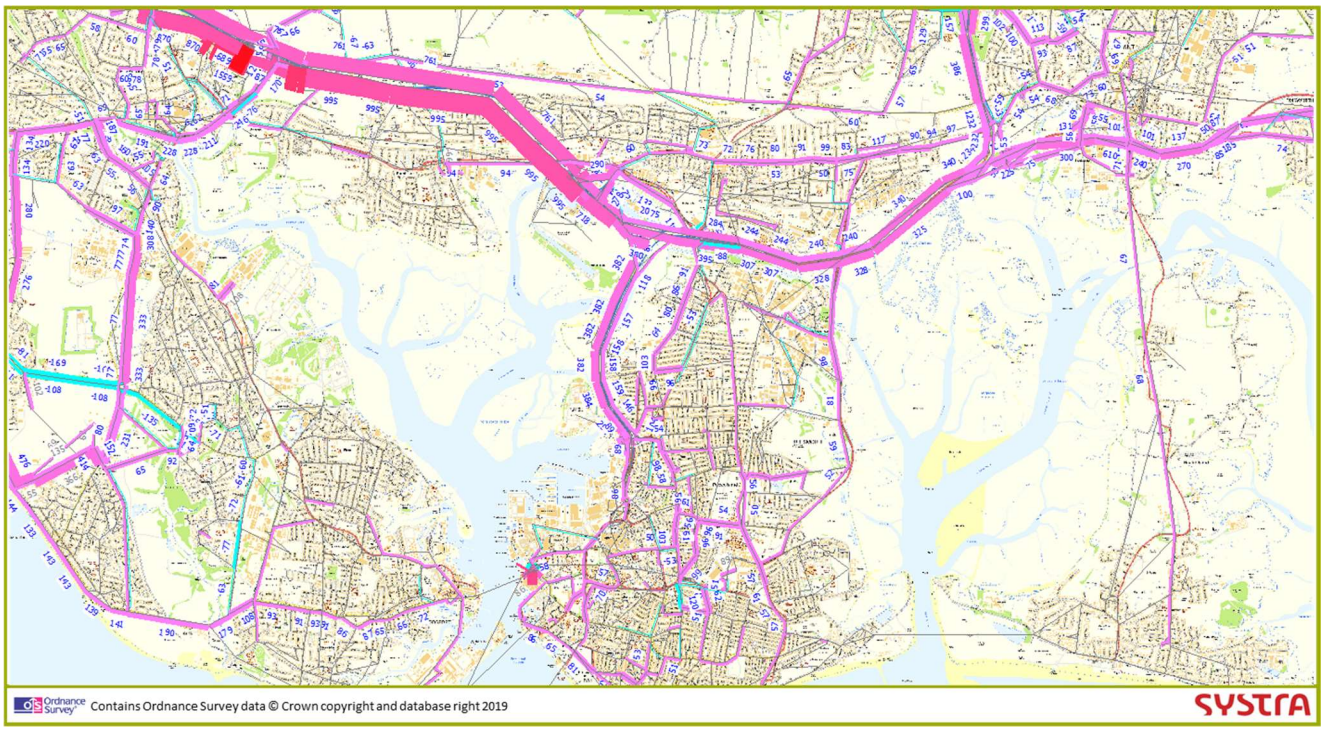


Figure 7. PM Pk Hr 2015 Base v 2019 Baseline Flow Change

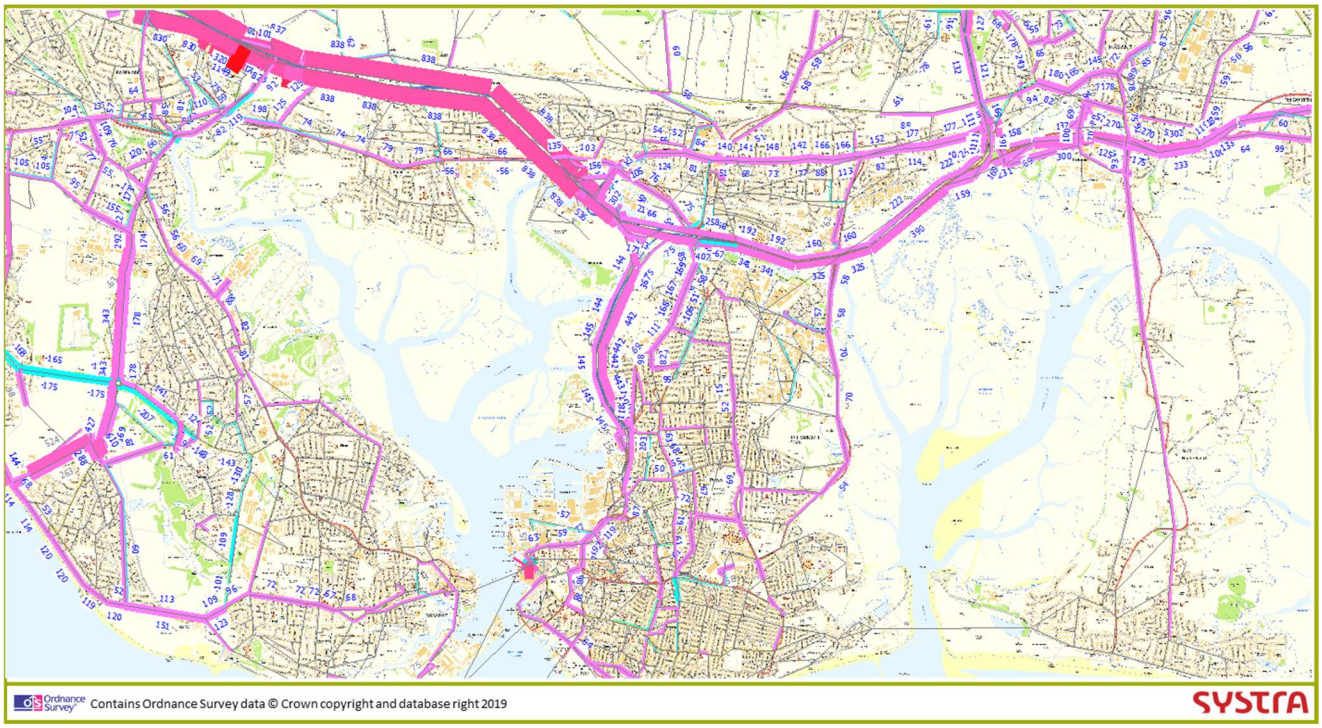


Figure 8. AM Pk Hr 2015 Base v 2026 Baseline Flow Change

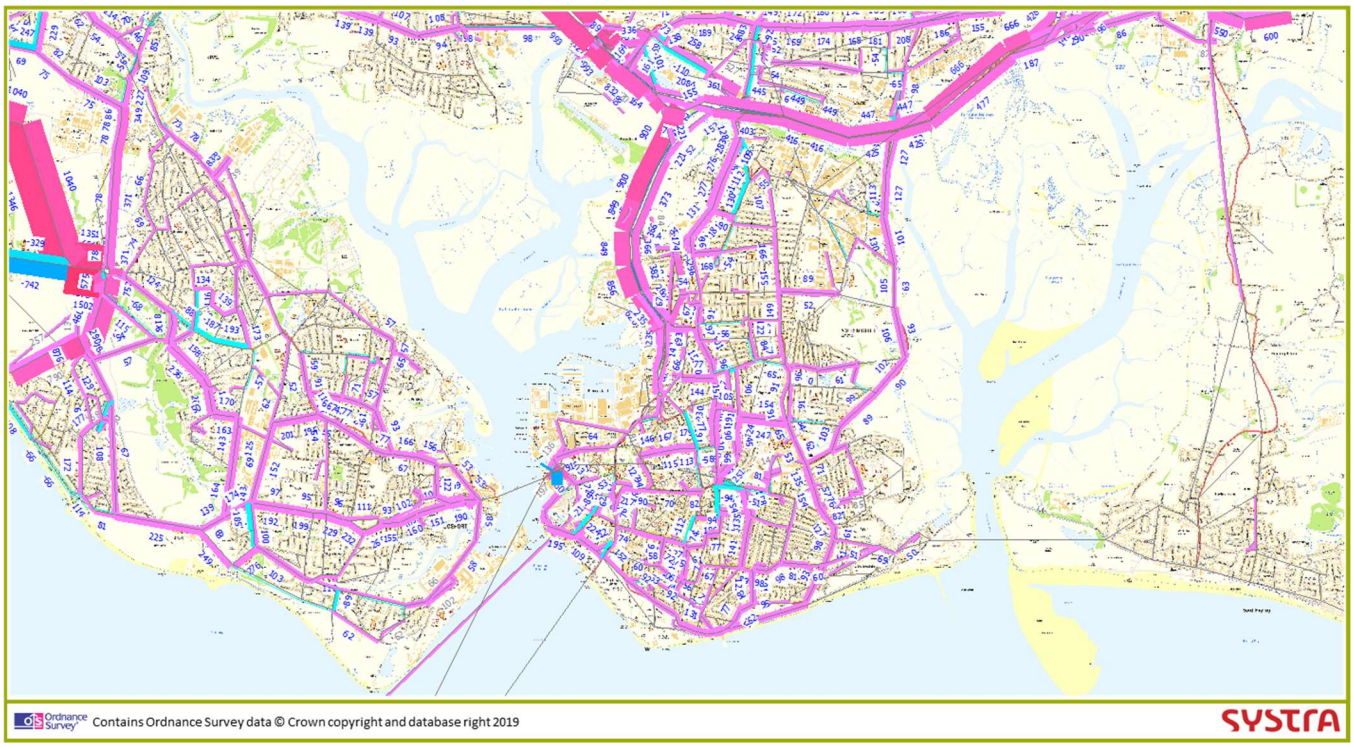
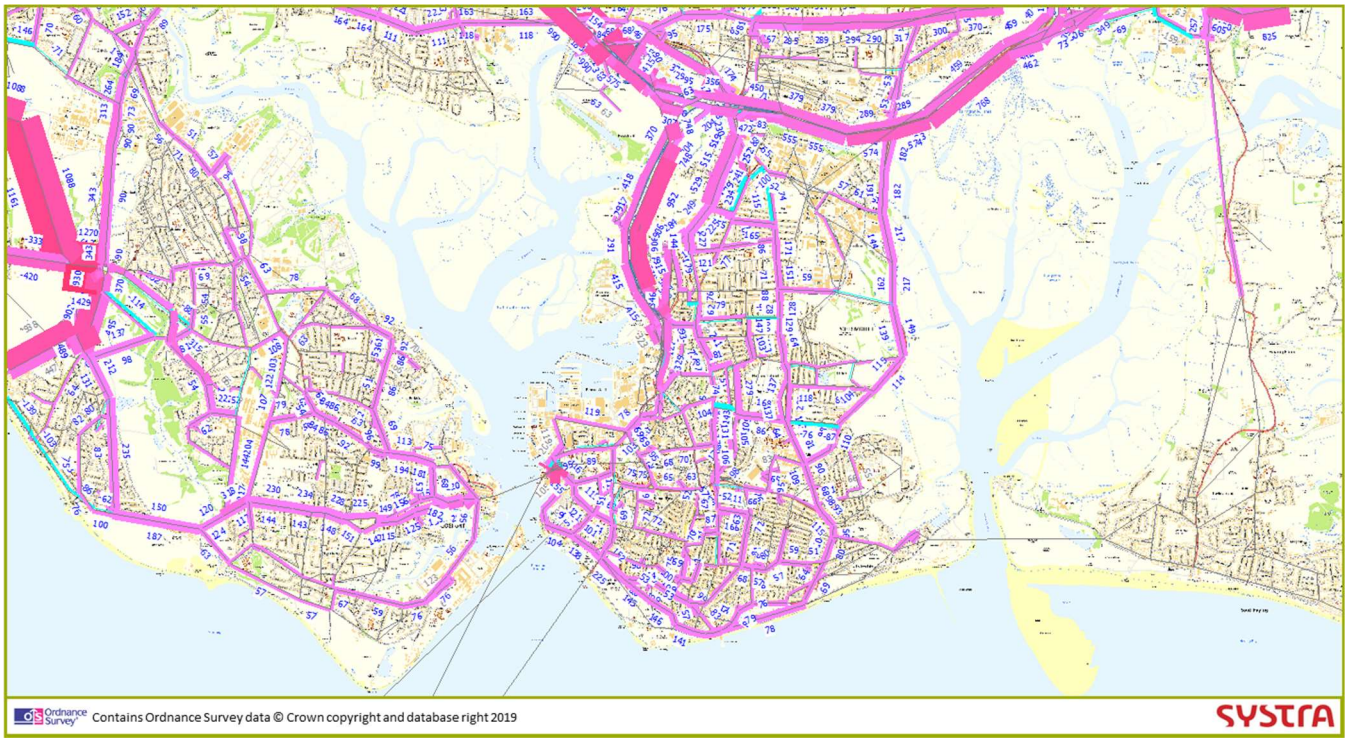


Figure 9. PM Pk Hr 2015 Base v 2026 Baseline Flow Change



4.4 Highway Delays

4.4.1 Figure 10 shows the forecast AM junction delay change in the modelled area between 2015 Base and 2019 Baseline (red indicates a delay increase, green a reduction and blue a neutral impact). A general pattern of delay increase is forecast consistent with traffic growth between model years. Significant average delay can be seen along the Eastern Corridor down to Milton Road, as well as A2047 Copnor Road and A288 London Road. An increase in delays is forecast at modelled exceedance sites such as Portsbridge roundabout and Eastern Road / Havant Bypass roundabout. Delays are forecast to increase in the city centre where a high number of modelled exceedance sites are situated. However, a small delay decrease is forecast at Marketway roundabout.

4.4.2 **Error! Reference source not found.** shows the change in highway delays over time between the Base and the Baseline scenario for the PM peak. It can be seen that the number of junctions experiencing delays during the PM is lower than the AM scenario for 2019, with many junctions forecast to experience existing levels of delay. However, delay increases can still be seen to the north of Portsea Island at Portsbridge roundabout and Eastern Road / Havant Bypass. A reduction in delay is forecast at Church Street roundabout, a modelled exceedance area.

4.4.3 Figure 12 shows the delay change at junctions between the 2015 Base and 2026 Baseline. An overall trend of increase in delay at junctions can be seen in this AM scenario. Once again the main arterial routes of A2030 Eastern Road, A288 Copnor Road and A2047 London Road are set to experience an increase in delays. Delays are also forecast to increase in the city centre where the majority of modelled exceedance sites can be found. Delays are forecast to increase in Southsea along east-west routing via the A2030.

4.4.4 Figure 13 shows the junction delay change between 2015 Base 2026 Baseline in the PM scenario. Once again the overall trend is an increase in delay due to increased demand in the future year. Less junctions are forecast to suffer from delay increases in the City Centre compared to the AM, most notably the omission of Hope Street roundabout.

4.4.5 Figure 27 to Figure 30 show the forecast junction delay between the Baseline and CAZ C within years 2019 and 2026. It can be seen that there is very little difference between the Baseline and CAZ C benchmark scenario in terms of changes in junction delay, as the majority of junctions remain neutral between both scenarios.

4.4.6 Figure 38 to Figure 41 show the forecast junction delay between the Baseline and CAZ C within years 2019 and 2026. It can be seen in the 2019 AM that junctions around the CAZ B area are forecast to experience a reduction in delays on the perimeter of the CAZ. This is consistent across both 2019 and 2026 in the AM and PM. One junction that is forecast to consistently reduce delays in the CAZ B scenario is King Street roundabout, this is largely due to a high V/C in the Baseline and it being a particularly volatile junction.

4.4.7 Figure 40 shows a number of junctions are forecast to experience an increase in delays during the 2019 PM. This is the only scenario in which this is forecast to happen, these delay increases on the most part are minor. The most significant increase in delay can be seen at Cambridge Road roundabout, which incidentally is a single junction away from Kings Road roundabout.

Figure 10. AM Pk Hr 2015 Base v 2019 Junction Delay Change (>15 seconds)

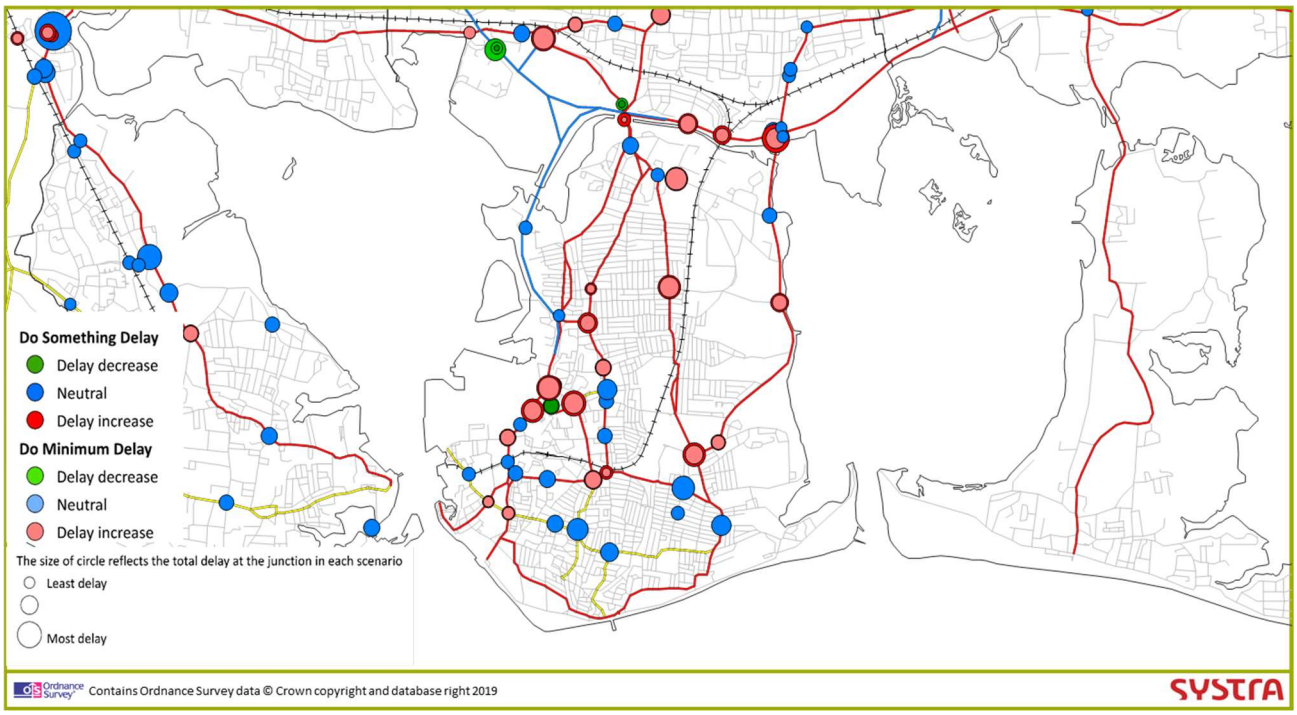


Figure 11. PM Pk Hr 2015 Base v 2019 Junction Delay Change (>15 seconds)

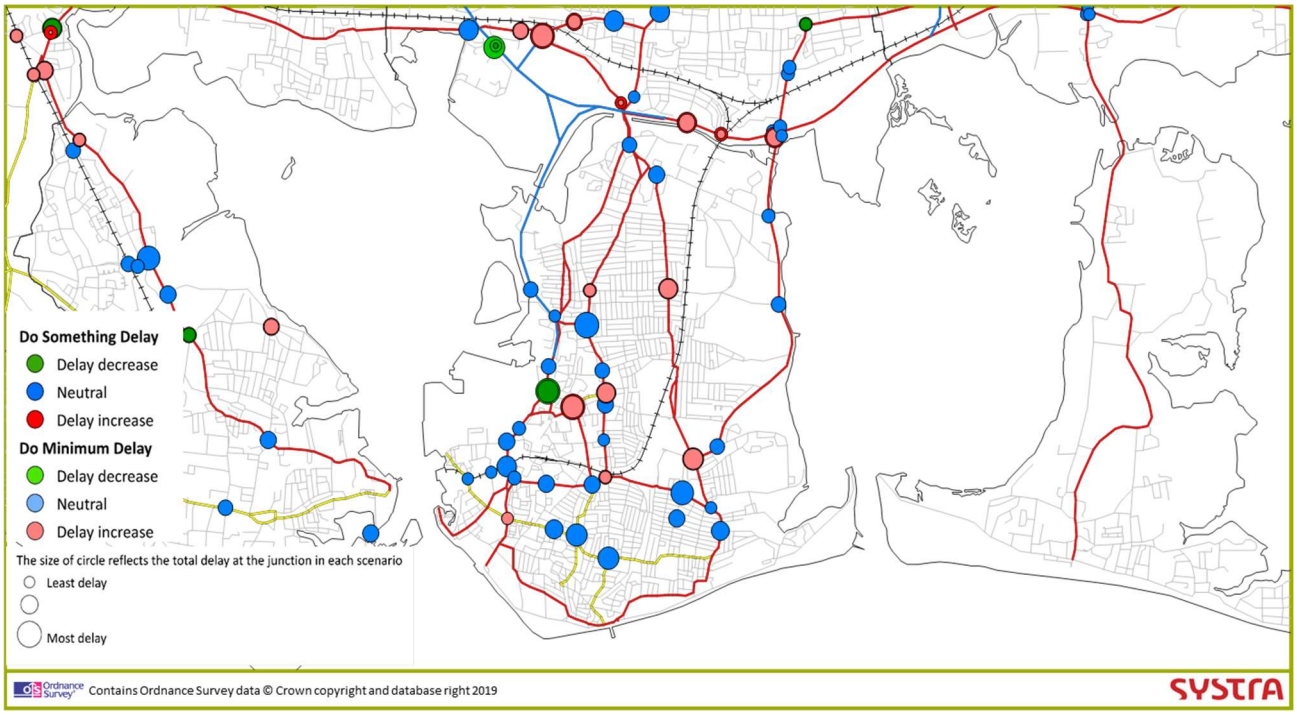


Figure 12. AM Pk Hr 2015 Base v 2026 Junction Delay Change (>15 seconds)

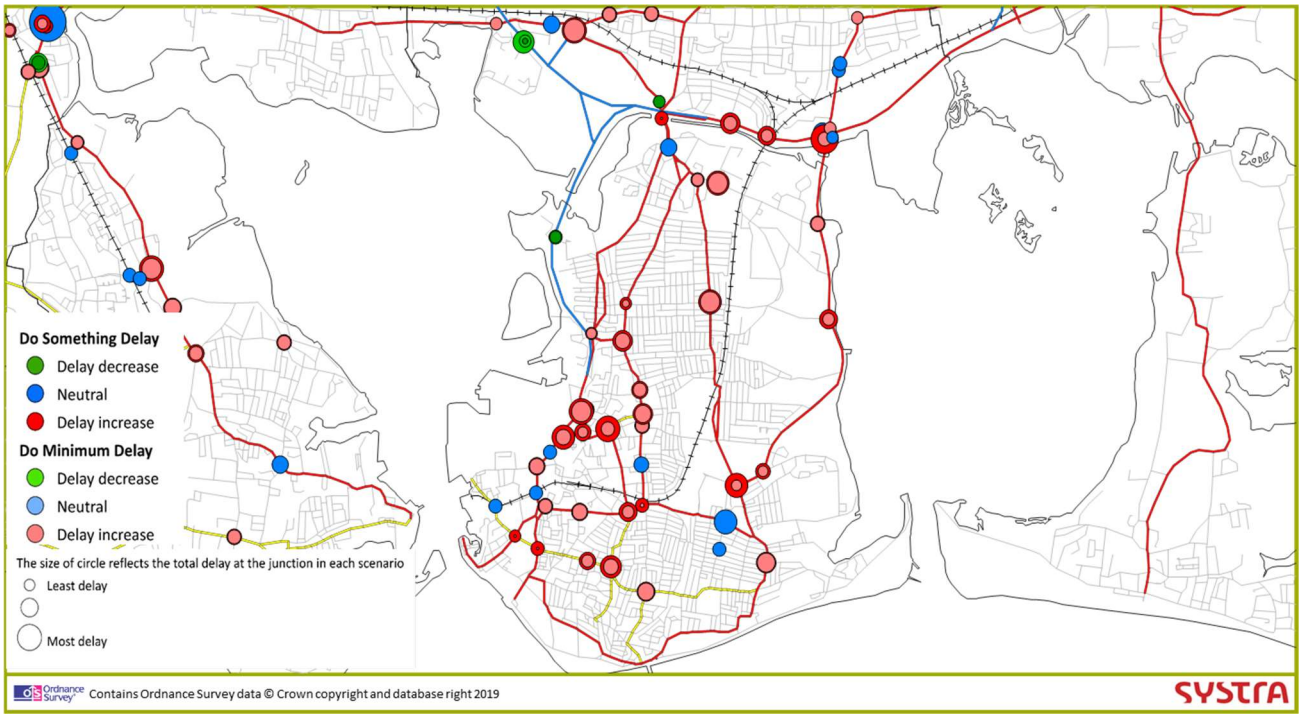
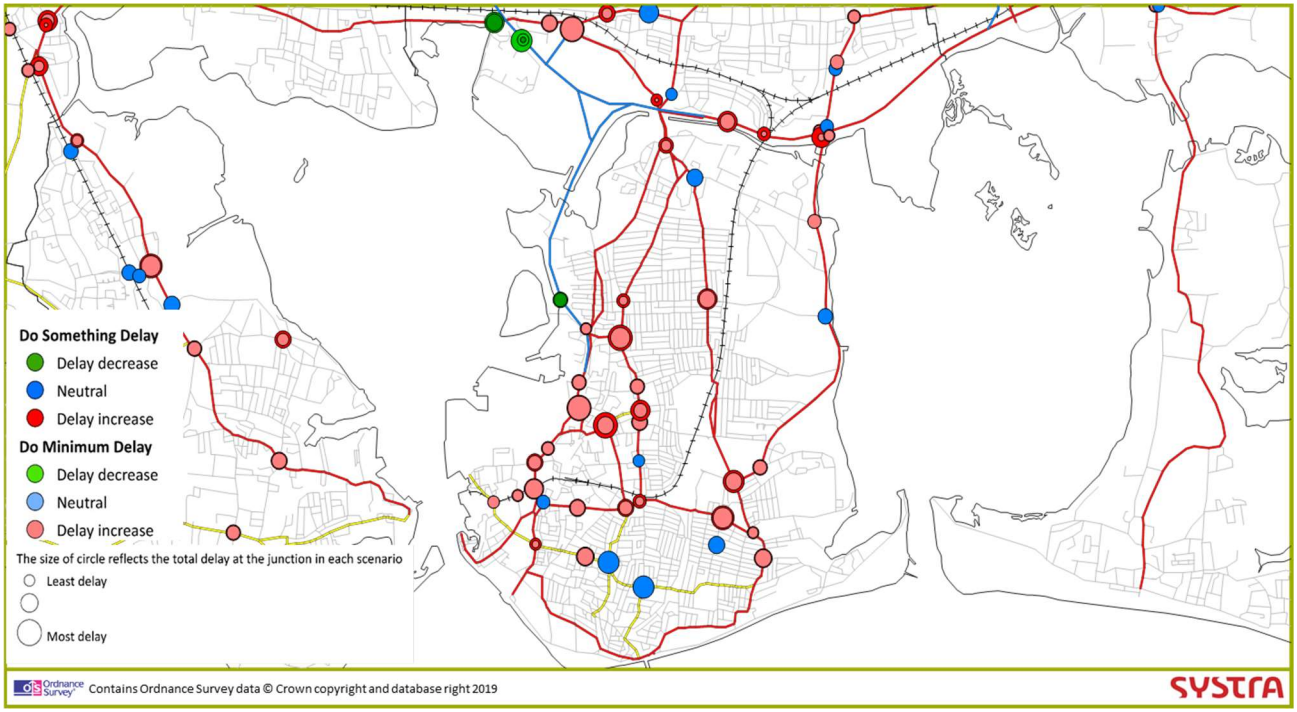


Figure 13. PM Pk Hr 2015 Base v 2026 Baseline Junction Delay Change (>15 seconds)



4.5 Summary RTM Statistics

4.5.1 Figure 15 to Figure 17 give a graphical representation of the following statistics by peak hour and year for Portsmouth District:

- Total Travel Time;
- Total Travel Distance; and
- Average Speed.

4.5.2 The impacts for the above are as would be expected for a highway network accommodating increasing demand through the years without major mitigation. Total travel time and distance increase in all periods and average speed reduces that indicates a network experiencing increasing delay.

4.5.3 In general the statistics are broadly similar for the AM and PM peaks, with the IP having lower total travel time and distance and higher speeds. Again, this is as expected.

Figure 15. Total Travel Time (PCU Hrs) for Portsmouth District

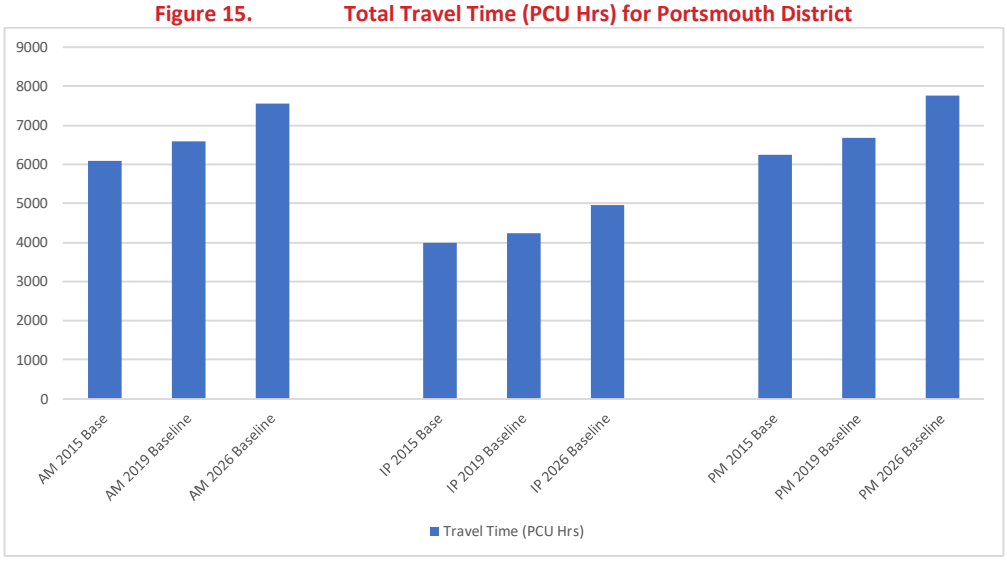


Figure 16. Total Travel Distance (PCU Kms) for Portsmouth District

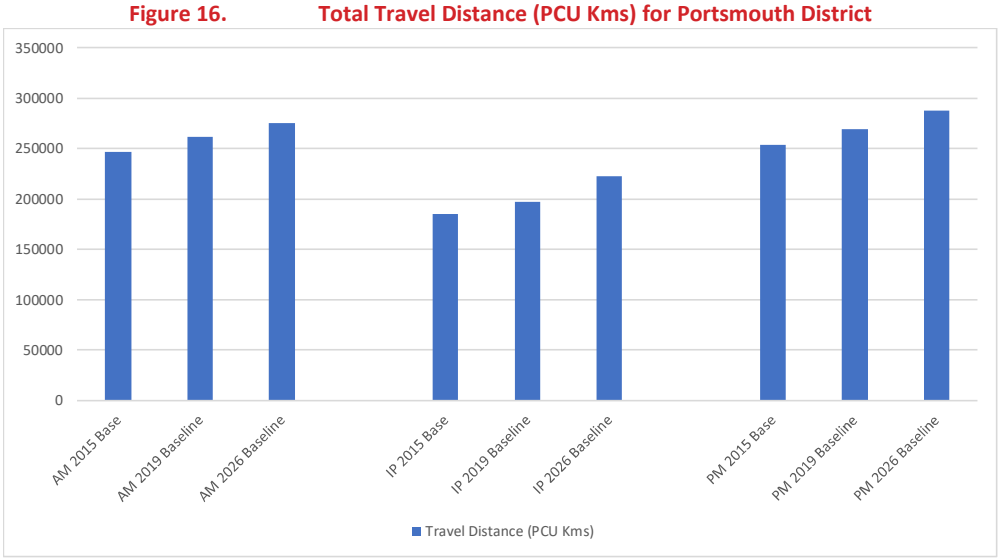
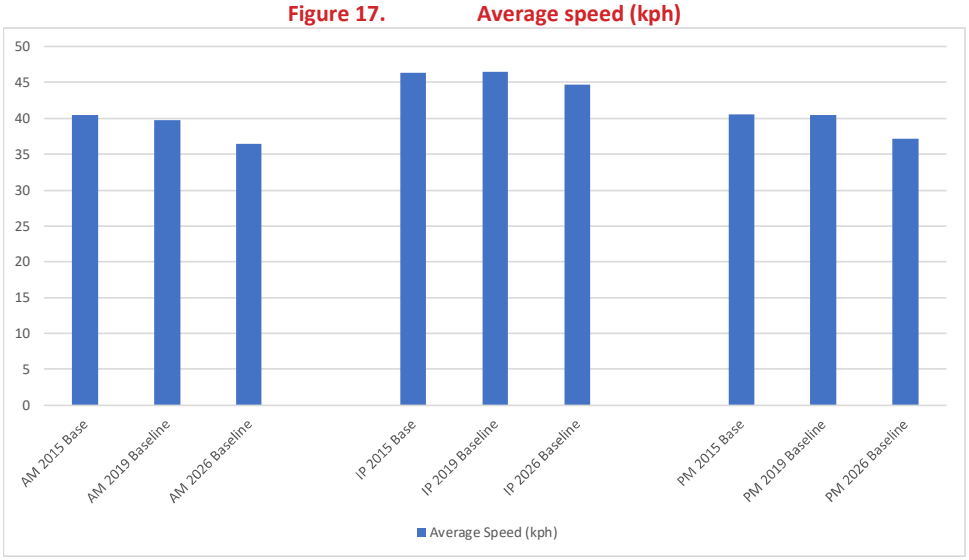


Figure 17. Average speed (kph)



5. CAZ C - BENCHMARK

5.1 Overview

5.1.1 This Chapter focusses on the forecast outputs from the transport model for the benchmark CAZ scheme to reach compliance in the shortest timeframe.

5.2 Benchmark Scheme

5.2.1 Each of the CAZ charging regimes (B to D) have been tested in isolation to determine which achieves compliance without the need for additional measures over and above the charging regime.

5.2.2 Following test scenarios, CAZ C has been identified as the benchmark CAZ scenario for achieving compliance. This band of CAZ requires charges to be applied to non-compliant vehicles in the following categories:

- Buses/ Coaches
- Taxis/ PHVs
- HGVs
- LGVs.

5.2.3 Section 7.2 of document T3 identifies the adaption of the SRTM model to represent complaint and non-compliant vehicle categories for Cars (Business), Cars (Other), LGVs and HGVs. A CAZ C includes for charges applied to the following SRTM user classes: non-compliant LGVs (UC6) and non-compliant HGVs (UC8). Compliance shift for buses, coaches, taxis and PHVs has been applied post-SRTM model for the purpose of the Air Quality models.

5.2.4 The proposed daily CAZ charges have been applied directly to the SRTM. The cost of travelling within the CAZ boundary for each respective non-compliant vehicle can be seen below in Table 2.

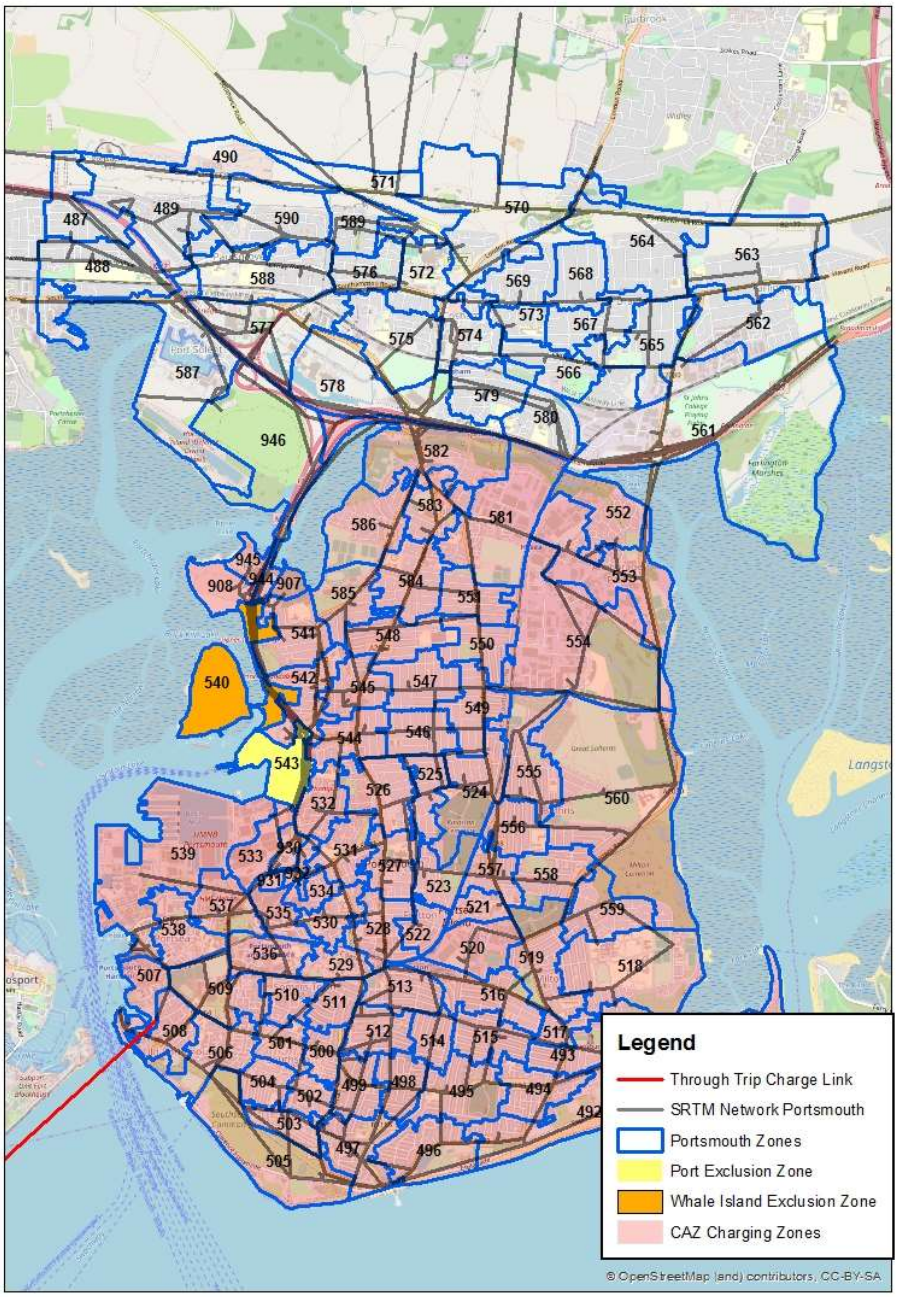
Table 2. CAZ C Daily charges applied to SRTM

VEHICLE TYPE	SRTM USER CLASS	PRICE
LGVs	Non-compliant LGVs (UC6)	£10
HGVs	Non-compliant HGVs (UC8)	£50

5.3 CAZ Boundary

5.3.1 The CAZ boundary can be seen in Figure 18 (the same boundary was applied to all the initial 'stand-alone' CAZ scenarios mentioned in 5.2.1). The CAZ effectively includes the whole of Portsea Island except for movements on the M275 to/from Whale Island and Portsmouth International Port. The Figure shows all model zones within Portsmouth District but it is only those highlighted in pink that are within the CAZ boundary.

Figure 18. Portsea Island CAZ Boundary



5.4 Highway Flow Differences

5.4.1 Figure 19 to Figure 26 highlight the forecast difference at a user class level, focussing on LGVs and HGVs where CAZ C charges have been applied. Red links identify an increase in flow and blue a reduction. Because the CAZ boundary effectively covers the whole of Portsea Island, there is no real alternative route to bypass the charging area. There is a small volume of cancelled trips but for Goods Vehicles, as targeted by a CAZ C, mode shift is not an option. Hence at a headline level the model output flow differences broadly just show the impact of

compliance shift (i.e. reduction in non-compliant vehicle movements and increase in compliant). Due to the results of the shift from compliant and non-compliant broadly mirroring each other, only compliant user classes will have commentary, however, figures are be provided for both.

5.4.2 Figure 19 summarises the forecast difference in compliant LGVs in the AM period. It is forecast that there will be network wide increases in the volume of compliant LGV trips. These are forecast to be felt most prevalently along the M27 as well as the M275 and Eastern Corridor. It can be seen that the increase in PCUs within this user class is forecast to be broadly evenly distributed between the M275 and A2030, 70 PCUs southbound on both routes. It is also forecast that there will be an increase in compliant LGVs accessing the city centre. There is also an increase in compliant LGV journeys forecast from the Anchorage Park area of Portsea Island.

5.4.3 Figure 21 show the forecast difference in compliant HGV flows during the AM peak. Similarly to LGVs there is a network wide increase forecast due to the implementation of a CAZ C, albeit overall volume of HGVs are lower. The effects are forecast to be felt most predominantly along the M27. Within Portsea Island it is once again forecast that the greatest increase in compliant HGVs will be via M275 and A2030 Eastern Road. The industrial area of Anchorage Park is forecast to see a greater volume of compliant vehicles accessing the area following the application of CAZ charges. This trend is mimicked in the City Centre as journeys continue along the M275 into the heart of the City.

5.4.4 Figure 23 shows the forecast difference in compliant LGVs in the PM period. Similarly to the AM period a network wide increase in compliant LGVs is forecast. Again, the main north-south routings accessing the city are forecast to see the greatest impact of this change in flows. A2030 Eastern Road is forecast to see an increase of 60 PCUs travelling northbound, whilst the M275 is forecast to see 50 PCUs travelling in the same direction. The number of compliant LGV northbound journeys leaving the City are forecast to increase more than southbound journeys, the inverse of the AM period.

5.4.5 Figure 25 show the forecast difference in compliant HGVs in the PM period. Similarly to the AM period a network wide increase in compliant HGVs is forecast. The M27 is forecast to see the greatest change in volume of compliant HGVs. An increase in compliant HGVs accessing Portsea Island via the north-south routings of M275 and A2030 Eastern Road can be seen.

Figure 19. Baseline vs CAZ C – Compliant LGVs (2022 AM)

Figure 20. Baseline vs CAZ C – Non-compliant LGVs (2022 AM)

Figure 21. Baseline vs CAZ C – Compliant HGVs (2022 AM)

Figure 22. Baseline vs CAZ C – Non-compliant HGVs (2022 AM)

Figure 23. Baseline vs CAZ C – Compliant LGVs (2022 PM)

Figure 24. Baseline vs CAZ C – Non-compliant LGVs (2022 PM)

Figure 25. Baseline vs CAZ C - Compliant HGVs (2022 PM)

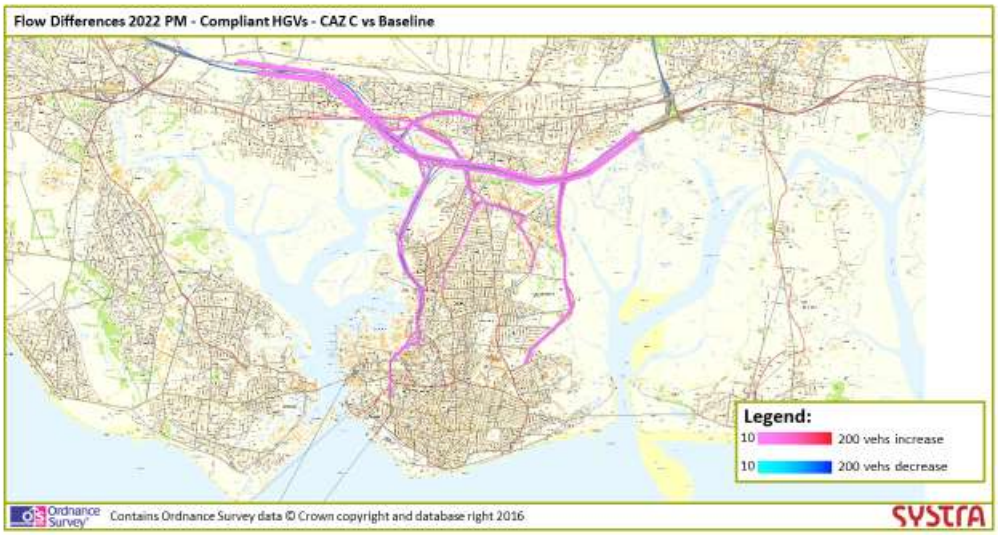


Figure 26. Baseline vs CAZ C – Non-compliant HGVs (2022 PM)

5.5 Highway Delay

5.5.1 Figure 27 to Figure 30 summarise the junction delay change between Baseline and CAZ C Benchmark scenarios (red indicates a delay increase, green a reduction and blue a neutral impact). As noted in Section 5.4.1, the impact of the CAZ C is mainly the compliance shift from non-compliant to compliant vehicles (LGVs and HGVs) with minimal impact on traffic volume itself. It follows that impact on junction delay between the Baseline and Benchmark scenarios would also be minimal and this is borne out in the Figures below with virtually all changes being 'neutral'.

Figure 27. AM Pk Hr 2019 Baseline v 2019 CAZ C Junction Delay Change (>15 seconds)

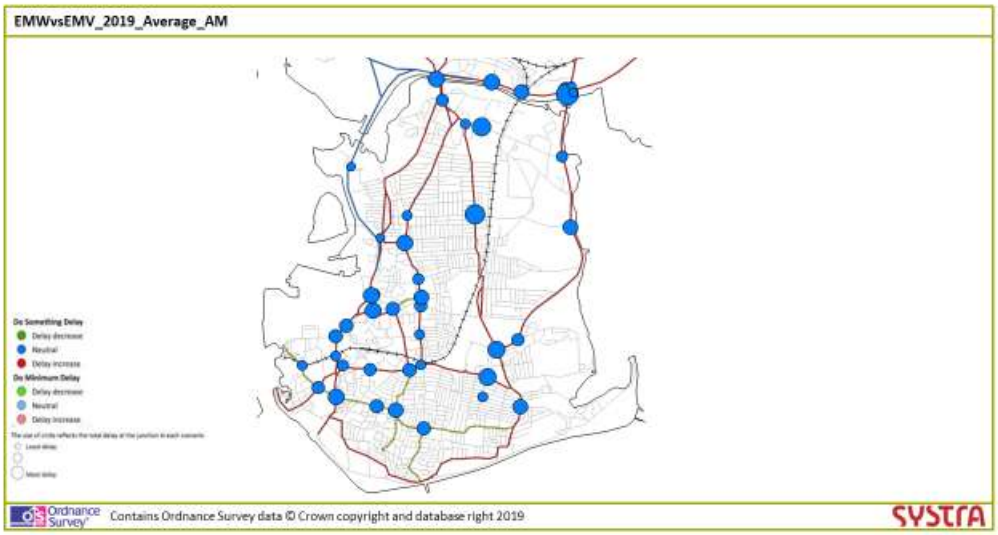


Figure 28. PM Pk Hr 2019 Baseline v 2019 CAZ C Junction Delay Change (>15 seconds)

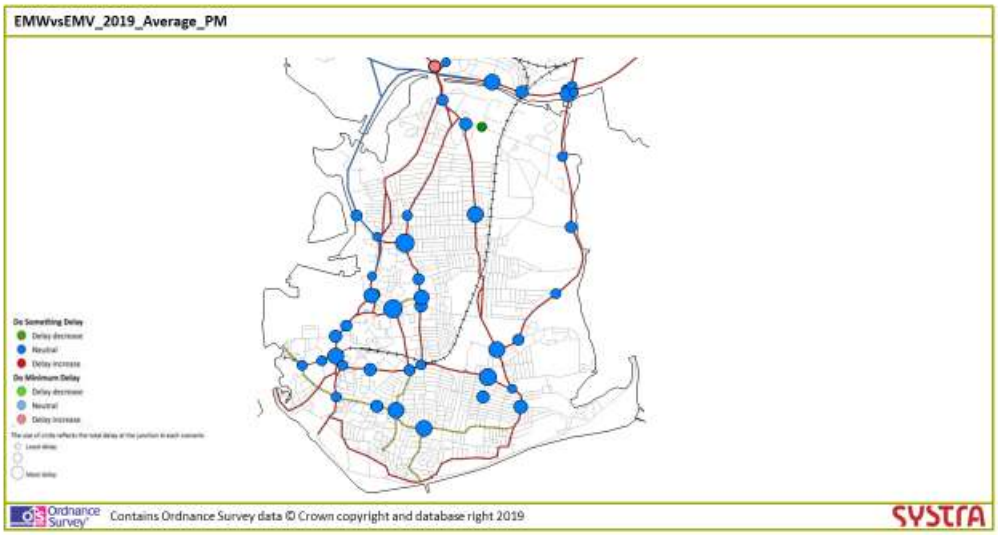


Figure 29. AM Pk Hr 2026 Baseline v 2026 CAZ C Junction Delay Change (>15 seconds)

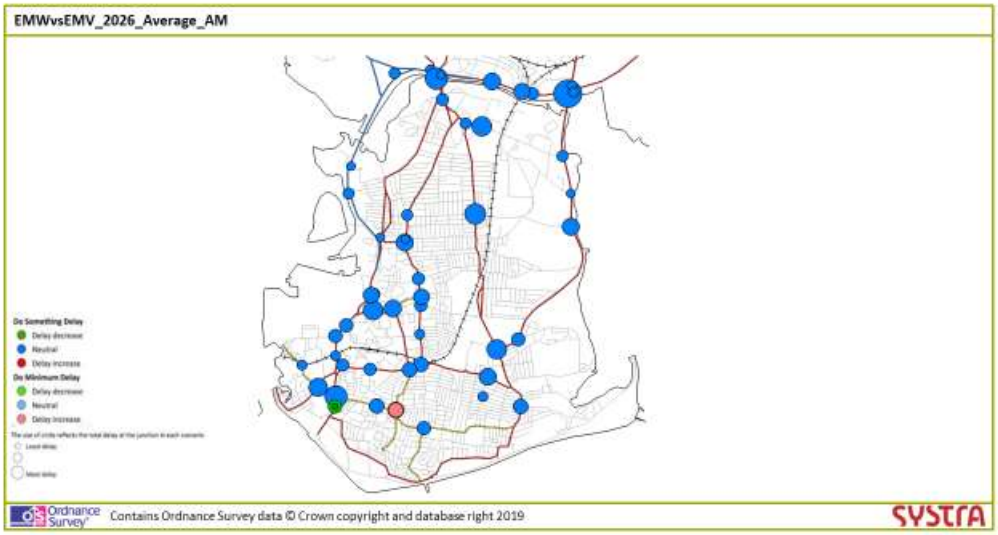
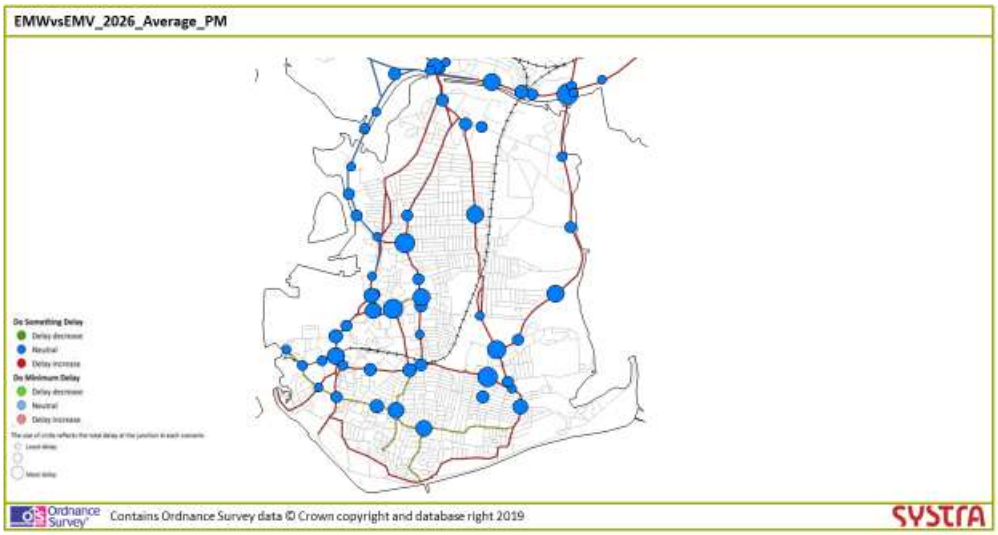


Figure 30. PM Pk Hr 2026 Baseline v 2026 CAZ C Junction Delay Change (>15 seconds)



6. PREFERRED PACKAGE

6.1 Overview

6.1.1 This Chapter focusses on the forecast outputs from the transport model for the preferred package scheme.

6.2 Summary of Preferred Package scheme

6.2.1 The preferred package to achieve air quality compliance includes the following components and are summarised in greater detail below:

- CAZ B City Centre Area
- Parking Measures
- Walking and Cycling Measures
- Alfred Road signal changes (not included in SRTM)
- Other non-charging measures (not included in SRTM)

CAZ B City Centre Area

6.2.2 A CAZ B requires charges to be applied to non-compliant vehicles in the following categories:

- Buses/ Coaches
- Taxis/ PHVs
- HGVs

6.2.3 Section 7.2 of document T3 identified the adaption of the SRTM model to represent complaint and non-compliant vehicle categories for Cars (Business), Cars (Other), LGVs and HGVs. A CAZ B includes for charges applied to the following SRTM user classes: non-compliant HGVs (UC8). Compliance shift for buses, coaches, taxis and PHVs has been applied post-SRTM for the Air Quality models.

6.2.4 The proposed daily CAZ charges have been applied directly to the SRTM. The cost of travelling within the CAZ boundary for each respective non-compliant vehicle can be seen below in Table 3.

Table 3. CAZ B Daily charges applied to SRTM

VEHICLE TYPE	SRTM USER CLASS	PRICE
HGVs	Non-compliant HGVs (UC8)	£50

6.2.5 The boundary applied to the CAZ B scenario can be seen in Figure 31. This represents a smaller charging area than the CAZ C Benchmark and focusses on the areas/ roads where air quality is a particular issue. The CAZ B scenario will enforce charges to any vehicles that have been flagged as having journeys that route via the CAZ area.

6.2.6 The proposed daily CAZ charges have been applied directly to the SRTM. Compliance of HGVs will change as per the calculations in T3. This is calculated by identifying origin and destination of HGV journeys within the SRTM. Those journeys identified as travelling to / from / within the CAZ area are subject to compliance shift.

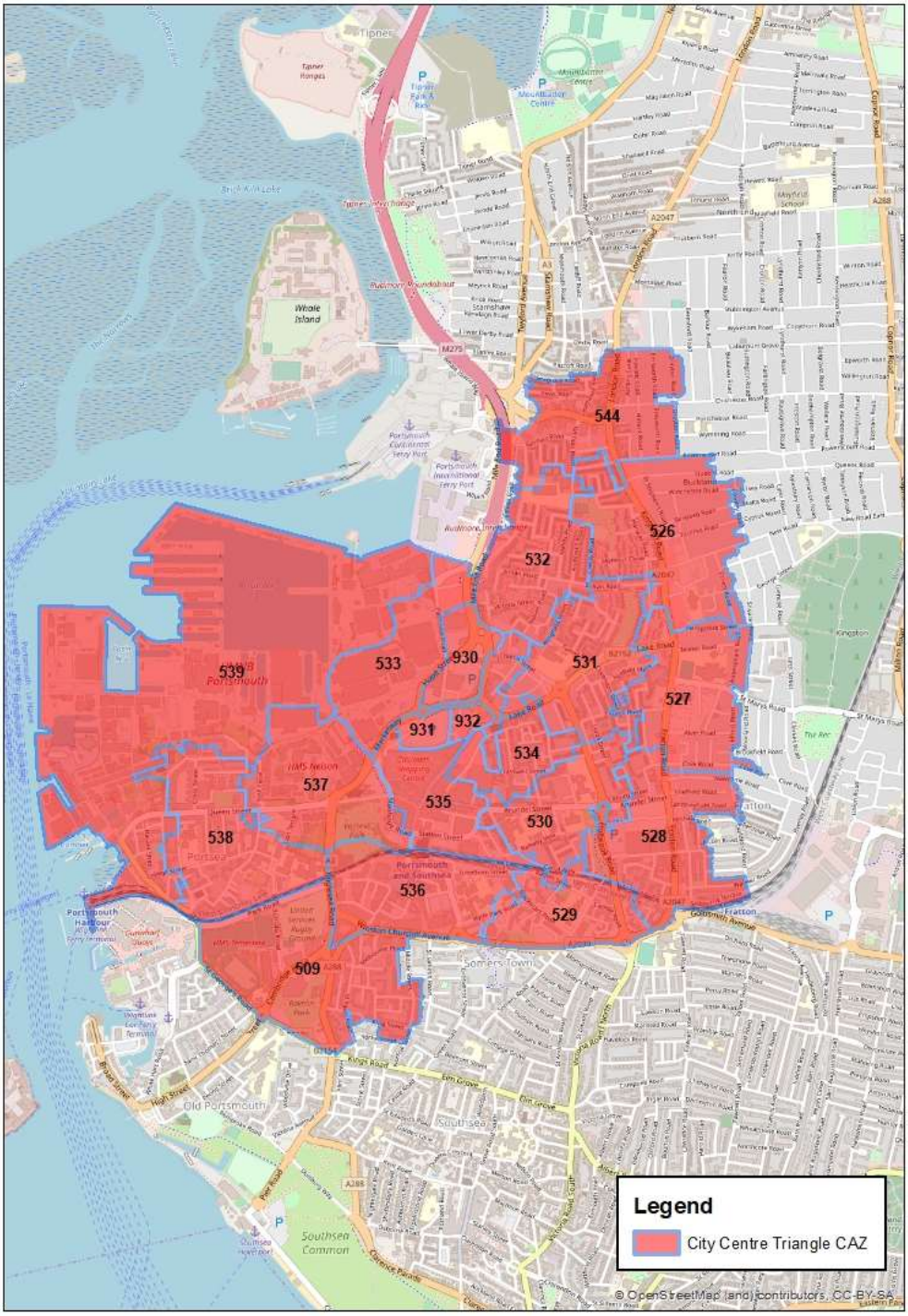


Figure 31. CAZ B Boundary

Parking Measures

6.2.7 The preferred Scenario includes a set of parking measures aimed at reducing the number of highway trips. The parking measures are not specifically aimed at non-complaint vehicles and the impact on such vehicle types will be in proportion to the underlying complaint/ non-complaint vehicle split.

6.2.8 The details of the parking measures and how they have been represented in the Transport Model are included in Section 7.5 of the T3 Methodology document. The measures considered as part of the package are as follows that would be deliverable for 2022 (not all measures result in a change to the model):

- Tipner Park and Ride Fee Restructuring
- Removal of Portsmouth City Council Employee Parking Permit subsidy
- New Policy for Portsmouth University Parking Permits
- Capacity reduction across City Centre Car Parks
- Increased Seafront Parking Charges

Walking and Cycling Measures

6.2.9 As part of the Portsmouth Local Cycling and Walking Infrastructure Plan (LCWIP), a series of corridor based cycling proposals are in development. To replicate the potential impact on mode shift, the Propensity to Cycle (PtC) toolkit has being deployed to determine a forecast reduction in highway users.

6.2.10 Further detail on how these measures have been represented in the Transport Model are included in Section 7.4 of the T3 Methodology document.

Alfred Road signal changes

6.2.11 Changes to the signal timings at Alfred Road/ Queen Street have been included directly in the AQ modelling only.

6.3 Highway Flow Differences

6.3.1 Figure 32 and Figure 33 highlight the forecast flow difference for all user classes for the interpolated year of 2022 in time periods AM and PM. It is forecast that there will be an overall reduction in vehicles accessing the road network within the Portsea Island area. The net reduction in vehicles can be largely attributed to parking and walking and cycling measures (the CAZ B impact is more in terms of compliance than net flow reduction).

6.3.2 In Figure 32 it can be seen that there is an AM reduction in vehilces accessing the zone where PCC employees previously had that subsidised parking at the Brunel MSCP (Zone 536). Figure 32 also shows that overall flows are forecast to be reduced along the southbound arterial routes into Portsea Island. A2030 Eastern Road, A2047 and M275 are all forecast to experience a reductions. In addition to this, east-west routes close to Zone 536, in particular A2030 Winston Churchill Avenue and Arundel Street, are forecast to see a reductions travelling westbound in the AM period.

6.3.3 The implementation of the new parking permit regime at Portsmouth University is forecast to produce reduction of PCUs accessing the zone in the AM period. In the PM it is forecast that there will be an equivalent reduction accessing the network from the zone.

6.3.4 Figure 34 to Figure 37 highlight the forecast difference at a user class level, focussing on HGVs where CAZ B charges have been applied (only flow differences in excess of 10 PCUS are displayed). As a result of compliance shift the forecast overall trend is that the implementation of a CAZ B will result in an increase in compliant HGVs accessing the CAZ area with a comparable reduction in non-compliant HGVs traversing the area.

6.3.5 The impact is most pronounced on the M275 which is expected as this would be one of the main routes for HGVs to/ from the City Centre area. There is limited re-routing of non-compliant vehicles around the CAZ boundary. The CAZ includes the City Centre commercial area, Naval Port and HGV routes to Gunwharf Quays and Wightlink terminals which are some of the larger attractors for HGVs in the area so potential for HGVs rerouting is minimal.

Figure 32. Baseline vs Preferred Package – All User Classes (2022 AM)

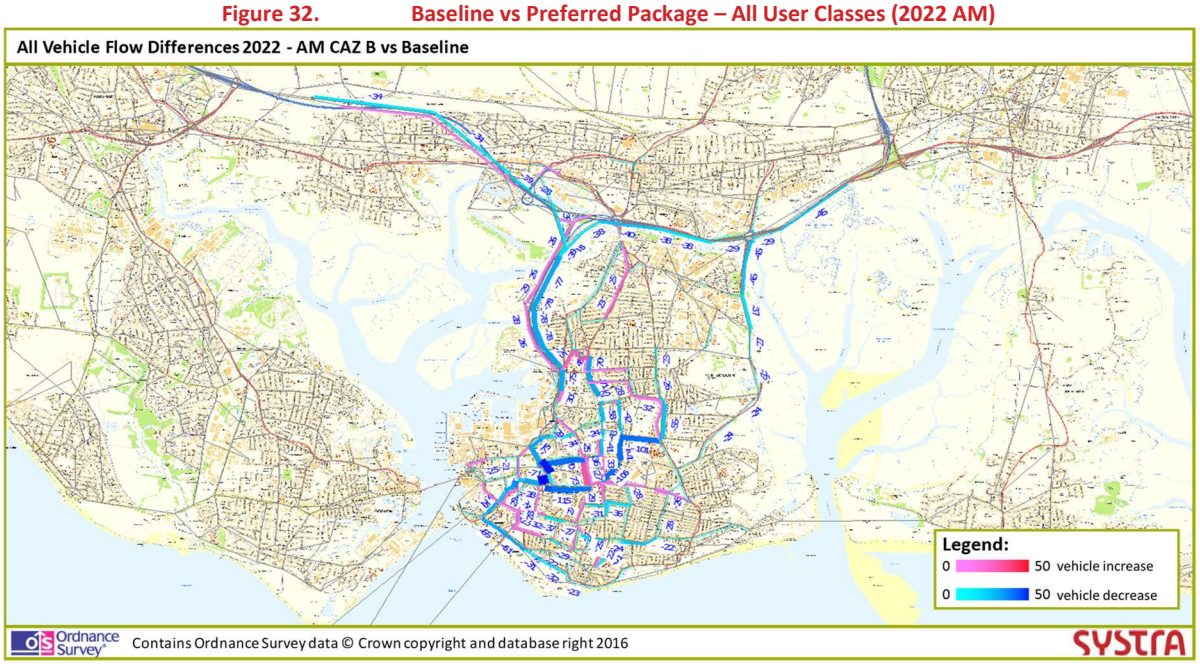


Figure 33. Baseline vs Preferred Package – All User Classes (2022 PM)

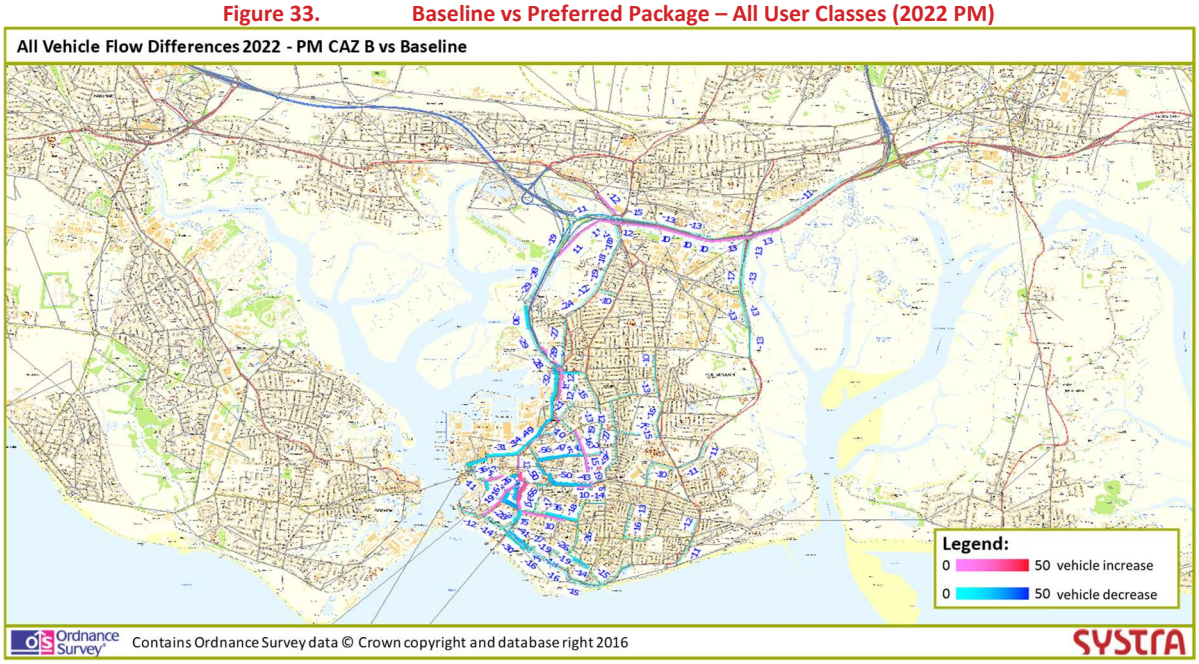


Figure 34. Baseline vs Preferred Package – Compliant HGVs (2022 AM)

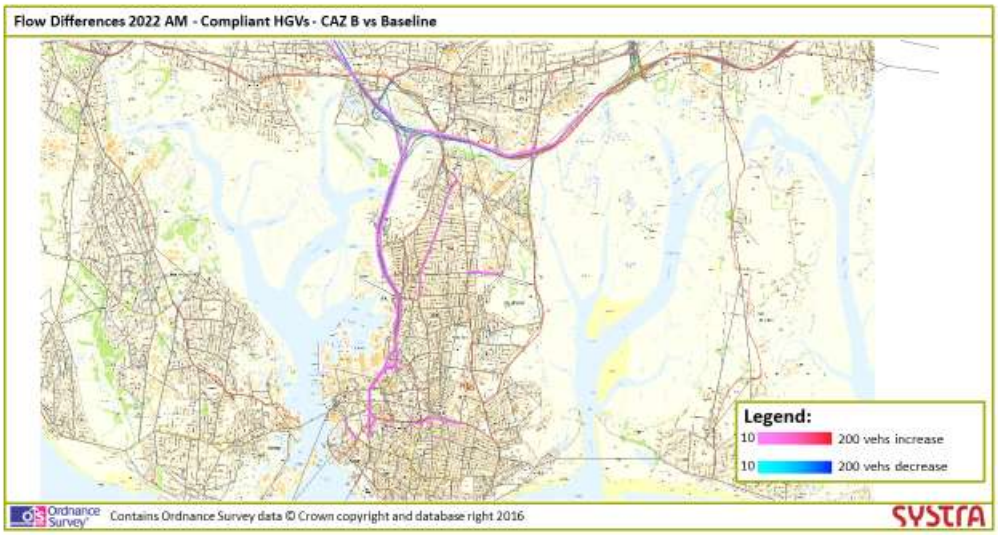


Figure 35. Baseline vs Preferred Package – Non-compliant HGVs (2022 AM)

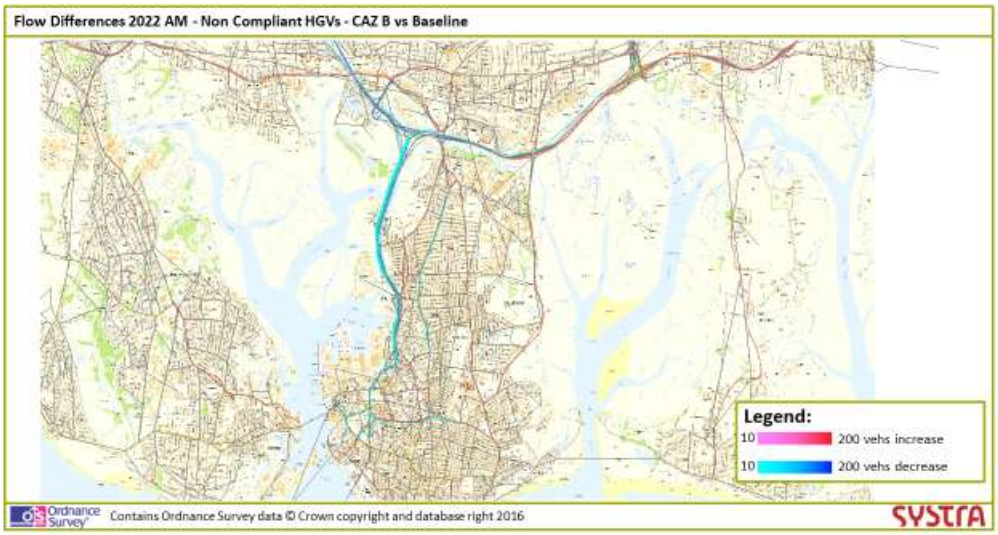


Figure 36. Baseline vs Preferred Package - Compliant HGVs (2022 PM)

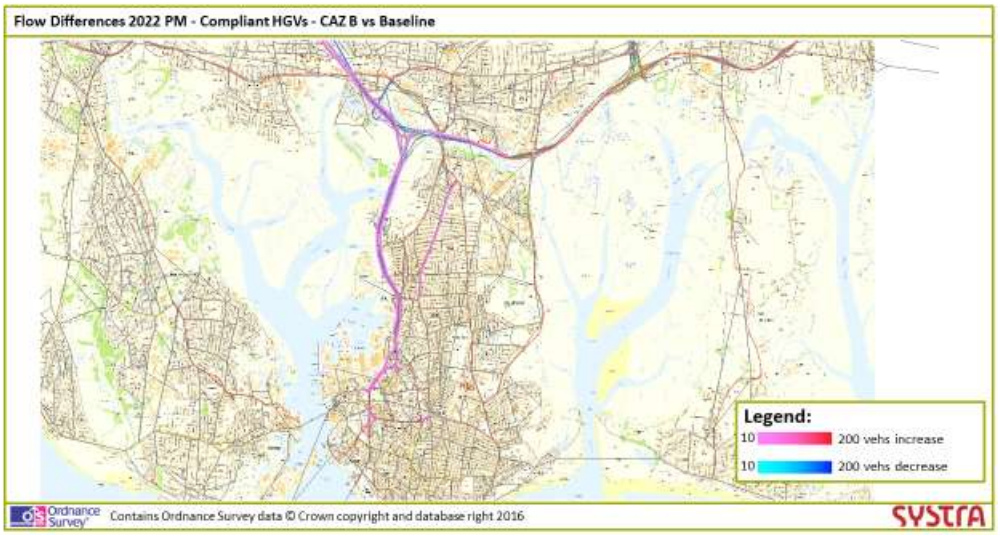
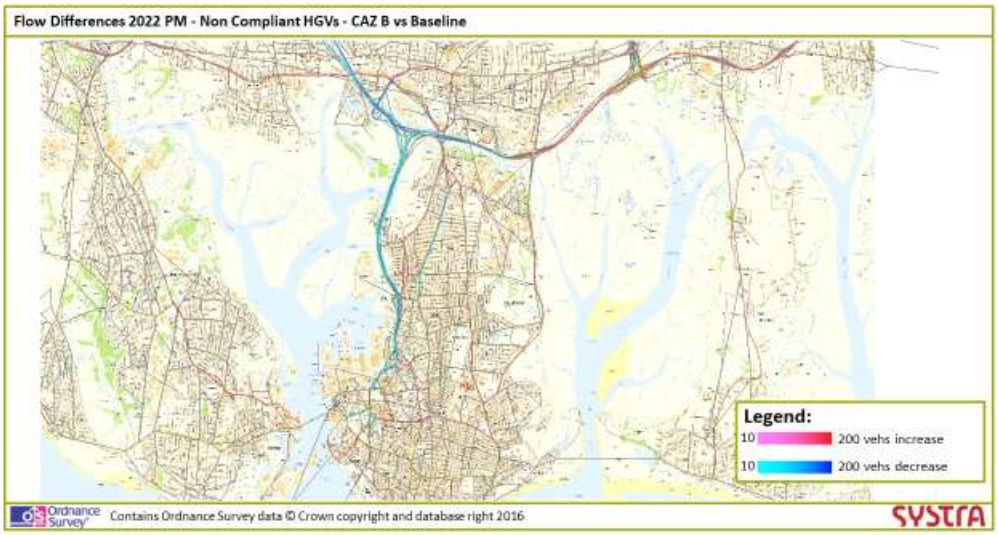


Figure 37. Baseline vs Preferred Package – Non-compliant HGVs (2022 PM)



6.4 Highway Delay

6.4.1 Figure 38 to Figure 41 summarise the junction delay change between Baseline and Preferred Package scenarios (red indicates a delay increase, green a reduction and blue a neutral impact). Similarly to the flow difference plots, it is the Parking and Walking & Cycling schemes that are the main drivers in total flow and delay impacts.

6.4.2 With highway trips being removed from the network as a result of the parking and walking & cycling measures, the general impact is positive with delay reductions albeit the scale is relatively modest. Impacts are more pronounced in the AM peak compared PM with three east-west routes of B2152 Lake Road, A2030 Winston Churchill Avenue, B2154 Kings Road showing the most impact.

Figure 38. AM Pk Hr 2019 Baseline v 2019 Preferred Package Junction Delay Change (>15 seconds)

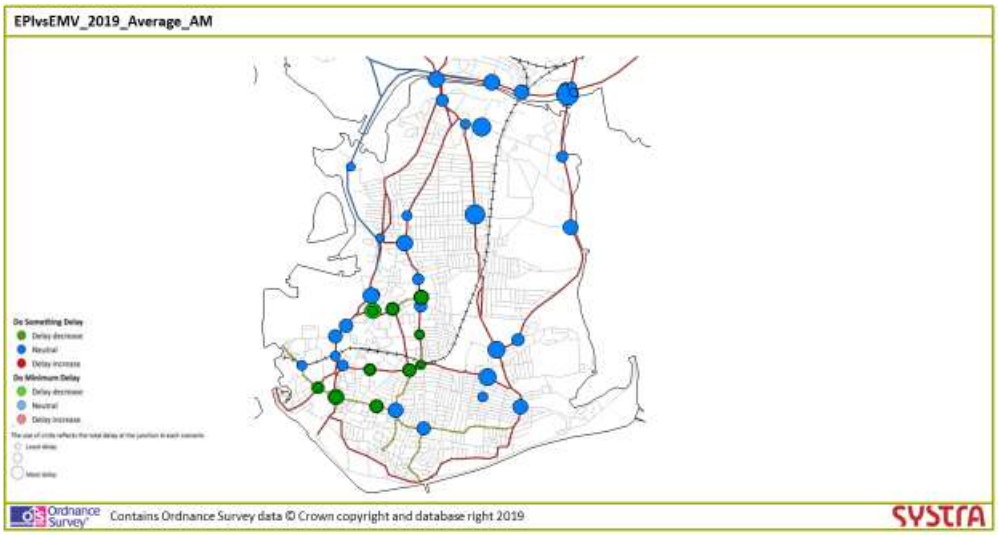


Figure 39. PM Pk Hr 2019 Baseline v 2019 Preferred Package Junction Delay Change (>15 seconds)

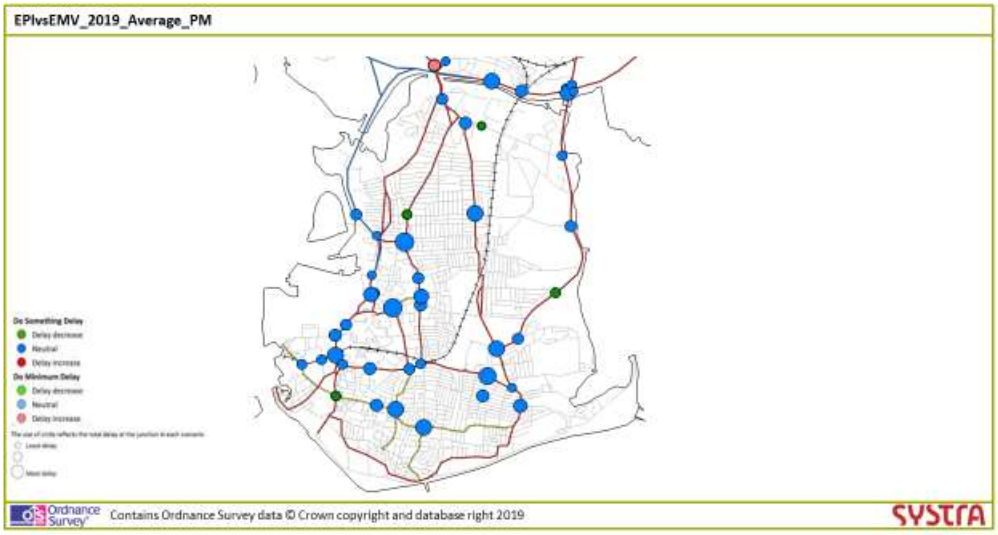


Figure 40. AM Pk Hr 2026 Baseline v 2026 Preferred Package Junction Delay Change (>15 seconds)

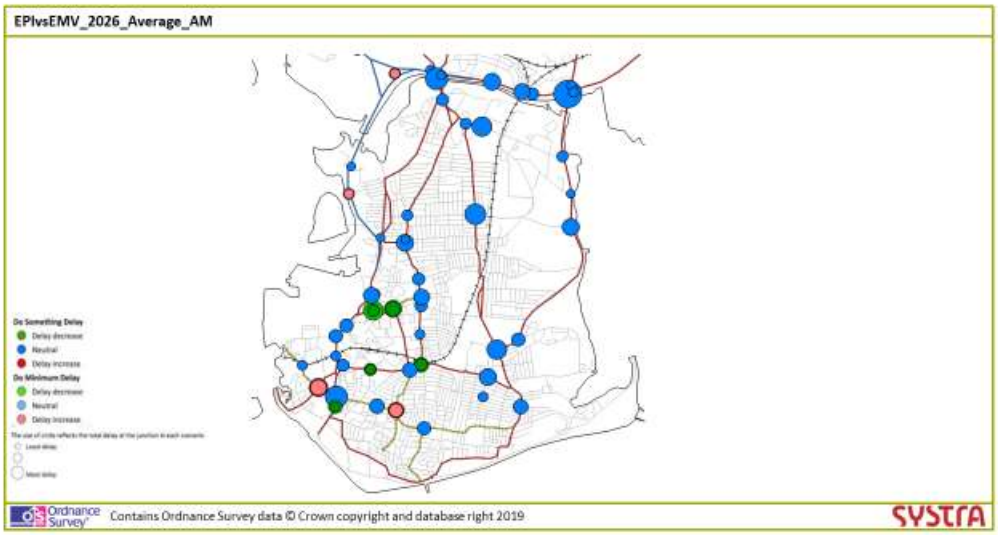
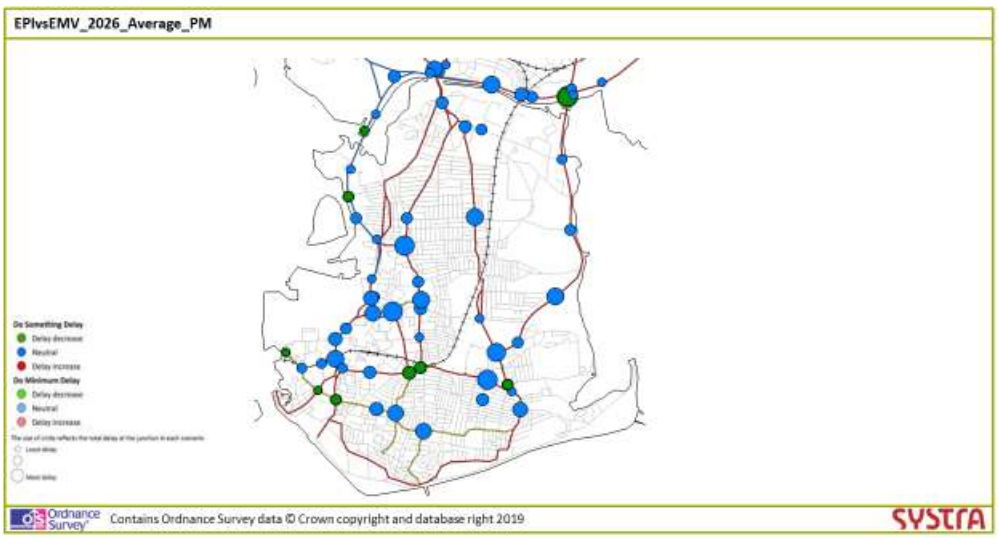


Figure 41. PM Pk Hr 2026 Baseline v 2026 Preferred Package Junction Delay Change (>15 seconds)



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