Development of Bristol Airport to Accommodate 12 mppa

Transport Assessment – Supplementary Document

On behalf of **Bristol Airport Limited**

Bristol Airport
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Project Ref: 44321/5501| Rev: AA | Date: May 2019

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For and on behalf of Peter Brett Associates LLP				

Contents

Figures

Tables

Appendices

1 Introduction

1.1 Introduction

1.1. Peter Brett Associates LLP (PBA) prepared a Transport Assessment (TA) on behalf of BAL to support the planning application for the development of Bristol Airport to accommodate 12 mppa, which was submitted to North Somerset Council (NSC) in December 2018.

1.1.1 This Supplementary Document has been prepared to address comments from highway and transport officers on the submitted TA. For the purpose of simplicity, these are reflected in this document as an updated version of Chapters 8, 10 and 11.

1.1.2 Chapter 8 (Bristol Airport Forecast Travel Demand) of this report provides corrections to tables and figures that were submitted in the TA. For ease of reference, the revised tables and figures have been highlighted.

1.1.3 As agreed during pre-submission discussions with NSC, Highways England and other key stakeholders, an alternative traffic assignment has been carried out. The request was to reflect the potential impact of traffic routing via more local roads as opposed to the strategic signposted routes. This assessment included the following elements:

- An additional link to represent the route between Clevedon Road and the A370 to access the airport through Nailsea.
- Disaggregation of the zone representing North Somerset.

1.1.4 Chapters 10 (Traffic Assignment) and 11 (Residual Highway Impact) of this report detail the results and impacts associated with the alternative traffic assignment.

8 Bristol Airport Forecast Travel Demand

8.1 Introduction

8.1.1 To determine the likely impacts resulting from an increase in passengers of 2 mppa, it is necessary to quantify both the trip generation of the permitted 10 mppa scheme and the 12 mppa proposals.

8.1.2 The 10 mppa scheme was permitted in 2011 and the assessment was based on the forecast flight schedule at that time. There is now a more up-to-date understanding of air traffic volumes and commercial viability of flight routes, and therefore the forecast 10 mppa flight schedule has been updated and used within this assessment. In addition to this, the CAA passenger survey, carried out in 2015, provides a more up to date understanding of passenger trends, which has been used within the trip generation methodology of this TA. application.

8.1.3 As detailed in **Chapter 5.2**, the established baseline of the assessment is 2017, which relates to 8.2 mppa. Comprehensive traffic surveys carried out in July 2018 forms the observed traffic baseline, which relates to a larger number of passengers (~8.6 mppa).

8.1.4 This chapter sets out the approach and methodology adopted for deriving the multi-modal trip generation for the consented 10 mppa (additional 1.8 mppa) and the proposed 12 mppa (additional 2 mppa) at Bristol Airport.

8.2 Passenger Annual Profile

8.2.1 The monthly passenger profiles are based on recorded profile from 2017. This is supported by historic annual trends at Bristol Airport for the past 5 years.

8.2.2 The profiles have been applied to the 10 mppa and 12 mppa scenarios to produce projected annual passenger profiles.

8.2.3 **Table 8.1** sets out the projected annual profile of passenger throughput for 10 mppa, 12 mppa and the difference by month and for an average (mean) day within the month.

Table 8.1: Passenger Profile 10 mppa and 12 mppa - UPDATED

Month	Passenger % per Month	2021 (10 mppa)		2026 (12 mppa)		Difference (2 mppa)	
		Month	Average Day	Month	Average Day	Month	Average Day
January	6.0%	601,049	19,389	721,258	23,266	120,210	3,878
February	6.2%	621,938	22,212	746,325	26,654	124,388	4,442
March	7.2%	722,103	19,516	866,524	23,420	144,421	3,903
April	8.3%	826,225	27,541	991,469	33,049	165,245	5,508
May	9.3%	930,542	30,017	1,116,650	36,021	186,108	6,003
June	10.0%	1,003,266	33,442	1,203,919	40,131	200,653	6,688
July	10.4%	1,038,549	33,502	1,246,259	40,202	207,710	6,700
August	**10.8%**	**1,078,009**	**34,774**	**1,293,611**	**41,729**	**215,602**	**6,955**
September	9.9%	993,392	33,113	1,192,070	39,736	198,678	6,623

Month	Passenger % per Month	2021 (10 mppa)		2026 (12 mppa)		Difference (2 mppa)	
		Month	Average Day	Month	Average Day	Month	Average Day
October	9.2%	917,080	29,583	1,100,496	35,500	183,416	5,917
November	6.2%	623,208	20,774	747,850	24,928	124,642	4,155
December	6.4%	644,640	20,795	773,568	24,954	128,928	4,159
Year	100%	10,000,000		12,000,000		2,000,000	

8.2.4 The Development Proposals are predicted to result in an uplift of 6,955 passengers on average in the month of August.

8.3 Passenger Catchment

8.3.1 Historically, passenger growth at Bristol Airport has been primarily from the South West of England and Wales. Passenger growth for 10 mppa and 12 mppa is forecast to continue in this trend, as BAL are introducing new flight destinations. This will be more attractive to those from the South West of England and Wales, who would otherwise travel further distances to other airports to make these journeys.

8.3.2 For these reasons, growth projections are expected to be met by passengers from the South West of England and Wales only. **Table 8.2** sets out the predicted 10 mppa and 12 mppa growth per area.

Table 8.2: Passenger Origin / Destination (10 mppa & 12 mppa)

Region	2021 10 mppa	2026 12 mppa	Difference 2 mppa
East Midlands	10,994	10,994	0
East of England	11,910	11,910	0
North East	1,832	1,832	0
North West	13,742	13,742	0
Scotland	17,407	17,407	0
South East	105,359	105,359	0
South West	7,773,308	9,383,308	1,610,000
Wales	1,882,975	2,272,975	390,000
West Midlands	162,161	162,161	0
Yorkshire	5,497	5,497	0
Total	**10,000,000**	**12,000,000**	**2,000,000**

8.3.3 **Table 8.3** presents the passenger catchment for an average day in the peak month of August for both the 10 mppa and 12 mppa scenarios. This has been based on the information set out within **Table 8.1** and **Table 8.2**.

Table 8.3: UK Daily Passenger Origin / Destination for the Peak Month of August (10 mppa & 12 mppa) - UPDATED

Region	Passengers per Day in August 10 mppa	Passengers per Day in August 12 mppa	Daily Difference in August
East Midlands	46	56	9
East of England	50	60	10
North East	8	9	2
North West	58	70	12
Scotland	74	88	15
South East	445	534	89
South West	**26,845**	**32,214**	**5,369**
Wales	**6,521**	**7,825**	**1,304**
West Midlands	685	822	137
Yorkshire	23	28	5
Total	**34,755**	**41,706**	**6,951**

Note: Values have been rounded. O/Ds in Ireland have been removed to focus on surface access.

8.3.4 This shows that on an average day in the peak month of August, an additional 5,369 (80%) of the number of additional passengers associated with the Development Proposals have an origin or destination in the South West.

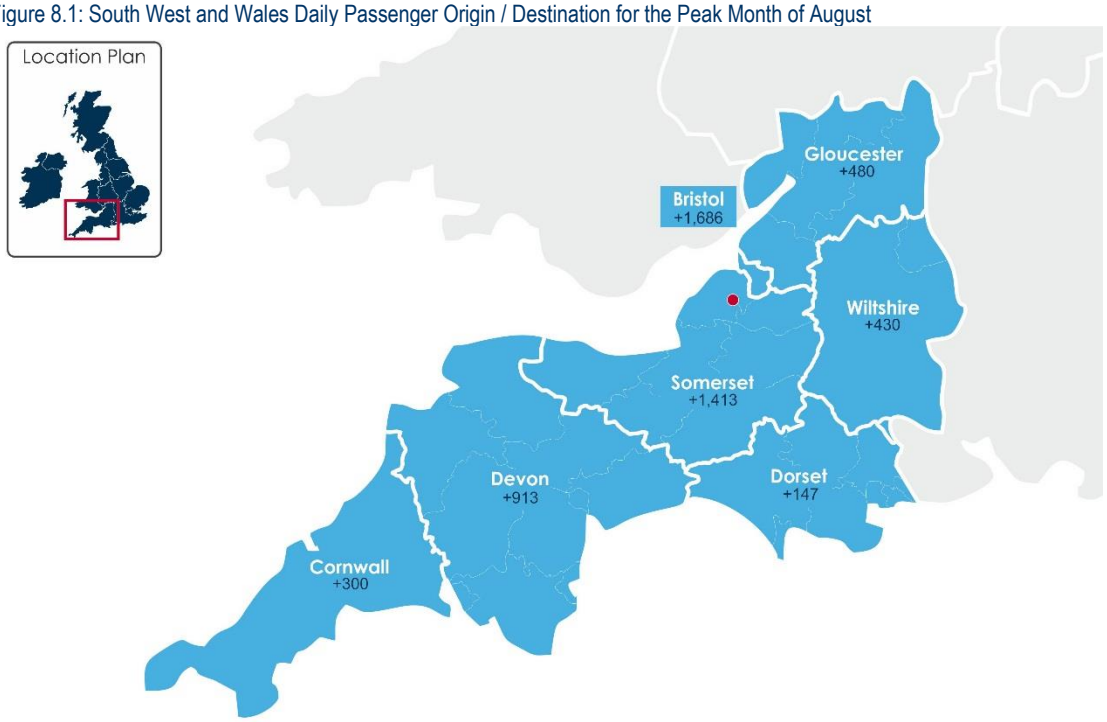
8.3.5 As set out in **Table 8.4**, additional passenger numbers per regional catchment for the South West of England has been determined for the forecast 10 mppa and 12 mppa.

Table 8.4: South West Daily Passenger Origin / Destination for the Peak Month of August (10 mppa & 12 mppa) - UPDATED

South West	Passenger Percentage	Passengers per Day 10 mppa	Passengers per Day 12 mppa	Difference 2 mppa
City of Bristol	31.41%	8,432	10,119	1,686
Cornwall	5.59%	1,502	1,802	300
Devon	17.00%	4,563	5,475	913
Dorset	2.74%	735	882	147
Gloucestershire	8.94%	2,399	2,879	480
Somerset	**26.32%**	**7,066**	**8,480**	**1,413**
Wiltshire	8.00%	2,148	2,577	430
Total	**100.0%**	**26,845**	**32,214**	**5,369**

8.3.6 **Figure 8.1** shows the daily passenger increase in South West and Wales increase because of the Development Proposals for the peak month of August.

Figure 8.1: South West and Wales Daily Passenger Origin / Destination for the Peak Month of August



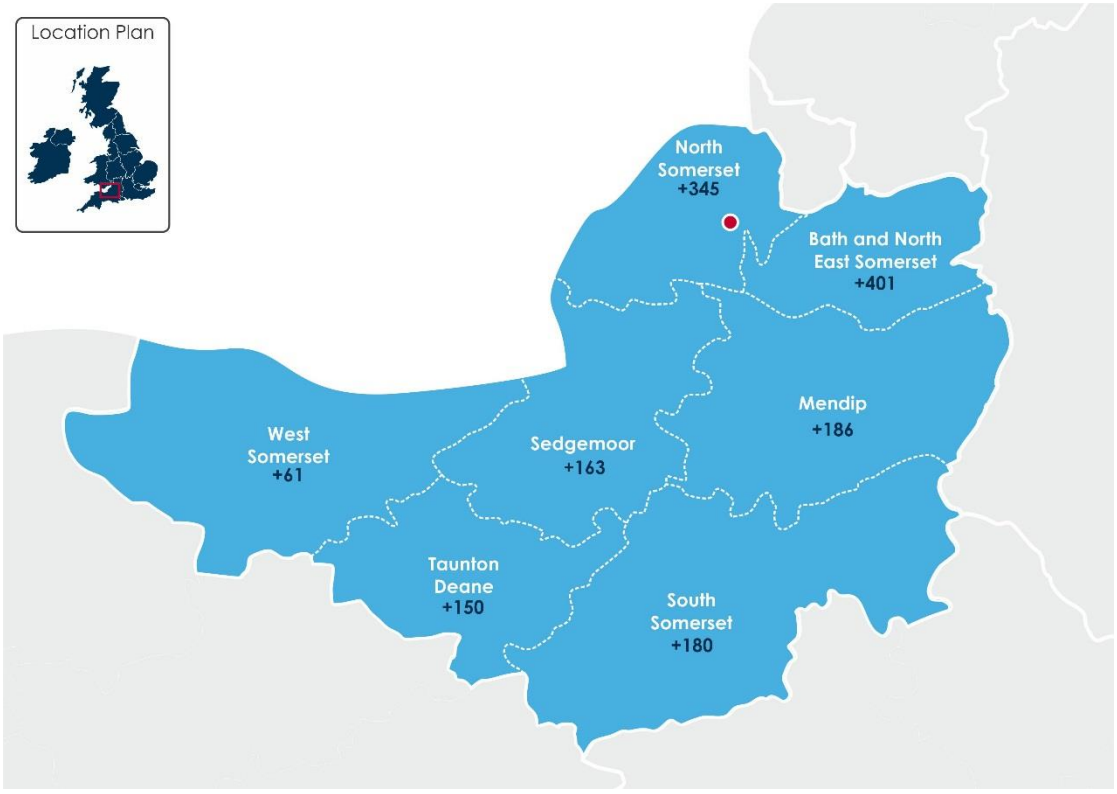
8.3.7 **Table 8.5** presents the additional passenger numbers per catchment within each Local Authority in the wider Somerset area, for an average day in the peak month of August.

Table 8.5: Somerset Daily Passenger Origin / Destination for the Peak Month of August (10 mppa & 12 mppa) - UPDATED

Somerset	Passenger Percentage	Passenger per Day 10 mppa	Passenger per Day 12 mppa	Difference 2 mppa
North Somerset	23.2%	1,663	2,008	345
Bath & North East Somerset	27.0%	1,936	2,337	401
Mendip District	12.5%	896	1,082	186
Sedgemoor District	11.0%	789	952	163
South Somerset	12.1%	868	1,047	180
Taunton Deane	10.1%	731	874	150
West Somerset	4.1%	301	355	61
Total	**100.0%**	**7,170**	**8,655**	**1,485**

8.3.8 **Figure 8.2** shows the additional passenger numbers per catchment within each Local Authorities in the wider Somerset area for an average day in the peak month of August because of the Development Proposals.

Figure 8.2: Somerset Daily Passenger Origin / Destination for the Peak Month of August



8.4 Forecast Passenger Modal Share

8.4.1 2015 CAA data has been used to understand modal share characteristics for each catchment area.

8.4.2 To present a robust assessment, the 15% target of passengers travelling via public transport has been utilised to forecast the uplift in public transport passengers from 8.2 mppa to 10 mppa and 12 mppa. The anticipated numbers of passenger using public transport are summarised below:

- 15% of 10 mppa = 1,500,000 passengers; and
- 15% of 12 mppa = 1,800,000 passengers.

8.4.3 **Table 8.6** summarises the overall modal share assumption for the Development Proposals on the basis that Public Transport mode share will remain constant between the forecast 10 mppa and 12 mppa scenarios, presenting a robust assessment. However, BAL intend to promote and improve public and shared transport use as part of the package of measures associated with the 12 mppa application as part of the ASAS which the airport will commit to deliver.

Table 8.6: 10mppa & 12mppa Modal share

	Public Transport	Taxi	Car	Car Drop Off	Other	Total
10 mppa Modal share	15% 1,500,000	11% 1,100,00	47% 4,700,000	27% 2,700,000	1% 100,000	100% 10,000,000
12 mppa Modal share	15% 1,800,00	11% 1,320,000	47% 5,640,000	27% 3,240,000	1% 120,000	100% 120,000,00
Change	0% 300,000	0% 220,000	0% 940,000	0% 540,000	0% 20,000	0% 2,000,000

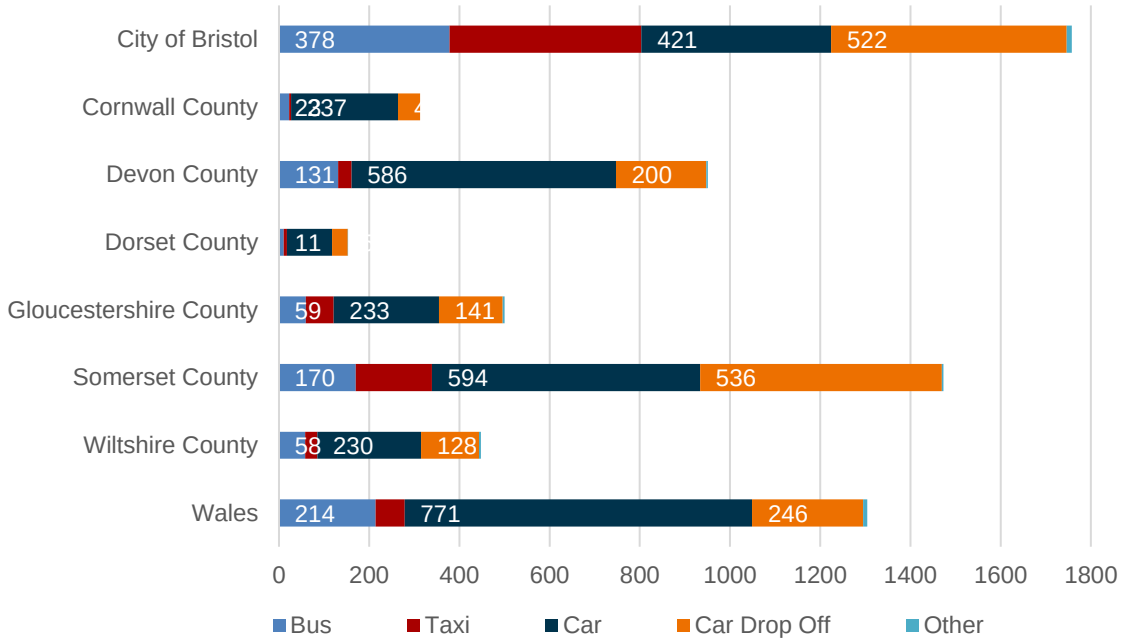
8.4.4 **Table 8.7** presents the predicted daily passenger modal share for each catchment, reflecting the overall 15% public transport modal share, based on CAA passenger survey data. These factors have been utilised for the 10 mppa and 12 mppa scenarios

Table 8.7: Passenger Modal Share per Growth Area for 10 mppa & 12 mppa

	Public Transport	Taxi	Car	Car Drop Off	Other	Total
City of Bristol	22%	24%	24%	30%	1%	100%
Cornwall County	7%	1%	76%	16%	0%	100%
Devon County	14%	3%	62%	21%	0%	100%
Dorset County	7%	4%	65%	23%	1%	100%
Gloucestershire County	12%	12%	47%	28%	1%	100%
Somerset County	12%	11%	40%	36%	0%	100%
Wiltshire County	13%	6%	51%	29%	0%	100%
Wales	16%	5%	59%	19%	1%	100%
Total	15%	11%	47%	27%	1%	100%

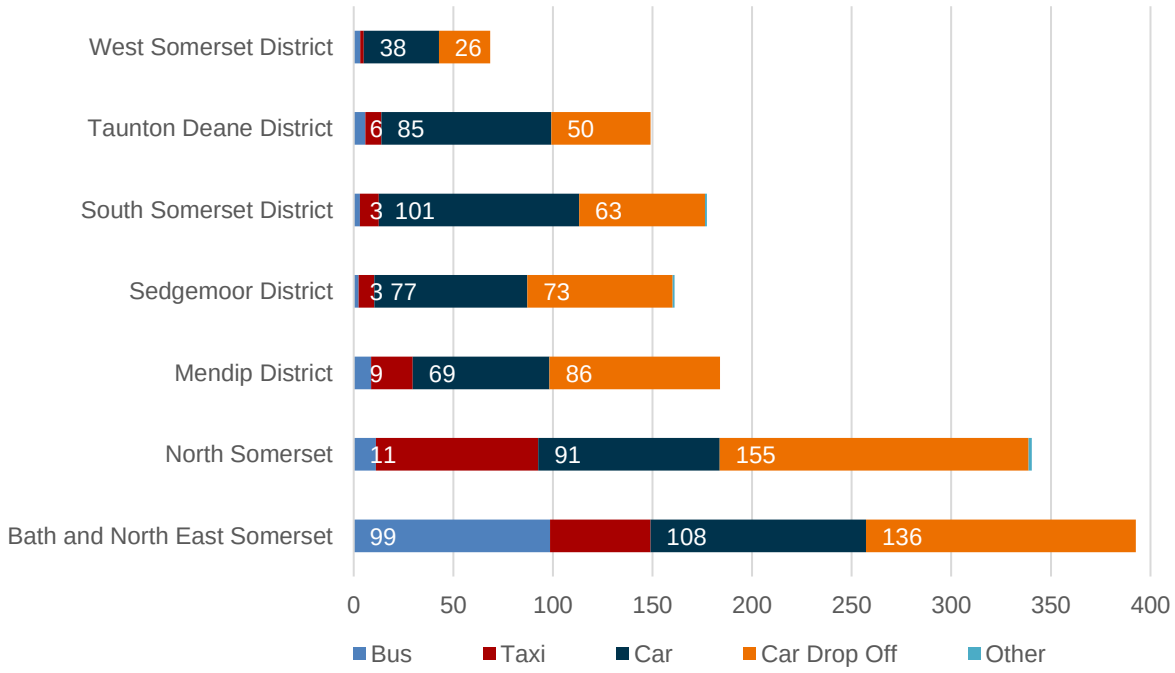
8.4.5 **Figure 8.3** presents the predicted daily passenger modal share for the peak month of August for each growth area.

Figure 8.3: Regional Additional 2 mppa Daily Passenger Modal Share in August



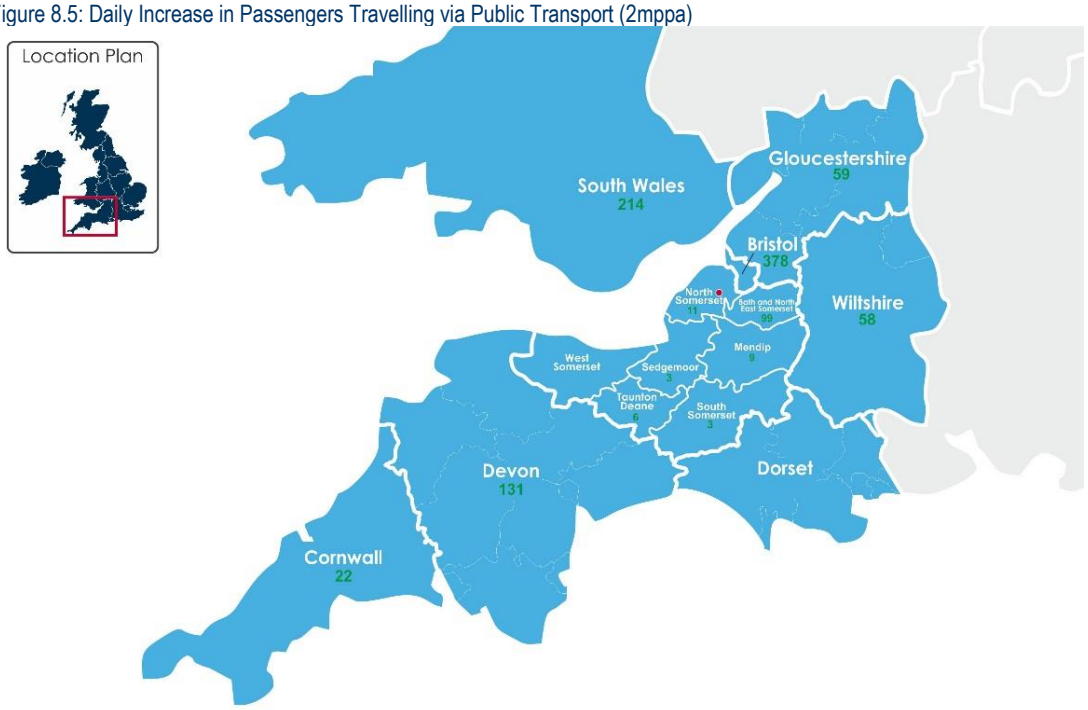
8.4.6 **Figure 8.4** shows the additional passenger modal share for Somerset per Local Authority.

Figure 8.4: Somerset Additional 2mppa Monthly Passenger Modal Share in August



8.4.7 **Figure 8.5** shows the additional daily passengers travelling via public transport per Local Authority in the peak month of August, assuming a constant modal split.

Figure 8.5: Daily Increase in Passengers Travelling via Public Transport (2mppa)



8.4.8 To establish car movements, it is necessary to quantify vehicle occupancy levels. **Table 8.8** presents vehicle occupancy for the South West and Wales for passengers who travel via Taxi / Mini Bus and Car (both parked and dropped off), as recorded in the CAA annual passenger survey at Bristol Airport.

Table 8.8: Passenger Group Size Analysis for the South West and Wales

	City of Bristol	Cornwall	Devon	Dorset	Gloucestershire	Somerset	Wiltshire	Wales	All Catchments
Taxi / Minicab	1.5	1.5	2	2	1.5	1.9	2.2	1.7	1.6
Car Parked	1.9	2.1	2	1.9	2	1.5	2	2.1	2.0
Car Drop Off	1.6	2.5	1.6	1.8	1.6	2	1.6	1.6	1.6

8.4.9 Passengers travelling by car (Taxi / Minicab, Car Drop Off and Car) have been factored utilising the occupancy rates presented in **Table 8.8** per growth area. The vehicular trip generation has been calculated using taxi, car driver and car drop off modal share for each catchment. The car pick up modal share is assumed to be the same as car drop off.

8.4.10 The passenger car occupancy rates presented above are annual averages per mode per catchment area. For the month of August, the overall average occupancy rates are as follows:

- Taxi / Minicab: 2.2
- Car Parked: 2.6

- Car Drop Off: 2.0

8.4.11 Overall, the car occupancy rates throughout the year are lower than the peak month of August. This would mean that August will have lower car trips in proportion to overall passenger numbers. However, the average rate for the year has been used in the assessment for robustness.

8.4.12 The vehicular trip generation for car drop off accounts for the return trip, and therefore 'outbound' vehicles will include inbound car drop off trips and vice versa.

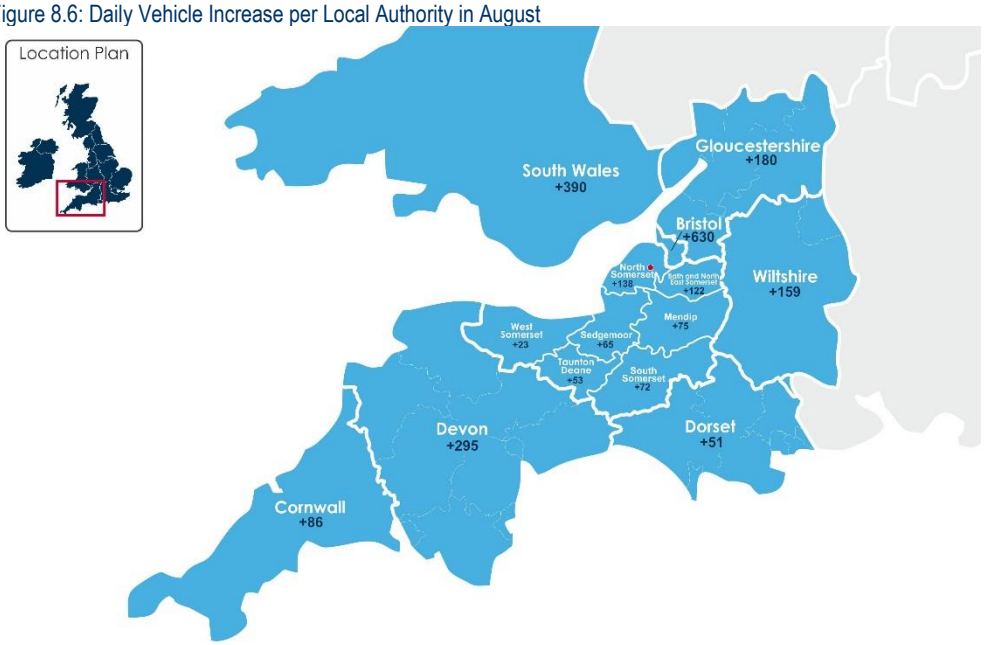
8.4.13 **Table 8.9** presents the predicted daily vehicle increase during the peak month of August, assuming a constant modal split.

Table 8.9: Daily Vehicle Increase (2 mppa) per Growth Area in Peak Month of August

	Taxi / Mini Bus	Car Parked	Car Drop Off	Total
City of Bristol	131	396	103	**630**
Cornwall	1	32	52	**86**
Devon	7	152	136	**295**
Dorset	2	25	24	**51**
Gloucestershire	19	107	54	**180**
North Somerset	20	97	21	**138**
Bath & North East Somerset	12	85	25	**122**
Mendip District	5	53	16	**75**
Sedgemoor District	2	46	18	**65**
South Somerset	2	50	20	**72**
Taunton Deane	2	31	20	**53**
West Somerset	0	15	8	**23**
Wiltshire	8	98	53	**159**
Wales	18	195	177	**390**

8.4.14 **Figure 8.6** presents the predicted daily vehicle increase by local authority as set out in **Table 8.9.**

Figure 8.6: Daily Vehicle Increase per Local Authority in August



8.5 Passenger Arrival & Departure Dwell Analysis

8.5.1 As highlighted previously Bristol Airport serves as the operating bases for many of the Airlines (including Easyjet and Thomas Cook). Flights are therefore scheduled to take off early in the morning to their destinations and land at the airport in the evening.

8.5.2 Passengers typically arrive to check in two to three hours before their flight is scheduled to take off. BAL have provided the average passenger dwell time for departures. This has been divided into short haul (under 6-hour flights) and long haul (over 6 hour flights) as set out in **Table 8.10**.

Table 8.10: Average Passenger Dwell Time – Departures

	0-30 Minutes	31-60 Minutes	61-90 Minutes	91-120 Minutes	120+ Minutes
Long Haul	11%	25%	24%	19%	20%
Short Haul	17%	32%	28%	13%	10%

8.5.3 BAL have also provided the passenger dwell time for arrivals, as set out within **Table 8.11**.

Table 8.11: Average Passenger Dwell Time – Arrivals

	Time (Minutes)	Cumulative (Minute)
Land at Bristol Airport	-	
Taxi to Gate	5 - 10	5 – 10
Passengers Disembark	15 - 20	20 – 30
Passenger Walk to Immigration	5 - 10	25 – 40
Dwell at Immigration	5 - 20	30 – 60
Baggage Reclaim	5 - 10	35 – 70

	Time (Minutes)	Cumulative (Minute)
Exit Terminal	2 - 5	37 – 75

8.5.4 As can be seen from **Table 8.11** an average arrival dwell time (land to exit terminal) is approximately 1 hour.

8.5.5 Flight schedules for a full week in the peak month of August for the 10 mppa and 12 mppa scenarios have been provided by BAL. The flight schedules have been compared to the forecast annual passenger numbers to produce a load factor, which represents an approximation of how full each flight is.

8.5.6 The difference between a busy day and a peak day typically is the load factor rather than the number of flights in the schedule.

8.5.7 **Figure 8.7** presents the hourly passenger arrival profile for a peak weekday in August. This has been based on the forecast flight schedule (10 mppa and 12 mppa) and the passenger dwell time summarised in **Table 8.10**.

8.5.8 **Figure 8.8** presents the hourly passenger departure profile for a peak weekday in August. This has been based on the forecast flight schedule (10 mppa and 12 mppa) and the passenger dwell time summarised in **Table 8.11**.

Figure 8.7: Daily Passenger Exit Terminal (Arrival) Profile in August

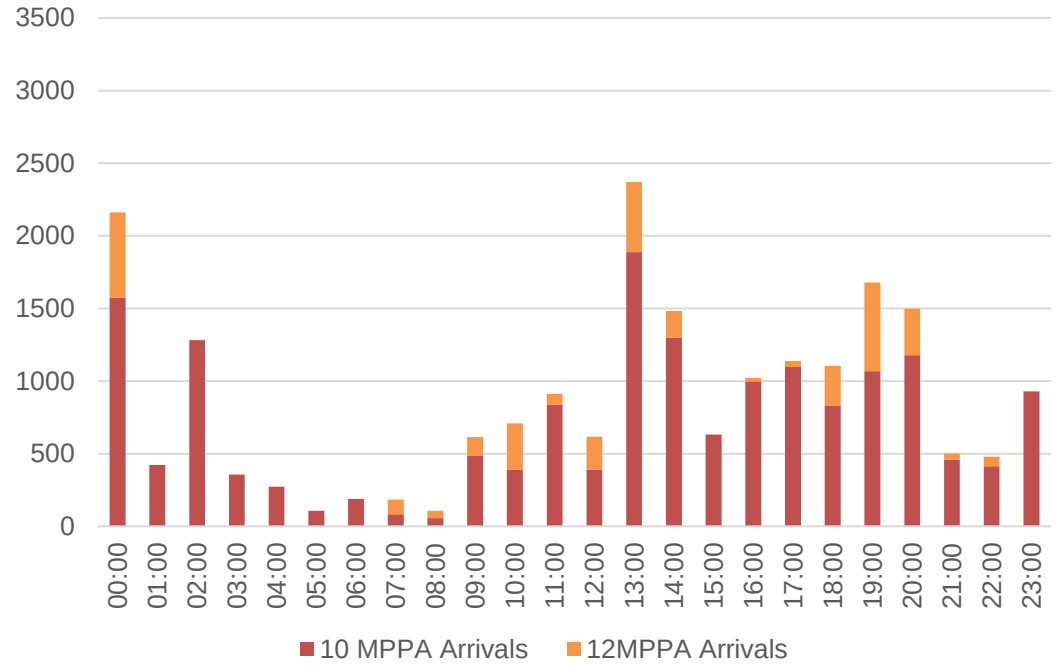
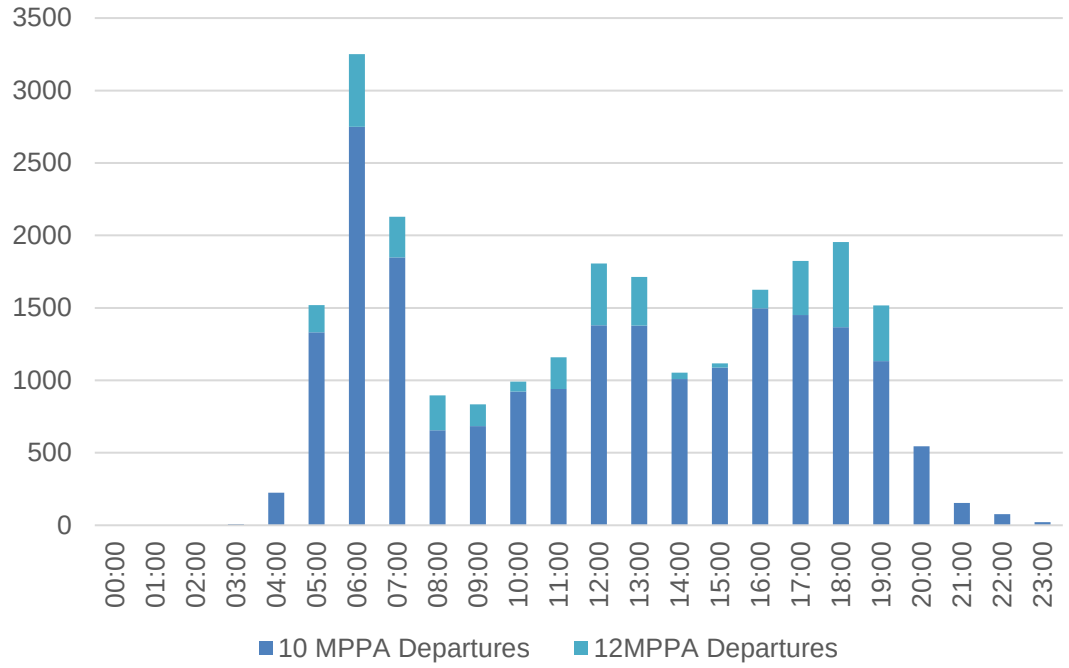


Figure 8.8: Daily Passenger Check In (Departure) Profile in August



8.5.9 The exit terminal and check in profiles indicate that the passenger through-flow peaks at 13:00 for arrivals and 06:00 for departures.

8.5.10 **Table 8.12** present the daily arrival and departure passenger surface access demand profile for the peak month of August. This has been provided for both the 10 mppa and 12 mppa scenarios.

Table 8.12: Daily Passenger Hourly Check In & Exit Terminal Profile in August

	10mppa		12mppa		Difference 2mppa	
	Exit Terminal - Arrival	Check in - Departure	Exit Terminal - Arrival	Check in - Departure	Exit Terminal - Arrival	Check in - Departure
00:00 – 01:00	1,572	-	2,162	-	590	-
01:00 – 02:00	421	-	421	-	-	-
02:00 – 03:00	1,281	-	1,281	-	-	-
03:00 – 04:00	356	7	356	7	-	-
04:00 – 05:00	273	190	273	190	-	-
05:00 – 06:00	106	1,124	106	1,283	-	158
06:00 – 07:00	189	2,322	37	2,746	-152	423
07:00 – 08:00	83	1,561	184	1,797	101	235
08:00 – 09:00	57	554	108	757	51	203
09:00 – 10:00	484	578	614	704	130	125
10:00 – 11:00	389	779	708	836	319	57
11:00 – 12:00	837	795	912	978	75	184
12:00 – 13:00	392	1,165	617	1,526	225	361
13:00 – 14:00	1,889	1,163	2,371	1,446	481	284
14:00 – 15:00	1,301	853	1,484	888	183	36
15:00 – 16:00	632	919	632	943	-	24
16:00 – 17:00	998	1,264	1,021	1,373	23	109
17:00 – 18:00	1,096	1,226	1,139	1,541	43	315
18:00 – 19:00	832	1,155	1,106	1,650	274	495
19:00 – 20:00	1,068	957	1,678	1,281	610	324
20:00 – 21:00	1,179	460	1,499	460	319	-
21:00 – 22:00	458	131	501	131	43	-
22:00 – 23:00	414	65	480	65	66	-
23:00 – 24:00	929	19	929	19	-	-
Daily	17,238	17,287	20,620	20,621	3,382	3,334

8.6 Employee Catchment

8.6.1 BAL have provided the projected employee (FTEs) for the consented 10 mppa and proposed 12 mppa scheme, this is set out within **Table 8.13**. These have been independently verified by York Aviation LLP.

Table 8.13: Employee Growth (FTE)

10 mppa (FTE)	12 mppa (FTE)	Difference 2 mppa (FTE)
3,875	4,575	700

8.6.2 BAL specifically target local residential areas for employee's recruitment. Recruitment growth will therefore be geographically weighted to the nearby residential areas and it is likely, in general, that these would be more suited to public and shared transport access to the airport than more remote employees. However, for robustness, the employee's projection for the 10 mppa and 12 mppa has been based on the current catchment set out in **Table 5.5**. **Table 8.14** summarises the 10 mppa and 12 mppa employee's levels per local authority.

Table 8.14: Employee Origin/Destination (10 mppa & 12 mppa)

Local Authority	Employee Catchment	10 mppa (FTE)	12 mppa (FTE)	Difference 2 mppa (FTE)
North Somerset	31%	1,201	1,418	217
City of Bristol	24%	930	1,098	168
South Gloucestershire	10%	388	458	70
Bath & North East Somerset	7%	271	320	49
Sedgemoor District	7%	271	320	49
Mendip District	4%	155	183	28
Wiltshire	2%	78	92	14
South Somerset District	1%	39	46	7
Caerdydd - Cardiff	1%	39	46	7
Casnewydd - Newport	1%	39	46	7
Stroud District	1%	39	46	7
Taunton Deane District	1%	39	46	7
Sir Fynwy - Monmouthshire	1%	39	46	7
Bro Morgannwg - the Vale of Glamorgan	1%	39	46	7
Caerffili - Caerphilly	1%	39	46	7
Swindon	1%	39	46	7
Others	6%	233	275	42
Total	**100%**	**3,875**	**4,575**	**700**

8.6.3 **Table 8.15** presents the 10 mppa and 12 mppa employees levels within North Somerset. This has been calculated from **Table 8.14** and the current North Somerset employee catchment profile.

Table 8.15: Employee Origin/Destination (10 mppa & 12 mppa)

	Percentage	2021 10 mppa (FTE)	2026 12 mppa (FTE)	Difference 2 mppa (FTE)
Weston-super-Mare	54%	653	771	118
Portishead	16%	192	227	35
Clevedon	4%	52	62	9
Nailsea	14%	163	193	29
Winscombe	5%	58	69	11
Yatton	7%	82	96	15
Total	**100%**	**1,201**	**1,418**	**217**

8.6.4 The Bristol Airport site is operational 24 hours a day, year-round. Employee numbers vary across the year, also peaking during the month of August.

8.6.5 BAL have identified that on an average day, 58% of the FTEs are present at the Bristol Airport site due to shift working patterns.

8.6.6 **Table 8.16** presents the projected employees start and finish profiles for the consented 10 mppa and the proposed 1 2mppa. This has been calculated on the level of employees present on any given day during the peak summer months and the shift patterns recorded in the 2017 employees travel survey.

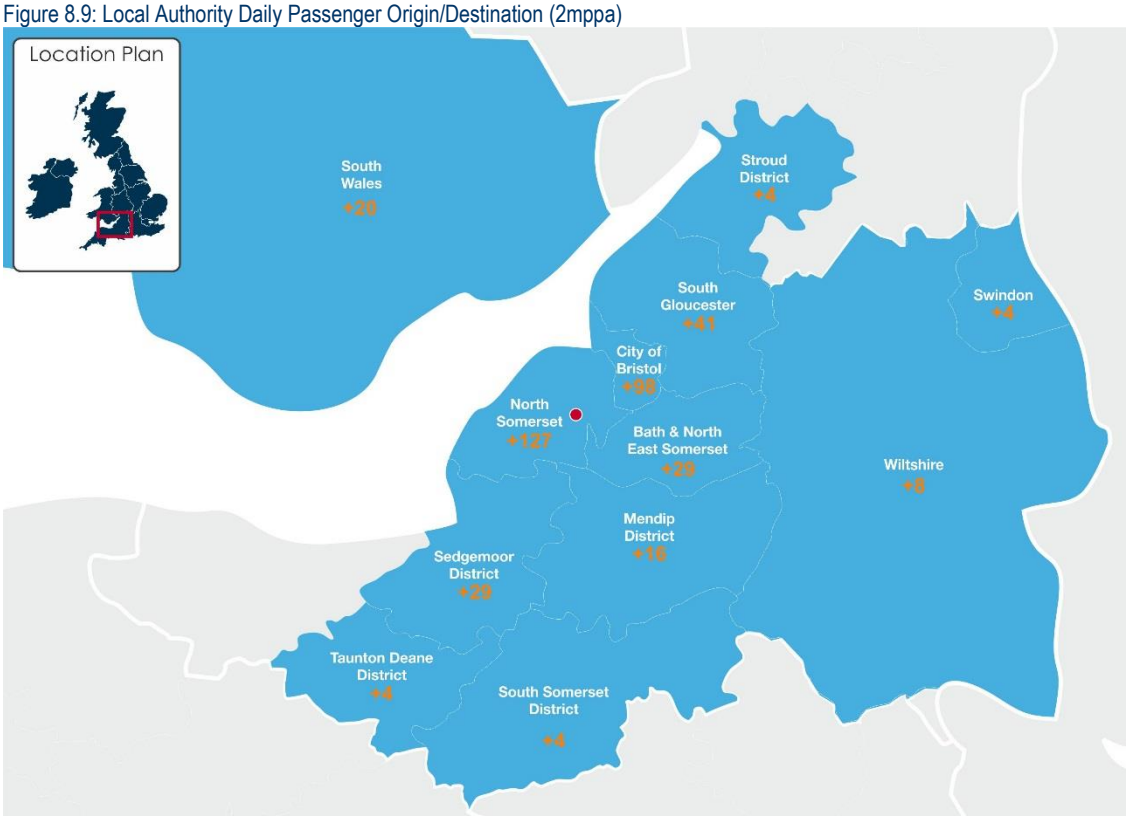
Table 8.16: Daily Profile of Employee Trip Generation (10 mppa & 12 mppa) in Peak Summer Months

Time	10 mppa			12 mppa			Difference 2 mppa		
	Start	Finish	Total	Start	Finish	Total	Start	Finish	Total
00:00 - 01:00	0	0	0	0	0	0	0	0	0
01:00 – 02:00	0	4	4	0	5	5	0	1	1
02:00 – 03:00	212	83	295	250	98	348	38	15	53
03:00 – 04:00	28	6	34	33	7	40	5	1	6
04:00 – 05:00	30	4	34	35	5	40	5	1	6
05:00 – 06:00	320	14	335	378	17	395	58	3	60
06:00 – 07:00	303	426	728	357	503	860	55	77	132
07:00 – 08:00	204	196	400	241	232	472	37	35	72
08:00 – 09:00	87	0	87	103	0	103	16	0	16
09:00 – 10:00	90	0	90	107	0	107	16	0	16
10:00 – 11:00	1	4	6	2	5	7	0	1	1
11:00 – 12:00	6	4	10	7	5	12	1	1	2
12:00 – 13:00	195	192	387	231	227	457	35	35	70
13:00 – 14:00	1	22	23	2	25	27	0	4	4
14:00 – 15:00	263	37	300	311	44	354	48	7	54

Time	10 mppa			12 mppa			Difference 2 mppa		
	Start	Finish	Total	Start	Finish	Total	Start	Finish	Total
15:00 – 16:00	91	24	116	108	29	137	16	4	21
16:00 – 17:00	3	27	30	3	32	36	1	5	5
17:00 – 18:00	6	384	390	7	454	460	1	69	70
18:00 – 19:00	227	306	533	268	361	629	41	55	96
19:00 – 20:00	115	223	338	136	263	399	21	40	61
20:00 – 21:00	75	10	85	88	12	100	14	2	15
21:00 – 22:00	3	66	69	3	78	81	1	12	12
22:00 – 23:00	1	24	26	2	29	31	0	4	5
23:00 – 24:00	0	202	202	0	239	239	0	37	37
Daily	**2,261**	**2,261**	**4,522**	**2,669**	**2,669**	**5,339**	**408**	**408**	**817**

8.6.7 **Figure 8.9** shows the difference in daily employee origin/destination for the peak month of August across Local Authorities between the 10 mppa and 12mppa scenarios.

Figure 8.9: Local Authority Daily Passenger Origin/Destination (2mppa)



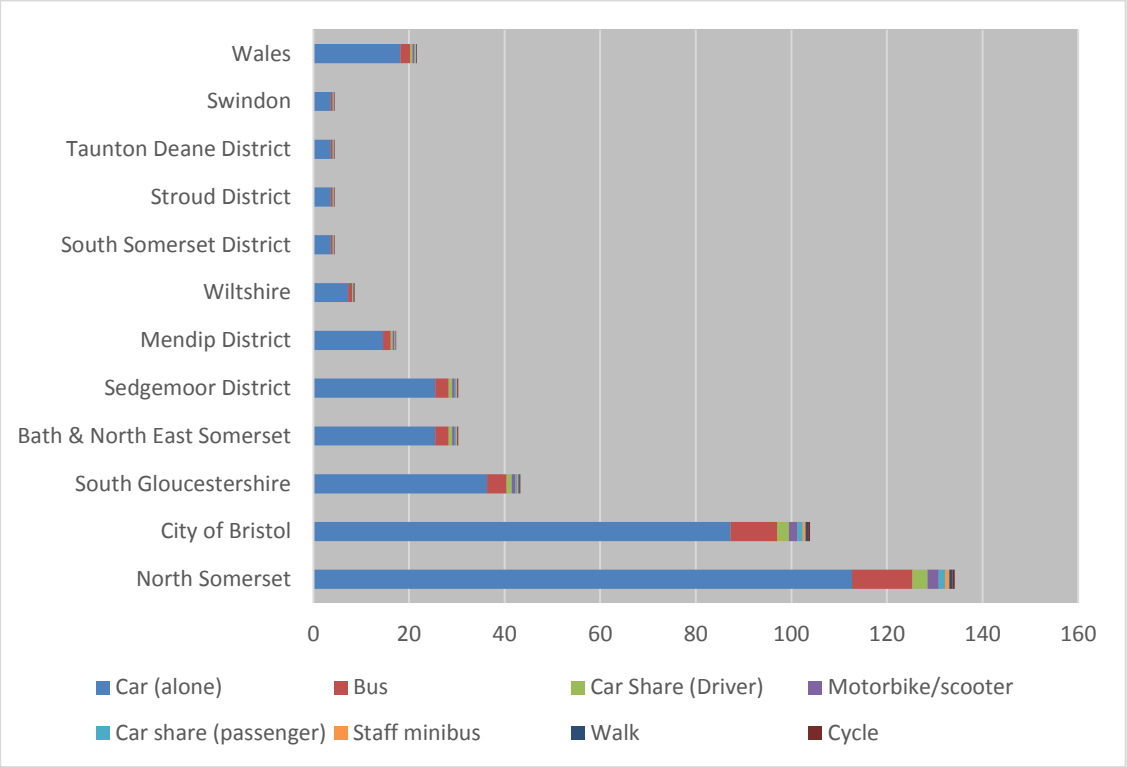
8.7 Employee Modal Share

8.7.1 Employee method of travel to work has been assumed to remain constant between the most recent travel survey and the forecast scenarios. No adjustments to mode share have been

made, despite the forthcoming launch of a new Workplace Travel Plan and the future reduction in parking spaces for employees, to ensure the assessment is robust.

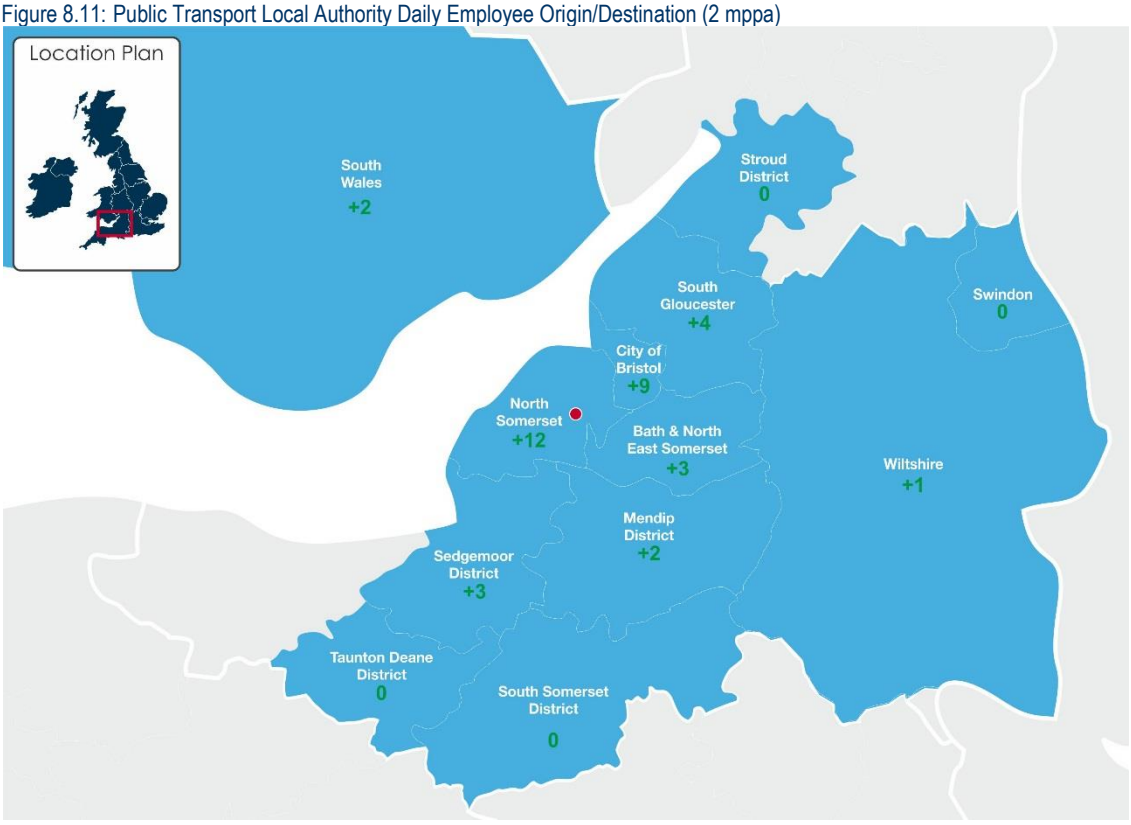
8.7.2 **Figure 8.10** presents the additional (2 mppa) employee modal share in the peak summer months, based on **Table 8.6** and **Figure 8.11**.

Figure 8.10: Employees Travel by Mode (%)



8.7.3 **Figure 8.11** shows the difference in daily employees travelling to the Bristol Airport site via public transport between the 10 mppa consented scenario and the 12 mppa Development Proposals.

Figure 8.11: Public Transport Local Authority Daily Employee Origin/Destination (2 mppa)



8.7.4 **Table 8.17** sets out the predicted daily additional employees shift patterns for employees who travel to work by public transport. This has been calculated on the level of employees present on any given day, the current shift patterns and modal share recorded in the 2017 employees travel survey. Importantly this also shows the difference between the consented 10 mppa and the 12 mppa Development Proposals.

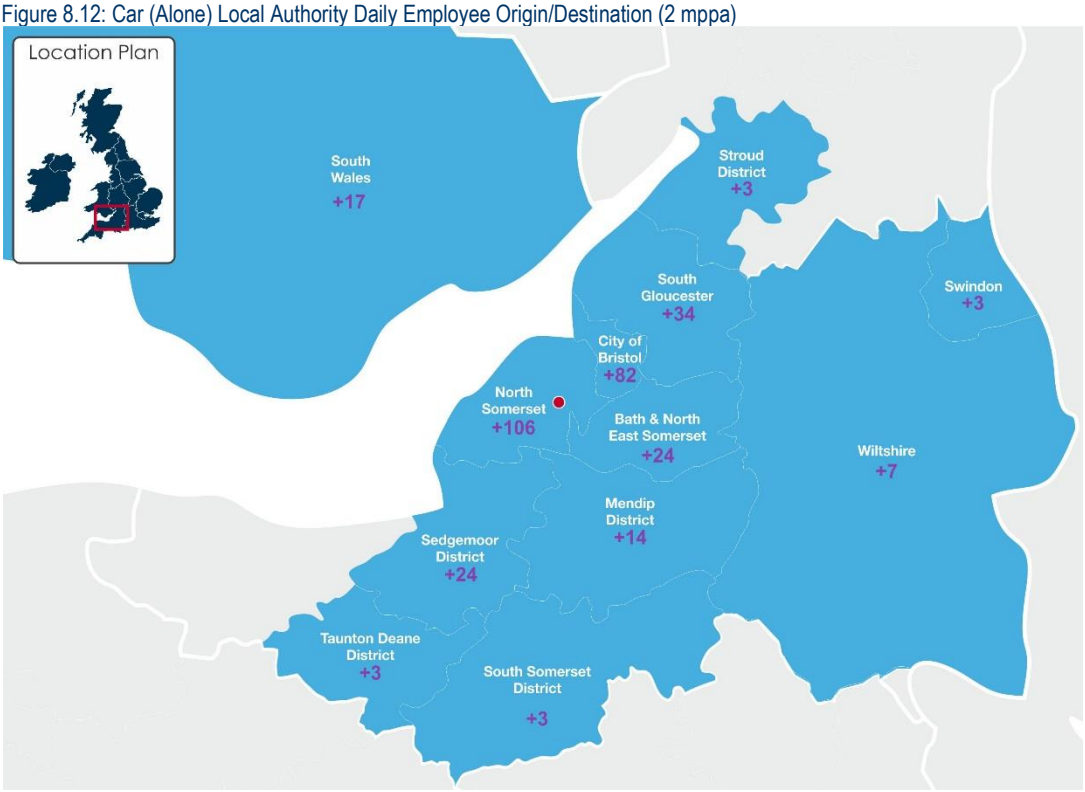
Table 8.17: Predicted Additional Daily Employee Public Transport Trip Profile in Peak Summer Months

Time	10 mppa			12 mppa			Difference 2 mppa		
	Start	Finish	Total	Start	Finish	Total	Start	Finish	Total
00:00 - 01:00	0	0	0	0	0	0	0	0	0
01:00 – 02:00	0	0	0	0	1	1	0	0	0
02:00 – 03:00	22	8	30	25	10	35	3	2	5
03:00 – 04:00	3	1	4	3	1	4	0	0	1
04:00 – 05:00	3	0	4	4	1	4	0	0	1
05:00 – 06:00	33	1	35	38	2	40	5	0	5
06:00 – 07:00	31	43	74	36	50	86	4	8	12
07:00 – 08:00	21	20	41	24	23	47	3	4	6
08:00 – 09:00	9	0	9	10	0	10	1	0	1
09:00 – 10:00	9	0	9	11	0	11	1	0	1
10:00 – 11:00	0	0	1	0	1	1	0	0	0

Time	10 mppa			12 mppa			Difference 2 mppa		
	Start	Finish	Total	Start	Finish	Total	Start	Finish	Total
11:00 – 12:00	1	0	1	1	1	1	0	0	0
12:00 – 13:00	20	19	40	23	23	46	3	3	6
13:00 – 14:00	0	2	2	0	3	3	0	0	0
14:00 – 15:00	27	4	31	31	4	36	4	1	4
15:00 – 16:00	9	2	12	11	3	14	1	0	2
16:00 – 17:00	0	3	3	0	3	4	0	0	1
17:00 – 18:00	1	39	39	1	46	46	0	7	7
18:00 – 19:00	24	31	54	27	36	63	3	6	9
19:00 – 20:00	12	22	34	14	26	40	2	4	6
20:00 – 21:00	8	1	9	9	1	10	1	0	1
21:00 – 22:00	0	7	7	0	8	8	0	1	1
22:00 – 23:00	0	2	3	0	3	3	0	0	0
23:00 – 24:00	0	20	20	0	24	24	0	4	4
Daily	**235**	**227**	**462**	**268**	**268**	**536**	**33**	**41**	**74**

8.7.5 **Figure 8.12** shows the difference in daily employee travelling to the Bristol Airport site via single occupancy vehicles between the 10 mppa consented scheme and the 12 mppa Development Proposals.

Figure 8.12: Car (Alone) Local Authority Daily Employee Origin/Destination (2 mppa)



8.7.6 **Table 8.18** sets out the daily employees shift patterns for employees who travel to work by car. This has been calculated on the level of employees present on any given day, the current shift patterns and modal share recorded in the 2017 employees travel survey. Importantly this also shows the difference between the consented 10 mppa and the 12 mppa Development Proposals.

Table 8.18: Daily Employee Vehicle Trip Profile in Peak Summer Months

Time	10 mppa			12 mppa			Difference 2 mppa		
	Start	Finish	Total	Start	Finish	Total	Start	Finish	Total
00:00 - 01:00	0	0	0	0	0	0	0	0	0
01:00 – 02:00	0	4	4	0	4	4	0	1	1
02:00 – 03:00	177	70	247	209	82	291	32	13	45
03:00 – 04:00	24	5	28	28	6	34	4	1	5
04:00 – 05:00	25	4	28	29	4	34	4	1	5
05:00 – 06:00	268	12	280	316	14	331	48	2	51
06:00 – 07:00	253	356	609	299	420	719	46	64	110
07:00 – 08:00	170	164	335	201	194	395	31	30	60
08:00 – 09:00	73	0	73	86	0	86	13	0	13
09:00 – 10:00	76	0	76	89	0	89	14	0	14
10:00 – 11:00	1	4	5	1	4	6	0	1	1
11:00 – 12:00	5	4	8	6	4	10	1	1	2
12:00 – 13:00	163	161	324	193	190	383	30	29	59
13:00 – 14:00	1	18	19	1	21	23	0	3	3
14:00 – 15:00	220	31	251	260	36	296	40	6	45
15:00 – 16:00	76	20	97	90	24	114	14	4	17
16:00 – 17:00	2	23	25	3	27	30	0	4	5
17:00 – 18:00	5	321	326	6	379	385	1	58	59
18:00 – 19:00	190	256	446	224	302	526	34	46	80
19:00 – 20:00	96	187	283	114	220	334	17	34	51
20:00 – 21:00	63	8	71	74	10	84	11	2	13
21:00 – 22:00	2	55	58	3	65	68	0	10	10
22:00 – 23:00	1	20	22	1	24	26	0	4	4
23:00 – 24:00	0	169	169	0	200	200	0	31	31
Daily	**1,891**	**1,891**	**3,782**	**2,233**	**2,233**	**4,465**	**342**	**342**	**683**

8.8 Logistics

8.8.1 As set out in **Section 5.2**, the logistics trip generators have been classified into the following categories:

a. Fuel Tankers

b. Car Rental Deliveries

c. Operational Deliveries

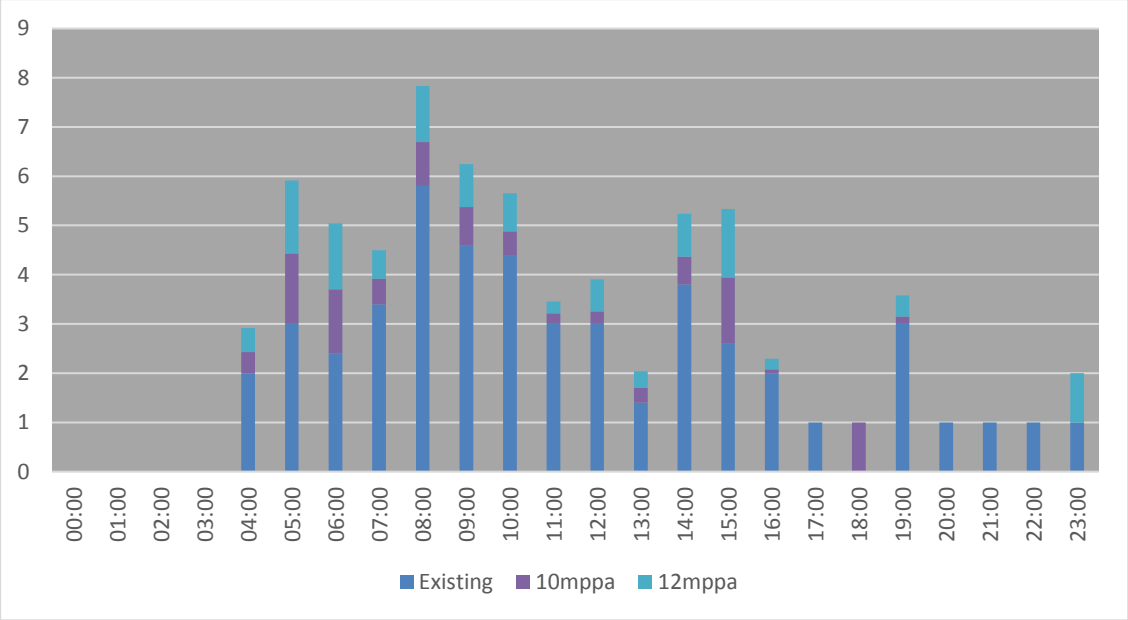
8.8.2 The vehicular trip generation calculated in **Section 5.2** has been scaled up using the passenger numbers to estimate a realistic logistic forecast associated with 10 mppa and 12 mppa. **Table 8.19** sets out the uplift in vehicles for each of the logistics categories.

Table 8.19: Additional Logistics Daily Vehicles Profile (10 mppa & 12 mppa)

Time	Consented 10 mppa			Proposed 12 mppa			Difference		
	Car Rental	Fuel	Operational	Car Rental	Fuel	Operational	Car Rental	Fuel	Operational
00:00 - 01:00	0	0	0	0	0	0	0	0	0
01:00 – 02:00	0	0	0	0	0	0	0	0	0
02:00 – 03:00	0	0	0	0	0	0	0	0	0
03:00 – 04:00	0	0	0	0	0	0	0	0	0
04:00 – 05:00	0	0	2	0	0	3	0	0	0
05:00 – 06:00	0	2	2	0	3	3	0	1	0
06:00 – 07:00	0	2	2	0	3	2	0	1	0
07:00 – 08:00	0	1	3	0	1	3	0	0	1
08:00 – 09:00	1	1	5	1	1	6	0	0	1
09:00 – 10:00	0	1	4	0	1	5	0	0	1
10:00 – 11:00	2	1	2	2	1	2	0	0	0
11:00 – 12:00	0	2	1	0	2	1	0	0	0
12:00 – 13:00	3	0	0	4	0	0	1	0	0
13:00 – 14:00	0	0	2	0	0	2	0	0	0
14:00 – 15:00	2	0	2	2	0	3	0	0	0
15:00 – 16:00	0	2	2	0	3	2	0	1	0
16:00 – 17:00	1	1	0	1	1	0	0	0	0
17:00 – 18:00	0	1	0	0	1	0	0	0	0
18:00 – 19:00	0	1	0	0	1	0	0	0	0
19:00 – 20:00	2	1	0	3	1	0	0	0	0
20:00 – 21:00	0	1	0	0	1	0	0	0	0
21:00 – 22:00	0	1	0	0	1	0	0	0	0
22:00 – 23:00	0	1	0	0	1	0	0	0	0
23:00 – 24:00	0	1	0	0	2	0	0	1	0
Daily	**11**	**20**	**28**	**13**	**24**	**34**	**2**	**4**	**6**

8.8.3 The greatest increase in any hour is one logistic vehicle movement when comparing the consented 10mppa to proposed 12 mppa scenario. In total, there is a daily increase of 12 vehicles between the consented 10 mppa scheme and the proposed 12 mppa. **Figure 8.13** demonstrates the total uplift in logistic vehicles for the consented 10mppa and the proposed 12 mppa scenarios.

Figure 8.13: Daily Increase in Logistic Vehicle Movements (2 mppa)



8.9 Total People Increase

8.9.1 **Table 8.20** sets out the predicted daily people increase (passengers and employees) during the peak month of August.

Table 8.20: Total Daily People Increase (2 mppa) in Peak Month of August

Time	Passengers			Employees			Total		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
00:00 - 01:00	0	590	590	0	0	0	0	590	590
01:00 – 02:00	0	0	0	0	1	1	0	1	1
02:00 – 03:00	0	0	0	38	15	53	38	15	53
03:00 – 04:00	0	0	0	5	1	6	5	1	6
04:00 – 05:00	0	0	0	5	1	6	5	1	6
05:00 – 06:00	158	0	158	58	3	60	216	3	219
06:00 – 07:00	423	-152	271	55	77	132	478	-75	403
07:00 – 08:00	235	101	337	37	35	72	272	137	409
08:00 – 09:00	203	51	253	16	0	16	218	51	269
09:00 – 10:00	125	130	255	16	0	16	142	130	272
10:00 – 11:00	57	319	376	0	1	1	57	320	377
11:00 – 12:00	184	75	259	1	1	2	185	76	260
12:00 – 13:00	361	225	586	35	35	70	396	260	656

Time	Passengers			Employees			Total		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
13:00 – 14:00	284	481	765	0	4	4	284	485	769
14:00 – 15:00	36	183	219	48	7	54	83	190	273
15:00 – 16:00	24	0	24	16	4	21	41	4	45
16:00 – 17:00	109	23	132	1	5	5	109	28	137
17:00 – 18:00	315	43	358	1	69	70	316	112	429
18:00 – 19:00	495	274	770	41	55	96	536	330	866
19:00 – 20:00	324	610	934	21	40	61	345	650	995
20:00 – 21:00	0	319	319	14	2	15	14	321	335
21:00 – 22:00	0	43	43	1	12	12	1	55	56
22:00 – 23:00	0	66	66	0	4	5	0	70	71
23:00 – 24:00	0	0	0	0	37	37	0	37	37
Daily	**3,334**	**3,382**	**6,716**	**408**	**408**	**817**	**3,742**	**3,790**	**7,533**

8.10 Total Public Transport Increase

8.10.1 **Table 8.21** sets out the predicted daily public transport increases (passengers and employees) in the peak month of August, based on a public transport overall modal share of 15%.

Table 8.21: Total Daily PT Increase (2 mppa) in Peak Month of August - UPDATED

Time	Passengers			Employees			Total		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
00:00 - 01:00	0	86	86	0	0	0	0	86	86
01:00 – 02:00	0	0	0	0	0	0	0	0	0
02:00 – 03:00	0	0	0	4	1	5	4	1	5
03:00 – 04:00	0	0	0	0	0	1	0	0	1
04:00 – 05:00	0	0	0	1	0	1	1	0	1
05:00 – 06:00	23	0	23	5	0	6	28	0	29
06:00 – 07:00	61	-22	39	5	7	12	67	-15	52
07:00 – 08:00	34	15	49	3	3	7	38	18	56

Time	Passengers			Employees			Total		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
08:00 – 09:00	29	7	37	1	0	1	31	7	38
09:00 – 10:00	18	19	37	2	0	2	20	19	39
10:00 – 11:00	8	46	55	0	0	0	8	46	55
11:00 – 12:00	27	11	38	0	0	0	27	11	38
12:00 – 13:00	52	33	85	3	3	7	56	36	92
13:00 – 14:00	41	70	111	0	0	0	41	70	111
14:00 – 15:00	5	27	32	4	1	5	10	27	37
15:00 – 16:00	3	0	3	2	0	2	5	0	5
16:00 – 17:00	16	3	19	0	0	1	16	4	20
17:00 – 18:00	46	6	52	0	7	7	46	13	59
18:00 – 19:00	72	40	112	4	5	9	76	45	121
19:00 – 20:00	47	89	136	2	4	6	49	92	141
20:00 – 21:00	0	46	46	1	0	1	1	47	48
21:00 – 22:00	0	6	6	0	1	1	0	7	7
22:00 – 23:00	0	10	10	0	0	0	0	10	10
23:00 – 24:00	0	0	0	0	3	3	0	3	3
Daily	**484**	**491**	**975**	**38**	**38**	**77**	**522**	**529**	**1,052**

8.11 Total Vehicle Increase

8.11.1 **Table 8.22** sets out the predicted daily vehicle increase (passengers and employees) in the peak month of August, based on a constant mode share between the two scenarios. The Airport Peak has been identified as 13:00-14:00 as the largest increase in traffic associated with Development Proposals between the two traditional peaks can be seen in this hour.

Table 8.22: Total Daily Vehicle Increase (2 mppa) in Peak Month of August - UPDATED

Time	Passengers			Employees			Logistics			Total		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
00:00 - 01:00	146	279	426	0	0	0	0	0	0	146	279	426
01:00 – 02:00	0	0	0	0	1	1	0	0	0	0	1	1
02:00 – 03:00	0	0	0	32	13	46	0	0	0	32	13	45
03:00 – 04:00	0	0	0	4	1	5	0	0	0	4	1	5
04:00 – 05:00	0	0	0	4	1	5	0	0	1	4	1	5
05:00 – 06:00	75	39	114	48	2	52	1	1	3	125	43	167
06:00 – 07:00	163	33	196	46	64	113	1	1	3	209	98	308
07:00 – 08:00	137	106	243	31	30	62	1	1	1	169	137	306
08:00 – 09:00	109	74	183	13	0	14	1	1	2	123	75	198
09:00 – 10:00	92	93	184	14	0	14	1	1	2	106	94	200
10:00 – 11:00	106	165	272	0	1	1	1	1	2	107	167	275
11:00 – 12:00	106	81	187	1	1	2	0	0	0	106	82	188
12:00 – 13:00	227	196	423	30	29	60	1	1	1	258	226	484
13:00 – 14:00	254	298	552	0	3	4	0	0	1	254	302	556
14:00 – 15:00	62	96	158	40	6	47	1	1	2	103	102	205
15:00 – 16:00	11	6	17	14	4	18	1	1	3	26	11	37
16:00 – 17:00	57	38	95	0	4	5	0	0	0	58	42	100
17:00 – 18:00	160	99	259	1	58	61	0	0	0	161	157	318
18:00 – 19:00	303	253	556	34	46	83	0	0	0	337	299	636
19:00 – 20:00	305	369	674	17	34	53	0	0	1	322	403	725
20:00 – 21:00	79	151	230	11	2	13	0	0	0	91	153	243
21:00 – 22:00	11	20	31	0	10	11	0	0	0	11	30	42
22:00 – 23:00	16	31	48	0	4	4	0	0	0	17	35	51
23:00 – 24:00	0	0	0	0	31	31	1	1	2	1	32	33
Daily	**2419**	**2430**	**4849**	**342**	**342**	**705**	**10**	**10**	**24**	**2771**	**2782**	**5552**

10 Forecast Traffic Assignment

10.1 Introduction

10.1.1 To determine where the proposed 2 mppa increase may have an impact on the surrounding highway network, it is necessary to determine the increase in traffic movements associated with the 12 mppa scheme. To do this, the vehicle movements associated with the permitted 10 mppa scheme have firstly been established. Vehicle increases associated with the 12 mppa scheme have then been identified and compared to future corrected network traffic flows to determine which areas require consideration in more detail.

10.1.2 This chapter therefore sets out the revised approach and methodology adopted for assigning the vehicular trip generation for the consented 10 mppa and the proposed 12 mppa scenarios at Bristol Airport.

10.1.3 A slightly revised assignment methodology has been agreed with NSC and Highways England. The following adjustments to the assignment method/network have been undertaken:

- The addition of a link to represent the route between Clevedon Road and the A370 to access the airport through Nailsea; and
- The disaggregation of the zone representing North Somerset.

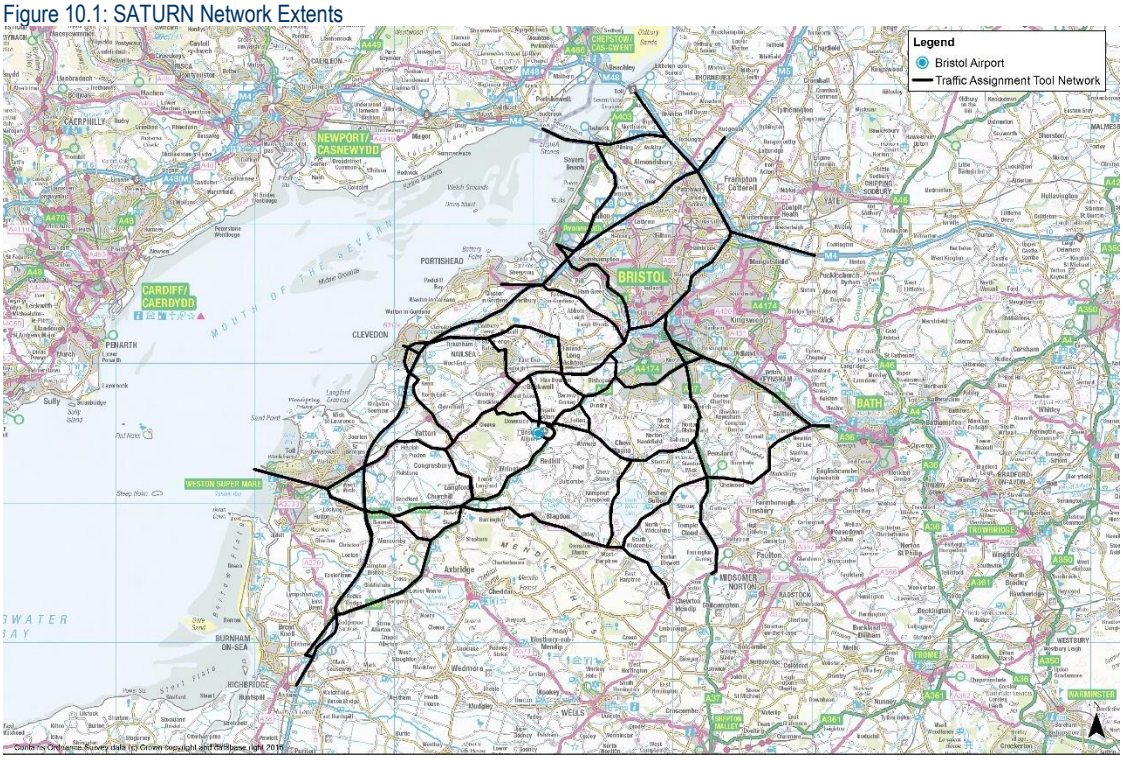
10.1.4 The detailed assignment methodology technical note which was agreed with NSC and Highways England is enclosed under **Appendix A**.

10.2 Methodology

10.2.1 To assess the impact of the increase in patronage to 10 and 12 mppa at Bristol Airport, a buffer network has been developed within SATURN to identify the traffic flow increases on a number of junctions near the airport. The thirteen junctions surveyed have been coded as dummy simulation nodes within the network to enable the junction turning movements to be calculated.

10.2.2 The Bristol Airport Strategic Highway Tool (BASHT) has been built within SATURN. It uses an 'all or nothing' assignment method on an unconstrained network, based on link distances between specific nodes and recorded HERE speed data. HERE data is extracted from the databases collected and used by in car satellite navigation systems, so is a good indication of current actual journey times at specific times of day. **Figure 10.1** illustrates the extents of the SATURN network.

Figure 10.1: SATURN Network Extents



10.2.3 As noted, the HERE data set, this uses GPS data from a number of car manufactures to provide average speed data over a specific period of time. The average speeds for the modelled time periods have been isolated per direction and have been allocated to each link within the model.

10.2.4 The speeds taken from the HERE network are for the relevant time periods and correspond with the peak periods identified within the junction surveys and used for the subsequent junction assessments.

10.2.5 The tool has been developed for three time periods including;

- AM Peak – 08:00 to 09:00;
- Airport Peak – 13:00 to 14:00; and
- PM Peak – 17:00 to 18:00.

10.2.6 Two scenarios have been assessed using the tool; the 10 mppa and 12 mppa scenarios. The additional trips associated with these scenarios have been derived and added to the 2018 recorded traffic volumes, scaled up to the year 2026 using TEMPro growth rates.

10.2.7 The agreed assessment year is 2026 in line with the full completion of the Development Proposals. To test the impact of the development on the highway, the following scenarios have been assessed:

- 2026 Baseline + Committed Development (2026 Reference Case, including 10 mppa consent); and
- 2026 Baseline + Committed Development + Proposed 12 mppa Development (2026 Test Case).

10.2.8 Assigned traffic network diagrams for each scenario and time period have been provided in **Appendix B**. It is important to note that the assigned traffic diagrams provided in Appendix B relates to the following:

10mppa: the traffic associated with the uplift from the observed 2018 baseline to forecast 10mppa

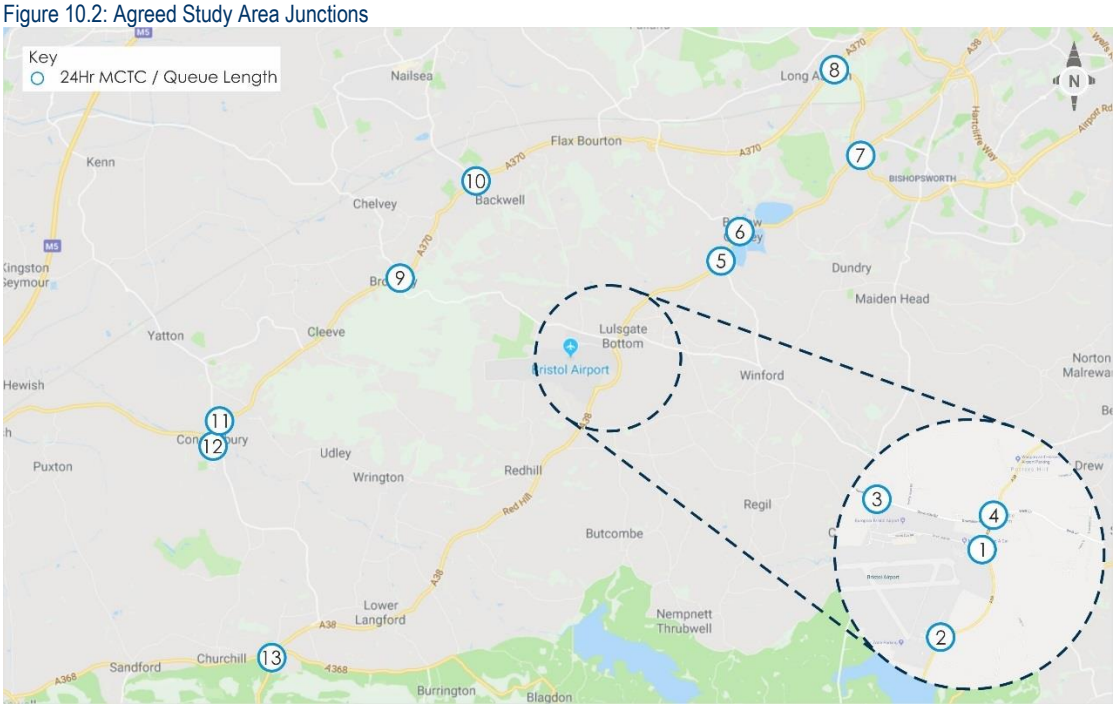
12mppa: the traffic associated with the uplift from 10mppa to 12mppa

10.2.9 These outputs have ben used to derive forecast traffic flows for specific junction capacity assessments, as outlined in **Section 10.4**.

10.3 Local Highway Assessment

10.3.1 As described above, the forecast development trips have been assigned to the local highway network. **Figure 10.2** shows the junctions being considered within the agreed study area.

Figure 10.2: Agreed Study Area Junctions



10.3.2 **Table 10.1** summarises the vehicular increases per junction during the AM (08:00-09:00), PM (17:00-18:00) and Airport Peak (13:00-14:00) periods. For ease of comparison the flows provided are for total vehicles through the junction for each scenario.

Table 10.1: Vehicular Increases per Junction

Junction Ref No	Junction Name	Time Period	2026 Reference Case	Forecast Development Traffic	2026 Test Case	% Increase
1	A38 / Bristol Airport Northern Roundabout	AM	2735	188	2923	7%
		Airport Peak	3181	531	3712	17%
		PM	3512	307	3819	9%
2	A38 / Bristol Airport Southern Roundabout	AM	2735	188	2923	7%
		Airport Peak	1776	182	1958	10%
		PM	2082	98	2180	5%
3	Downside Road / Bristol Airport Service Access	AM	785	8	793	1%
		Airport Peak	521	20	541	4%
		PM	664	21	685	3%
4a	A38 / Downside Road	AM	2908	154	3062	5%
		Airport Peak	2915	434	3349	15%
		PM	3497	254	3751	7%
4b	A38 / West Lane	AM	2588	143	2731	6%
		Airport Peak	2642	409	3051	15%
		PM	3081	227	3308	7%
5	A38 / Barrow Lane	AM	2563	105	2668	4%
		Airport Peak	2344	298	2642	13%
		PM	2881	167	3048	6%
6	A38 / Barrow Street	AM	2768	105	2873	4%
		Airport Peak	2432	298	2730	12%
		PM	3002	167	3169	6%
7	A38 / A4174 SBL	AM	3807	105	3912	3%
		Airport Peak	3110	298	3408	10%
		PM	3940	167	4107	4%
8	A370 / A4174 SBL	AM	3463	54	3517	2%
		Airport Peak	2934	154	3088	5%
		PM	3798	84	3882	2%
9	A370 / Brockley Combe Road / Brockley Lane	AM	1,770	8	1,778	0%
		Airport Peak	1,402	20	1,422	1.4%

Junction Ref No	Junction Name	Time Period	2026 Reference Case	Forecast Development Traffic	2026 Test Case	% Increase
		PM	1,951	20	1,971	1%
10	A370 / Dark Lane / Station Road	AM	1,797	0	1,797	0%
		Airport Peak	1,602	1	1,603	0%
		PM	2,081	1	2,082	0%
11	A370 / Smallway	AM	1,127	5	1,132	0%
		Airport Peak	945	13	958	1%
		PM	1,326	15	1,341	1%
12	A370 / High Street	AM	612	0	612	0%
		Airport Peak	568	0	568	0%
		PM	751	0	751	0%
13	A38 / A368	AM	2,333	43	2,376	2%
		Airport Peak	1,890	122	2,012	6%
		PM	2,413	64	2,477	3%

10.3.3 To determine which of the junctions in the study area require more detailed consideration, the potential effects of the Development Proposals at each of the junctions should be considered.

10.3.4 The predicted impact at Junctions 1 to 7 has been considered potentially material due to the percentage increase in traffic flows predicted and therefore detailed junction modelling has been undertaken, as set out within Section 11.

10.3.5 The predicted impact at the A370 / A4174 roundabout (Junction 8) and the signal junction with the A368 (Junction13) is forecast to be greater than 5% in the Airport peak. However, the forecast 2026 Test Case traffic volumes in the Airport peak hour are lower than the recorded 2018 traffic volumes at both junctions in the weekday peak hours. Therefore, the effects of the Development Proposals at these junctions would not be considered 'severe', unless there is a clear safety issue that would be exacerbated (based on NPPF 2018). This is not the case, as set out previously in Section 7.7. Therefore, no further analysis of these junctions has been undertaken at this stage.

10.3.6 The Development Proposals result in an additional vehicle every 3 minutes at the signalised crossroad A370 / Brockley Combe Road / Brockley Lane Junction (Junction 9) in the afternoon and evening peak hour, which relates to 1 additional vehicle every 2 signal cycles. Clearly this minimal impact falls well within day to day vehicle flow variation. The impact is therefore not considered to be severe in accordance with the NPPF and no further assessment is required at this junction.

10.3.7 The Development Proposals are not predicted to increase traffic on the A370 / Dark Lane / Station Road Junction (Junction 10) by more than 1 vehicle per hour. The impact is therefore

not considered to be severe in accordance with the NPPF and no further assessment is required at this junction.

10.3.8 The Development Proposals result in a maximum of 1 additional vehicle every 4 minutes at the A370 / Smallway Roundabout (Junction 11). The effects of the Development Proposals are therefore not considered severe, in accordance with the NPPF, and no further assessment is required at this junction.

10.3.9 As with the A370 / Dark Lane / Station Road Junction (Junction 10), the impact at the A370 / High Street (Junction 12) is not considered severe in accordance with the NPPF and no further assessment is required at this junction.

10.3.10 At the A38 / A368 signalised crossroad (Junction 13), the airport peak time period (13:00 – 14:00) shows the greatest vehicle uplift as a result of the Development Proposals. The overall predicted traffic in the 2026 test case (2,016) is however still lower than the recorded 2018 morning and evening peak hour traffic volume at this junction. The Development Proposals result in an increase of 1 vehicle per minute or 1.5 additional vehicles per signal cycle in the morning and evening peaks. Given the above, no further assessment is required at this junction

10.4 Highways England Junctions Net Trip Generation

10.4.1 The alternative traffic assignment assessment (primarily affecting trips to/from the west of the airport crossing the M5 such as Weston-Super-Mare, Clevedon, Portishead Nailsea) has been agreed with Highways England.

10.4.2 **Figure 10.3** to **10.6** illustrates the development impacts associated with 10 mppa and 12 mppa at Junction 18, 19, 21 and 22 respectively for each peak hour identified.

Figure 10.3: Junction 18 of the M5 Motorway

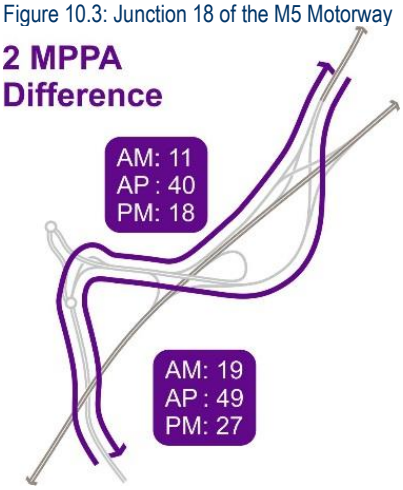


Figure 10.4: Junction 19 of the M5 Motorway

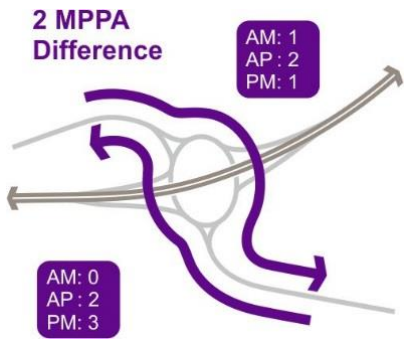


Figure 10.5: Junction 21 of the M5 Motorway

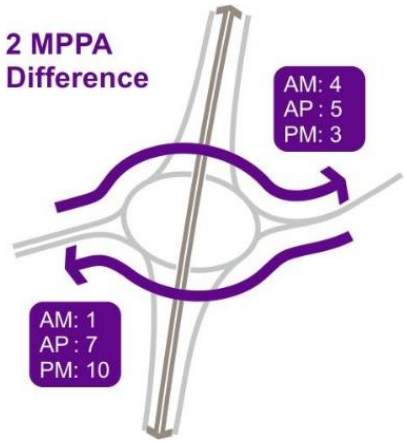
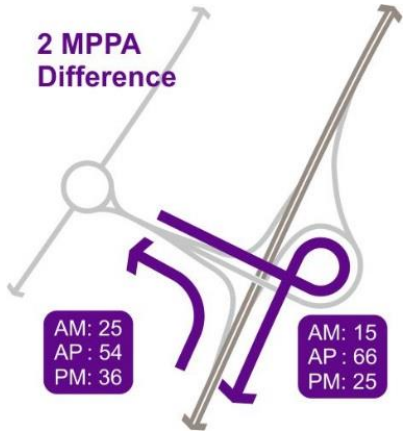


Figure 10.6: Junction 22 of the M5 Motorway



10.4.3 Highways England requested additional information to understand how the incremental passenger growth at Bristol Airport relates to the traffic passing through Junction 22.

10.4.4 A threshold level of an additional 30 two-way vehicles from the airport within either the AM or PM peak has been identified by Highways England before mitigation is required to be in place.

10.4.5 It is possible that some trips from the south could continue beyond Junction 22 and onto Junction 21 to access the airport, but a robust assessment assuming all the traffic from the south on the M5 would access the airport via Junction 22 has been agreed.

10.4.6 Incremental growth (steps of 250,000 passengers) based on all trips to/from the south on the M5 using J22 is summarised in **Table 10.2**.

Table 10.2: Passenger growth analysis of Junction 22 – Scenario 1

Passengers	AM Peak (0800 - 0900)	PM Peak (1700 - 1800)
10 mppa	0	0
10.25 mppa	5	8
10.5 mppa	10	15
10.75 mppa	15	23
11 mppa	20	30
11.25 mppa	25	38
11.5 mppa	30	46
11.75 mppa	35	53
12 mppa	40	61

10.4.7 The 30 two-way vehicle level is reached at 10.984 mppa in the PM peak. It has been agreed with Highways England that a threshold level of 11 mppa is set before mitigation is required to be in place at Junction 22.

11 Residual Local Highways Impacts

11.1 Introduction

11.1.1 BAL intend on developing an ambitious ASAS through Section 106 and Airport Transport Forum discussions. These proposals are designed to improve access, legibility and safety to reduce congestion on the road network surrounding Bristol Airport.

11.1.2 Notwithstanding this and based on the analysis set out in Chapter 10, which identified which junctions could require more detailed consideration, this chapter sets out the predicted vehicle operational impact on the local road network at the following junctions within the agreed study area:

- Junction 1 A38 / Bristol Airport Northern Roundabout;
- Junction 2 A38 / Bristol Airport Southern Roundabout;
- Junction 3 Downside Road / Bristol Airport Service Access;
- Junction 4a A38 / Downside Road;
- Junction 4b A38 / West Lane;
- Junction 5 A38 / Barrow Lane;
- Junction 6 A38 / Barrow Street; and
- Junction 7 A38 / A4174 SBL.

11.1.3 The agreed assessment year is 2026, in line with the completion of the development. To test the impact of the development on the highway, the following scenarios have been assessed:

- 2026 Baseline + Committed Development (2026 Reference Case including 10 mppa consent); and
- 2026 Baseline + Committed Development + Proposed 12 mppa Development (2026 Test Case).

11.2 A38 / Bristol Airport Roundabouts (J1)

Existing Layout

11.2.1 The results of the junction capacity assessments at the existing A38 Northern roundabout with Bristol Airport is summarised in **Table 11.1**.

Table 11.1: A38 / Bristol Airport Roundabouts Existing Scheme - Capacity Results Summary

	Arm	2018 Baseline		2026 Reference Case		2026 Test Case	
		RFC	Queue	RFC	Queue	RFC	Queue
AM	A38 (N)	0.68	2.2	0.82	4.6	0.89	7.6
	Cul-de-sac	0.02	0.0	0.02	0.0	0.03	0.0
	A38 (S)	0.55	1.2	0.67	2.1	0.72	2.5
	Bristol Airport	0.18	0.2	0.26	0.4	0.31	0.4
IP	A38 (N)	0.70	2.4	0.96	15.5	1.13	107.1
	Cul-de-sac	0.02	0.0	0.04	0.0	0.04	0.0
	A38 (S)	0.37	0.6	0.52	1.1	0.60	1.5
	Bristol Airport	0.36	0.6	0.57	1.3	0.73	2.6
PM	A38 (N)	0.92	9.6	1.14	127.2	1.22	196.3
	Cul-de-sac	0.04	0.0	0.05	0.1	0.05	0.1
	A38 (S)	0.52	1.1	0.65	1.9	0.69	2.2
	Bristol Airport	0.39	1.6	0.55	1.2	0.63	1.7

RFC – Ratio of Flow to Capacity

11.2.2 The existing Bristol Airport northern access (A38 roundabout with Bristol Airport) has been validated and calibrated against recorded traffic flows, recorded queue length surveys, video and on-site observations and on-site measurements.

11.2.3 The above results indicate that the existing northern A38 roundabout with Bristol Airport operates over practical capacity in the 2018 baseline PM peak. It is forecast to operate over capacity in both the 2026 reference case and test case.

11.2.4 The full junction assessment output for the existing A38 roundabouts with Bristol Airport is contained within **Appendix C**.

Improvement Scheme

11.2.5 The development proposals include upgrades to the northern roundabout. This includes a dedicated left turn slip lane onto the A38 and an internal dual carriageway gyratory.

11.2.6 The results of the junction capacity assessment at the proposed improved A38 northern roundabout with Bristol Airport is summarised in **Table 11.2**.

Table 11.2: A38 / Bristol Airport Roundabout Improvement Scheme - Capacity Results Summary

Time Period	Arm	2026 Test Case	
		RFC	Queue
AM	A38 (N)	0.63	1.7
	Cul-de-sac	0.04	0.0
	A38 (S)	0.81	4.1
	Bristol Airport	0.17	0.2
IP	A38 (N)	0.85	5.5
	Cul-de-sac	0.19	0.2
	A38 (S)	0.84	5.1
	Bristol Airport	0.22	0.3
PM	A38 (N)	0.85	5.6
	Cul-de-sac	0.28	0.4
	A38 (S)	0.84	5.1
	Bristol Airport	0.22	0.3

RFC – Ratio of Flow to Capacity

11.2.7 The improved northern access roundabout to Bristol Airport is predicted to operate well within capacity in each 2026 Test Case scenario.

11.2.8 The proposed junction offers a variety of improvements outside of capacity issues, such as improved safety, ease of wayfinding, and reduction in driver delay. Delay is considered an important factor in passenger experience at Bristol Airport due to the possibility of passengers missing their flights.

11.2.9 The full junction assessment output for the proposed A38 roundabout with Bristol Airport is contained within **Appendix C**.

11.3 A38 / Bristol Airport Silverzone (South) (J2)

11.3.1 The results of the junction capacity assessments at the existing southern A38 roundabout with Bristol Airport (Silverzone) is summarised in **Table 11.3**.

Table 11.3: A38 / Bristol Airport Southern Roundabout - Capacity Results Summary

	Arm	2018 Baseline		2026 Reference Case		2026 Test Case	
		RFC	Queue	RFC	Queue	RFC	Queue
AM	A38 (N)	0.34	0.5	0.4	0.7	0.41	0.7
	A38 (S)	0.45	0.8	0.53	1.2	0.55	1.2
	Bristol Airport	0.09	0.1	0.12	0.1	0.14	0.2
IP	A38 (N)	0.36	0.6	0.46	0.9	0.47	0.9
	A38 (S)	0.23	0.3	0.30	0.4	0.33	0.5
	Bristol Airport	0.19	0.2	0.28	0.4	0.33	0.5
PM	A38 (N)	0.45	0.8	0.48	0.9	0.47	0.9
	A38 (S)	0.34	0.5	0.41	0.7	0.43	0.7
	Bristol Airport	0.19	0.2	0.26	0.4	0.29	0.4

11.3.2 The existing southern A38 roundabout with Bristol Airport is forecast to operate within capacity in both the 2026 reference case and test case. The full junction assessment output for the southern A38 roundabout with Bristol Airport is contained within **Appendix C**.

11.4 Downside Road / Bristol Airport (J3)

11.4.1 The results of the junction capacity assessment at the existing Downside Road junction with Bristol Airport are summarised in **Table 11.4**.

Table 11.4: Downside Road / Bristol Airport Existing Layout - Capacity Results Summary

	Arm	2018 Baseline		2026 Reference Case		2026 Test Case	
		RFC	Queue	RFC	Queue	RFC	Queue
AM	Bristol Airport Left Turn	0.05	0.1	0.06	0.1	0.06	0.1
	Bristol Airport Right Turn	0.03	0.0	0.04	0.0	0.04	0.0
	Downside Road (W)	0.12	0.2	0.14	0.3	0.14	0.3
IP	Bristol Airport Left Turn	0.08	0.1	0.09	0.1	0.10	0.1
	Bristol Airport Right Turn	0.07	0.1	0.08	0.1	0.09	0.1
	Downside Road (W)	0.07	0.1	0.08	0.1	0.08	0.1

	Arm	2018 Baseline		2026 Reference Case		2026 Test Case	
		RFC	Queue	RFC	Queue	RFC	Queue
PM	Bristol Airport Left Turn	0.12	0.1	0.14	0.2	0.14	0.2
	Bristol Airport Right Turn	0.05	0.1	0.06	0.1	0.06	0.06
	Downside Road (W)	0.08	0.1	0.09	0.2	0.09	0.09

RFC – Ratio of Flow to Capacity

11.4.2 The existing models have been validated and calibrated against recorded traffic flows, recorded queue length surveys, video and on-site observations and on-site measurements.

11.4.3 The junction is forecast to operate well within capacity in each scenario assessed. Given the above junction assessment results, the impact of the development is not considered 'severe' in the context of the NPPF.

11.4.4 The full junction assessment output for the existing Downside Road priority junction with Bristol Airport is contained within **Appendix C**.

11.5 A38 / West Lane & Downside Road (J4)

Existing Layout

11.5.1 The results of the junction capacity assessment at the existing A38 signalised junction with Downside Road and the A38 priority junction with West Lane are summarised in **Table 11.5** and **Table 11.6** respectively.

Table 11.5: A38 / Downside Road Existing Layout - Capacity Results Summary

	Arm	2018 Baseline			2026 Reference Case			2026 Test Case		
		DOS	Queue	PRC	DOS	Queue	PRC	DOS	Queue	PRC
AM	A38 (S)	77.7%	26.0	11.8%	92.1%	45.8	-8.4%	95.9%	56.1	-16.3%
	Downside Road	80.5%	12.4		94.0%	17.8		96.2%	19.4	
	A38 (N)	79.9%	26.3		97.6%	54.5		104.6 %	90.0	
IP	A38 (S)	65.2%	14.6	16.7%	89.4%	36.3	-8.9%	102.2 %	86.6	-22.6%
	Downside Road	77.1%	8.8		93.4%	13.8		107.8 %	25.4	
	A38 (N)	72.9%	17.9		98.0%	51.4		110.3 %	128.1	
PM	A38 (S)	80.3%	39.8	-6.2%	98.8%	104.6	-29.8%	106.8 %	175.6	-39.3%
	Downside Road	94.4%	19.1		110.4 %	35.7		113.2 %	39.5	
	A38 (N)	95.6%	73.5		116.9 %	239.8		125.4 %	318.2	

DOS – Degree of Saturation, PRC – Practical Reserve Capacity

11.5.2 A validation / calibration exercise on the base model for each identified peak hour has been undertaken and summarised in a supplementary technical note which is contained within **Appendix C**.

11.5.3 The results indicate the existing A38 signal junction is operating over capacity in 2018 in the PM peak, with the PRC recorded at -9.1%. The observed 2018 traffic flows and junction tests indicate that the junction is operating within capacity during the morning peak and interpeak.

11.5.4 All of the 2026 scenarios assessed forecast the existing A38 signal junction with Downside Road operate over capacity.

Table 11.6: A38 / West Lane Existing Layout - Capacity Results Summary

Time Period	Arm	2018 Survey Flows		2026 Reference Case		2026 Test Case	
		RFC	Queue	RFC	Queue	RFC	Queue
AM	West Lane (Left Turn)	0.52	1.1	0.79	3.1	0.97	9.8
	West Lane (Right Turn)	0.15	0.2	0.55	0.9	3.48	6.2
	A38 (S)	0.37	0.6	0.49	1.0	0.54	1.2
IP	West Lane (Left Turn)	0.40	0.7	0.80	3.6	1.03	14.0
	West Lane (Right Turn)	0.15	0.2	1.83	5.9	-	11.7
	A38 (S)	0.33	0.5	0.54	1.2	0.72	2.7
PM	West Lane (Left Turn)	0.84	4.3	1.43	59.5	1.60	87.4
	West Lane (Right Turn)	0.47	0.7	-	5.9	-	10.1
	A38 (S)	0.60	1.4	0.86	6.1	1.01	22.5

RFC – Ratio of Flow to Capacity

11.5.5 The existing models have been validated and calibrated against recorded traffic flows, recorded queue length surveys, video and on-site observations and on-site measurements.

11.5.6 The existing A38 junction with West Lane is forecast to operate over capacity in both the 2026 Reference Case and 2026 Test Case. The full junction assessment outputs for the existing A38 signalised junctions with Downside Road and the existing A38 priority junction with West Lane are contained within **Appendix C**.

Improvement Scheme

11.5.7 As set out within Chapter 4.3 of the TA, the development proposals include significant upgrades to A38 junctions with Downside Road and West Lane.

11.5.8 The results of the junction capacity assessment at the improved A38 signalised staggered cross roads with West Lane and Downside Road are summarised in **Table 11.7**.

Table 11.7: A38 / West Lane & Downside Road Improvement Scheme - Capacity Results Summary

Time Period	Junction	Arm	2026 Reference Case		
			DOS	Queue	PRC %
AM	A38 / Downside Road	A38 (S) - Left & Ahead	75.1%	12.4	19.9
		A38 (S) - Ahead	54.7%	9.6	
		Downside Road - Left	71.9%	8.1	
		Downside Road – Right	71.9%		
		A38 (N) – Ahead	60.6%	4.1	
		A38 (N) – Ahead & Left	63.4%	4.3	
	A38 / West Lane	A38 (N) – Ahead	67.2%	8.6	25.1
		A38 (N) – Left	67.2%		
		West Lane – Left	54.5%	5.7	
		A38 (S) – Ahead	52.0%	6.6	
		A38 (S) – Ahead & Right	71.9%	14.7	
IP	A38 / Downside Road	A38 (S) - Left & Ahead	71.3%	12.8	16.5
		A38 (S) - Ahead	54.7%	10.2	
		Downside Road - Left	77.3%	8.3	
		Downside Road – Right	77.3%		
		A38 (N) – Ahead	60.8%	5.1	
		A38 (N) – Ahead & Left	62.8%	3.8	
	A38 / West Lane	A38 (N) – Ahead	81.2%	12.8	10.8
		A38 (N) – Left	81.2%		
		West Lane – Left	51.8%	6.0	
		A38 (S) – Ahead	55.6%	7.6	
		A38 (S) – Ahead & Right	81.1%	15.7	
PM	A38 / Downside Road	A38 (S) - Left & Ahead	80.7%	11.2	11.6
		A38 (S) - Ahead	59.5%	8.7	
		Downside Road - Left	79.5%	6.5	
		Downside Road – Right	79.5%		
		A38 (N) – Ahead	73.4%	4.3	
		A38 (N) – Ahead & Left	78.4%	4.8	
	A38 / West Lane	A38 (N) – Ahead	79.6%	10.5	13.1
		A38 (N) – Left	79.6%		
		West Lane – Left	78.4%	7.4	
		A38 (S) – Ahead	57.6%	6.3	
		A38 (S) – Ahead & Right	77.2%	13.8	

DOS – Degree of Saturation, PRC – Practical Reserve Capacity

11.5.9 The improved signalised A38 junction with West Lane and Downside Road is predicted to operate within capacity in each 2026 Test Case scenario. The PRC is predicted to be above 10% for all scenarios assessed at the proposed A38 signal junctions with Downside Road and West Lane.

11.5.10 In addition to providing additional highway capacity, the proposed scheme offers significant improvements to pedestrian and cyclist facilities, as detailed in Section 4.3.

11.5.11 The full junction assessment output for the proposed A38 signalised junction with West Lane and Downside Road is contained within **Appendix C**.

11.6 A38 / Barrow Street (J5)

11.6.1 The results of the junction capacity assessment at the existing A38 signalised junction with Barrow Street are summarised in **Table 11.8**

Table 11.8: A38 / Barrow Street / Barrow Lane Existing Layout - Capacity Results Summary

Time Period	Arm	2018 Survey Flow			2026 Reference Case			2026 Test Case		
		DOS	Queue	PRC	DOS	Queue	PRC	DOS	Queue	PRC
AM	A38 Bridgewater Road (W) – Left Ahead	71.9%	10.6	25.2%	84.4%	14.7	6.6%	85.9%	16.1	4.7%
	A38 Bridgewater Road (W) – Ahead	38.9%	5.8		45.8%	7.0		46.5%	7.4	
	B3130 Barrow Street	71.8%	5.8		81.8%	7.4		82.9%	7.7	
	A38 Bridgewater Road (E) - Ahead	41.8%	6.2		50.8%	8.2		53.8%	9.0	
	A38 Bridgewater Road (E) – Ahead & Right	53.6%	2.6		61.4%	3.1		62.2%	3.2	
IP	A38 Bridgewater Road (W) – Left Ahead	66.6%	8.3	35.1%	82.8%	12.4	8.7%	87.5%	14.2	2.9%
	A38 Bridgewater Road (W) – Ahead	24.6%	2.7		38.4%	4.7		50.4%	6.6	
	B3130 Barrow Street	55.7%	2.7		65.0%	3.3		65.0%	3.3	
	A38 Bridgewater Road (E) - Ahead	41.5%	5.0		55.3%	7.7		63.2%	9.8	
	A38 Bridgewater Road (E) – Ahead & Right	15.8%	0.8		18.2%	1.1		18.2%	1.3	

Time Period	Arm	2018 Survey Flow			2026 Reference Case			2026 Test Case		
		DOS	Queue	PRC	DOS	Queue	PRC	DOS	Queue	PRC
PM	A38 Bridgewater Road (W) – Left Ahead	69.1%	8.6	30.2%	82.2%	11.8	9.5%	85.4%	13.1	4.2%
	A38 Bridgewater Road (W) – Ahead	44.9%	5.6		52.7%	7.0		54.4%	7.5	
	B3130 Barrow Street	66.1%	5.6		80.6%	7.5		86.4%	8.5	
	A38 Bridgewater Road (E) - Ahead	64.0%	10.6		75.7%	14.7		78.5%	15.8	
	A38 Bridgewater Road (E) – Ahead & Right	26.3%	2.7		29.9%	3.2		30.0%	3.3	

11.6.2 A validation / calibration exercise on the base model for each identified peak hour has been undertaken and summarised in a supplementary technical note which is contained within **Appendix G**.

11.6.3 The results indicate that the junction operates within capacity in all scenarios. The full junction assessment outputs are provided in **Appendix C**.

11.7 A38 / Barrow Lane (J6)

11.7.1 The results of the junction capacity assessment at the existing A38 priority junction with Barrow Lane are summarised in **Table 11.9.**

Table 11.9: A38 / Barrow Lane - Capacity Results Summary

Time Period	Arm	2018 Baseline		2026 Reference Case		2026 Test Case	
		RFC	Queue	RFC	Queue	RFC	Queue
AM	Barrow Lane	0.69	2.1	1.44	26.8	1.90	39.8
	A38(S) Right Turn	0.02	0.0	0.03	0.0	0.03	0.0
IP	Barrow Lane	0.48	1.0	1.02	9.5	1.95	40.2
	A38(S) Right Turn	0.01	0.0	0.01	0.0	0.01	0.0
PM	Barrow Lane	0.87	4.3	2.77	47.1	2.77	50.5

Time Period	Arm	2018 Baseline		2026 Reference Case		2026 Test Case	
		RFC	Queue	RFC	Queue	RFC	Queue
	A38(S) Right Turn	0.02	0.0	0.03	0.0	0.03	0.0

11.7.2 A validation / calibration exercise on the base model for each identified peak hour has been undertaken.

11.7.3 The base model created within PICADY does not reflect the existing onsite conditions of the junction. In order to more accurately represent the existing conditions calibration methods have been investigated. The only calibration method available for this specific type of junction is an intercept adjustment. This effectively represents a change to the maximum flow that would be possible to cross the give way line in the absence of any straight through traffic. An intercept adjustment of 50pcu/per hour was considered appropriate following video observations and was applied to all scenarios.

11.7.4 Additionally, the model does not include the platooning of traffic created by the existing A38/Barrow Street signalised junction located north of the junction. The intercept adjustment helps to account for this, but in reality, more gaps in traffic arise than PICADY predicts.

11.7.5 The largest increase of through traffic on the A38 is due to the increase in background traffic and committed development. The Reference Case scenario shows an increase of overall traffic of 402 vehicles (19%) in the AM period, 559 vehicles (31%) in the IP period and 490 vehicles (21%) in the PM period.

11.7.6 The Test Case scenario shows an increase in overall traffic of 105 vehicles (5%) in the AM period, 298 vehicles (14%) in the IP period and 167 vehicles (7%) in the PM period. There is no increase in traffic exiting/entering the minor arm in either the Reference Case and Test Case scenarios. The increase in traffic between the Reference Case and Test Case scenarios is through traffic only. Since it is not deliverable to promote the use of Barrow Lane, it is felt that any capacity improvements to the side road would lead to negative outcomes by promoting rat running. The full junction assessment outputs are provided in **Appendix C**.

11.8 SBL / A38 (J7)

11.8.1 The results of the junction capacity assessment at the existing A4174 SBL signalised roundabout with the A38 are summarised in **Table 11.10**.

Table 11.10: SBL / A38 Existing Layout - Capacity Results Summary

Time Period	Arm	2018 Survey			2026 Reference			2026 Test Case		
		DOS	Queue	RFC	DOS	Queue	RFC	DOS	Queue	RFC
AM	SBL (N) – Ahead & Left	57.6%	5.7	47.7	66.6%	7.0	28.3	69.5%	7.3	18.5
	SBL (N) – Ahead	24.3%	2.2		33.7%	3.2		38.8%	3.6	

Time Period	Arm	2018 Survey			2026 Reference			2026 Test Case		
		DOS	Queue	RFC	DOS	Queue	RFC	DOS	Queue	RFC
	SBL (N) – Circulatory Ahead	29.4%	3.0		33.2%	3.4		32.6%	3.3	
	SBL (N) – Circulatory Right Ahead	36.5%	3.8		41.5%	4.3		41.8%	4.3	
	A38 (N) – Ahead + Left	56.7%	3.2		70.2%	4.3		76.0%	4.9	
	A38 (N) – Ahead	35.9%	1.9		40.6%	2.2		40.6%	2.2	
	A38 (N) – Circulatory Ahead	23.1%	1.6		26.2%	1.9		26.6%	1.9	
	A38 (N) – Circulatory Right Ahead	31.8%	1.9		36.3%	3.1		36.8%	3.6	
	A38 (N) – Circulatory Right	11.7%	0.1		15.5%	0.1		17.0%	0.1	
	SBL (S) – Left	44.6%	4.3		50.9%	5.0		50.9%	5.0	
	SBL (S) – Ahead	60.9%	4.7		70.1%	6.7		70.0%	6.6	
	SBL (S) – Circulatory Ahead	24.4%	2.1		28.9%	2.7		31.7%	3.1	
	SBL (S) – Circulatory Ahead	31.5	3.7		40.3%	5.3		43.8%	6.0	
	SBL (S) – Circulatory Right	10.7	0.7		11.8%	0.8		11.8%	0.8	
	A38 (S) – Left	57.8%	4.0		65.7%	4.9		65.6%	5.0	
	A38 (S) – Ahead	55.2%	3.7		63.1%	4.4		63.6%	4.4	
	A38 (S) – Circulatory Ahead	39.7	1.0		46.6%	3.1		46.8%	4.9	

Time Period	Arm	2018 Survey			2026 Reference			2026 Test Case		
		DOS	Queue	RFC	DOS	Queue	RFC	DOS	Queue	RFC
	A38 (S) – Circulatory Right Ahead	46.2%	2.3		55.2%	6.1		59.7%	6.7	
IP	SBL (N) – Ahead & Left	59.3%	4.4	51.7	66.4%	5.7	35.6	70.0%	6.2	27.5
	SBL (N) – Ahead	35.7%	2.4		44.2%	3.5		49.5%	4.0	
	SBL (N) – Circulatory Ahead	18.3%	1.6		24.8%	2.3		27.2%	2.5	
	SBL (N) – Circulatory Right Ahead	23.5%	2.1		30.3%	2.9		34.5%	3.3	
	A38 (N) – Ahead + Left	45.1%	2.2		59.4%	3.4		70.6%	4.3	
	A38 (N) – Ahead	18.4%	0.8		19.7%	1.0		19.7%	1.0	
	A38 (N) – Circulatory Ahead	23.0%	0.8		27.7%	1.2		29.1%	1.3	
	A38 (N) – Circulatory Right Ahead	26.5%	0.7		31.8%	1.9		33.4%	2.5	
	A38 (N) – Circulatory Right	13.1%	0.1		17.6%	0.1		19.8%	0.1	
	SBL (S) – Left	41.5%	2.7		47.4%	3.4		51.1%	3.5	
	SBL (S) – Ahead	43.2%	2.5		50.4%	3.1		54.1%	3.3	
	SBL (S) – Circulatory Ahead	20.7%	1.0		28.6%	1.5		33.9%	2.1	
	SBL (S) – Circulatory Ahead	26.7%	1.2		36.2%	1.8		40.3%	2.4	

Time Period	Arm	2018 Survey			2026 Reference			2026 Test Case		
		DOS	Queue	RFC	DOS	Queue	RFC	DOS	Queue	RFC
	SBL (S) – Circulatory Right	4.9%	0.3		5.6%	0.3		5.4%	0.3	
	A38 (S) – Left	47.2%	2.4		62.4%	3.9		69.8%	4.7	
	A38 (S) – Ahead	33.9%	1.6		42.3%	2.2		45.9%	2.4	
	A38 (S) – Circulatory Ahead	28.0%	0.5		31.7%	0.6		31.7%	0.6	
	A38 (S) – Circulatory Right Ahead	35.9%	0.9		41.9%	1.2		46.6%	1.3	
PM	SBL (N) – Ahead & Left	75.2%	6.9	19.7	1.9%	9.1	9.9	83.9%	9.7	7.2
	SBL (N) – Ahead	54.1%	4.5		63.2%	6.1		68.6%	6.9	
	SBL (N) – Circulatory Ahead	22.6%	2.0		28.3%	2.7		29.6%	2.9	
	SBL (N) – Circulatory Right Ahead	29.9%	2.8		35.7%	3.5		38.1%	3.8	
	A38 (N) – Ahead + Left	71.9%	4.4		77.4%	5.7		83.5%	6.6	
	A38 (N) – Ahead	50.3%	2.9		50.5%	3.4		50.5%	3.4	
	A38 (N) – Circulatory Ahead	30.5%	1.5		35.4%	2.1		36.2%	2.2	
	A38 (N) – Circulatory Right Ahead	36.3%	3.0		43.4%	4.8		43.7%	4.8	
	A38 (N) – Circulatory Right	21.6	0.1		27.2%	1.9		29.5%	2.5	
	SBL (S) – Left	54.4%	4.2		58.6%	5.2		62.3%	5.4	

Time Period	Arm	2018 Survey			2026 Reference			2026 Test Case		
		DOS	Queue	RFC	DOS	Queue	RFC	DOS	Queue	RFC
	SBL (S) – Ahead	54.3%	3.5		60.8%	4.3		64.9%	4.7	
	SBL (S) – Circulatory Ahead	32.9%	2.2		40.7%	2.8		42.6%	3.2	
	SBL (S) – Circulatory Ahead	44.9%	2.7		55.8%	7.3		58.5%	7.9	
	SBL (S) – Circulatory Right	14.6%	1.2		16.9%	1.0		16.5%	1.0	
	A38 (S) – Left	39.2%	2.1		48.4%	3.0		51.3%	3.3	
	A38 (S) – Ahead	44.8%	2.4		54.1%	3.3		55.1%	3.4	
	A38 (S) – Circulatory Ahead	44.1%	1.2		48.6%	2.5		50.2%	1.4	
	A38 (S) – Circulatory Right Ahead	49.3%	2.4		54.3%	5.4		58.1	5.7	

11.8.2 The existing signalised A38 junction with Bristol South Link operates on Microprocessor Optimised Vehicle Actuation (MOVA), as such the green times and cycle time differ depending on the demand at the junction. Therefore, green times and cycle times for the baseline model have been taken from video observations. Furthermore, a validation / calibration exercise on the base model for each identified peak hour has been undertaken and summarised in a supplementary technical note which is contained within **Appendix I**.

11.8.3 The 2026 Reference Case and 2026 Test Case models have been optimised to reflect the operation of MOVA.

11.8.4 The existing signalised A38 junction with Bristol South Link is predicted to operate within capacity in each scenario assessed.

11.8.5 Given the above junction assessment results, the impact of the development is not considered 'severe' in the context of the NPPF. The full junction assessment output is contained within **Appendix C**.

Appendix A Reassignment Method Statement

TECHNICAL NOTE

Job Name:	Development of Bristol Airport to Accommodate 12 mppa
Job No:	43321
Note No:	43321 / TN018
Date:	February 2019 (Updated May 2019)
Prepared By:	Y Hujair
Subject:	**Reassignment Methodology**

1. Introduction

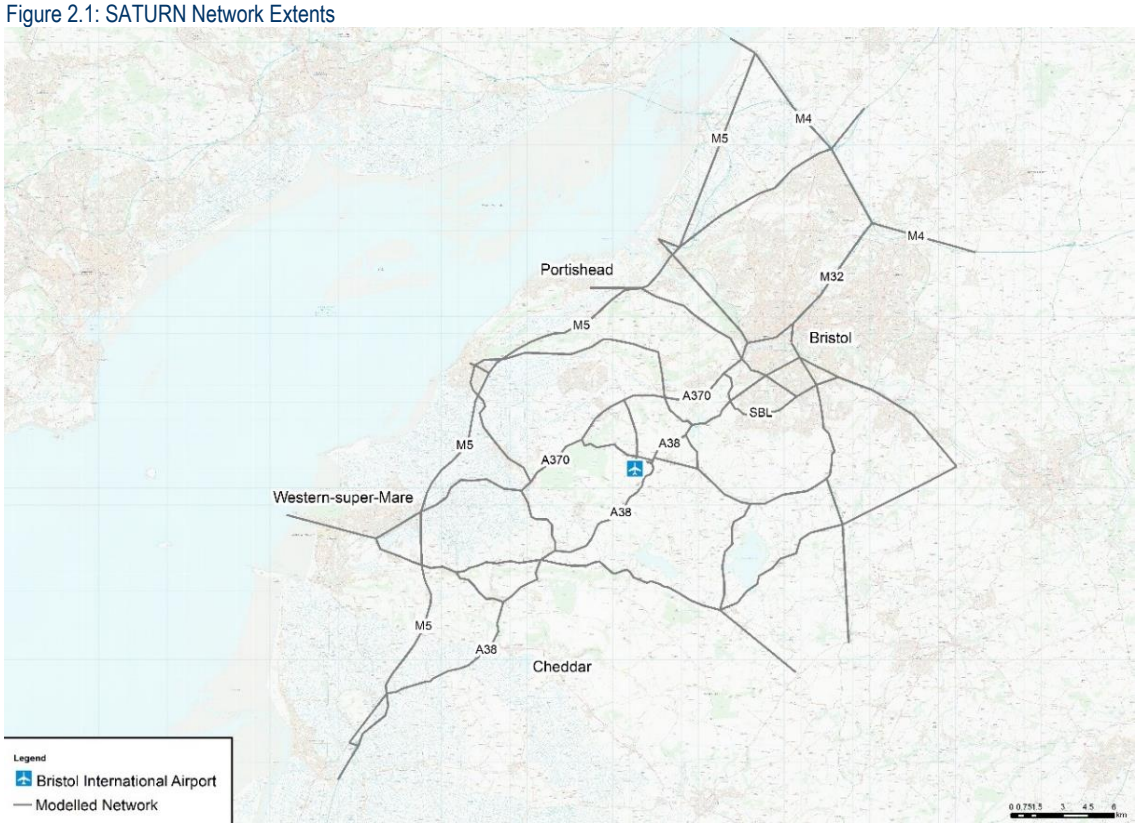
1.1. Peter Brett Associates LLP (PBA) was commissioned by BAL to prepare a Transport Assessment (TA) in support the planning application for the development of Bristol Airport to accommodate 12 mppa, which was submitted to North Somerset Council (NSC) in December 2018.

1.2. In post application discussions with Highways England and NSC, a traffic reassignment has been requested to reflect the potential impact of traffic on more local roads, since the studies to date mainly assign trips to the strategic signposted routes. This Technical Note sets out the reassignment methodology for agreement with NSC and Highways England.

2. Assignment Methodology

2.1. As set out in the TA, traffic has been assigned using the Bristol Airport Strategic Highway Tool (BASHT), built within SATURN. The tool uses all or nothing assignment method on an unconstrained network, based on recorded HERE speed data. HERE data is extracted from the databases collected and used by in car satellite navigation systems, so is a good indication of actual journey times at specific times of day. **Figure 2.1** illustrates the extents of the SATURN network.

Figure 2.1: SATURN Network Extents



3. Reassignment Methodology

3.1. The following adjustments to the assignment method/network are proposed:

- The addition of a link to represent the route between Clevedon Road and the A370 to access the airport through Nailsea
- The disaggregation of the zone representing North Somerset (detailed below)

Addition of Link

3.2. A new link within the SATURN network will be added. This will represent the route between Clevedon Road and the A370, through Nailsea.

North Somerset Disaggregation

3.3. The main issue affecting the limited assignment of traffic to more local roads is the size and loading point for the North Somerset Area. The zone representing North Somerset has therefore been disaggregated using postcodes that have been recorded within the 2015 CAA passenger survey and the 2017 employee travel survey. **Figure 3.1** demonstrates the distribution of passengers within North Somerset. **Figure 3.2** demonstrates the distribution of employees within North Somerset.

Figure 3.1: Passenger Postcode Distribution within North Somerset

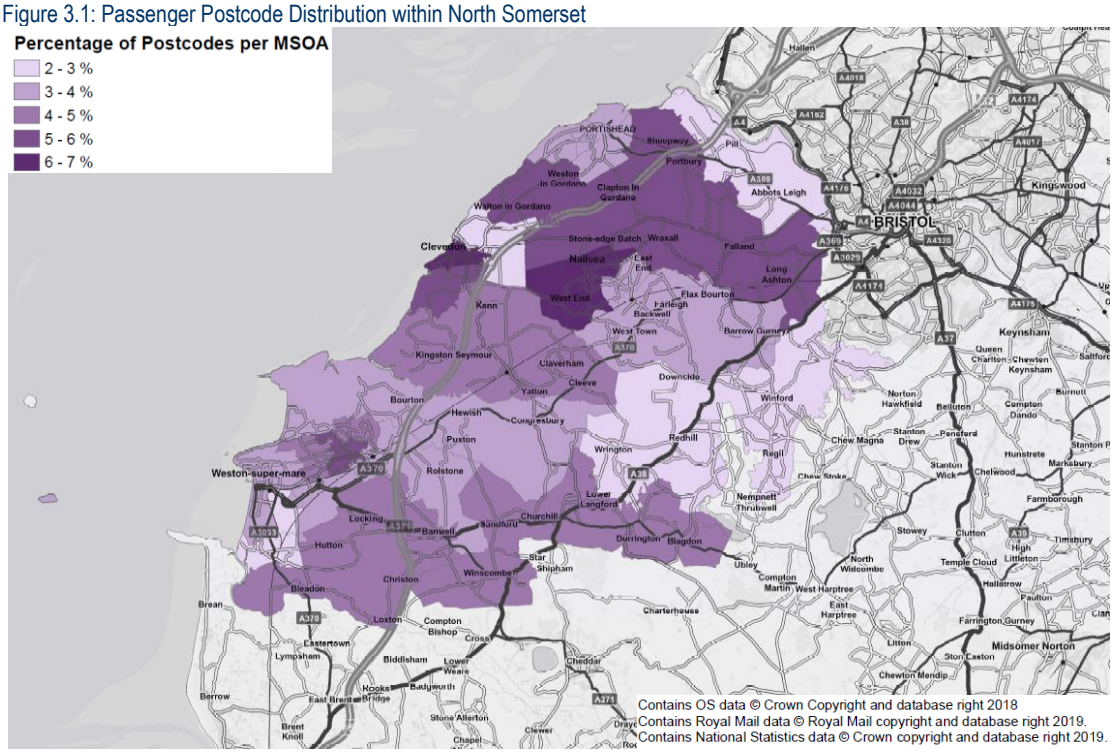
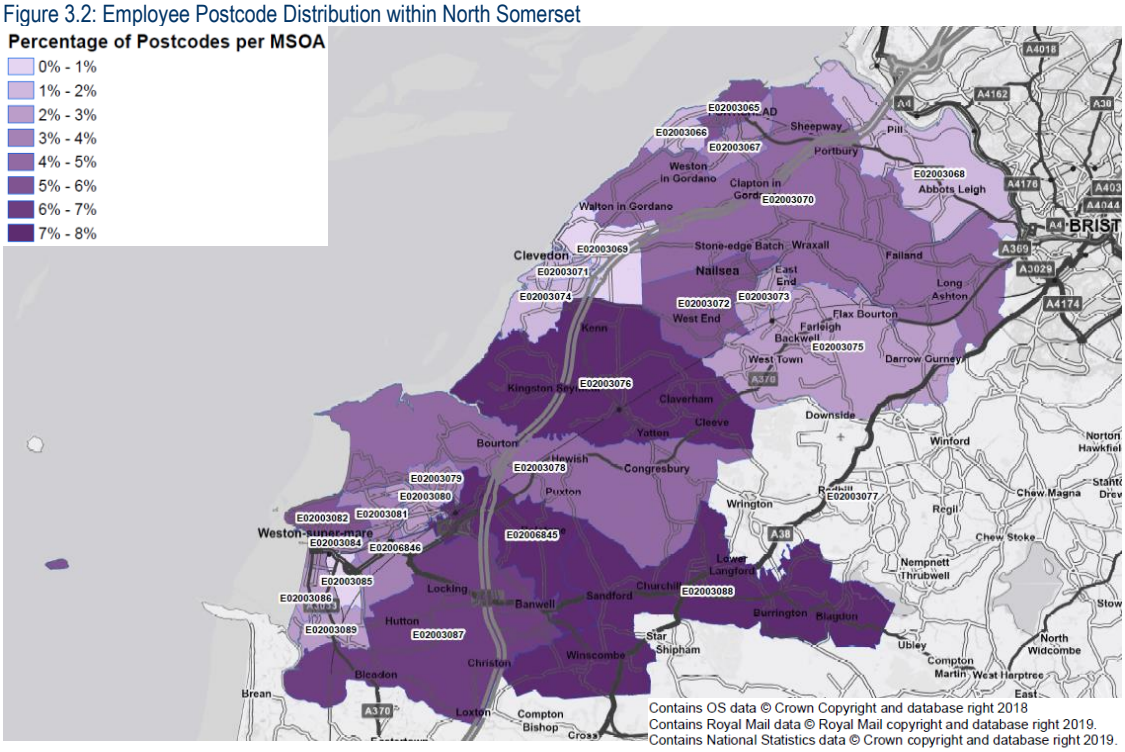


Figure 3.2: Employee Postcode Distribution within North Somerset



3.4. The postcodes have been spatially allocated to middle super output areas (MSOAs), which have been grouped into zones – detailed in **Table 3.1**. A full list of the MSOAs contained within each zone is provided in Appendix

Table 3.1: Allocated North Somerset Postcodes

	Zone	Passenger Distribution	Employee Distribution
1	Weston-super-Mare North	24%	26%
2	Weston-super-Mare South	16%	16%
3	Clevedon	14%	4%
4	Portishead	11%	11%
5	Nailsea	13%	10%
6	Cleeve and Yatton	5%	7%
7	Winscombe	4%	7%
8	Long Ashton	5%	5%
9	Bristol Airport	2%	8%
10	Congresbury	3%	4%
11	Pill	2%	1%

3.5. The additional vehicle trips associated with the Development Proposals (expansion of Bristol Airport from 10 mppa to 12 mppa) that have an origin / destination in North Somerset are summarised in **Table 3.2**.

Table 3.2: Summary of Vehicle Trips to/from North Somerset

North Somerset	Inbound	Outbound	Two Way
AM (08:00 – 09:00)	4	11	15
PM (17:00 – 18:00)	25	9	35
Airport Peak (13:00 – 14:00)	17	15	32

Note: may not sum to total due to rounding

3.6. The zone boundaries and routing assumptions to / from each new zone are provided in **Appendix B**. The zones have been numbers and correspond to Table 3.1.

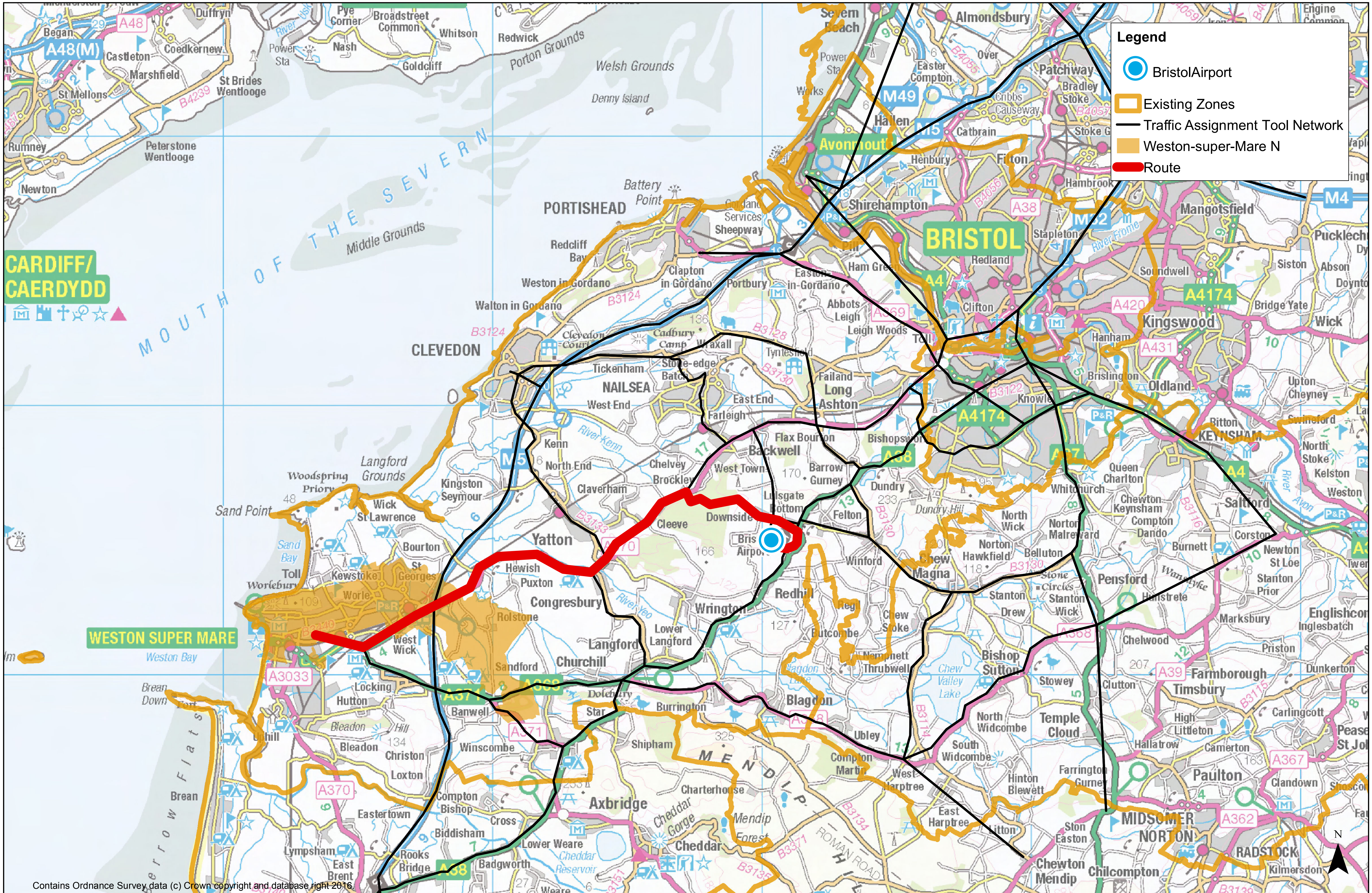
Reporting

3.7. The results of the reassignment and the associated updated junction capacity assessments have been provided in a Transport Assessment Supplementary Document.

Appendix A: MSOAs per zone

Zone number	Zone	MSOA	MSOA Name
1	Weston-super-Mare North	E02003079	North Somerset 015
		E02003080	North Somerset 016
		E02003081	North Somerset 017
		E02003082	North Somerset 018
		E02003084	North Somerset 020
		E02006845	North Somerset 026
2	Weston-super-Mare South	E02003085	North Somerset 021
		E02003086	North Somerset 022
		E02003087	North Somerset 023
		E02003089	North Somerset 025
		E02006846	North Somerset 027
3	Clevedon	E02003069	North Somerset 005
		E02003071	North Somerset 007
		E02003074	North Somerset 010
4	Portishead	E02003065	North Somerset 001
		E02003066	North Somerset 002
		E02003067	North Somerset 003
5	Nailsea	E02003072	North Somerset 008
		E02003073	North Somerset 009
		E02003075	North Somerset 011
6	Cleeve and Yatton	E02003076	North Somerset 012
7	Winscombe	E02003088	North Somerset 024
8	Long Ashton	E02003070	North Somerset 006
9	Bristol Airport	E02003077	North Somerset 013
10	Congresbury	E02003078	North Somerset 014
11	Pill	E02003068	North Somerset 004

Appendix B: Routing Assumptions



Development of Bristol Airport to Accommodate 12 mppa

0 1.5 3 Kilometers

pba peterbrett now part of Stantec

Client: Bristol Airport

1:125,000 @ A3
26/02/19
Drawn: JB
Checked: DT

Bristol Airport Assignment Tool Indicative Route Choice between Zones 1 and 9

Figure 2 | Rev C

Document Path: J:\43321 Bristol Airport Expansion\Transport\Working Documents\SATURN\GIS\Bristol Airport Assignment Tool Attributes_10.5.mxd